Environmental Impact Assessment Registration Document Salem Oil and Gas Exploration Project, Albert County, New Brunswick

CONTACT EXPLORATION INC. (PIERIDAE PRODUCTION LIMITED PARTNERSHIP)

May 2014

Our File No: 13-7737

Submitted by:

DILLON CONSULTING LIMITED

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May 27, 2014

New Brunswick Department of Environment and Local Government
P.O. Box 6000
Fredericton, NB
E3B 3H1

ATTENTION: Ms. Crystale Harty, Project Manager

Environmental Impact Assessment Registration Document - Salem Gas Exploration Wellfield, Albert County, New Brunswick

Dear Ms. Harty,

We are pleased to present a Final copy of the Registration Document for the above-noted project. This document will be submitted on behalf of Contact Exploration Inc. (in partnership with PIERIDAE PRODUCTION Limited) to the New Brunswick Department of Environment and Local Government for review as per the *New Brunswick Environmental Impact Assessment Regulation (Reg. 87-83),* under the *Clean Environment Act.*

If you have any questions, please contact the undersigned.

Yours truly,

DILLON CONSULTING LIMITED

Gay Drescher, MES MCIP RPP.
Project Manager

Our File: 13-7737

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LIST OF ACRONYMS

AANB	Aboriginal Affairs New Brunswick
ACCDC	Atlantic Canada Conservation Data Centre
AQHI	Air Quality Health Index
ASU	Archaeological Services Unit
ATV	All Terrain Vehicle
CAC	Criteria Air Contaminants
CAPP	Canadian Association of Petroleum Producers
CCME	Canadian Council of Ministers for the Environment
CIHB	Canadian Inventory of Historic Buildings
^{o}C	Degrees Celsius
cm	Centimeter
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
dB_A	decibel, A-weighted
DO	Dissolved Oxygen
DTW	Depth to Water Table
EC	Environment Canada
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
ESAs	Environmentally Significant Areas
FFFN	Fort Folly First Nation
ft	Foot
FWAL	Freshwater Aquatic Life
GAC	Granular Activated Carbon
GCDWQ	Guidelines for Canadian Drinking Water Quality
GHG	Greenhouse Gas
GIS	Geographic Information Systems
ha	hectare
HADD	Harmful Alteration, Disturbance or Destruction of fish habitat
H&S	Health and Safety
IBA	Important Bird Areas
IQUA	Index of Quality of the Air
km	kilometre
km/h	kilometre per hour
kt	kilotonne
kV	kilovolts
kW	kilowatts
L	litre
L/s	litre per second
Leq	Equivalent continuous noise level
LiDAR	Light Detection and Ranging
lpm	litres per minute
m	metre

m^3	cubic metres
MBBA	Maritime Breeding Birds Atlas
MBCA	*Migratory Birds Convention Act*
mbgs	metres below ground surface
MCF	1000 cubic feet
mg/L	milligram per litre
ML	Mega litre
ML/d	Mega litre per day
mm	millimetre
MT	Mega tonne
N	North
NB	New Brunswick
NBDELG	New Brunswick Department of Environment and Local Government
NBDEM	New Brunswick Department of Energy and Mines
NBDNR	New Brunswick Department of Natural Resources
NBDTI	New Brunswick Department of Transportation and Infrastructure
NBDWCS	New Brunswick Department of Wellness, Culture and Sport
NBSARA	*New Brunswick Species at Risk Act*
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
NPRI	National Pollutant Release Inventory
O_3	Ozone
OWLS	Online Well Log (DELG)
PID	Parcel Identification Number
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter less than 2.5 micrometers in diameter
PM_{10}	Particulate Matter less than 10 micrometers in diameter
PNA	Protected Natural Area
ppb	Parts per billion
PPE	Personal Protective Equipment
ppm	Parts per million
PSW	Provincially Significant Wetland
RA	Responsible Authority
Ramsar Site	Ramsar Convention – Convention on Wetlands of International Importance
RW	Regulated Wetland
SARA	*Species at Risk Act*
SEMP	Security and Emergency Management Plan
SMP	Stormwater Management Plan
SNB	Service New Brunswick
SO_2	Sulphur dioxide
SO_x	Sulphur x-oxide
SW	Southwest
t	tonne
TPM	Total Particulate Matter
TRC	Technical Review Committee
$\mu g/m^3$	micrograms per cubic meter
USEPA	United States Environmental Protection Agency

VOCs	Volatile Organic Compounds
W	West
WAWA	*Watercourse and Wetland Alteration Regulation*

1.0 THE PROPONENT

1.1 Name of Proponent:

Contact Exploration Inc.
Suite 1520, 700 6th Ave SW
Calgary, Alberta
T2P 0T8
(403) 234-8663
(403) 695-3915

1.2 Chief Executive Officer:

Name:	Steven Harding, P.Geo.,
Official Title:	President and Chief Executive Officer
Address:	Suite 1520, 700 6th Ave SW
	Calgary, Alberta
	T2P 0T8
Telephone Number:	(403) 234-8663
Fax:	(403) 695-3915

1.3 Principal Contract Person for purposes of Environmental Impact Assessment:

Name:	Raymond Sully, P.Eng.
Official Title:	Chief Operating Officer
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	Calgary, Alberta
	T2P 0T8
Telephone Number:	(403) 234-8663
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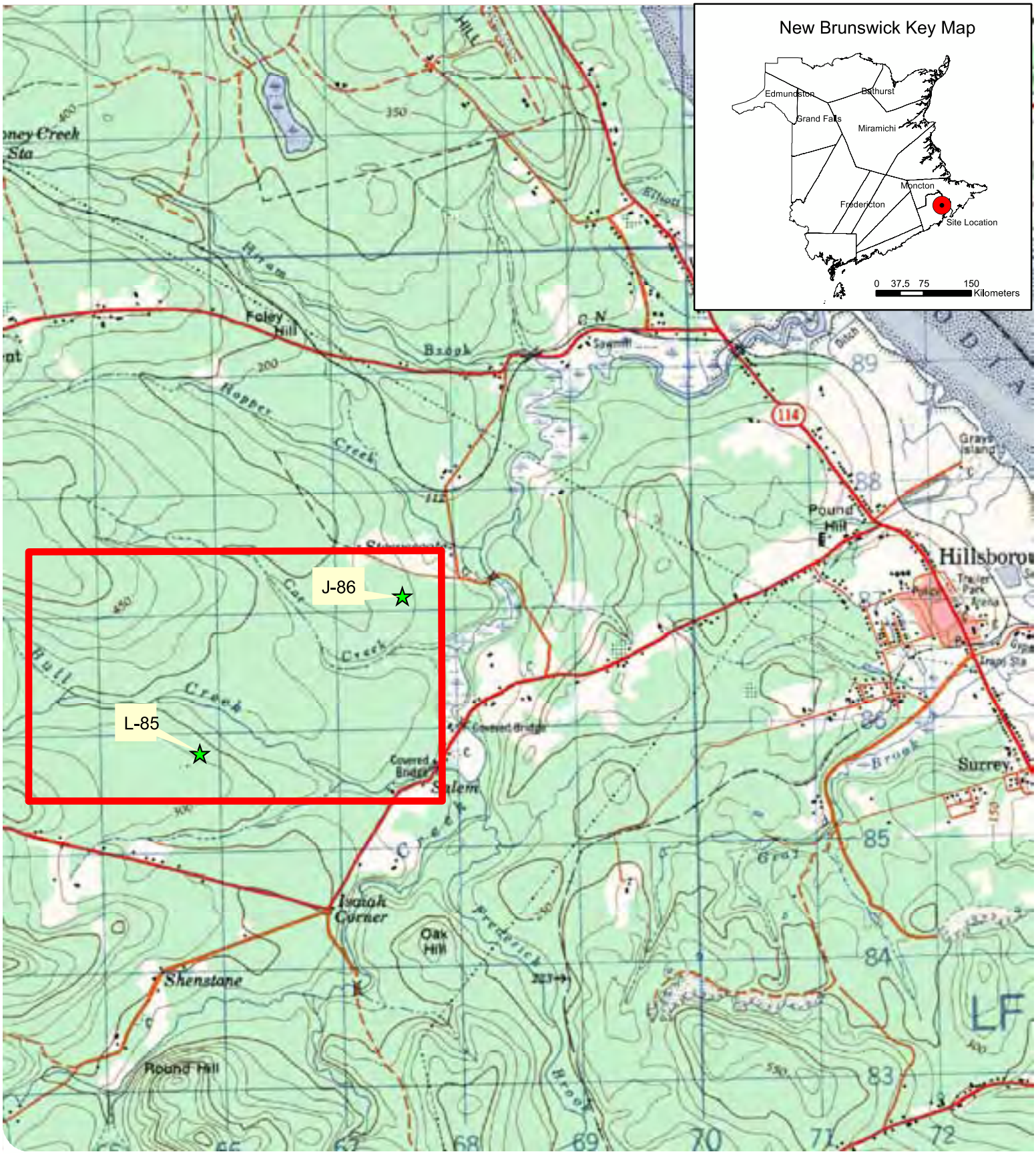
1.4 Property Ownership

The Well J-86 is proposed for a privately owned property, approximately 84 ha. Contact has leased an area of 2 ha for the well pad development (110m x 110m) and has an existing signed agreement with the owner of this property (Appendix A).

The Well L-85 is proposed for a property owned by the Proponent. The property is 1.7 ha and the well pad will occupy an area equivalent to 130m x 130m.

Refer to Figure 1.1 and Figure 1.2 for the site location plan and aerial mapping for Well J-86 and Well L-85.



Contact Exploration Inc.
Gas Exploration, Albert County, NB

Site Location
Figure 1.1

CONTACT EXPLORATION INC.

Legend

Study Exploration Area

Proposed Oil and Gas Exploration Well

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MAP DRAWING INFORMATION: HLM
DATA PROVIDED BY DNR

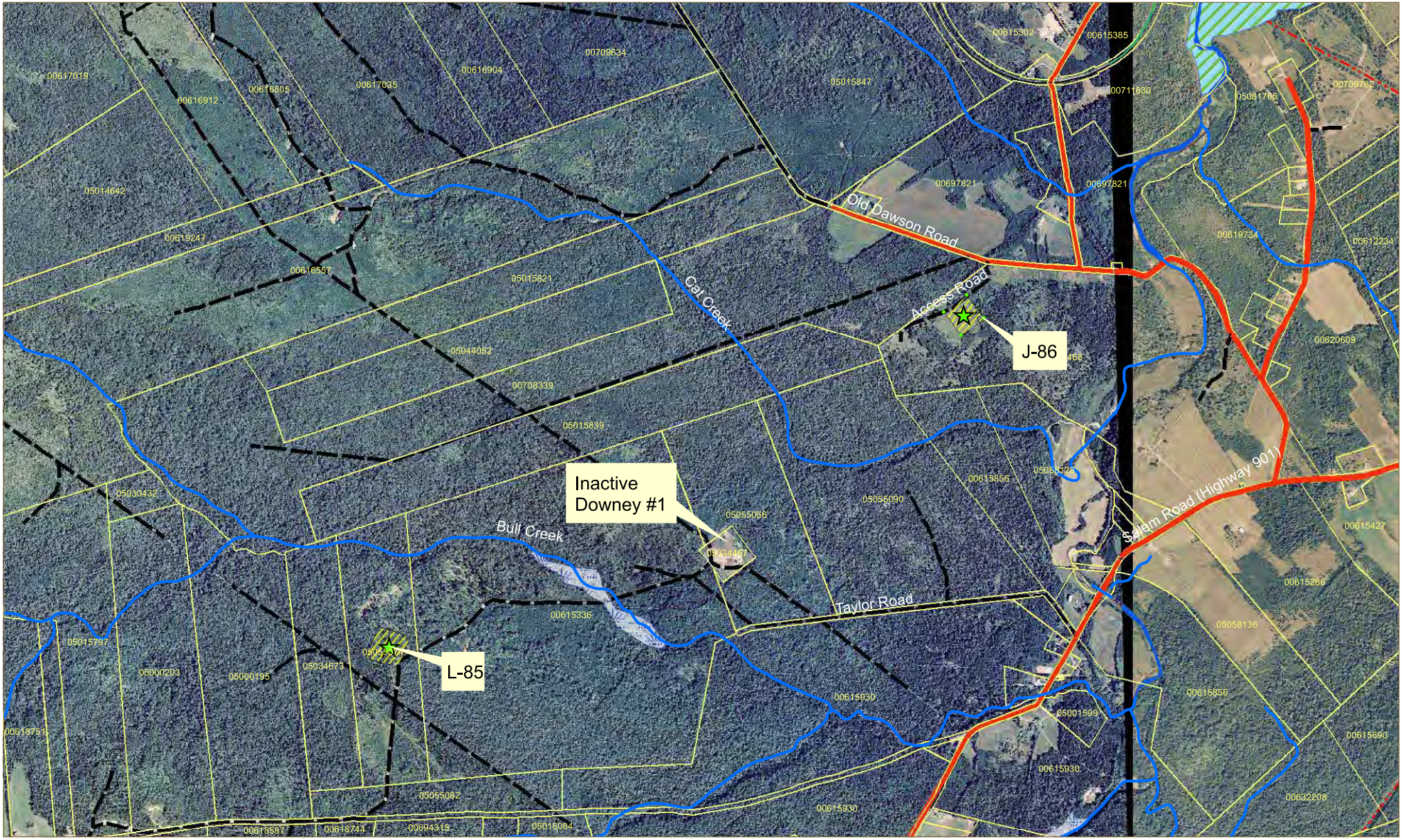
MAP CREATED BY: HLM
MAP CHECKED BY: RMD
MAP PROJECTION:

FILE LOCATION: \\dillon.ca\DILLON_DFS\St. John's\St. John's CAD\CAD\13-Contact Exploration

SCALE 1:30,000

N W E S

PROJECT: 13-7737 STATUS: DRAFT DATE: 04/25/13



Contact Exploration Inc.

Gas Exploration, Albert County, NB

Well Pad Site Locations

Figure 1.2

CONTACT EXPLORATION INC.

Legend

- Proposed Oil and Gas Exploratory Well
- Proposed Exploratory Well Pad
- Property Line
- Watercourse
- Wetland
- Rural Road
- Forestry Road/Trail
- Provincial Highway
- Provincially Significant Wetland

DILLON CONSULTING

MAP DRAWING INFORMATION: HLM
DATA PROVIDED BY: GNB, Contact Exploration Inc.

MAP CREATED BY: HLM
MAP CHECKED BY: RMD
MAP PROJECTION: NAD_1983_CSRS_New_Brunswick_Stereographic

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0 150 300 600 Meters

N W E S

SCALE 1:20,000

PROJECT: 13-7737 STATUS: DRAFT DATE: 9/3/2013

2.0 THE UNDERTAKING

2.1 Name of the Undertaking

Salem Oil and Gas Exploration Project

2.2 Project Overview

Contact is investigating the potential for oil and gas development in the Salem area as presented on Figure 1.1. Currently, Contact holds the oil and gas rights for approximately 35,000 acres (over 14,000 ha) of land in the Salem area. Historical surface seismic exploration work completed in the area has identified prospective natural gas and oil bearing zones in both the Frederick and Hiram Brook Members of the Albert Formation. Encouraging results have been observed at other locations within wells in the immediate area in the Moncton Sub Basin (Downey #1 and Hillsborough #1, as shown on Figure 1.2).

Drilling is required to confirm the presence of a potentially commercially significant petroleum hydrocarbon reservoir in the Salem area. The exploration program will consist of two (2) new wells that will assess the resource potential within the Hiram Brook and the Frederick Brook Members of the Albert Formation. The two well are identified as J-86-2328 and L-85. Herein these wells will be referred to as J-86 and L-85, respectively.

This project is considered an Undertaking under item 'f.' of Schedule 'A' of the *Environmental Impact Assessment Regulation 87-83* of the *New Brunswick Clean Environment Act*. In accordance with the phased Environmental Impact Assessment (EIA) approach for oil and gas development projects in New Brunswick and the February 2013 guidance document: "Responsible Environmental Management of Oil and Natural Gas Activities in New Brunswick – Rules for Industry" (the Rules), the intent of this registration is to obtain approval for well pad siting and construction to allow for exploration of the proposed J-86 and L-85 wells.

An application for a well authorization for these new wells will be submitted to the New Brunswick Department of Energy and Mines (NBDEM). Should these wells prove viable, approval for the construction of a commercial production facility would be sought in accordance with the provincial regulatory system.

2.3 Purpose/Rationale/Need for the Undertaking

Contact has identified the potential for private sector development of petroleum reserves in the Salem area. Specifically, two well sites have been identified, each having the geological characteristics supporting petroleum. For this project, the initial well exploration will be for both oil and/or natural gas.

This development will provide employment opportunities to the local communities during the project phases of development and operation as well as provide financial returns for private sector partners and royalty income for the Province of New Brunswick. Initial wells will require employment associated with the drilling and completion of the wells; success will encourage additional wells and eventually the construction of a pipeline may lead to the tie in to the Maritimes and Northeast Pipeline. Should a commercial project be identified an escalating level of support will be required, beginning with a few full time people to potentially 30-50 jobs once a larger operation is in place. These numbers will become more evident once the testing results from these wells are known.

A shortfall in natural gas in particular in New Brunswick has caused prices to recently escalate, causing businesses and community facilities to bear the burden of elevated pricing. Anticipated declines in longer term supply as driven by declining production from Sable and McCully will only add to the cost increase in gas supply.

Production of hydrocarbon will be subject to royalty payments to the Province of New Brunswick, which is a clear benefit to the Province. Employment from within the Province will also induce additional income tax payments to the Government. One of the greatest benefits operational activity will encourage is that of part time and service/support business such as the need for welders, electricians, mechanics, etc. as well as increased demand on the local services such as restaurants, hotels, grocery stores, etc.

Great effort is currently underway to connect Marcellus gas in the northeastern United States into New England, concurrently servicing New York and Boston. This influx of gas once connected, will produce a surplus of gas that will quickly become absorbed. Without a concerted effort in New Brunswick, future gas sources will come from outside of the Province, the benefits of which will flow south of the border, the control of which will also reside outside of the Province.

The locations of the well pads were selected based on stratigraphic information collected during the drilling of the Hillsborough#1 and Downey#1 wells, and the 2D seismic data. As suggested from these wells, natural gas has been observed within the Hiram Brook and potentially the Frederick Brook Members of the Albert Formation. Accordingly, there are no reasonable alternatives to the current proposed well pad locations and anticipated drill depths.

2.4 Project Location

The proposed well pad sites are located in undeveloped rural areas located within the Salem area of Albert County, approximately 5km to 7km west of Hillsborough, New Brunswick. The Salem J-86 well pad will be situated on the property located north of Route 910, approximately 5km west of Hillsborough, New Brunswick (Figure 2.1). The latitude and longitude of the site is given as N45°55'35.8" W64°42'19.0" (20 T 367782 5087308).

The L-85 well pad will be situated on the property, which is also located in an undeveloped rural area of Salem, north of Route 910 and approximately 7km west of Hillsborough, New Brunswick as presented on Figure 2.2. The latitude and longitude of the site is given as N45°54'56.4" W64°44'10.0" (20 T 365365 5086143).

2.5 Siting Considerations

Contact considers the adjacent land use and the surrounding biophysical environment when selecting a well pad site. Where possible, well pads are located to avoid interaction with watercourses and wetlands, species at risk, protected drinking water wellfields and watersheds, environmentally significant areas (ESAs), and residential areas. Terrain constraints such as accessibility, slope and intensity of land use are also key factors in site selection. Land availability is another constraint. Aerial photographs, digital GIS mapping resources, as well as field investigations were used to assist with the identification of potential constraints within the proposed well pad areas.

The project is being proposed for a rural portion of Albert County. The geographic expression of the region is one of gently rolling hills and valleys, characterized by woodlots, individual farms and residential acreages. In the immediate vicinity of the proposed well site locations much of the surrounding lands are currently either forested or used for agricultural purposes. The surface locations have been chosen so as to minimize impacts on the local environment by utilizing existing local access and logging roads to the extent possible to minimize ground disturbance.

While respecting the environmental constraints, siting of the wells must also be in close proximity to the prospective oil and gas bearing geological units. Accordingly, the locations selected have been chosen based on technical information gathered from older wells drilled in the area, specifically the Downey #1 well drilled in 1998 and Hillsborough #1 well drilled in 1985. The locations also benefit from having reasonable 2D seismic control that allows a better understanding of the depths and thicknesses of the target lithologies. The locations encounter the Moncton Sub-basin within its more central position, where the Hiram Brook and Frederick Brook Members of the Albert Formation are deep, residing within hydrocarbon generative positions. Trapping mechanisms are less well-defined, but as demonstrated in the earlier two

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Oil & Gas Exploration, Albert County, NB

Well pad J-86 site plan and associated constraints
Figure 2.1

Contact Exploration Inc.

Legend

- Proposed Oil and Gas Exploration Well
- 5m Contour
- Unmapped Wet Feature
- Proposed Exploratory Well Pad
- Depth to Water Table: 0-0.25, 0.25-0.5, 0.5-0.75, 0.75-1.0
- Watercourse
- Rural Road/Trail
- Proposed Access Road

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MAP DRAWING INFORMATION: HLM
DATA PROVIDED BY: GNB, DNR, ACCDC 2013

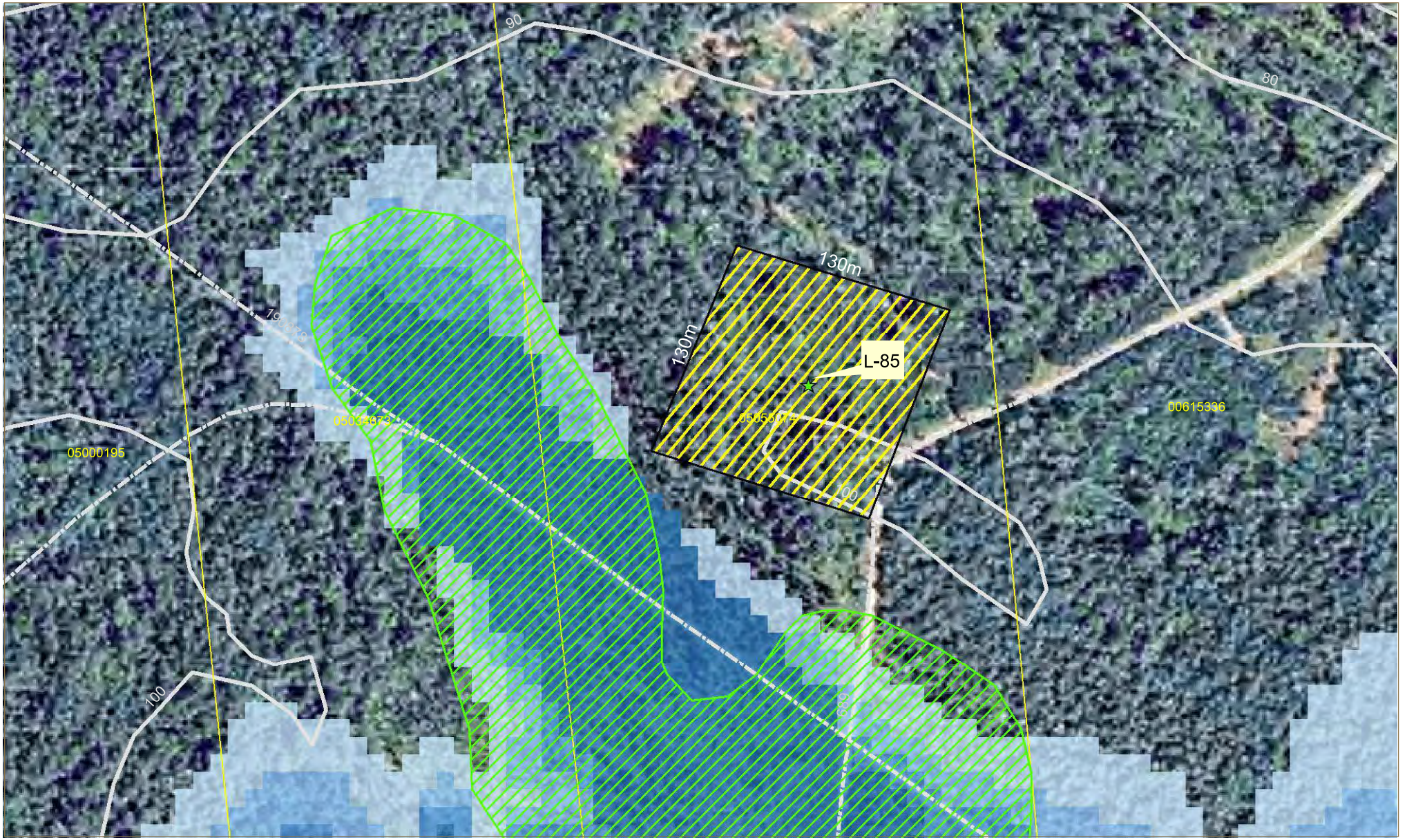
MAP CREATED BY: HLM
MAP CHECKED BY: RMD
MAP PROJECTION: NAD_1983_CSRS_New_Brunswick_Stereographic

FILE LOCATION: \\dillon.ca\DILLON_DFS\St. John's\St. John's CAD\CAD\13-Contact Exploration

0 25 50 100 Meters

SCALE 1:3,000

PROJECT: 13-7737 STATUS: DRAFT DATE: 06/03/14



Contact Exploration Inc.
Oil & Gas Exploration, Albert County, NB

Well pad L-85 site plan and associated constraints
Figure 2.2

CONTACT EXPLORATION INC.

Legend

- Proposed Oil and Gas Exploration Well
- 5m Contour
- Unmapped Wet Feature
- Proposed Exploratory Well Pad
- Depth to Water Table: 0-0.25, 0.25-0.5, 0.5-0.75, 0.75-1.0
- Watercourse
- Rural Road/Trail

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MAP DRAWING INFORMATION: HLM
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SCALE 1:3,000

PROJECT: 13-7737 STATUS: DRAFT DATE: 9/3/2013

wells, the overall fine-grained nature of the reservoirs, characterized by low permeability, have enabled hydrocarbon to be retained within the overall succession as is typical with resource-style oil and gas plays today across North America.

A summary of the setbacks from various receptors in the vicinity of the well pads is provided in Table 2.1. Both the J-86 and L-85 well pad locations meet or exceed the recommended setbacks outlined by the Province of New Brunswick (NBDEM, 2013). It should be noted that Contact repositioned the well pad for L-85 to avoid a potential small unmapped wetland area, reducing the projects impact on the local environment.

Table 2.1- Suggested setbacks (based on the Rules for Industry, (NBDEM, 2013) for well head and well pad siting

Siting Consideration	Recommended Setback (based on Rules for Industry, February, 2013)	Actual Setback	
		J-86	L-85
Residential Water Well	• 250m of a water well or a spring or a reservoir serving as an individual water supply • 250m of a surface water intake feeding into an individual water supply.	450m to closest residence	800m to closest residence
Public Water Supplies	• Oil and gas facilities are not permitted within or beneath wellfields or watersheds that have been designated under the provisions of the Watershed Protected Area Designation Order or the Wellfield Protected Area Designation Order under the *Clean Water Act* • 500m of the wellhead of any public water supply well • 250m of the shoreline of a reservoir, natural lake or impoundment serving as a public water supply • 250m of a surface water intake feeding into a public water supply	~ 7km	~ 7km
Communal Water Supply	• 250m of the wellhead of any	>1km	>1km

Siting Consideration	Recommended Setback (based on Rules for Industry, February, 2013)	Actual Setback	
		J-86	L-85
	communal water supply well • 250m of the shoreline of a reservoir, natural lake or impoundment serving as a non-municipal communal water supply • 250m of a surface water intake feeding into a non-municipal communal water supply		
Surface Water (well head) - Watercourses and Wetlands	• 100m of a watercourse or a regulated wetland	550m from Cat Creek	275m from Bull Creek
Surface Water (Well pads, batteries, gas conditioning plants and compressor stations) – Watercourses and Wetlands	• 30m of a watercourse or a regulated wetland (RW) or within 100m of a provincially significant wetland (PSW)	500m from Cat Creek 1km from PSW 2km from RW	200m from Bull Creek No PSW in range 800m from RW
Buildings and Other Cultural Features	• 500m of an elementary school, middle school, high school, hospital, or nursing home • 250m of a dwelling • 250m of a place of outdoor public concourse such as a playground, fairground, outdoor theatre or campground • 100m of any other permanent building, railway, pipeline, or public road	450m to closest dwelling	800m to closest dwelling

2.6 Physical Components and Dimensions of the Project

The locations of the well pads at the respective properties are shown on Figures 2.1 and 2.2. The site access for each property is also indicated.

For the exploration phase, each well pad will support a well head and associated infrastructure which will be situated on the pad. Off-site support for the exploration will include but not limited to waste and wastewater management and product storage.

A description of the development of each component is provided below.

2.6.1 Construction of Well Pad Access Road

Local access to each of the well pads will be off of the Route 910 via existing forestry roads. The project access roads will be re-graded and resurfaced with gravel, prior to, or concurrently with development of the well pads.

2.6.2 Well Pad Preparation

Well pad preparation will take place over a period of approximately one month. Heavy civil equipment will be required to complete the site preparation. Truck traffic to and from the sites may be required to provide and remove materials. The hours of operation will be 7am – 7pm.

2.6.2.1 Clearing and Grubbing

Both well pad locations have been previously cleared and currently support regenerative hardwoods and some softwoods. Clearing activities will adhere to applicable regulatory requirements and will only be done on an as required basis (unnecessary tree removal will not occur). A biologist will be engaged to complete a pre-construction bird survey for any clearing activities that may occur during the migratory bird season (May 1-August 31). As necessary, the biologist shall identify the appropriate mitigation measures to protect migratory birds that may be present in the project area. The well pads have been located to ensure there will be no clearing required within 30 meters of a watercourse or GeoNB mapped wetland.

After clearing, the sites will be grubbed. Prior to grubbing activities sedimentation/siltation fencing will be set up adjacent to the wet area identified at a distance of 50m from Well Pad L-85. Grubbing will involve the removal of all organic material and unsuitable soil including all stumps, roots, felled timber, embedded logs, and root mat from the well pad lease area. Bulldozers will be used to scrape the organic material off the underlying soil. If the grubbed material (spoils) cannot be used on site and requires removal, it will be located to a natural opening on the respective property and flattened and covered with soil. This material will not be piled into standing timber and will not be located within 30m of a watercourse.

2.6.2.2 Excavation, Grading and Earthworks

Earthworks including grading and/or excavation will be required to prepare and level the sites. Suitable soil material and overburden will be segregated so that it can be reused onsite. Additional material, if required, will be sourced locally.

Once the site has been cleared and graded, the area will be stabilized with gravel to a required thickness capable of supporting heavy equipment traffic. The gravel will be brought in as required from a local pit. A typical profile of the well pad area and construction is provided in Figure 2.3**.**

2.6.2.3 Surface and Storm Water Management

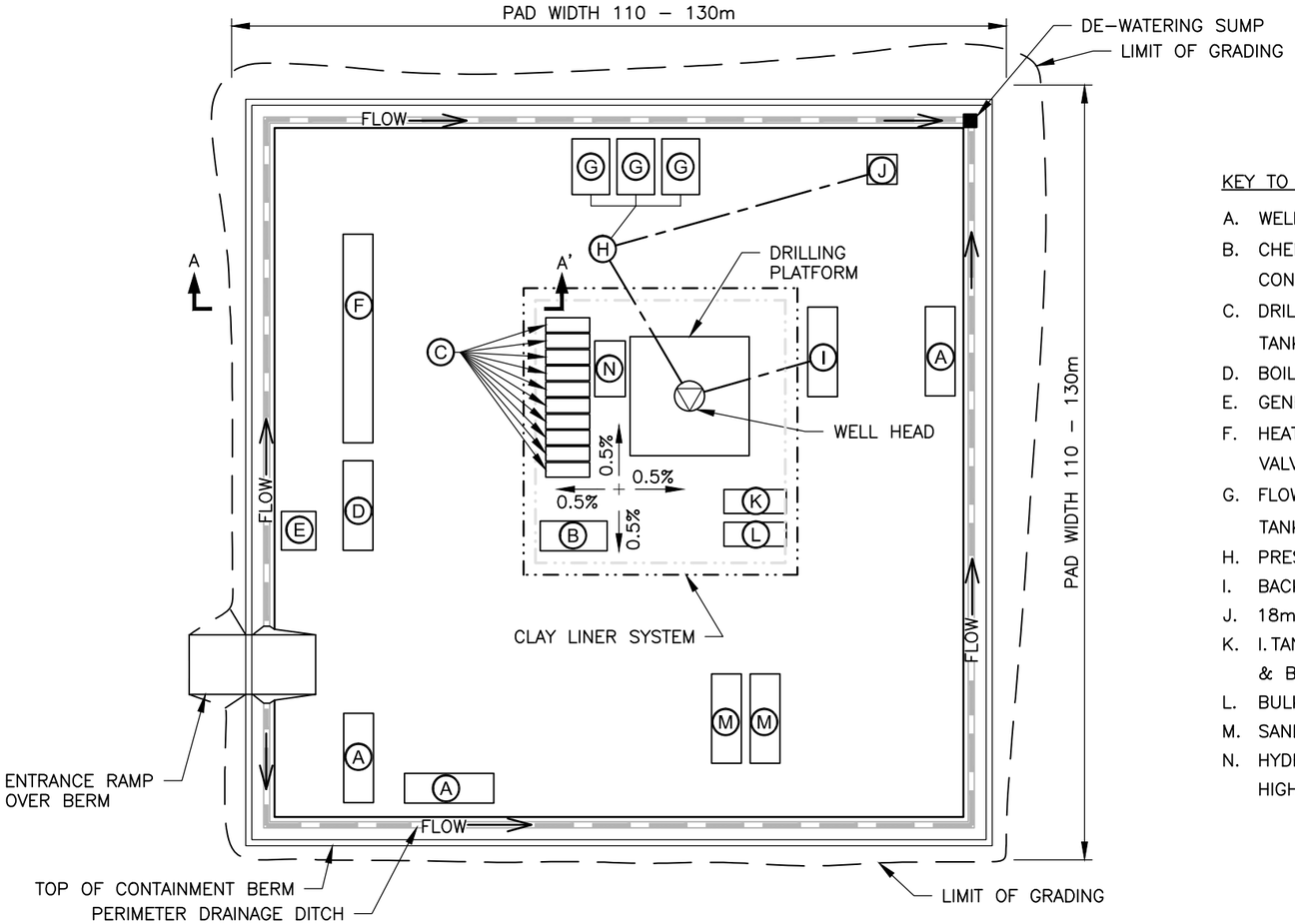
Access roads will be topped with pit run gravel or crushed rock, crowned, and compacted to minimize erosion. Sedimentation structures including check dams, hay bales, and silt fencing will be installed along the access roads on an as needed basis to control run-off. Swales and diversion ditches will also be used to direct drainage to vegetated areas. Silt fence will be installed on the down gradient side of the pads until the appropriate control structures, such as berms, are in place.

2.6.3 Well Drilling and Testing

Once the pads are constructed, initial drilling will take place. This is exploratory drilling and based on the results of this initial program, the best method for further drilling will be determined. The target depths will be between 2500m to 3400m.

Water is the main constituent of the drilling fluid normally referred to as 'mud'. The drilling mud is required to cool the drill bit during drilling operations, to transport rock cuttings to the surface and for borehole conditioning during drilling. The mud also acts as a primary control for down-hole pressures that may be encountered while drilling. For drilling, typical water volumes required are approximately 200m^3 to 300m^3 per well. The water will be sourced from nearby watercourses in accordance with applicable regulations, (i.e., at a rate of less than 45 litres per minute).

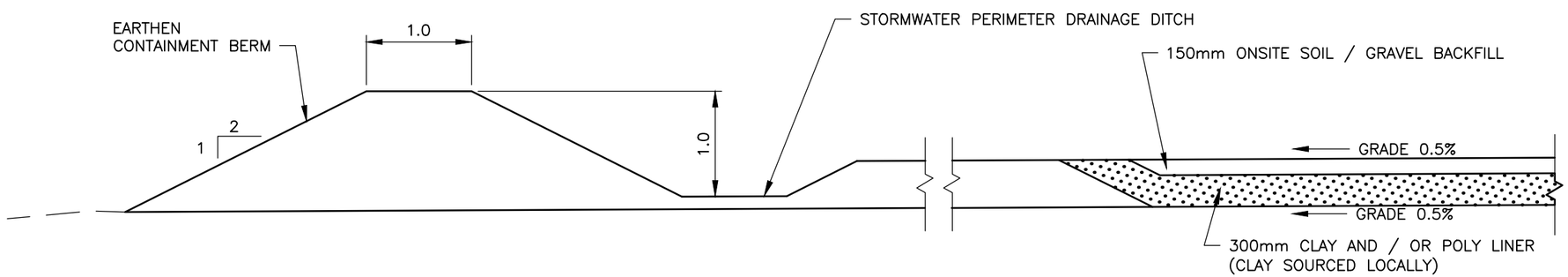
In accordance with section 6.3 of the Rules for Industry (2013), the water source was selected following consideration of the hierarchical approach outlined. Specifically, the potential municipal source is no longer available, there is no nearby saltwater and there is no nearby recycled drilling waters. Given the exploratory nature of the activity, there is no value in drilling a well to obtain groundwater.



KEY TO SITE FEATURES

A. WELL SITE TRAILER
B. CHEMICAL STORAGE TRUCK / CONTAINER
C. DRILLING FLUID MIXING / HYDRATION TANK (8–10 TANKS)
D. BOILER
E. GENERATOR
F. HEAT EXCHANGER(S), PUMP(S), VALVES, LIGHT TOWERS
G. FLOW BACK WATER TANK (2–6 TANKS)
H. PRESSURE TANK
I. BACK PRESSURE PUMP
J. 18m FLARE STACK
K. I. TANKER TRUCK FOR BALL LAUNCH & BACK PRESSURE
L. BULK FUEL TRUCK
M. SAND BINS OR TRAILERS
N. HYDRATION TANKS, BLENDERS, AND HIGH PRESSURE INJECTION PUMPS

GENERAL ARRANGEMENT - WELL PAD SITE SCALE: 1:1000



SECTION A-A': PERIMETER DITCH / CONTAINMENT BERM SCALE: 1:50

CONTACT EXPLORATION INC.
OIL & GAS EXPLORATION, ALBERT COUNTY, NB

GENERAL WELL PAD CONFIGURATION WITH LINER
FIGURE 2.3

File Location:
\\dillon.ca\dillon_dfs\fredericton\fredericton cad\cad\137737 contact\02–civil–well pad\137737 well pad general arrangement.dwg
May, 21, 2014 3:25 PM

DILLON CONSULTING

DATE: MAY 2014

Drill cuttings will be temporarily stockpiled on site in bins which will be placed on the drill pad. These bins, constructed of metal with a capacity to hold 150 tonnes, will be three sided allowing loading of material on the fourth side. The cuttings will be stored for approximately four weeks after drilling is completed to provide time for laboratory analysis prior to disposal at an approved facility.

2.6.4 Project Schedule

The drilling program for the two well pads is tentatively scheduled to commence in the spring/summer of 2014, based on the success of the drilling program. Refer to Figure 2.4 for the anticipated scheduled activities of the well pad construction.

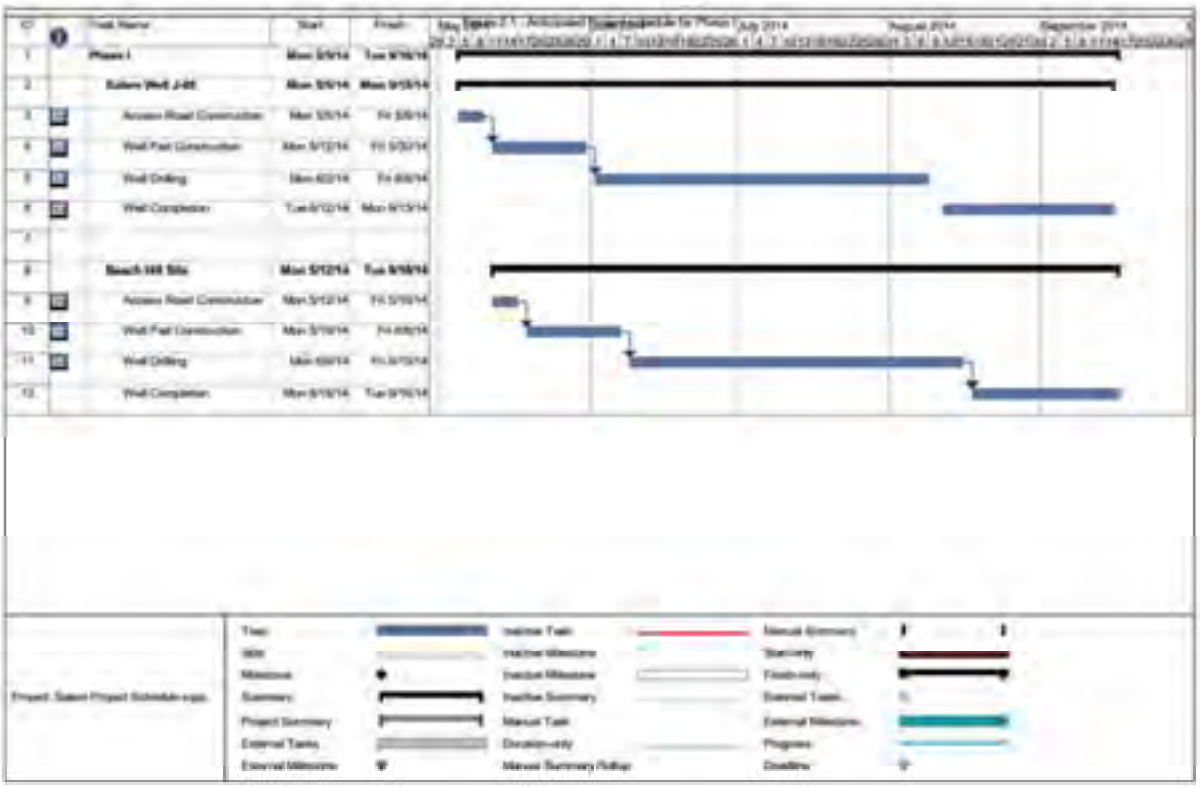
2.7 Phase II – Project Activities

The following are proposed activities and are subject to change as it is dependent on the resources available. If Contact determines that it is economically feasible to develop either of the two new wells, updates with the following components will be submitted for this EIA registration document.

Phase II of the Project may include the following components:

- Well Production Program;
- Air Quality and Water Quality Monitoring;
- Water Use/Disposal and Hydraulic Stimulation;
- Waste Management Activities;
- Safety and Emergency Response Activities;
- Pipeline and Related Infrastructure; and,
- Decommissioning/Site Restoration

Figure 2.4-Anticipated schedule for well pad construction and exploration activities for J-86 and L-85



3.0 DESCRIPTION OF EXISTING ENVIRONMENT

The following description includes the site specific environmental information identified within the areas of the proposed well pad areas. The information has been gathered through a desktop review and field investigation surveys and includes the following sections:

- Atmospheric Environment;
- Geology;
- Hydrogeology;
- Aquatic Environment (Wetlands and Watercourses);
- Terrestrial Environment;
- Species of Conservation Concern (including habitat);
- Archaeological and Heritage Resources; and
- Land use.

3.1 Methodology

3.1.1 Desktop Review

The desktop review consisted of an analysis of the biophysical and socio-economic setting based on available background information available within the proposed well pad areas. Information sources included digital mapping and online databases through provincial and federal government resources along with discussions with government representatives.

The NBDELG and industry maintains and operates a number of ambient air monitoring stations within the province to measure ground-level concentrations of a variety of air contaminants.

The ambient air quality monitoring station that is in closest proximity to the project is located in Moncton, approximately 18km north of the project. An ozone monitoring station is located in Fundy National Park, approximately 41km southwest of the project. Data from these locations were used to develop an understanding of the ambient air quality in the area. No field investigations were conducted

Prior to conducting field investigation studies, the Atlantic Conservation Data Centre (ACCDC) and New Brunswick Department of Natural Resources (NBDNR) were consulted to identify potential occurrences of rare and endangered flora and fauna, and unique or sensitive habitats that have been known to occur within a 5km radius of the study area. The following lists were reviewed for species:

- Listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- Listed under the *Species at Risk Act* (SARA);
- Listed under the *New Brunswick Species at Risk Act* (NBSARA);
- Ranked by New Brunswick Department of Natural Resources (NBDNR); and,

- Listed by the Atlantic Canada Conservation Data Center (ACCDC) as extremely rare (S1), rare (S2) and uncommon (S3).

Available background information from the following websites and databases was reviewed:

- Nature NB;
- Important Bird Areas (IBA), the Ramsar Convention on Wetlands and Federally recognized Migratory Bird Sanctuaries;
- Provincially identified deer wintering areas;
- Protected Wellfields and Watersheds; and
- Protected Natural Areas.

Watercourses and wetland habitats were identified using the NBDNR Depth to Water Table (DTW) mapping, derived from Light Detection and Ranging (LiDAR) surveys and the GeoNB wetland mapping database, as well as high resolution aerial photography mapping.

3.1.2 Field Investigation Surveys

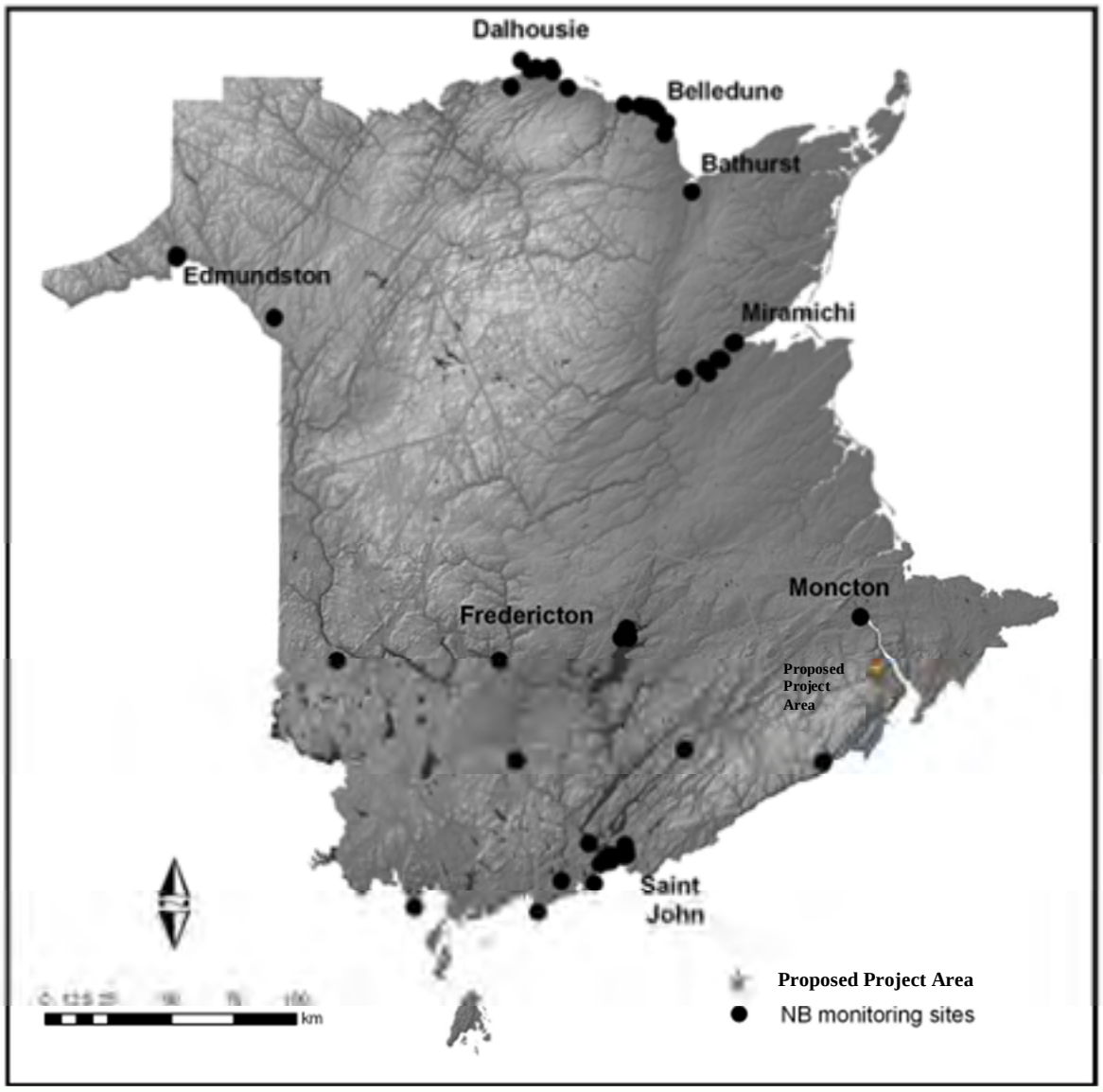
Site investigations were carried out on June 21, 2010 and August 6, 2013 for the J-86 well pad area and August 6, 2013 for the L-85 well pad area. These site investigations focused on identifying the existing environment and potential environmental constraints, including watercourse and wetland habitats.

Characterization of the existing conditions included:

- Watercourses within 30m;
- Regulated wetlands within 30 m of the well pad area including field identified wetlands;
- Forest habitat;
- Wildlife and wildlife habitat; and,
- Land use

The results of the baseline field assessments for well pad areas J-86 and L-85 are presented in Appendix B. The NBDNR Well applications are provided in Appendix C and site photographs in Appendix D.

Figure 3. 1-Air quality monitoring sites in New Brunswick for 2009 (NBDELG, 2011)



3.2 Atmospheric Environment

3.2.1 Ambient Air Quality

3.2.1.1 Fine Particulate Matter ($PM_{2.5}$)

Particles less than 2.5 micrometers in diameter ($PM_{2.5}$) are referred to as "fine" particles and are believed to pose the greatest health risks. Because of their small size (approximately 1/30th the average width of a human hair), fine particles can lodge deeply into the lungs (USEPA, 2012). Monitoring results for $PM_{2.5}$ for the Moncton station in 2010 (most recent available data; NBDELG, 2012) showed no hourly values exceeding the Canada-wide Standard (CCME, 2000) of

30µg/m^3. In 2009, there were two days when the daily average $PM_{2.5}$ levels exceeded the 30ug/m^3 and one day in 2007. The 2009 exceedances were associated with a regional air quality event in the period August 17-19, 2009 (NBDELG, 2011). There were no reported exceedances of $PM_{2.5}$ in 2007 (NBDELG, 2009) and 2008 (NBDELG, 2010). The annual average concentration in 2010 of $PM_{2.5}$ measured at the Moncton station was 5.1µg/m^3. A summary of the annual concentrations from 2007-2010 are presented in Table 3.1.

Table 3.1- Annual average $PM_{2.5}$ Concentration emissions in Moncton.

Year	Annual Average $PM_{2.5}$ Concentration (µg/m^3)
2010	5.1
2009	6.7
2008	5.9
2007	5.3

3.2.1.2 Ozone (O_3)

Monitoring results for O_3 for the Moncton and Fundy National Park stations indicate there were no reported exceedances of the Canada Wide Standard (CCME, 2000) between 2007 and 2010. Reviewing the O_3 records since 1990, a linear trend indicated no change in the province wide O_3 average of 26 ppb (NBDELG, 2012).

3.2.1.3 Nitrogen Dioxide (NO_2)

Monitoring results for NO_2 showed that levels did not exceed the 1 hour objective of 400 ppb or the 24-hour objective of 400 ppb in 2010 (CCME, 1989). No exceedances of NO_2 standards have been recorded at the Moncton station since monitoring commenced in 1998 (NBDELG, 2012).

3.2.1.4 Carbon Monoxide (CO)

Monitoring results in 2010 for CO in Moncton showed that levels did not exceed the hourly objective of 15 ppm or the 8-hour objective of 6 ppm (CCME, 1996). No exceedances of CO objectives have been recorded at the Moncton station since monitoring commenced in 1998 (NBDELG, 2009, 2012).

3.2.1.5 Emissions

The air contaminant releases from sources throughout New Brunswick can serve as a benchmark for the existing environment conditions. Emissions data available for criteria air contaminants (CACs) include:

- Particulate Matter:
  - Total Particulate Matter (TPM);
  - Particles less than 10 µmin diameter (PM_{10}); and,
  - Particles less than 2.5 µmin diameter ($PM_{2.5}$).
- Combustion Gases:
  - Sulfur Dioxide (SO_2);
  - Nitrogen Oxides (NO_x); and,
  - Carbon Monoxide (CO).
- Volatile Organic Compounds (VOCs).

A summary of the CACs emissions in New Brunswick from 2009 and 2011 (the most recent available data) from Environment Canada is presented in Table 3.2 below.

Table 3.2 - Estimated CAC Emissions from New Brunswick.

Contaminant	2011 Emissions (tonnes)[1]	2010 Emissions (tonnes)[2]	2009 Emissions (tonnes)[3]
Total Particulate Matter	384,254	383,686	379,621
Particulate Matter less than 10 microns	101,849	101,864	100,786
Particulate Matter less than 2.5 microns	24,791	24,790	24,742
Sulphur Oxides	28,057	33,263	54,003
Nitrogen Oxides	40,540	43,221	48,781
Carbon Monoxide	220,609	235,707	231,485
Volatile Organic Compounds	276,689	278,628	279,253

[1] Environment Canada 2011 Air Pollutant Emissions for New Brunswick (Environment Canada, 2013a)
[2] Environment Canada 2010 Air Pollutant Emissions for New Brunswick (Environment Canada, 2012a)
[3] Environment Canada 2009 Air Pollutant Emissions for New Brunswick (Environment Canada, 2011a)

The closest major emitter that reports to the National Pollutant Release Inventory (NPRI) is the Greater Moncton Sewerage Commission Wastewater Treatment Facility located approximately 18km north of the proposed well pads (Environment Canada, 2013b).

3.2.1.6 Index of Quality of the Air (IQUA)

The Index of Quality of the Air system has been used for over 25 years to make air quality monitoring results easier for the public to understand. Results for each pollutant measurement are expressed on a scale from 1-100+, and classed as "good" (index 0 to 25), fair (26 to 50), "poor" (51 – 100) or "very poor" (over 100). Each of the categories is based on the National Air Quality Objectives. The average IQUA in Moncton for 2007-2010 was rated as "good" for 99.3% of the time over the three year period and "fair" for the remaining 0.7% of the time (NBDELG, 2009; NBDELG, 2010 and NBDELG, 2011).

3.2.1.7 Air Quality Health Index (AQHI)

The Air Quality Health Index (AQHI) is a scale designed to compare the air quality in a specific region to associated health risks. The purpose of the AQHI is to provide the public information in order for them to protect their health from the negative effects of air pollution. The index is based on three key health-related air pollutants: O_3, NO_2 and Particulate Matter ($PM_{2.5}$/PM_{10}) (Environment Canada, 2013c). It uses a scale from 1 to 10 to measure the air quality in relation to human health. The higher the number, the greater the health risk associated with the air quality. When an amount of air pollution is very high, the number will be reported as 10+. There are four categories of risk, low (1-3), moderate (4-6), high (7-10) and very high (>10).

The 2010 year was the first year in which the AQHI was reported for the Moncton Station. The AQHI for Moncton for 2012 was rated as low 98.8% of the year and moderate for 1.2% for the remaining time (NBDELG, 2012).

3.2.2 Climate

The nearest weather station to the proposed project is the Moncton Airport weather station (Latitude: 46° 6' N and Longitude: 64° 47' W), located approximately 20km north of the proposed well pads. According to the Canadian Climate Normals for the Moncton Airport weather station, the average annual temperature was 4.5 ^{o}C (Environment Canada, 2013d). A summary of the average temperature by month from the Moncton weather station is presented in Table 3.3 below.

Table 3.3- Average Daily Temperatures Moncton Climate Station (Environment Canada, 2013d)

Temperature (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average	-8.9	-8	-2.9	3.2	9.9	15.1	18.6	17.9	13	7.1	1.4	-5.5	5.1
Daily Maximum	-3.6	-2.7	2	8	15.9	21.3	24.5	23.8	18.8	12.4	5.6	-0.7	10.4
Daily Minimum	-14.3	-13.2	-7.8	-1.7	3.9	8.9	12.6	12	7.2	1.8	-2.9	-10.3	-0.3

The warmest months are generally from June to August with July being the warmest month having an average daily temperature of 18.6 °C. The warmest day on record according to the Canadian Climate Normals was recorded on August 12, 1944 with a temperature of 37.2 °C. The coldest period is typically between December and February, with the coldest month being January, having an average daily temperature of -8.9 °C. The coldest day recorded was on January 14, 1957, at a temperature of -32.2 °C.

The monthly averages for rainfall, snow and total precipitation are presented in Table 3.4 below. The historical precipitation data from the Moncton Airport station recorded an average of 1223.2 mm of precipitation per year with 865.4 mm falling as rain and 349.9 cm as snowfall. On average precipitation occurred approximately 175 days per year with March being the wettest month and June being the driest. The extreme daily rainfall occurred on April 1, 1962, where 131.8 mm of rain fell. The extreme daily snowfall occurred on February 1, 1992, where 83 cm of snow fell.

Table 3.4- Average Precipitation Moncton Airport Climate Station (Environment Canada, 2013d)

Precipitation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	41.5	26.8	45.9	57.2	91.5	91.5	103.3	79.5	92.7	99.5	81.1	54.9
Snowfall (cm)	80.1	68.1	70.8	35.8	4.5	0	0	0	0	3.4	21.7	65.6
Precipitation (mm)	121.6	94.9	116.7	93	96.0	91.5	103.3	79.5	92.7	102.9	102.8	120.5

Historical wind direction and speed data from the Moncton Airport climate station are presented in Table 3.5.

Table 3.5- Historical Wind Direction and Speed at the Moncton Airport Climate Station (Environment Canada, 2013d)

Wind	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Wind Speed (km/h)	19.1	18.2	19.2	18.3	16.6	14.9	13.3	13	14.4	16.1	17.7	18.7	16.6
Most Frequent Wind Direction	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Maximum Wind Gust Speed (km/h)	129	135	161	137	121	109	145	89	124	122	126	126	
Direction of Maximum Gust	SW	S	SW	N	SW	NW	W	N	S	SW	SW	W	SW

According to the Climate Normals, the average annual wind speed at the Moncton Airport climate station is 16.6km/h from the southwest. The maximum wind speed generally occurs in March with an average speed of 19.2km/h from the southwest. The minimum wind speed generally occurs in August with an average speed of 13km/h from the southwest. The maximum hourly wind speed noted in the climate normal data from the Moncton Airport climate station was 103km/h, which was recorded on September 11, 1954. The maximum gust speed of 161km/h was recorded on March 7, 1963. Generally the average monthly wind speeds tend to be high between February and April and lower between July and September. The prevailing winds are generally from the southwest throughout the year.

3.2.3 Greenhouse Gas (GHG) Emissions

The Province of New Brunswick has no standards or guidelines for regulating the emissions of GHGs. In 2011 (most recent published data), the national reported emissions of GHGs for Canada were 702 Mega-tonnes (MT) of carbon dioxide equivalent (CO_2e) (Environment Canada, 2013e) which is similar to the 2010 and 2009 emissions levels (Environment Canada, 2012b and 2011 b,c,d). In New Brunswick, the annual emissions from 2009 to 2011 were approximately 18.4MT of CO_2e per year representing 2.6% of the national emissions (Environment Canada, 2013e).

GHG reporting is mandated by Environment Canada from sources that release 0.05MT or more of CO_2e per year. In New Brunswick, 13 facilities reported emissions to Environment Canada for a total of 7.8MT of CO_2e (Environment Canada, 2013f). The closest of these facilities to the project is located in Saint John, New Brunswick, approximately 120km to the south.

3.2.4 Ambient Noise Quality

The Province of New Brunswick has not established regulatory limits for sound pressure levels from industrial and construction activities. As indicated in the *Responsible Environmental Management of Oil and Natural Gas Activities in New Brunswick, Rules for Industry* (NBDEM, 2013) the maximum permissible levels of noise from oil and gas operations (including well drilling, servicing, compressors and production) are 50dB$_A$ Leq during the day (7 am to 7 pm) and 40dB$_A$ Leq during the night (7 pm to 7 am) at the nearest residence.

Given the largely rural setting of the proposed well pads, existing sound pressure levels in the vicinity of the project are expected to be typical of sound pressure levels in a quiet rural area. Based on data collected by the USEPA (1971) of typical background community noise, existing sound pressure levels in the area are likely in the range of 33 to 40dB$_A$, as a 24-hour equivalent (Leq).

3.3 Geology

Salem is located in the southeastern area of New Brunswick approximately 5 km west of the Petitcodiac River within the Petitcodiac Ecodistrict. The area is underlain primarily by Pennsylvanian aged sandstone, conglomerate and mudstone that range from grey to red (NBDNR, 2007). Relatively rich soils in the Petitcodiac Ecodistrict are represented by alluvial material of the Interval Unit and tidal deposits of the Acadia Unit, that generally occur along the Petitcodiac and Memramcook Rivers and have been intensively farmed (NBDNR 2007).

3.3.1 Description of Surficial Geology

Based on the Generalized Surficial Geology Map of New Brunswick (Rampton 1984, 2002 Ed.), the surficial geology of the Salem area is Wisconsinan aged morainal sediments comprised of lodgement till, ablation till and associated gravel and sand deposited directly by Wisonsinan ice or with minor reworking by water. Depositional types generally consist of blanket and veneer of loamy lodgement till, minor ablation till, silt, sand, gravel and rubble, with a blanket generally 0.5m to 3m thick.

The general topography of the area is anticipated to slope to the northeast towards the Petitcodiac River. The generalized groundwater flow direction in the deep aquifer is assumed to follow the regional topography of the area and flow northeast towards the Petitcodiac River. The generalized groundwater flow in the shallow aquifer is likely to follow the localized topographic morphology towards small streams and creeks and ultimately into the Petitcodiac River.

Refer to Figure 3.2 for the surficial geology within the proposed well pad areas for J-86 and L-85.

3.3.2 Description of Regional Bedrock Geology

The geology in the Salem region is comprised of primarily of early Carboniferous aged sedimentary rock belonging to the Windsor Group (Hillsborough Formation) and Sussex Group (Weldon Formation) (NBDNRE, 2000 and NBDNR, 2009 Map Plate NTS 21 H/15). The Hillsborough Formation is comprised of red and locally grey, angular to sub-rounded clasts (granule to boulder) conglomerate, grey and red-brown, parallel and ripple- laminated, fine to coarse-grained sandstone with minor red and grey mudstone. The conglomerate beds in the upper part of the formation carry limestone clasts. The Weldon Formation is comprised primarily of red and grey mudstone and shale with local mud-cracks, red to rarely grey parallel and cross-laminated fine to coarse-grained sandstone.

The primary oil and gas bearing stratigraphic interval to be penetrated in the wellbores will be the Albert Formation of the Horton Group. Both the Hiram Brook and Frederick Brook Members of the Albert Formation consist of interbedded sandstones, siltstones and grey shales which compositely can be present in thicknesses up to 2000m. Minor amounts of conglomerate may be encountered, along with lesser evaporites and marlstones. In the Upper Albert succession, evaporites have been seen in nearby wells and would be anticipated in the wells contained within this registration document. Refer to Figure 3.3 for the bedrock geology within the proposed well pad areas for J-86 and L-85.

3.4 Hydrogeology

Domestic and communal wells are present within the area. The Hillsborough wellfield is located approximately five kilometers from the proposed Salem well pad areas (J-86 and L-85) which services residents living within the Hillsborough Village limits. Residential properties not serviced by the Village of Hillsborough obtain potable water via onsite domestic wells. Domestic and communal wells are typically at depths ranging between 30m to 90m in the bedrock aquifer.

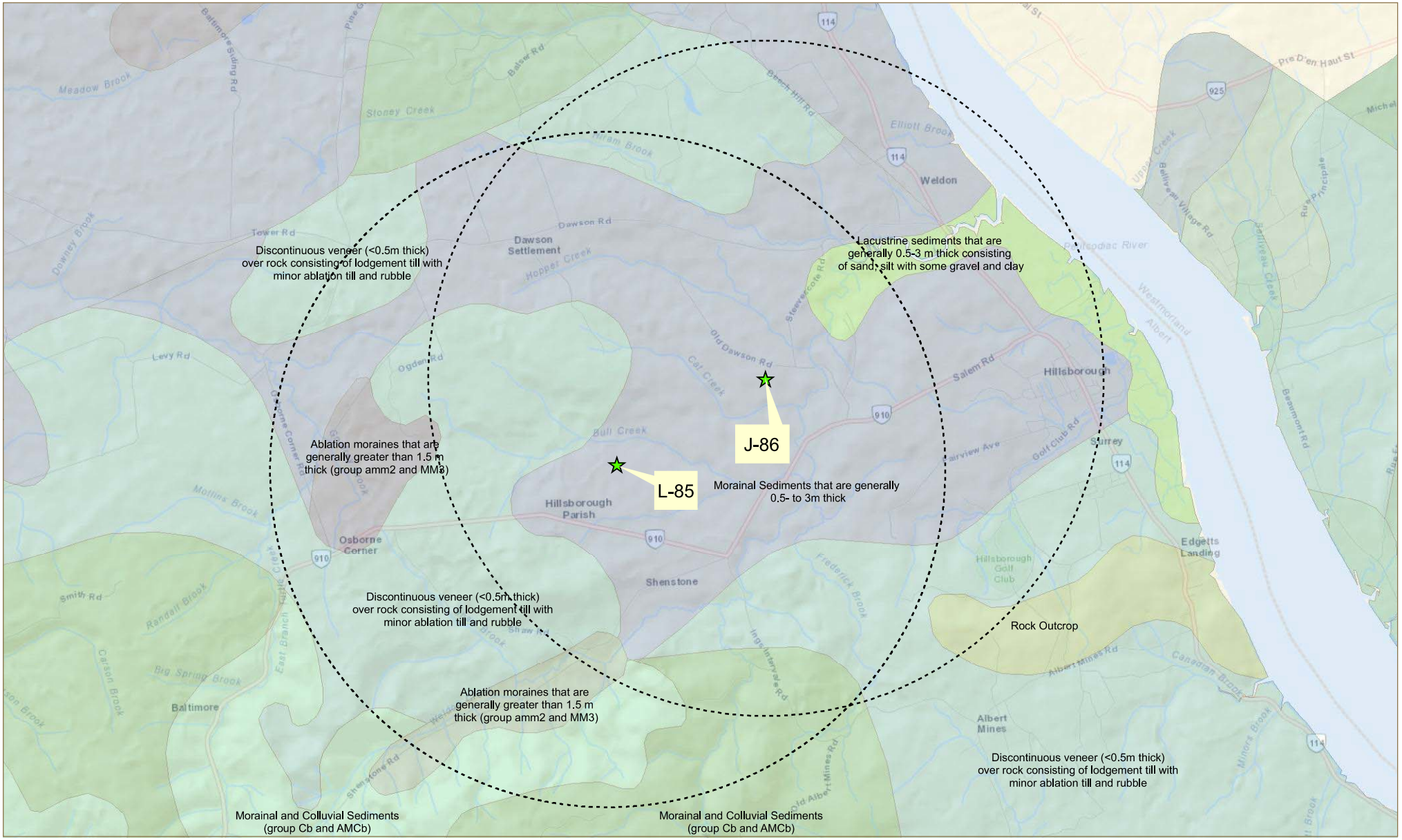
The following discussion of the local groundwater resources and hydrogeology is based on a desktop study, and does not include any water well inspection, groundwater sampling and analysis, or groundwater depth measurements.

3.4.1 Protected Wellfields

The Hillsborough area is provided drinking water and sewer services by the Village of Hillsborough (Dillon, 2009). Within the Salem well pad areas, there are no designated watersheds protected under the New Brunswick Watershed Protection Program. The Hillsborough Protected Wellfield is located approximately 5km southeast of the proposed well pad areas (J86 and L-85) and is situated at the headwater of Canadian Brook. According to the NBDELG, a wellfield protected area is the area (surface and subsurface) surrounding a water

well or wellfield which supplies a public water supply system. Each Wellfield Protected Area around a municipal well is divided into three smaller zones: Zone A, Zone B and Zone C. The zones reflect the fact that different contaminants persist in the environment for different time-frames, move at different rates and pose different health risks.

The Municipality of Hillsborough is currently adopting an additional water supply well into their current wellfield located along Beaumont Road south of Salem. This well was drilled to 91m deep with 18m to bedrock and fractures at 60m, 65m, 69 m, and 77m (pers. comm. S. McCoy, NBDELG, 2011). These protected wellfields service the Municipality of Hillsborough and are located more than 7km southwest of the proposed exploratory wells. Figure 3.4 illustrates the distances of the protected wellfields in relation to the proposed exploratory wells.



Contact Exploration Inc.
Oil & Gas Exploration, Albert County, NB

Simplified Surficial Geology, Salem, New Brunswick
Figure 3.2

CONTACT EXPLORATION INC.

Legend

- 5 km radius
- Proposed Oil and Gas Exploration Well

DILLON CONSULTING

MAP DRAWING INFORMATION: HLM
DATA PROVIDED BY: Rampton, V.N. 1984. Generalized surficial geology map of New Brunswick, Department of Natural Resources and Energy, Minerals. Policy and Planning Division, NR-8 (scale 1: 500,000).

MAP CREATED BY: HLM
MAP CHECKED BY: RMD
MAP PROJECTION: NAD_1983_CSRS_New_Brunswick_Stereographic

FILE LOCATION: \\dillon.ca\DILLON_DFS\St. John's\St. John's CAD\CAD\13-Contact Exploration

0 0.5 1 2 Kilometers

N W E S

SCALE 1:75,000

PROJECT: 13-7737 STATUS: DRAFT DATE: 9/3/2013

Contact Exploration Inc.
Oil & Gas Exploration, Albert County, NB

Simplified Bedrock Geology, Salem, New Brunswick
Figure 3.3

CONTACT EXPLORATION INC.

Legend

- 5 km radius
- Proposed Oil and Gas Exploration Well
- Cumberland Group
- Windsor Group
- Mabou Group
- Sussex Group
- Windsor Group
- Horton Group
- Waterbody

DILLON CONSULTING

MAP DRAWING INFORMATION: HLM
DATA PROVIDED BY: St. Peter. C. and Johnson S.C. 2008. Carboniferous Geology of the Hillsborough Formation Area (NTS 21 H/A5). Albert and Westmorland Counties. New Brunswick. New Brunsicke DNR: Minerals. Policy and Planniong Divison. Plate 2008-23.

MAP CREATED BY: HLM
MAP CHECKED BY: RMD
MAP PROJECTION: NAD_1983_CSRS_New_Brunswick_Stereographic

FILE LOCATION: \\dillon.ca\DILLON_DFS\St. John's\St. John's CAD\CAD\13-Contact Exploration

0 0.5 1 2 Kilometers

N W E S

SCALE 1:75,000

PROJECT: 13-7737 STATUS: DRAFT DATE: 9/3/2013

3.4.2 Residential Potable Wells

Population of the NBDELG Domestic Water Well Database began on January 1, 1994 in conjunction with the *New Brunswick Potable Water Regulation* 93-203. Information from this database can be retrieved using a well tag number or PID number. Radius searches can also be conducted using the PID number or with coordinates. Well logs requested for wells drilled prior to the January 1, 1994 cut-off date are often not readily available. An older well log database containing information from the mid-1970s to December 31, 2003 is available. No PID numbers, well tag numbers or civic addresses are associated with these well logs and as such many of them do not have any spatial information associated with them. Developments located in the study area typically consist of homes that have been built in the past 15 years and as such it is anticipated that most if not all of the wells logs are available as part of the NBDELG database.

NBDELG recently made efforts to make Well Logs more accessible via an online database referred to as Online Well Log System (OWLS). However, through this process spatial identifiers have been removed from these well logs such that they cannot be linked to an individual property. The NBDELG OWLS was used to obtain hydrogeological data for private wells within a 1.2km and 1.5km search radii set around each of the proposed well locations (1.2km of J86 and 1.5km of L-85). A summary of domestic well records for wells located within each of the search radii of the proposed well locations are provided in Table 3.6. Refer to Appendix E for the detailed well reports.

These wells are indicative of the likely conditions of the soil and bedrock aquifers located on the project site and within the community of Salem. The project site does not contain any private potable wells within 500m of the proposed well pad locations and therefore baseline sampling will not be required for either of the proposed well pad locations.

Table 3.6-Summary of Domestic Water Wells Records in Salem New Brunswick

1.2km Search Radius of Proposed Well Location J86					
Log #	**Well Depth (m)**	**Casing Length (m)**	**Estimated Yield (lpm)**	**Water Depth (m)**	**Depth to Bedrock (m)**
835	29.0	19.5	46	9.1	4.6
7832	22.9	8.5	46	3.1	3.7
7854	21.3	NA	46	7.3	16.5
10187	33.5	NA	32	6.1	23.2

10202	45.7	24.4	27	24.4	24.4
12569	71.6	20.7	5	20.4	3.1
12570	68.6	15.5	2	68.3	12.2
17939	32.0	22.3	68	13.1	6.1
17946	24.4	11.3	68	1.2	3.1
24399	39.0	18.0	68	6.1	18.0
90154400	41.5	9.1	5	2.4	2.4
90299500	35.1	24.4	23	18.3	23.8
90461900	61.3	21.6	9	36.6	13.7
1.5km Search Radius of Proposed Well Location L-85					
Log #	**Well Depth (m)**	**Casing Length (m)**	**Estimated Yield (lpm)**	**Water Depth (m)**	**Depth to Bedrock (m)**
7832	22.9	8.5	46	3.1	3.7
7854	21.3	NA	46	7.3	16.5
24729	51.2	24.1	68	33.5	22.9
90154900	50.3	10.1	46	27.4	5.2
90462700	61.9	17.1	9	12.2	12.2

3.5 Aquatic Environment

3.5.1 Watercourses

Based on a review of NBDNR 1:10000 mapping and field verification studies conducted in 2010 and 2013, there are no watercourses within 30m of the well pad areas (J-86 and L-85). The surface water drainage flows to the southeast towards the Cat Creek drainage system for Well Pad Area J-86 and southwest towards the Bull Creek drainage system for Well Pad Area L-85 as shown on Figure 1.2. Both watercourses are tributaries to Frederick Brook, a subdrainage of the Weldon Brook watershed, which drains to the Petitcodiac River. Cat Creek is located approximately 550m from the proposed J-86 well pad area and Bull Creek is located approximately 275m from the proposed Well Pad L-85 area.

Well J-86

During the 2010 and 2013 field visits at the proposed J-86 Well Pad, it was noted that the surface water drainage flows to the southeast towards Cat Creek. According to the NBDNR depth to water table mapping, water flow is modeled to flow in a southern direction, however, due to past forest harvesting activities and forestry road construction in the area, the drainage has been divided to flow in an easterly and southerly direction. A small unmapped intermittent channel was noted with little to no water. During the spring thaw and rain events, this watercourse would likely flow in a northerly direction off the property crossing the Old Dawson Road and flowing along the ditch which drains into Frederic Brook.

Well Pad L-85

Desktop surveys for mapped watercourses and provincially regulated wetlands indicated there were no features within 250m of the well pad area. The survey showed two (2) tributaries to Bull Creek approximately 350m north and 750m south respectively. During the field verification surveys, there were no additional watercourses (i.e., unmapped watercourses) identified within 30m of the proposed well pad area. Surface water drainage generally flows to the southeast through forested and regenerative growth forest towards the tributaries to Bull Creek.

3.5.2 Wetlands

Any project proposed within 30m of wetlands that is identified on the GeoNB map must apply for a permit under the *Wetland and Watercourse Alteration Regulation* (WAWA) under the *Clean Water Act*. In addition to those wetlands identified as regulated on the GeoNB mapping and according to the "Rules for Industry (Feb 2013)" document, proponents of oil and gas facilities are required to identify all potentially affected wetlands, regardless of whether or not they are regulated.

Well Pad J-86

According to the GeoNB wetland mapping database, there are no regulated wetlands within 30m of the proposed well pad area, as illustrated on Figure 2.1. According to the NBDNR, DTW mapping, it is unlikely that wetlands or watercourses are located within the boundaries of the well pad; however, a low lying wet feature was noted approximately within 90 m northwest of the access road. Field observations conducted in 2010 and 2013 indicated that this wet feature consisted of groundwater seepages and was previously (prior to historical clear cutting activities) a forested wetland. The vegetation consisted of moss, black spruce (immature), sedges and grasses. This wet feature is not regulated as a wetland in New Brunswick.

Well Pad L-85

According to the GeoNB wetland mapping database, there are no regulated wetlands identified within 30m of the proposed well pad area, as illustrated on Figure 2.2. During the field investigations, an unmapped wet feature was noted approximately 75m south of the proposed well pad area. This wet feature was identified in a previously harvested area where the water was generally confined with no evidence of a flow. The vegetation consisted of moss, sedges (*Carex sp*.), raspberry (*Rubus idaeus*), trembling aspen (*Populus tremuloides*), white birch (*Betula papyrifera*), willow (*Salix sp.*) and speckled alder (*Alnus incana*) with a herbaceous layer of blueberries, American goldenrod (*Solidago canadensis*), grasses (*Graminoids sp*.), sedges, and ferns (*Dryopteris sp.*), which is consistent with moist woodland areas.

The plant species identified within both well pad areas are commonly found in this habitat and are not considered flora with a unique or sensitive status within the province of New Brunswick. This wet feature is not regulated as a wetland in New Brunswick.

3.6 Terrestrial Environment

Information regarding terrestrial vegetation in the study area was derived from several sources including: aerial photographs, GIS database information, field studies, ACCDC data, *Species at Risk Act* (SARA), Committee on the Status of Endangered Wildlife in Canada (COSEWIC), *New Brunswick Species at Risk Act* (2013), published references and field investigations. Field investigations were conducted in June 2010 and August 2013 in the area of Well Pad J-86 and in August 2013 in the area of Well Pad L-85. The area identified for each of the well pads consisted of previously disturbed lands from past and present forestry activities.

3.6.1 Forest Cover

Both proposed well pad areas (J-86 and L-85) are located within the Eastern Lowland Ecoregion, an ecoregion of the Atlantic Maritimes Ecozone, and within the Petitcodiac Ecodistrict. The Petitcodiac Ecodistrict is a low-lying, gently rolling area with ridges and valleys that encompass the broad Petitcodiac River basin.

The forest habitat in this ecoregion is dominated by red spruce (*Picea rubens*), white spruce (*Picea glauca*), black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), white birch (*Betula papyrifera*), and trembling aspen (*Populus tremuloides*) (NBDNR, 2007).

Both proposed well pad areas have similar forest and forest age characteristics consisting of woodlots that have been historically harvested for timber.

Well Pad J-86

Forest cover within the proposed J-86 well pad area consists of hardwood/softwood mixed stands of immature to mature forest habitat dominated by stands of balsam fir, maple (*Acer sp*.) and balsam poplar with the exception of the northwest section which borders an old (<10 years) clearcut/harvested area. This previously harvested area consists of regenerating stands of white spruce, balsam poplar (*Populus balsamifera*), red maple, yellow and white birch (*Betula sp.*) and willow (*Salix sp.*) with a herbaceous layer of red raspberries (*Rubus idaeus*), Canada goldenrod, grasses and sedges consistent with moist woodlands and forested wetland areas.

Other less dominant species noted in the area were common to clear cut/regenerating habitats within New Brunswick. The plant species identified in this area are commonly found in this habitat and are not considered to be flora with a unique or sensitive status within the province of New Brunswick.

Well Pad L-85

The forest cover in the area of well L-85 is generally similar to the J-86 well pad area and consists primarily of a mix of immature to mature hardwood and softwood stands of balsam poplar (*Populus balsamifera*), red maple (*Acer rubrum*), birch (*Betula* sp.) and black spruce with the exception of the southern section which is comprised of birch, willow and alder with a herbaceous layer of blueberries, golden rod (*Solidago canadensis*), grasses (*Graminoids sp.*) and sedges (*Carex sp.*) and ferns.

Other less dominant species noted in the area were common to clear cut/regenerating habitats within New Brunswick. The plant species identified in this area are commonly found in this habitat and are not considered to be flora with a unique or sensitive status within the province of New Brunswick.

3.6.2 Flora Species at Risk

The ACCDC has provided information on species of conservation concern potentially occurring within the general study area. The ACCDC information is provided in Appendix F. The ACCDC data list has identified two (2) flora species within 3-5km of the well pads, one species with a

ranking of S2 (rare) and the other with a ranking of S3 (uncommon). These two species are not listed under COSEWIC, Schedule 1 of *SARA* or Schedule A of the NB *SARA*. The S2 (rare) ranked, eastern leatherwood (*Dirca palustris*), prefers tolerant hardwoods and rich deciduous mature stands, and is identified as "May be At Risk" on the NBDNR Vascular Plants List (NBDNR, 2010). The S3 (uncommon) ranked, Hyssop-leaved fleabane (*Erigeron hyssopifolius*) is a perennial, growing from slender rootstocks directly out of rock crevices. (Maine Department of Conservation Natural Areas Program, 2004) and is classified as "Secure" on the New Brunswick Vascular Plants List (2010). These species were not observed during field investigations and the existing environmental conditions for the proposed well pad site would suggest that there is no habitat in this area to support these species. Appendix G provides a table indicating the detailed habitat requirements, provincial and federal status rankings and potential interactions with these species within the proposed well pad areas.

3.7 Terrestrial Wildlife

3.7.1 Avifauna (Birds)

Available information on the known occurrence of birds within the proposed well pad areas or in the general vicinity were considered and based on existing data which included the Maritime Breeding Bird Atlas (MBBA) online Data Summaries for the Petiticodiac Region and the ACCDC database. According to the data provided for Square #20LR68 (Dawson Settlement), 40 point counts were conducted between 2006 and 2010 (MBBA, 2013). A total of 57 species of birds were documented to occur within this area or identified as having the possibility of occurring in the area due to available habitat. The list of birds identified from the MBBA is provided in Appendix H. The ACCDC also identified 16 rare or uncommon species of birds that have the potential to occur within a 5km radius of each proposed well pad area.

Of the species identified by ACCDC and the MBBA bird counts, eight (8) species are listed as Special Concern, Threatened or Endangered either provincially (*NB SARA*) or federally (*SARA*). These species include:

- Chimney Swift (*Chaetura pelagica*) listed as Threatened (COSEWIC, 2007a and *NB SARA*, 2013),
- Barn Swallow (*Hirundo rustica*), listed as Threatened (COSEWIC, 2011 and *NB SARA*, 2013),
- Common Nighthawk (*Chordeiles minor*), listed as Threatened (COSEWIC, 2007b and *NB SARA*, 2013),
- Olive-sided Flycatcher (*Contopus cooperi*) , listed as Threatened (COSEWIC, 2007c and *NB SARA*, 2013),
- Eastern Wood Pee-Wee (*Contopus virens*) , listed as Special Concern (COSEWIC, 2012a and *NB SARA*, 2013),
- Wood Thrush (*Hylocichla mustelina*), listed as Threatened (COSEWIC, 2012b and *NB SARA*, 2013),

- Peregrine Falcon (*Falco peregrinus)* , listed as Special Concern or Schedule 1 of *SARA* (COSEWIC 2007d) and Endangered on Schedule A of the *NB SARA* (2013), and
- Bald Eagle (*Haliaeetus leucocephalus*) listed as Endangered on Schedule A of the *NB SARA* (2013).

These species' sighting locations has been provided on Figure 3.4 and is based on the ACCDC, 2012 data. Appendix G provides a table indicating the detailed habitat requirements, provincial and federal status rankings and potential interactions (if any) with these species within the proposed well pad areas. Due to the habitat identified within the area, it is unlikely that these species have the potential to occur within the area.

3.7.2 Bats

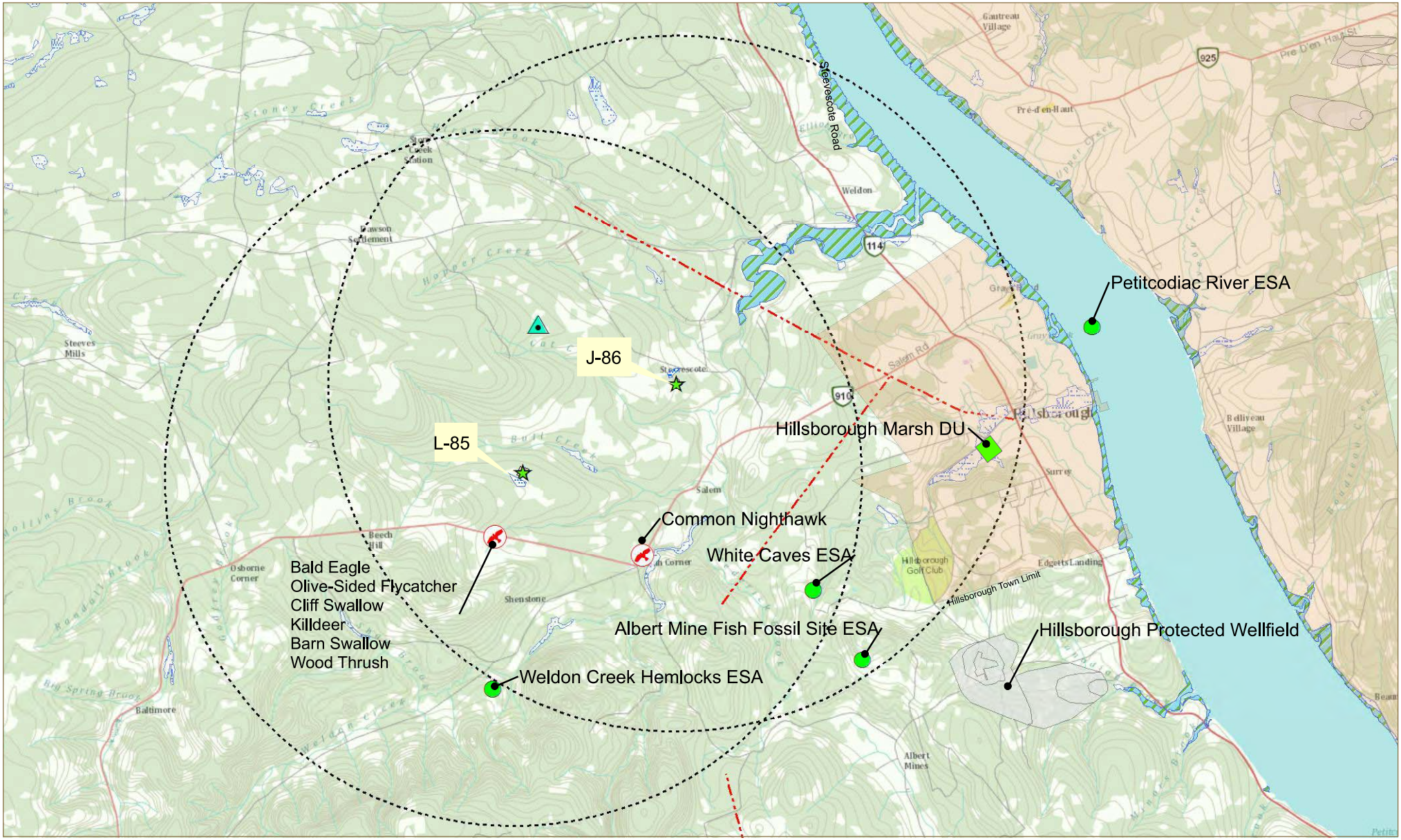
According to the ACCDC, there are three bat species ranked as S1 (extremely rare) known to occur within a 5km radius of the exploration area: the tri-colored bat (*Perimyotis subflavus)* formerly known as the eastern pipistrelle (*Pipistrellus subflavusis)*, northern long-eared myotis (*Myotis septentrionalis*) and the little brown myotis (*Myotis lucifugus*).

Populations of all three species have recently declined precipitously due to the rapid spread of White Nose Syndrome. Although these species are not listed on Schedule 1 of the *SARA*, they have been listed as Endangered by COSEWIC and listed on the *NB SARA* in 2013. A recommendation has been made to the Federal Minister of the Environment that an Emergency Order be issued placing these wildlife species on the *SARA* list.

These bats typically hibernate in caves or abandoned mines from October to May. More specifically, the Albert Mines caves located approximately 5km south of the proposed well pad areas provides one of the most valuable hybernaculum locations within the province of New Brunswick. During the rest of the year they forage in open forests along the edges of rivers and streams, roosting in caves, rock crevices, attics, and trees. Refer to Appendix G for detailed habitat requirements and potential interactions with these species within the proposed well pad areas.

3.7.3 Herpetiles

The wood turtle (*Glyptemys insculpta*) has a provincial ranking (ACCDC) of S3 (uncommon) and is designated as Threatened on Schedule 1 of *SARA* and Schedule A of the *NB SARA*. According to ACCDC, there are currently no records of Wood Turtle within the study area. Wood turtle or wood turtle habitat was not identified within the project boundaries.



Contact Exploration Inc.
Oil & Gas Exploration, Albert County, NB

Environmental Constraints (within 5 km)
Figure 3.4

CONTACT EXPLORATION INC.

Legend

- Ecologically Significant Area
- Potential Bird Species of Special Concern (within a 50km range)
- Potential Eastern Cougar Habitat
- Provincially Significant Wetland
- Wetland
- 5 km radius
- Proposed Oil and Gas Exploration Well
- 5m Contour
- Rail road
- Rural Road/Trail
- Provincial Highway
- Utility
- Watercourse
- Waterbody
- Protected Wellfield

DILLON CONSULTING

MAP DRAWING INFORMATION: HLM
DATA PROVIDED BY: ACCDC, 2013

MAP CREATED BY: HLM
MAP CHECKED BY: RMD
MAP PROJECTION: NAD_1983_CSRS_New_Brunswick_Stereographic

FILE LOCATION: \\dillon.ca\DILLON_DFS\St. John's\St. John's CAD\CAD\13-Contact Exploration

0 0.5 1 2 Kilometers

SCALE 1:75,000

PROJECT: 13-7737 STATUS: DRAFT DATE: 9/3/2013

3.7.4 Other Mammals

Visual sightings, tracks, droppings (scat) and/or feeding activities were evident from moose, deer, coyote, snowshoe hare, amphibians, and smaller rodents such as mice, voles and chipmunks, within both proposed well pad areas. These species are generally common in New Brunswick (Dilworth, 1984).

According to the ACCDC, one (1) rare mammal species has the potential to occur within the general area, the eastern cougar (*Puma concolor*). ACCDC data records are presented in Appendix F. The eastern cougar is not listed on Schedule 1 of *SARA* and has been identified by COSEWIC as "Data Deficient". Eastern cougar habitat requirements in New Brunswick are not known, however, throughout its range, cougars have been found in a variety of habitats ranging from large swamp areas to dense coniferous forests.

During the 2010 and 2013 field investigations, there was no evidence of potential cougar or its habitat to occur in the area. Refer to Appendix G for detailed habitat requirements and potential interactions with these species within the proposed well pad areas.

3.8 Rare and Sensitive Habitat

Wildlife management zones, ecological reserves, environmentally significant areas, wilderness areas, managed wetlands and significant wildlife habitat, including areas of high wildlife concentrations, wildlife corridors or habitats rare to New Brunswick were investigated for the study area. Most of these areas are either designated or identified on existing mapping and thus were identified based on existing data. The study area (i.e., within 5km) does not have "significant habitat" status (e.g. designated wildlife management areas, ecological reserves, managed wetlands or protected areas) associated with it as per the following: Ramsar Sites, Important Bird Areas, or Provincially recognized Protected Natural Areas (PNAs). According to NBDELG (Pers. Comm., Mackenzie, 2013), the Nature Trust of New Brunswick (2005) and the ACCDC data search, the proposed study area is within 5km of four (4) Environmentally Significant Areas (ESAs), listed below:

- Albert Mines Fish Fossil Site (ESA641);
- Whites Cave (ESA655);
- Hillsborough Ducks Unlimited Marsh; and,
- Weldon Creek (ESA654).

These ESAs are illustrated on Figure 3.4 and are described below.

Albert Mines Fish Fossil Site (ESA 641)

This site is located approximately 1.5km north/northwest of Albert Mines. Albert Mines is known for the Mississippian vertebrate fossil *Elonichthys browni* held in the New Brunswick Museum. Nerepis River is the only other place in New Brunswick where fish fossils have been found. The area is primarily significant for fossils.

Whites Cave (ESA 655)

This area is located at the head of a tributary of the Gray Brook, 3.5km southwest of Hillsborough and is primarily significant for geology and mammals. The White Caves, occurring in Mississipian Gypsum, consist of two caverns which are believed to have once been part of a single cave that would have been cut in half by a ceiling collapse. Together they represent one of the longest gypsum cave networks in Eastern Canada. The southernmost cave (also called the Bat Cave) is 10m long and ends in a huge chamber at least 25m long, 15m wide, with a ceiling about 10m high. The northernmost of the two caves (also called the Gypsum Cave), extends 247m to the south towards and almost reaching the entrance of the Bat Cave. A low and half flooded wet passage discourages most explorers from seeing most of this cave (Nature Trust, 2005). Recent winter monitoring surveys conducted by the New Brunswick Museum and the University of New Brunswick found that at least 25% of the bats in the caves have died as a result of White Nose Bat syndrome. This is the first identification of it in New Brunswick, and the impact of its arrival in the province is significant (Telegraph Journal, 2011).

Hillsborough Ducks Unlimited Marsh

In partnership with Ducks Unlimited, 15ha (38 ac) of land which provides wildlife habitat with walking trails and observation decks is located 5km from the Salem area. It is very popular with hikers and birdwatchers as it offers an excellent view of waterfowl, songbirds, raptors and other wildlife.

Weldon Creek (ESA654)

This site is located approximately 4km south of the proposed well pad areas, along the south bank of Weldon Creek and the northeastern slope of Caledonia Mountain, including Round Hill. This ESA contains mature stands of Hemlocks (*Tsuga canadensis*), although selective cutting has occurred here in the past, the area is significant for its forest value.

NBDNR has also identified of the following records of species at risk habitat known to occur in the area and is based on the NBDNR Species at Risk Database within a 5km radius of the proposed surface lease (Pers. Comm., Lusk, 2007):

- Bald Eagle (*Haliaeetus leucocephalus)* (Endangered on *NB SARA*) nest site on Weldon Creek just east of Route 114; and,

- Peregrine Falcon (*Falco peregrinus anatum/tundrius*) Special Concern, *SARA* and Endangered, *NB SARA*) site on the Petitcodiac River located at Big Cape.

These records have been established for some time. The ACCDC (ACCDC, 2013) has provided information on species at risk potentially occurring within a 5 km radius of the surface lease.

3.9 Archaeological and Heritage Resources

The Petitcodiac Ecodistrict lies within the traditional Mi'kmaq territory of Sigenigteoag. This Ecodistrict intersects the main portage route between the Bay of Fundy and Gulf of St. Lawrence, and possess multiple resources such as shellfish, waterfowl, seabirds, wild rice, and sweet grass. Although little is known about early native villages in the area, it likely supported many settlements over its several thousand years of aboriginal habitation. The first non-aboriginal inhabitants were Acadian families, who settled the area in the 1600s and built dykes to drain the marshes, creating some of the most fertile farmland in the North America. They also constructed the first dry dock in Canada at the confluence of the Aulac and La Coupe rivers, about 8km from Cumberland Basin (NBDNR, 2007).

In 1766, immigrants from Saxony, via Pennsylvania, moved onto the dyked and other lands around present-day Moncton. The Germans subsequently were joined by Planters from New England, as well as by Acadians returning from exile. Regional mineral resources also were varied. Gypsum and grindstone quarries were the mainstay mining occupations – the Hillsborough gypsum quarries and local grindstone quarries had operated steadily since the late 1700s - but people also worked deposits of building stone, coal, manganese, oil shale, copper, barite, lead, natural gas, and oil (NBDNR, 2007).

A preliminary desktop investigation was conducted in order to assess potential historical and pre-contact archaeological and heritage resources within the study area. This investigation included a review of the Archaeological Services predictive modelling information provided by Brent Suttie (pers. comm.) of Archaeological Services Unit (ASU) of the New Brunswick Department of Wellness, Culture and Sport (NBDWCS) and reviewing the New Brunswick Historic Places Database (NBDWCS, 2013), the Canadian Inventory of Historic Buildings (CIHB) (Parks Canada, 2013a) and Historic Places of Canada (Parks Canada, 2013b).

Provincial and Federal Heritage Resources/Buildings

According to the NBDWCS, the Historic Places Unit of the Heritage Branch, there are no designated Provincial Historic Sites or Districts within the exploration area. The nearest designated Provincial Historic Site is the Albert Mines Provincial Historic Site at Albert Mines, located west of the exploration area. According to Canada's Historic Places, Albert Mines Site is a 324 hectare defunct mine site containing outcrops of albertite (a shiny brown to black hydrocarbon rock classified as bitumen), visible ruins including mine shafts, tailings piles, manager's house and a church.

Several inventoried historic structures are documented in the communities of Stoney Creek (4), Weldon (13) and Hillsborough (76).

The CIHB also indicated three (3) Canadian historic places located more than 5 km east of the exploration area within the town of Hillsborough: Old Hillsborough Post Office, Willy Duffy House and Allison Peck House.

Archaeological Resources

Based on the Archaeological Predictive Modelling provided by the ASU, the majority of the exploration area shows low potential for archaeological and heritage resources. There are a few high and medium potential areas for archaeological and heritage resources predominately within the floodplain of major watercourses. Refer to Appendix I for the Archaeological predictive mapping.

The well pads have been sited to remain outside of the buffer of any sensitive archaeological feature in order to avoid further intrusive investigations. Therefore, a Heritage Resource Impact Assessment will not be conducted as part of the Phased EIA process.

3.10 Aboriginal Land and Resource Use

Pet-Kout-Koy-ek, one of several original versions of the name now written as Petitcodiac and otherwise meaning 'the river that bends like a bow', is home to the native Mi'gmaq people represented today in the region by the Fort Folly First Nation (FFFN).

The most important aboriginal settlements on the Petitcodiac River were situated at Beaumont near the mouth of the river and in the region of the present-day village of Salisbury where the Mi'gmaq had established an important winter camp. Several burial sites exist along the Petitcodiac River but remain unmarked, the only exception being at Beaumont, the site of a First Nation cemetery dating back to the 1800's. Beaumont is located on the east side of the Petitcodiac River approximately 8 km west of the proposed well pad areas.

FFFN Band is located in Dorchester, New Brunswick, about 13km west of Sackville, New Brunswick, and about 40km east of Moncton, New Brunswick. The FFFN is located approximately 15km east of the exploration area. The community resides on approximately 40 hectares of land and has a registered population of 106. Elispogtop First Nation has lands in the vicinity of Barry Mills, which is within a 30 to 40km radius of the project. Bouctouche FN is approximately 70 to 80km from the project area.

There are no known aboriginal lands or first nations located in the exploration area. The proposed well pad leases are held by surface land owners. Contact will consult with Aboriginal Affairs New Brunswick (AANB) to determine if there are consultation requirements for the surrounding aboriginal communities.

3.11 Land Use

The Salem area is primarily rural settlement including woodlots, agricultural lands and some light industrial activity (i.e., gravel pit and quarry). Residential properties are generally situated east and west of Highway 910.

The area is under the jurisdiction of the Regional Service Commission #7 and is subject to the Rural Plan established for the Westmorland- Albert Area. Zoning of the two properties is Agricultural – A Zone and oil and gas exploration is a permitted use. It should be noted, that the minimum setback distance from a residence is 200m in accordance with the zoning. This setback has been met for both well pad locations.

Well Pad J-86

The surface lease on PID No. 00615468 is situated on unoccupied land and identified on Service New Brunswick (SNB) as a woodlot (woodland). During the site visits conducted in the summer of 2010 and 2013, the land use at the proposed site was noted as having varying degrees of activity from both present and past forestry activities with some limited local recreational activities such as hunting and all-terrain vehicle (ATV) use. The nearest residences are located approximately 450m of the proposed well pad location. Current access roads are primarily used for harvesting activities and ATV use.

Well Pad L-85

The proposed surface lease on PID No. 05055074 is situated on unoccupied land on SNB. Field investigations conducted in August 2013 identified the property as having limited activity with some recreational ATV use from the local residents. The nearest residences are located approximately 750m south of the proposed well pad location. Current access roads are primarily used for harvesting activities and ATV use.

4.0 SUMMARY OF ENVIRONMENTAL IMPACTS

The assessment of potential impacts has been undertaken in consideration of the project, as well as potential accidental events/malfunctions, for the exploration of oil and natural gas reserves in the Salem area, specifically at sites located off Route 910.

4.1 Approach to the Assessment of Environmental Impacts

A central component of the environmental assessment process is to identify the anticipated impacts on the environmental features resulting from the construction and operation of the proposed project. The approach taken involves identifying the potential for the project to interact with the existing environmental components which are present at the project locations. This step is shown in a simple matrix format. Following this identification of potential interactions, the effect of the interaction is evaluated with consideration of the time in which it may occur and the space in which it may occur. Mitigation is identified for each effect and the significance of each interaction is established. Best management practices, as specified in the "Rules for Industry" have been identified as appropriate mitigative measures. The significance of the resultant effect was evaluated using the following questions as a guide:

1. What is the magnitude of the effect?
2. What is the geographic extent of the effect?
3. What is the duration (short or long term) and frequency of the effect?
4. How does the net effect compare to the existing environment? Does it represent a substantive or order of magnitude negative change in baseline conditions?
5. Is there a substantive public, government or agency concern?
6. What is the ecological and/or social context for the effect?
7. Is the effect reversible?

4.2 Project Interaction Matrix

The project components identified in Section 2 are indicated under "Project Components" in Table 4.1. All components of the existing environment (biophysical and socioeconomic) identified in Section 3 are indicated under "Environmental Components". This is the initial screening to determine if an interaction between the project and the environmental component is possible.

Table 4.1- Project interactions with environmental components

Environmental Components		Project Components		
		Access road construction	**Well pad construction**	**Drilling**
Atmospheric	Ambient Air Quality	✓	✓	✓
	Climate	N/A	N/A	N/A
	GHG Emissions	✓	✓	✓
	Ambient Noise Quality	✓	✓	✓
Hydrogeology	Groundwater	N/A	N/A	N/A
Aquatic	Surface Water	N/A	N/A	N/A
	Wetlands	N/A	N/A	N/A
Terrestrial	Vegetation (Flora)	✓	✓	✓
	Wildlife (Fauna)	✓	✓	✓
	Migratory Birds	✓	✓	✓
	Designated Habitat and other Protected Areas	N/A	N/A	N/A
Species at Risk	Flora/Fauna and Associated Habitat	N/A	N/A	N/A
Socio-Economics	Archaeological / Cultural Heritage Resources	N/A	N/A	N/A

Environmental Components		Project Components		
		Access road construction	**Well pad construction**	**Drilling**
	First Nations / Aboriginal Interests	N/A	N/A	N/A
	Recreational Fisheries, Hunting	N/A	N/A	N/A
	Land Use	✓	✓	N/A

Notes: "✓" signifies potential interaction
"n/a" signifies no interaction

4.3 Potential effects

An analysis of the potential effects of the interactions identified in Table 4.1 is presented in Table 4.2. For each of these effects, proposed mitigation, and predicted residual effects were determined. The predicted residual effect assumes that each of the recommended mitigation measures is implemented. The significance of the residual effect is based upon an evaluation of the effect's magnitude, geographic extent, duration/frequency, irreversibility and ecological context.

Table 4.2- Potential Project Effects

Environmental Component	Project Activity	Effect	Mitigation	Residual Effect	Level of Significance
Ambient Air Quality	Road construction Well Pad Construction	Generation of fugitive dust	• Application of dust suppressants when required; • Stabilize exposed soils as soon as practical; • Limit onsite vehicle speed; • Equipment will be properly maintained in good working order; and • Anti-idling policy will be set up for the site.	Residual effects are not likely significant due to limited magnitude, extent, duration and reversibility, provided mitigation is put in place and applicable regulations are followed.	Low
GHG Emissions	Road/Well Pad Construction Drilling	Generation of GHG	• Road and well pad construction anticipated to generate only 50 tonnes of CO_2e. Calculations are presented in next section. • Well drilling is anticipated to generate 126 tonnes of CO_2e.	Residual effects are not likely significant due to limited magnitude, extent, duration and reversibility, provided mitigation is put in place and applicable regulations are followed.	Low
Ambient Noise	Road/Well Pad Construction Drilling	Increased Noise impacts	• Construction will only take place between 7 am and 7 pm. Anticipated sound pressure levels from construction are not anticipated to exceed the 50dBA Leq. • Predicted sound pressure levels during drilling are not anticipated to exceed 50dBA during the day and 40dBA during the night. Results of noise modeling are presented in subsequent sections.	Residual effects are not likely significant due to limited magnitude, extent, duration and reversibility, provided mitigation is put in place and applicable regulations are followed.	Low

Environmental Component	Project Activity	Effect	Mitigation	Residual Effect	Level of Significance
Terrestrial Environment • Flora and Fauna • Migratory Birds	Road Construction Well Pad Construction Drilling	Noise and Light Disturbance Exterior lighting associated with drilling during night time operations Loss or alteration of habitat	• Equipment to be maintained in proper working order, including pollution control devices. • Any nuisance wildlife as identified under the *Nuisance Wildlife Regulation* (97-141) of the *Fish and Wildlife Act* identified as disrupting production operation may only be removed by a licensed Nuisance Wildlife Control Officer or a licensed trapper • Exterior lighting would use motion sensing devices (where practical). • If heights of infrastructure associated with the project exceed 30m, Contact will refer to the Environment Canada (CWS) draft document "Bird-Friendly Buildings: Best Management Practices for Tall Structures" for additional mitigation to minimize the potential impacts to migratory birds from lights/flares. • Clearing activities are to be conducted outside of the breeding bird season (May 1st to August 31st) • If clearing is required during the breeding bird season, Contact shall employ a bird specialist to conduct pre-construction nesting bird surveys prior to clearing	Residual effects are not likely significant due to limited magnitude, extent, duration and reversibility, provided mitigation is put in place and applicable regulations are followed.	Low

Environmental Component	Project Activity	Effect	Mitigation	Residual Effect	Level of Significance
			• Only those areas necessary for road construction and well pad areas will be cleared and grubbed to minimize impacts to wildlife and wildlife habitat • Trucking and movement of equipment is to take place along designated trucking routes. • Machinery should be muffled. • Construction activities will be carried out during times acceptable to local authorities and after the migratory and breeding season, where possible. • Food scraps and garbage are to be removed from the work site or maintained in secured garbage bins to avoid attracting wildlife • Waste generated on-site shall be securely stored in drums or containers until it is removed to an approved facility		
Land Use	Road Construction Well pad construction	Potential impacts to road quality Increased noise and road traffic	• Standard emissions controls on equipment • Use approved dust suppression when necessary • Minimize idling time of equipment • The Proponent will work to reduce noise levels associated with the project by using appropriate machinery/equipment	Residual effects are not likely significant due to limited magnitude, extent, duration and reversibility, provided mitigation is put in place and applicable regulations are followed.	Low

Environmental Component	Project Activity	Effect	Mitigation	Residual Effect	Level of Significance
		that could disturb local residences.	for the project and ensuring machinery/equipment is muffled to mitigate disturbance to nearby residents. ● Work is to be carried out during times acceptable to local residence to mitigate any disturbance ● Construction activities will be carried out from 7am to 7pm or at times acceptable to local authorities to avoid disturbance to residents in the area		

4.4 Phase II

The potential effects and mitigation measures for the activities associated with Phase II will depend on the type (if any) of petroleum or natural gas discoveries made, and the potential production facilities required (if any), the specific location of the new wells, new production facility, potential gathering lines and existing infrastructure at that particular location. Having an understanding of the potential activities and knowledge of the baseline environmental data in the wellfield will allow for a high level determination of potential effects and mitigation measures to implemented.

Prior to commencing any of the Phase II activities, and once the location of any additional wells, production facility and potential pipelines is known, Contact will submit updated project information (including baseline environment data, updated project information, potential impacts and mitigation measures). This additional information will be submitted as an addendum to this EIA Registration document.

4.5 Summary of Mitigation

The scope of the project is limited to well pad construction and exploration activities. The interactions with environmental components will arise primarily from site development and exploratory drilling. Contact has committed to complying with the "Rules for Industry". In addition, as indicated in Section 4, standard operating procedures employed by Contact will be followed to mitigate the potential effects of all interactions. As well, operating protocols established for other wells owned and or operated by Contact will be brought forward to this project and followed.

With these commitments and measures in place, there will be no significant residual impacts from the exploration for petroleum at Well Pad J-86 and Well Pad L-85.

5.0 PUBLIC CONSULTATION

INTRODUCTION

In accordance with the New Brunswick EIA Regulation (87-83), public notification of the proposed project is required. Evidence of notification will be provided to the NBDELG within 60 days of registration of the project. As specified in the "Rules for Industry", public consultation is required. Although the extent of the consultation is specified in the Rules for Industry, the requirements for consultation in the Guide to Environmental Impact Assessment in New Brunswick (2012) are more stringent. In developing the consultation plan for the Contact project, both documents have been considered.

COMMUNICATIONS OBJECTIVES

The following objectives have been established by Contact to ensure effective communications with the stakeholders and public:

1. Keep the public informed about the project through timely and meaningful information updates related to project progress, challenges, and construction impacts.

2. Consult with affected stakeholders in a timely manner in an effort to mitigate impacts.

3. Provide the public and interested stakeholder groups with opportunities to be involved and learn more about the project.

PAST OPEN HOUSE FORUMS

Contact has been active in the Stoney Creek area, near Hillsborough. To support the project, Contact has held four (4) Open Houses over the last eight (8) years in Hillsborough to discuss the proposed oil and gas activities. These events are summarized as follows:

- **May 26, 2005**, an Open House was held at the Kiwanis Community Center Hall in Hillsborough and was attended by approximately 75 to 100 people. Contact presented information on their plans for a 3D seismic program as well as potential drilling and operations. Residents, businesses and landowners within and near the site were invited by a mailed invitation to postal codes for the surrounding areas.

- **February 2, 2006**, at the Kiwanis Community Center Hall in Hillsborough, NB. Approximately 100 to 125 people attended the session, which was advertised through a mailed out invitation. Contact presented the results of the seismic program, discussed

plans to drill multiple wells in the well field and to install a production facility at the site. The information presented included pictures of the drilling operation, well pumping equipment, and photos of a typical production facility. Many of those in attendance were familiar with past operations at the Stoney Creek Well Field and what the machinery associated with the project activities looked like.

- **May 11, 2006**, at the Kiwanis Hall in Hillsborough, NB. Approximately 70 people attended the session, which was advertised through mailed invitations. Contact presented information on the EIA process, drilling site locations, the proposed future drilling plan and pipeline (gathering lines) routing, monitoring, and study area environmental features. Concerns were expressed regarding project impact on: springs and water, noise/light, contamination to organic farm, impact on forestry/environmental management, effect on level of water table, excess pollution/contamination of community, impacts from "inspection method" of oil recovery damaging environment, tourism, and use of Beech Hill Road. Some respondents (24%) indicated that they felt the project would have a positive effect on community development/employment.

- **June 8, 2011** at the Kiwanis Hall in Hillsborough, NB. Approximately 54 people attended the session, which was advertised through 2,934 flyer mailed invitations and notices were also posted on the Contact Exploration and throughout various locations in the Village of Hillsborough (i.e., Village Office bulletin board, Legion bulletin board, Kiwanis building bulletin board, Two Irving gas stations, Drug Store). Contact presented their corporate information including:
    - Regional and local land base, personnel and maps showing project area and drilling activity
    - Background information about the Stoney Creek and Hopewell prospects with accompanying satellite maps, reservoir mappings and educational material describing the science (geology) of the formations where they are located
    - Detailed the process of horizontal drilling, the technical aspects associated with well placement (and well pad usage), and the provincial regulatory process of water protection and usage, complete with diagrams to assist in the distinction between horizontal wells and ground water wells
    - Outlined the well fraccing process and its outcome, water usage associated with fraccing, and an explanation of the proposed pipeline, accompanied by a map and corporate construction practices for the pipeline
    - Explained the Phased EIA process, map of the study area, the management of health and safety discussing best practices, and provincial

regulations Contact adheres to regarding operational requirements such as report submissions surrounding production, emission and waste.

Many of those in attendance at the four open house sessions were familiar with previous activities associated with the historical oil and natural gas development at the Stoney Creek Well Field.

SALEM OIL AND GAS EXPLORATION PUBLIC NOTIFICATION PROCESS

The proposed public consultation approach will include the following activities:

Step 1 – Direct written communications to elected officials and community groups.

Step 2 – Direct written communications to area residents.

Step 3 – Make the Registration documentation available to public and all stakeholders.

Contact will approach the Mayor and Council of the Village of Hillsborough to give a public presentation of the proposed well pads and the associated activities. The same presentation will be made to the Regional Service Commission 7, whose Board is comprised of all local Mayors.

DIRECT COMMUNICATIONS (STEP 1)

As stated in Step 1 of Appendix C of the EIA Guide [NBDELG 2012], "The Proponent shall communicate directly with elected officials, local service groups, community groups, environmental groups, and other key stakeholder groups enabling them to become more familiar with the Undertaking and ask questions and/or raise concerns". Contact will achieve this through:

- Notification mail-out sent to local elected officials, service groups, environmental groups and other key stakeholder groups as identified in Table 1. Each letter will contain the following information:
    - Brief description of the proposed Undertaking;
    - Description of the location for the proposed Undertaking;
    - Map showing the location of the proposed Undertaking;
    - Status of the Provincial Regulatory Approval process;
    - Statement indicating that members of the general public can ask questions and/or raise concerns with Contact regarding any and all environmental impacts; and

- Date when the public comment period expires.

Table 5-1 Elected Officials, service groups, environmental groups and stakeholders to be contacted

Association
Local MLA
Mayor of Hillsborough
Planning Director, Region 7, New Brunswick Regional Service Commission
Fort Folly First Nations
Director, Petitcodiac Riverkeeper
Within 1.8 km of Salem Well Pad Areas

DIRECT WRITTEN COMMUNICATIONS TO AREA RESIDENTS (STEP 2)

Direct written communications regarding the Undertaking and its location will be conducted with potentially affected local residents, landowners and individuals. The written notification, including the required content of Public Notices [NBDELG, 2012], will be sent through the mail. The letter will be directed to all residents and landowners within 1.8 km of the Undertaking.

Similar to Step 1, each letter will contain the following information:

- Brief description of the proposed Undertaking;
- Description of the location for the proposed Undertaking;
- Map showing the location of the proposed Undertaking;
- Status of the Provincial Regulatory Approval process;
- Statement indicating that members of the general public can ask questions and/or raise concerns with the Proponent regarding any and all environmental impacts; and,
- Date that the public comment period expires.

REGISTRATION DOCUMENT AVAILABILITY (STEP 3)

Contact will provide a copy of the Registration document to the NBDELG office in Fredericton, the Regional NBDELG office in Moncton, the Village of Hillsborough Office, and the office of Regional Service Commission 7. Requests for copies from the public, stakeholders and First

Nation communities will be honoured by providing a copy of the Registration document directly. Subsequent submissions in response to issues raised by the Technical Review Committee will be made available upon request.

6.0 APPROVAL OF THE UNDERTAKING

It is anticipated that the following permits, approvals, licenses or other forms of authorization may be required for the Project:

- Certificate of Approval to Construct/Operate under the *Air Quality Regulation - Clean Environment Act*;
- A Rehabilitation Plan which describes site closure activities; and,
- New Brunswick Department of Transportation and Infrastructure (NBDTI) haulage permits for over-weight and over dimension loads.

There are currently no known permits, approvals, licenses or other forms of authorization from a federal authority to enable the Project to be carried out at this time. Contact will consult the NBDTI in advance of the proposed project to ensure that the department's concerns are addressed and the required permits are obtained for truck traffic on public roads.

SIGNATURE

MAY 27TH/2014

DATE

SIGNATURE OF CHIEF EXECUTIVE OFFICER

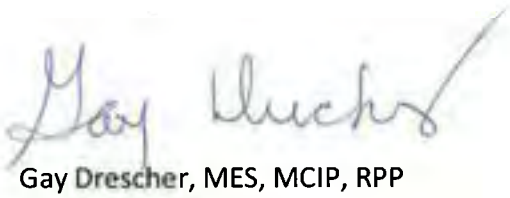
7.0 CLOSURE

This report was prepared by Dillon Consulting Limited (Dillon) on behalf of Contact Exploration Inc. Dillon has used the degree of care and skill ordinarily exercised under similar circumstances at the time the work was performed by reputable members of the environmental consulting profession practicing in Canada. Dillon assumes no responsibility for conditions which were beyond its scope of work. There is no warranty expressed or implied by Dillon.

The material in the report reflects Dillon's best judgment in light of the information available to Dillon at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Yours Truly,

DILLON CONSULTING LIMITED



Gay Drescher, MES, MCIP, RPP
Project Manager

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APPENDIX A

Signed Property Agreement

(to be provided at a later date)

APPENDIX B

Baseline Field Reports

June 29, 2010

DILLON
CONSULTING

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CONTACT EXPLORATION INC.
Suite 400
750-11th Street S.W.
Calgary Alberta
T2P 3N7

ATTENTION: Mr. Raymond Sully, P.Eng
Chief Operating Officer

Initial Baseline Environmental Evaluation for Proposed Natural Gas Well, Salem (PID 00615468), Albert County, New Brunswick

Dear Mr. Sully:

Dillon Consulting is pleased to present the initial baseline environmental evaluation for the proposed natural gas well to be located on PID# 00615468 in Salem, located west of the Village of Hillsborough, NB. This site is the proposed location of a surface lease that would accommodate the construction of a new natural gas exploration well. The property is located off the Old Dawson Road and Steevesote Road. This evaluation is based on a review of available background information (completed as part of the environmental review conducted by Dillon in June 2010) and a site walk-over on June 21, 2010. The purpose of this baseline evaluation was to determine the site-specific observable environmental condition and natural features of the proposed surface lease location prior to preparing the site for drilling.

BACKGROUND

The proposed Salem surface lease, located southeast of Moncton, NB, consists of undeveloped forest land. Contact Exploration Inc. is investigating the potential for further development at this property (i.e. preparation of the surface lease and development of an access road to the property).

The site walk-over was conducted by a Recognized Wetland Delineator (senior biologist) and an intermediate biologist. These biologists have a combination of experience related to terrestrial and aquatic habitat assessment as well as site contaminant management and remediation. The site walkover was used in addition to the review of existing background data (e.g., Species at Risk information, wetland mapping) in order to confirm what conditions were existing at the site.

The following sections summarize the observations made during the site walk-over and review of existing background information.

SUMMARY OF FINDINGS

General Site Conditions

The field survey (walk-over) was conducted within and around the proposed surface lease in Salem (PID #00615468). Permission was obtained from the property owner, , at the time of the assessment, and prior to accessing the land.

Debris on site at the Salem property.

Current Environmental Conditions

The proposed site has had varying degrees of activity from both present and past forestry activities. Various types of debris (e.g., wood, metal drums, and old tires) were noted within the boundaries of the proposed surface lease at the time of the site visit. It is suspected that these items had been used for paintball recreational activities on the property.

The proposed Salem surface lease is approximately 1.2 ha in size, with dimensions of 110 m by 110 m. There are no residential properties located within a 1 km radius of the proposed surface lease. This area is generally used for recreational (i.e., hunting, ATV trails, and snowmobile) and forestry activity.

Forest Habitat Information

The current forest cover consists of hardwood/softwood mixed stands of immature to mature forest habitat dominated by stands of balsam fir (*Abies balsamea*), maple (*Acer sp.*) and balsam poplar (*Populus balsamifera*) with the exception of the northwest section which borders an old (<10 years) clearcut/harvested area. This previously harvested area

consists of regenerating stands of white spruce (*Picea glauca)*, balsam poplar (*Populus balsamifera*), red maple (*Acer rubrum*), birch (*Betula sp.*) and willow (*Salix sp.*) with a herbaceous layer of red raspberries (*Rubus idaeus*), golden rod (*Solidago canadensis*), grasses (*Graminoids sp.*) and sedges (*Carex sp.*) consistent with moist woodlands and forested wetland areas. Other less dominant species noted in the area were common to clear cut/regenerating habitats within New Brunswick. There was no evidence of surface contamination or stressed vegetation within the proposed surface lease. The plant species identified in this area are commonly found in this habitat and are not considered to be flora with a unique or sensitive status within the province of New Brunswick.

Forest habitat within the proposed surface lease at Salem.

Wildlife Use

There is evidence of wildlife use (e.g., deer, moose, bear, coyote, birds, and snowshoe hare) at this site in the form of tracks, browse, visual sightings and droppings. The property is accessed via the Old Dawson Road which egresses west of the Stevescote Road.

Aquatic Habitat Information

The surface water drainage flows to the north and the west and drains towards Frederic Brook and Cat Brook, respectively. According to the DNR depth to water table mapping, water flow is modeled to flow in a southern direction, however, due to past harvesting activities and woods road construction in the area, the drainage has been divided to flow in north and south directions. A small unmapped intermittent ephemeral channel was noted with little to no water. During the spring thaw and rain events, this watercourse would likely flow in a northern drainage off the property crossing the Old

Dawson Road and flow along the ditch that drains into Frederic Brook. The watercourse and forested wetland in this northwestern corner of the property has been avoided and the location of the surface lease has been offset 50 m in order to avoid interfering with these aquatic features.

Small (<0.5 m) watercourse with a dry channel and forested wetland located approximately 150 m from the proposed well center

The proposed surface lease has been offset southeast of this area to avoid any disturbance to these water features. Any runoff from the surface lease would flow southeast into immature hardwood mixed forest habitat as shown in the picture below.

Forest habitat located southeast of the proposed surface lease at Salem.

Environmentally Sensitive Areas

Review of available information for the study area has indicated that none of the following environmentally significant areas are in proximity to the proposed surface lease:

- Important Bird Areas;
- Environmentally Significant Areas;
- Ramsar Sites;
- New Brunswick Protected Wellfields;
- New Brunswick Protected Watersheds;
- Heritage Sites;
- Migratory Bird Sanctuaries;
- National Wildlife Areas; and/or
- New Brunswick Protected Natural Areas.

➢ *Species of Concern*

The New Brunswick Department of Natural Resources (NBDNR) has identified one record in the DNR Species at Risk Database within a 5 km radius of the proposed surface lease: a Bald Eagle (*Haliaeetus leucocephalus)* (NB Endangered) nest site on Weldon Creek just east of Rte 114, located approximately 3 km east of the proposed surface lease. These proposed exploration activities are unlikely to affect the Bald Eagle nesting site (due to distance).

The Atlantic Canada Conservation Data Centre (ACCDC) has provided information on Species at Risk potentially occurring within a 5 km radius of the surface lease. The

ACCDC has identified two (2) flora species ranking from S2 (rare) to S3 (uncommon) and 16 fauna species including one (1) fish species, two (2) wildlife species and 13 bird species ranking from S1 to S3S4. There were no plant, bird, or wildlife species records noted within the property in question. During the site visit, there were no species of concern, or their habitat, observed in the area of the surface lease. It was determined that available habitat for these species was low in and adjacent the proposed surface lease.

- ***Heritage Sites***

A review of the potential to encounter areas of archaeological or heritage significance was previously completed by Dillon for Contact's well at Shenstone (G-75-2328), a property approximately 2.5 km to the southeast off Fairview Road. That information has been used in this report.

According to the New Brunswick Historic Places Unit of the Heritage Branch, Department of Wellness, Culture and Sport, there are no designated Provincial Historic Sites or Districts within the area of the proposed well. Currently there is one designated Provincial Historic Site located approximately 1 km west of the study area, west of Albert Mines known as the Albert Mines Provincial Historic Site, it covers 324 ha (PID 00614446). This Historic Site is located beyond the Salem site.

The Canadian Inventory of Historic Buildings (CIHB) indicates 77 inventoried historic structures in Hillsborough. In addition a database search for other surrounding communities in the study area was undertaken. The results indicate an additional 118 structures inventoried in the following communities; Albert Mines (24), Edgetts Landing (35), Greys Island (0), Isaiah Corner(0), Oak Hill(0), Pound Hill (0), Salem (3), Steevescote (0), Surrey (43) and Weldon (13) substantiating the long cultural history of this region.

- ***Groundwater***

Oil and gas exploration wells are generally terminated at much greater depths than domestic water wells and the drilling programs must meet specific standards that are protective of the aquifers in the area, however, there are no residential properties located within a 1 km radius of the proposed surface lease.

Conclusions

The proposed surface lease appears to have no identified significant or adverse environmental concerns at the proposed location. The proposed surface lease is in a location that has been previously disturbed from tree harvesting. As a result, it is unlikely that environmental features in the area will be negatively impacted as a result of the proposed activities.

Contact Exploration should identify and implement appropriate measures (mitigation and contingency plans) to prevent accidents, including proper handling of petroleum product and waste handling during the construction activity.

Contact Exploration should also ensure that project activities have been appropriately permitted and/or approved by the relevant government departments.

With the exception of the potential for discovery of previously contaminated soils, it is unlikely that activities proposed to install a gas well at this location will result in a negative residual impact on the surrounding environment.

We trust that the information contained in this letter is satisfactory for your needs at this time. Should you have any questions, please do not hesitate to contact the undersigned.

Yours sincerely,

DILLON CONSULTING LIMITED

Andrea Youssef, M.Sc.C.E. (Environment)
Regulatory Coordinator

AJY/slp
attachments

August 7, 2013

Contact Exploration Inc.
Suite 400
750-11th Street S.W.
Calgary Alberta
T2P 3N7

ATTENTION: Mr. Raymond Sully, P.Eng
Chief Operating Officer

Initial Baseline Environmental Evaluation for Proposed Natural Gas Well (L-85), Salem (PID 05055074), Albert County, New Brunswick

Further to your request, a field survey was conducted within the vicinity of the proposed well pad located on the property denoted by PID No. 05055074 in Salem, NB on August 6, 2013. There were no apparent environmental constraints other than an unmapped wetland feature located 20m to the south of the proposed wellpad location. If possible we recommend moving the wellpad 10m north to maintain a 30m buffer. At the time of the site visit we did not observe any environmental constraints in the field that would prevent shifting the wellpad to maintain the buffer. Below is a brief summary of the finding of our biologist' site visit.

Adjacent Property Use:

The nearest residence is located approximately 750 m south of the proposed well pad area.

Forest Habitat Information:

The forest cover in the area generally consisted primarily of a mix of immature hard and softwood stands of primarily immature balsam poplar, maple, birch and spruce trees with the exception of the southern section which is comprised of a large wet area that is not mapped on the GeoNB website. The wet area, located approximately 20 metres south of the proposed well pad location, consisted primarily of birch, willow and alder with a herbaceous layer of blueberries, golden rod, grasses, sedges, and ferns, which is consistent with moist woodlands and forested wetlands areas. Evidence of surface contamination or stressed vegetation within the proposed well pad property was not noted. The plant species identified in this area are commonly found in this habitat and are not likely to be considered flora with a unique or sensitive status within the province of New Brunswick.

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Dillon Consulting Limited

Wildlife Use:

There is evidence of wildlife use (*e.g.,* moose and deer) at this site in the form of tracks, browse and droppings. Wildlife use was more commonly noted in the wet area.

Aquatic Information:

Mapped watercourse or provincially regulated wetlands were not identified in the vicinity of the proposed well pad area; however, a mapped watercourse, which is contiguous with a provincially regulated wetland, is located approximately 450 m north of the location near the northern property boundary. Additional watercourses were not identified in the field in the vicinity of the proposed well pad area.

Additionally, as previously mentioned a large wet area, which is consistent with wetland habitat is located 20 m south the proposed well pad area. Although this feature is not mapped it may be considered a groundwater sources, and as such it is recommended that a 30 m buffer be established from the edge of the feature and that the location of the proposed well pad area be moved north to avoid potential interaction with the feature.

The nearest residence is located approximately 750 m south of the proposed well pad area.

We trust that the information contained in this letter meets your requirements at this time. If you have any questions, or if you require any additional information, please contact the undersigned at 444-8820.

Yours truly,
DILLON CONSULTING LIMITED

Geoff Allaby, P. Geo

APPENDIX C

NBDNR Well Applications

Reset

APPLICATION FOR A WELL AUTHORIZATION

Form to be submitted in duplicate at least 14 days prior to the desired spud date and accompanied by the required fee, deposit, agreement with the owner of the surface rights, and survey plan, to the Director, Minerals and Petroleum Development Branch, Department of Natural Resources, P.O. Box 6000, Fredericton, New Brunswick, E3B 5H1, or delivered to 1350 Regent St., Fredericton, New Brunswick, E3C 2G6.

The undersigned operator in compliance with the regulations under the *Oil and Natural Gas Act* applies for a well authorization to drill:

1. Well name: **Contact Salem J-86-2328**

2. Location: Unit **J** Section **86** Grid Index No. **2328** Elevation: Gr. **51.7** K.B. **55.7**

   Grid Latitude: **46 Degrees** Grid Longitude: **64 Degrees - 30 Min**

   Well Latitude: **45-55-36.51099** Well Longitude: **64-42-26.66740**

3. Applicant's Name: **Contact Exploration Inc.**

   Address: **400, 510 - 5th Ave SW, Calgary, AB, T2P 3S2**

4. Expected completion: Oil ☐ Gas ☑ in

(Formation)	(Depth m)
Hiram Brook, Second to Fourth Sandstone	1308 - 2100

5. Expected total depth: **Hiram Brook, Fourth Sand** Formation at total depth: **2178**

6. Title: **01-01/86** (Licence / Lease ID) Title Holder: **Contact Exploration Inc** (Licensee / Lessee)

7. Surface Rights Owner:

   Address:

8. Right of Entry ☐ Obtained ☑ Under Negotiation ☐ Pending

9. Proposed starting date: **Oct 1, 2010** Proposed spud date: **Oct 2, 2010**

10. Proposed casing and cementing program.

Program	(1) Bit Size	(2) Casing, outside diameter	(3) Weight (kg/m)	(4) Make	(5) New or Used	(6) Setting Depth (m)	(7) Cement (m^3)
Surface	**279/222**	**178**	**25**	**H-40**	**N**	**379**	**5**
Main	**159**	**114**	**17**	**J-55**	**N**	**2178**	**21**

11. Control Equipment and Expected Oil, Gas and Water Zones: **See attachment**

12. Drilling Fluid: **Gel/Chem** Sump Construction: **Earthen Pit**
(Earth Pit, Tank, Lined Pit, etc.)

13. Type of Security: ☐ Cash ☐ Bearer Bonds ☐ Term Certificates ☐ Bond ☑ Promissory Note

14. Drilling Contractor: **Nabors**
Address: **Calgary, AB**

15. Rig Name: **Nabors 112** Rig Licence No.: **112** Rig Size: **1800m Hybrid**

16. Remarks: **Vertical well to obtain gas production from Hiram, Second to Fourth Sandstones.**

17. Responsible Agent of Applicant:

At well site	**Bill Weir**	At local office	**Geoff Morrison**
Address	**Calgary, AB**	Address	**Calgary, AB**
Telephone	**403-262-8595**	Telephone	**403-262-8595**

Dated at **Calgary, AB** this **30** day **June** 20 **10**

Signed by _____ Position C.O.O.

Approved subject to conditions specified on the well licence

New Nouveau Brunswick

DRILLING PROGRAM

FIELD Salem WELL Contact Salem J-86-2328

LOCATION J-86-2328

DRILL X DEEPEN ELEVATION: GL 51.7 KB 55.7 TOTAL DEPTH (m) 2178

REMARKS Drilling a vertical well to provide gas from Hiram, Second to Fourth Sandstone

1. NAME OF SURFACE FORMATION: Top Sussex Group

2. ESTIMATED TOPS OF IMPORTANT GEOLOGICAL MARKERS:

FORMATION	APPROXIMATE TOP (m)	FORMATION	APPROXIMATE TOP (m)
Top Sussex Group	508	Hiram. Third Sand	1923
Top Albert Group	1088	Hiram. Fourth Sand	2078
Hiram. One Sand	1188	Total Depth	2178
Hiram. Second Sd	1308		

3. ESTIMATED DEPTHS OF ANTICIPATED WATER, OIL, GAS OR OTHER MINERAL-BEARING FORMATIONS:

FORMATION	DEPTH (m)	TYPE	FORMATION	DEPTH (m)	TYPE
Hiram. One Sand	1188	Gas			
Hiram. Second Sd	1308	Gas			
Hiram. Third Sand	1923	Gas			
Hiram. Fourth Sd	2078	Gas			

4. CASING PROGRAM (O = OLD, N = NEW):

	SURFACE	O/N	INTERMEDIATE	O/N	OIL STRING/LINER	O/N
HOLE SIZE	279				159	
PIPE SIZE	178				114	
GRADE	H-40	N			J-55	N
WEIGHT	25				17	
DEPTH	379				2178	
CEMENT	Class A				Class G	
TIME WOC	12					
CASING TEST						
OTHER						

REMARKS For cementing details refer to page BJ cement program

5. BOPE: As per rig inventory

6. MUD PROGRAM:

DEPTH INTERVAL (m):	TYPE	WEIGHT	VISCOSITY	WATER LOSS
379	Gel Water	1060-1100	as required	no control
379-800	Water	1000	28	no control
800-2178	Gel Chem PHPA	1080-1100	45-60	8-12

7. AUXILIARY EQUIPMENT:

8. LOGGING PROGRAM:

SURFACE DEPTH (m) 379m - none

INTERMEDIATE DEPTH (m)

OIL STRING DEPTH (m)

TOTAL DEPTH (m) 2178m - As per logging program - DIL, CNL-FDC, SONIC

9. MUD LOGGING UNIT:

SCALES: 2" = 100' _____ to _____ ; 5" = 100' _____ to _____

				FORMATIONS	APPROXIMATE DEPTH (m)	APPROXIMATE LENGTH OF CORE (m)
CORE	none	DST	none			
CORE	none	DST	none			

11. ANTICIPATED BOTTOM HOLE PRESSURE/TEMPERATURES/HAZARDS AND PLANS FOR MITIGATING:
Potential problems include lost circulation on surface hole - LCM onsite, and sloughing on main hole - PHPA

12. COMPLETION & REMARKS: Fracing to be completed at a later date.

APPROVED: GEOFF MORRISON, DRILLING MANAGER DATE: June 29/2010

To accompany "Application for Well Authorization"

Contact Exploration Inc.

CONTACT SALEM

J-86-2328

Drilling Package Contents

Application for Well Authorization
New Brunswick Drilling Program
Stick Diagram
Drilling Program
Geological Prognosis
Survey
ERCB Surface Casing Calculations
Rig Information
Cementing Program

TRISTAR
Resource Management Ltd.

Contact Exploration Inc.

Vertical Drilling Program

WELL NAME: CONTACT SALEM J-86-2328
LOCATION: J-86-2328
LICENCE:

AFE NUMBER:
GL ELEVATION: 51.7 m
KB ELEVATION: 55.7 m (est.)

WELLHEAD
229mm x 219mm
21MPa
Casing Bowl

EVALUATION	DEVIATION	ZONE	DEPTH KB	DEPTH SS	BITS	CSG. & CMT.	MUD
	Survey every 30m. Maximum allowable deviation is 1°. Maximum allowable rate of change is 1° / 30m.	Windsor-Hillsborough	0	78	222 mm	Run 177.8 mm, 25 kg/m, H-40, ST&C casing. Run a guide shoe, float collar & 3 centralizers. Cement to surface with 0:1:0 G + 3.00% $CaCl_2$ (100% excess)	Native Clay/Gel
		Surface Casing	**379**				
SAMPLES: Contact New Brunswick **CORES:** None **DSTS:** None anticipated **LOGS:** As per attached geo prog and logging program **SOUR ZONES:** none anticipated **EST. PRESSURES:** Hiram SS 21,600 kPa **POTENTIAL PROBLEMS** Losses possible on surface hole	Survey 50m under the shoe and every 150m thereafter. Deviation greater than 3° to be reported to Calgary.	Top Sussex Group	508	-452	159mm	Run 114.3mm, 17.26 kg/m, J-55, LT&C production casing from TD to surface. Run scratchers from 5 m above to 10m below any potentially productive interval spaced at 3m increments. Centralize shoe joint, every joint from 25m above to 25m below any potentially productive interval, every 3rd or 4th joint in build section, and every 50 meters thereafter. Run a marker joint no more than 25m Above any potentially productive interval. Cement with: FILL-LITE 2-100 + 0.7% R-3 + 0.9% FL-5 + 5.0% A-11 (1400m to surf) (40% xs over caliper) Cement with: 0:1:0 G + 0.1% SPC-12000 + 0.2% R-3 + 0.4% FL-5 + 0.5% A-11 + 0.5% CD-32 + 2.0% Microsil 12P (TD to 1400m) (40% xs over caliper) Rotate casing while cementing. (when possible) Hold pressure on annulus after plug-down.	Gel PHPA Water (surf csg to 800 m) Gel PHPA (800m - TD) Wt.: 1040-1080 kg/m³ Vis.: 34-40 s/l (drlg) 55-65 s/l (log)
		Boyd Creek Tuff	863	-807			
		Top Albert Group	1088	-1032			
		Hiram 1st SS	1188	-1132			
		Hiram 2nd SS *	**1308**	**-1252**			
		Hiram 3rd SS *	**1923**	**-1867**			
		Hiram 4th SS *	**2078**	**-2022**			
		TOTAL DEPTH	**2178**	**-2122**			
			KB	**SS**			

*** Primary Objective**
**** Secondary Objective**
LC= Potential Lost Circ Zone

ALL DEPTHS ARE IN METERS

TABLE OF CONTENTS

DRILLING PROGRAM **PAGE**

SUMMARY WELL DATA

WELL NAME:	CONTACT SALEM J-86-2328	
LOCATION:	J-86-2328	
UWI:		
FIELD:	Salem	
LAHEE / CONFIDENTIAL:		
WELL LICENCE NO.:		
ELEVATIONS:	Ground 51.7 m (surveyed)	
	K.B. 55.7 m (estimated)	
	K.B. to Ground 4.0 m (estimated)	
CLASS:		
Maximum H_2S LEVELS:	N/A	
EPZ:	0 km	
PRIMARY OBJECTIVE:	Hiram Sandstone	
SECONDARY OBJECTIVES:	N/A	
PROGRAMMED FOR:	No DST's or Cores	
HOLE SIZES:	Surface: 222 mm	0 - 379mKB
	Main: 159 mm	379mKB - TD
MUD SYSTEM:	Surface: 0 – 379 m	Gel Slurry
	Main: 379 - 800m	Gel PHPA Water
	800 – TD	Gel PHPA
DRILLING RIG:	Nabors 112	
AFE # (copy on tickets & PO's):		
PROJECTED WELL COSTS:		
DIRECTIONS:	Follow route map on survey plan.	

ENGINEERING & OPERATIONS CONTACTS

Drilling Department Area code 403	Business
Tristar Operations	
Geoff Morrison Drilling Engineer Consultant morrison@tstar.ca	403-262-8595
Hugh Rennie Drilling Superintendent rennie@tstar.ca	403-262-8595
Dan Karst Drilling Engineer Consultant karst@tstar.ca	403-262-8595
Fax Machine	403-262-8501
Contact Operations	
Fax Machine	

SERVICE & SUPPLIERS

Service	Company	Phone #
Directional Tools	N/A	
Mud	CES – Ross Kovacs Brent Bailey	403-813-2508 403-999-6353
Mud Warehouse		
Cementing	BJ – Dartmouth	1-877-778-1773
Casing & Accessories		
Casing Trucking	TBD	
Logging		
Drill Bit	Field Bid	
Coring	N/A	
Environmental		
Power Tongs	Field Bid	
Water Hauling & Vac Truck	Field Bid	
Drilling Rig / Toolpush	Nabors 112	
Construction Supervisor		
Landowner		
Occupant		
Field Geologist	TBD	
Supervisor	Bill Weir	403-860-2603
New Brunswick Mines & Energy	Fredricton (24hr) John Griggs	506-444-5709 506-453-2206

SURFACE HOLE (222 mm) DRILLING PROCEDURES

Notify New Brunswick Department of Natural Resources 27 hours prior to moving to location (John Griggs – 506-444-5709)

Contact the Tristar Calgary office within 12 hours of spudding the well to confirm that the spud notification has been submitted.

Email all daily drilling reports to ops@tstar.ca by 7:00am.

Ensure the lease and access route is clearly flagged and utilized.

1. Make up bit and drill 222 mm hole to surface TD as stated on the stick diagram.

2. Use sawdust and kwikseal with viscous mud if lost circulation problems are encountered on surface hole. Offset wells have not experienced significant losses on surface hole.

3. Survey first 9, 18, and 27 m and every 30 m thereafter or as required to maintain surface deviation at or below 1.0 degree.

4. Wiper trip to surface.

5. Measure and check tally out of hole. If over 0.6 m out, measure back in.

6. Drill to surface T.D. Measure kelly to assure total depth is correct.

7. Circulate hole clean, working pipe at T.D. at least two full circulations or until the hole is clean. Hoist to run 177.8mm surface casing.

SURFACE CASING (177.8 mm)PROGRAM

1. Run 177.8mm, 25kg/m, H-40, ST&C surface casing from bottom up as follows:

    i. 177.8 mm guide shoe
    ii. 177.8 mm, 25kg/m, H-40, ST&C casing
    iii. 177.8 mm float collar
    iv. 177.8 mm, 25kg/m, H-40, ST&C casing to surface.

2. Running procedures to be followed:

    i. Visually inspect all joints of casing for thread and tube damage.
    ii. Tally and drift casing with API drift *on the racks*.
    iii. Threadlok float shoe, first joint of casing, and float collar.
    iv. Install centralizers, one on shoe joint and one every third collar to surface.
    v. Review cementing handbook for pressure and torque limitations. Review values with tong operator and cementing supervisor

SURFACE CEMENTING PROGRAM

- Circulate and work casing on bottom for minimum of 0.5 hour or a minimum of two bottoms up. Make sure the hole is clean prior to cementing in place.

- Pressure test surface lines prior to proceeding with cementing operation.

- Precede cement job with 3.0 m^3 of water preflush.

- Cement with 100% excess using attached cementing program. Ensure at least one dry sample, and three cement slurry cement samples are caught during the cementing operation in the event there are complications with the job. See attached cementing program for specific details.

- Use rubber plug to displace cement. Slow pump rate near the end of displacement and bump the plug using 3500 kPa (500 psi) over final pumping pressure.

- Record cement returns, KB to ground in tour book and on TriStar daily drilling reports (note: take into account any cut or fill during construction that would change the pin elevation).

- If good cement returns are not obtained, immediately contact Geoff Morrison or Hugh Rennie for a remedial cementing program.

- Check the cement quality before slack off. Slack off and head up in 4 hours. Wait on cement a minimum of 8 hours prior to drilling out.

- Provide the cementing company with a sample of water at the time of surface cement job for compatibility testing with production cement blends.

CASING BOWL AND BOP INSTALLATION

1. Install a 229mm x 178mm x 21 MPa WP casing bowl. Pressure test the weld with nitrogen or a low viscosity oil (do not use grease) to 7000 kPa for 10 minutes.
2. Nipple up BOP stack as per New Brunswick's Regulations and specifications.
3. Pressure test blind rams and surface casing as per New Brunswick's regulations. Pressure test pipe rams, annular preventor, manifold, stabbing valve and inside BOP as per ERCB regulations. No equipment leaks will be tolerated. Re-test after each repair.
4. The inside BOP, drill pipe stabbing valve and wrench are to be on the rig floor at all times, or a suitable place with sufficient heat and proximity to the rig floor.
5. Conduct a blow out drill, a thorough rig inspection and record in the tour book.

MAIN HOLE (159 mm) DRILLING PROCEDURES

- The geolograph, mechanical pit gain/loss indicator and trip tank are to be fully operational prior to drill out. **Do not proceed** until all deficient items are functional and repaired.
- Drill out surface casing shoe after WOC with a 159 mm PDC bit. Caliper and record all drill collar and drilling BHA dimensions prior to running in the hole.
- Check mud program for further details outlining the mud properties and concerns.
- Complete drilling to TD as indicated on attached stick diagram.
- Circulate and condition hole to run logs. If bridges/reaming is encountered on wiper trip, condition the hole and wiper trip again. POOH to run wireline logs.
- Rig to and run logs

PRODUCTION CASING (114.3mm) PROGRAM

1. Run 114.3 mm; 17.26 kg/m, J-55, LT&C, production casing from bottom up as follows:

    i. One 114.3 mm 8 round float shoe.
    ii. One joint 114.3 mm, 17.26 kg/m, LT&C, J-55 casing.
    iii. One 114.3 mm 8 round float collar.
    iv. 114.3 mm, 17.26 kg/m, LT&C, J-55 casing from TD to surface.

Install a 114.3mm, 17.26 kg/m, LT&C, J-55 marker joint no more than 25m above any potentially productive formation.

2. Running procedures to be followed:

    i. Visually inspect all joints of casing for thread and tube damage.
    ii. Tally and drift casing with API drift.
    iii. Threadlok float shoe and float collar.
    iv. Install centralizers: the casing shoe joint, every joint from 25m below to 25m above all possible productive intervals, and every 50m thereafter. Install scratchers/standoff bands: every joint from 10m below to 5m above possible all productive intervals
    v. Technical data to be reviewed from cementing tubular handbook. Note pressure and torque limitations. Confirm torque values with tong operator and cementing pressure limitations with cementing supervisor.

PRODUCTION CEMENTING PROGRAM

Note: Use the callipered hole volume from logs to determine volumes of cement, unless hole conditions are badly washed out. Use 40% excess over the caliper log to calculate lead & tail cement volumes. Cement production casing to surface. If hole conditions dictate a larger amount of excess discuss the required amount with Tristar Resource Management in Calgary prior to ordering the cement.

The following presentation is for a basic primary cementing operation:

1. Once on bottom reduce mud viscosity to 40-45 s/l and obtain a yield point of 3-4 Pa or less while maintaining mud density. Reciprocate the casing in 6 m strokes.

2. Compatibility testing and cement properties with mix water sent in at time of surface casing cement job must be done prior to proceeding with cementing operation.

3. Conduct a complete mud check prior to cementing.

4. Rig in pumper to cement production. Reference the attached cementing program for details.

5. A plug loading head is to be used and treatment recorder run when cementing. Reciprocate casing 4 - 5 m while placing cement. Record all pump rates, circulating pressures and densities.

6. Pump spacer, fill cement, and tail cement in turbulent flow as determined by cement rheology. Keep pump stoppages to a minimum.

7. Slow the displacement rate to 0.3 m^3/min or less prior to bumping the plug and bump the plug with 3500 kPa (500 psi) over the final pumping pressure. Flush BOP's.

8. Mix water for cementing is to be approximately 20˚ C prior to cementing.

9. Land the casing in full string weight using a manual primary slip and seal assembly. Install the primary seal assembly after the slips are landed in place.

10. Cut the casing a minimum 20 cm (8") above the casing bowl flange and tack

LOGGING

As per geological prognosis

CORING

None

TESTING

No testing anticipated.

PIPE MEASUREMENT

Strap pipe on all trips.

WELL CONTROL / KICK DETECTION

1. If potential hydrocarbon bearing zones have been penetrated, a bottoms up circulation shall be conducted prior to pulling pipe from the well.

2. Conduct 10 minute flow checks and record on the tour sheets at the following stages during trips:

   Trip Out
   - i. after pulling the first 5% of drill pipe from the hole
   - ii. at the mid-point depth of the wellbore.
   - iii. prior to pulling the first stand of drill collars from the hole.
   - iv. after all of the drill string is pulled out of the hole.

   Trip In
   - i. upon reaching the surface casing shoe with the drill string.
   - ii. at the mid point depth of the wellbore.

3. The hole is to be kept full on all trips. Watch for the fluid level to drop on the first few stands prior to installing the stripper.

4. Check the fluid level and conduct periodic flow checks when on the bank.

ABANDONMENT

If the well is going to be abandoned, obtain particulars from Tristar Calgary.

SPECIAL INSTRUCTIONS – DRILLING

1. Contact the Tristar Calgary office within 12 hours of spudding the well to confirm that the spud notification has been submitted.

2. In the event of any cut or fill arising from lease construction, ensure that corrected ground level and kelly bushing elevations are noted on all documentation pertaining to the subject well (daily reports, stick diagram, well licence, logs etc.).

3. In the event of County or country road disturbance, ensure all mud and debris are cleaned up promptly. In extreme cases, discuss with Calgary office.

4. Drilling supervisor is to be familiar with and enforce New Brunswick's regulations as they pertain to on the work site. Refer any questions or discrepancies to Tristar's office.

5. Conduct BOP drills and function test BOP system and rig ESD's as per New Brunswick's regulations. Report any deficiencies in equipment or personnel to the Calgary Office. **If either equipment or procedures are found to be deficient, the Tristar representative will suspend operations until these conditions are rectified.**

6. Remove all garbage from wellsite prior to moving drilling rig off the well. On-lease disposal of engine oils or hydrocarbons is not permitted. Clean-up of contaminated flare-pits, sumps and cellars will be charged to those responsible. **Ensure proper New Brunswick's manifesting procedures are adhered to.**

7. Material Transfers are required for all Contact inventory brought to or moved off location.

8. **Email all daily drilling reports to ops@tstar.ca by 7:00am. Send a 4:00pm update to drilling@tstar.ca**

FIELD TICKETS & INVOICES

All field tickets and invoices are to be billed directly to Contact Exploration Inc. There are to be no third party charges for any services and supplies.

Ensure all tickets contain supervisor's signature and wellsite ticket label. Label is to include location, AFE number and sub code feature. Field tickets are to be sent to Calgary office at the end of the well.

Supervisors are not to accept any final invoices. If one is acquired, fax into Tristar office in order to keep separate from field tickets:

Contact Exploration Inc.
c/o Tristar Resource Management Ltd.
800, 815 – 8th Ave SW
Calgary, Alberta
T2P 3P2

ATTENTION: Geoff Morrison

TERMS AND CONDITIONS

The operations to be conducted, services to be rendered or personnel, manuals, programs or equipment to be provided (collectively the "Services") by TRISTAR RESOURCE MANAGEMENT LTD. ("TRISTAR") at the sole request of the customer ("Customer") shall only be offered, rendered or provided in accordance with the following general terms and conditions ("Terms"):

1. Acceptance of Terms - The Customer agrees the prices levied by Tristar for the Services take into consideration and are predicated on Customer assuming and releasing Tristar of certain liabilities and responsibilities. By requesting Services of Tristar, Customer voluntarily elects to enter into this agreement and to be bound by all of the Terms hereof rather than negotiate a different agreement which would exclude exculpatory indemnification, hold harmless and other provisions herein and wherein, such negotiated agreement would among other things involve substantially higher prices and/or require the provision of adequate insurance by and for the expense of the Customer to protect Tristar against liabilities and responsibilities assumed by Customer herein.

2. Independent Contractor - In the provision of Services to Customer it is understood that Tristar acts always as an independent contractor and nothing in the provision of such Services shall be interpreted so as to make Tristar an agent or servant of Customer or any other party.

3. Subsidiaries, Affiliates, Agents, and Subcontractors - The Term "Tristar" as defined herein shall include but not be limited to any subsidiary, affiliate, joint venturers, contractor, subcontractor, invitee, agent or consultants of Tristar Resource Management and their respective officers, directors, employees, representatives (or spouses, if any).

4. License - These Terms and Conditions grant the Customer a one-time, non-transferable, license for use of the Drilling/Completion/Abandonment Program (the "Program") for the well described in Summary Well Data of the Program (the "Designated Well"). The Program is not intended for use in any other location or for any other well. This license is not transferable and does not include the right to sub-license. The Customer understands that the license herein granted applies to the Customer only and does not extend to any other party associated with the Customer, including without limitation, their joint venturers, associates, sub-contractors, affiliates or subsidiaries.

5. Custody and Control of Well - Customers recognizes and accepts that at all times it has full care, custody, and control of Customer's well and all conditions and equipment situated on or at Customer's wellsite and has sole responsibility for all decisions regarding the drilling, abandonment, completion, stimulation, workover, construction, production procedure and any other activities at Customer's wellsite. Customer agrees to supply Tristar with all necessary so the Services requested by Customer can be performed safely by Tristar and the responsibilities assumed herein by Customer and Tristar shall not be changed.

6. Warranty - Customer acknowledges and agrees that the Services provided by Tristar are of such a nature that no certainty of result can be assured and Tristar specifically does not make any representations, warranties or guarantees as to the likely results or consequences arising from the utilization of Services by Customer.

7. Warranty for Use of Drilling/Completion/Abandonment Program - Customer acknowledges that the Drilling/Completion/Abandonment Program is designed for and is only applicable to use on the Designated Well. Tristar only warrants the usefulness and accuracy of the Program for the Designated Well.

8. Indemnification's - Customer shall provide Tristar and/or its agents and consultants with all information about well conditions required for the safe and efficient performance of its Services. Customer shall notify Tristar in advance of hazardous or unusual circumstances existing in the well. All Services are hereby supplied by Tristar with the understanding that:

a. Tristar shall not be liable or responsible for (i) any direct, contingent, incidental or consequential damages or expenses of any kind or nature arising from the Services provided or otherwise regardless of any knowledge which Tristar may have regarding the probability of the occurrence of such damages or expenses, including without limitation, lost profits, well damages, injury or damage to persons or property, injury or damage to the environment, loss of use, lost good will, impairment of other goods, or damages or expenses arising out of action, including without limitation, actions for breach of contract or negligence; (ii) damages caused by Customer's failure to perform its responsibilities; (iii) use of information applied in the Program in relation to any other project other than the Designated Well; (v) use of the information supplied in the Program by any other party other than the Customer.

b. Customer shall protect, defend, indemnify and hold harmless Tristar and its officers, directors, agents, employees and consultants, from and against any and all claims, demands, damages, liens, losses, suits, judgments, liabilities, expenses (including legal fees and associated costs) and causes of action of whatever kind and nature and without limitation or regard to the cause thereof or the negligence of any party including but not limited to the sole, concurrent, active or passive negligence of Tristar and its officers, directions, agents, employees and consultants, (i) on account of loss or damage to property, (ii) on account of personal injury or death, (iii) on account of pollution, contamination, subsurface loss or damage, (iv) on account of damage or personal injury or death arising on the surface as a result of any subsurface loss or damage, including but not limited to the loss or damage to the well or the reservoir in connection with the Services and arising in favor of Customer, Customers contractors (other than Tristar) and such contractors subcontractors and their respective agents, invitees and employees and the representatives, spouses or dependants, if any, of such employees.

8. Suppliers and Manufacturers - All of these Terms shall also apply to favor of any supplier of Tristar which designs, manufactures and/or supplies any equipment, components of services thereof which Tristar may use in the provision of Services and in favor of the contractors and subcontractors of such suppliers.

9. Damaged or Lost Equipment - In the event Tristar or its Suppliers equipment is lost, destroyed, damaged or abandoned, regardless of the cause including Force Majeure or otherwise, Customer shall be liable for such loss up to the current repair and/or replacement value. All right, title and interest in and to the equipment shall at all times remain in Tristar or its Suppliers as applicable notwithstanding payment of loss or repair charges.

10. Confidentiality - Information derived from the Services rendered by Tristar will be held in the strictest confidence and will be released only upon approval of Customer unless such information is part of the public domain or except where its divulgence is required by law or by legal process.

11. Copyright - The Program is the subject of the copyright and no part of it may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic or mechanical, photocopying, recording or otherwise without the prior written permission of the copyright owner, Tristar Resource Management.

12. Terms of Payment - Customer shall pay Tristar in accordance with Tristar applicable price schedule in effect in the area of operations on the date the Services were provided to the full extent of all Services provided as described in detail in associated Tristar invoice (s). Terms of payment for Services rendered by Tristar are net cash within thirty (30) days from the invoice date in Canadian dollars and in accordance with any payment instructions described on the invoice. Interest will be charged at 2% per month on any unpaid balance. For unpaid balance amounts collected through legal proceedings or by collection agency, Customer shall pay legal and agency fees and reasonable costs thereof incurred by Tristar in addition to the amount of the invoice and any accrued interest.

13. Force Majeure - Tristar shall not be liable for delay or non-performance due to governmental regulations, strikes, hostile actions, weather, acts of God, or any other cause beyond the reasonable control of Tristar (any and all of which caused are referred to herein as "Force Majeure"). Force Majeure shall not however excuse payment for services performed or any personnel and equipment charges accrued and unpaid prior to declaration of Force Majeure.

14. Amendments, Severability and No Waiver - These terms constitute the entire agreement between the parties with respect to the provision of Services and supersede all other terms either expressed or implied by law. None of the Terms set out herein may be added to, waived, modified, superseded or otherwise altered except by written permission signed by an officer of Tristar and delivered to Customer. No employee, agent or consultant is empowered to alter or amend these Terms as set out herein. Failure to enforce any or all of these Terms in a particular instance shall not constitute a waiver of or preclude subsequent enforcement of any of all such terms. In the event of any part or parts of these Terms held being invalid, such holdings shall not invalidate the remainder. Both parties agree that the exculpatory indemnification and hold harmless provisions herein shall be modified or altered only insofar as required by any jurisdiction purporting to limit such provisions, it being the intent of the parties to enforce to the fullest extent all terms and conditions as are herein agreed to.

15. Governing Law - The Terms of this agreement shall be construed in accordance with the law of the Province of Alberta, Canada.

16. Insurance - Customer's indemnity obligation herein shall be supported by appropriate liability insurance furnished by Customer at its sole cost which insurance must contain a contractual liability endorsement and a waiver of subrogation in favor of Tristar.

GEOLOGICAL WELL PROGNOSIS

Well Name and Location: 100-J-86-2328 Surface Location: GIN 2328, Section 86, Unit J

Elevations (m)	GL (m)(est)	51.7	KB (m)(est)	55.7	**Status:**

Coordinates(m)	(Surface-hole)	5087202.5	S of N	367457.1	W of E	**Proj Spud:**
	(Bottom-hole)	5087202.5		367457.1	W of E	

Formation	Projected Tops (m)		Sample Tops(m)		(+/-)	Anticipated Lithology
	TVD	Subsea	Depth	Subsea	to prog	
Windsor Group Hillsborough Fm	-22	78				Polymictic Conglomerte
Top Sussex Group	508	-452.0				Intb red ss, sltst & sh
Boyd Creek Tuff	863	-807.0				Volcanic tuffpos gas zone?
Top Albert Gp, (Top Hiram Bk Mem)	1088	-1032.0				Grey shale, mnr ss
Hiram, One Sandstone	1188	-1132.0				Fine ss, sh intbs, pos gas zone
Hiram, Second Sandstone	1308	-1252.0				Intb ss & sh, pos gas zone
Producing Shale Zone	1458	-1402.0				SS & mnr sh, **pos gas zone**
Hiram, Third Sandstone	1923	-1867.0				Fine ss & sh, pos gas zone
Hiram, Fourth Sandstone	2078	-2022.0				Intb ss & sh, pos gas zone
Total Depth	2178	-2122.0				
TOTAL DEPTH	764	-708.7				

Primary Objective **Producing Shale Zone**
Secondary Objective **Hiram, Third Sandstone**

GEOLOGICAL WELLSITE REQUIRMENTS

Samples: Need to collect two starndard sest for NBDNR plus Contact's requirements.
(To be verified)

Core: Non planned.

Mud up depth: 800 m

Gas Detector: Required

Logging: DIL, CNL-FDC, SONIC (see attached logging program).

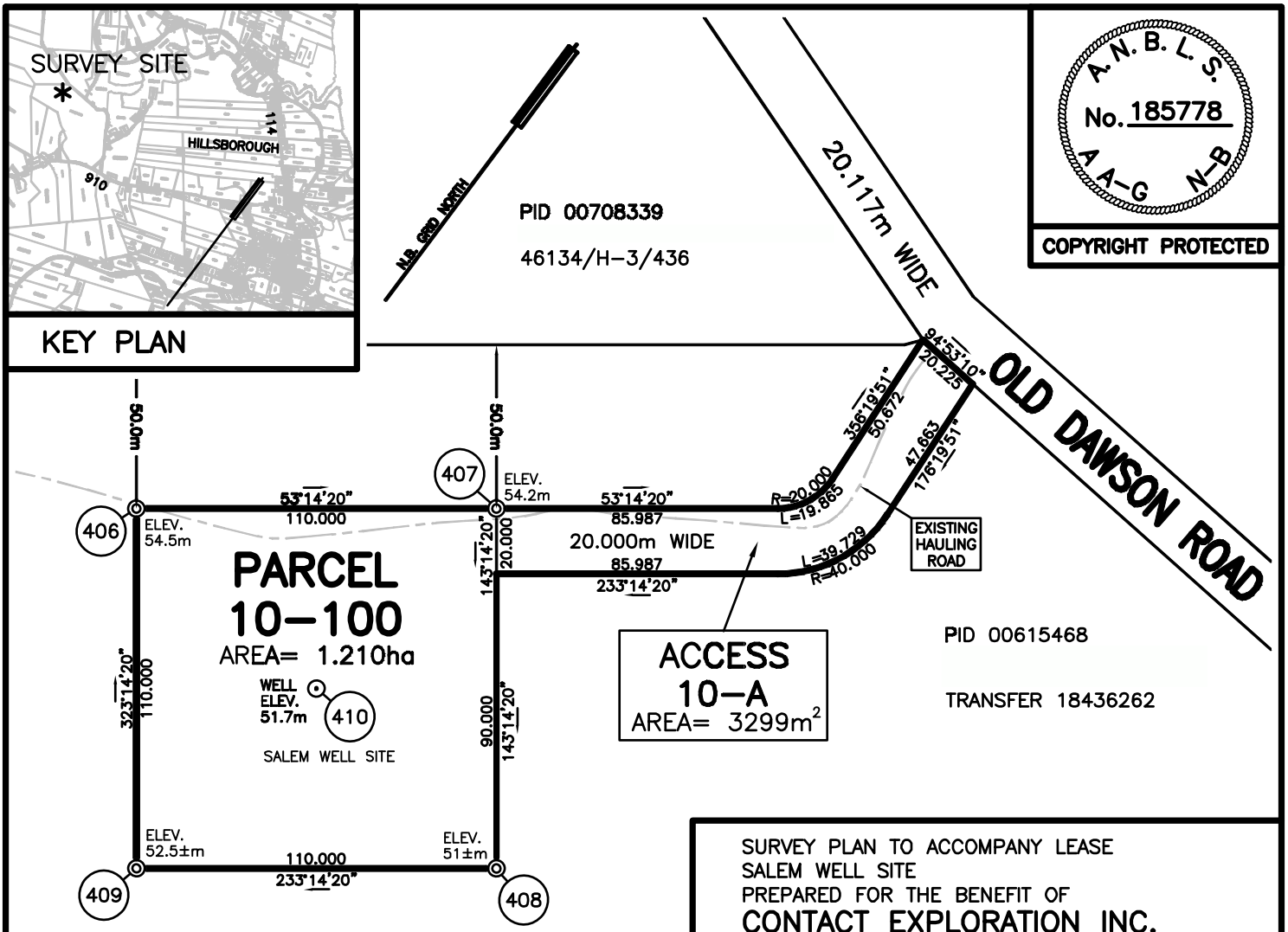
Log Prints: Testing: Optional

Comments: Careful attention to deviation is critical.

Phone Numbers:	Office	Office fax	Cell	Home	Home fax
Exploration Dept					
Engineering Dept.					
Engineering Consultants					
Dan Karst (Tristar)	262-8595	262-8501	519-0336		
Geoff Morrison (Tristar)	262-8595	262-8501	650-3900		

KEY PLAN

A.N.B.L.S. No. 185778 A-G N-B



SURVEY PLAN TO ACCOMPANY LEASE
SALEM WELL SITE
PREPARED FOR THE BENEFIT OF
CONTACT EXPLORATION INC.
LOCATED SOUTH OF THE OLD DAWSON ROAD
AT SALEM
PARISH OF HILLSBOROUGH
COUNTY OF ALBERT
PROVINCE OF NEW BRUNSWICK

40 0 40 80 120

SCALE – METRES 1: 2000

DRAWN BY:	SL	CHECKED BY:	WD

SURVEYOR'S STATEMENT:

I, WARREN E. DAIGLE N.B.L.S., DO HEREBY CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND ABILITY THIS PLAN CORRECTLY DEPICTS ANY RESEARCH, FIELD WORK AND COMPUTATIONS UNDERTAKEN FOR THIS PROJECT.

DATE: JUNE 24, 2010

WARREN E. DAIGLE N.B.L.S.

SURVEYED BY : WARREN E. DAIGLE N.B.L.S. # 306
FIELD SURVEY COMPLETED : JUNE 23, 2010

N.B. GRID COORDINATE VALUES NAD83 (CSRS)			
POINT	EASTING (m)	NORTHING (m)	DESCRIPTION
406	2638950.975	7437873.082	SMSET
407	2639039.101	7437938.915	SMSET
408	2639104.933	7437850.790	SMSET
409	2639016.808	7437784.957	SMSET
410	2639027.954	7437861.936	WELL CENTER
28155	2628800.998	7456492.126	MONUMENT (GPS)

NOTE: POINT NUMBERS SHOWN IN THE LAT. AND LONG. TABLE CORRESPOND TO THE POINT NUMBERS SHOWN ON THIS PLAN +1000

LATITUDE AND LONGITUDE NAD83 (CSRS)			
POINT	LATITUDE	LONGITUDE	DESCRIPTION
1406	45° 55' 36.92818"	64° 42' 30.22741"	SMSET
1407	45° 55' 38.99532"	64° 42' 26.06951"	SMSET
1408	45° 55' 36.09378"	64° 42' 23.10742"	SMSET
1409	45° 55' 34.02667"	64° 42' 27.26524"	SMSET
1410	45° 55' 36.51099"	64° 42' 26.66740"	WELL CENTER
(1)28155	46° 05' 46.96386"	64° 50' 03.03881"	MON. (GPS)

NOTE: POINT NUMBERS SHOWN IN THE UTM COORDINATE TABLE CORRESPOND TO THE POINT NUMBERS SHOWN ON THIS PLAN +2000

UTM COORDINATES ZONE 20 NAD83 (CSRS)			
POINT	X (m)	Y (m)	DESCRIPTION
2406	367541.475	5087347.341	SMSET
2407	367632.390	5087409.219	SMSET
2408	367694.267	5087318.305	SMSET
2409	367603.354	5087256.427	SMSET
2410	367617.871	5087332.823	WELL CENTER
(2)28155	358223.081	5106391.266	MONUMENT (GPS)

ALL COMPUTATIONS PERFORMED AND COORDINATES SHOWN ON THIS PLAN ARE BASED ON THE NEW BRUNSWICK STEREOGRAPHIC DOUBLE PROJECTION AND THE NAD83 (CSRS) ELLIPSOID AS REALIZED BY SERVICE NEW BRUNSWICK'S ADJUSTED COORDINATE MONUMENT SYSTEM.

DAIGLE SURVEYS LTD
1090 COVERDALE ROAD, RIVERVIEW, NB E1B 5G5
TELEPHONE (506) 387-4073 FAX (506) 387-7926

Revision No.:

JOB No.: 12694

MAP: 21H/15-Y2

Geoff Morrison

To: Raymond Sully
Subject: RE: Contact with landowners

From: Peter Coleman [mailto:scotiagold@ns.aliantzinc.ca]
Sent: June-30-10 7:05 AM
To: 'Raymond Sully'
Subject: Contact with landowners

Raymond:

SALEM LEASE

PID # 00615468

Discussions with regarding the well site and access road. is receptive to having a well site on his property. He gave verbal survey consent and once I have a survey plan, I will meet with him to negotiate a lease.

STONEY CREEK LEASE EXTENSION

PID # 00613067

Discussions with egarding the well site. I is receptive to having a well site on his property. He gave verbal survey consent and once I have a survey plan, I will meet with him to negotiate a lease.

HOPEWELL/EDGETT'S LANDING LEASE

PID # 00613174

Discussions and meeting with , representative for s receptive to having a well site and access road on the property. He gave verbal survey consent and one I have a survey plan, I will meet with him to negotiate a lease.

PID # 05062104

Discussions with / regarding use of access road. , gave consent for surveyors to use road and once I have a survey plan I will meet with him to negotiate an access road agreement.

PID # 05662096

Discussions with gave consent for surveyors to use road and once I have a survey plan, I will meet with him to negotiate an access road agreement.

PID # 05054705
PID # 05054713
PID # 05054721
PID # 05054697

Discussions with gave consent for surveyors to use road and once I have a survey plan, I will meet with him to negotiate an access road agreement.

Peter

SURFACE CASING CHECK SHEET

Special Areas: if well is in the Senex, Kidney, Trout, or associated area, or in the specific high hazard area (southeastern Alberta)

or is being drilled for the purpose of waste disposal, See Guide 8, Section 2.1.

Well Name: J-86
Tvd: 2178 m
KB: 55.7 m

I: Normal Surface Casing Required (Guide 8, Section 2.2)

1 Maximum of the most representative pressure measurements in area: _____ kPa

2 Depth of recorder : _____ m

3 Reference well: _____

4 Higher pressures were found but were discounted. ☐ Yes ☐ No

Reason: _____

5 Maximum gradient: (1) / (2) = 11.5 kPa/m

6 Surface casing depth required:

$$\frac{\text{Maximum gradient} * TVD * (0.5 - 0.0000625\ TVD)}{22} = 414.3 \text{ m}$$

7 If (6) is less than 10% TVD, use 10% TVD = _____ m

8 Groundwater Depth: _____ m Using groundwater depth as surface casing depth? ○ Yes ◉ No

Type 1 Reduction

Normal Surface Casing Required = 414.3 m (6 or 7 above)
Reduced Surface Casing Depth = (6 or 7 above) x 0.913 = 378.2 m

One of the requirements will be followed

A PVT system will be installed with a probe in each active mud compartment; system is sensitive to +/- 1.0 m^3 and will alarm at +/- 2.0 m^3 ☑

or

A leak-off test will be conducted according to the procedure outlined in Appendix 2 of G-8. ☐

Type 2 Reduction

Normal Surface Casing Required = 414.3 m (6 or 7 above)
Reduced Surface Casing Depth = (6 or 7 above) x 0.707 = _____ m

Three of the requirements will be followed:

The well is in a development-type setting ☐

The well is low risk:

- The field kick rate is less than 3 per 100 development wells, ☐

or,

- The field kick rate is less than 3 per 100 development wells drilled in the field to a formation not exceeding the terminating formation of this well. ☐

A PVT system will be installed with a probe in each active mud compartment; system is sensitive to +/- 0.5 m^3 and will alarm at +/- 1.0 m^3 ☐

A leak-off test will be conducted according to the procedure outlined in Appendix 2 of G-8. ☐

Type 3 Reduction

Normal Surface Casing Required = 414.3 m (6 or 7 above)

Historical Surface Casing Depth Required = _____ m

The historical depth requested is the same or greater than that set in the following wells:

Well Location	T.D. (m)	Surface Casing (m)	Date	Distace To Center (km)

The **five** requirements will be followed:

The well is in a development-type setting ☐

The well is low risk:

- The field kick rate is less than 3 per 100 development wells ☐

or,

- The kick rate is less than 3 per 100 development wells drilled in the field to a formation not exceeding the terminating formation of this well. ☐

A PVT system will be installed with a probe in each active mud compartment; system is sensitive to +/- 0.5 m^3 and will alarm at +/- 1.0 m^3 ☐

A leak-off test will be conducted in accordance with Appendix 2. ☐

An emergency flare line will be installed in accordance with Figure 7 ☐

Type 4 Reduction

Normal surface casing depth required: 414.3 m (6 or 7 above)

"Prognosed" top of problem zone: _____ m

Name of problem zone: _____

Surface casing depth requested: _____ m

Reason zone is a problem: _____

The three requirements will be followed:

A PVT system will be installed with a probe in each active mud compartment; system is sensitive to +/- 0.5 m^3 and will alarm at +/- 1.0 m^3 ☐

A leak-off test will be conducted in accordance with Appendix 2. ☐

An emergency flare line will be installed in accordance with Figure 7 ☐

SURFACE CASING WAIVERS

It is strongly recommended that you carefully review the details of these guidelines. **Click here for details**

J-86

1.1 **2178**

55.7
Click here for details

1.2 **Surface Casing Waivers - Approval Required**

To obtain an exemption from surface casing, you must indicate on Schedule 4 of *Guide 56** that the requirements of *Guide 8* are **not** met and file your application as non-routine. You must also attach to your application a detailed explanation including the items listed in *Guide 56* , Appendix 1**.

* Guide 56 - Schedule 4
** Guide 56 - Appendix 1

As explained in *Guide 56* , Appendix 1: "Guide 8: Surface Casing Depth Minimum Requirements sets out the technical guidelines for determining surface casing in wells to be drillied and also gives specific areas where surface casing is not required. In addition, you may obtain an exemption to the requirement to set surface casing if you meet all of the following criteria..."
Click here for details

1.1 Surface Casing Waivers - No Approval Required

(Check box to confirm)

Wells Drilled to the Base of the Second White Specks in Southeastern Alberta

☐ The well is located in an exempt area Click here for details

☐ There is a minimum of 20 m of conductor pipe set and cemented in place?

☐ A Class 1A BOP system (defined in *ID 91-3* , see Appendix 4 of *Guide 8*) is installed with a 152 mm flare line

☐ The base of the Second White Specks does not exceed a depth of 950 m

☑ The estimated absolute open flow (AOF) does not exceed 113 103m3/day (See Gas Flare Line Length Reduction, Guide 8, Appendix 3)

Please select which flow rate to refer to:
◉ Calculated AOFP at Original Pressure ○ AOFP as reported by AEUB
☐ Accept post-stimulation flow rates?
☐ Include flow rates recorded below proposed TVD

Location	Distance km	Test	Test Date	Depth m	Flow Rate 10^3m^3/day	AOFP 10^3m^3/day	Calc AOF 10^3m^3/day	Foot Notes	Valid? Y or N

The flare line terminates a min. of 35m from the well centre in an open tank at least 2m high ☐

In areas prone to drilling problems associated with unconsolidated zones near the surface, the EUB recommends certain procedures. Click here for details

Oil Sands Core Holes and Oil Sands Evaluation Wells

EUB *ID 89-2* (see *Guide 8,* Appendix 4) lists blowout prevention and drilling requirements for core holes and oil sands evaluation wells in surface mineable oil sands areas Figures

Within the surface mineable oil sands area, surface casing is not required if you set conductor pipe into a competent formation and install a Class 1 BOP

You may follow the same requirements within 10 km of the surface mineable oil sands area if the well does not exceed 200 m in depth

These requirements apply to core holes and oil sands evaluation wells only. They do **not** apply to conventional wells within Figure2

1.2 Surface Casing Waivers - Approval Required

(Check box to confirm)

☐ The proposed well terminates at less than 950 m true vertical depth.

☐ The proposed well is located in or adjacent to a development-type setting.

☑ The maximum absolute open flow (AOF) gas rate from offset wells does not exceed 109 10^3m^3/day.

Please select which flow rate to refer to:

◉ Calculated AOFP at Original Pressure ○ AOFP as reported by AEUB

☐ Accept post-stimulation flow rates

☐ Include flow rates recorded below proposed TVD

Location	Distance km	Test	Test Date	Depth m	Flow Rate 10^3m^3/day	AOFP 10^3m^3/day	Calc AOF 10^3m^3/day	Foot Notes	Valid? Y or N

☐ "There are no problems such as overpressuring, severe lost circulation, kicks, blows or blowouts, or artesian water flows within 3 km of the proposed site."

According to AEUB's public drilling problem database, there are problems within 3 km of your target location

If the proposed well meets the above criteria, you must file the application as nonroutine and provide the information detailed in Guide 56, Appendix 1*, where applicable, with your well licence application.

* Click here for Guide 56, Appendix 1

NABORS DRILLING
Rig Inventory and Specifications

Rig No.: 112 CT

Effective Date of Inventory: September 2009

Rig depth rating 1,800m using 102 mm Range 2 Drill Pipe
Rig depth rating 1,800m using 89 mm Coiled Tubing
Number of loads (w/ boiler & 600m of Drill Pipe) 10, No Crane required
Number of loads (w/ boiler & 1,800m of Drill Pipe) 12

A. Drawworks: Make: Pacific Rim — Drum

Maximum Hoisting Capacity	88,964	daN
Number of Hoisting Speeds	Low / High	
Auxiliary Brake Type	N/A	

B. Rig Power: Make: 2 ea. Caterpillar C18

Peak Power	2 @ 545	kW	1800 rpm
		kW	

C. Derrick: Make: Foremost — Type: Coil / Top Drive — Height: 19.5 m

Normal Number of Lines Strung	8			
Maximum Allowable Working Load (API rating)	88,964	daN w/	8	8
Contractor's Allowable Working Load	80,068	daN w/	8	lines

D. Substructure: Make: Foremost — Type: 24 Wheel Coil / Top Drive Carrier

Maximum Load Capacity Set back	N/A	daN	3.88m long	
Maximum Load Capacity Rotary	88,964	daN	3.81m wide	
KB - Ground	3.8-4.2	m	Vertical Clearance for BOPs	3.2-3.5 m
			c/w BOP handling system	

E. Rotary Table:

Make	Enid Drill Systems Inc.		
Type	200,000 lb Superbowl	Opening	419.1 mm
Contractor's Operating RPM Max.	70	Min.	0

F. Travelling Equipment:

	Make/Model	Manufacturer's Maximum Allowable Load	
Bails	K.O.T.	88,964	daN
Elevator	A.O.T.	88,964	daN
Casing Elev.	A.O.T.	57,826	daN

G. Drilling Line:

Line Size	24	mm	Line Type	Shaw's Dyform
Single Line Breaking Strength	51,154	daN		

H. Drill Pipe:

102	mm OD,	Grade	SS95	,	23.4	kg/m,	Conn.	3 ½" IF	, ____ m
c/w 2 hydraulic pipe tubs						Hydraulic Push			

I. Drill Collars:

121	mm OD,	57	mm ID,	Conn.	3 ½" IF	joints available	20

J. Mud Pump: Make & Model: Gardner Denver PZ9 Stroke: 229 mm

Pump powered by: 860kW WEG 1150 Hp

Liner Sizes (mm)	Maximum Strokes/min.	Minimum Strokes/min.	Manufacturer's Maximum Pump Pressure (kPa)	Contractor's Maximum Pump Pressure (kPa)
127	130	1	29,900	21,000
140	130	1	24,800	21,000
165	130	1	17,650	16,000

K. Mud Tanks:

Total Volume	55.1	m^3	Number of Tanks	1	
Active (Useable) Volume	49.7	m^3	Number of Compartments	5	
Pill Tank Volume	N/A	m^3			
Trip Tank Volume	3.9	m^3			
Independent Mud Mixing System	Pump 1 Type	Mission	Size	152m x 127mm x 356mm	
	Pump 2 Type	Mission	Size	152m x 127mm x 356mm	
Agitator Type	Brandt		Number of Agitators	2	
Hole Fill Pump	Brico				

L. Shale Shaker:

Make: King Cobra – Brandt Number: 1

Vibrating Speed: 1,800 Cycles/min.

M. Mud Gas Separator:

Location	Shaker Tank	
Height Above Mud Level	1.88	m (Mud level to top of vessel)
Vessel Diameter	610	mm
Liquid Inlet Line Size	76	mm
Gas Outlet Size	152.4	mm
Open Bottom	Yes	
Internal Baffles	Yes	
NACE Certified	Yes	

N. Blowout Prevention:

BOP	Make	Type	Size (mm)	Pressure Rating (kPa)	Nace Trim
Annular	Townsend	T90	228.6	21,000	Yes
Pipe Ram	Townsend	T81	228.6	21,000	Yes
Blind Ram	Townsend	T81	228.6	21,000	Yes

HCR Valve 79.4mm Hi-Kalibre Kill Line valves 51mm

Accumulator Academy Services Model# G250 B42/408-21
Size 249.8 litres Rating 21,000 kPa

O. Manifold:

a) The Master BOP controls are located at the accumulator and remote controls located at the driller's station

b) Pressure Rating 21,000 kPa
Choke Line Size 76 mm
Valve Type Hi-Kalibre
Size 76 x 52 mm

c) Nace Trim Yes

P. Light Plants:

	Powered by	Output kW
Number 1	n/a	n/a
Number 2		

R. Instrumentation: Pason

S. Boiler: Make William Davis Type 100 HP Output 74.5 kW

T. Top Drive Make Foremost Type RC240

U. Lubricator / Stripper Make Progressive Tech. Type Hydraulic

V. Fuel Storage: 10,000 litres Boiler 5,200 litres

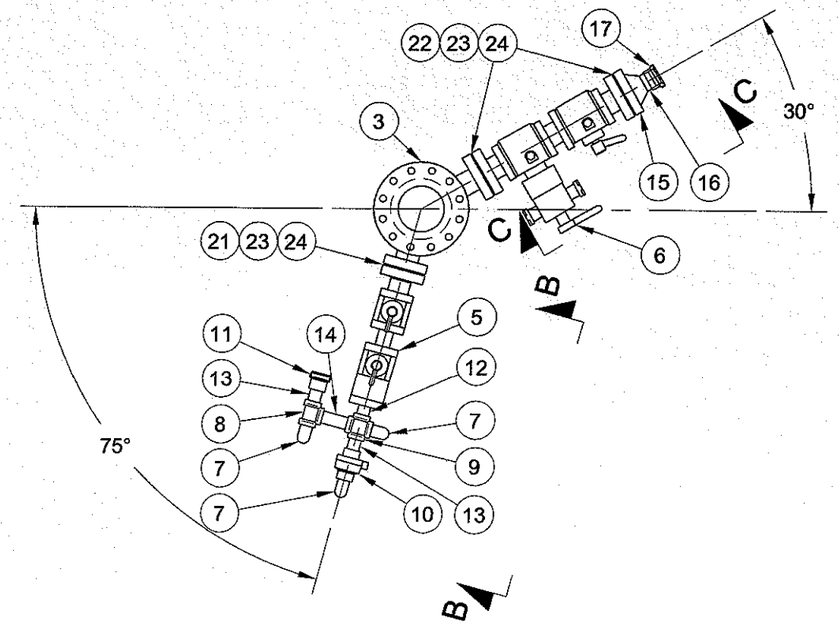
W. Water Storage: 48,000 litres Boiler 21,000 litres

X. Injector
Make: Fluid Design Systems
Max Pull 55,378 daN
Max tube size 89mm

Y. Tubing Storage Reel
Make Foremost
OD 3.81m
ID 2.79m
Inside width 2.29m
Capacity 1800m of 89mm tubing

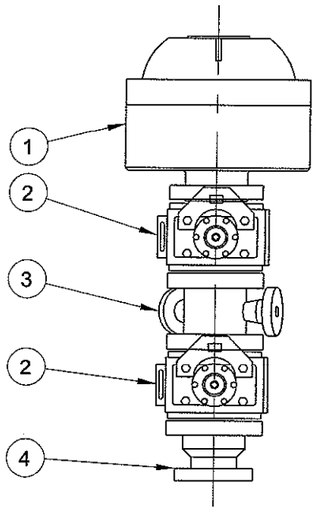
Please note that due to routine changes in equipment such as BOPs, pump liners, overhead equipment and drill pipe, this inventory serves as a guideline only. Please contact our office to verify existing equipment.

IF IN DOUBT....PLEASE ASK!

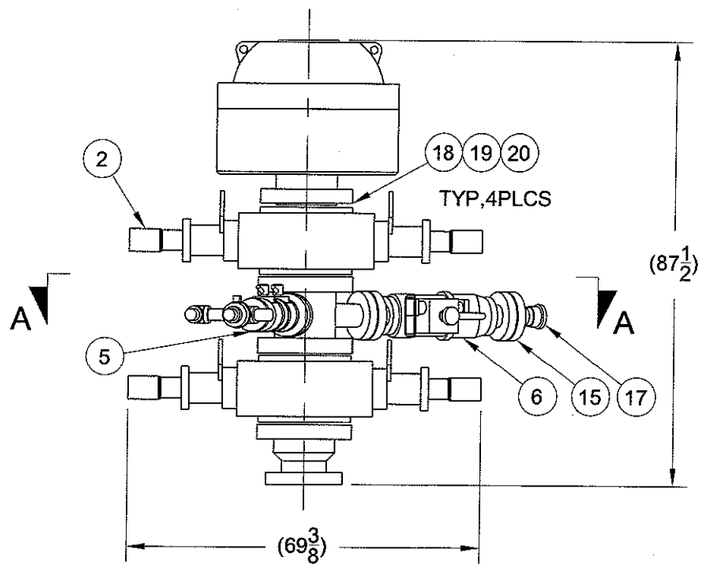


SECTION A-A

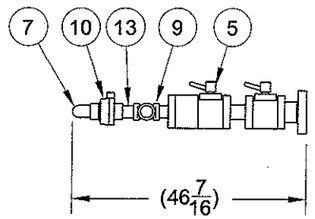
ITEM	QTY	PART NO.	DESCRIPTION		WT
1	1	106458	ANNULAR,TYPE 90,9,3000		-
2	2	106459	BOP,SINGLE GATE,TYPE 81,9,3000		-
3	1	106481	SPOOL,9,3000PSI,2-OUTLETS		-
4	1	109749	SPOOL,ADAPTER,9, 3000 x 7-1/16,2000/3000		-
5	1	106471	VALVE ASSY,KILL LINE,2-1/16,3600PSI		-
6	1	106470	VALVE ASSY,HCR/BU,3-1/8,3600PSI		-
7	3	103053	PLUG,BULL,2,SCH 80,RD,THRD		-
8	1	103101	TEE,2,3000,THRD		-
9	1	109843	CROSS,2,3000,THRD		-
10	1	107332	UNION,HAMMER,ASSY,2 FIG1502,THRD		-
11	1	112218	UNION,HAMMER,SUB-F,2 FIG1502,THRD		-
12	1	104868	PIPE,2,SCH 80,A-106B (T.B.E)	3 1/4	-
13	2	104868	PIPE,2,SCH 80,A-106B (T.B.E)	3 3/4	-
14	1	104868	PIPE,2,SCH 80,A-106B (T.B.E)	6 1/2	-
15	1	111904	FLANGE,RTJ,WN,3-1/8,3000,3 SCH 80 BORE	3 1/4	-
16	1	104870	PIPE,3,SCH 80,A-106B (B.O,E & T.O.E)	2	-
17	1	112217	UNION,HAMMER,SUB-F,3 FIG1502,THRD		-
18	48	-	STUD,1-3/8 x 9-1/2,B7M,NACED		-
19	48	-	BOP NUT,1-3/8,2HM,NACED		-
20	4	109548	GASKET,RTJ,OVAL,R49,316SS		-
21	1	105235	GASKET,RTJ,OVAL,R24,316SS		-
22	2	109283	GASKET,RTJ,OVAL,R31,316SS		-
23	24	110092	STUD,7/8 x 6-1/2,B7M,SOUR SRVC		-
24	48	105234	NUT,7/8,GR2HM,A194,SOUR SRVC		-
25	1	DD11408	FLOW NIPPLE,CTU,10 DIAx41LG		-
26	1	107915	COUPLING,VIC,10,STYLE 77		-
27	1	DD11409	FLOW PIPE,10DIAx12LG		-
28	1	DD10986	FLOW PIPE,8 DIA x 136 LG		-



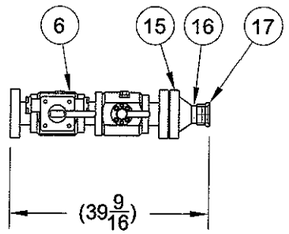
SIDE VIEW w/o PIPINGS



ELEVATION VIEW



VIEW B-B
KILL LINE



VIEW C-C
CHOKE LINE

REV	YYYY-MM-DD	ECN	DESCRIPTION	DRWN	CHCK	APPR
A	2006-12-05	—	INITIAL RELEASE	MZ	DNC	-

TOLERANCES UNLESS OTHERWISE NOTED:
- MACHINING
  - DECIMAL: .X = ±.030; .XX = ±.010; .XXX = ±.005; FRACTIONAL ± 1/16
  - ANGULAR DIMENSIONS ±1/2°; CONCENTRICITY .005 T.I.R.; SURFACE FINISH 125 RMS; BREAK EDGES .015 X 45°; MINIMUM RADIUS R.010
- FABRICATION
  - 0 TO 24" : ±1/16 (±.06); > 24" : ±1/8 (±.12)
  - ANGULAR DIMENSIONS 2°

Academy SERVICES

TITLE: BOP STACK & FLOW LINE

PROJECT: J1022 RIG 94 CTU

SCALE	DRAWING NO.	SIZE	SHEET	REV.
1:30	J1022-DA-511	B	1 of 2	A

KEY B.O.P. SERVICES

5705 - 47 Street
Leduc, Alberta
T9E 7A1

Phone: 780-980-9823 Fax: 780-980-9830 E-mail: keybop@telusplanet.net

B.O.P. CERTIFICATE

CUSTOMER: ACADEMY SERVICES

DESCRIPTION: 9" 3000 90 ANNULAR

SERVICE COMPLETION DATE: NOV 9/2007

IN SERVICE DATE: MAY 14/2010

WORD ORDER # **TRIM:NACE**

CLIENT I.D. #ND35-0357 **SN#90-9-2907**

Operations Manager
D. Sleen

Sales
A. Spalding

KEY B.O.P. SERVICES

5705 - 47 Street
Leduc, Alberta
T9E 7A1

Phone: 780-980-9823 Fax: 780-980-9830 E-mail: keybop@telusplanet.net

B.O.P. CERTIFICATE

CUSTOMER: ACADEMY SERVICES

DESCRIPTION: 9" 3000 81 SINGLE GATE

SERVICE COMPLETION DATE: NOV 9/2007

IN SERVICE DATE: MAY 14/2010

WORD ORDER # **TRIM:NACE**

CLIENT I.D. #ND35-0356 **SN#8H29107**

Operations Manager
D. Sleen

Sales
A. Spalding

KEY B.O.P. SERVICES

5705 - 47 Street
Leduc, Alberta
T9E 7A1

Phone: 780-980-9823 Fax: 780-980-9830 E-mail: keybop@telusplanet.net

B.O.P. CERTIFICATE

CUSTOMER: ACADEMY SERVICES

DESCRIPTION: 9" 3000 81 SINGLE GATE

SERVICE COMPLETION DATE: NOV 9/2007

IN SERVICE DATE: MAY 14/2010

WORD ORDER # **TRIM:NACE**

CLIENT I.D. #ND35-0355 **SN#8H29007**

Operations Manager
D. Sleen

Sales
A. Spalding

CONTACT STONEY CREEK

Location: SFC STONEY CREEK
UWI 100-J-86-2328

SURFACE CASING CEMENT PROPOSAL

Prepared for: Shellie Scott

CONTACT EXPLORATION INC.
C/O TRISTAR RESOURCE MANAGEMENT
#800, 815 - 8 AVENUE S.W.
CALGARY, AB
T2P 3P2

BJ Services Representative(s): Darcy A. Schultz (403) 531-5026

For Service Call: RED DEER PUMPING SERVICES 1-877-778-1773
DARTMOUTH 1-877-778-1773

Proposal: P250884 Rev: 01
Prepared By: Nathan Kellett
Date: 25/Jun/10

BJ Services Company Canada

Summary:

SURFACE CASING CEMENT PROPOSAL
CONTACT STONEY CREEK
SFC STONEY CREEK
UWI 100-J-86-2328

COMMENTS
Ensure that the mix water is between 15°C and 30°C to prevent viscous cement slurries.

TREATMENT SUMMARY

WELL DATA

Open Hole	222.2 mm			0.0 m to 220.0 m
Casing	177.8 mm	25.30 kg/m	H-40	0.0 m to 220.0 m

PREFLUSH: Water

Water Required:	5.00 m^3	Density:	1000 kg/m^3

CEMENT: 0:1:0 G + 3.00 % CaCl2

Slurry Interval:	0.0 m - 220.0 m	Yield:	0.757 m^3/t
Slurry Volume:	6.13 m^3	Density:	1901 kg/m^3
Cement Required:	8.10 t	Water:	0.440 m^3/t
Excess:	0.0 m - 220.0 m		100.0 %

Treatment Events:

SURFACE CASING CEMENT PROPOSAL
CONTACT STONEY CREEK
SFC STONEY CREEK
UWI 100-J-86-2328

Casing Preparation

Dress the casing with guide shoe and suitable float equipment. The casing should be adequately centralized at the top and bottom and at 50 meter intervals. This equipment together with the bottom three joints should be coated with thread locking compound if K-55 grade or stronger; or welded if weaker.

Safety

Conduct a pretreatment safety meeting with all personnel on location detailing program, pressure limitations, personnel responsibilities, and safety precautions.

Mud Conditioning

Condition hole with the casing on bottom.

Recorder

Ensure pressure recorder is rigged in and serviceable. (Chart to be attached to job ticket).

Pressure Test

Pressure test the surface equipment to 80% of the internal yield of the casing.
Maximum working pressure is 60% of the internal yield of the casing.

Preflush

Pump 5.0 m^3 of water ahead as a preflush.

Cement

Continuous mix and pump 8.10 tonnes of 0:1:0 G. Cement is to be mixed at 1901 kg/m^3.
Cement to contain:

3.00 %	CaCl2

Displacement

Drop plug and start displacement.

Slow displacement rate to 0.3 m^3/min or less prior to bumping plug. Bump plug at 3500 kPa over final pumping pressure. Do not exceed 60% of the casing's internal yield pressure.

Note

Do not disturb casing until cement has reached a compressive strength of 3500 kPa or greater (usually 6 to 8 hours).

Estimated Slurry Properties:

SURFACE CASING CEMENT PROPOSAL
CONTACT STONEY CREEK
SFC STONEY CREEK
UWI 100-J-86-2328

Description	Quantity	UOM	Unit Price	Price
Cement, Class G Oil Well Bulk	8.10	TNE	620.00	5,023.86
Plug, Wooden 177.8mm(7")	1.00	EA	150.00	150.00
FP-13L Foam Preventer	1.00	L	46.90	46.90
Calcium Chloride HT (CaCl2)	243.09	KG	2.55	619.88
Electronic Recording System	1.00	JOB	950.00	950.00
Bulk Bins, Rental	1.00	DAY	185.00	185.00
Handling and Blending of Material	8.34	TNE	90.20	752.81
Travel, all units	100.00	KM	7.65	765.00
Bulk Cement Delivery	834.60	TKM	1.43	1,193.48
Single Cementer Set Up & Depth Charge	220.00	M		3,265.00
Commun.Pkg. - radios w/headsets	1.00	JOB	285.00	285.00
Environmental Service Charge	1.00	JOB	50.00	50.00
	ESTIMATE TOTAL:			**$13,286.93**

ADDITIONAL CHARGES:

- Water supply and cartage
- Planks for cement bin (if necessary)
- Cement bin cartage

NOTE:

Provincial sales taxes and G.S.T. are additional to above costs where applicable.

Travel charges and bulk delivery charges are based on estimated kilometres only. Invoiced price will be based on actual kilometres travelled. Minimum charges may be applied to cement delivery pricing.

All charges are based on **New Brunswick** pricing.

The provision of products and services described in this treatment proposal shall be subject to the general terms and conditions in the BJ Services Company Canada Price and Information Book dated October 1, 2008, unless the parties are subject to a current existing master service agreement or other executed service contract.

The programmed Cement properties of yield and water required, may change with the addition of additives and final slurry density.

COST ESTIMATE

CONTACT EXPLORATION INC.

Customer	Proposal	Quotation
0001133953	P250884-01	31155639

Primary Cementing

Quotation Date
2010.06.25

CONTACT STONEY CREEK
100-J-86-2328

Description	Quantity	UOM	Discount %	Discounted Unit Price	Net Price
0:1:0 G + 3% CaCl2	8.103	TNE	45.0	515.18	4,174.51
Plug, Wooden 177.8mm(7")	1.000	EA	45.0	82.50	82.50
FP-13L Foam Preventer	1.000	L	45.0	25.79	25.79
Electronic Recording System	1.000	JOB		N/C	N/C
Bulk Bins, Rental	1.000	DAY		N/C	N/C
Travel, all units	100.000	KM	45.0	4.21	420.75
Single Cementer Set Up & Depth Charge	220.000	M	45.0	8.16	1,795.75
Commun.Pkg. - radios w/headsets	1.000	JOB		N/C	N/C
Environmental Service Charge	1.000	JOB		50.00	50.00

ESTIMATE TOTAL* **$6,549.30**

Salesperson Comments	Salesperson: Wind, David J.

NOTE: Travel charges and bulk delivery charges are based on estimated kilometers only. Invoiced price will be actual kilometers travelled.

*This estimate does not include taxes, royalties, or third party charges which may be incurred.

The provision of products and services described in this quote shall be subject to the general terms and conditions in the BJ Services Company Canada Price and Information Book dated Oct. 1, 2008, unless the parties are subject to a current existing master service agreement or other executed service contract.

CONTACT EXPLORATION INC.

Continued

Customer	Proposal	Quotation
0001133953	P250884-01	31155639

Primary Cementing

CONTACT STONEY CREEK
100-J-86-2328

FOB Blend Detail Costs:

Description	Quantity	UOM	Discount %	Discounted Unit Price	Blend Price
0:1:0 G + 3% CaCl2					
0:1:0 G	1.000	TNE	45.0	341.00	341.00
Handling and Blending of Material	1.030	TNE	45.0	49.61	51.10
Bulk Cement Delivery	102.999	TKM	45.0	0.79	81.01
Calcium Chloride HT (CaCl2)	30.000	KG	45.0	1.40	42.07
Blend Total FOB:	**1**	**TNE**			515.18
	1	**M3**			680.55

CONTACT STONEY CREEK

Location: 100-J-86-2328

PRODUCTION CASING CEMENT PROPOSAL

Prepared for: Shellie Scott

CONTACT EXPLORATION INC.
C/O TRISTAR RESOURCE MANAGEMENT
#800, 815 - 8 AVENUE S.W.
CALGARY, AB
T2P 3P2

BJ Services Representative(s): Darcy A. Schultz (403) 531-5026

For Service Call:	RED DEER PUMPING SERVICES	1-877-778-1773
	DARTMOUTH	1-877-778-1773

Proposal: P250885 Rev: 01
Prepared By: Nathan Kellett
Date: 25/Jun/10

BJ Services Company Canada

Summary:

PRODUCTION CASING CEMENT PROPOSAL
CONTACT STONEY CREEK
100-J-86-2328

COMMENTS

Temperatures provided with program are estimated from various sources and should be compared with actual logged temperatures. If there are any discrepancies, please contact the BJ Engineering department for a revision to blend.

Ensure that the mix water is between 15°C and 30°C to prevent viscous cement slurries.

If the final conditioned mud density at casing point exceeds 1100 kg/m3, contact the BJ Engineering Cement department for a revised preflush design.

TREATMENT SUMMARY

WELL DATA

Casing	177.8 mm	25.30 kg/m	H-40	0.0 m	to	220.0 m
Open Hole	158.7 mm			220.0 m	to	2198.0 m
Casing	114.3 mm	17.26 kg/m	J-55	0.0 m	to	2198.0 m

Summary:

PRODUCTION CASING CEMENT PROPOSAL
CONTACT STONEY CREEK
100-J-86-2328

PREFLUSH: Water

Water Required:	4.00 m^3	Density:	1000 kg/m^3

SCAVENGER: FILL-LITE 2-100 + 0.70 % R-3 + 0.90 % FL-5 + 5.00 % A-11

		Yield:	3.130 m^3/t
Slurry Volume:	3.00 m^3	Density:	1250 kg/m^3
Cement Required:	0.95 t	Water:	2.812 m^3/t

FILL CEMENT: FILL-LITE 2-100 + 0.70 % R-3 + 0.90 % FL-5 + 5.00 % A-11

Slurry Interval:	0.0 m - 1400.0 m	Yield:	1.317 m^3/t
Slurry Volume:	18.23 m^3	Density:	1518 kg/m^3
Cement Required:	13.84 t	Water:	1.000 m^3/t
Excess:	0.0 m - 220.0 m		0.0 %
	220.0 m - 1400.0 m		40.0 %

TAIL CEMENT: 0:1:0 G + 0.10 % SPC-12000 + 0.20 % R-3 + 0.40 % FL-5 + 0.50 % A-11 + 0.50 % CD-32 + 2.00 % Microsil 12P

Slurry Interval:	1400.0 m - 2198.0 m	Yield:	0.757 m^3/t
Slurry Volume:	10.63 m^3	Density:	1901 kg/m^3
Cement Required:	14.04 t	Water:	0.440 m^3/t
Excess:	1400.0 m - 2198.0 m		40.0 %

Treatment Events:

PRODUCTION CASING CEMENT PROPOSAL
CONTACT STONEY CREEK
100-J-86-2328

Casing Preparation

The casing should be adequately centralized at the following locations:

- from top to bottom at 50 meter intervals
- one per joint across productive intervals
- and 3 joints above and below each productive interval.

This equipment together with the bottom three joints should be coated with thread locking compound.

Safety

Conduct a pretreatment safety meeting with all personnel on location detailing program, pressure limitations, personnel responsibilities, and safety precautions.

Mud Conditioning

Circulate the well with reconditioned mud. Lower yield point and plastic viscosity as much as possible. (To be determined by mud engineer.)

Recorder

Ensure pressure recorder is rigged in and serviceable. (Chart to be attached to job ticket).

Pressure Test

Pressure test the surface equipment to 80% of the internal yield of the casing.
Maximum working pressure is 60% of the internal yield of the casing.

Preflush

Install a casing wiper plug and pump 4.0 m^3 of water ahead as a preflush.

Scavenger

Follow with 3.00 m^3 (0.95 tonne(s)) of FILL-LITE 2-100. Scavenger slurry is to be mixed to a density of 1250 kg/m^3.
Cement to contain:

0.90 %	FL-5
5.00 %	A-11
0.70 %	R-3

Treatment Events:

PRODUCTION CASING CEMENT PROPOSAL
CONTACT STONEY CREEK
100-J-86-2328

Fill Cement

Continuous mix and pump 13.84 tonne(s) of FILL-LITE 2-100. Fill cement is to be mixed at 1518 kg/m^3.
Cement to contain:

0.90 %	FL-5
5.00 %	A-11
0.70 %	R-3

Tail Cement

Continuous mix and pump 14.04 tonne(s) of 0:1:0 G. Tail cement is to be mixed at 1901 kg/m^3.
Cement to contain:

0.50 %	CD-32
0.50 %	A-11
0.40 %	FL-5
2.00 %	Microsil 12P
0.20 %	R-3
0.10 %	SPC-12000

Displacement

Drop the top plug and displace. Reciprocate the casing during displacement.

Slow displacement rate to 0.3 m^3/min or less prior to bumping the plug. Bump the plug at 3500 kPa over final pumping pressure. Do not exceed 60% of the casing's internal yield pressure.

Note

Set casing slips. Do not disturb casing until cement has reached a compressive strength of 3500 kPa or greater.

Book Price:

PRODUCTION CASING CEMENT PROPOSAL
CONTACT STONEY CREEK
100-J-86-2328

Description	Quantity	UOM	Unit Price	Price
Cement, Class G Oil Well Bulk	14.04	TNE	620.00	8,705.42
SPC-12000	14.04	KG	87.75	1,232.10
FP-13L Foam Preventer	1.00	L	46.90	46.90
FL-5 Fluid Loss Control	189.35	KG	24.50	4,639.20
Microsil 12P	280.82	KG	4.45	1,249.65
A-11 Accelerator	810.15	KG	2.65	2,146.91
CD-32 Dispersant	70.20	KG	29.60	2,078.07
R-3 Cement Retarder	131.67	KG	10.90	1,435.25
FILL-LITE 2-100 Cement Blend	14.79	TNE	985.00	14,577.02
Electronic Recording System	1.00	JOB	950.00	950.00
Bulk Bins, Rental	1.00	DAY	185.00	185.00
Handling and Blending of Material	30.33	TNE	90.20	2,736.40
Travel, all units	100.00	KM	7.65	765.00
Bulk Cement Delivery	3,033.70	TKM	1.43	4,338.19
Single Cementer Set Up & Depth Charge	2,198.00	M		7,290.00
Commun.Pkg. - radios w/headsets	1.00	JOB	285.00	285.00
Environmental Service Charge	1.00	JOB	50.00	50.00
Plug, Rubber Top 114.3mm(4.5")Drillable	1.00	EA	165.00	165.00
Plug, Rubber Btm 114.3mm(4.5")Drillable	1.00	EA	165.00	165.00
	ESTIMATE TOTAL:			**$53,040.11**

ADDITIONAL CHARGES:

- Water supply and cartage
- Planks for cement bin (if necessary)
- Cement bin cartage

NOTE:

Provincial sales taxes and G.S.T. are additional to above costs where applicable.

Travel charges and bulk delivery charges are based on estimated kilometres only. Invoiced price will be based on actual kilometres travelled. Minimum charges may be applied to cement delivery pricing.

All charges are based on **New Brunswick** pricing.

The provision of products and services described in this treatment proposal shall be subject to the general terms and conditions in the BJ Services Company Canada Price and Information Book dated October 1, 2008, unless the parties are subject to a current existing master service agreement or other executed service contract.

The programmed Cement properties of yield and water required, may change with the addition of additives and final slurry density.

Estimated Slurry Properties:

PRODUCTION CASING CEMENT PROPOSAL
CONTACT STONEY CREEK
100-J-86-2328

	Fill Cement	Tail Cement
	FILL-LITE 2-100 +0.90% FL-5 +5.00% A-11 +0.70% R-3	0:1:0 G +0.50% CD-32 +0.50% A-11 +0.40% FL-5 +2.00% Microsil 12P +0.10% SPC-10000 +0.20% R-3
Thickening Time (hrs):	4.5	3.5
Fluid Loss (cc/30 min):	30	25
Comp. Strength (MPa):	4.0	18.0
@ hours:	24	24
@ Depth (m):	1400	2198
Fann 300:	41	54
Fann 100:	29	20
n':	0.3152	0.9041
K' (Pa. s^n'):	2.9351	0.0982
Plug Flow (m3/min):	0.1797	0.052
Turbulent Flow (m3/min):	1.55	1.2
BHCT (Celsius):	32	32
BHST (Celsius):	28	42

COST ESTIMATE

CONTACT EXPLORATION INC.

Customer	Proposal	Quotation
0001133953	P250885-01	31155642

Primary Cementing

Quotation Date
2010.06.25

CONTACT STONEY CREEK
100-J-86-2328

Description	Quantity	UOM	Discount %	Discounted Unit Price	Net Price
0:1:0 G + 0.5% CD-32 + 0.5% A-11 + 0.4% F	14.041	TNE	45.0	725.80	10,190.95
FP-13L Foam Preventer	1.000	L	45.0	25.79	25.79
FILL-LITE 2-100 + 0.9% FL-5 + 5% A-11 + 0	14.799	TNE	45.0	914.60	13,535.06
Electronic Recording System	1.000	JOB		N/C	N/C
Bulk Bins, Rental	1.000	DAY		N/C	N/C
Travel, all units	100.000	KM	45.0	4.21	420.75
Single Cementer Set Up & Depth Charge	2198.000	M	45.0	1.82	4,009.50
Commun.Pkg. - radios w/headsets	1.000	JOB		N/C	N/C
Environmental Service Charge	1.000	JOB		50.00	50.00
Plug, Rubber Top 114.3mm(4.5")Drillable	1.000	EA	45.0	90.75	90.75
Plug, Rubber Btm 114.3mm(4.5")Drillable	1.000	EA	45.0	90.75	90.75

ESTIMATE TOTAL* **$28,413.55**

Salesperson Comments	Salesperson: Wind, David J.

NOTE: Travel charges and bulk delivery charges are based on estimated kilometers only. Invoiced price will be actual kilometers travelled.

*This estimate does not include taxes, royalties, or third party charges which may be incurred.

The provision of products and services described in this quote shall be subject to the general terms and conditions in the BJ Services Company Canada Price and Information Book dated Oct. 1, 2008, unless the parties are subject to a current existing master service agreement or other executed service contract.

CONTACT EXPLORATION INC.

Customer	Proposal	Quotation
0001133953	P250885-01	31155642

Primary Cementing

CONTACT STONEY CREEK
100-J-86-2328

FOB Blend Detail Costs:

Description	Quantity	UOM	Discount %	Discounted Unit Price	Blend Price
FILL-LITE 2-100 + 0.9% FL-5 + 5% A-11 + 0.7% R-3					
FILL-LITE 2-100	1.000	TNE	45.0	541.75	541.75
Handling and Blending of Material	1.066	TNE	45.0	49.61	52.89
Bulk Cement Delivery	106.602	TKM	45.0	0.79	83.84
FL-5 Fluid Loss Control	9.000	KG	45.0	13.48	121.28
A-11 Accelerator	50.000	KG	45.0	1.46	72.88
R-3 Cement Retarder	7.000	KG	45.0	5.99	41.96
Blend Total FOB:	**1**	**TNE**			914.60
	1	**M3**			694.46
0:1:0 G + 0.5% CD-32 + 0.5% A-11 + 0.4% FL-5 + 2% Microsil 12P + 0.2% R-3 + 0.1% SPC-12000					
0:1:0 G	1.000	TNE	45.0	341.00	341.00
Handling and Blending of Material	1.037	TNE	45.0	49.61	51.45
Bulk Cement Delivery	103.703	TKM	45.0	0.79	81.56
CD-32 Dispersant	5.000	KG	45.0	16.28	81.40
A-11 Accelerator	5.000	KG	45.0	1.46	7.29
FL-5 Fluid Loss Control	4.000	KG	45.0	13.48	53.90
Microsil 12P	20.000	KG	45.0	2.45	48.95
R-3 Cement Retarder	2.000	KG	45.0	5.99	11.99
SPC-12000	1.000	KG	45.0	48.26	48.26
Blend Total FOB:	**1**	**TNE**			725.80
	1	**M3**			958.78

APPENDIX D

Site Photographs

Appendix A – Site Photos

	
Access Road to Well XX	Proposed Well Pad Area
	
Proposed Well Pad Area	Wet Feature located 100 m south of well pad area
WELL PAD J-86	**PID: 00615468** **Photo Date: June 2010 and August 6, 2013**

Appendix A – Site Photos

	
Access Road to Well XX	Proposed Well Pad Area
	
Proposed Well Pad Area	Wet Feature located 50 to 100 m south of well pad area
WELL PAD XX	**PID: 05055074** **Photo Date: August 6, 2013**

APPENDIX E

Potable Well Reports (OWL)

New Nouveau Brunswick

Environment

Report Number **835**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	06/13/2002

Casing Information

Casing above ground 0.30m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
835	Steel	15.24cm	0m	19.51m	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	9.14m *(BTC - Below top of casing)*	54.6 lpm	1hr	0m	46 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
N/A

Qty 54.6L

Pump Installed
Submersible
Intake Setting (BTC)
24.38m

Driller's Log

Well Log	From	End	Colour	Rock Type
835	0m	0.91m	Brown	Sand
835	0.91m	1.52m	Brown	Topsoil
835	1.52m	4.57m	Red	Clay
835	4.57m	18.29m	Red	Soft Shale
835	18.29m	28.96m	Red	Shale

Overall Well Depth
28.96m

Bedrock Level
0m

Water Bearing Fracture Zone

Well Log	Depth	Rate
835	21.34m	6.82 lpm
835	24.38m	45.5 lpm

Setbacks

There is no Setback information.

New Nouveau Brunswick

Environment

Report Number **7832**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	10/03/2003

Casing Information

Casing above ground 0.86m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
7832	**Steel**	**15.24cm**	**0m**	**8.53m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	3.05m *(BTC - Below top of casing)*	45.5 lpm	0hr	8.53m	46 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
N/A

Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
15.24m

Driller's Log

Well Log	From	End	Colour	Rock Type
7832	**0m**	**3.66m**	**Brown**	**Clay and Sand**
7832	**3.66m**	**9.14m**	**Brown**	**Sandstone**
7832	**9.14m**	**19.81m**	**Grey**	**Glomer**
7832	**19.81m**	**22.86m**	**Brown**	**Glomer**

Overall Well Depth
22.86m

Bedrock Level
3.66m

Water Bearing Fracture Zone

Well Log	Depth	Rate
7832	**8.53m**	**27.3 lpm**

Setbacks

Well Log	Distance	Setback From
7832	**25.91m**	**Septic Tank**
7832	**24.38m**	**Septic Tank**
7832	**32.00m**	**Leach Field**
7832	**60.96m**	**Right of any Public Way Road**

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	10/03/2003

Casing Information

Casing above ground 0.86m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
7832	Steel	15.24cm	0m	8.53m	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	3.05m	45.5 lpm	0hr	8.53m	46 lpm	No	0 lpm
	(BTC - Below top of casing)						

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
N/A

Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
15.24m

Driller's Log

Well Log	From	End	Colour	Rock Type
7832	0m	3.66m	Brown	Clay and Sand
7832	3.66m	9.14m	Brown	Sandstone
7832	9.14m	19.81m	Grey	Glomer
7832	19.81m	22.86m	Brown	Glomer

Overall Well Depth
22.86m

Bedrock Level
3.66m

Water Bearing Fracture Zone

Well Log	Depth	Rate
7832	8.53m	27.3 lpm

Setbacks

Well Log	Distance	Setback From
7832	25.91m	Septic Tank
7832	24.38m	Septic Tank
7832	32.00m	Leach Field
7832	60.96m	Right of any Public Way Road

New Nouveau Brunswick

Environment

Report Number **7854**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	06/02/2004

Casing Information — Casing above ground 0.69m — Drive Shoe Used? No

There is no casing information.

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	7.32m *(BTC - Below top of casing)*	45.5 lpm	0hr	10.06m	46 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
0m

Driller's Log

Well Log	From	End	Colour	Rock Type
7854	0m	1.83m	Brown	Sand
7854	1.83m	4.88m	Red	Sand and Gravel
7854	4.88m	8.23m	Brown	Sand and Gravel
7854	8.23m	12.19m	Red	Clay and Sand and Gravel
7854	12.19m	16.46m	Brown	Glomer
7854	16.46m	21.34m	Light brown	Shale

Overall Well Depth
21.34m

Bedrock Level
0m

Water Bearing Fracture Zone

There is no water bearing fracture zone information.

Setbacks

Well Log	Distance	Setback From
7854	19.81m	Septic Tank
7854	24.38m	Leach Field

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	06/02/2004

Casing Information

Casing above ground 0.69m Drive Shoe Used? No

There is no casing information.

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	7.32m *(BTC - Below top of casing)*	45.5 lpm	0hr	10.06m	46 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)

Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
0m

Driller's Log

Well Log	From	End	Colour	Rock Type
7854	0m	1.83m	Brown	Sand
7854	1.83m	4.88m	Red	Sand and Gravel
7854	4.88m	8.23m	Brown	Sand and Gravel
7854	8.23m	12.19m	Red	Clay and Sand and Gravel
7854	12.19m	16.46m	Brown	Glomer
7854	16.46m	21.34m	Light brown	Shale

Overall Well Depth
21.34m

Bedrock Level
0m

Water Bearing Fracture Zone

There is no water bearing fracture zone information.

Setbacks

Well Log	Distance	Setback From
7854	19.81m	Septic Tank
7854	24.38m	Leach Field

New Nouveau Brunswick

Environment

Report Number **10187**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	05/16/2005

Casing Information — Casing above ground 0.76m — Drive Shoe Used? No

There is no casing information.

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	6.10m *(BTC - Below top of casing)*	54.6 lpm	1hr	14.02m	32 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
N/A
Intake Setting (BTC)
21.34m

Driller's Log

Well Log	From	End	Colour	Rock Type
10187	0m	3.05m	Red	Clay
10187	3.05m	12.19m	Brown	Clay and Sand
10187	12.19m	18.29m	Red	Clay and Sand and Gravel
10187	18.29m	23.16m	Brown	Clay
10187	23.16m	27.43m	Brown	Shale
10187	27.43m	33.53m	Brown	Glomer

Overall Well Depth
33.53m

Bedrock Level
23.16m

Water Bearing Fracture Zone

Well Log	Depth	Rate
10187	25.91m	4.55 lpm
10187	30.78m	27.3 lpm

Setbacks

Well Log	Distance	Setback From
10187	27.43m	Septic Tank
10187	30.48m	Leach Field
10187	56.39m	Right of any Public Way Road
10187	22.86m	Right of any Public Way Road

New Nouveau Brunswick

Environment

Report Number **10202**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	09/15/2004

Casing Information

Casing above ground 0.94m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
10202	**Steel**	**15.24cm**	**0m**	**24.38m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	24.38m *(BTC - Below top of casing)*	45.5 lpm	0hr	36.58m	27 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
41.15m

Driller's Log

Well Log	From	End	Colour	Rock Type
10202	**0m**	**4.57m**	**Brown**	**Sand and Gravel**
10202	**4.57m**	**12.19m**	**Red**	**Clay and Sand**
10202	**12.19m**	**18.29m**	**Brown**	**Clay and Sand and Gravel**
10202	**18.29m**	**24.38m**	**Red**	**Clay and Sand**
10202	**24.38m**	**27.43m**	**Brown**	**Shale**
10202	**27.43m**	**33.53m**	**Red**	**Shale**
10202	**33.53m**	**39.62m**	**Brown**	**Sandstone**
10202	**39.62m**	**45.72m**	**Red**	**Shale**

Overall Well Depth
45.72m

Bedrock Level
24.38m

Water Bearing Fracture Zone

Well Log	Depth	Rate
10202	**30.48m**	**4.55 lpm**
10202	**42.67m**	**18.2 lpm**

Setbacks

Well Log	Distance	Setback From
10202	**21.34m**	**Septic Tank**
10202	**24.38m**	**Leach Field**
10202	**20.73m**	**Right of any Public Way Road**

New Nouveau Brunswick

Environment

Report Number **12569**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	05/25/2006

Casing Information

Casing above ground 0.61m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
12569	**Steel**	**15.24cm**	**0m**	**20.73m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	20.42m *(BTC - Below top of casing)*	45.5 lpm	0hr 30min	70.10m	5 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)

Qty 0L

Pump Installed
N/A

Intake Setting (BTC)
0m

Driller's Log

Well Log	From	End	Colour	Rock Type
12569	**0m**	**0.30m**	**Black**	**Topsoil**
12569	**0.30m**	**3.05m**	**Brown**	**Gravel**
12569	**3.05m**	**21.34m**	**Grey**	**Soft Conglomerate**
12569	**21.34m**	**71.63m**	**Brown**	**Sandstone**

Overall Well Depth
71.63m

Bedrock Level
0m

Water Bearing Fracture Zone

Well Log	Depth	Rate
12569	**53.34m**	**4.55 lpm**

Setbacks

Well Log	Distance	Setback From
12569	**24.38m**	**Right of any Public Way Road**

New Nouveau Brunswick

Environment

Report Number **12570**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	06/23/2006

Casing Information — Casing above ground 0.61m — Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
12570	**Steel**	**15.24cm**	**0m**	**15.54m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	23.16m *(BTC - Below top of casing)*	45.5 lpm	0hr 30min	68.28m	2 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
60.96m

Driller's Log

Well Log	From	End	Colour	Rock Type
12570	**0m**	**0.61m**	**Brown**	**Topsoil**
12570	**0.61m**	**6.10m**	**Brown**	**Gravel**
12570	**6.10m**	**12.19m**	**Red**	**Clay**
12570	**12.19m**	**37.19m**	**Red**	**Conglomerate**
12570	**37.19m**	**60.96m**	**Grey**	**Conglomerate**
12570	**60.96m**	**68.58m**	**Red**	**Conglomerate**

Overall Well Depth
68.58m

Bedrock Level
0m

Water Bearing Fracture Zone

Well Log	Depth	Rate
12570	**38.10m**	**2.28 lpm**

Setbacks

Well Log	Distance	Setback From
12570	**24.38m**	**Septic Tank**
12570	**27.43m**	**Leach Field**
12570	**30.48m**	**Right of any Public Way Road**

New Nouveau Brunswick

Environment

Report Number **17939**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	06/25/2008

Casing Information

Casing above ground 0.61m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
17939	**Steel**	**15.24cm**	**0m**	**22.25m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	13.11m *(BTC - Below top of casing)*	68.25 lpm	1hr	13.41m	68 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)

Qty 0L

Pump Installed
Submersible

Intake Setting (BTC)
18.29m

Driller's Log

Well Log	From	End	Colour	Rock Type
17939	**0m**	**0.91m**	**Brown**	**Gravel**
17939	**0.91m**	**6.10m**	**Red**	**Clay**
17939	**6.10m**	**22.25m**	**Red**	**Shale**
17939	**22.25m**	**32.00m**	**Brown**	**Shale**

Overall Well Depth
32.00m

Bedrock Level
0m

Water Bearing Fracture Zone

Well Log	Depth	Rate
17939	**22.86m**	**9.1 lpm**
17939	**24.99m**	**18.2 lpm**
17939	**30.48m**	**68.25 lpm**

Setbacks

Well Log	Distance	Setback From
17939	**25.91m**	**Septic Tank**
17939	**28.96m**	**Leach Field**
17939	**14.02m**	**Right of any Public Way Road**

New Nouveau Brunswick

Environment

Report Number **17946**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	07/29/2008

Casing Information — Casing above ground 0.30m — Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
17946	**Steel**	**15.24cm**	**0m**	**11.28m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	1.22m *(BTC - Below top of casing)*	136.5 lpm	0hr 30min	12.19m	68 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
19.81m

Driller's Log

Well Log	From	End	Colour	Rock Type
17946	**0m**	**3.05m**	**Red**	**Clay**
17946	**3.05m**	**9.14m**	**Brown**	**Conglomerate**
17946	**9.14m**	**24.38m**	**Brown**	**Sandstone**

Overall Well Depth
24.38m

Bedrock Level
3.05m

Water Bearing Fracture Zone

Well Log	Depth	Rate
17946	**18.90m**	**22.75 lpm**
17946	**21.34m**	**68.25 lpm**

Setbacks

Well Log	Distance	Setback From
17946	**18.29m**	**Septic Tank**
17946	**25.91m**	**Leach Field**
17946	**18.29m**	**Right of any Public Way Road**

New Nouveau Brunswick

Environment

Report Number **24399**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	04/18/2011

Casing Information

Casing above ground 0.61m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
24399	**Steel**	**15.24cm**	**0m**	**17.98m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	6.10m *(BTC - Below top of casing)*	68.25 lpm	1hr	22.86m	68 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
33.53m

Driller's Log

Well Log	From	End	Colour	Rock Type
24399	**0m**	**4.57m**	**Brown**	**Gravel**
24399	**4.57m**	**17.98m**	**Brown**	**Clay**
24399	**17.98m**	**39.01m**	**Red**	**Shale**

Overall Well Depth
39.01m

Bedrock Level
17.98m

Water Bearing Fracture Zone

Well Log	Depth	Rate
24399	**21.34m**	**13.65 lpm**
24399	**34.44m**	**68.25 lpm**

Setbacks

Well Log	Distance	Setback From
24399	**36.58m**	**Septic Tank**
24399	**33.53m**	**Leach Field**
24399	**45.72m**	**Right of any Public Way Road**

New Nouveau Brunswick

Environment

Report Number **90154400**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well (NEW WELL)	Cable Tool (CABLE TOOL)	07/20/1995

Casing Information

Casing above ground 0.61m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
90154400	**Steel**	**15.24cm**	**0.61m**	**9.14m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	2.44m *(BTC - Below top of casing)*	113.75 lpm	1hr	0m	5 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 4.55L

Pump Installed
N/A
Intake Setting (BTC)
38.10m

Driller's Log

Well Log	From	End	Colour	Rock Type
90154400	**0m**	**2.44m**	**Brown**	**Fill**
90154400	**2.44m**	**18.29m**	**Brown**	**Conglomerate**
90154400	**18.29m**	**41.45m**	**Brown**	**Coarse Sandstone**

Overall Well Depth
41.45m

Bedrock Level
0m

Water Bearing Fracture Zone

Well Log	Depth	Rate
90154400	**21.34m**	**477.75 lpm**

Setbacks

There is no Setback information.

New Nouveau Brunswick

Environment

Report Number **90299500**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well (NEW WELL)	Cable Tool (CABLE TOOL)	06/26/1996

Casing Information

Casing above ground 0.61m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
90299500	**Steel**	**15.24cm**	**0m**	**24.38m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	18.29m *(BTC - Below top of casing)*	22.75 lpm	1hr	27.43m	23 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Chlorine Pucks
Qty 13.65L

Pump Installed
Submersible
Intake Setting (BTC)
30.48m

Driller's Log

Well Log	From	End	Colour	Rock Type
90299500	**0m**	**23.77m**	**Red**	**Clay**
90299500	**23.77m**	**35.05m**	**Red**	**Shale**

Overall Well Depth
35.05m

Bedrock Level
23.77m

Water Bearing Fracture Zone

Well Log	Depth	Rate
90299500	**28.96m**	**4.55 lpm**
90299500	**31.09m**	**18.2 lpm**

Setbacks

There is no Setback information.

New Nouveau Brunswick

Environment

Report Number **90461900**

Well Driller's Report

Date printed 2013/04/17

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well (NEW WELL)	Cable Tool (CABLE TOOL)	11/12/1996

Casing Information

Casing above ground 0.61m Drive Shoe Used? No

Well Log	Casing Type	Diameter	From	End	Slotted?
90461900	**Steel**	**15.24cm**	**0.61m**	**21.64m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	36.58m *(BTC - Below top of casing)*	45.5 lpm	1hr	0m	9 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 9.1L

Pump Installed
Submersible
Intake Setting (BTC)
57.91m

Driller's Log

Well Log	From	End	Colour	Rock Type
90461900	**0m**	**3.66m**	**Brown**	**Fill**
90461900	**3.66m**	**13.72m**	**Brown**	**Conglomerate**
90461900	**13.72m**	**61.26m**	**Grey**	**Conglomerate**

Overall Well Depth
61.26m

Bedrock Level
13.72m

Water Bearing Fracture Zone

Well Log	Depth	Rate
90461900	**36.58m**	**2.28 lpm**
90461900	**57.91m**	**9.1 lpm**

Setbacks

There is no Setback information.

New Nouveau Brunswick

Environment

Report Number **7832**

Well Driller's Report

Date printed 2013/08/25

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	10/03/2003

Casing Information

Casing above ground 0.86m Drive Shoe Used? Yes

Well Log	Casing Type	Diameter	From	End	Slotted?
7832	**Steel**	**15.24cm**	**0m**	**8.53m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	3.05m (BTC - Below top of casing)	45.5 lpm	0hr	8.53m	46 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
N/A

Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
15.24m

Driller's Log

Well Log	From	End	Colour	Rock Type
7832	**0m**	**3.66m**	**Brown**	**Clay and Sand**
7832	**3.66m**	**9.14m**	**Brown**	**Sandstone**
7832	**9.14m**	**19.81m**	**Grey**	**Glomer**
7832	**19.81m**	**22.86m**	**Brown**	**Glomer**

Overall Well Depth
22.86m

Bedrock Level
3.66m

Water Bearing Fracture Zone

Well Log	Depth	Rate
7832	**8.53m**	**27.3 lpm**

Setbacks

Well Log	Distance	Setback From
7832	**25.91m**	**Septic Tank**
7832	**24.38m**	**Septic Tank**
7832	**32.00m**	**Leach Field**
7832	**60.96m**	**Right of any Public Way Road**

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	10/03/2003

Casing Information

Casing above ground 0.86m Drive Shoe Used? Yes

Well Log	Casing Type	Diameter	From	End	Slotted?
7832	Steel	15.24cm	0m	8.53m	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	3.05m (BTC - Below top of casing)	45.5 lpm	0hr	8.53m	46 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
N/A

Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
15.24m

Driller's Log

Well Log	From	End	Colour	Rock Type
7832	0m	3.66m	Brown	Clay and Sand
7832	3.66m	9.14m	Brown	Sandstone
7832	9.14m	19.81m	Grey	Glomer
7832	19.81m	22.86m	Brown	Glomer

Overall Well Depth
22.86m

Bedrock Level
3.66m

Water Bearing Fracture Zone

Well Log	Depth	Rate
7832	8.53m	27.3 lpm

Setbacks

Well Log	Distance	Setback From
7832	25.91m	Septic Tank
7832	24.38m	Septic Tank
7832	32.00m	Leach Field
7832	60.96m	Right of any Public Way Road

New Nouveau Brunswick

Environment

Report Number **7854**

Well Driller's Report

Date printed 2013/08/25

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	06/02/2004

Casing Information

Casing above ground 0.69m Drive Shoe Used? Yes

There is no casing information.

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	7.32m (BTC - Below top of casing)	45.5 lpm	0hr	10.06m	46 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
0m

Driller's Log

Well Log	From	End	Colour	Rock Type
7854	0m	1.83m	Brown	Sand
7854	1.83m	4.88m	Red	Sand and Gravel
7854	4.88m	8.23m	Brown	Sand and Gravel
7854	8.23m	12.19m	Red	Clay and Sand and Gravel
7854	12.19m	16.46m	Brown	Glomer
7854	16.46m	21.34m	Light brown	Shale

Overall Well Depth
21.34m

Bedrock Level
0m

Water Bearing Fracture Zone

There is no water bearing fracture zone information.

Setbacks

Well Log	Distance	Setback From
7854	19.81m	Septic Tank
7854	24.38m	Leach Field

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	06/02/2004

Casing Information

Casing above ground 0.69m Drive Shoe Used? Yes

There is no casing information.

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	7.32m (BTC - Below top of casing)	45.5 lpm	0hr	10.06m	46 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)

Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
0m

Driller's Log

Well Log	From	End	Colour	Rock Type
7854	0m	1.83m	Brown	Sand
7854	1.83m	4.88m	Red	Sand and Gravel
7854	4.88m	8.23m	Brown	Sand and Gravel
7854	8.23m	12.19m	Red	Clay and Sand and Gravel
7854	12.19m	16.46m	Brown	Glomer
7854	16.46m	21.34m	Light brown	Shale

Overall Well Depth
21.34m

Bedrock Level
0m

Water Bearing Fracture Zone

There is no water bearing fracture zone information.

Setbacks

Well Log	Distance	Setback From
7854	19.81m	Septic Tank
7854	24.38m	Leach Field

New Nouveau Brunswick

Environment

Report Number **24729**

Well Driller's Report

Date printed 2013/08/25

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	12/15/2009

Casing Information

Casing above ground 0.61m Drive Shoe Used? Yes

Well Log	Casing Type	Diameter	From	End	Slotted?
24729	**Steel**	**15.24cm**	**0m**	**24.08m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	33.53m (BTC - Below top of casing)	68.25 lpm	0hr 30min	35.05m	68 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
46.33m

Driller's Log

Well Log	From	End	Colour	Rock Type
24729	**0m**	**2.74m**	**Red**	**Clay**
24729	**2.74m**	**22.86m**	**Red**	**Clay and Gravel**
24729	**22.86m**	**51.21m**	**Red**	**Conglomerate**

Overall Well Depth
51.21m

Bedrock Level
22.86m

Water Bearing Fracture Zone

Well Log	Depth	Rate
24729	**39.62m**	**9.1 lpm**
24729	**46.33m**	**68.25 lpm**

Setbacks

Well Log	Distance	Setback From
24729	**25.91m**	**Leach Field**
24729	**12.19m**	**Right of any Public Way Road**
24729	**33.53m**	**Septic Tank**

New Nouveau Brunswick

Environment

Report Number **90154900**

Well Driller's Report

Date printed 2013/08/25

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well (NEW WELL)	Cable Tool (CABLE TOOL)	09/15/1995

Casing Information

Casing above ground 0m — Drive Shoe Used? Yes

Well Log	Casing Type	Diameter	From	End	Slotted?
90154900	**Steel**	**15.24cm**	**0.61m**	**10.06m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	27.43m (BTC - Below top of casing)	81.9 lpm	1hr	28.35m	46 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 4.55L

Pump Installed
Submersible
Intake Setting (BTC)
44.20m

Driller's Log

Well Log	From	End	Colour	Rock Type
90154900	**0m**	**1.22m**	**Brown**	**Fill**
90154900	**1.22m**	**5.18m**	**Brown**	**Clay**
90154900	**5.18m**	**50.29m**	**Brown**	**Conglomerate**

Overall Well Depth
50.29m

Bedrock Level
0m

Water Bearing Fracture Zone

Well Log	Depth	Rate
90154900	**41.15m**	**6.82 lpm**
90154900	**45.72m**	**91 lpm**

Setbacks

There is no Setback information.

New Nouveau Brunswick

Environment

Report Number **90462700**

Well Driller's Report

Date printed 2013/08/25

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well (NEW WELL)	Cable Tool (CABLE TOOL)	07/16/1997

Casing Information

Casing above ground 0.61m Drive Shoe Used? Yes

Well Log	Casing Type	Diameter	From	End	Slotted?
90462700	**Steel**	**15.24cm**	**0.61m**	**17.07m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Bailer	12.19m (BTC - Below top of casing)	9.1 lpm	1hr	0m	9 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 4.55L

Pump Installed
Submersible
Intake Setting (BTC)
56.39m

Driller's Log

Well Log	From	End	Colour	Rock Type
90462700	**0m**	**3.05m**	**Red**	**Clay**
90462700	**3.05m**	**15.24m**	**Red**	**Clay and Shale**
90462700	**15.24m**	**61.87m**	**Red**	**Conglomerate**

Overall Well Depth
61.87m

Bedrock Level
15.24m

Water Bearing Fracture Zone

Well Log	Depth	Rate
90462700	**19.81m**	**9.1 lpm**

Setbacks

There is no Setback information.

APPENDIX F

Atlantic Canada Conservation Data Centre (ACCDC) Report

Atlantic Canada Conservation Data Centre
Centre de données sur la conservation du Canada Atlantique

DATA REPORT 4990: Hillsborough, NB

Prepared 17 April, 2013
by S.L. Robinson, Data Manager

CONTENTS OF REPORT

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) is part of a network of circa 85 NatureServe data centres and heritage programs in 50 states, 10 provinces and 1 territory, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The ACCDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador. Although a non-governmental agency, the ACCDC is supported by 6 federal agencies, plus 4 provincial governments, outside grants and data processing fees. URL: www.ACCDC.com.

Upon request and for a fee, the ACCDC reports known observations of rare and endangered flora and fauna, in and near a specified study area. As a supplement to that data, the ACCDC includes locations of managed areas with some level of protection, and also known sites of ecological interest. Data summarised in each report is attached as DBF files which may be opened from within data software (Excel, Access) or mapped in GIS (ArcView, MapInfo, AutoCAD).

1.1 RESTRICTIONS

The ACCDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting ACCDC data, recipients assent to the following limits of use:

a.) Data is restricted to use by trained personnel who are sensitive to landowner interests and the potential threat of the information contained here to rare and/or endangered flora and fauna.
b.) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
c.) The ACCDC requires Data Users to cease using and delete data 12 months after receipt.
d.) ACCDC data responses are restricted to that data in our Data System at the time of the data request.
e.) Data is qualified in regard to locational uncertainy and period of observation; cf Data Dictionary for details.
f.) ACCDC data responses are not to be construed as exhaustive inventories of taxa in an area.
g.) The non-occurrence of a taxon cannot be inferred by its absence in an ACCDC data response.

1.2 ADDITIONAL INFORMATION

Please direct biological questions about ACCDC data to: Sarah Robinson, ACCDC: (506) 364-2664, and technical data queries to: Samara Eaton, CWS (NB and PE): (506) 364-5060 or Julie McKnight, CWS (NS): (902) 426-4196.

For provincial information on rare taxa and protected areas, or information on game animals, deer yards, old growth forest, archeological sites, fish habitat etc, please contact Stewart Lusk, NBDNR: (506) 453-2440.

2.0 RARE AND ENDANGERED TAXA

A 5km buffer around the study area contains 35 records of 21 taxa from 16 sources, a relatively moderate-to-high density of records (quintile 4): 0.45 rec/km2.

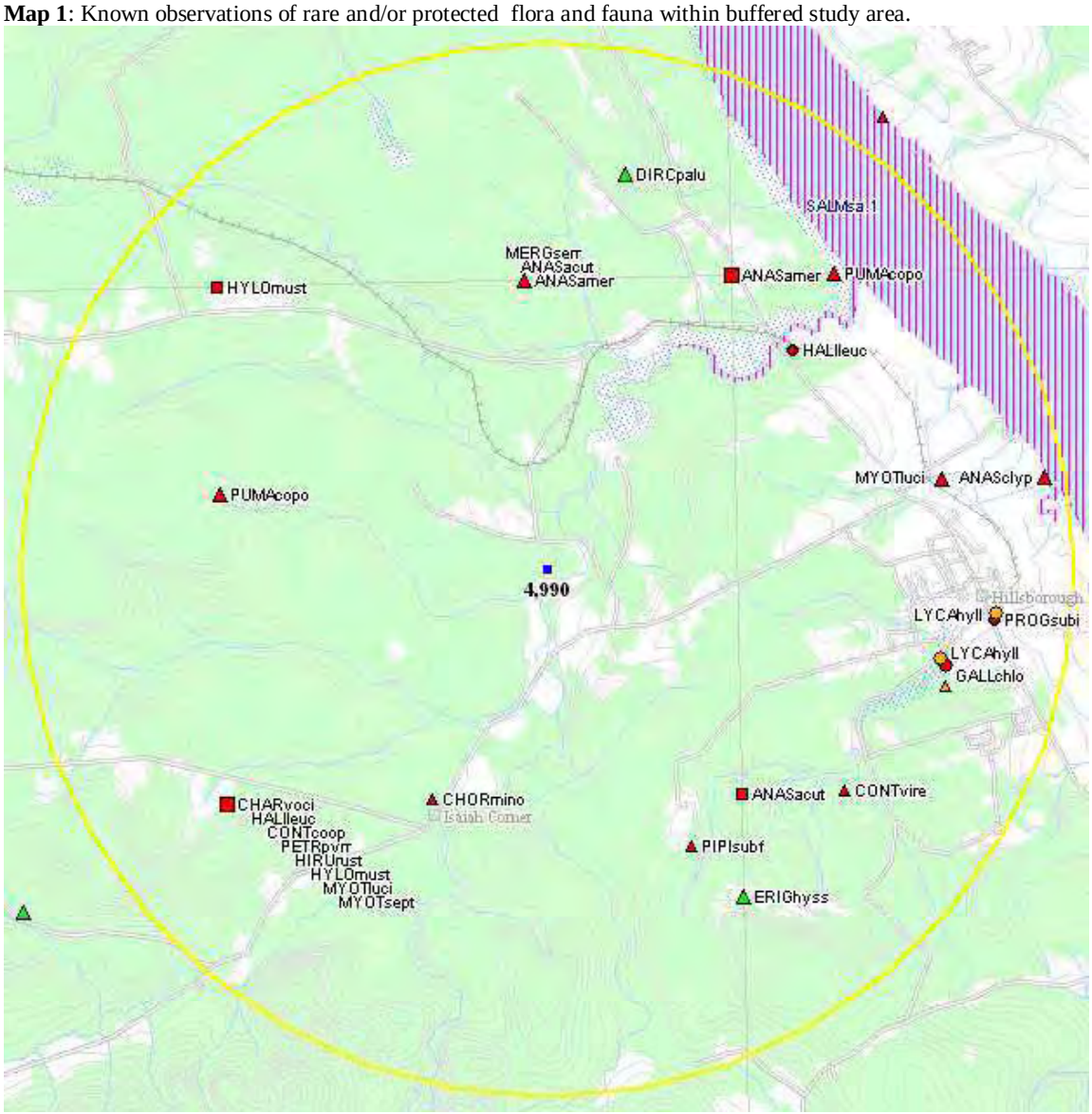
2.1 FLORA

A 5km buffer around the study area contains 2 records of 2 vascular, 0 records of nonvascular flora (see attached *ob.dbf).

2.2 FAUNA

A 5km buffer around the study area contains 30 records of 18 vertebrate, 3 records of 1 invertebrate fauna (cf attached *ob.dbf). Sensitive data: Wood Turtles are POTENTIALLY present in the study area (cf attached WOTU.rtf). Peregrine Falcons are PRESENT in the study area (cf attached PEFA.rtf).

Map 1: Known observations of rare and/or protected flora and fauna within buffered study area.



3.0 SPECIAL AREAS

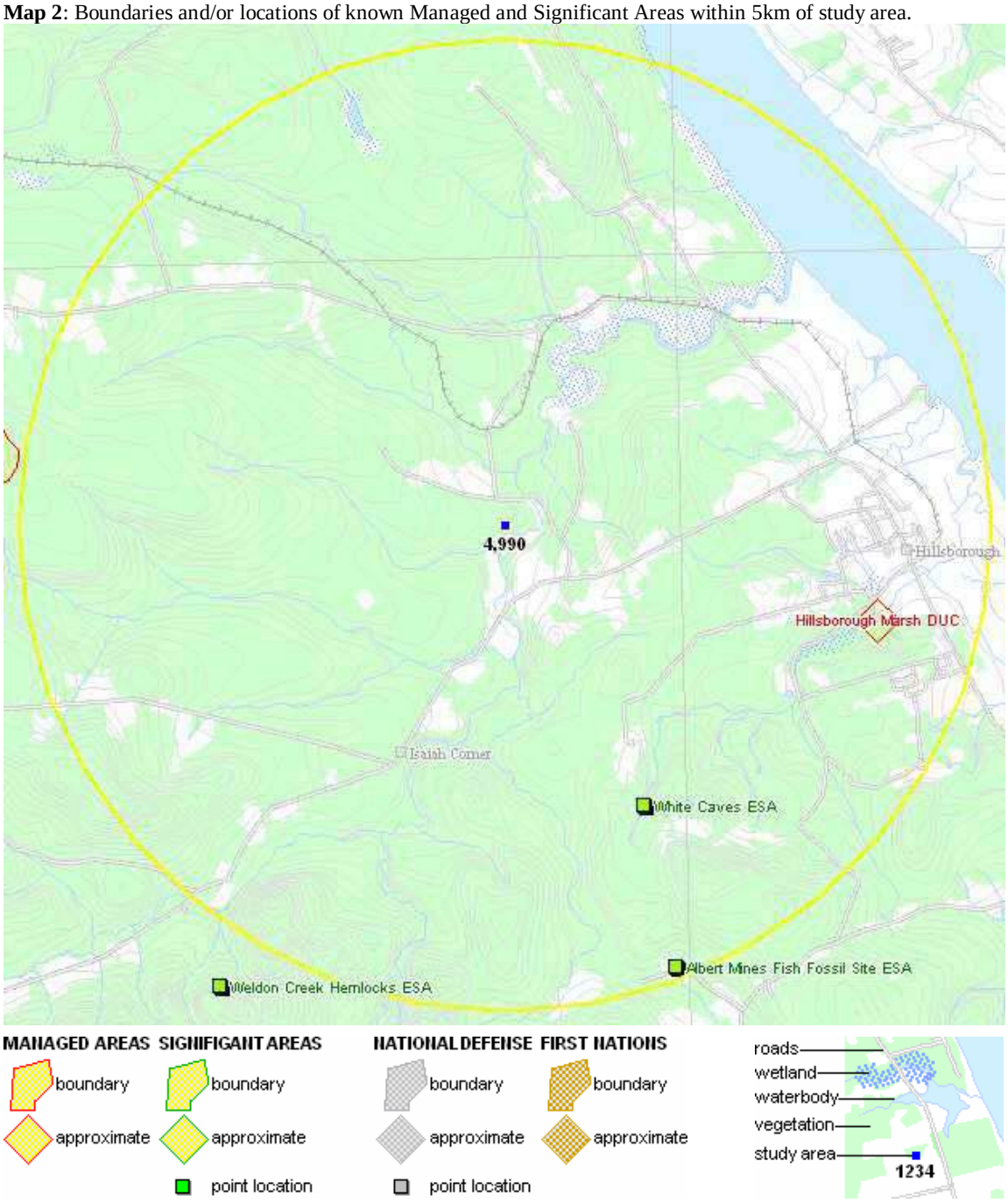
3.1 MANAGED AREAS

The GIS scan identified 1 Managed Area with some degree of protected status, in the vicinity of the study area (see attached *ma.dbf).

3.2 SIGNIFICANT AREAS

The GIS scan also identified 2 biologically significant sites in the vicinity of the study area; such sites are known for exceptional biotic richness but may or may not have legal status (see attached *sa.dbf).

Map 2: Boundaries and/or locations of known Managed and Significant Areas within 5km of study area.



4.0 TAXON LISTS

Rare and/or endangered taxa within the buffered area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation. [p] = vascular plant, [n] = nonvascular plant, [a] = vertebrate animal, [i] = invertebrate animal, [c] = community.

4.1 FLORA

	scientific name	common name	prov. rarity	prov. status	COSEWIC	obs	dist.km
p	Dirca palustris	Eastern Leatherwood	S2			1	4 ±1
p	Erigeron hyssopifolius	Hyssop-leaved Fleabane	S3			1	4 ±1

4.2 FAUNA

	scientific name	common name	prov. rarity	prov. status	COSEWIC	obs	dist.km
a	Myotis septentrionalis	Northern Long-eared Myotis	S1		E	1	4 ±10
a	Myotis lucifugus	Little Brown Myotis	S1		E	4	3 ±0.5
a	Hylocichla mustelina	Wood Thrush	S1S2B		T	2	4 ±5
a	Hirundo rustica	Barn Swallow	S3B		T	1	4 ±5
a	Chordeiles minor	Common Nighthawk	S3B		T	1	2 ±0.5
a	Contopus cooperi	Olive-sided Flycatcher	S3S4B		T	1	4 ±5
a	Contopus virens	Eastern Wood-Pewee	S4B		SC	1	4 ±0.5
a	Puma concolor pop. 1	Cougar - Eastern pop.	SU,SH	Endangered	DD	2	3 ±1
a	Haliaeetus leucocephalus	Bald Eagle	S3B	Reg.Endangered	NAR	3	3 ±0.1
a	Perimyotis subflavus	Eastern Pipistrelle	S1			1	3 ±0.5
a	Progne subis	Purple Martin	S1S2B			1	4 ±0.1
a	Gallinula chloropus	Common Moorhen	S1S2B			1	4 ±0.1
a	Anas clypeata	Northern Shoveler	S2B			1	5 ±1
i	Lycaena hyllus	Bronze Copper	S3			3	4 ±0.5
a	Charadrius vociferus	Killdeer	S3B			2	4 ±5
a	Anas americana	American Wigeon	S3B			2	3 ±1
a	Anas acuta	Northern Pintail	S3B			4	3 ±1
a	Mergus serrator	Red-breasted Merganser	S3B,S4S5N			1	3 ±1
a	Petrochelidon pyrrhonota	Cliff Swallow	S3S4B			1	4 ±5

4.3 RANGE MAPS

The legally protected taxa listed below are linked to the study area by predictive range maps based upon expert estimates of distribution. Taxa listed here but not in the observation data above, are unknown within the study area but perhaps present. Ranges of rank 1 indicate possible occurrence, those of rank 2 and 3 increasingly less probable.

	scientific name	common name	prov. rarity	prov. status	COSEWIC	range
a	Glyptemys insculpta	Wood Turtle	S3		T	1
i	Danaus plexippus	Monarch	S3B		SC	1
a	Ixobrychus exilis	Least Bittern	S1S2B		T	2
a	Lynx canadensis	Canada Lynx	S1	Reg.Endangered	NAR	2
a	Salmo salar pop. 1	Atlantic Salmon - inner Bay of Fundy	S2		E	1
p	Listera australis	Southern Twayblade	S2	Endangered		1
p	Pterospora andromedea	Giant Pinedrops	S1	Endangered		2
p	Isoetes prototypus	Prototype Quillwort	S2	Endangered	SC	1
a	Buteo lineatus	Red-shouldered Hawk	S2B		NAR	1
a	Buteo lineatus	Red-shouldered Hawk	S2B		NAR	2

5.0 SOURCE BIBLIOGRAPHY

The recipient of this data shall acknowledge the ACCDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

recs	source
9	Lepage, D. 2009. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 143,498 recs.
5	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
4	Bateman, M.C. 2000. Waterfowl Brood Surveys Database, 1990-2000 . Canadian Wildlife Service, Sackville, unpublished data. 149 recs.
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2	Sollows, M.C,. 2008. NBM Science Collections databases: mammals. New Brunswick Museum, Saint John NB, download Jan. 2008, 4983 recs.
2	Scott, Fred W. 1998. Updated Status Report on the Cougar (Puma Concolor couguar) [Eastern population]. Committee on the Status of Endangered Wildlife in Canada, 298 recs.
2	Sabine, D.L. 2012. Bronze Copper records, 2003-06. New Brunswick Dept of Natural Resources, 5 recs.
2	McAlpine, D.F. 1983. Status & Conservation of Solution Caves in New Brunswick. New Brunswick Museum, Publications in Natural Science, no. 1, 28pp.
2	Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc.
1	Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc, 6042 recs.
1	McAlpine, D.F. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB, 241 recs.
1	Klymko, J.J.D. 2012. Maritimes Butterfly Atlas, 2010 and 2011 records. Atlantic Canada Conservation Data Centre, 6318 recs.
1	Hicks, Andrew. 2009. Coastal Waterfowl Surveys Database, 2000-08. Canadian Wildlife Service, Sackville, 46488 recs (11149 non-zero).
1	Clayden, S.R. 1998. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, 19759 recs.
1	Benedict, B. Connell Herbarium Specimen Database Download 2004. Connell Memorial Herbarium, University of New Brunswick. 2004.
1	Amirault, D.L. 1995. Atlantic Canada Conservation Area Database (ARCAD).

APPENDIX G

Species at Risk and

Species of Conservation Concern summary

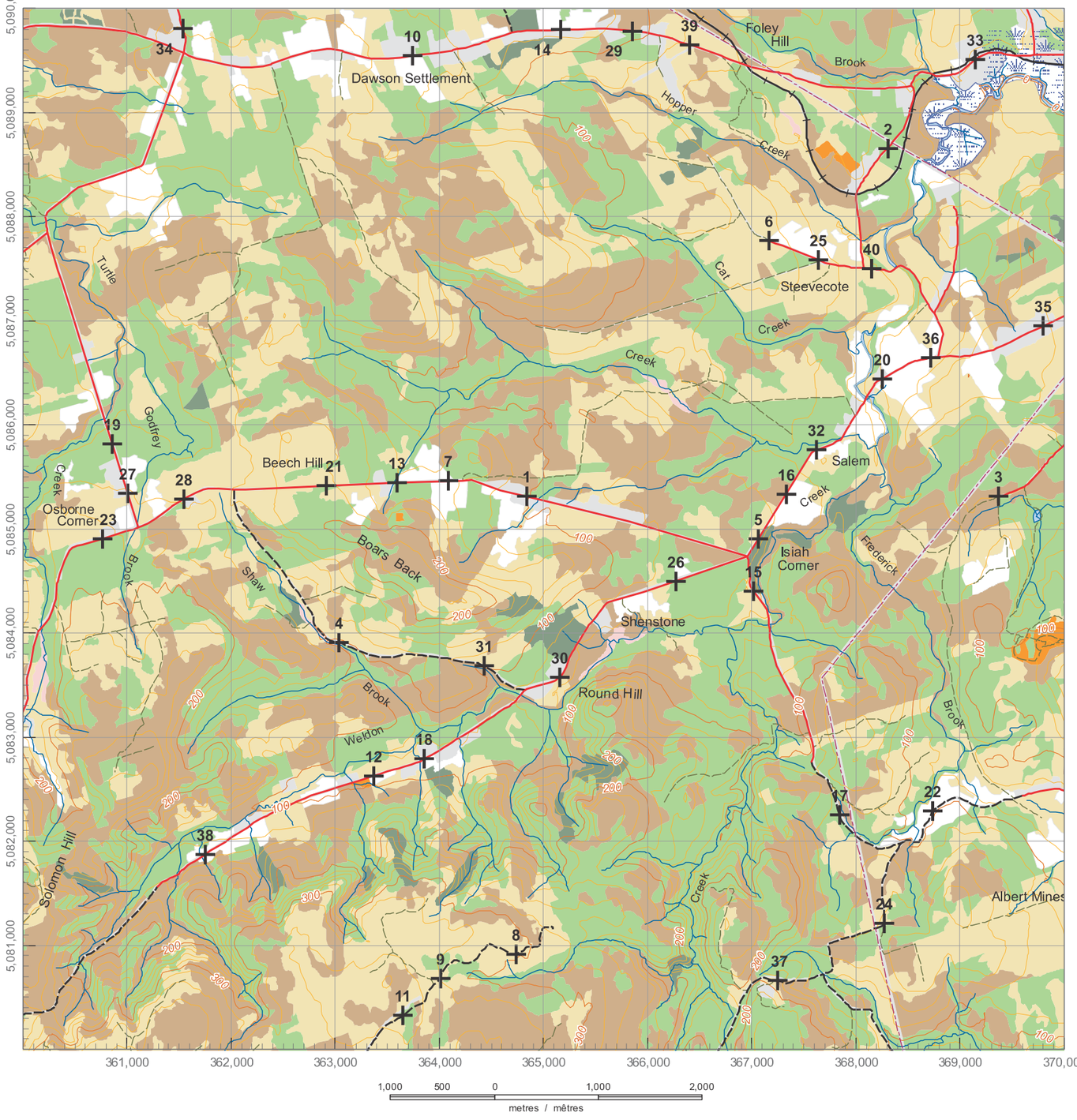
Species of Conservation Concern Common name (*Scientific name*)	Attributes of Habitat	Condition of Habitat (Based on Desktop Review)[1]	Function	Federal/ Provincial status	Potentially applicable to study area	Not applicable to study area	Rationale	Project components
5.5.2. Flora								
Multi-rayed Goldenrod (*Solidago multiradiata*)	Prefers to grow on gypsum rock faces	No habitat identified within the project location	Habitat for species of conservation concern	- ACCDC as S1 (regionally extremely rare)	---	✓	Based on review of information on the geology of the area the ground cover is mainly comprised of: loamy lodgement till, minor ablation till, silt, sand, gravel and rubble. Gypsum rock faces are not known to occur within or near the project location.	None
Blueberry Willow (*Salix myrtillifolia*)	Prefers to grow in open wetlands with a minimum amount of disturbance	No habitat identified within the project location	Habitat for species of conservation concern	- ACCDC as S1 (regionally extremely rare)	---	✓	Wetlands and undisturbed areas required for the blueberry willow are not found within or near the project. The closest wetland to the project location is at a distance of 180m. The area is currently used for agricultural, residential and industrial purposes currently and would be considered “disturbed” habitat and therefore, would not be ideal conditions for the blueberry willow.	None
5.5.3. Birds								
Chimney Swift (*Chaetura pelagica)*	Nesting habitat includes both chimneys (of sufficient size to support nests) and large hollow tree such as within old growth forest. Higher potential habitat is near larger streams, lakes or wetlands with open water (marsh, aquatic bed, shrub wetland or bog) (COSEWIC, 2007).	No habitat identified within the project location	Nesting Habitat	- COSEWIC/ SARA (Schedule 1)/NBSARA as Threatened	---	✓	The Chimney Swift requires specific habitat requirements for its survival. The project area is limiting in old growth and there are few residential areas within the project location. Chimney swifts would likely not be able to use the area for nesting	None
Olive-sided Flycatcher (*Contopus cooperi)*	The Olive-sided Flycatcher is most often associated with open areas containing tall live trees or snags for perching. Open areas may be forest clearings, forest edges located near natural openings (such as rivers or swamps) or human-made openings (such as logged areas), burned forest or openings within old-growth forest stands; these forests are characterized by mature trees and large numbers of dead trees (COSEWIC, 2007).	No habitat identified within the project location	Nesting Habitat	- COSEWIC/ SARA (Schedule 1)/NBSARA as Threatened	---	✓	The Olive-sided Flycatcher requires habitat with old growth or trees or snags for perching. The project area is limited in old growth and is in a regenerative stage of forest growth. This species would likely not be able to use the larger open regenerative growth habitat currently within each of the well pad areas.	None
Eastern Wood Pee-Wee (*Contopus virens)*	Their breeding habitat is usually deciduous, mixed woods, or pine plantations in eastern North America. It may perch high above the ground on the exposed branches of a tree near a clear area for foraging (	No habitat identified within the project location	Nesting Habitat	- COSEWIC (No SARA Status) as Special Concern	---	✓	Eastern Wood Pee-Wee habitat requires mature mixed forest habitat. This species would likely not be able to use the regenerative growth habitat currently within each of the well pad areas.	None
Wood Thrush (*Hylocichla mustelina)*	Wood Thrushes breed throughout mature deciduous and mixed forests. They nest somewhat less successfully in fragmented forests and even suburban parks where there are enough large trees for a territory. Ideal habitat includes trees over 50 feet tall, a moderate understory of saplings and shrubs, an open floor with moist soil and decaying leaf litter, and water nearby. (Cornell, 2013).	No habitat identified within the project location	Nesting Habitat	- COSEWIC (No SARA Status)/NBSARA as Threatened	---	✓	Wood Thrush habitat requires mature mixed forest habitat. This species would likely not be able to use the regenerative growth habitat currently within each of the well pad areas.	None
Barn Swallow (*Hirundo rustica)*	Barn Swallow feed in open habitats from fields, parks, and roadway edges to marshes, meadows, ponds, and coastal waters. Their nests are often easy to spot under the eaves or inside of sheds, barns, bridges and other structures (Cornell, 2013).	No habitat identified within the project location	Nesting Habitat	- COSEWIC (no SARA Status)/NBSARA as Threatened	---	✓	Barn Swallow require open habitats near meadow or marsh habitat and usually nest in structures or buildings. There is limited habitat within the well pad areas to support this species.	None
Common Nighthawk (*Chordeiles minor)*	The Common Nighthawk nests in a wide range of open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests (COSEWIC, 2007)..	No habitat identified within the project location	Nesting Habitat	- SARA (Schedule 1)/NBSARA as Threatened	---	✓	Common Nighthawk prefer recently cleared or harvested area, the current conditions of the well pad areas consist of regenerative growth (5-10 year growth) and therefore would not provide suitable habitat for this species	None
Peregrine Falcon (*Falco peregrinus anatum)*	Found usually nesting alone on cliff ledges or crevices, preferably 50 to 200 m in height, but sometimes on the ledges of tall buildings or bridges, always near good foraging areas (COSEWIC, 2007).	No habitat identified within the project location	Nesting Habitat	- SARA (Schedule 1) as Special Concern - NBSARA as Endangered	---	✓	Although according to NBDNR, a Peregrine Falcon nest is situated approximately 2 km from the general study area on the east side of the Petitcodiac River, the nest is well outside the project location and the activities carried out within the project would not adversely affect the nest.	None
Bald Eagle (*Haliaeetus leucocephalus)*	Sticks and plant material to build its nest in the top of a tall tree – often a large white pine. It usually uses the same nest for a number of years. The bald eagle becomes territorial during breeding season, and will defend an area up to two kilometres around its nest. It prefers a site near open water – an abundant source of fish.	No habitat identified within the project location	Nesting and Feeding Habitat	- NBSARA as Endangered	---	✓	According to NBDNR, a Bald Eagle nest site is situated on Weldon Creek just east of Rte 114 approximately 5 km north of the general study area. It is not likely that the activities associated with the development of the surface lease or the exploration for natural resources will affect the nesting activities of these bird species.	None

Species of Conservation Concern Common name (*Scientific name*)	Attributes of Habitat	Condition of Habitat (Based on Desktop Review)[1]	Function	Federal/ Provincial status	Potentially applicable to study area	Not applicable to study area	Rationale	Project components
5.5.4. Aquatic Species								
Atlantic salmon (*Salmo salar*) - Inner Bay of Fundy Population	Spawns in freshwater habitat, and requires clean, cool, flowing water free from chemical or organic pollution. It prefers natural stream channels with rapids and pools, a gravelly bottom, and water temperatures between 15 ^{o}C and 25^{o}C in summer. The marine habitat in the Bay of Fundy has provided the essential needs of this population of Atlantic salmon.	No habitat identified within the project location	Spawning and Nursery Habitat	- SARA (Schedule 1) and NBSARA as Endangered	---	✓	There are no watercourses within the project location or 30 meter buffer. Project specifications state that any waste water from the mining activities will be stored and taken off-site for proper handling. The relative proximity of the project location to the Petitcodiac River is greater than 30m and would therefore not trigger the need for a WAWA permit (unless otherwise indicated by the New Brunswick Department of Environment and Local Government).	None
Brook Floater (*Alasmidonta varicose)*	Requires running water environments such as shallow rivers or streams with moderate to high water flows. In New Brunswick it has only been found in rivers. It usually prefers sand or fine gravel substrates but is occasionally found in pockets of sand within cobble and rocky bottom areas.	No habitat identified within the project location	Foraging and Breeding Habitat	- SARA (no schedule) as Special Concern - COSEWIC as Special Concern -NBSARA as Special Concern	---	✓	There are no watercourses within the project location or 30m buffer. Project specifications state that any waste water from the mining activities will be stored and taken off-site for proper handling. The relative proximity of the project location to the Petitcodiac River is greater than 30m and would therefore not trigger the need for a WAWA permit (unless otherwise indicated by the New Brunswick Department of Environment and Local Government).	None
5.5.5. Mammals								
Canada Lynx (*Lynx canadensis)*	Associated with extensive boreal forests. It chooses areas that are beneficial to snowshoe hare, usually in forests where there is dense vegetation and shrubbery. Numerous studies have shown that lynx populations are influenced by that of the snowshoe hare. As hare populations become larger or smaller, so do the lynx populations. This occurs because the amount of food available to lynx influences their reproductive success and the survival of kittens and adults.	Mixed forest including: Red spruce, white spruce, black spruce, balsam fir, red maple, white birch, and trembling aspen.	Rearing and Foraging Habitat	- Data Deficient	---	✓	In the vicinity of the general study area there are some pockets of habitat that would support the Canada Lynx (correspondence with NBDNR, 2011). Canada Lynx are generally territorial animals and require a large habitat. It would be unlikely that the project would negatively affect Canada Lynx habitat due to limited project footprint and the high degree of habitat fragmentation and disturbance that has already been established in the area.	L-85 and J-86
Northern Myotis (*Myotis septentrionalis*)	Typically hibernates in caves or abandoned mines from October to May. During the rest of the year it forages in open forests along the edges of rivers and streams, roosting in caves, rock crevices, attics, and trees.	There are no hibernacula within the project footprint, however, foraging habitat would be available	Hibernacula and Foraging habitat	- ACCDC as S1 (extremely rare) - COSEWIC as Endangered -NBSARA as Endangered	---	✓	There are no noted abandoned mines or caves noted within the area of the project. The forest habitats may provide adequate habitat for foraging.	Construction/Operations
Little Brown Myotis (*Myotis lucifugus*)				- ACCDC as S1 (extremely rare) - COSEWIC as Endangered -NBSARA as Endangered	---	✓		Construction/Operations
Tri-colored Bat (*Perimyotis subflavus*) formerly known as Eastern Pipistrelle (*Pipistrellus subflavusis)*				- ACCDC as S1 (extremely rare) - COSEWIC as Endangered -NBSARA as Endangered	---	✓		Construction/Operations
5.5.6. Herpetiles								
Wood Turtle (*Glyptemys insculpta)*	Requires rivers and streams with sandy or gravely-sandy bottoms and prefers clear meandering watercourses with a moderate current. The Wood Turtle's natural nesting sites are found on sand or gravel-sand beaches and banks. Although they prefer riparian areas with diverse, patchy cover, females also lay in gravel holes, at the edges of roads and railways, in utility right-of-ways, in farming fields, pastures and former fields – any sunny and easily dug spot. Other habitats used less frequently by the Wood Turtle include bogs, marshy pastures, beaver ponds, shrubby cover, meadows, coniferous forests, mixed forests, hay, and agricultural fields and pastures.	No habitat identified within the project location	Breeding, brooding, foraging and hibernacula habitat.	- SARA (Schedule 1)/NBSARA as Threatened - ACCDC as S3	---	✓	According to ACCDC, there are currently no records of Wood Turtle within the study area. The edges along the Petitcodiac River may provide adequate habitat for the Wood turtle for foraging, but the project components are well outside the 30m buffer.	None

APPENDIX H

Maritime Breeding Bird Atlas Data

Region/région:13 *New Brunswick* **Dawson Settlement** *Nouveau-Brunswick* 20LR68



Maritime Breeding Bird Atlas 2006 - 2010 Atlas des oiseaux nicheurs des Maritimes

Roadside Point Count Coordinates/
Coordonnées de points d'écoute
de bordure de route

#	Easting/ Abscisse	Northing/ Ordonnée
1	364,833	5,085,310
2	368,303	5,088,656
3	369,367	5,085,310
4	363,036	5,083,911
5	367,065	5,084,906
6	367,167	5,087,767
7	364,087	5,085,460
8	364,737	5,080,916
9	364,006	5,080,684
10	363,744	5,089,541
11	363,644	5,080,324
12	363,371	5,082,626
13	363,587	5,085,440
14	365,163	5,089,792
15	367,015	5,084,402
16	367,328	5,085,331
17	367,841	5,082,248
18	363,855	5,082,788
19	360,856	5,085,816
20	368,247	5,086,440
21	362,914	5,085,410
22	368,736	5,082,286
23	360,758	5,084,904
24	368,271	5,081,208
25	367,641	5,087,582
26	366,266	5,084,497
27	361,005	5,085,339
28	361,543	5,085,285
29	365,852	5,089,780
30	365,156	5,083,573
31	364,430	5,083,679
32	367,622	5,085,755
33	369,140	5,089,507
34	361,537	5,089,800
35	369,800	5,086,947
36	368,717	5,086,645
37	367,247	5,080,660
38	361,747	5,081,870
39	366,401	5,089,649
40	368,145	5,087,498

Dawson Settlement

Region/région: 13 **20LR68**

Legend/Légende

- Highway — Route
- Forest Road — Route forestière
- Seasonal Road — Chemin saisonnier
- Trail — Sentier
- Railway, Abandoned Railway or Trail — Voie ferrée, Voie ferrée abandonnée ou sentier
- PipeLine — Gazoduc ou conduite d'eau
- Transmission Line — Ligne électrique
- Contour 20 m — Courbe de niveau 20 m
- Contour 100 m (index) — Courbe de niveau 100 m (index)
- Stream — Ruisseau
- Lake, River, Ocean — Lac, rivière, océan
- Open Wetland — Marécage
- Bog, Fen or Shrub Wetland — Tourbière ou marécage arbustif
- Mature Deciduous Forest — Forêt de feuillus mature
- Mature Coniferous Forest — Forêt de conifères mature
- Mature Pine Forest — Forêt de pins mature
- Young Forest — Jeune fôret
- Upland Open Country — Terrain ouvert: agricole, non-boisé
- Occupied, Urban, Other — Terrain occupé, zone urbaine, autre
- Gravel Pit — Gravière

Cartographic production by New Brunswick Department of
Natural Resources, Fish & Wildlife Branch, 2006
Disclaimer
The New Brunswick Department of Natural Resources
accepts no liability for any errors, deficiencies, or faults on this map.

This map is for use in Maritime Breeding Bird Atlas work only.

Production cartographique de la Province du Nouveau-Brunswick, Ministère
des Ressources naturelles, Direction de la pêche sportive et de la chasse, 2006
Avis
Le Ministère des Ressources naturelles du Nouveau-Brunswick
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ou anomalies dans la présente carte.

L'usage de cette carte est limité aux activités de l'Atlas des oiseaux
nicheurs des Maritimes seulement.

Atlas des oiseaux nicheurs des Maritimes Breeding Bird Atlas
New Nouveau Brunswick Natural Resources Ressources naturelles
Bird Studies Canada Études d'oiseaux Canada

Square Summary (20LR68)

#species (1st atlas)				#species (2nd atlas)				#hours		#pc done	
poss	prob	conf	total	poss	prob	conf	total	1st	2nd	road	offrd
30	23	4	57	0	0	0	0	6	22	13	2

Region summary (#13: Petitcodiac)

#squares	#sq with data		#species		#pc done	target #pc
	1st	2nd	1st	2nd		
61	57	0	153	0	0	228

Target number of point counts in this square: 12 road side, 3 off road (1 in Mature coniferous, 2 in Mature deciduous). Please try to ensure that each off-road station is located such that the entire 100m radius circle is within the prescribed habitat.

SPECIES	Code		%		SPECIES	Code		%		SPECIES	Code		%	
	1st	2nd	1st	2nd		1st	2nd	1st	2nd		1st	2nd	1st	2nd
Canada Goose		S	3	0	Sharp-shinned Hawk	H	H	49	0	Short-eared Owl †			3	0
Wood Duck			19	0	Northern Goshawk			21	0	North Saw-whet Owl		H	15	0
Gadwall ‡			1	0	Red-should Hawk †			3	0	Common Nighthawk †		S	43	0
American Wigeon			10	0	Broad-winged Hawk	H	NB	42	0	Whip-poor-will			5	0
American Black Duck	P		59	0	Red-tailed Hawk		H	38	0	Chimney Swift †			38	0
Mallard			12	0	American Kestrel	H	H	82	0	Ruby-thr Hummingbird	H	S	64	0
Blue-winged Teal			17	0	Merlin			17	0	Belted Kingfisher		H	52	0
Northern Shoveler			3	0	Virginia Rail †			8	0	Yellow-bellied Sapsucker	H	S	66	0
Northern Pintail	H		8	0	Sora			15	0	Downy Woodpecker	H	P	64	0
Green-winged Teal	P		21	0	Common Moorhen †			3	0	Hairy Woodpecker			57	0
Ring-necked Duck	P		31	0	American Coot †			3	0	Am Three-toed Woodpecker †			3	0
Common Eider ‡§			1	0	Semipalmated Plover †			1	0	Black-back Woodpecker			22	0
Common Goldeneye ‡			3	0	Piping Plover †			1	0	Northern Flicker		S	84	0
Hooded Merganser			5	0	Killdeer	FL	S	64	0	Pileated Woodpecker			57	0
Common Merganser	P		24	0	Spotted Sandpiper		FY	56	0	Olive-sided Flycatcher †	H	S	59	0
Red-breast Merganser			5	0	Solitary Sandpiper †			1	0	Eastern Wood-Pewee			70	0
Ring-necked Pheasant		S	14	0	Greater Yellowlegs †			0	0	Yellow-bellied Flycatcher			63	0
Ruffed Grouse	FL	FY	59	0	Willet ‡			1	0	Alder Flycatcher		P	91	0
Spruce Grouse	H		10	0	Upland Sandpiper †			5	0	Willow Flycatcher †			5	0
Common Loon			12	0	Wilson's Snipe		H	54	0	Least Flycatcher		T	54	0
Pied-billed Grebe			7	0	American Woodcock		S	52	0	Eastern Phoebe		CF	26	0
Double-crest Cormorant ‡§			1	0	Herring Gull ‡§			1	0	Gr Crested Flycatcher			8	0
American Bittern			19	0	Great Black-backed Gull ‡§			1	0	Eastern Kingbird	H		57	0
Great Blue Heron §			5	0	Rock Pigeon			35	0	Blue-headed Vireo	H	S	84	0
Green Heron †			1	0	Mourning Dove		S	40	0	Warbling Vireo †			5	0
Turkey Vulture ‡¤			1	0	Black-billed Cuckoo			15	0	Philadelphia Vireo			12	0
Osprey			12	0	Great Horned Owl		H	33	0	Red-eyed Vireo	T	FY	87	0
Bald Eagle ¤		FY	1	0	Northern Hawk Owl †			1	0	Gray Jay			45	0
Northern Harrier			57	0	Barred Owl		S	24	0	Blue Jay		S	77	0

next page >>

Maritimes Breeding Bird Atlas - Summary Sheet for Square 20LR68 (page 2 of 2)

SPECIES	Code		%		SPECIES	Code		%		SPECIES	Code		%	
	1st	2nd	1st	2nd		1st	2nd	1st	2nd		1st	2nd	1st	2nd
American Crow		S	82	0	Tennessee Warbler	H	S	82	0	Swamp Sparrow			49	0
Common Raven	H	H	85	0	Nashville Warbler	H	S	77	0	White-throat Sparrow	T	CF	94	0
Horned Lark †			8	0	Northern Parula	T	P	87	0	Dark-eyed Junco	FL	S	84	0
Purple Martin			15	0	Yellow Warbler	T		68	0	Scarlet Tanager †		CF	15	0
Tree Swallow	H	CF	85	0	Chestn-sided Warbler		P	61	0	Northern Cardinal ‡			0	0
Bank Swallow §			49	0	Magnolia Warbler	T	S	91	0	Rose-breast Grosbeak	H	S	78	0
Cliff Swallow §		CF	59	0	Cape May Warbler			35	0	Bobolink	H	S	64	0
Barn Swallow	A	AE	89	0	Black-thr Blue Warbler		S	33	0	Red-wing Blackbird	A	P	71	0
Black-capp Chickadee	FL	P	89	0	Yellow-rumped Warbler		FY	82	0	Eastern Meadowlark †			7	0
Boreal Chickadee			45	0	Black-thr Green Warbler	H	S	73	0	Rusty Blackbird †			29	0
Red-breast Nuthatch		S	84	0	Blackburnian Warbler	H	S	80	0	Common Grackle	H	A	87	0
White-breast Nuthatch		S	7	0	Palm Warbler			19	0	Brown-head Cowbird			49	0
Brown Creeper		H	28	0	Bay-breasted Warbler	H		59	0	Baltimore Oriole			19	0
Winter Wren	T	S	71	0	Blackpoll Warbler ‡			1	0	Pine Grosbeak ‡			3	0
Sedge Wren †			1	0	Black-white Warbler	H	S	85	0	Purple Finch	T	P	84	0
Marsh Wren †			1	0	American Redstart	T	P	91	0	House Finch †			5	0
Golden-crown Kinglet	H	S	75	0	Ovenbird	T	S	78	0	Red Crossbill †		P	8	0
Ruby-crown Kinglet	T	S	85	0	North Waterthrush			40	0	White-winged Crossbill	H		38	0
Eastern Bluebird †		CF	15	0	Mourning Warbler	H		52	0	Pine Siskin		NB	64	0
Veery	T	T	61	0	Common Yellowthroat		P	94	0	American Goldfinch	T	CF	73	0
Bicknell's Thrush †			1	0	Wilson's Warbler			26	0	Evening Grosbeak			70	0
Swainson's Thrush	T	S	78	0	Canada Warbler †	H		59	0	House Sparrow			54	0
Hermit Thrush	H	S	84	0	Chipping Sparrow	T	S	85	0					
Wood Thrush †	T		15	0	Vesper Sparrow †			7	0					
American Robin	T	CF	98	0	Savannah Sparrow		S	63	0					
Gray Catbird	H	NB	64	0	Nelson's Sh.-tail Sparrow			17	0					
Northern Mockingbird †			15	0	Fox Sparrow ‡			1	0					
European Starling		FY	70	0	Song Sparrow	H	A	80	0					
Cedar Waxwing	H	P	89	0	Lincoln's Sparrow	A		54	0					

This list includes all species found during the Maritimes Breeding Bird Atlas (1st atlas: 1986-1990, 2nd atlas: 2006-2010) in the region #13 (Petitcodiac). Underlined species are those that you should try to add to this square (20LR68). They have not yet been reported during the 2nd atlas, but were found during the 1st atlas in this square or have been reported in more than 50% of the squares in this region during the 2nd atlas so far. "Code" is the code for the highest breeding evidence for that species in square 20LR68 during the 2nd and 1st atlas respectively. The % columns give the percentage of squares in that region where that species was reported during the 2nd and 1st atlas (this gives an idea of the expected chance of finding that species in region #13). Rare/Colonial Species Report Forms should be completed for species marked: § (Colonial), ‡ (regionally rare), † (rare in the Maritimes) or ¤ (rare in the Maritimes, documentation only required for confirmed records). Current as of 22/04/2013. An up-to-date version of this sheet is available from http://www.mba-aom.ca/jsp/summaryform.jsp?squareID=20LR68?lang=en

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APPENDIX I

Archaeology/Heritage Resources Report

64°40'0"W

J86

Legend

waterbody

WATER_CODE

AQ
LK
ON
PN
RV
SL
WA

watercourse

WATERCOURS

1
2

0 0.4 0.8 1.6 2.4 3.2

64°40'0"W

CANADIAN REGISTER SEARCH RESULTS

Old Hillsborough Post Office

2852 Main Street, Hillsborough, New Brunswick

The Old Hillsborough Post Office is a two-storey brick and sandstone Beaux Arts style institutional building that stands proudly aloof on Main Street in Hillsborough, just inside...

Willy Duffy House

3 Duffy Lane, Hillsborough, New Brunswick

The Willy Duffy House was built in 1895 by William H. Duffy. It is an irregular two-storey Queen Anne Revival residence located on Duffy Lane in Hillsborough. The flourishes of...

Allison Peck House

2832 Main Street, Hillsborough, New Brunswick

The Allison Peck house is a two-storey Queen Anne Revival dwelling with a large two-storey bay window. Built in 1870, this residence is located on Main Street in the centre of the...

APPENDIX J

AIR EMISSIONS Calculations

1. Air Emissions Characteristics

1. Anticipated GHG Emissions

1. Access Road and Well Pad Preparation

For access road and well pad preparation it is anticipated that the following equipment would be used: 1 dozer, 1 grader, 1 excavator, 3 pick-up trucks, and 1 float (considered as Other Construction Equipment). It is anticipated that each access road and well pad will take approximately 40 hours to construction. A list of anticipated construction equipment and their emission factors is presented in Table 41.

Table 41- Composite Emission Factors from OFFROAD 2007 for year 2012 (SCAB, 2013)

Equipment	ROG (kg/hr)	CO (kg/hr)	NO_X (kg/hr)	SO_X (kg/hr)	PM (kg/hr)	CO_2 (kg/hr)	CH_4 (kg/hr)
Excavator	0.058967	0.244985	0.445291	0.000590	0.024313	54	0.005307
Grader	0.069536	0.278007	0.567126	0.000680	0.029438	60	0.006260
Other Construction Equipment	0.014742	0.174497	0.390044	0.000590	0.016601	56	0.003765
Rubber Tired Dozers Composite	0.141249	0.566582	1.218620	0.001134	0.051573	108	0.012746
Off-highway trucks composite	0.101650	0.300958	0.914351	0.001225	0.032432	118	0.009163

Considering only CO_2 and CH_4 for greenhouse gases, the total emission factors for all equipment on site would be calculated using Equation 1:

$$Total\ GHG\ Emissions = \left[\sum(CO2\ emisoins/hour) + \left(\sum CH4 \frac{emissions}{hour} * GWP\ of\ CH4\right)\right] * t$$

$$Total\ GHG\ Emissions = \left[\sum(CO2\ emisoins/hour) + \left(\sum CH4 \frac{emissions}{hour} * GWP\ of\ CH4\right)\right] * t$$

(1)

Where:

- Total GHG Emissions is in kg of CO2e;
- GWP of CH4 is 21;
- t is total hours of operation, for this case 40 hours.

Therefore based on the emission factors presented in Table 41 and using equation 1 it is expected that 50 tonnes of CO_2e will be produced for the construction of the access roads and well pads.

2. Well Drilling

In 2004 the Canadian Association of Petroleum Producers (CAPP, 2004) commissioned a study to complete a national inventory of GHG emissions from the upstream oil and gas industry. This study evaluated the GHG emissions from upstream oil and gas development across Canada from 1995 till 2000. In 2000, the upstream oil and gas industry in Canada emitted an estimated 85 Mt of CO2e GHGs. Approximately 41% was from fuel combustion, 27% from venting, 12% from equipment leaks, 8% from formation leaks, 6% from flaring, 5% from accidental releases, and 1% percent from storage and handling losses.

The 2004 study also included an emission intensity analysis, which was intended to provide a high level estimate of GHG emissions from potential new upstream oil and gas developments (CAPP, 2004). This was a considerable undertaking as the estimation of potential GHG generated during well drilling, well servicing, well testing and light oil production is dependent on a number of site specific factors that are not known until the oil well is undergoing production. Despite this CAPP reviewed over 20,000 wells that were drilled in Canada and estimated the GHG emissions from each activity. The activity along with the estimated GHG

emissions calculated by CAPP is presented in Table 42.

Table 42 - Summary of potential GHG emissions from Upstream Oil and Gas activities (CAPP, 2004).

Activity	**Unit**	**GHG Emissions (tonnes of CO_2e)**
Well Drilling	Per well	63.3
Well Servicing	Per well	26.3
Well Testing	Per well	47.7
Light Oil Production	Per 10^3 m^3 oil produced	180
Petroleum Liquid Transportation	Per 10^3 m^3 oil produced	0.36

Based on data in Table 42it is anticipated that approximately 126 tonnes of CO_2e, GH G emissions will be produced from the drilling of the two wells.

Given that Salem field is still in the early stages of development, it is not possible at this time to accurately forecast the potential GHGs that could be generated from the development and production of the two proposed wells. The rate that GHGs are generated during production is a direct function of the rate and chemical composition of the oil and/or natural gas. These two parameters will not be known until after the wells are in production.

2. Anticipated Noise Impacts

Typical noise levels associated with oil and gas production and development as well as typical construction equipment are presented in Table 43.

Table 43 - Noise Levels Associated with Oil and Gas Production and Development

Equipment Type	**Noise Level (dBA)***
Tanker Truck	74[1]
Water Truck	74 [1]

Flatbed Truck	74 [1]
Concrete Mixer Truck	85 [1]
Crane	85 [1]
Bulldozer	85 [1]
Well drilling	83 [2]
Backhoe	80 [1]
Pump Jack	82 [2]
Pickup Truck	55 [1]
Pumps	77 [1]
Average Construction Site	85 [2]

* Noise level at 15.25 m (50 ft) away from source.

[1] Source: Roadway Construction Noise Model, USDOT 2006

[2] Source: Crocker and Kessler 1982.

The Province of New Brunswick has not established regulatory limits for noise levels from industrial and construction activities but has recently put rules in place limiting noise levels from oil and gas activity. However, according to the *publication Responsible Environmental Management of Oil and Natural Gas Activities in New Brunswick, Rules for Industry* (NBDEM, 2013) the maximum permissible levels of noise from oil and gas operations (including well drilling, servicing, compressors and production) are 50 dBA Leq during the day (7 am to 7 pm) and 40 dBA Leq during the night (7 pm to 7 am).

Potential receptors within 1,500 meters of the well pad were identified to the north, south east and west of each of the well pads and are presented in Table 44.

Table 44 - Residential receptors in vicinity of proposed well pads.

Receptor	Direction	Address	Distance from well(m)
Salem Well (J86)			
R1	North	Steeves Cote Road, Dawson Settlement	550
R2	East	- 910 Highway Salem	842
R3	South	Property on Route 910 Salem	1155

R4*	West	Nothing within 1,500 meters	1500
Beach Hill Well			
R5*	North	Nothing within 1,500 meters	1500
R6*	East	Nothing within 1,500 meters	1500
R7	South	- 910 Highway Shenstone	804
R8	West	- 910 Highway Shenstone	1000

* No residential receptors were identified within 1,500 meters of wellpad.

In order to determine the potential noise impacts construction of the access roads, well pads and the drilling of the well have on nearby residential receptors identified in Table 44 the sources noises presented in Table 43 were entered into the USDOT, Federal Highway Administration Road Construction Noise (RCN) Model. The results of the model are presented in the following sections.

1. Access Road and Well Pad Preparation

In order to construction the access road and well pad the same equipment identified in Section 4.1.1.1 was entered into the RCN Model. The results of the modeling are presented in Table 45 below.

Table 45 - Predicted sound pressure levels during construction of Access Road and Well pad.

Receptor	Direction	Address	Predicted Leq (dBA)[1]
Salem Well (J86)			
R1	North	Steeves Cote Road, Dawson Settlement	47.3
R2	East	- 910 Highway Salem	43.6
R3	South	Property on Route 910 Salem	46.2
R4*	West	Nothing within 1,500 meters	44
Beach Hill Well			
R5*	North	Nothing within 1,500 meters	41.6
R6*	East	Nothing within 1,500 meters	41.6
R7	South	- 910 Highway Shenstone	44

R8	West	- 910 Highway Shenstone	45.1
* No residential receptors were identified within 1,500 meters of wellpad.			
[1] 3dBA was subtracted from each predicted Leq to account for shielding provided by trees			
as per ISO 9613-1, 1993			

Construction of the access road and well pad will only occur during the day, from 7 am to 7 pm 5 days a week. The results of the RCN Model do not predict that 50 dBA Leq noise level will be exceeded at any of the identified receptors during the construction of either well pad.

2. Well Drilling

Predicted sound pressure levels at nearby receptors during the drilling of each well are presented in Table 46. In order to complete the wells in a timely manner it is expected that well drilling activities will take place 24 hours a day, 7 days a week until the each well is drilled, approximately 20 days each.

Table 46 - Predicted sound pressure levels at closest receptors during the drilling of two wells.

Receptor	Direction	Address	Predicted Leq (dBA) [1]
Salem Well (J86)			
R1	North	Steeves Cote Road, Dawson Settlement	40
R2	East	- 910 Highway Salem	39.9
R3	South	Property	37.1
R4*	West	Nothing within 1,500 meters	34.8
Beach Hill Well			

R5*	North	Nothing within 1,500 meters	34.8
R6*	East	Nothing within 1,500 meters	34.8
R7	South	- 910 Highway Shenstone	40
R8	West	- 910 Highway Shenstone	38.4

* No residential receptors were identified within 1,500 meters of wellpad.

[1] Up to 10 dBA of shielding is provided by trees (3dBA), well pad berm (3 dBA) and drill rig (4 dBA) as per the US DOT FHA, Noise Barrier Design Handbook, 2000 and ISO-9613, 1993 .

The drilling of the two wells is not expected to result in noise impacts greater than 40 dBA.

3. Anticipated Air Emissions

1. Access Road and Well Pad Preparation

The anticipated equipment identified in Section 4.5.1.1 and the composite emission factors presented in Table 41 were used to determine the potential emissions during the construction phase. The anticipated emissions are presented in Table 47 and are not anticipated to exceed the NB maximum ground level concentrations.

Table 47 - Anticipated Air Emissions during construction of well pad

Contaminant	Anticipated Emissions per hour (kg/hour)	Total Anticipated Emissions (kg)
VOC	0.416	33.25
CO	1.914	153.12
NO_X	4.316	345.24
SO_X	0.005	0.43
PM	0.188	15.00

2. Well Drilling

In order to calculate the anticipated emissions from well drilling it was assumed that 10,000 liters of diesel fuel was used by the drill rig to drill each well. The following assumptions were made in order to calculate the emissions from well drilling:

- 10,000 L of diesel = 353.15 cubic feet
- Using a diesel density of 54.6 lb/ft^3 [1] fuel consumption was 19,282 lb
- Diesel heating value: 44,800 kJ/kg or 19,300 BTU/lb[2]
- Fuel input was 372,142,600 BTU, or 372 MMBTU

Using emission factors from the AP42 – Compilation of Air Pollutant Emission Factors (US EPA, 200) the anticipated air emissions from drilling a well are presented in Table 48

Table 48 - Air Emissions from Drilling one well.

Pollutant	Diesel Fuel Emission Factor (lb/MMBTU fuel input)[1]	Emissions per Well (lb)	Emissions per Well Drilled (kg)
NO_X	4.41	1,640.50	744.1
CO	0.95	353.4	160.3
SO_X	0.29	107.9	48.9
PM_{10}	0.31	115.3	52.3

[1] Density value from http://www.engineeringtoolbox.com/fuels-densities-specific-volumes-d_166.html Accessed 10 May 2012

[2] Heating value from http://www.engineeringtoolbox.com/fuels-higher-calorific-values-d_169.html Accessed 10 May 2012