

PREFACE

Pioneer Coal Limited (Pioneer Coal) is submitting this Environmental Assessment Registration Document (EARD) for surface mining operations of the Point Aconi Coal Resource Block. A proposal submitted by Pioneer Coal in response to a Call for Proposals for the exploration, development and reclamation of the coal resource area in Point Aconi via surface extraction techniques was accepted by the Nova Scotia Department of Natural Resources (NSDNR) on May 21, 2004. As such, Pioneer Coal was granted the exclusive right to apply for a Special Mining Lease for this block and did so on January 6, 2005. On April 14, 2005 the Governor in Council authorized the granting of a Special Lease for Coal.

The proposed surface mining operation at the Prince Mine Site would not only provide employment opportunities through the mining of Nova Scotia's indigenous coal resources, but would also provide a means for the systematic and economical reclamation and stabilization of lands highly disturbed by Cape Breton Development Corporation (CBDC) and a large number of previous bootleg mining operations.

This information has been prepared utilizing the comments, advice and expertise of a number of different agencies and persons including: Nova Scotia Department of Natural Resources (NSDNR); Nova Scotia Department of Environment and Labour (NSDEL); Nova Scotia Museum (NSM); Confederacy of Mainland Mi'kmaq (CMM); Un'amaki Institute of Natural Resources (UINR); the Canadian Environmental Assessment Agency (CEAA); the federal Department of Fisheries and Oceans (DFO); Environment Canada (EC); and, community members via a public and stakeholder consultation process.

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EXECUTIVE SUMMARY

Pioneer Coal Limited proposes to undertake a Surface Coal Mine and Reclamation Project at the Prince Mine Site in the Point Aconi Coal Resource Block, Cape Breton, Nova Scotia. The undertaking requires a Class I Environmental Assessment under the Nova Scotia *Environment Act* and *Environmental Assessment Regulations*.

Prince Mine coal resources can play a significant role in the supply of indigenous coal in Nova Scotia. The use of indigenous coal resources in electrical generating facilities is a main principle of Nova Scotia's Energy Strategy. The undertaking will significantly improve future land use options in the project area via its reclamation program for the former Prince Mine Site.

The proposed undertaking involves the operation of a surface mine to extract approximately 1.6 million tonnes of coal. Conventional surface mining methods as well as innovative highwall mining methods, using the NOVAMINER 2000, will be employed. Final site reclamation will occur in 2012.

This registration document assesses the environmental effects of the proposed undertaking in relation to identified Valued Ecological and Socio-Economic Components (VESC's). The assessment of the environmental effects undertaken in this registration document was based heavily on inputs from regulators, stakeholders, members of the public, and other levels of government, including Mi'kmaq government.

The following VESC's were identified for this undertaking:

- Freshwater
- Saltwater
- Sensitive or Rare Species
- Flora
- Fauna
- Wetlands
- Economy
- Air Quality
- Noise Levels
- Cultural Resources
- Mi'kmaq Land and Resource Use
- Transportation
- Community Resources
- Fisheries
- Domestic Wells
- Aesthetics
- Human Health and Safety
- Climate

The document describes effective mitigation measures to minimize the negative effects of the project, and the negative cumulative effects of the project, on the identified VESCs. A monitoring and follow-up plan is designed to ensure the implementation and effectiveness of the mitigation measures.

It is concluded that the undertaking will create no significant long-term adverse effects on the identified VESCs, and an overall positive residual impact on the VESCs will result from the reclamation of the Prince Mine Site. The project will lead to the reclamation of the existing Prince Mine Site at little or no cost to the federal or provincial governments; creation of 40-50 direct jobs and possibly over 100 indirect jobs; the restoration of derelict lands (pockmarked and subsidence impacted); a long term solution to the existing mine water drainage issue; and the potential to generate new business for the rail line and benefit taxpayers through increased payments to governments for royalties, taxes and further economic spin-off.

LIST OF ACRONYMS AND ABBREVIATIONS

ACCDC	Atlantic Canada Conservation Data Centre
ARD	acid rock drainage
CBDC	Cape Breton Development Corporation
CBRM	Cape Breton Regional Municipality
CLC	Community Liaison Committee
cm	centimetre
cm/sec	centimetre per second
CMM	Confederacy of Mainland Mi'kmaq
COA	Conditions of Approval
CRM Group	Cultural Resource Management Group
dB	decibel
EA	Environmental Assessment
EAR	Environmental Assessment Report
EBS	Environmental Baseline Study
EC	Environment Canada
EEM	Environmental Effects Monitoring
EARD	Environmental Assessment Registration Document
ESA	Environmental Site Assessment
ha	hectare(s)
IA	Industrial Approval
kg	kilogram
km/hr	kilometre per hour
m	metre
m ²	square metre
m ³	cubic metre
m ³ /d	cubic metre per day
m ³ /hr	cubic metre per hour
MGI	MGI Limited
mg/L	milligram per litre
MKS	Mi'kmaq Knowledge Study
mm	millimetre
NAPS	National Air Pollution Surveillance
NSPI	Nova Scotia Power Inc.
NSDEL	Nova Scotia Department of Environment and Labour
NSDNR	Nova Scotia Department of Natural Resources
NSM	Nova Scotia Museum
PAH	polycyclic aromatic hydrocarbons
Pioneer Coal	Pioneer Coal Limited
ppm	parts per million
ppb	parts per billion
TARR	Treaty and Aboriginal Rights Research Centre
tonne	metric tonne (1000 kg)
TSP	total suspended particulate
WSC	Weather Service Canada

VESC	Valued Ecological and Socio-Economic Component
°C	degree Celsius
ng/m ³	nanogram per cubic metre
µg/m ³	microgram per cubic metre
UINR	Un'amaki Institute of Natural Resources

TABLE OF CONCORDANCE

The following table shows the format as outlined in *Guide to Preparing an EA Registration Document for Mining Developments in Nova Scotia* (NSDEL, December 2002). The appropriate section of this EARD is matched with the guide format to show completeness.

NSDEL Guide Format		Corresponding Location in EARD	
<i>Section</i>	<i>Title</i>	<i>Section</i>	<i>Title</i>
1	PROPONENT DESCRIPTION	1.1	Registration
2	THE UNDERTAKING		
2.1	Name	1.1	Registration
2.2	Location	1.1	Registration
3	SCOPE		
3.1	Scope of Undertaking	2.1	Scope of the Undertaking
3.1.1	Purpose and Need for Undertaking	2.3	Project Justification
3.1.2	Consideration of Alternatives	2.3	Project Justification
3.2	Scope of the Environmental Assessment	2.6	Scope of Environmental Assessment
4	PUBLIC INVOLVEMENT		
4.1	Methods of Involvement	5.2	Components
4.2	Public Comments	5.2	Stakeholder Input
4.3	Steps Taken to Address Public Concerns	5.2.1	Public Information Sessions
5	DESCRIPTION OF UNDERTAKING		
5.1	Geographical Location	2.4	Site Location and Physiography
5.2	Physical Components	3.0	Site Features
5.3	Site Preparation and Construction	3.2	Site Preparation
5.4	Operation and Maintenance	3.3	Operation and Maintenance
5.5	Decommissioning and Reclamation	3.4	Decommissioning and Reclamation

TABLE OF CONCORDANCE (continued)

NSDEL Guide Format		Corresponding Location in EARD	
<i>Section</i>	<i>Title</i>	<i>Section</i>	<i>Title</i>
6	VECS AND EFFECTS MANAGEMENT		
6.1	Biophysical Environment		
6.1.1	Geology	4.7	Geology
6.1.2	Surface Water	4.3	Surface Water
6.1.3	Groundwater	4.4	Groundwater
6.1.4	Wetlands	4.5.3	Wetlands Habitats
6.1.5	Flora and Fauna Species and Habitat	4.6.3	Terrestrial
6.1.6	Fish and Fish Habitat	4.6.2	Marine
6.1.7	Atmospheric Conditions / Air Quality	4.1	Atmospheric Condition
6.1.8	Noise Levels	4.2	Noise Levels
6.2	Socio-Economic Conditions	4.8	Socio-Economic Environment
6.2.1	Economy	4.8.2	Economy
6.2.2	Land Use and Value	4.8.3	Land Uses
6.2.3	Transportation	4.8.6	Transportation
6.2.4	Recreation and Tourism	4.8.7	Community Resources
6.2.5	Human Health	6.4	Socio-Economic
6.3	Cultural and Heritage Resources	4.8.4/.5	Archaeological Resources/Mi'kmaq Land and Resource Use
6.4	Other Undertakings in the Area	4.8.8	Other Undertakings in Area
7	EFFECTS OF THE UNDERTAKING ON THE ENVIRONMENT	6.0	Potential Environmental Impacts and Mitigation
8	EFFECTS OF THE ENVIRONMENT ON THE UNDERTAKING	3.2.6	Contingency Planning
9	OTHER APPROVALS REQUIRED	1.2	Regulatory Environment
10	FUNDING	1.3	Funding
11	ADDITIONAL INFORMATION	7.0	Follow Up and Monitoring

1.0 INTRODUCTION

The proponent, Pioneer Coal Limited (Pioneer Coal), is registering an undertaking, Surface Coal Mine and Reclamation Project – Prince Mine Site, for Environmental Assessment (EA) Approval. Through an open Call for Proposals process, Pioneer Coal was awarded exclusive rights to apply for a Special Mining Lease to develop mineral resources in the Point Aconi Coal Resource Block.

According to the Nova Scotia's Energy Strategy (Dec 2001) Statement of Principle, our Province "will encourage the use of indigenous coal where environmentally and economically appropriate, promote reclamation mining in lands previously disturbed by mining". The proposed undertaking embodies the goals of the Energy Strategy.

Point Aconi coal resources can play a significant role in the supply of energy for Nova Scotia. Besides the additional security afforded to Nova Scotia Power Inc. (NSPI) by having another local source of coal supply, there is the socio-economic reality of creating employment for Nova Scotians by using the indigenous coal resources readily available in Point Aconi.

As such, this document outlines project activities, the potential environmental and socio-economic impacts (both positive and negative), associated mitigation, and approach to monitoring for this undertaking.

The primary activities that were completed in order to assess residual environmental and socio-economic impacts of the proposed undertaking are:

- environmental screening from the Nova Scotia Museum (NSM);
- Mi'kmaq Knowledge Study screening by Confederacy of Mainland Mi'kmaq (CMM);
- archaeological and heritage resource screening by Cultural Resource Management Group (CRM);
- terrestrial ecology assessment using existing data;
- surface water analysis and sediment pond sizing by Pioneer Coal and MGI;
- groundwater baseline information and impact assessment by MGI;
- assessment of existing site contamination from historical land uses by MGI;
- reclamation planning by Pioneer Coal and MGI;
- preliminary viewplane assessment of proposed stockpile orientation and size by Pioneer Coal and MGI;
- assessment program of the coal resource to determine delineation, quality and thickness by Pioneer Coal;
- acid production / consumption testing results for subsurface material by MGI;
- ongoing stakeholder consultation (including One Window Committee and elected officials) by Pioneer Coal and MGI;
- open discussions with nearby property owners by Pioneer Coal and MGI;
- public information sessions in April, 2005 by Pioneer Coal and MGI; and,
- past experiences and feedback on mitigation methodologies and approaches used by Pioneer Coal on other surface mining operations.

The following sub-sections present registration information, outline the regulatory environment, note the source of project funding and describe the document structure.

1.1 Registration

The name and location of the undertaking and proponent information are outlined below. Regional and local scale mapping is located in Section 2.0.

Name of Undertaking: Surface Coal Mine and Reclamation Project – Prince Mine Site

Location of the Undertaking: Point Aconi, Cape Breton County, Nova Scotia

Map: 11 K/08 (1:50,000 series)
Grid Ref: Zone 20 073327

Name of the Proponent: Pioneer Coal Limited
Project Contact: Mr. John W. Chisholm, President

Head Office: P. O. Box 1328
3098 Post Road
Antigonish, N.S. B2G 2L7
(902)863-4004 (telephone)
(902)863-2291 (fax)
pioneer@ns.sympatico.ca

Local Office: To be established in 2005

Contact person for purposes of Environmental Registration:

Proponent: Mr. John W. Chisholm, President
See above for contact information

Project Consultant: Mr. Peter Oram, P.Geo.
MGI Limited
31 Gloster Court
Dartmouth, N.S. B3B 1X9
(902)468-1248 (telephone)
(902)468-2207 (fax)
peter.oram@mgi-limited.com

Refer to Section 8.0 at the end of the document for the Company President's signature of acceptance of this Environmental Assessment Registration Document.

1.2 Regulatory Environment

There are various approvals required by statute or regulations. Pioneer Coal will submit additional detailed operational information beyond that contained in this Environmental Assessment Registration Document (EARD) to meet specific requirements listed below and any others that are necessary.

1.2.1 Applicable Acts and Regulations

Federal and provincial environmental acts and regulations apply to Pioneer Coal in regards to the design, site preparation, operation, and rehabilitation of the proposed mine. In addition to the environmental legislation, other acts and regulations relating to labour standards, mining practices, and other phases are applicable to the project.

Pioneer Coal is well aware of the applicable acts and regulations that pertain to the proposed undertaking at Prince Mine Site. Pioneer Coal has demonstrated the ability to prepare the necessary information and design plans required to obtain permits and approvals, as well as the ability to operate within the requirements of these acts and regulations both at previously completed and currently operating surface coal mining projects.

The following provides a listing of some pertinent acts that may be applicable for the undertaking and/or were considered in the preparation of this EARD.

Federal Legislation

- Canada Wildlife Act and Regulations
- Canadian Environmental Assessment Act and Regulations
- Canadian Environmental Protection Act and Regulations
- Fisheries Act and Regulations
- Migratory Birds Convention Act and Regulations
- Transportation of Dangerous Goods Act and Regulations
- Species at Risk Act

Provincial Legislation

- Environment Act and Regulations
- Dangerous Goods Transportation Act and Regulations
- Endangered Species Act and Regulations
- Labour Standards Code
- Mineral Resources Act and Regulations
- Crown Lands Act and Regulations
- Occupational Health and Safety Act and Regulations
- Wildlife Act and Regulations

1.2.2 Municipal Planning Strategy and By- Laws

Pioneer Coal will work with Cape Breton Regional Municipality (CBRM) and comply with any applicable land zoning, bylaws and permits, as required.

1.2.3 Provincial Lease and Approvals

There are provincial lease and approvals required for the implementation of the proposed undertaking:

Special Mining Lease: Successful application for a Special Mining Lease granting mineral rights for coal for 20 years from the date of issue. Pioneer Coal has submitted the application on January 6, 2005 and is awaiting receipt of the Special Mining Lease.

EA Approval As the proposed surface mining is defined under the Environmental Assessment Regulations as a Class I undertaking, an EA Approval is required. Pioneer Coal will have registered the undertaking with the Province via submission of this EARD.

Industrial Approval An Industrial Approval (IA) defines specific operational conditions and limitations, including dust, noise, surface water and groundwater discharge criteria and monitoring plans. An IA application would be made by Pioneer Coal if EA approval is received.

1.3 Funding

No government funding is sought for this undertaking. The undertaking is 100% privately funded by the proponent, Pioneer Coal.

1.4 Document Purpose and Structure

The purpose of this document is to register a proposed surface coal mine at the Prince Mine Site. It is felt that the project is technically sound and incorporates principles of community involvement and environmental protection. This document provides sufficient information to enable an EA Approval to be granted by Minister of the Nova Scotia Department of Environment and Labour (NSDEL) subject to appropriate conditions. The contents of this document are in accordance with the Guide to Preparing an EA Registration Document for Mining Developments in Nova Scotia (NSDEL, December 2002). As previously noted the Table of Concordance outlines the variations in formatting and locates pertinent information. Volume I contains the text of the document while Volume II contains all Appendices of supporting information and documents.

Following this introductory section, an overview of the project is presented in Section 2 with various maps and figures to illustrate the proposed undertaking. The text includes the scope of the project, background information and project justification, as well as a discussion of area

geography, surface rights and mineral rights. The scope of the EARD is also defined in this section.

Section 3 provides a detailed project description under subsections of design and preconstruction activities, site preparation, operation and maintenance and decommissioning and reclamation. Potential environmental impacts and protection methods are presented as they are an integral part of the project description. The proposed project schedule is presented. Plans of proposed site facilities are presented.

A detailed description of the environment (including biophysical and socio-economic resources) is included in Section 4. The atmospheric conditions are outlined. The freshwater systems and local marine environment are presented. Terrestrial wildlife and vegetation common to the area and specific to the site are discussed. Soils, surficial geology, bedrock conditions and groundwater regime are detailed. The socio-economic setting is presented, such as land uses; population; employment; archaeological resources; Mi'kmaq land and resource use; transportation; and community resources.

The consultation program is presented in Section 5. This section describes the program's objectives, outlines the components (e.g., public information sessions, etc.), summarizes the stakeholder input and provides information on how public input was used in the final project design.

Section 6 provides an analysis of the potential environmental impacts and proposed mitigative measures. These potential impacts are described as they relate to valued ecological and socio-economic components (VESC's). Potential cumulative effects are also presented.

The overview of plans for follow up and monitoring is presented in Section 7. These plans include inspection and maintenance programs, community liaison, environmental monitoring, contingency and emergency planning, and reclamation plans.

The impact assessment is presented in Section 8 of this document. Both the positive and negative residual impacts of the proposed project are defined. The signature of the President of Pioneer Coal Limited and closing statement are also provided.

References used in the document are detailed in Section 9. Appendix A provides the relevant project correspondence. Appendix B provides the results of baseline environmental monitoring (groundwater, surface water) available at time of registration. Appendix C provides site photographs and aerial photographs. Appendix D contains the applicable portions of the Provincial Energy Strategy. The NSM Environmental Screening is found in Appendix E. The report on archaeological resources in the area is contained in Appendix F. The Mi'kmaw Knowledge Study Screening results are shown in Appendix G. Display information presented in the public information sessions and additional public consultation related material is contained in Appendix H. Appendix I contains information on and graphics of a type of highwall mining system. CCME Water Sampling Procedures are contained in Appendix J.

2.0 OVERVIEW OF THE PROJECT

Pioneer Coal proposes to operate a surface mining operation to extract approximately 1.6 million tonnes of coal from the Point Aconi Coal Resource Block. The site location and study area are shown in Figures 2-1 and 2-2, respectively.

The following sub-sections provide a scope of the undertaking; present background information; justify the project by looking at alternative methods; discuss the coal resources, surface rights and mineral rights; and, define the boundaries of the EA. The details of the proposed operation are described in Section 3 of this document and the existing environment is presented in Section 4.

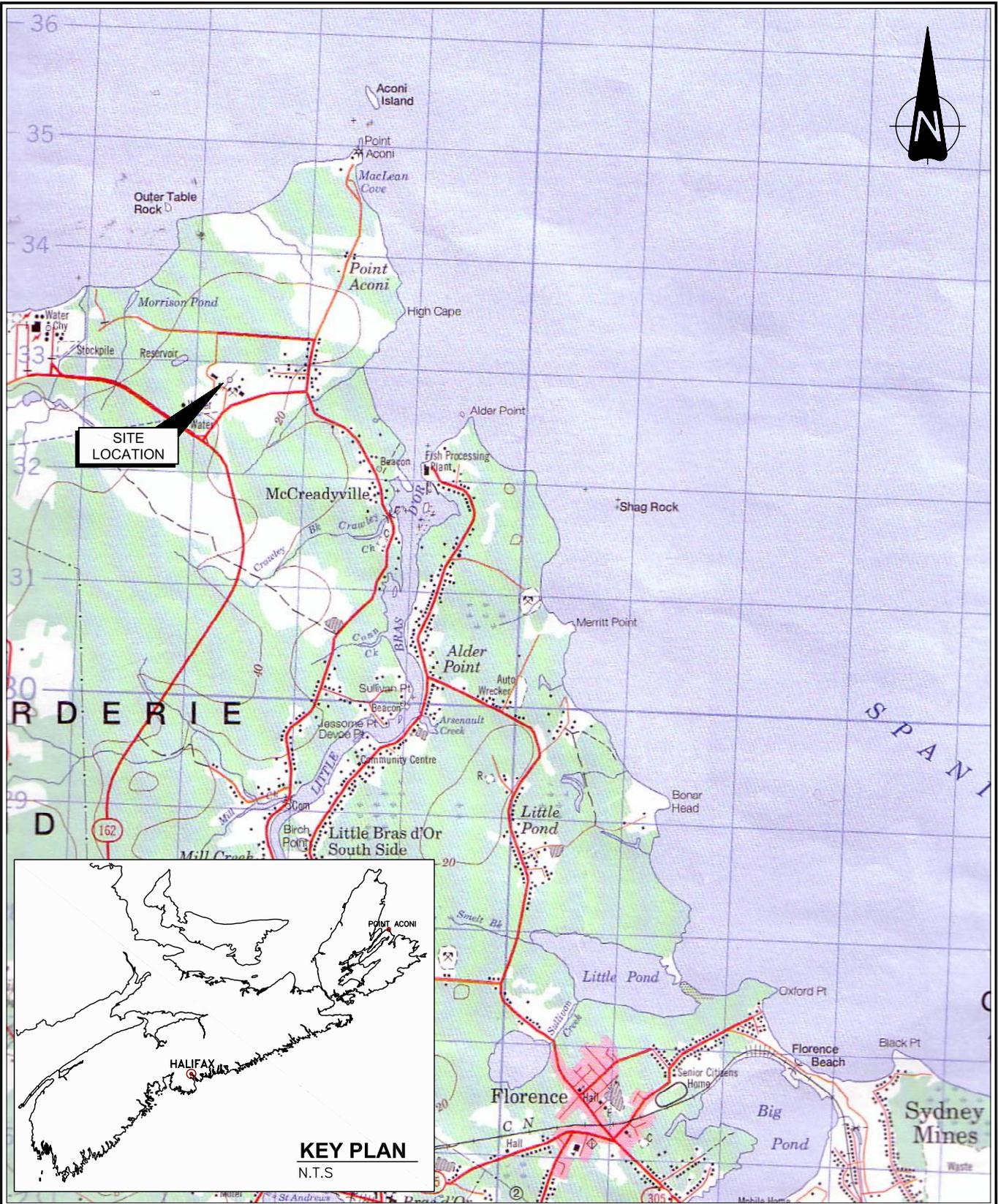
2.1 Scope of the Undertaking

The proposed recovery of coal from the Point Aconi Coal Resource Block via surface extraction techniques is anticipated to be up to approximately 350,000 tonnes annually with an anticipated total project length of seven years. This results in an average daily coal output of 1350 tonnes. During this operation, Pioneer Coal will provide direct employment for forty (40) to fifty (50) workers at the site and in the transportation of the coal to markets. The proposed surface mining operation at the Prince Mine Site would not only provide employment opportunities through the mining of Nova Scotia's indigenous coal resources, but would also provide a means for the systematic and economical reclamation and stabilization of lands highly disturbed by mining by Cape Breton Development Corporation (CBDC), as well as many bootleg mining operations.

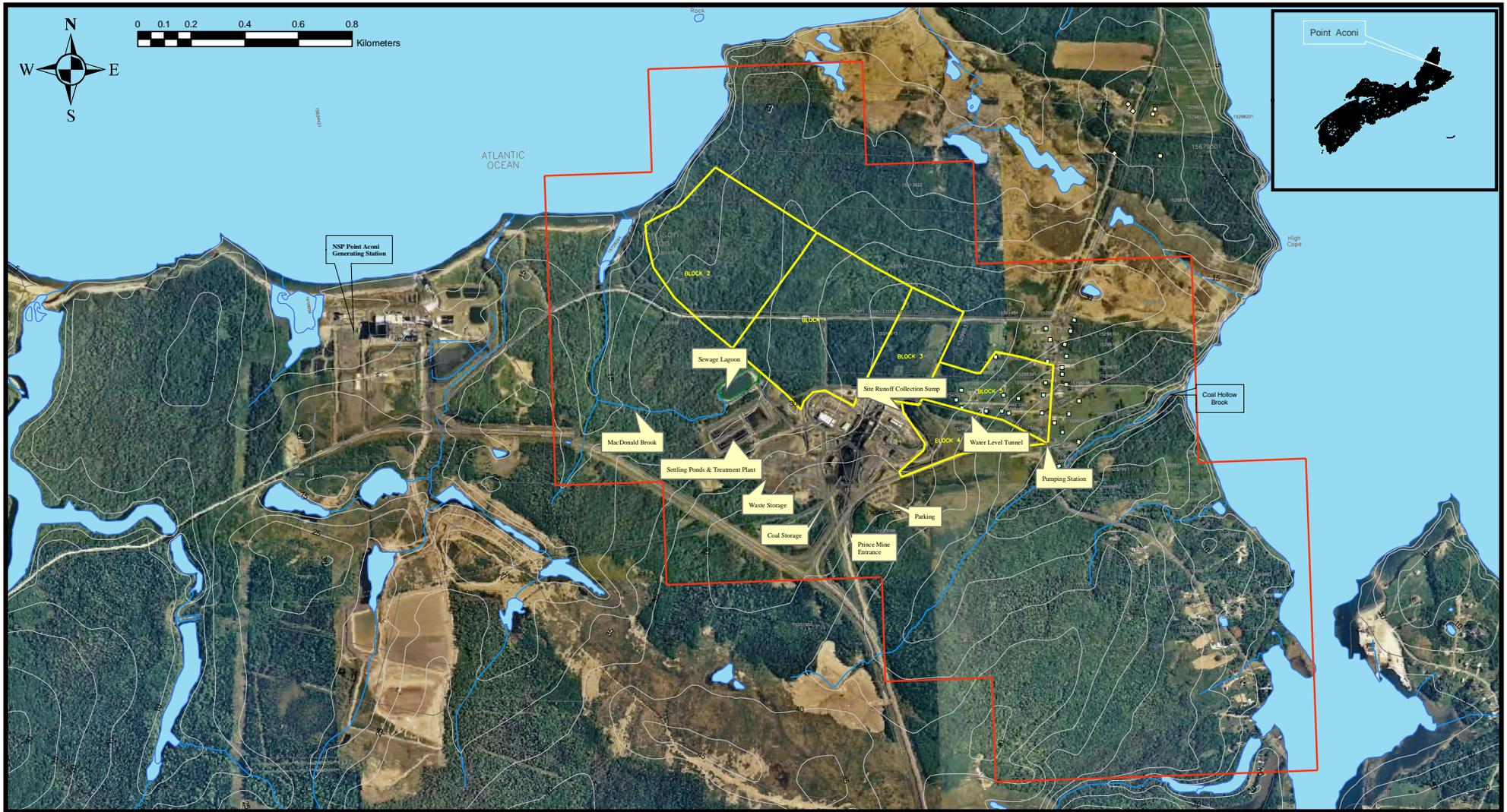
The coal will be recovered through conventional surface mining methods, as well as innovative highwall mining. Pioneer Coal will use the NOVAMINER 2000, a unique highwall mining system developed and manufactured in Nova Scotia by an affiliated company of Pioneer Coal, Nova Construction Co. Ltd. Pioneer Coal has demonstrated the ability to successfully operate this equipment for the past four years in the Pictou Coalfield. This unique mining system will allow additional coal quantities to be mined in the Point Aconi Coal Resource Block that would otherwise be left behind and become a lost energy source. See Appendix I.

The coal resource is within the Hub Seam, locally named the Stubbert Seam, and lies approximately 1.2 km south of Point Aconi, the most northern point on Boularderie Island. The Hub Seam lies between two seams that were both previously surface mined; these are the Harbour Seam (Sydney Main) located approximately 1km to the south and the Lloyd Cove Seams (Upper and Lower Bonar Seams) found approximately 1km to the north.

The proposed project lies to the immediate west and east of the closed Prince Mine underground coal operation. The mineable resource area (approximately 85 ha) extends from the Prince Mine approximately 1100m westward (toward the Atlantic Ocean and vicinity of Morrison Pond) and approximately 300m eastward (intersection of Point Aconi Road and Prince Mine Road).



 	TITLE	DATE	PROJECT NO.
	Site Location	May 2005	50090A
	PROJECT	SCALE	FIGURE NO.
	Surface Coal Mine and Reclamation Project- Prince Mine Site Point Aconi, Nova Scotia	1:50000	2-1
	DRAWN	SYC	



Legend		Homes within 500 metres of Mining Block	
—	Special Mining Lease Boundary		Homes on Municipal System
- - - -	Property Boundary		Homes on Wells
—	Contour (masl)		
—	Watercourse		
—	Mining Blocks		

Title: Study Area
(1997/99 Aerial Photographs as base)

Project: Surface Coal Mine and Reclamation Project-
Prince Mine Site
Point Aconi, Nova Scotia

Date: May 2005
Project No.: 50090A
Figure No.: 2-2

Numerous small shafts and pits, as well as a few slopes, are located on the Hub Seam to the west of the Prince Mine and attest to bootleg mining activity. Significant bootleg activity has also occurred in the vicinity of the Water Level Tunnel east of the Prince Mine Site. Given the historical bootlegging on the site in the past, a serious safety hazard exists. The proposed undertaking, which includes final reclamation, provides an excellent opportunity to reduce the safety risk to the public and restore the lands to a usable state.

Buildings and bankhead infrastructure remain in place from underground mining of the Hub Seam. Tunnel bulkheads are still in place as well. However, the removal of various structures on the Prince Mine Site has been tendered. Some of the remaining infrastructure, following the sale of buildings by CBDC on the site, will remain for the duration of this project. Figure 2-3 shows features of the site (including existing infrastructure). Photographs of the existing facility and aerial photographs can be found in Appendix C.

The project will include: the excavation and stockpiling of overburden (all natural materials overlaying the coal); the excavation, stockpiling and transportation of coal; backfilling of overburden; and, site reclamation. Progressive reclamation will occur on the site as the surface mining occurs. No coal processing facilities are planned for the site.

Background environmental monitoring data for the site exists and has been used in the planning of this undertaking. Mitigation and monitoring results will be submitted to NSDEL over the duration of the project. Pioneer Coal has summarized existing environmental information and it forms part of this submission. These data are included in Appendix B.

The existing settling pond system, located at the west end of the existing Prince Mine Site, will remain and continue to be used. The active pit areas will be used to contain any surface and groundwater that is encountered before it is pumped to the Prince Mine workings or to the settling pond system. Surface water will be treated, as required, prior to release into the environment. Regular monitoring will occur according to schedule and involving locations and parameters approved by NSDEL.

Coal will be transported from the site to customers using local roadways appropriate for the transport trucks. The market for the coal product may include, but is not limited to, NSPI. Coal may be trucked directly to NSPI's Point Aconi facility, trucked to NSPI's Trenton facility or by train to Trenton via a loadout facility planned for the North Sydney/Sydney Mines area. A sketch of the proposed facility is provided in Appendix H. Up to 250,000 tonnes of coal could be loaded out annually via the rail loadout facility if logistics, markets, and economics are favourable.

Several residential properties exist on Forest Lane and Point Aconi Road (north of the intersection with Prince Mine Road). Pioneer Coal will negotiate the purchase of these properties at fair market value prices. Site development includes cutting off the existing roadway of Sheri Lee Lane/Millpond Road. Alternate routes are available to the south and then west along existing roads. Figure 3-2 illustrates the proposed beach access options.

Ongoing reclamation will occur at the site as mining progresses as it is fully integrated with mining operations. Final reclamation on the site is expected to occur in the year 2012 and reclamation will include contouring overburden, placing of topsoil and re-vegetation. See Figure 3-4. Ultimately, the site will be stabilized to minimize erosion and the overall drainage pattern will be restored. Site drainage will be planned to direct approximately the same volumes of water flow to the downstream watercourses as existed prior to this development.

Daily operational requirements are 24 hours a day for five days a week, with occasional Saturday, as required. There is no seasonal variation expected with this schedule. Without the ability to operate 24 hours/day on the surface coal mining operation, there is reduced employment levels, the project takes place over a longer period of time in order to complete the mining and reclamation, the coal resource will not be maximized because of future reductions in SO₂ emission levels and the economics of the project will be negatively impacted to the point of not being feasible.

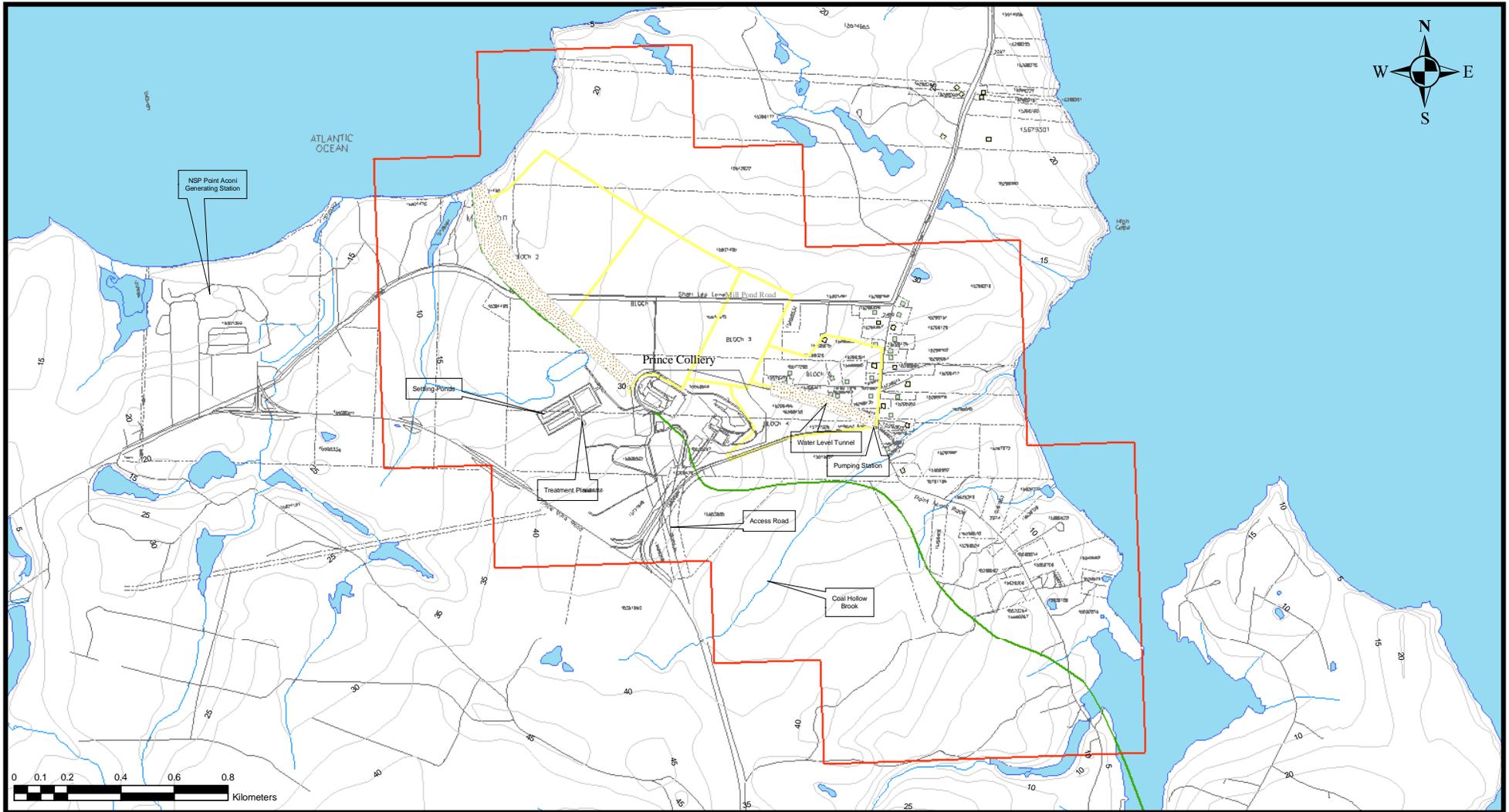
2.2 Background

Much of NSPI's electrical generating capacity is coal-fired. Although alternative energy use is being initiated in the Province, regular coal supplies are still required to meet current power generating needs in Nova Scotia. With the closure of CBDC coal mines, NSPI has had to source the majority of their coal supply from offshore suppliers. The use of indigenous coal resources is part of Nova Scotia's Energy Strategy (see Appendix D).

A Call for Proposals was issued by Nova Scotia Department of Natural Resources (NSDNR) on December 5th, 2003. The Call for Proposals was for the exploration, development and reclamation of four selected areas of the Sydney Coalfield in Cape Breton (including Point Aconi, Boularderie Island, Birch Grove and Broughton). Pioneer Coal was the successful proponent for the exclusive right to apply for coal rights of the Point Aconi Coal Resource Block.

The lands of former coal producing areas that still belong to CBDC, including the Point Aconi Coal Resource Block, are yet to be reclaimed and remediated of the environmental and hazardous conditions. Reclamation mining can provide some of the coal supply required by NSPI, as well as provide an economical means of site remediation of the areas of past surface and underground mining operations.

As with most coal mining areas throughout the world, bootleg operations were historically conducted on near-surface coal resources without any reclamation or mitigation of hazardous conditions left by these operations. Often, no plans or records exist on the type of workings, depths or extent. The area along the crop of the Hub Seam is pockmarked with remnants of bootleg pits, some of which are open in excess of 20m vertical depth from the surface. See Figure 2-3. This presents a significant safety risk to the public.



Legend	
—	Special Mining Lease Boundary
---	Property Boundary
—	30 Contour (masl)
—	Watercourse
—	Mining Blocks
—	Hub Seam Outcrop
•••••	Area of Extensive Bootleg Operations
■	Homes within 500 metres of Mining Block
■	Homes on Wells
■	Homes on Municipal System

Title: Existing Features

Date: May 2005

Project: Surface Coal Mine and Reclamation Project-
Prince Mine Site
Point Aconi, Nova Scotia

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Figure No.: 2-3



Currently, the site presents an environmental risk to the receiving environment via impacted surface water, groundwater, soil and sediment (refer to sub-section 4.8.3 for a discussion on existing environmental impacts on the site). East of the five existing entrances to the underground mine (portals), surface water enters bootleg pits, drains into the Water Level Tunnel and gathers at the water pumping station and then directed into the Prince Mine underground workings. This water is highly acidic and cannot be discharged into the environment untreated. This water is presently stored in the workings; however, ultimately, the storage capacity will be reached and a sustainable solution will be required. Surface mining through this area and subsequent backfilling will eliminate the present requirement.

After the surface mining of the coal resource and the final reclamation have been completed, the land will no longer be a liability from either environmental or health and safety perspectives. Pioneer Coal and associated companies have completed various successful reclamation mining projects in Nova Scotia. These include: Point Aconi (approximately 1,000,000 tonnes, completed in 1985); Reserve Mines (approximately 600,000 tonnes, completed in 1992); Westville (approximately 1,000,000 tonnes, completed in 1995); and, Thorburn (approximately 150,000 tonnes, completed in 2000). These operations demonstrate Pioneer Coal's ability to complete reclamation mining to the satisfaction of environmental guidelines and the stakeholders. In the case of the land area of the Prince Mine Site, site reclamation is a significant, long-term positive benefit of this proposed undertaking.

2.3 Project Justification

The following sub-sections present the purpose and need for the undertaking and the consideration of alternatives. The purpose of this sub-section is to demonstrate that the proposed methodology and project scope is justified.

2.3.1 Reason for Undertaking

In its present condition, the proposed surface mining site at Point Aconi presents significant environmental and safety liabilities. Future use and development on the land requires reclamation. In addition, mitigation of existing environmental concerns is required. These requirements can be achieved by reclamation mining. Final reclamation is expected within approximately seven years of operations commencing on the site.

Development of the surface mine also provides an economic means of extracting indigenous coal. The potential markets for coal from the Point Aconi Coal Resource Block include NSPI, as well as the potential to export the coal via one of the several large marine facilities in the Sydney area. Economic viability is, therefore, another primary reason for undertaking the project.

The following are excerpts from Nova Scotia's Energy Strategy dated Dec 2001 (refer to Appendix D):

“Coal has an important role in satisfying our primary energy demand because 70-80% of our electricity is currently generated from coal. Until very recently, this demand was satisfied using Nova Scotia coal. However, with the recent closure of the underground coal mines in Cape Breton, the province relies increasingly on imported coal for electricity generation.”

“Until fairly recently, Nova Scotia was self-sufficient in coal. This is no longer the case. Nonetheless, there are still opportunities for coal mining to contribute to the province's economy and to community development over the short and medium terms. Environmental targets would not be relaxed in favour of indigenous coal, nor should government financially support non-economic mining operations. However, where coal mining can provide a net benefit to the province and to the communities where it occurs, and where it is economically feasible and environmentally appropriate, the province will facilitate business opportunities in this sector.”

The project also provides the following additional benefits to the immediate area:

- Direct employment of approximately 40-50 workers at the mine site and in the transportation of the coal to markets;
- Employment in supporting roles, plus additional spin-off employment;
- Use of local suppliers (goods and services) to support the operation;
- Significant direct and indirect economic activity in the region; and,
- Completion of the mining cycle at the former Prince Mine Site with reclamation and stabilization of lands.

2.3.2 Other Methods of Carrying Out the Undertaking

There are no other alternative methods to carrying out the undertaking in a manner that enables lands to be returned to safe and stable conditions.

2.3.3 Alternatives to the Undertaking

The location of the mine is fixed by the coal resource. Thus, one alternative to the undertaking is a “do nothing” alternative. A “do nothing” approach results in no indigenous coal being extracted which puts increasing demand on NSPI to import coal to meet the energy requirements of the Province. Another alternative is to complete a surface reclamation project only with no coal extraction. This alternative does not generate royalties, or remove the liability and safety concerns with the bootleg pits and does not preclude mining in the future as the coal would still be on-site.

The undertaking will provide employment in the mining sector. Approximately 40-50 people will be directly employed. This is a boost to the economy of the local area and the Province in general.

Additionally, the “do nothing” alternative is not feasible given the existing risks associated with liability on the site.

2.4 Site Location and Physiography

The site is located at Point Aconi, near the northern tip of Boularderie Island. Boularderie Island is bounded by the narrow St. Andrew’s Channel to the east, and the broader St. Patrick’s Channel to the west – the main shipping lane to the Bras d’Or Lake system from the Atlantic Ocean.

The mine site is characterized by topography that gently slopes to the west and northwest. Elevations range from 39 m at a high point north of the Prince Mine Site to sea level west of the mine. The topography becomes steeper as the shoreline is approached.

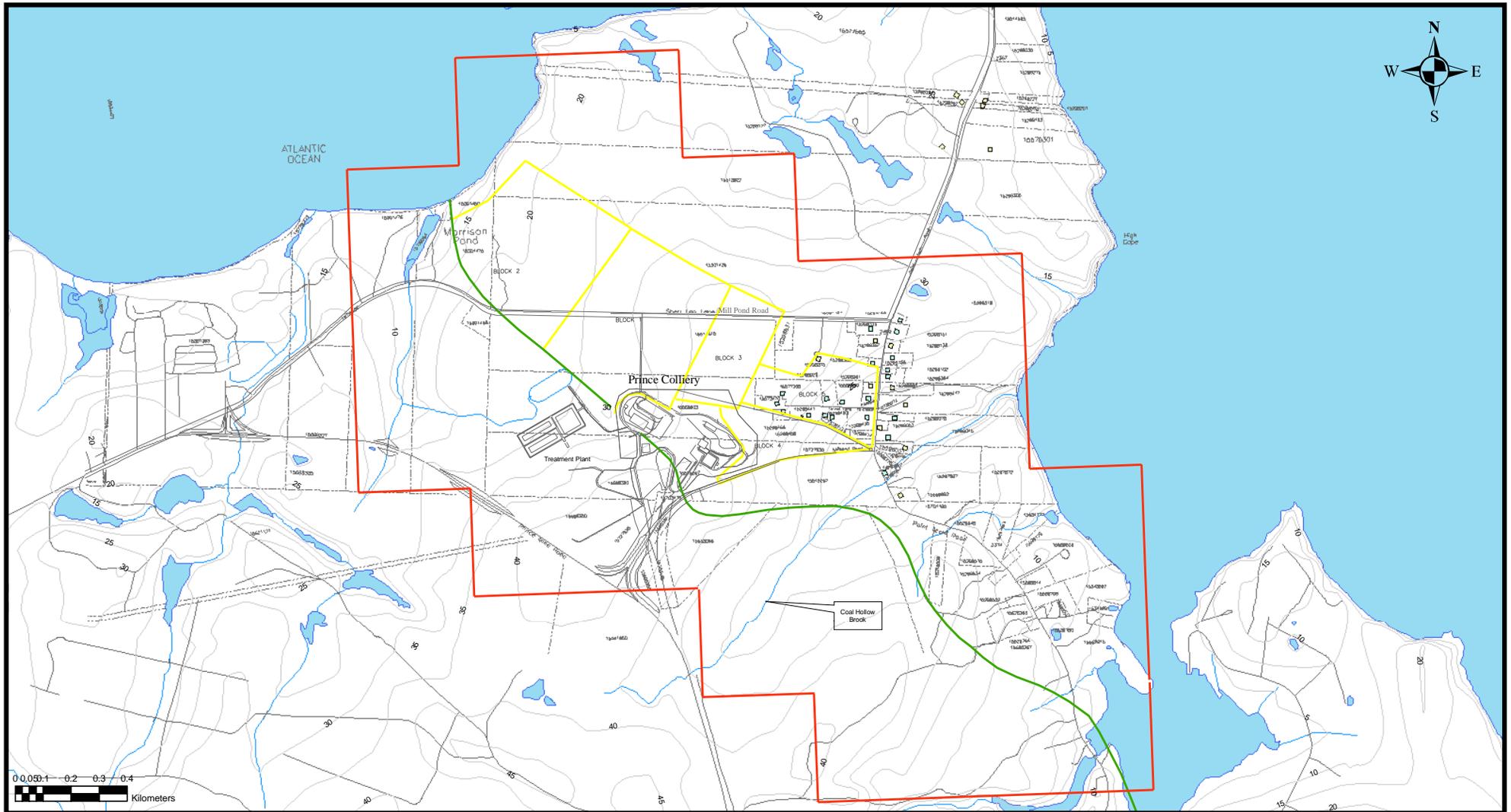
Small intermittent streams drain the site with a gradual gradient that steepens at the shoreline. The main drainage channel drains the western portion of the site (i.e., primarily Mining Block 1, 2 and 3) into Morrison Brook and then to the Atlantic Ocean via Morrison Pond. Drainage in the vicinity of the Prince Mine Site (i.e., primarily Mining Blocks 4 and 5) is easterly into Coal Hollow Brook that empties into St. Andrews (Little Bras d’Or) Channel. A small portion of the area north of the high point (i.e., portions of Mining Blocks 1 and 3) drains to the Atlantic Ocean via a series of channels on the Brogan Mine Site. No mapped watercourses exist within the Mining Blocks (i.e., no wetlands, lakes or defined natural drainage channels).

The surficial cover in the area consists of glacial drift that varies in thickness from 4 to 6m. It is comprised of sandy till with scattered boulders and low clay content.

The area is forested with fairly even aged mixed hardwood and softwood stands. All merchantable timber will be recovered. The site does not contain lands under cultivation. The nearest commercial agriculture operation is approximately 1.5 kilometres to the northeast of the site and consists of a vegetable crop of less than 20 ha.

The area encompassed by the Point Aconi Coal Resource Block is located on the Hub Seam, which lies approximately 1.2 km south of Point Aconi. The Hub Seam is the single coal seam amenable to open pit mining. The resource block has a mineable strike length of 1400m lying east and west of the Prince Mine. The seam maintains a relatively constant thickness of 2.1m over the entire strike length.

The estimated coal resources in the area are 1.6 million tonnes. The following figure (Figure 2-4 Coal Seam Location) shows the seam and the five resource blocks in which mining is feasible.



Legend

- Property Boundary
- 30- Contour (masl)
- Watercourse
- Mining Blocks
- Special Mining Lease Boundary
- Hub Seam Outcrop

- Homes within 500 metres of Mining Block**
- Homes on Wells
 - Homes on Municipal System

Title: Coal Seam Location

Project: Surface Coal Mine and Reclamation Project-
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Point Aconi, Nova Scotia

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Figure No.: 2 - 4

2.5 Surface Rights

The following table describes current surface land ownership within the site area:

Table 2-2: Land Ownership

Land Owner	Land owned (in hectares)
NSPI	27.2
NSDNR	90.9
CBDC	76.8
Private land owners	15.8

The acquisition of surface rights for some of this land is required for the project, and for some of the land, the acquisition of surface rights would be beneficial. Pioneer Coal will negotiate with private landowners for surface rights to the lands under consideration.

Property owners are aware that environmental approvals do not interfere with their ability to fairly negotiate a sale price. The actual extent of mining depends upon the results of property negotiations. In the event that surface rights are not obtained for any particular property, then the project would have to be scaled back in that particular area. As shown on Figure 2-3, Mining Blocks 1, 2 and 3 are not dependent on negotiations with non-Crown property owners.

The specific method by which Pioneer Coal acquires the surface rights to CBDC lands will only be determined after the EA approval has been received by Pioneer Coal.

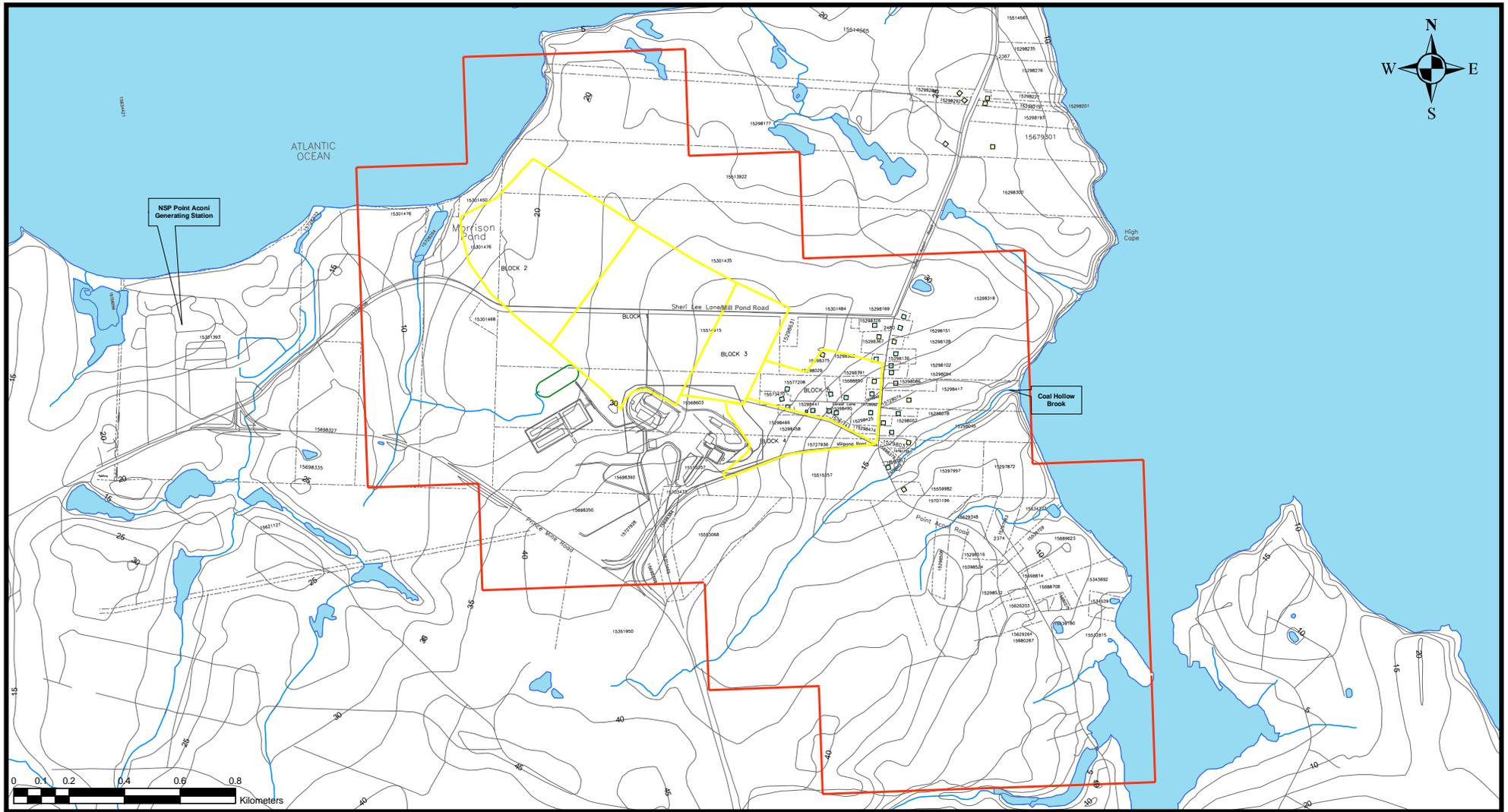
2.5.1 Mineral Rights

Coal development rights in Nova Scotia are issued by means of a Special Mining Lease granted by the Minister of Natural Resources with the approval of the Governor in Council.

The resource area identified by the Special Mining Lease encompasses the claims as shown on the following table. The aerial extent of the claims is shown on Figure 2-5 Coal Rights.

Table 2-3: Pioneer Coal Claims

Claim	Tract Number	Claim Reference
D E M	50	11 K 08 B
AB FGH JKLM NOPQ	51	11 K 08 B
J PQ	52	11 K 08 B
AB GH J	69	11 K 08 B
ABCD EF M	70	11 K 08 B



Legend

- Property Boundary
- 30- Contour (masl)
- Watercourse
- Mining Blocks
- Special Mining Lease Boundary

Homes within 500 metres of Mining Block

- Homes on Wells
- Homes on Municipal System

Title: Coal Rights

Project: Surface Coal Mine and Reclamation Project-
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Figure No.: 2 - 5

2.6 Scope of Environmental Assessment

This document serves to provide information required for NSDEL to approve the surface mining of the Point Aconi Coal Resource Block. Methodologies and approaches to reflect current environmental and socio-economic conditions are contained in this EARD, as are results and implications of the completed formal public consultation program.

Baseline information includes data collected by Pioneer Coal as a part of preparation of this EARD, as well as data collected for ongoing work on behalf of CBDC (in conjunction with Public Works and Government Services of Canada) regarding environmental site assessment of federal lands associated with the Prince Mine Site. Additional information was found in publicly available documents on other undertakings in the area and data collected by the proponent and consultants on environmental conditions.

The approach to site operations, including environmental management and monitoring, is based on knowledge gathered from past surface coal mining projects. Pioneer Coal has specific knowledge of this site, as well as general experience in surface coal mining while meeting environmental criteria.

The environmental bounds are confined to the immediate area of the site and the downgradient receptors. With respect to socio-economic components and locomotive terrestrial species, a wider study area is used as appropriate. A detailed presentation and discussion of VESCs can be found in Section 6.1 of this document. The VESCs analysis is based on the project description (refer to Section 3) and the environmental setting (refer to Section 4) and public input (refer to Section 5). The potential cumulative effects from the proposed undertaking and other undertakings in the area are discussed and assessed on the identified VESCs in sub-section 6.5.

Regulatory officials from both NSDEL and NSDNR have been aware of Pioneer Coal's intention to submit the EARD for this undertaking. Regulators have assisted in scoping by bringing forth issues of concern and/or uncertainty. The One Window process has assisted in this communication and information exchange.

A One Window Committee meeting held with Provincial and Federal regulators did not reveal a CEEA trigger. CEEA staff will coordinate review of the EARD by other federal agencies at the time of the Provincial EA registration and provide a response as to whether additional scrutiny is required via the federal EA process.

Environmental management is a priority to Pioneer Coal. It is the corporate objective for operations to meet and/or exceed the current standards to achieve a high level of environmental performance. This EARD presents these environmental goals and outlines Pioneer Coal's methodology to continue to protect the VESCs; however, it is important to recognize that process changes may occur due to conditions unforeseen at this time. As such, Pioneer Coal may use alternative mitigative measures other than those identified to meet the stated environmental goals. The proponent will keep NSDEL and the Community Liaison Committee (CLC) updated on process and schedule. Pioneer Coal has the proven ability to meet environmental goals while efficiently mining coal resources.

3.0 DETAILED PROJECT DESCRIPTION

Once a resource has been identified, the development of a surface coal mine progresses through several distinct stages. These are: design and preconstruction activities, site preparation, operation and maintenance, decommissioning and reclamation.

A description of the project is presented in the following sub-sections with respect to each of these planned stages. This is followed by an overview of potential environmental impacts and mitigations, which are an implicit part of the proposed undertaking. At the end of this section, the proposed schedule is presented.

3.1 Design and Pre-construction Activities

In order to assess the economic and environmental feasibility of surface mining the Point Aconi Coal Resource Block, the proponent completed a variety of studies and assessments. The following items were completed and used in the design and assessment of the proposed undertaking:

- Assessment program to gather information to assist in the development of preliminary mine design and site drawings;
- Review of baseline sampling of surface water, soils, and sediment (based on data from CBDC/PWGSC projects);
- Groundwater impact assessment based on groundwater level data in monitoring wells in Prince Mine Site area (based on data from CBDC/PWGSC projects);
- Stormwater management planning to confirm sizing and design of surface water diversion and treatment facilities;
- Terrestrial ecology evaluation (preliminary);
- Environmental screening (desktop assessment of cultural and natural heritage resources in the area) completed by the Nova Scotia Museum (NSM) in autumn of 2004 and supplemental information provided to the proponent in April 2005;
- Mi'kmaq Land and Resource Use screening by CMM to determine likelihood of need to complete a Mi'kmaq Knowledge Study;
- Testing of representative materials (rock units and coal) for acid production/consumption properties;
- Preliminary visual evaluation of proposed development on adjacent properties and roadways;
- Assessment of impacts to land and environmental risk due to historical land uses (based on data from CBDC/PWGSC projects);
- Open house sessions for the general public in April, 2005;
- Ongoing discussions with elected officials and staff of various levels of government including Municipal, Provincial, Federal and Mi'Kmaq about the proposed undertaking; and,
- Evaluation of past experiences with reclamation mining and mitigative measures to attain environmental protection goals.

Results of these biophysical and socio-economic assessments are found in their respective locations in Section 4 of this document.

3.2 Site Preparation

The following sub-sections describe the activities to be completed by the proponent to prepare for active surface coal mining operations. These activities are in addition to operation and maintenance activities (sub-section 3.3) and the design and pre-construction activities listed in the last sub-section.

The following figure, Figure 3-1 Site Infrastructure, shows the layout of the site and its current infrastructure (including erosion and sediment control and surface water management features).

3.2.1 Erosion and Sedimentation Control

The following items will be put in place as part of site preparation to control erosion and sedimentation during surface mining operations:

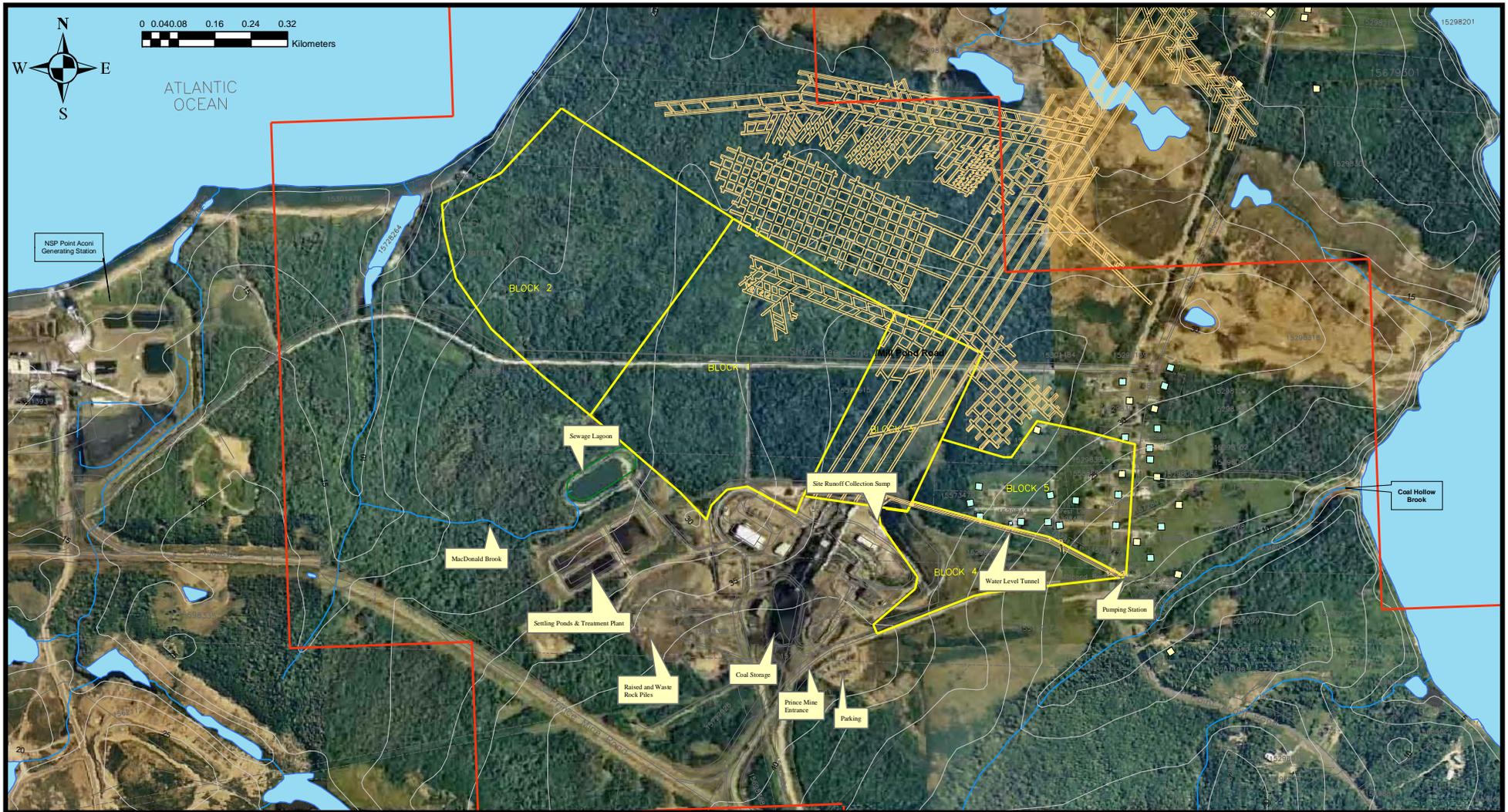
- A minimum riparian buffer of 30 m to a watercourse.
- The edge of any disturbed area will be delineated with sedimentation control fencing strategically placed along land contours.
- A rock-lined perimeter ditch will be constructed around the active work areas as mining advances to collect surface water runoff, which is in turn directed to the underground workings.
- The placement area for topsoils, subsoils and waste rock will be within the site perimeter ditch.
- As needed during site preparation, temporary erosion and sedimentation control measures will be in place (e.g., rock dams with geotextile, hay mulching, etc.).

3.2.2 Clearing and Grubbing

The existing scrub plant material and debris will be disposed of in appropriate locations. Where feasible, this material will be re-used in the reclamation as a growing medium placed as the final layer on top of the contoured lands. Much of the wood is a young to mature mixed stand and a portion of the area is grassed over such that limited tree harvesting is required.

Clearing and grubbing requirements will follow a work progression schedule limiting the areas open to those required only for active mining activities. As part of the planned progressive reclamation, the site will be cleared and grubbed in stages.

The delineated area of clearing and grubbing will not be exceeded, such that stated riparian zones will be maintained. The limit of disturbance will be clearly delineated on the ground using fencing or other measures.



Legend	
— Special Mining Lease Boundary	 Homes on Wells
 Property Boundary	 Homes on Municipal System
— Contour (masl)	
— Watercourse	
— Mining Blocks	
— Mine Workings	

Title: Existing Site Infrastructure (2005)

Project: Surface Coal Mine and Reclamation Project- Prince Mine Site Point Aconi, Nova Scotia

Date: May 2005

Project No.: 50090A

Figure No.: 3-1

3.2.3 Surface Water Management

The project will occupy an area of approximately 85 ha between the general area of Morrison Pond to the west and Coal Hollow Brook to the east. The ridge north of the Prince Mine Site forms a drainage divide. Surface drainage from the active mining areas will contain suspended solids due to mining activities and from the storage of waste rock, topsoil, and overburden. The drainage system is designed to collect surface runoff from active areas within the site for the removal of suspended solids by gravity sedimentation. The collected water will be pumped from the active pit to the Prince Mine workings or to the existing Settling Ponds for treatment as required prior to discharge. All water discharged from the Settling Ponds will meet established discharge guidelines.

Runoff will be collected in ponds formed in low points of exhausted pits (i.e., sumps). The use of drainage ditches and pumps will allow Pioneer Coal to redirect surface water collected from within the active pit areas. Surface water from site activities will initially be directed into the Prince Mine workings. Monitoring of the water level within the workings will dictate how long this can continue during the project. The water level is currently at approximately -900 feet.

The Settling Ponds will be operated at design discharge rates. These ponds have been in place since 1994. Coagulant will be added, if required; however, based on Pioneer Coal's past operating experiences, coagulant is not expected to be required to meet effluent objectives.

Temporary diversion berms and ditches will be used within the site to divert runoff away from the active mining areas, ensuring this water is kept clean. Other ditches will be used to isolate and collect runoff from the active mining areas. Ultimately, at full mine site development, the drainage control system will consist of perimeter ditches/berms surrounding the site.

A Weather Service Canada (WSC) hydrometric station was operated at Fifes Brook during the period from December 1988 to March 1992 (station 01FJ006 – *Fifes Brook near Mill Pond*). The station was established to determine water supply availability for the Point Aconi thermal generation plant. Surface flow data from the station was obtained from WSC's HYDAT database. The station was located near Mill Pond, NS (46°18'3" N, 60°21'57" W), with a drainage area of 34.3 km² (3430 ha). Average daily flows for the period of record ranged from approximately 0.2 m³/s in July/August to 3.0 m³/s in April, with a maximum recorded daily flow of 14.3 m³/s and minimum of 0.04 m³/s. Average annual discharge for the period of record was 1.09 m³/s, with a range from 0.96 m³/s to 1.35 m³/s.

The drainage control system is designed for a storm with duration of 24 hours and a return period of 25 years. Settling Pond capacity will be sufficient to capture the complete runoff from the associated active mining areas.

The Settling Ponds are located on the west end of the existing Prince Mine Site. The exact location and relative size can be seen on Figure 3-1. A three-pond arrangement is in place. The first pond in the arrangement is of square shape and has a capacity of approximately 17 million litres. Ponds 2 and 3 are rectangular and each has a capacity of approximately 13 million litres. The total storage capacity of the Settling Pond arrangement is approximately 43 million litres or 43,000 cubic metres; therefore, highly conservative sedimentation conditions will be provided at

a maximum flow rate through the ponds of 225 m³/h. Under normal runoff conditions, the applied flow rate will be considerably less than the maximum design flow rate. The ponds will be connected allowing for maximum retention time with one discharge point.

All drainage ditching will be designed to maintain stable conditions to minimize erosion for the estimated peak flow rates of storm drainage. Long-term ditches will be rock lined to minimize erosion. Temporary diversion ditches and berms will be seeded and temporarily stabilized to minimize erosion during the establishment of vegetation.

All water discharged from the site will be within applicable guideline limits. The holding ponds and active pit areas will provide substantial containment capacity for storm runoff and for any other emergency situations that require holding of water prior to treatment in existing sediment ponds and discharge. During a significant storm event, runoff will remain in the pit until sediment ponds have cleared. The pits provide a significant storage capacity for unusually large storm events.

3.2.4 Roadways

Existing roads located in the vicinity of the Prince Mine Site include:

- Sheri Lee Lane/Millpond Road – a secondary road which extends east and west across the northern portion of Special Mining Lease area;
- Prince Mine Road - a 100 series highway used primarily for access to the NSPI Point Aconi Generating Station located within the south western portion of the Special Mining Lease area; and
- Point Aconi Road - a secondary road which becomes a gravel road north of the intersection with Sheri Lee Lane/Millpond Road.

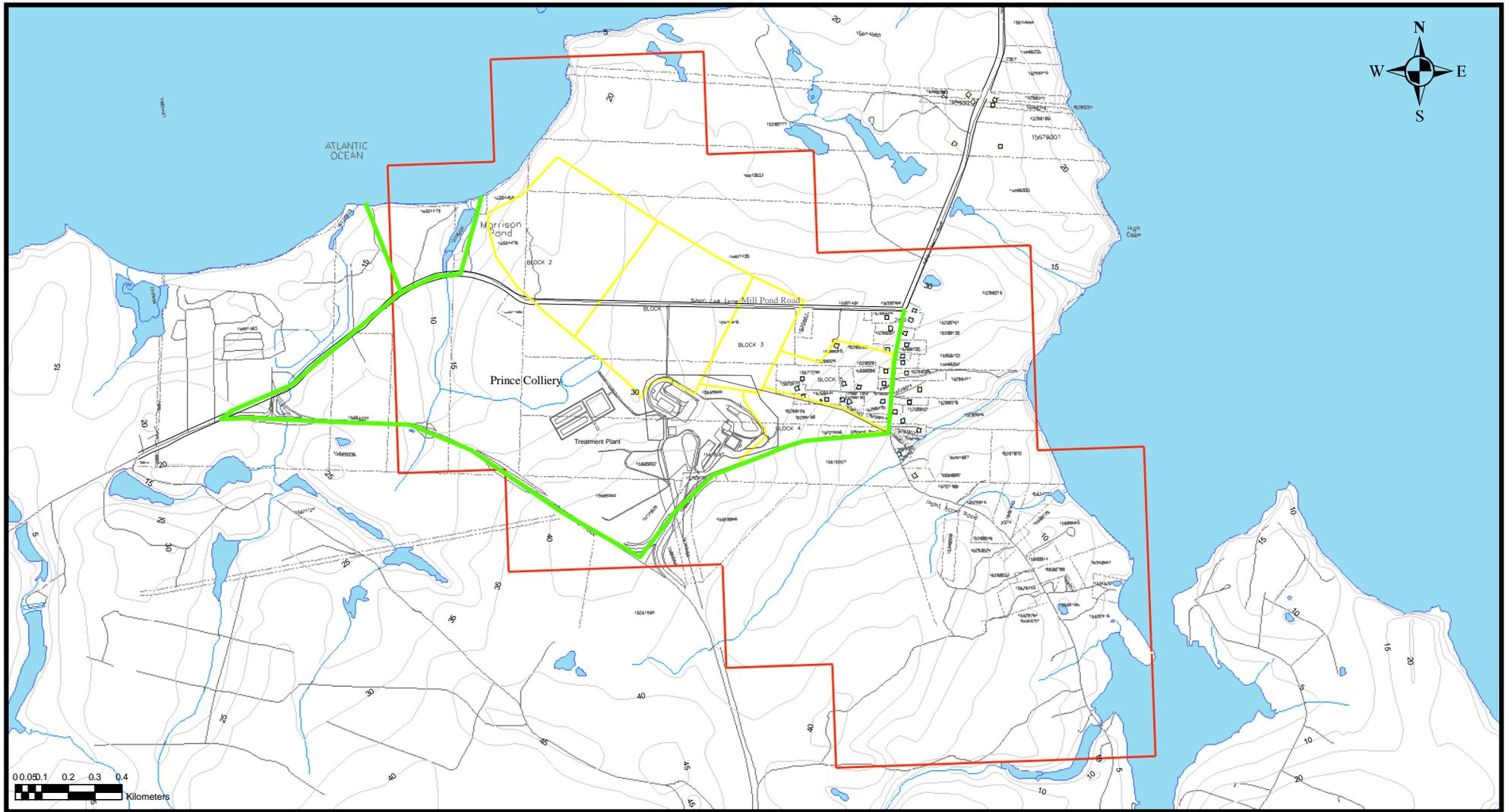
Site development includes cutting off the existing roadway of Sheri Lee Lane/Millpond Road. Alternate routes to local beaches west of the site are available to the south and then west along existing roads. Figure 3-2 illustrates the proposed beach access options.

3.2.5 Overburden / Waste Stockpiles

The location and relative size of the overburden piles are shown on Figure 3-3. The drainage from the pile(s) will be directed to the sump in the active pit and will then be pumped to the surface water management system.

The total estimated height for the stockpiles during operations above existing grades is 30 m. Viewplanes will be considered in the location, height and configuration of various stockpiles.

Refer to sub-section 3.3.3 Waste Handling and Figure 3-3, for details on estimated height, characteristics and management of the stockpiles.



Legend

- Special Mining Lease Boundary
- Property Boundary
- 30 Contour (masl)
- Watercourse
- Mining Blocks
- Option 1-Via Existing Roads
- Homes on Wells
- Homes on Municipal System

Homes within 500 metres of Mining Block



Title:

Beach Access

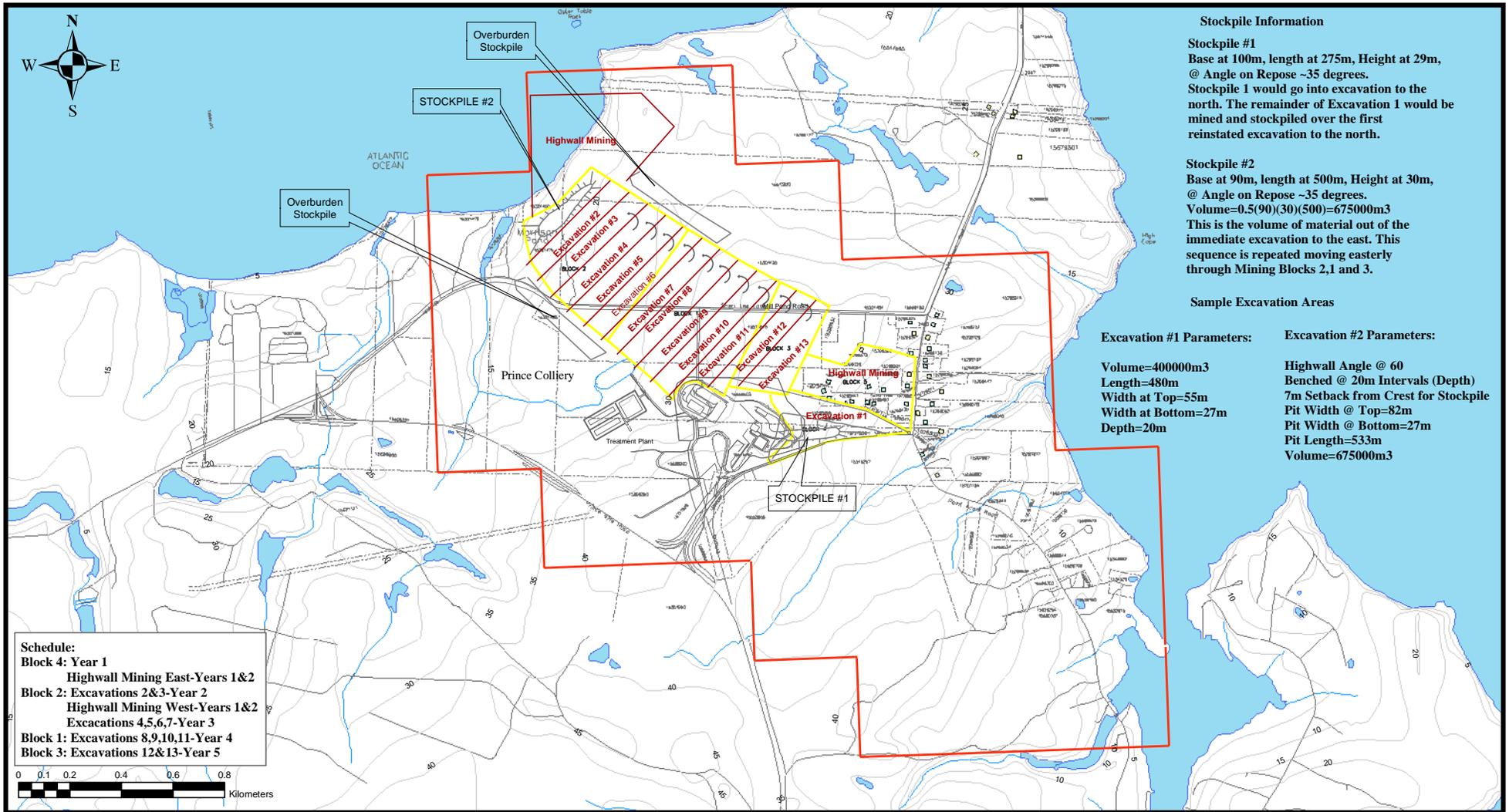
Date: May 2005

Project:

Surface Coal Mine and Reclamation Project-
Prince Mine Site
Point Aconi, Nova Scotia

Project No.: 50090A

Figure No.: 3 - 2



Stockpile Information

Stockpile #1
 Base at 100m, length at 275m, Height at 29m,
 @ Angle on Repose ~35 degrees.
 Stockpile 1 would go into excavation to the north. The remainder of Excavation 1 would be mined and stockpiled over the first reinstated excavation to the north.

Stockpile #2
 Base at 90m, length at 500m, Height at 30m,
 @ Angle on Repose ~35 degrees.
 Volume=0.5(90)(30)(500)=675000m3
 This is the volume of material out of the immediate excavation to the east. This sequence is repeated moving easterly through Mining Blocks 2,1 and 3.

Sample Excavation Areas

Excavation #1 Parameters:	Excavation #2 Parameters:
Volume=400000m3	Highwall Angle @ 60
Length=480m	Benched @ 20m Intervals (Depth)
Width at Top=55m	7m Setback from Crest for Stockpile
Width at Bottom=27m	Pit Width @ Top=82m
Depth=20m	Pit Width @ Bottom=27m
	Pit Length=533m
	Volume=675000m3

Schedule:
 Block 4: Year 1
 Highwall Mining East-Years 1&2
 Block 2: Excavations 2&3-Year 2
 Highwall Mining West-Years 1&2
 Excavations 4,5,6,7-Year 3
 Block 1: Excavations 8,9,10,11-Year 4
 Block 3: Excavations 12&13-Year 5



Legend		Homes within 500 metres of Mining Block	
--- Property Boundary	--- Special Mining Lease Boundary	■ Homes on Municipal System	■ Homes on Wells
-30 Contour (masl)	--- Stockpile		
--- Watercourse	--- Mining Layout		
--- Mining Blocks			

Title: Mining Sequence
Date: May 2005
Project: Surface Coal Mine and Reclamation Project- Prince Mine Site
Project No.: 50090A
Figure No.: 3 - 3
 Point Aconi, Nova Scotia

3.2.6 Contingency Planning

The standard contingency plans outline protocols should an emergency occur (e.g., fuel spill or spontaneous combustion). The contingency plans will also address the effect of meteorological conditions (e.g., rainfall / wind direction) on operations. Contingency plans for the proposed undertaking will be submitted as part of the IA application. Additional detail on contingency planning can be found in sub-section 7.2 that outlines the scope of contingency and emergency planning.

3.3 Operation and Maintenance

The following sub-sections describe the activities to be completed by the proponent during active surface coal mining operations.

3.3.1 Mining Operations Approach

Pioneer Coal proposes to extract approximately 1.6 million tonnes of near surface coal resource from the site. The proposed development plan focuses initially on reclamation of the areas significantly impacted by historic bootleg mining activity. These areas will be secured first. This series of bootleg mining pits and the Water Level Tunnel to the east of the Prince Mine will be removed. This will eliminate the pumping station requirement, such that surface water can be directed into the Prince Mine workings by way of a pit floor sump and pumping system. The work will be carried out before the expected timeframe for the Prince Mine workings to reach capacity (circa 2008).

Next, Pioneer Coal will initiate a box cut trench parallel to the western boundary of the site. The trench is expected to be approximately 45m wide at the bottom with a 60 degree highwall. Once the extraction is complete, the highwall miner will be utilized to extract coal parallel to the strike in a westerly direction. The NOVAMINER 2000 may be used along the end wall of the western surface pit because of the moderate dip (4 degrees). This potential highwall mining area is indicated on Figure 3-3.

One of the essential ingredients for successful highwall mining operations is the ability to undertake operations as continuously as possible. The highwall miner makes repeated cuts into the coal seam. Once a cut is started, mining continues until the cut has reached the desired length. To withdraw the miner from partially completed cuts will necessitate abandonment of the remaining coal resource available in that cut. Withdraw of the miner at the end of the work hours leads to water accumulation at the low end of the mining cuts. These cuts cannot be re-entered because of the water. Highwall mining operations will run on a 24 hour basis, 5 days a week.

The overall mine development for the Point Aconi Coal Resource Block is shown on Figure 3-3 Mining Sequence which is a plan view of the site showing the ultimate pit limits, overburden stockpile locations, and pit sequencing. The drawing shows pit layout and design along with their relative locations to existing site features.

The mining operations are progressive with reclamation ongoing through the life of the project. The first pit within the resource block will have the overburden stockpiled adjacent to the excavation. This stockpile will be sloped and stabilized as it will remain in place until the remainder of the block has been mined. Materials from the second excavation will be placed into the first excavation, and subsequently materials from the third excavation will be placed in the second excavation until the mining has progressed to completion of the block. Additional materials from the Raised Rock Pile will be buried in the excavations as well. Once a sizable area has been backfilled with overburden, the area will be rough graded, shaped, contoured, covered with topsoil and re-vegetated. The progressive reclamation approach will ensure that the site is completely reclaimed within a relatively short time period after mining.

Once the Prince Mine workings have flooded, surface water will be directed toward the existing sediment pond system that will remain in place for the duration of the project.

Waste rock will be transported from within the pit by use of conveyors, haul units and/or dozers. Pioneer Coal will meet the required noise and dust guidelines via mitigative measures.

Site access will remain via the Prince Mine Road using the existing Prince Mine entrance-way. The parking area will remain in place. See Figure 3-1.

3.3.2 Mining Methods and Equipment

The mining methods proposed for the project area would be consistent with those used at similar Pioneer Coal surface mining operations. Pioneer Coal is familiar with surface mining conditions at the Point Aconi site because of their past experience at an adjacent site south of this resource block. Topsoil and subsoil removal will be routine in nature using mainly bulldozers and excavators with off-highway haul trucks. Removal of consolidated rock will require blasting.

The mining sequence and methods (beyond site preparation activities as outlined in sub-section 3.2) are summarized as follows:

- Remove, stockpile topsoil and/or utilize as cover for reclamation of previous pits;
- Remove, stockpile overburden and/or utilize as backfill for reclamation of previous pits;
- Drill off areas above coal seam in preparation for blasting;
- Blast overburden rock from surface to top of coal seam;
- Place overburden rock in a waste rock pile and/or place as backfill for reclamation sequence in completed pit;
- Mine coal seam in series of lifts from crop to total depth of pit; and,
- Repeat sequence in next pit along crop of seam.

Travel on the site will be on temporary access roads constructed from site materials. Tandem trucks will be used for transportation of coal from the pit. No coal processing such as a wash plant is planned for the site.

Pioneer Coal equipment will be utilized on the site. Typical equipment to be used is summarized as follows:

- Rock drill for drilling blastholes to top of coal resource;
- Dozers, excavators, trucks and beltlines to remove overburden and rock;
- Crusher equipment;
- Excavators to mine coal;
- Tandem trucks to transport coal to the loadout area;
- Conveyor systems and components will be used where practical;
- Loaders and tractor trailers to load and ship coal; and,
- Highwall mining equipment (i.e., NOVAMINER 2000).

In addition to the above, other equipment requirements include: water pumps of various sizes; generators and compressors; pickup trucks, tools, etc.; portable noise and dust monitors; and, office and laboratory facilities. A description of the highwall mining method is provided in Appendix I.

3.3.3 Overburden and Rock Waste Handling

Removal and transportation of rock will be done in a manner typical to other Pioneer Coal surface mining operations. Materials will be transported via conveyor, haul units and/or dozer.

Estimated volumes of overburden (free dig soil), waste rock and coal are based on the following parameters:

- Angle of coal from horizontal plane: 4 degrees
- Angle of highwall: 60 degrees
- Thickness of topsoil/subsoil: 6 to 10 m
- Width of pit (crest to crest) 560 m
- Pit depth < 50 m
- Coal seam thickness 2.1 m
- Rock density 2.5 tonne/m³
- Recovery 60% overall
- Strip ratio 13:1

Total estimated coal quantity is approximately 1,600,000 tonnes from the Point Aconi Coal Resource Block.

Total estimated overburden and waste rock removal is approximately 12,000,000 m³. Only a portion of this material will be stockpiled at any given time as waste materials will be placed back in mined areas as backfill. Estimated waste pile heights at the site will be a maximum of approximately 30 metres above existing grades.

Prior to coal extraction, additional acid consumption / production testing will be done to further determine the acid rock drainage (ARD) potential of the overburden and host rock. Acid-Base accounting (ABA) is a screening procedure whereby the acid-consuming potential and acid-

producing potential of rock samples are determined, and the difference, net neutralizing potential, is calculated.

Should ARD occur on the site, mitigative measures (e.g., lime addition to sediment pond) will ensure quality of water entering the receiving environment. Regular testing for ARD on the site will be a part of the monitoring plan.

Baseline testing results for ARD are contained in Table 3-1 below. As expected, the coal is net acid producing and the waste rock is net consuming using the acid-base accounting method.

Table 3-1: Results of Baseline ARD Testing

Sample ID #	Description	Location in Stratigraphic Sequence	pH	%	kg of H ₂ SO ₄ /t	
				S (Total)	Acid Producing Potential	Acid Consuming Potential
Waste Rock						
PA-401	silty shale	gray silty shale/siltstone, representative sample taken 4 feet above top of coal seam	7.10	0.10	3.00	7.11
PA-406	mudstone	gray mudstone, taken from bedrock just below overburden till about 65 feet above coal seam	7.40	0.08	2.52	8.09
PA-407	silty shale/siltstone	gray silty shale/siltstone, sample is approximately 35 feet above coal seam	7.50	0.06	1.77	5.96
Coal Seam						
PA-402	coal	top 12" of seam includes yellow 2" stained dirt band (sulphur content)	2.40	3.90	119.30	<0.25
PA-403	coal	includes 2" yellow stained dirt band and down 6" additional into seam	2.20	1.76	53.84	<0.25
PA-404	coal	bottom 10" of coal seam right on top of gray underclay	2.30	5.74	175.59	<0.25
Pit Floor						
PA-405	underclay	gray underclay at base of coal seam	6.60	0.26	8.08	3.19
Sulphide Bearing Material Disposal Regulations Limits				0.4	12.51	n/a

An assessment of ARD potential for the site was completed based on data in Table 3-1 and reveals that the rock has an average net consuming potential of 2.25 kg H₂SO₄/tonne. Based on an estimated tonnage of rock to be removed of 8,000,000 cubic metres at a density of 2.5 tonnes/cubic metre, the rock has a net acid consuming potential of 45,000,000 kg of H₂SO₄.

The coal at the site is net producing (average of 87.18 kg H₂SO₄/tonne) and based on a total tonnage of 1,600,000, the net producing potential would be 139,000,000 kg H₂SO₄. ARD is not

expected to be an issue at the site as coal is shipped off-site to market. Any temporary “in pit” quantities of coal that may exist will not create an ARD issue as the host rock is net consuming.

Pioneer Coal is experienced with monitoring and successfully mitigating ARD in past surface coal mining operations. Given this proven track record and proposed monitoring and contingency plans; offsite impacts from ARD will not occur.

3.3.4 Wastewater Management

As previously described, a perimeter ditch will be constructed around the active work areas as mining advances. The channel will be rock-lined and collected surface water will be directed into the active pit. From there it will be either pumped to the Prince Mine workings or to the existing treatment pond system where it will be treated as required and monitored according to operating approvals.

Ongoing wastewater management activities include:

- Ongoing construction of perimeter ditching as mining progresses;
- Pumping of water to either the Prince Mine workings or treatment ponds;
- Monitoring of sediment pond function and discharge,
- Addition of coagulant and / or lime (where required) to treatment pond;
- Construction of temporary berms and ditches (with surface stabilization) to divert surface water as work progresses;
- Removal of sediment from ponds during summer low-flow periods;
- Maintenance of diversion berms and ditches – both temporary and permanent; and,
- Maintenance of water holding areas and pumping systems.

Refer to sub-section 3.2.3 for information on the surface water management plan.

3.3.5 Coal Transportation

All coal will be transported from the site in standard 35 tonne tractor-trailers via local roads suitable for transport trucks. The trucks will be fitted with tarp covers to eliminate dust emissions and spillage. To eliminate the tracking of site materials on local roads, the coal transport trucks will be washed as necessary when leaving the site. On average, there will be 40 round trip shipments per day. Transportation of the coal will fluctuate somewhat with market demands. It is intended to ship the coal 10 hours per day, 5 days per week (Monday to Friday).

3.3.6 Coal Handling Facility

Transportation of a portion of the coal from the site to the NSPI Trenton Generating Station by rail remains an option for Pioneer Coal. This will require a Coal Handling Facility. Coal would be trucked from the Prince Mine Site to a new facility located in the North Sydney/Sydney Mines area. From there the coal would be delivered by rail.

The facility would be completely enclosed. Bottom dump highway trucks would drive into a building enclosure, dump into a floor hopper and then exit the building. Coal dumped into the floor hopper would be transported within an enclosed conveyor to the rail car loading building. This building would contain a hopper with a 2000 tonne capacity. Rail cars would drive in under the hopper for loading. It is anticipated that eleven rail cars will be loaded daily.

Complete enclosure of the facility will minimize any impact relating to noise and dust. The entire footprint of the facility would be less than 1 hectare. A sketch of the proposed facility is provided in Appendix H on the Transportation panel. Up to 250,000 tonnes of coal could be loaded out annually via this facility if logistics, markets, and economics are favourable.

3.3.7 Site Security

The site will have gated access and the gate is locked during non-operating hours.

3.4 Decommissioning and Reclamation

The major component of the reclamation process for the site is the replacement of the waste material back into the excavated pits. The waste rock from the next block to be mined will be deposited into the voids of the previously mined areas after the coal has been removed. Material in the Raised Rock Pile (approximately 200,000 m³) will be buried in the mining blocks as well. This progressive reclamation is designed to be an integral component of the mining operation itself.

Broken rock materials will be rough graded to the approximate shape of the original site contours that existed prior to mining. Bulking effects due to the excavation process will cause some localized increases to site elevation. The operation will be followed by overburden contouring, topsoil placement, and vegetation planting.

Because the majority of the site is Crown land, Pioneer Coal is constrained from defining the ultimate land use of this site after the completion of mining activities. Final reclamation activities will be completed with input from land owners.

Previous horticultural study in the Thorburn/Westville/Stellarton area showed that re-vegetation of mining areas could be effectively attained using conventional seed and fertilizer product.

Final determination of end land use does not rest solely with Pioneer Coal; however, Pioneer Coal will provide advice based on previous experience. The reclamation bond ensures that Pioneer Coal is responsible to reclaim in a manner which satisfies stakeholders (as described in 3.4.1). The final land use planning of Provincial Crown lands will be resolved within the NSDNR Integrated Resource Management (IRM) process.

The final result of the reclamation process will be that the site will be stable to erosion and the overall drainage patterns will be restored. Site drainage will be planned to direct approximately the same volumes of water flow to the downstream areas as prior to development. The

reclamation will follow the submission requirements and timeframes as outlined in the NSDEL Pit and Quarry Rehabilitation Procedure (March 1994). Figure 3-4 shows a conceptual reclamation plan.

Other components of the reclamation process include removal of bootleg pits, tunnels, structures and equipment to provide an attractive, safe site. The existing box cut will be filled in and contoured.

The following sub-sections describe the components of reclamation.

3.4.1 Performance / Rehabilitation Bond

Pioneer Coal is aware of the requirement for bonding associated with reclamation of the site and will arrange for bonding as required. Bonding will remain in place for the duration of the mining and site reclamation and would be returned to Pioneer Coal based on a favourable review by regulatory agencies of the completed reclamation program.

3.4.2 Waste Rock Management

The complete cycle of the waste rock handling consists of excavating, initial placement of it in temporary storage piles, and then returning the waste rock to the excavated pit as mining progresses, or progressive refilling to meet the overall reclamation objective.

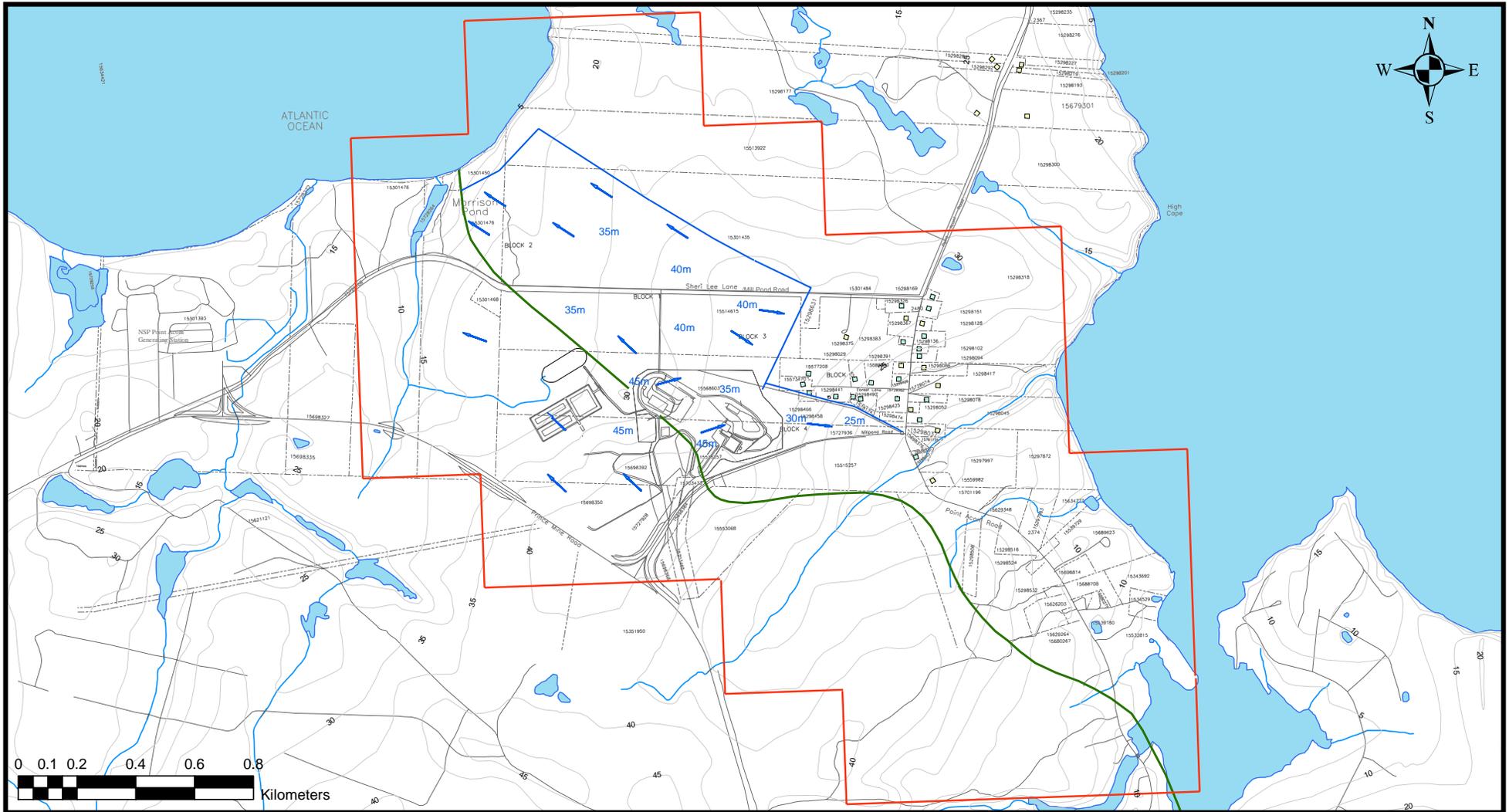
The excavated pit volume will equal the quantity of coal mined and overburden removed; however; in excavating the waste rock, there is typically an increase in volume due to “swell”. This “swell” occurs because the material, formerly a solid rock mass, is broken and voids become abundant. As a result, the final reclaimed site may have some increased elevation that will be contoured to mimic a natural landscape.

3.4.3 Site Contouring

The final contouring of the site will include the following features in its design:

- Establishment of site drainage controls;
- Removal of existing structures;
- Infilling of the existing box cut;
- Proper burial of ARD producing materials from Raised Rock Pile;
- Safe abandonment of retention ponds by grading slopes and reducing the depth; and,
- Grading of slopes to minimize erosion.

After re-contouring, stockpiled topsoil will be spread over the area to provide a suitable bed for the re-vegetation process.



Legend

- Property Boundary
- 30 Contour (masl)
- Special Mining Lease Boundary
- Hub Seam Outcrop
- Watercourse
- Conceptual Reclamation

- Homes within 500 metres of Mining Block
- Homes on Wells
 - Homes on Municipal System

Title: Conceptual Reclamation

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Prince Mine Site
Point Aconi, Nova Scotia

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Figure No.: 3 - 4

Throughout the life of the mining and reclamation operations, the sediment control ponds will provide good protection against the release of suspended solids and other contaminants into the surface streams. These ponds will continue to be operated during the reclamation process until such time as the site is sufficiently stabilized to prevent the release of suspended solids.

3.4.4 Re-vegetation

The goal of the re-vegetation program is to provide a ground cover that will prevent soil erosion, support local flora and fauna, be self-sustaining and diverse, and require no ongoing maintenance.

Re-vegetation planning will involve the selection of the type of planting or sowing that will be done, as well as the selection of plant species. The selection will be made after considering the current native plant species, the plant's survivability and local wildlife.

3.5 Potential Environmental Impacts and Mitigation

There are both positive and negative impacts of the proposed undertaking on the biophysical and socio-economic environment. These are assessed based on the potential interaction of the project description (as outlined in this section, Section 3) with the existing environment (as described in the next section, Section 4). The analysis of the interaction of the project on the environment produces VESCs. This analysis is presented later in the document (refer to Section 6.1).

Based on the project description and typical issues of concern for a surface mine development (given its proximity to a residential area, its past land use as an industrial site and upgradient location to an aquatic resource), the potential impacts (positive and negative) may include impacts to the following:

- Economy;
- Safety (owing to excavations where bootleg pits remain)
- Social environment;
- Air quality;
- Noise;
- Groundwater;
- Fresh water environment;
- Marine environment;
- Terrestrial habitat;
- Transportation;
- Mi'kmaq Land and Resource Use;
- Climate; and,
- Archaeology.

Design and operational approaches to environmental management are needed to mitigate the negative issues. Environmental management for the proposed undertaking includes ongoing monitoring of groundwater, surface water, noise and dust, and process controls to minimize

impacts. The existing knowledge of the location from work on the Prince Mine Site by CBDC, studies completed for other undertakings in the area and additional baseline studies allow for a very well supported plan to mitigate negative impacts.

3.6 Project Schedule

The actual schedule of work is expected to vary depending on market demand, weather, quality of coal recovered, environmental monitoring, equipment and process changes, and a number of other factors. It is difficult to predict an accurate schedule of mining locations and time frames; however, given ideal conditions, operations would commence as soon as possible in 2005 and final reclamation is expected by 2012. Site reclamation would be ongoing with progressive backfilling, and environmental monitoring is part of daily operations.

4.0 ENVIRONMENTAL SETTING

This section of the document presents information on the existing environment of the site and the immediate area. The data relies on a compilation of existing data (referenced, as appropriate) and baseline surveys completed by Pioneer Coal as part of the background work for this proposed undertaking.

The environmental setting is divided into eight sub-sections. These are atmospheric conditions, noise levels, surface water, marine environment, groundwater, habitat, geology and the socio-economic environment.

4.1 Atmospheric Conditions

The current atmospheric conditions are described using existing data and augmented by baseline data collected or compiled by Pioneer Coal. This text is divided into three sub-sections: climate (including temperature and precipitation), winds (including typical speed and direction), and air quality (regional and local, where available).

4.1.1 Climate

The mine site is located within a cool, humid climatic zone greatly influenced by its proximity to the Atlantic Ocean. This zone is influenced by prevailing westerly winds that cause many of the low-pressure systems moving across North America to reach Atlantic Canada. The frequent passage of these systems, plus its maritime location, results in a moderately high precipitation occurrence within the study area. The annual precipitation in Point Aconi is approximately 1200 mm/year based on Environment Canada climate data since 1990 for the Point Aconi station located close to the site at latitude 46°19'N and longitude 60°19'W at 11.7m ASL.

http://climate.weatheroffice.ec.gc.ca/climateData/canada_e.html

The study area experiences a modified continental climate, exhibiting variability in all seasons. The continental influence in the area produces a wide range in annual temperatures. Winters are typically cold with frequent snowfalls; springs are late, cold and cloudy; summers warm and relatively humid. In general, rainfall is most abundant during the fall months. Storms frequently pass close to the Atlantic coast of Nova Scotia and cross the southern part of Newfoundland, producing highly changeable and generally stormy weather. Without doubt this region has more storms over the year than any other region of Canada.

The following table summarizes the typical temperature and precipitation data from Environment Canada's data on Canadian Climate Normals 1971-2000

http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.htm.

The nearest station to the site with comprehensive climate normal data is Sydney, at a latitude 46°10'N and longitude 60°02'W at 61.9m ASL. When compared with limited available data for Point Aconi, the differences noted were negligible.

Table 4-1: Climatology Summary – Sydney Weather Station

Temperature (°C)	
Annual Mean	5.5
Maximum Mean Daily	(Jul) 23.0
Minimum Mean Daily	(Feb) -11.1
Extreme Maximum	(Aug) 35.5
Extreme Minimum	(Feb) -27.3
Precipitation (mm)	
Annual Total	1504.9
Rainfall	1212.9
Snowfall (cm)	298.3
Maximum Mean Monthly	(Dec) 167.5
Minimum Mean Monthly	(Jul) 86.8
Greatest 24 hr. Rainfall	(Aug 1981) 128.8
Greatest 24 hr. Snowfall (cm)	(Dec 1964) 58.7

4.1.2 Winds

The prevailing winds in the region are from the south and southwesterly direction, generally from the direction of the Bras d’Or Lakes; however, topography, marine environment and presence of storms locally influence wind direction at the project site.

The following table shows wind speed and direction data that is typical of the region. Data is from Environment Canada’s Canadian Climate Normals 1971-2000.

http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.htm

The nearest station to the site with climate normal data (including wind) is Sydney (mean wind speed of 18.6 km/hr in southern direction). When compared with available data for Point Aconi (NSPI, Dec. 1989), the noted differences were negligible.

Table 4-2: Wind Speed and Direction Data – Sydney Weather Station

Month	Mean Wind Speed, km/hr	Maximum Hourly Wind Speed, km/hr	Direction of Maximum Gust
January	21.3	89	S
February	20.6	89	SW
March	20.8	97	SE
April	19.5	80	SE
May	17.9	80	E
June	16.9	76	N
July	15.8	72	S
August	15.1	61	S
September	16.2	89	NW
October	18.2	97	S
November	19.8	85	S
December	21.0	97	S

4.1.3 Air Quality

The existing air quality in the region is influenced by natural conditions, local point sources, distant point sources and mobile sources. Local point sources of emissions primarily include existing industrial operations (e.g., NSPI Point Aconi Generating Station) and traffic related emissions. Industrial activities in CBRM (e.g., Sydney) would also be part of a local point source. More distant air quality influences include contributions from the industrial complexes in the Atlantic Provinces, as well as from Central Canada and the New England states.

The National Air Pollution Surveillance (NAPS) network has been established to monitor air pollution levels in Canada. There are five sites in metro Halifax, two in Sydney and one each in Saint John, N.B., St. John's, Nfld., Charlottetown, P.E.I., Glace Bay, N.S. and Fredericton, N.B. Not all pollutants are measured at each site. For example, air quality monitoring in 2002 at Sydney included sulphur dioxide, ozone, and particulate.

Data from the Atlantic Province stations and local monitoring facilities are used to present information of the existing air quality in the study area. The following presents a regional and local overview (if available) of air quality with respect to total suspended particulates, polycyclic aromatic hydrocarbons, sulphur dioxide, nitrogen dioxide and carbon monoxide.

Total Suspended Particulates

Total suspended particulates (TSP) is the most relevant variable to the proposed mine site. It describes solid or liquid particles that tend to stay suspended in the air and thereby available for inhalation. Particulates are the most commonly observed form of air pollution, resulting in visibility reduction, soiling, and respiratory irritation. Point sources for TSP in Nova Scotia include thermal generation plants, pulp and paper mills, and other industrial operations.

Coarse particles originate primarily from wind blown dust (e.g., from fields, unpaved roads, construction), sea spray, and mining and quarrying operations. The coarse mode is largely made up of crustal elements such as oxides of iron, calcium, silicon, and aluminum. These particles are efficiently removed by gravitational settling and remain in the atmosphere for periods of a few hours to a few days (Health Canada 1997).

Most particulate matter (89% and 72% for PM₁₀ and PM_{2.5}, respectively, in 1995) comes from open sources (e.g., agricultural tilling, wind erosion, construction, dust from roads, forest fires). Non-open sources of particulate matter include industry, non-industrial fuel consumption, and transportation (Environment Canada 1999).

The effects of larger suspended particles (i.e., >10 µm in diameter) are generally limited to reduced visibility and soiling, as well as vegetation distress; however, health and environmental concerns exist with smaller particulate (i.e., <10 µm). These particles may be drawn deep into the lungs and are linked to cardiac and respiratory diseases.

Background TSP levels in North America generally average less than the 60 microgram per cubic metre (µg/m³) Maximum Desirable Level for annual geometric mean concentrations set by the National Ambient Air Quality Objectives (NAAQO).

Annual mean concentrations of PM_{2.5} decreased at all urban sites across Canada over the past decade, while annual mean concentrations of PM₁₀ decreased at most urban sites. The mean annual PM_{2.5} concentration in 2001 was 27% lower than in 1990, while the PM₁₀ level was 34% lower.

PM_{2.5} concentrations in 2001 in Dartmouth were approximately 52 µg/m³. In 2002, the annual geometric mean concentration was 31.6 µg/m³ in Sydney; there were no exceedences of the NAAQO thresholds in Sydney.

Polycyclic Aromatic Hydrocarbons

Polycyclic Aromatic Hydrocarbons (PAHs) cause concern because of their indicated ability to precipitate changes in living cells. PAHs are created by incomplete combustion and are associated with smelting operations and motor vehicles and are generated in large quantities by wood combustion. PAH levels in Truro and Lower Sackville, NS were found, in a 1985 study, to range between 0.1 and 30 nanograms per cubic metre (ng/m³). These low levels would not likely result in a public health impact. Ambient levels in the study area would be expected to fall in the lower middle to upper portion of the range depending on the season of the year.

As PAHs are created by the incomplete combustion of hydrocarbons, baseline monitoring of PAH levels in ambient air is not part of ongoing monitoring as they are not relevant to this project.

Sulphur Dioxide

Sulphur dioxide originates from several regional sources. However, 75 to 80 percent of the sulphur deposited in the region originates from Central Canada and the northeastern United States.

Power generation produces 87 percent of this region's own sulphur dioxide production while fuel combustion, including motor vehicle operation, produces approximately 12 percent of the total. The NAAQO sets the Maximum Acceptable Level annual mean concentration at 23 parts per billion (ppb) and the Maximum Desirable Level annual mean concentration at 11 ppb.

Annual mean concentrations of SO₂ at most urban sites across Canada declined over the past decade. The mean SO₂ concentration in 2001 was 32% lower than in 1990. Industrial sources accounted for the largest decrease in emissions during this time, while emissions from non-industrial fuel combustion increased.

Halifax had the 5th highest annual mean concentration in Canada in 2001, at approximately 12 ppb, which exceeds the Maximum Desirable Level. Annual mean concentrations in 2002 in Sydney were 6 ppb, higher in the winter months and lower in the summer months.

Again because increased ambient concentrations of sulphur dioxide is not expected as part of surface coal mine operations, no baseline monitoring for sulphur dioxide was completed as it is not relevant to this project.

Nitrogen Dioxide

Gasoline combustion is the largest single source of nitrogen dioxide generation in the Atlantic region, followed by diesel engines, industrial fuel and power plant combustion, fuel wood burning and residential and commercial fuel combustion. Point sources include thermal plants, oil refineries and pulp mills. In 1980, Nova Scotia produced an estimated 48,000 tonnes of nitrogen dioxide emissions. Oxides of nitrogen can be carried thousands of kilometres from the point of emissions.

The NAAQO sets the nitrogen dioxide Maximum Acceptable Level annual mean concentration at 53 ppb and the Maximum Desirable Level annual mean concentration at 32 ppb.

In 2002, downtown Halifax had an annual mean concentration of 16.9 ppb. Annual averages in the study area would be expected in the 12 to 25 ppb range.

As no significant emissions of nitrogen dioxide are expected from surface coal mining operations, no baseline monitoring for nitrogen dioxide was completed as it is not relevant to this project.

Carbon Monoxide

Carbon monoxide (CO) is a product of incomplete combustion and occurs in high concentrations in areas with heavy traffic. In 1995, transportation accounted for 65% of the total anthropogenic CO emissions in Canada (EC 1999). Other sources include wood burning, gasoline use and diesel combustion. Point sources include oil refineries, thermal plants and pulp mills.

Target levels are expressed in terms of short-term exposures by the NAAQO with the Maximum Desirable Level over an 8-hour period set at 5 ppm, and the Maximum Acceptable Level over an 8-hour period set at 13 ppm.

Concentrations of CO at all Canadian sites were well below the maximum acceptable concentration over a 1-hour period as prescribed by the NAAQO in 2001. The highest annual mean concentrations in the Atlantic Region occurred in Moncton in 2002 at approximately 0.6 ppm. Halifax had an annual mean of 0.5 ppm in the same year. Annual mean concentrations for the study area would likely be less than 0.5 ppm.

As no significant emissions of carbon monoxide are expected from surface coal mining operations, no baseline monitoring for nitrogen dioxide was completed as it is not relevant to this project.

4.2 Noise Levels

Sound is a sensation produced in hearing receptors as the result of waves or vibrations caused in the surrounding air by a disturbance. Sound levels decrease with distance and are also attenuated by geographic and surface features. Different vibration frequencies create different pitches of sound.

The minute variations in air pressure that result in sound are measured by sound level metres which are calibrated to describe those levels in decibels (dB). Weighting networks are built into metres to result in different responses to portions of the sound frequency spectrum received. The “A” weighting network most closely corresponds to the range of human hearing and is therefore used in most sound impact assessment work with measurements recorded in units of dBA.

Extremely low levels of sound are in the 20 to 35 dBA range while sounds causing immediate and noticeable disturbance start at 70 to 80 dBA. A quiet location such as library or inactive residential area will register a sound level of approximate 35 dBA. A tractor trailer passing at a distance of 15m will create a 90 dBA reading, similar to that of a blender at 1m.

The baseline noise emissions (i.e., those not generated from surface coal mining activity) in the immediate vicinity of the site include:

- Local vehicular traffic (cars, light trucks, school buses, garbage trucks, etc.);
- NSPI Point Aconi Generating Station;
- Marine activity (e.g., boating) and water action (e.g., waves);
- Occasional tandem truck and tractor trailer traffic with variable traffic volumes throughout the day; and,
- Traffic along Highway 162 (much associated with NSPI Point Aconi Generating Station).

The noises generated from activity associated with the mine site typically include:

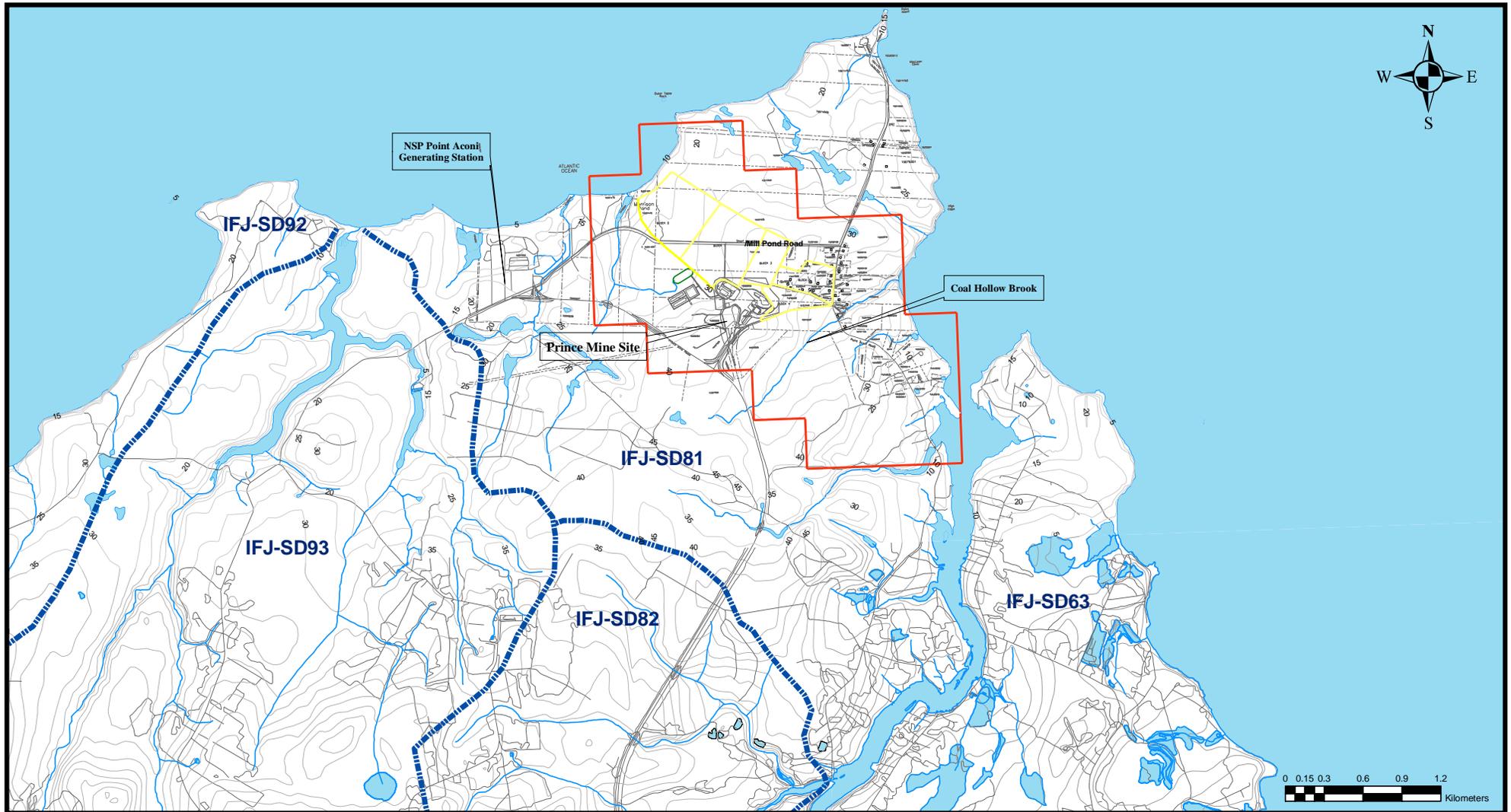
- Trucks and/or conveyor hauling material from the pit;
- Mine trucks hauling waste to spoil piles;
- Removal of rock overburden (including blasting) to access coal resource;
- Reverse warning signals on mine equipment;
- Trucks associated with transport of coal; and,
- Non-mine vehicles delivering supplies to the site.

Pioneer Coal will conduct a baseline noise survey at key areas of the site prior to commencement of operations and the information will be submitted to NSDEL for review.

4.3 Surface Water

The proposed site of the surface coal mine sits within a major Provincial watershed (defined as IFJ-SD81). Within the site, there is a high point that divides the site into three drainage basins, which flow to the west, east or north. The site ultimately drains to the Atlantic Ocean (on either side of Boularderie Island) through a series of ephemeral and full time watercourses. Refer to Figure 4-1 for the illustration of watersheds, drainage areas and watercourses.

The following two sub-sections describe the hydrology and water chemistry in the local area. For a discussion on aquatic habitat, refer to sub-section 4.6.1.



Legend

- Property Boundary
- Contour (masl)
- Watercourse
- Mining Blocks
- Special Mining Lease Boundary
- Regional Watershed Boundary

- Homes within 500 metres of Mining Block
- Homes on Municipal System
 - Homes on Wells

Title: Regional Watersheds
Project: Surface Coal Mine and Reclamation Project-
 Prince Mine Site
 Point Aconi, Nova Scotia

Date: May 2005
Project No.: 50090A
Figure No.: 4 - 1

Pioneer Coal completed a review of CBDC files for background information on surface water chemistry. The review indicated that the Phase II ESA compiled data on a brook sampling program. Jim MacDonald Brook had been occasionally sampled from April, 1992 to December, 1994 for general chemistry and metals. The brook was sampled upstream of the site thereby providing information on local surface water quality up-gradient from the site.

The general chemistry data indicates that all parameters sampled were within CCME Freshwater Aquatic Life guidelines with the exception of pH. Metals results indicated that guideline exceedences for aluminum, arsenic, cadmium, chromium, copper, iron, lead and zinc are typical for local surface water as outlined in Appendix B.

4.3.1 Site Hydrology

The three drainage basins from the site are discussed as follows:

- **Western Drainage Basin:** The drainage basin to the west leads into Morrison Pond which drains to the outlet of the Bras d'Or Lakes. This drainage area comprises over half of the proposed site (including Mining Block 2 and the majority of Mining Blocks 1 and 3).

The proposed site area within the Western Drainage Basin is gently sloping (2%), tree covered with no defined channels. Downgradient of the project area, the grades steeply increase as proximity to the shoreline increases. Sheri Lee Lane/Millpond Road bisects the portion of the site within this drainage area.

- **Eastern Drainage Basin:** The drainage basin to the east leads into Coal Hollow Brook that drains to the St. Andrews Channel. This drainage area comprises approximately one third of the proposed site (including Mining Blocks 4 and 5 and a portion of Mining Block 3). The surface water drains under the Millpond Road through a culvert.

Much of the proposed site area within the Eastern Drainage Basin is cleared and developed as rural residential and industrial land (i.e., portion of the former Prince Mine Site). The area is moderately sloping (5%) with steepness increasing outside of proposed site area as the land slopes toward the outlet of Coal Hollow Brook.

- **Northern Drainage Basin:** A small portion north of the ridge within the proposed site drains north. While the marine receiving environment is the same as the Western Drainage Basin, the surface water travels overland to the Atlantic Ocean. This area is approximately 16% of the proposed site (including portions of Mining Blocks 1 and 3).

This small portion of the proposed site within the Northern Drainage Basin is gently sloping (2%) and tree covered with no defined channels. There is a defined wetland area in the area of the Brogan Mine site (approximate distance of 500m from the northern edge of this project).

As discussed in sub-section 3.2.3, it is proposed that water from active surface mining operation will be treated for the removal of suspended solids and adjustment of pH (where necessary) prior to discharge to the environment. The effluent is directed to Morrison Brook (i.e., Western Drainage Area). This treatment pond and discharge location proposed by Pioneer Coal is the same as that used in the former operation of the Prince Mine Site by CBDC.

Only surface runoff from areas not disturbed by mining activities will continue to flow into Coal Hollow Brook from the eastern portion of the proposed site. All surface runoff which contacts the active Mining Block areas will be pumped either into the Prince Mine workings or to existing treatment facilities. At the completion of mining activities and final reclamation, surface runoff from the eastern portion of the site will have been restored to flow into Coal Hollow Brook.

Similarly, once the northern portion of the site is disturbed by project activities, surface water will be directed to the Prince Mine workings or to the treatment facilities and discharged to the Morrison Brook system. Upon reclamation, it is expected that a similar sized portion of the site will be contoured to drain to the north to replicate pre-project conditions.

4.3.2 Surface Water Chemistry

Baseline data on surface water chemistry includes information collected for CBDC and PWGSC for environmental site assessment work on the former Prince Mine Site.

Surface water in the vicinity of the proposed undertaking consists of small part time (ephemeral) drainage courses and a full time watercourse at Morrison Pond. The surface water chemistry is characterized through previous studies as low pH, moderate to high Total Suspended Solids (TSS), low in metals with the exception of typically elevated iron and aluminum and moderate to high chlorides and sulphate.

4.4 Groundwater

This sub-section describes the hydrogeology in terms of regional and local characteristics. The groundwater regime is presented, as well as the expected groundwater quality and quantity in the area and the implications to the proposed project are also noted. At the end of this sub-section, an overview of groundwater users (e.g., domestic well) is presented.

Baseline data on groundwater is based upon information collected for CBDC and PWGSC for environmental site assessment work on the former Prince Mine Site.

4.4.1 Regional Hydrogeology

The availability of groundwater in the Sydney Coalfield is generally excellent. Wells constructed for domestic use in all hydrostratigraphic units have a 95-98% success rate. The Lower Morien unit is capable of producing adequate water supplies for medium to large-scale institutional, industrial and municipal developments, especially where wells penetrate significant thicknesses of sandstone, example, Point Aconi Generating Station freshwater supply well field. Yields from the Upper Morien and Upper Windsor units are somewhat lower. (Baechler, Regional Water Resources, Sydney Coalfield, Nova Scotia, 1986)

4.4.2 Site Hydrogeology

Groundwater flow across the site area is generally in an easterly direction towards the Atlantic Ocean. Local topography influences the groundwater located within the till and to some extent that found in the bedrock aquifer creating localized flow directions as well to the north-east in the area near Mining Block 5 and westerly in the vicinity of Mining Block 1 and possibly Mining Block 2. The portal to the underground workings and the box cut affect groundwater within the till and the bedrock creating a depression in the groundwater table centered at that location. Water levels from site wells indicate that groundwater within the till unit is from surface to 5 metres below ground surface and bedrock water levels from near surface to 10 metres in areas of the site not influenced by the portal excavation. Localized groundwater effects of the portal may extend up to 300 metres distance from the excavation as evidenced in the site wells.

Phase II ESA work at the site in 2004 indicated that the hydraulic conductivity of the till at the site averaged 4×10^{-6} cm/sec which is considered a low hydraulic conductivity.

Pioneer Coal completed a review of CBDC files for background information on groundwater chemistry. The Phase II ESA compiled data on three on-site drilled bedrock wells that had been occasionally sampled by CBDC from April, 1989 to January, 2000 for general chemistry and metals. These wells were installed in the mid-1980's to provide potable water at the site during underground mine operations.

The general chemistry data indicates that all parameters sampled were within Canadian Drinking Water Quality guidelines (April 2003 values) with the exception of colour which is an aesthetic objective not a health objective. Metals results indicated exceedances for several health and aesthetic objectives as outlined in Appendix B.

4.4.3 Drawdown Assessment

The hydrogeology of the Point Aconi area where the Pioneer Coal operation is proposed is complex due to the disturbed nature of the site from past formal and bootleg mining operations. Conventional pump testing and groundwater modeling were found to be problematic to determine with certainty the effect of the proposed operation on the local groundwater regime, in particular with respect to effects to domestic wells. Information was reviewed from the following sources to assist:

1. Nova Scotia Well Log Database
2. Phase II ESA Reports for the Prince Mine Site
3. NSDEL Observation Well Data for the well located at the corner of Point Aconi Road and Sheri Lee Lane/Mill Pond Road
4. Regional Water Resources Study (Baechler, 1986)

These data sources indicate effects from former mine operations, which included excavations up to 20-25 metres below ground surface, were measured at the NSDEL well located approximately 600 metres from the proposed Mining Blocks. These effects from past operations were recorded to be a maximum of 3 metres which is not considered to be problematic for most drilled domestic wells in the area. This fluctuation amount is also approximately what the normal yearly fluctuation is for the observation well. Extrapolation of these effects to no effect would therefore be in the range of 800 metres from the Mining Blocks.

A search of all records for Point Aconi in the NSDEL Well Log Database indicated that there were 102 records showing an average well depth of 122 feet (37 metres), well yield of 11 Igpm (50 litres per minute) and a water level of 22 feet (7 metres), Table 4-3. This indicates that the vast majority of the domestic wells have the static water level and yield capable of delivering adequate water supplies.

Pioneer Coal proposes a comprehensive pre-activity domestic well survey, a well planned monitoring program and a water supply policy due to the uncertainty with respect to effects to groundwater. Pioneer Coal will complete a survey of all homes within 800 metres that use domestic wells and will implement a water supply policy. The policy will cover homes with domestic wells in the event that there is loss of quantity or quality caused by Pioneer Coal. Current information indicates that approximately 65% of the homes within the 800m zone are on the municipal system and therefore will not be affected. It is estimated from site visits and mapping that up to 50 homes would be included in the 800m zone, of which approximately 33 would currently be on the municipal system.

Factors that reduce the possibility of effects to the local groundwater supplies include the following:

- The majority of local residences using groundwater derive the water from the bedrock aquifer and the effects created from mining would be by localized lowering of the water levels in surficial materials due to excavations for the Mining Blocks.
- The majority of the homes are located down-gradient from the Mining Blocks.
- It is anticipated that a limited amount of groundwater will enter the Mining Blocks.
- A municipal water supply is available as an alternative water supply.

Table 4-3: Domestic Well Information Point Aconi

OWNER	ADDRESS	COMPLETE	DEPTH (ft)	CASDEPTH (ft)	DIAMETER (in)	YIELD (gpm)	STATDEPTH (ft)	FRACT1 (ft)	FRACT2 (ft)
MacLean, George		9-May-77	30	81	0	6	0	0	0
Corbett, Melvin		13-Oct-77	65	31	5	20	16	0	0
Drummon, Dave		15-Apr-77	100	68	6	5	8	0	0
Gormon, Stewart		13-Oct-77	75	28	5	5	8	0	0
Chadwick, John		31-Dec-78	61	22	4	15	8	0	0
Point Aconi Centre		31-Dec-78	87	29	4	10	18	0	0
Reilly, John		31-Dec-78	91	22	4	15	4	0	0
Stubbert, Robert		31-Dec-78	69	22	4	10	12	0	0
Warren, Phillip		31-Dec-78	64	44	6	6	8	0	0
Nugent, Micheal		31-Dec-78	150	21	6	15	30	0	0
Parks, David		31-Dec-78	105	20	6	6	25	0	0
Snow, Herbert		31-Dec-78	30	27	6	8	20	0	0
Scott, Jack		31-Dec-78	125	22	6	20	21	0	0
Romeo, Stanley		31-Dec-78	85	22	6	8	36	0	0
Nugent, Micheal		31-Dec-78	150	21	6	15	30	0	0
Stubbert, H		31-Dec-78	115	40	6	15	55	0	0
Apestegrey, Gerald	Marshes Lane	2-Nov-79	105	22	6	40	-1	100	0
Barrie, Frank		18-Jun-79	55	22	6	10	18	51	0
Beaton, John		29-Mar-79	125	24	6	4	15	103	121
Brogan, R	Point Aconi	9-Aug-79	165	22	6	3	30	0	0
Marsh		15-Aug-79	170	22	6	70	12	0	0
Quinn, Greg	Point Aconi	6-Jun-79	85	22	6	7	23	0	0
Harrietha, Mike	Point Aconi Rd	31-May-79	68	35	4	10	7	56	68
Turner, John	Point Aconi Rd	13-Jul-79	70	15	4	5	17	60	70
Briggs, Wally		6-Mar-80	125	22	6	5	40	95	118
Compton, David		22-Oct-80	65	20	6	5	20	55	61
Erickson, Frank		4-Sep-80	340	64	6	2.5	30	315	8
Macintyre, Phillip		15-Oct-80	65	22	6	4	20	0	0
Pendergast, Adrian		6-Mar-80	85	22	6	3	20	33	75
Serroul, Brian		18-Jul-80	125	22	6	30	123	123	0
Nova Construction	Point Aconi	29-Oct-80	124	24	6	4	16	80	124
Devco	Point Aconi	27-Jan-81	205	53	6	3	40	188	0
Johnstone, Gary	Point Aconi	12-Aug-81	125	22	6	3	20	25	65
MacIntyre, Phillip	Point Aconi	22-Jul-81	115	0	6	5	35	110	0
Marsh, Sylvester	Marshes Lane, Point Aconi	29-Apr-81	55	22	6	20	7	51	0
Gracie, P	Point Aconi	23-Jun-81	80	20	6	5	0	77	80
MacNeil, D	Point Aconi	24-Jun-81	125	20	6	3	0	90	0
Beaton, Richard	Point Aconi	2-Oct-82	185	19	6	7.5	75	175	185
Jessome, Reg	Point Aconi	6-May-82	95	22	6	15	25	90	0
Marsh, Kevin	Point Aconi	10-May-82	55	22	6	10	20	50	0
Prince Mine	Point Aconi	17-Aug-82	205	44	8	30	12	148	180
Fraser, C	Point Aconi	26-Oct-82	80	22	6	2	10	24	0
Howley, W		11-Aug-82	44	20	6	12	12	36	40
Chaulk, Stewart	Point Aconi	13-Oct-83	165	0	6	20	15	160	0

Table 4-3: Domestic Well Information Point Aconi

OWNER	ADDRESS	COMPLETE	DEPTH (ft)	CASDEPTH (ft)	DIAMETER (in)	YIELD (gpm)	STATDEPTH (ft)	FRACT1 (ft)	FRACT2 (ft)
Turner, David		13-Oct-83	145	41	6	5	30	140	0
White, George		16-Nov-83	145	6	37	50	30	140	0
Powers, Dave	Novaco #2, Point Aconi	7-Jul-83	44	27	6	10	12	40	44
Powers, Dave	Point Aconi	4-Jul-83	123	21	6	8	12	98	124
MacLellan, Lawrence	Point Aconi Rd	19-Jul-84	104	43	6	25	10	90	104
Harrietha, Joseph	266 Point Aconi Rd	25-Sep-85	125	80	6	10	30	122	0
Marsh, Clarence		16-Aug-85	130	28	6	8	40	127	0
Gracie, Francis	81 Jessome Rd, Point Aconi	18-Jun-86	125	22	6	3	20	106	115
Campbell, David	Point Aconi Rd	21-Jul-86	165	60	6	12	40	154	0
LeBlanc, David	Point Aconi	31-Jul-86	125	22	6	4	25	115	120
Laffin, Patrick	Point Aconi Rd	9-Jun-87	145	65	6	3	30	125	141
MacLean, Roy	Point Aconi	9-Feb-87	145	44	6	3	30	80	125
Laffin, Lawrence	298 Point Aconi Rd	7-Aug-87	145	65	6	7	5	115	133
Briggs Construction	Point Aconi	13-Aug-87	145	65	6	10	70	138	0
MacNeil, Don	Point Aconi Rd	1-Sep-87	145	44	6	3	90	125	134
Pero, Elizabeth	Point Aconi Rd	10-Nov-87	118	40	6	50	-1	115	0
LeBlanc, Mr.	Point Aconi Rd	1-Oct-87	70	41	6	30	0	58	62
MacMullen, Westley (CMHC)	Point Aconi	12-Aug-88	85	40	6	15	30	78	0
Marsh, Ted	Jessome Rd, Point Aconi	25-Feb-88	85	36	6	2	16	40	66
Chant, George	Point Aconi Rd	18-Oct-88	65	44	6	10	27	46	54
Walker, Susan	Point Aconi	20-Jun-89	285	44	6	1	30	275	0
Marsh, Bernard	Point Aconi	30-Jun-89	205	33	6	2	30	145	193
Marsh, Elmer	1 Marsh's Lane, Poitn Aconi	11-Aug-89	105	42	6	44	10	97	0
Carey, Michelle	Poitrn Aconi Rd	19-Oct-89	185	60	6	3	30	166	180
MacLean, Gary	Forrester's Lane	1-Mar-89	110	22	6	10	0	105	0
Bonnar, Jacqueline	944 Point Aconi Rd	10-Aug-89	204	40	6	2	0	0	0
Erickson, Sheldon	Point Aconi Rd	11-Aug-89	80	40	6	2	0	0	0
Barron, Ethel	27 Forrester's Lane	16-Oct-89	304	40	6	1	0	0	0
Stubbert, Byron	670 Point Aconi Rd	12-Apr-90	55	22	6	6	15	51	0
MacLean, Leona	34 Forrest Lane	2-Aug-90	105	40	6	8	30	45	67
MacLean, Theresa	1044 Point Aconi	3-Aug-90	127	40	6	10	60	74	88
Long, W M	113 Point Aconi Rd	16-Oct-90	185	30	6	45	15	127	181
Gouthro, Fred	20 Turner Dr	17-Oct-90	105	40	6	10	0	36	97
C M H C	Forrest Lane	1-Nov-90	205	0	0	0	0	0	0
Forrest, Mr.	Point Aconi	22-Nov-90	16	17	36	0	0	24	0
C M H C	Forrest Lane	9-Nov-90	105	20	6	6	25	64	97
Bonnar, John	944 Point Aconi Rd	19-Dec-90	150	115	6	3	35	125	141
MacLean, Francis	Poitrn Aconi	25-Feb-91	150	89	8	3	25	118	0
Riely, Truman	Point Aconi Rd	15-Mar-91	205	60	6	3	0	125	196
Zutphen Brothers	Point Aconi	28-Nov-91	205	40	6	-1	0	113	0
Harrietha, Donald	18 Marsh Lane, Point Aconi	16-Jul-91	85	20	6	10	20	75	81
Barron, Ethel	Forrest Lane	19-Mar-91	150	83	8	35	50	135	141
NS Power Corporation	Fisherman Rd	21-May-91	100	20	6	1	0	30	0
MacLean, Russell		19-Dec-91	242	40	6	2	140	18	162
Bonar, Adrian		18-Jul-91	123	40	6	20	20	45	117
Campbell, Al	46 Point Aconi Rd	29-Oct-92	100	40	6	7	20	45	95

Table 4-3: Domestic Well Information Point Aconi

OWNER	ADDRESS	COMPLETE	DEPTH (ft)	CASDEPTH (ft)	DIAMETER (in)	YIELD (gpm)	STATDEPTH (ft)	FRACT1 (ft)	FRACT2 (ft)
Boutillier, Jerry	Point Aconi Rd	6-Oct-92	68	20	6	8	17	16	58
Campbell, Adrian		21-Jul-93	105	44	6	5	20	47	97
Thurbide, Reg		17-Sep-93	155	20	6	5	20	115	150
Beddow, Melvin	Jessome Rd	17-Sep-93	125	20	6	4	20	97	119
Cholock, Len	Point Aconi Rd	16-Sep-93	165	42	6	10	25	140	159
Marsh, Paul	Point Aconi	15-Apr-93	104	60	6	15	0	82	92
Thurbide, Reg	Jessome Rd, Point Aconi	8-Oct-93	125	20	6	8	3	120	0
Rideout, Denise	90 CMHC, Point Aconi	20-Sep-93	164	40	6	8	0	152	157
Briggs, Creighton	Point Aconi Rd	24-Aug-94	82	21	6	2.5	25	42	77
Bonnar, Raymond	769 Point Aconi Rd	17-Oct-95	90	28	6	3	20	80	87
Walker, Mrs. Jody	1041 Point Aconi Rd	2-Jul-98	183	40	6	8	0	80	111
Pitts, John	Point Aconi Rd	11-Jun-99	145	6	48	5	30	140	0
Average			122.4	33.9	6.8	10.8	22	73.5	52.5

Source: NSDEL well log database records for search for "Point Aconi"

4.4.4 Chemistry

During the Baseline ESA conducted in January/February 2004 by MGI for the Prince Mine Site, groundwater general chemistry sampling was undertaken. The analytical result noted exceedences for sulphate in five of the wells sampled, exceedences for colour and turbidity in all of the wells sampled, exceedences for calculated Total Dissolved Solids (TDS), and values outside their respective limit for pH in two of the wells sampled. These parameters in excess, or outside, of the Canadian Drinking Water Quality (CDWQ) guidelines have been established based on aesthetic objectives that are not related to any known health related concerns

Mining operations are not predicted to have a negative effect on water quality as the groundwater and surface water at the site will either: 1) move according to existing gradients and directions in areas not influenced by the mining operations or; 2) move under influence of the mining operations to the Mining Block areas and be directed to the portal and underground as is the presently acceptable case or, if the water level in the portal reaches the lower limit of mining, be directed to the existing settling pond system for treatment prior to discharge and subjected to appropriate monitoring to ensure proper discharge limits are achieved.

Groundwater monitoring will be completed at the site to outline any negative affects to groundwater quality that may be occurring as outlined in Section 6.2.

4.4.5 Groundwater Users

As shown on Figure 4-1, there are approximately 20 homes within 800m of the facility that use domestic groundwater supplies (9 are known, additional 11 estimated). The remainder are currently using a municipal system for supply of water. None of the users have a groundwater withdrawal approval or are considered commercial users of water. The nearest identified

commercial user of water is NSPI who operate a freshwater supply wellfield for their Point Aconi operation. The wellfield is approximately 5 kilometres to the south of this undertaking. Pioneer Coal will conduct a domestic well survey, including all homes within an 800 metre radius of the site, prior to site development to determine the exact number and status of these wells. Pioneer Coal does not anticipate affecting groundwater users beyond 500 metres of the Mining Blocks and will work with residents to secure a mutually agreeable solution to any water quality or quantity loss caused by Pioneer Coal.

4.5 Marine Environment

The ultimate receptor of surface water and groundwater from the area of the proposed site is the marine environment of the Atlantic Ocean (on either side of Boularderie Island). On a regional scale, the freshwater outflow from the St. Lawrence River travels toward the ocean and mixes with the saltwater in the Gulf of St. Lawrence. This forms a low salinity surface layer that flows to the Cabot Strait. Surface currents flowing through the Cabot Strait have an approximate velocity of 0.2m/s and tend toward the southeast. The bottom water current is several times less and considered weak.

The variance in water levels is due to tidal action as well as storm surges. The annual mean variance is approximately 0.8m due to tides; however, extreme conditions (i.e., 100 year return period) may result in a variance of approximately 3m. An annual temperature cycle is evident as the maximum summer temperature is 16°C while minimum temperatures are at or near freezing (allowing formation of some sea ice). This information implies that the upper ocean undergoes a thermal stratification in the summer.

The seawater also has an annual salinity cycle. Maximum salinity occurs in March while minimum salinity occurs in September. However, in the upper layers, there are rapid and varied changes in salinity, likely due to inflow of freshwater on surface layers, and therefore, seasonally influenced.

4.6 Habitat Evaluation

The habitat of the site and the local / regional context is presented in this sub-section. The description is broken into four categories: freshwater, marine, terrestrial and wetland environments. The typical components of the habitat are described, as well as the probable presence / absence of rare or sensitive species.

The data used in the habitat evaluation consists of information gathered as part of the 1989 Point Aconi Generating Station EAR, the environmental screening by NSM, and other publicly available information.

4.6.1 Freshwater

On a regional basis, there are several local watercourses sustaining a healthy population of fish, including Trout and Salmon. A few kilometres west of the site are Aconi Brook and Millpond. These are both known to contain Smelt and Gaspereau.

The two watercourses within the watershed (1FJ-SD81) of the proposed undertaking are Coal Hollow Brook and Morrison Pond and its tributaries including Jim MacDonald Brook.

The Environmental Screening provided by NSM identified three rare/sensitive species from an adjacent area relating to Sydney River only. These include the Freshwater Isopod, Delicate Lamp Mussel and Yellow Lamp Mussel. The Marine Bristletail is noted as a potential marine species in the general study area; however, it is reported only in a handful of sites in Nova Scotia.

4.6.2 Marine

As part of work completed for the NSPI EAR (1989), biological marine data were collected including benthic sampling, plankton sampling and a fisheries assessment. This is summarized in this sub-section. No additional marine studies were undertaken for this EAR. The Environmental Screening provided by NSM did not offer specific comments on potential marine species to consider in this undertaking.

Habitat for benthic species is varied and generally characterized by bedrock, cobble and some sand and silt sediments. Due to ice scour and storms, the benthic species found are hardy with a discontinuous distribution. Dominant marine plants are kelp with some filamentous species closer to shore. Benthic fauna include echinoderms, bivalves and gastropods. Most abundant benthic species include blue mussel, periwinkle and sea urchins.

Due to lack of suitable substrate, there is a lack of detritus feeders. Zooplankton abundance falls as the seasons change based on changes in presence of prey and water temperatures. Study results indicated that this area does not act as nursery for fish species.

The habitat is generally not suitable for groundfish species. Cunner, sculpin, fourbeard, hake, rockling and flounder appear to be resident of Point Aconi whereas mackerel, herring, etc. are not resident year round. Commercial fisheries exist; however, individuals of various species would be occasionally present (e.g., salmon, gaspereau, smelt, cod, etc.). Lobsters and rock crab are also common in the area.

4.6.3 Terrestrial

The following two sub-sections describe the flora and fauna in the general area and on the site. Information from the NSPI 1989 EAR is summarized and referenced. To augment this information, an environmental screening was completed by NSM to overview known natural heritage resources in the general study area. Information on species at risk and species of concern

from the Atlantic Canada Conservation Data Centre (ACCDC) and the NSDNR Significant Habitats and Species Database were also included in this desktop review.

Discussion on wetland and typical wetland species (e.g., dragonflies and damselflies) is presented in sub-section 4.6.4.

4.6.3.1 Flora

Much of the vegetation on Boularderie Island near Point Aconi has been disturbed through agriculture, forestry, mining, road building, housing activities and fire. As a result, there are a high percentage of coniferous trees as opposed to deciduous. While it is a mixed forest, it is dominated by black spruce and balsam fir, with some maple, birch, aspen and beech present on well-drained ridges. The exposed areas and coastline are dominated by stunted conifers and scrub bush. In heavily disturbed areas, shade intolerant tree species dominate, such as aspen and alders. Ground cover varies and depends on canopy type and coverage; it ranges from mosses to ferns to fireweed.

There are ten yellow or red listed flora species identified within or adjacent to the site boundary as per the NSM Screening (see Appendix E). In addition, a data search was performed by the ACCDC. No records of rare or sensitive flora records were noted within 5km; however, seven records for five different species of rare vascular flora were noted within a 10km radius of the site.

The following table lists all potential rare or sensitive flora and describes their sensitivity, habitat, and potential for presence on the site.

Table 4-4: Potential for Rare or Sensitive Flora

Name	Common Name	Ranking	Habitat	Potential
<i>Asplenium viride</i> (<i>Asplenium trichomanes-ramosum</i>)	Green Spleenwort	Yellow	Shaded area, basic soils (limestone).	Low
<i>Caramine parviflora</i> , <i>var. arenicola</i>	Small-Flower Bitter-Cress	Red (S2)	Dry woods, shaded or exposed ledges, and in sandy soils	Low-medium
<i>Cypripedium calceolus</i> (2 varieties)	Small Yellow Lady's-Slipper, Large Yellow Lady's-Slipper	Yellow	Fens, bogs and moist meadows	Low
<i>Cypripedium reginae</i>	Showy Lady's-Slipper	Red	Fens, bogs and moist meadows	Low
<i>Dryopteris filix-mas</i>	Male Fern	Green (S3)	Moist under growth; wooded areas	Medium-high

Table 4-4: Potential for Rare or Sensitive Flora

Name	Common Name	Ranking	Habitat	Potential
<i>Erigeron philadelphicus</i>	Philadelphia Fleabane	Undetermined (S2)	Old fields, meadows, springy slopes	Low
<i>Isoetes acadensis</i>	Acadian Quillwort	Yellow	Bordering watercourses	Medium-low
<i>Isoetes prototypus</i>	Prototype Quillwort	Red	Deep water, nutrient poor, acidic lakes	Low
<i>Liparis loeselii</i>	Loesel's Twayblade	Green (S3S4)	Basic bogs and fens	Low
<i>Lobelia kalmii</i>	Kalm's Lobelia	Yellow	Basic bogs, shores and wet meadows	Low
<i>Ophioglossum pusillum</i>	Adder's Tongue	Yellow	Acidic soil, ditches, old fields	Medium-low
<i>Potamogeton zosteriformis</i>	Flatstem Pondweed	Yellow	Shallow lakes and rivers	Low
<i>Senecio pseudo-arnica</i>	Seabeach Groundsel	Yellow (S2)	Gravelly sea shores	Medium-low

4.6.3.2 Fauna

On a regional basis, the northern end of Boularderie Island provides habitat for a wide range of animals and birds. The NSPI EAR (1989) indicates that while moose are known to pass through the area, they do not reside in this area. Common species in the area are likely deer, coyote, fox, bobcat, raccoons, mink and otter.

Birds of prey are common in the general area (e.g., Osprey, Red-tailed Hawk, Bald Eagle), as well as Herons. Various species of breeding birds are also present on the site (e.g., Boreal Chickadee). While the Bobolink (*Dolichonyx oryzivorus*) is known to reside in the general area, their preferred habitat is grasslands and pastures. Therefore, their presence within the site is unlikely.

Bird Island (about 7km northwest of the site) is home to Razor Bill, Atlantic Puffin, Leach's Storm Petrel, Herring Gulls, Cormorants, Common Tern and other sea birds. While birds from the Bird Island are expected to visit the shoreline downgradient of the proposed site, there is no indication that these waters are critical feeding grounds for any of these species.

Both NSM and ACCDC noted a potential for rare or sensitive dragonflies and damselflies in the general area; however, the potential presence on the mine site is non-existent given the lack of wetland habitat.

4.6.4 Wetlands Habitats

Several mapped wetlands are in the Point Aconi area but there is no mapped wetland habitat located within the Mining Blocks or in an area of the site where disturbance will occur. The nearest mapped wetlands are located approximately 1.6 kilometres northeast and southwest of the proposed undertaking. Wetland habitat (unmapped) exists in the vicinity of Morrison Pond that is downgradient of the proposed undertaking. Only effluent meeting guidelines will be discharged to tributaries leading to Morrison Pond and the project is designed so as not to have run-off directed to the wetland habitat noted at Morrison Pond. Site surveys completed to date do not indicate any additional wetlands. Should wetlands be encountered Pioneer Coal will liaise with NSDEL and NSDNR to determine mitigation or replacement options.

4.7 Geology

This sub-section outlines the surficial geology and bedrock geology of the region and the site. The following figures (i.e., Figure 4-2 Soils, Figure 4-3 Surficial Geology, and Figure 4-4 Bedrock Geology) graphically present the geology of the area.

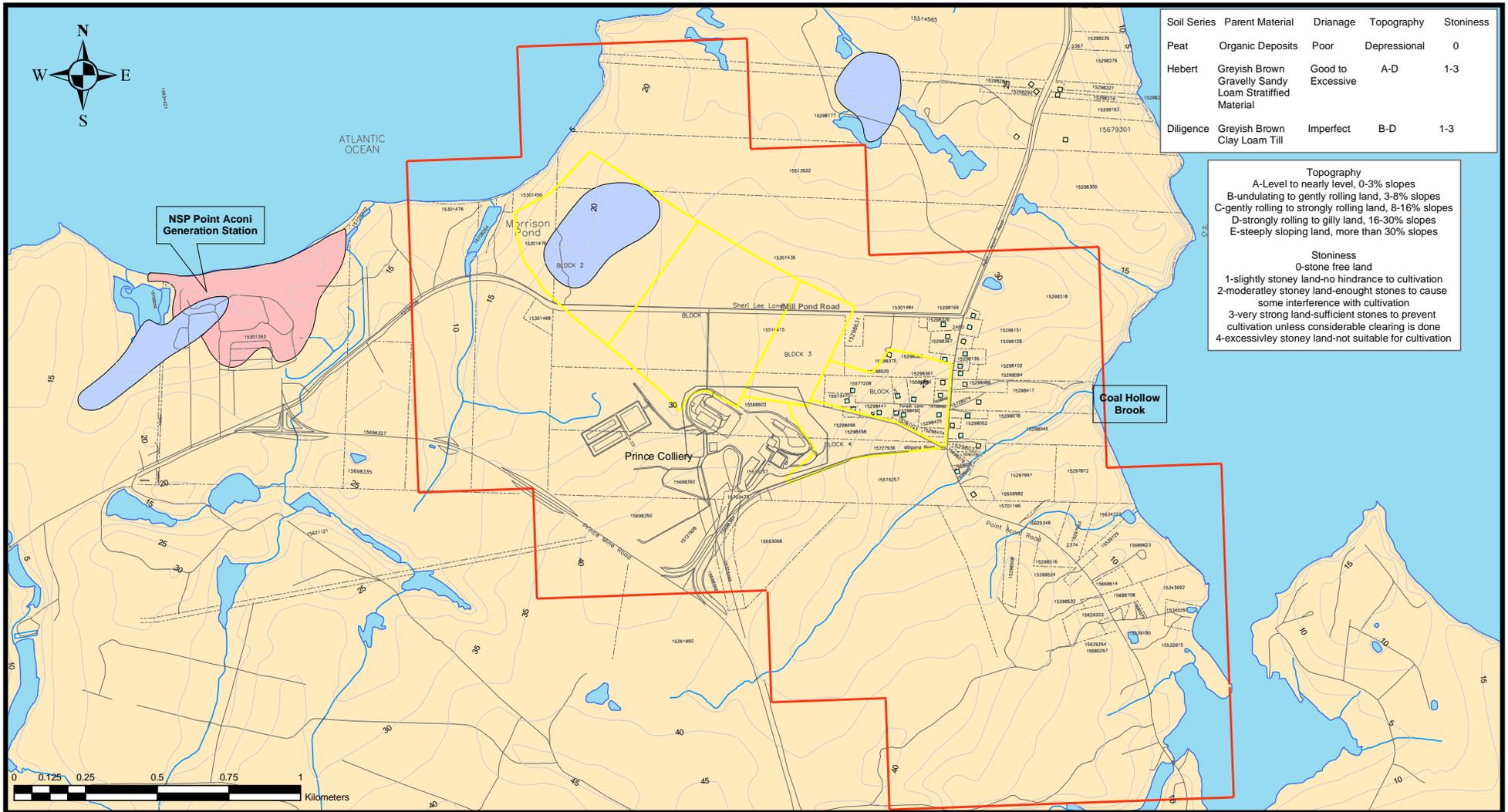
The information is based on publicly available data, as well as data gathered as part of the work performed on the Prince Mine Site for CBDC/PWGSC. References of external sources are made as appropriate.

A discussion of groundwater resources is contained in sub-section 4.4. An overview of historical mining on the site is presented in sub-section 4.8.3.

4.7.1 Surficial Geology

The surficial geology of the project area (northeast tip of Boularderie Island), has been mapped (Grant, D.R., GSC Map 1631A) as a continuous veneer (approximate thickness of 2 to 4m) of sandy till, with accumulations of a sandy/stony till in the area of the Prince Mine to Point Aconi.

Small areas of a clayey/silty till (approximate thickness of 5 to 10m) occur in drumlin fields between Point Aconi and Table Head. Peat deposits are known at Point Aconi and south of the Prince Mine area. Few deposits of marine and lacustrine sediments are known (mostly as littoral deposits) on the coast between Bonar Head and Table Head. Soil development is quite uniform in this area, with imperfectly drained greyish brown Diligence Series silt clay loams present over the majority (D.B. Cann et al, 1963, Soil Survey of Cape Breton Island Nova Scotia). These Diligence Series soils have seen limited agricultural use and have a low natural fertility. Along the coastline between Point Aconi and Table Head, greyish brown Hebert Series soils, consisting of gravelly sandy loam, are present.



Soil Series	Parent Material	Drainage	Topography	Stoniness
Peat	Organic Deposits	Poor	Depressional	0
Hebert	Greyish Brown Gravelly Sandy Loam Stratified Material	Good to Excessive	A-D	1-3
Diligence	Greyish Brown Clay Loam Till	Imperfect	B-D	1-3

Topography
 A-level to nearly level, 0-3% slopes
 B-undulating to gently rolling land, 3-8% slopes
 C-gently rolling to strongly rolling land, 8-16% slopes
 D-strongly rolling to gilly land, 16-30% slopes
 E-steeply sloping land, more than 30% slopes

Stoniness
 0-stone free land
 1-slightly stoney land-no hindrance to cultivation
 2-moderately stoney land-enough stones to cause some interference with cultivation
 3-very strong land-sufficient stones to prevent cultivation unless considerable clearing is done
 4-excessively stoney land-not suitable for cultivation



Legend		Homes within 500 metres of Mining Block	Soil Type
	Special Mining Lease Boundary		Homes on Municipal System
	Property Boundary		Homes on Wells
	Contour (masl)		Hebert
	Water Course		Peat
	Mining Blocks		Diligence

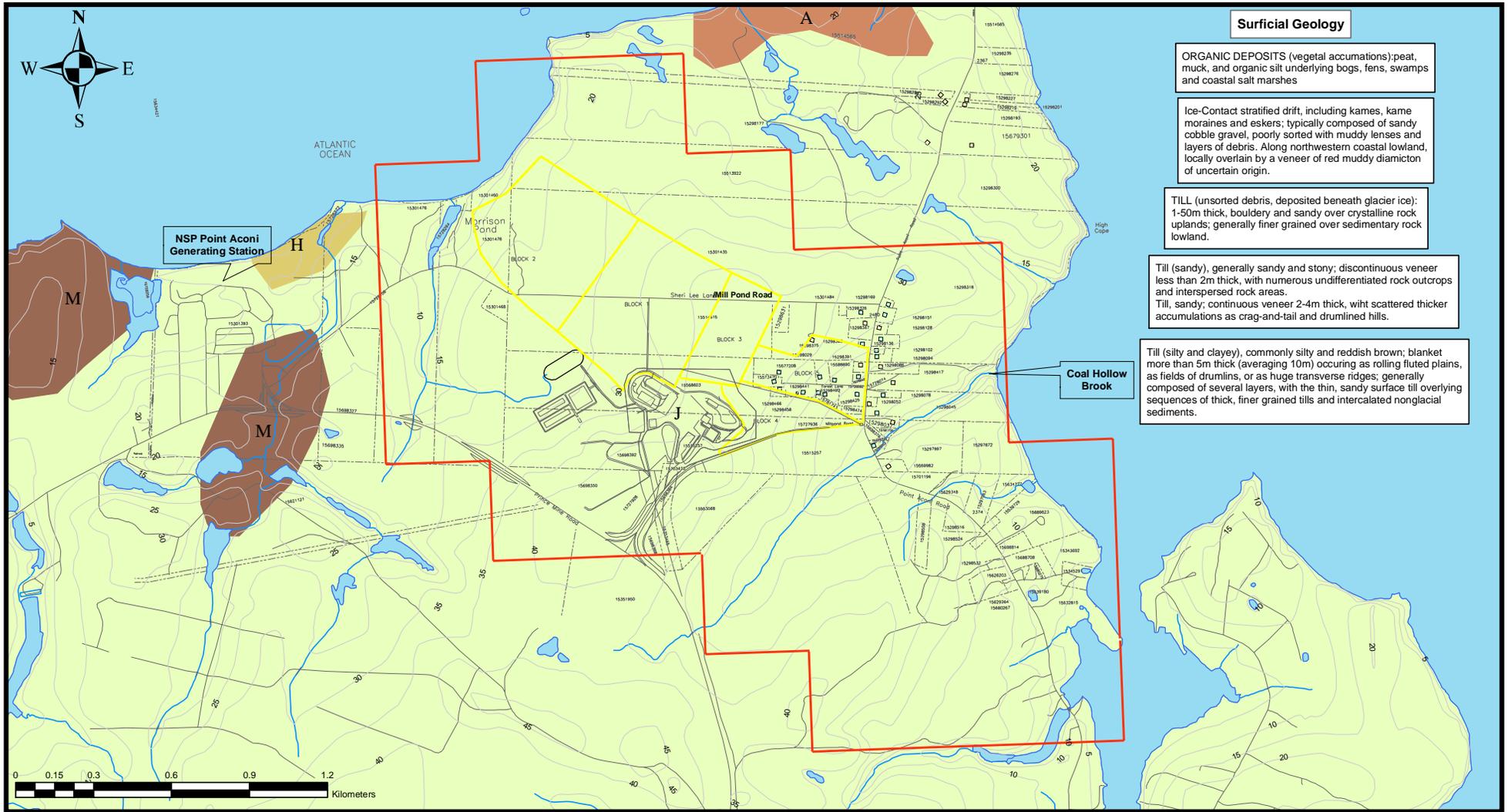
Title: Soils

Date: May 2005

Project: Surface Coal Mine and Reclamation Project-Prince Mine Site
Point Aconi, Nova Scotia

Project No.: 50090A

Figure No.: 4-2



Surficial Geology

ORGANIC DEPOSITS (vegetal accumulations): peat, muck, and organic silt underlying bogs, fens, swamps and coastal salt marshes

Ice-Contact stratified drift, including kames, kame moraines and eskers; typically composed of sandy cobble gravel, poorly sorted with muddy lenses and layers of debris. Along northwestern coastal lowland, locally overlain by a veneer of red muddy diamicton of uncertain origin.

TILL (unsorted debris, deposited beneath glacier ice): 1-50m thick, bouldery and sandy over crystalline rock uplands; generally finer grained over sedimentary rock lowland.

Till (sandy), generally sandy and stony; discontinuous veneer less than 2m thick, with numerous undifferentiated rock outcrops and interspersed rock areas.
Till, sandy; continuous veneer 2-4m thick, with scattered thicker accumulations as crag-and-tail and drumlined hills.

Till (silty and clayey), commonly silty and reddish brown; blanket more than 5m thick (averaging 10m) occurring as rolling fluted plains, as fields of drumlins, or as huge transverse ridges; generally composed of several layers, with the thin, sandy surface till overlying sequences of thick, finer grained tills and intercalated nonglacial sediments.



Legend		Surficial Geology	
— Property Boundary	Homes within 500 metres of Mining Block	Organic Deposits	
- - - Contour (masl)	Homes on Wells	Ice Contact Stratified Drift	
— Watercourse	Homes on Municipal System	Till (silty and clayey)	
— Mining Blocks		Till (sandy)	
— Special Mining Lease Boundary			

Title: Surficial Geology

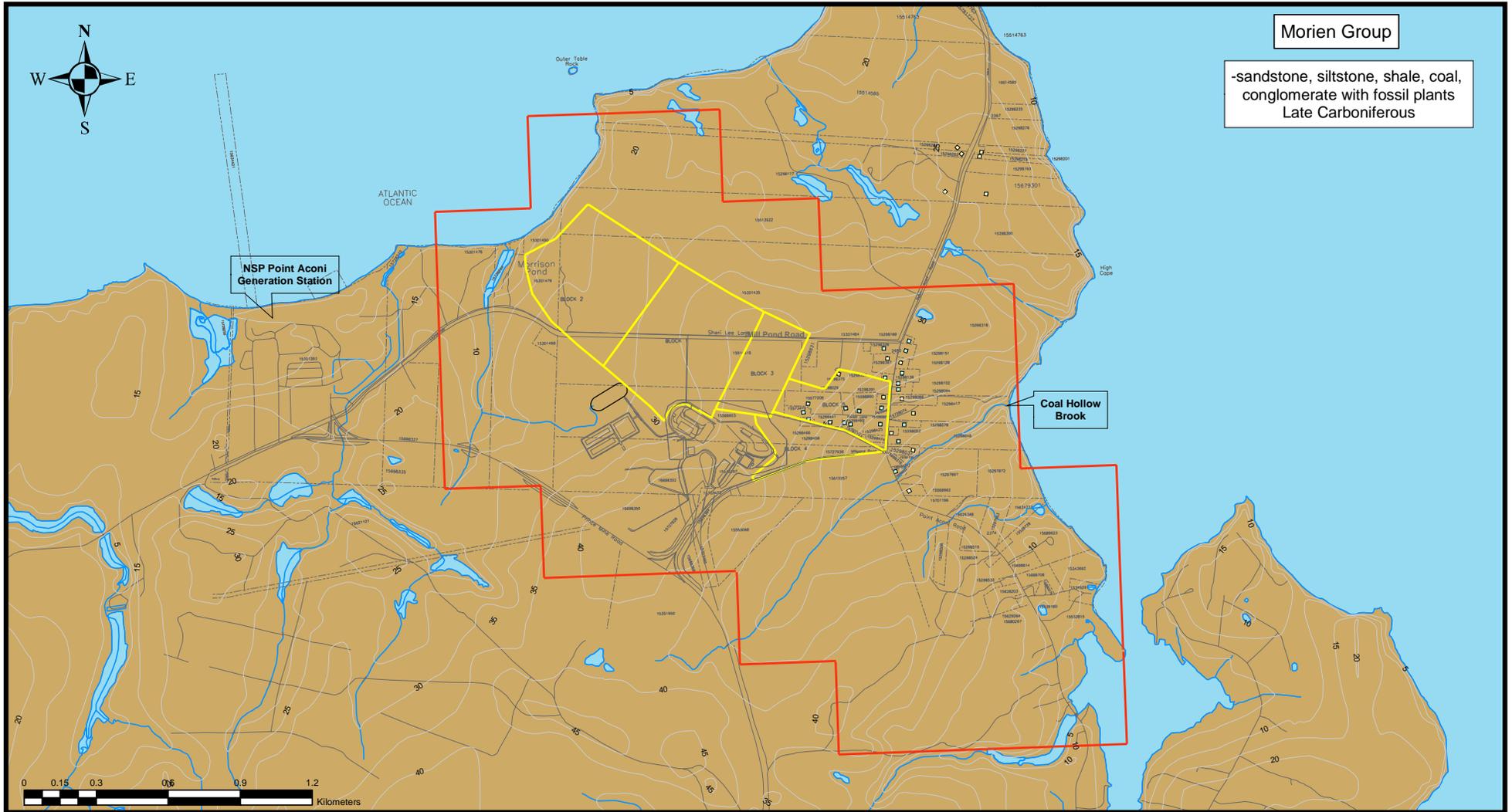
Date: May 2005

Project: Surface Coal Mine and Reclamation Project- Prince Mine Site

Project No.: 50090A

Figure No.: 4 - 3

Point Aconi, Nova Scotia



Morien Group

-sandstone, siltstone, shale, coal, conglomerate with fossil plants
Late Carboniferous

**NSP Point Aconi
Generation Station**

**Coal Hollow
Brook**

0 0.15 0.3 0.6 0.9 1.2
Kilometers

Legend

Special Mining Lease Boundary	Homes on Municipal System	Morien Group
Property Boundary	Homes on Wells	
Contour (masl)		
Watercourse		
Mining Block		



Title: Bedrock Geology

Date: May 2005

Project: Surface Coal Mine and Reclamation Project- Prince Mine Site
Point Aconi, Nova Scotia

Project No.: 50090A

Figure No.: 4 - 4

Surficial materials at the Prince Mine Site consist of gravel/cobble sandy till, overlain by clay and/or silty sand. This sequence is noted from logs of boreholes, monitoring wells and test pits completed at the site between September 2003 and February 2004 by MGI personnel (as part of work completed for CBDC/PWGSC).

The colour of the gravel/cobble sandy till ranges from grey to brown, while the clay and silty-clay materials are also typically grey. Locally, significant iron staining has produced colours ranging from orange to a reddish brown. The silty sand may range from grey to brown and even black in colour.

Across the site, depth to bedrock ranges from less than 0.5m to as much as 10.7m. Many of the soil profiles measured at the site indicate that some soils have been emplaced as fill or have been disturbed by excavation.

4.7.2 Bedrock Geology

The study area is located in the Sydney Coalfield that is of Carboniferous age and constitutes the on-land and near shore portion of the much larger Sydney Basin which extends eastward to the coastline of Newfoundland.

The project area is situated on the western side of the Sydney Coalfield where regional geological mapping (Boehner and Giles, NSDNR Map 86-1) indicates the presence of sedimentary rocks belonging to the Sydney Mines Formation (Westphalian C – Stephanian age). This formation is composed of grey mudstone, shale, siltstone, sandstone and major coal seams. Minor constituents include reddish mudstones, diagenetic carbonates and algal limestones (stromatolites). The character of this stratigraphy reflects deposition in fluvial environment. Outcroppings of the unit are well exposed along the northern coast of Boularderie Island extending from McCreadyville to Black Rock Point.

The Prince Mine project site is underlain by rocks of the Sydney Mines Formation. Lithologies encountered in test-pits and boreholes at the site include grey siltstone, shale, mudstone, sandstone and coal seams. The most prominent unit within the sequence is the Hub Seam with an average thickness of 2.1m. In general, the coal is clean but has an inferior section of coal at its base. The Hub Seam has been extensively mined by CBDC at the Prince Mine. In addition, there has been widespread illegal mining of the seam where it outcrops.

The sedimentary rocks enclosing the Hub Seam consist primarily of shale, siltstone and mudstone with inter-bedded layers of fine to coarse-grained sandstone. The strata are well bedded with numerous examples of ripple marks, cross bedding, and graded bedding which are all indicative of its fluvial origin. Bedding planes are generally defined by carbonaceous material and well preserved plant fossils. Bands and nodules of siderite are common. Locally the Hub Seam is directly overlain by sandstone that was deposited in paleo-river channels. The immediate floor of the Hub Seam consists of weak mudstone seatearth that has deteriorated to soft fire-clay. In general, all the argillaceous strata are considered to be weak, and will deteriorate readily in the presence of water.

No faulting is known to exist in the area. The strata are well jointed. The joints planes tend to be well defined, open, and persistent along strike in the sandstones. In the argillaceous rocks, the jointing is poorly defined and discontinuous. These jointing attributes make the sandstone beds good aquifers (transmit groundwater easily) favourable for the storage and movement of groundwater, while the argillaceous rocks are considered to be aquitards (limit groundwater movement).

4.8 Socio-Economic Environment

The proposed site of the surface mine operation is situated in an existing industrial area (i.e., the former Prince Mine). The area of the Point Aconi Coal Mining Block is within rural residential ribbon development along the Point Aconi Road.

The history of coal mining in the Sydney Coalfield is well documented and forms an integral part of the heritage of the region. It is very common for people in the area to readily identify themselves as part of a mining community.

The following eight sub-sections present the existing socio-economic environment of the area, specifically as it relates to the proposed surface coal mine. Topics include: population, economy, land uses, archaeological resources, Mi'kmaq land and resource use, transportation and community resources. In the last sub-section, a discussion of other known undertakings in the general area is presented.

4.8.1 Population

The small communities in the general area of the site (e.g., Point Aconi, McCreadyville, Millpond and Mill Creek) are within a 5km radius on Boularderie Island. According to 2001 Census data, a general decline in population in CBRM of 7% occurred over five years. This is likely representative of decline within the general area of Boularderie Island but specific population data is not available.

The employment in the area is primarily based upon natural resources (e.g., fishing, mining, forestry, farming). In addition, many of the local residents commute to the larger communities (e.g., Sydney Mines, North Sydney and Sydney) for employment and commercial activities. According to CBRM, the unemployment rate is approximately 20%.

Historical underground coal mining operations in the area were a primary reason for existing settlement in the immediate area.

4.8.2 Economy

Based on the estimated coal reserves and mining plans, it is anticipated that the proposed surface mining operation of the Point Aconi Coal Resource Block will operate for approximately seven years. The development and operation of the mine will generate both direct and indirect economic benefits in the region.

Indirect employment would be created in the local community and Nova Scotia by the purchase of goods and services required for the development and operation of the surface mine. These services would include such items as:

- Equipment maintenance services;
- Purchase of goods;
- Supplies and fuel oil;
- Equipment rental;
- Equipment purchases; and,
- Professional services.

Surface mining operations (conventional surface coal extraction, highwall mining and reclamation) will proceed 24 hours per day throughout the year. Typically, operations will run five days a week; however, occasional work on Saturday may occur because of production requirements.

It is anticipated that the mine in full production would employ approximately 40-50 people directly, including those involved in the transportation of the coal.

4.8.3 Land Uses

The area surrounding the Point Aconi Coal Resource Block is primarily industrial with some rural ribbon residential development. Within the proposed Mining Block areas, there are an estimated 13 privately owned properties.

Historical forestry and farming have occurred in the area. Today there remains some farming; however, none is within a 1 km radius of this undertaking.

In addition, within a 5 km radius of the site is: a fish packing plant (Alder Point); farming (at various locations); NSPI Point Aconi Generating Station (approximately 1 km west of the site); and, ocean beaches near Morrison Pond and the NSPI site.

Previously, the Point Aconi Coal Resource Block site was mostly undeveloped and consisted of wooded land, with some small areas being used for farmland, prior to the development of the Prince Mine site in 1974. See Figures 4-5A-C for historical aerial photographs.

Although the Hub Seam was not officially mined until the development of the Prince Mine, illegal mining activity had occurred historically at the seam outcrop. Evidence of historical bootleg mines can be seen at the site today. Subsidence is a serious risk to visitors to the area due to the historical bootleg pits. Remnants of bootleg pits have been recorded as open in excess of 20 m in vertical depth from the surface, see Figure 2-3.

During operation of the underground mine by CBDC, facilities and activities on the site included: coal handling/storage; storage and use of various petroleum products and chemicals (e.g., fuel, oil, antifreeze, paint, batteries, etc.); scrap metals; office and maintenance buildings; fire training activities; waste rock piles; and, water treatment.

The Prince Mine ceased operations in 2001 and is presently in a state of remediation. As identified in a series of reports produced for CBDC and PWGSC, these historic land uses have associated environmental impacts and liabilities.

The most recent report, Prince Mine Baseline Environmental Site Assessment (MGI, March 2004), consists of soil, groundwater, surface water and sediment sampling program to determine point sources of impact. In addition, there were the findings of elevated contaminants (i.e., above applicable guidelines) at distinct locations on the site. All issues are manageable using known techniques for industrial site clean-up.

The identified contaminants do not exist on the Mining Blocks outlined for the Pioneer Coal project except for a limited area of petroleum hydrocarbons (less than 25m³) near the portal. This area of impacted soil will be properly remediated during the course of the mining project according to NSDEL requirements and does not present a constraint to the successful completion of the surface coal mine and reclamation project but rather is a project benefit.

4.8.4 Archaeological Resources

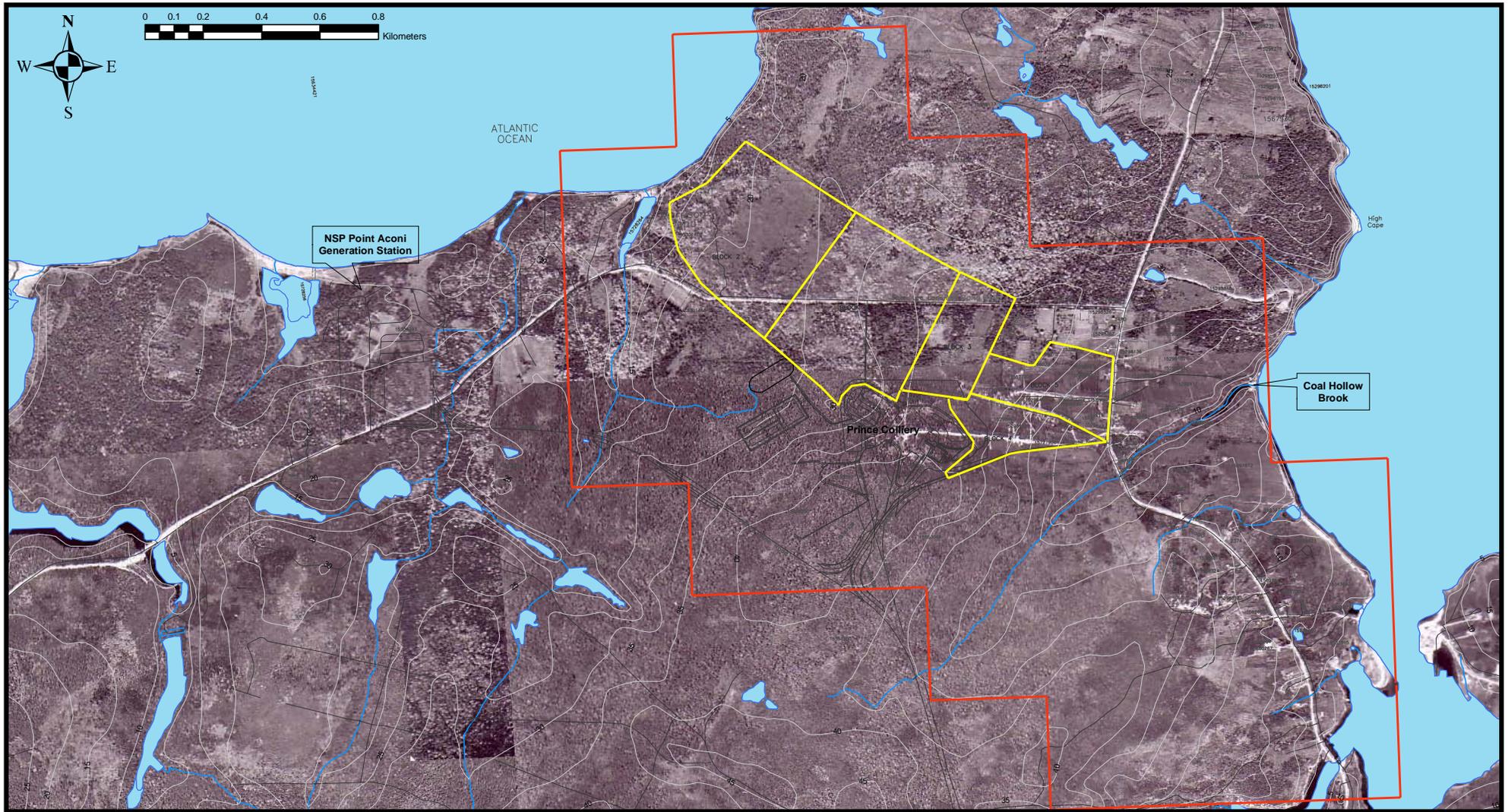
Previous archaeological work in the study area (NSPI EAR, December 1989) identified no items of interest, and no indication of native settlement. However, a recent screening of heritage resources in the area completed by NSM in December 2004 (Appendix E) indicated a record of a pre-contact aboriginal archaeological site (see next sub-section). Although the NSM could not definitively establish post-contact archaeological resources in the area, an archaeological impact assessment was recommended.

The following components were recommended to be completed:

- Determine the archaeological potential based on various landforms within the study area;
- Complete background document search to determine potential for significant post-contact archaeological resources; and,
- Field reconnaissance to locate any archaeological resources present.

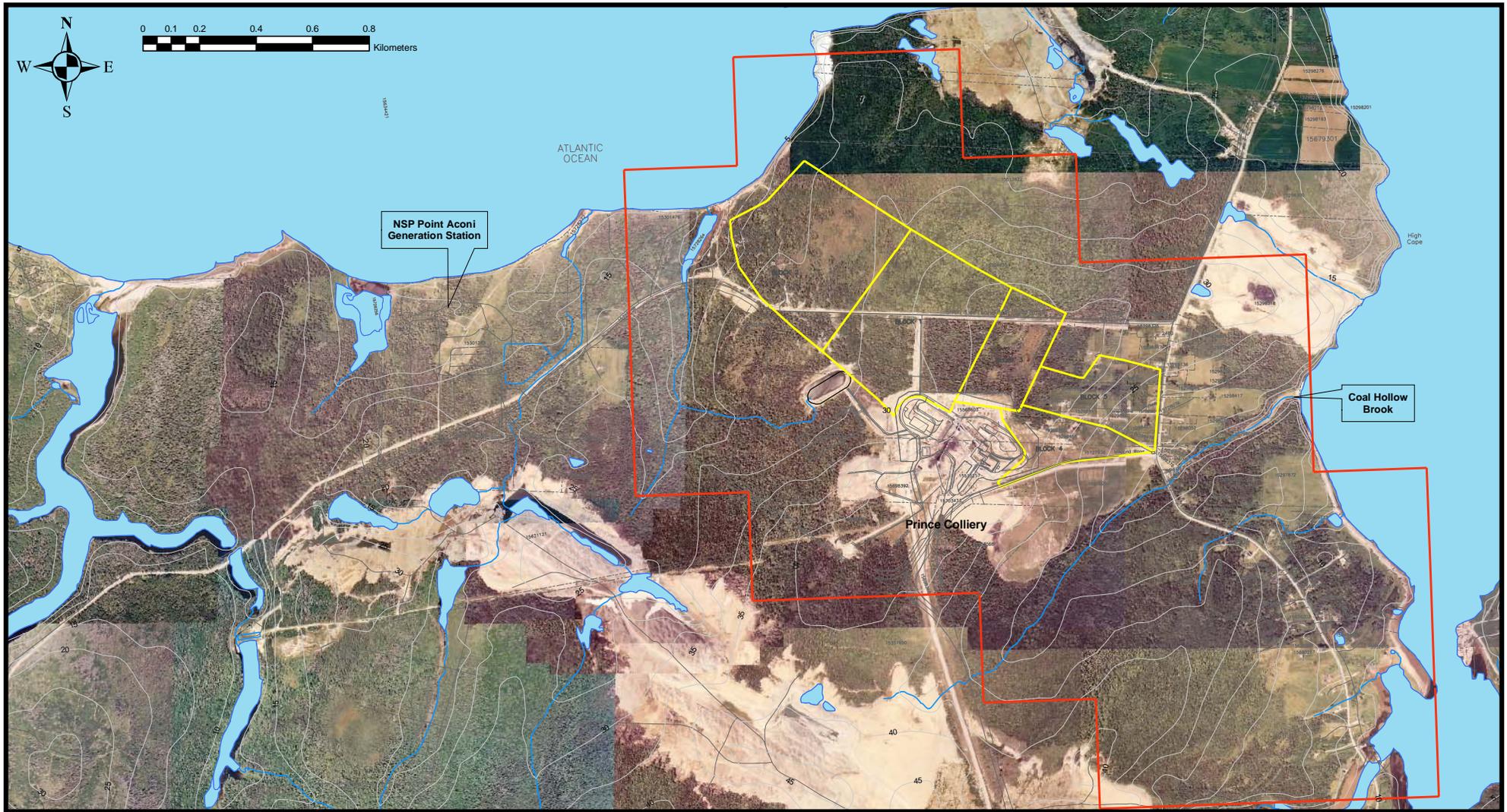
Cultural Resource Management Group (CRM) was contacted to complete the archaeological work for the site. The results of the assessment (full report included in Appendix F) are as follows:

1. Given the low archaeological potential ascribed to Mining Blocks 1 to 5, it is recommended that they be cleared of any further archaeological investigation prior to development.
2. In the event that archaeological deposits or human remains are encountered during construction, all work in the associated area(s) should be halted and immediate contact should be made with the Nova Scotia Museum (David Christianson: 424-6461).



Legend	
	Property Boundary
	Contour (masl)
	Watercourse
	Mining Blocks
	Special Mining Lease Boundary

Title: Historical Aerial Photograph-1977
Date: May 2005
Project: Surface Coal Mine and Reclamation Project- Prince Mine Site Point Aconi, Nova Scotia
Project No.: 50090A
Figure No.: 4 - 5 A



Legend

- Property Boundary
- 30— Contour (masl)
- Watercourse
- Mining Blocks
- Special Mining Lease Boundary

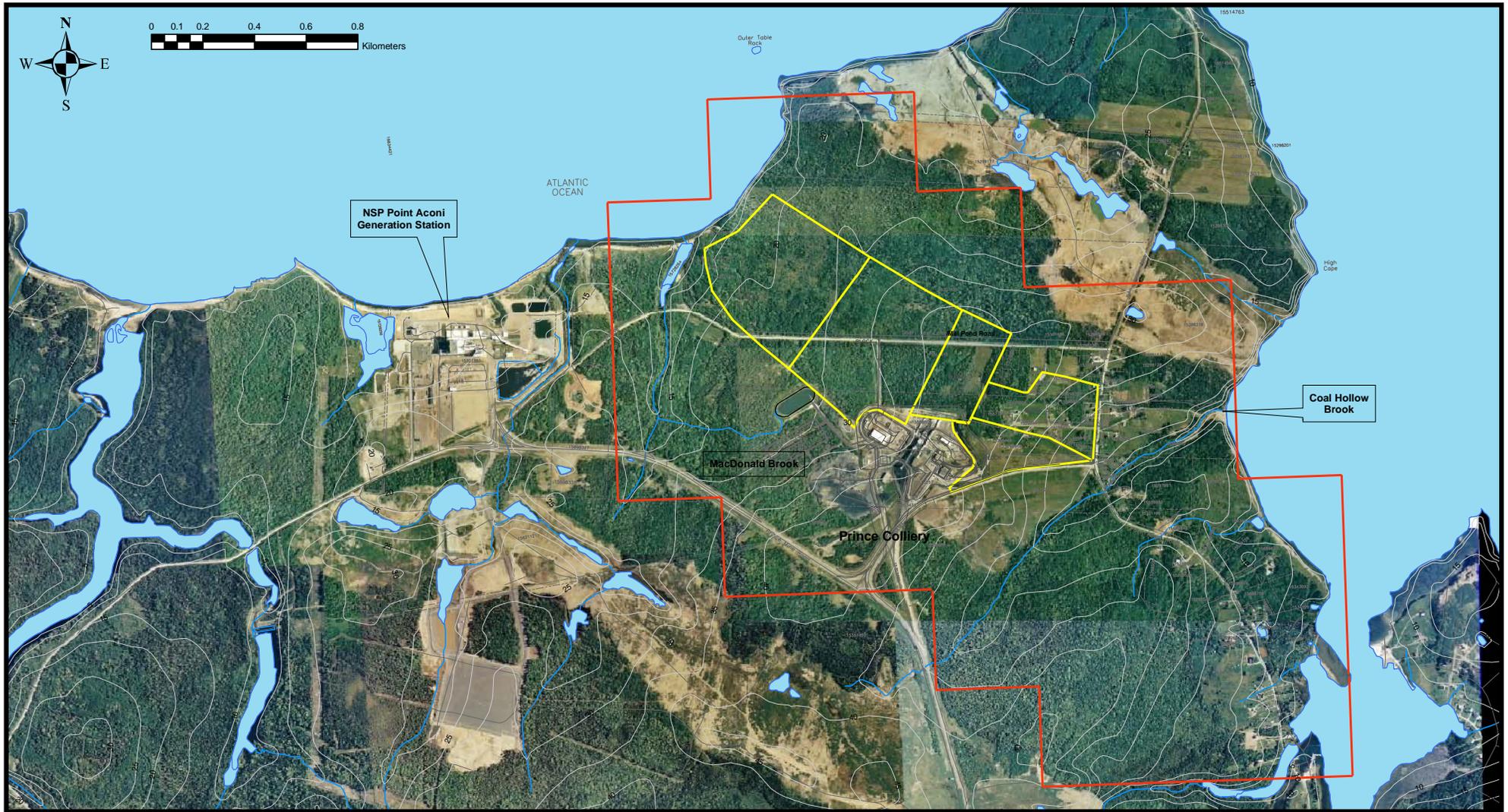
Title: Historical Aerial Photograph-1983

Project: Surface Coal Mine and reclamation Project- Prince Mine Site Point Aconi, Nova Scotia

Date: May 2005

Project No.: 50090A

Figure No.: 4 - 5 B



0 0.1 0.2 0.4 0.6 0.8
Kilometers

NSP Point Aconi
Generation Station

ATLANTIC
OCEAN

MacDonald Brook

Prince Colliery

Coal Hollow
Brook



Legend	
	Special Mining Lease Boundary
	Property Boundary
	Contour (masl)
	Watercourse
	Mining Blocks

Title: Historical Aerial Photograph 1993

Project: Surface Coal Mine and Reclamation Project
Prince Mine Site
Point Aconi, Nova Scotia

Date: May 2005

Project No.: 50090A

Figure No.: 4-5C

4.8.5 Mi'kmaq Land and Resource Use

As outlined in the NSM Environmental Screening (Appendix E), there is one recorded pre-contact aboriginal site near the eastern border of the proposed site area. Based on this, NSM identified that there is a high probability of other aboriginal sites located within the site area.

The Confederacy of Mainland Mi'kmaq (CMM) undertook to complete a screening of the project area to determine whether further study of Mi'kmaq land and resource use in the area via a Mi'kmaw Knowledge Study is required. CMM made all efforts to coordinate the study with the Union of Nova Scotia Indians in order to make sure that input from all First Nations with knowledge of the site area is used in the assessment of significance. CMM also worked directly with the Un'amaki Institute of Natural Resources (based in Eskasoni, Cape Breton) on the determination of past and present site use and importance.

The purpose of the Mi'kmaw Knowledge Study (MKS) is to support the integration of Mi'kmaw knowledge of use and occupation of Mi'kma'ki into development decisions via the environmental assessment process.

The MKS included:

- 1) a study of historic and current Mi'kmaq land and resource use;
- 2) an evaluation of the potential impacts of the project on Mi'kmaq use and occupation and constitutionally based rights;
- 3) an evaluation of the significance of the potential impacts of the project on Mi'kmaq use and occupation; and
- 4) recommendations to proponents and regulators that may include recommendations for mitigation measures, further study, or consultation with Mi'kmaq.

A status report is provided in Appendix G for the MKS. As our aboriginal consultant has suggested that the issues with the site are limited to non-existent, Pioneer Coal requests that the Minister of Environment and Labour consider a Condition of Release that requires submission of the final MKS report that satisfactorily addresses First Nations issues.

4.8.6 Transportation Options

Three transportation routes are proposed for this undertaking that all involve the use of existing roads and rail infrastructure. A coal handling facility would be required at the rail siding as previously described in Section 3. All trucks would leave the existing Prince Mine Site as outlined on Figure 3-1.

Route 1 - Coal would be transported directly to the NSPI Generating Station at Point Aconi using the existing Prince Mine Road using coal transport trucks.

Route 2 - Coal would be transported to the NSPI Generating Station at Trenton using coal transport trucks. Trucks would leave the mine site, travel along the Prince Mine Road (Route #162) to the TransCanada Highway and then along the TransCanada to the Trenton Connector and then use local roads to the Trenton Generating Station.

Route 3 - Coal would be transported to a rail siding in the North Sydney/Sydney Mines area via the Prince Mine Road, Trans Canada Highway and a local route from the Trans Canada.

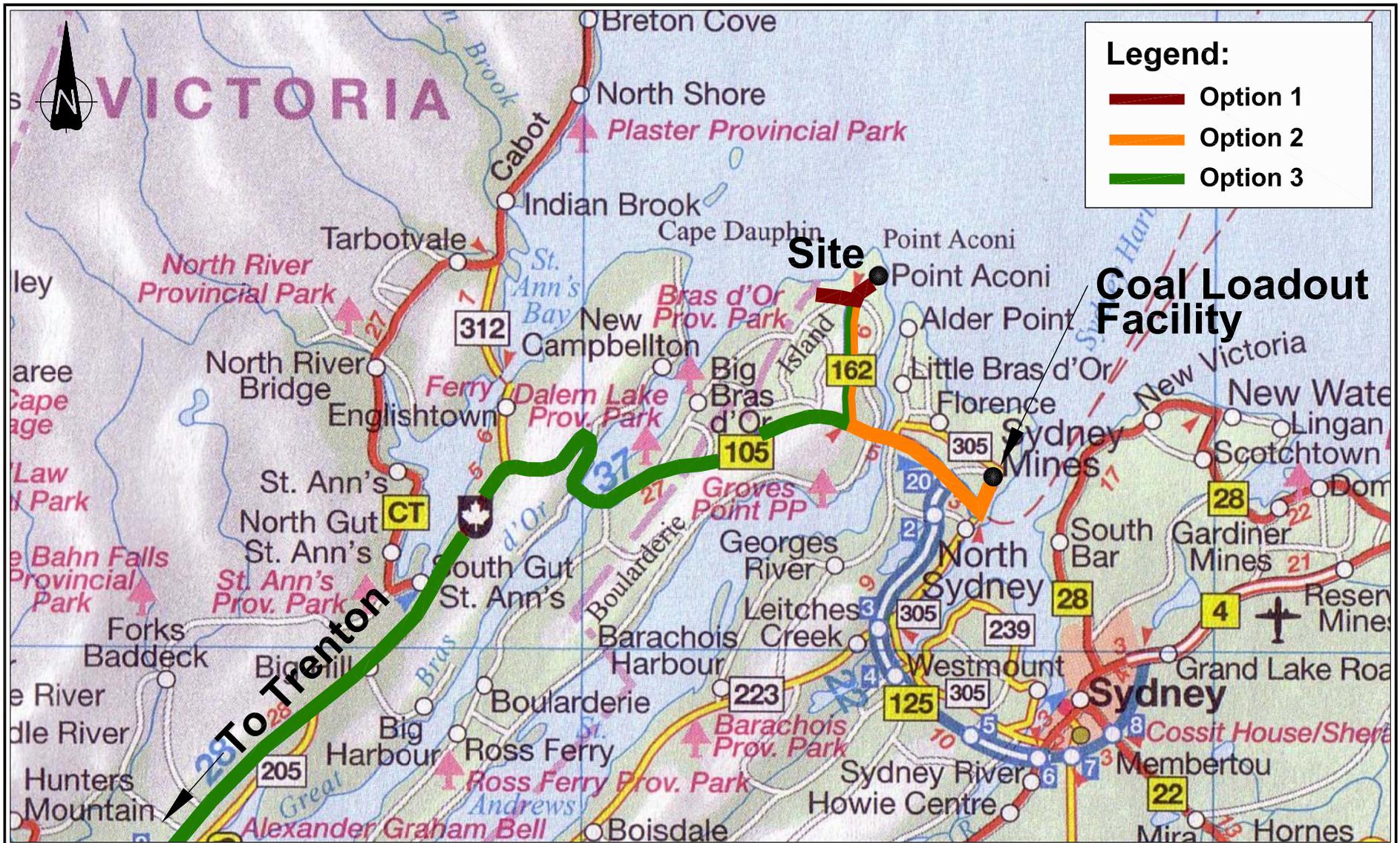
See Figure 4-6 for transportation options.

4.8.7 Community Resources

Community resources in the vicinity of the site consist of local roads and mixed forest used occasionally for recreation. No sports facilities or community centers are located within several kilometers of the site. Recreational fishing and hunting occurs locally but the extent to which the site is used is not documented and thought to be limited due to the safety concerns and aesthetics. Bird Islands, located approximately 7 kilometres offshore of the site is used extensively for recreation and tourism. Local beaches are used by the community as well for recreation and as access points for the commercial fishery which is important locally for both shellfish (lobster, crab and scallop), groundfish and pelagic species.

4.8.8 Other Known and Potential Undertakings in Area

There are two potential undertakings within 5 kilometres of the site and no known undertakings. The Point Aconi Phase III Surface Coal Mine (Brogan Mine) is a potential undertaking located approximately 1 kilometre north and the Boularderie Island Coal Resource Block – Surface Extraction is located approximately 2 kilometres south of the Surface Coal Mine and Reclamation Project at the Prince Mine Site. Neither the proponent nor NSDEL EA Branch Office is aware of any other potential or known undertakings in the general area of the site.



Legend:

- Option 1
- Option 2
- Option 3

CADFILE No. 50090AFLDWG

 A member of the Family of Companies	TITLE	Transportation Options	DATE	May 2005	PROJECT NO.	50090A
	PROJECT	Surface Coal Mine and Reclamation Project Prince Mine Site Point Aconi, Nova Scotia	SCALE	NTS	FIGURE NO.	4-6
			DRAWN	SYC		

5.0 CONSULTATION PROGRAM

Pioneer Coal believes that most community members are familiar with the original call for proposals for the Point Aconi Coal Resource Block.

This section outlines the public consultation program completed as part of preparing plans to extract coal from the resource block via surface extraction methods.

5.1 Objectives

The objective of completing a consultation program is to solicit and use public input in the design of a proposed undertaking. Although no formal public consultation is required for a Class I undertaking (other than Notice of Registration – refer to sub-section 5.2.6), the proponent felt it important to consider public input in the preparation of this EARD. The design of the undertaking has considered input received from the various forms of informal and formal public consultation described in this section.

5.2 Components

There were five components of the consultation program for the project. These include public information sessions, First Nations assessment, elected officials consultation, consultation with regulatory agencies and Notice of Registration. These components are outlined in the following sub-sections.

5.2.1 Public Information Sessions

The details of the Public Information Sessions are described below. Sessions were held at a facility located at the former main entrance to the Prince Mine Site for two days (April 5 and 6) with 9 hour per day sessions running from 12 noon - 9 pm. Issues raised by the participants were recorded by Pioneer Coal personnel and consultants and the frequency that the issues were raised by participants recorded as well (see Section 5.3, Table 5-1). The session was staffed by four Pioneer Coal staff and two consultants to the projects for the entire length of the sessions, who were responsible for answering questions posed and guiding the participants through a series of panels detailing all aspects of the project (see Appendix H). Additional project information in the form of a slide show on the NOVAMINER 2000, aerial photography of the site and surrounding area, and information on reclamation projects completed by Pioneer Coal was available.

Notification for the Public Information Sessions consisted of hand delivered notices to residents along Point Aconi Road to its northern limit and south to Mill Creek including Forrest Lane and Sheri Lee Lane/Millpond Road. Additionally notices were placed in the Cape Breton Post for April 4, 5 and 6, 2005.

5.2.2 Community Liaison Committee

The Community Liaison Committee (CLC) will be established based upon NSDEL's "Guidelines for the Formation of Community Liaison Committees". The CLC will be an integral part of the operations of this surface coal mine. Participants at the sessions were provided with information about the important role of the CLC. It is the purpose of the CLC to serve as a conduit for information on the project to flow to local residents and for concerns from the residents to flow to Pioneer Coal. The CLC will enable a number of community issues to be effectively dealt with by Pioneer Coal including, but not limited to noise issues, dust issues, and visibility issues.

The proponent recognizes the value in having an effective CLC and believes that projects they have completed with CLC involvement have created better projects.

5.2.3 First Nations Assessment

The Confederacy of Mainland Mi'kmaq (CMM) has completed a modified Mi'kmaq Knowledge Study (MKS) which included a review of written records to establish historic Mi'kmaq land and resource use in the area of the site, as well as a reconnaissance program to have informal discussions with Mi'kmaw participants. Based on this assessment, a site visit was not recommended to follow up on specific information. Refer to sub-section 4.8.5 and Appendix G for additional detail.

5.2.4 Elected Official Consultation

Pioneer Coal provided opportunities for elected official involvement in the consultation program via the Public Information Sessions. Additional opportunity for elected official input to the project will occur through the formal review of the Environmental Assessment Registration Document.

5.2.5 Regulatory Agency Consultation

Discussions with the various regulatory agencies have been held since NSDNR's Call for Proposals in December 2003. Since this time information discussions have been held with numerous regulatory agencies, including NSM, NSDNR, DFO, EC, etc. In addition, the proponent initiated a One Window Committee meeting in January, 2005.

5.2.6 Notice of Registration

A Notice of Registration will be placed in two newspapers (Cape Breton Post and the Chronicle-Herald) in accordance with the *Environmental Assessment Regulations*. The registration notice will also be posted on the NSDEL website (www.gov.ns.ca/enla/ess/ea) and available for viewing at that location as well. The Environmental Assessment Registration Document will be available for the general public to review at two locations in the project area. The locations will

be provided in the notice, as well as instructions on ways in which to get comments to the Environmental Assessment Branch and the review timeframe.

5.3 Stakeholder Input

The following sub-sections provide a summary of the issues, responses and conclusion of the stakeholder input into the proposed undertaking as compiled during the public information sessions at Point Aconi on April 5 and 6, 2005.

5.3.1 Issues Raised

Issues raised and the frequency was recorded and is summarized in Table 5-1. An examination of the issues raised reveals two key areas of concern, namely, Reclamation and Water Supply. These two Types of Concern represent 70% of the Total Concern. These concerns have been carefully recorded and considered in the planning of the final project design put forward in the EARD. Section 5.3.2 identifies the specific proponent responses to the Specific Items raised with a focus on those of greatest recorded concern from the Public Information Sessions.

5.3.2 Proponent Response to Issue Raised

Transportation

T1. What is the trucking route?

The trucking routes have been explained in Sections 2.1, 3.3.5 and on Figure 4-6 and were presented in a Panel at the Public Information Session (Appendix H). Pioneer Coal was clear that the Point Aconi Road from the minesite to Bras D'Or would not be used for the transport of coal as some concern was expressed relative to this. The proponent explained that all trucks would be equipped with tarps and those materials from the minesite that inadvertently track to Highway #162 would be removed by Pioneer Coal. Trucks will need to adhere to all highway safety legislation.

T2. Will Pioneer Coal build train tracks from Bras D'Or to Point Aconi?

The proponent does not intend to build train tracks to the mine site as the project economics do not allow for this. Pioneer Coal believes using existing transportation infrastructure creates/leaves a smaller project footprint.

T3. Will there be trucking contracts available?

Some concern was expressed that trucking would be sub-contracted and not create local employment. All coal from the site will leave via trucks and therefore presents local opportunities.

Blasting

B1. What blasting effects will there be on the marine environment?

Concern was expressed that blasting operations during lobster season (May 15-July 15) would negatively affect lobster landings. Pioneer Coal commits to working with the local fisher's association to determine the most favourable timing for blasting operations. Information at the Public Information Sessions from local fisherman indicated that blasting during the lobster season, if it needs to occur, would be best done before noon.

B2. What is the blasting schedule?

Pioneer Coal has estimates 3 blasts per month and will accommodate the local residents' requests to limit blasting to daylight hours. Blasting procedures have been detailed in Section 3.3.

Beach Access

BA1. What effects on beach access will the project have?

The proponent heard in the Public Information Sessions that recreational and commercial use of two beach areas west of the minesite and east of the Point Aconi Generating Station are valued by the local community. Currently beach access is restricted by NSPI via an access road from their plant entrance to the beaches. Pioneer Coal intended to remove beach access via Sheri Lee Lane/Millpond Road as part of the mine operation before the Public Information Sessions but will negotiate with NSPI to participate in making fulltime access to the beaches via the NSPI plant entrance route. Pioneer Coal recognizes that the recreational and commercial uses of the beach require access and will make reasonable effort to provide this.

BA2. What beach access options will be available after the project?

Pioneer Coal will make efforts to ensure that access as described in BA1 above would be available after the project is complete.

Reclamation

R1. Will the site be treed as part of reclamation?

Pioneer Coal heard in the Public Information Sessions that reclamation of the site should include the planting of native species immediately after final grading and placement of topsoil or other suitable growing medium. Participants noted that regrowth of vegetation, and trees in particular at adjacent sites, is accelerated by placement of a proper growing medium after final contouring and immediate planting of trees.

R2. Will there be aquatic habitats created as part of reclamation?

Participants noted that the inclusion of aquatic habitats (ponds, swamps, bogs) within the reclaimed area would be viewed more favourably and create a reclaimed site more in line with

local features. Pioneer Coal recognizes that additional benefits may include the terrain being able to better hold moisture than a ridge or mound type profile. Pioneer Coal will incorporate these preferences into the reclamation plan with the permission of the landowner(s). Should this be acceptable to the landowner(s), Pioneer Coal would create discontinuous aquatic habitats so as not to direct surface waters from the site.

R3. Will there be trails developed as part of reclamation?

Participants noted that some recreational value is realized from portions of the site currently (hiking and hunting) and that trails could be viewed favourably if part of the reclamation plan. Pioneer Coal recognizes the value of the recreational opportunities and will develop trails as part of reclamation with permission from the landowner(s).

R4. Will Pioneer Coal use their reclamation experience as part of this project?

Participants expressed both positive and negative comments relative to past reclamation programs completed by the proponent. Pioneer Coal has completed several reclamation projects that meet or exceeded the expectations of communities and/or regulators. Important to the process of reclamation is to establish goals and expectations at the project outset. Pioneer Coal feels that the views of the community are well known and will work with the regulators and landowner(s) with the aim to create a reclaimed site that meets or exceeds expectations.

Operations

O1. Will there be run-off from the site to the ocean?

Participants expressed concern that site drainage would go to the ocean and possibly be sediment laden or contain site contaminants. Pioneer Coal has designed the site drainage plans to include directing all run-off to the current underground workings, away from the freshwater and marine aquatic environments. The former underground mine has site infrastructure including settling ponds that will be used when surface water needs to be directed elsewhere than to the workings. Pioneer Coal is familiar with and will employ practices in the Nova Scotia Sediment and Erosion Control Handbook at the site during development, operation and reclamation which include use of sediment barriers (silt fences), filter media in ditches and slope stabilization. Site monitoring will include surface water sampling for Total Suspended Solids (TSS) as well as other general chemistry and metal parameters as outlined in Section 7.

O2. What are the setbacks from the shoreline to the pit?

Pioneer Coal heard concern from participants that there would be setbacks from the shoreline and freshwater aquatic environments. Currently Pioneer Coal has placed setbacks of 50-80 metres from the landside edge of the bank to the ocean and 30-50 metres from the edge of the banks for freshwater aquatic environments. These setbacks establish buffers that are currently and will continue to be fully vegetated for the life of the project. Pioneer Coal feel that health of the buffers provides excellent protection from release of airborne or waterborne particles from the minesite to the natural environment. The buffers also provide visual breaks from a number of viewplanes where views of site operations would be available.

O3. What is the operating schedule for the mining?

The site will operate 24 hours a day for 5-6 days per week with blasting scheduled for daylight hours. Some concern was expressed relative to lights and noise associated with the operation by residents within 500 metres of the proposed operation. Pioneer Coal will work within all applicable legislation for noise limits and will work with local residents to minimize effects. Typical surface coal operations can apply various measures to mitigate nuisance factors for local residents and Pioneer Coal has a history of completing a number of these.

One of the essential ingredients for successful highwall mining operations is the ability to undertake operations as continuously as possible. The highwall miner makes repeated cuts into the coal seam. Once a cut is started, mining continues until the cut has reached the desired length. To withdraw the miner from partially completed cuts will necessitate abandonment of the remaining coal resource available in that cut. Withdraw of the miner at the end of the work hours leads to water accumulation at the low end of the mining cuts. These cuts cannot be re-entered because of the water. Highwall mining operations must run on a 24 hour basis, 5 days a week.

Water Supply

WS1. Will Pioneer Coal have a water supply guarantee?

Concern was expressed that mining operations would affect local water supplies. Pioneer has completed an assessment of local water supplies and has identified approximately 10 homes that may have their domestic well affected. Pioneer has developed a water supply policy described below to assist homeowners where their water supply has been negatively affected by Pioneer.

WS2. What are the water supply replacement options?

Homes within 800 m of the facility that use domestic groundwater supplies will be identified during a domestic well survey. Pioneer Coal will develop a water supply policy that will provide a mutually agreeable solution for water quality or quantity loss caused by Pioneer Coal.

WS3. Were previous groundwater studies in the area used by Pioneer Coal in designing this project?

Some concern was noted by participants that Pioneer Coal may not be aware of or draw upon other studies/experiences relative to groundwater in the area. Pioneer Coal has reviewed all publicly available information on groundwater use and previous studies. Pioneer Coal has also used information collected by CBDC on the Prince Mine Site on groundwater levels, fluctuations and water chemistry to design the project and make the drawdown assessment (Section 4.3). NSDEL maintains an observation well that is located at the corner of Sheri Lee Lane/Millpond Road and Point Aconi Road that was used in the assessment of potential effects to groundwater as well. This well would be used for long term monitoring of water levels in the vicinity of the mine site during operations as well as those installed by Pioneer Coal as outlined in Section 6 and as directed by NSDEL.

Safety

S1. What are the timing details for the NSDNR Mine Openings Program?

NSDNR assessed most of the mine openings including bootlegs operations in the early to mid-1980's and this included the Point Aconi area. Over the past 2-3 years NSDNR was able to post signage and complete some filling in of mine openings in the Point Aconi area. Some concern was expressed that bootleg openings do not present a significant threat to human or environmental health. The Province issued a Request for Proposals for reclamation of the Point Aconi Coal Resource Block due to safety concerns associated with the mine openings and therefore feels that the mining and subsequent elimination of the risk associated with the openings is a net benefit to the residents of Nova Scotia. Pioneer Coal is well versed in completing surface mining operations in areas of former formal and informal underground and surface coal extraction.

S2. Will Pioneer Coal use back-up beepers and/or lights for heavy equipment at the site?

Some concern was expressed about the noise created by back-up beepers on heavy equipment, especially at surface. Pioneer Coal will need to adhere to all applicable safety legislation but will incorporate noise mitigation practices into the design and operation of the site and seek to have local residents provide information during operations about noise levels including back-up beepers.

Socio-Economic

SE1. Will the project create local employment?

The project will create employment for 40-50 people for the approximately 7 year lifespan of the extraction and reclamation phases. Some concern was expressed by participants that the majority of the employment would be sourced from outside the Point Aconi area. Prior to startup, Pioneer Coal intends to solicit resumes from the local area for persons wishing to be considered for employment.

SE2. Are royalties generated for the project?

Some concern was expressed that no royalties would be generated from the coal extraction. Royalties are required to be paid to the Province by Pioneer Coal according to the Mineral Resource Act.

SE3. Will there be a Community Liaison Committee (CLC)?

Pioneer Coal recognizes the value in having a CLC and has experience in the set-up and function of an effective CLC on other surface mine and reclamation projects. A CLC will be formed upon receipt of all necessary approvals for the mine operation. Additional information on the CLC is contained in Section 5.2.2.

Baseline Studies

BS1. Will there be baseline data collected from Morrison Pond?

Baseline data from Morrison Pond has been collected and will be supplemented with additional information as directed by NSDEL and possibly DFO. Some concern was raised at the Public Information Sessions that fish species present and water quality is highly variable and that efforts should be put forward to collect baseline information. Pioneer Coal's plan does not include disturbance to or in close proximity to Morrison Pond and will possibly not include directing any treated effluent to that watercourse. With the likelihood of impact from the mining operation being minimal, the information collected will reflect this unless Pioneer Coal is directed otherwise.

BS2. Will an Environmental Baseline Study be completed for the site and surrounding area?

The process of preparing an EARD includes an Environmental Baseline Study (EBS). The scope of the data collection for an EBS is determined by the scope of the project and the available data. In the case of this project the amount of existing information is high and has been extensively used and referenced in many sections of the document. Supplemental information has been collected for a number of aspects (Mi'kmaq Use and Knowledge, Acid Rock Drainage, etc.) and has been used in the assessment of potential and actual effects for the project. Monitoring data will be collected during the project as well to allow comparison to the baseline set of information.

5.3.3 Conclusion

Pioneer Coal feels that the public consultation program has provided valuable information on stakeholder views that allow for a final project design that should be viewed by all stakeholders as inclusive of their input.

The ongoing role of the public via the CLC will be important in the successful operation of this facility. Further, the role of the regulatory agencies will assist the proponent in effective monitoring and mitigation where necessary. Pioneer Coal has encouraged the public to review this EARD and provide additional comment to NSDEL.

Table 5-1: Public Information Session – Summary of Concerns

Type of Concern	Specific Item	# of Times Specific Item Noted	% Concern	Ranking
Transportation	T1 What is the trucking route?	10	3	3
	T2 Will Pioneer Coal build train tracks to Prince Mine?	3	1	5
	T3 Will there be trucking contracts available?	5	1	5
Subtotal		18	5	6
Blasting	B1 What blasting effects will there be on the marine environment?	8	2	4
	B2 What is the blasting schedule?	19	5	2
Subtotal		27	7	4
Beach Access	BA1 What effects on beach access will the project have?	13	3	3
	BA2 What beach access options will be available after the project?	5	1	5
Subtotal		18	4	6
Reclamation	R1 Will the site be treed as part of reclamation?	50	13	1
	R2 Will there be aquatic habitats as part of reclamation?	50	13	1
	R3 Will there be trails developed as part of reclamation?	12	3	3
	R4 Will Pioneer Coal use their reclamation experience as part of this project?	7	2	4
Subtotal		119	31	2
Operations	O1 Will there be runoff from the site to the ocean?	8	2	4
	O2 What are the setbacks from the shoreline to the pit?	10	3	3
	O3 What is the operating schedule for the mining?	2	1	5
Subtotal		20	6	5
Water Supply	WS1 Will Pioneer Coal have a water supply guarantee?	50	13	1
	WS2 What are the water supply replacement options?	50	13	1
	WS3 Were previous groundwater studies in the area used by Pioneer Coal in designing this project?	50	13	1
Subtotal		150	39	1
Safety	S1 What are the timing details for the NSDNR Mine Openings Program?	6	2	4
	S2 Will Pioneer Coal use backup lights and/or beepers for heavy equipment at the site?	1	1	5
Subtotal		7	3	8
Socio-Economic	SE1 Will the project create local employment?	7	2	4
	SE2 Are royalties generated for the project?	18	5	2
	SE3 Will there be a Community Liaison Committee?	3	1	5
Subtotal		28	8	3
Baseline Studies	BS1 Will there be baseline data collected from Morrison Pond?	2	1	5
	BS2 Will an Environmental Baseline Study be completed for the site and surrounding area?	6	2	4
Subtotal		8	2	7
Total		395	100	n/a

Notes: 128 people attended the Public Consultation
5 people were non-participants (regulatory or media)
n/a not applicable

6.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

This section of the document provides a review of potential environmental effects and proposed mitigation that will result in a project that will have the minimal possible impact on the environment. The VESCs are outlined in the first sub-section. The following three sub-sections outline potential effects and proposed mitigations in the categories of aquatic, terrestrial and socio-economic. The majority of these mitigation measures are integrated features of the project design and have been further described in other sections of the document, particularly Sections 2.0 and 3.0. The last sub-section assesses potential cumulative effects of the proposed undertaking and other activities (prior, ongoing and planned) within the bounds of this provincial environmental assessment.

6.1 Valued Ecological and Socio-economic Components (VESCs)

Given the description of the project proposed in Section 3.0, the biophysical and socioeconomic environment presented in Section 4.0 and the results of the consultation program as outlined in Section 5.0, a prediction of possible impacts on the VESCs can be made.

The table shown on the next page, Table 6-1 Potential Impacts on VESCs Matrix, presents the potential impacts as interactions between the project activities and the VESCs. The ecological and socio-economic components are listed on the left side of the table and the major project components (as divided by site preparation, maintenance and operation and decommissioning and reclamation) are listed at the top of the table.

Impacts are scored as positive (+), negative (-), and unknown effect (o), whereas the score is left blank where no effect is expected. The remainder of this section describes the potential impacts and proposed mitigation measures for the VESCs. The proposed follow up and monitoring is presented in Section 7.0.

6.2 Aquatic

The potential effects of the undertaking and the proposed mitigative measures for aquatic resources (freshwater and marine) are outlined in this sub-section.

6.2.1 Potential Effects

Of the aquatic resources, potential impacts (both positive and negative) exist for both surface water and fisheries. Sensitive or rare species has some potential for impact (both positive and negative) due to their potential presence in the receiving environment.

Primary potential negative impact includes sedimentation, metals and acidification impacts. Main positive impacts of project activities will be related to community health and safety from the reclamation of the site currently affected by subsidence.

Table 6-1: Potential Impacts on VESCs Matrix

	Site Preparation					Operations and Maintenance						Reclamation					
	E&S Control	Clearing /Grubbing	Water Management	Roadway	Stockpiling	Mining Operations	Equipment	Waste Management	Wastewater Management	Transportation	Monitoring	Security	Backfilling	Overburden	Contouring	Vegetation	Follow up
<i>Aquatic</i>																	
Freshwater	+	-	+		-	-	-	-	+		+		-	-			+
Saltwater	+	-	+		-	-	-	-	+		+		-	-			+
Fisheries	+	-	+		-	-	-	-	+		+		-	-		+	+
Sensitive or Rare Species			+		-	-	-	-	+		+						+
<i>Terrestrial</i>																	
Flora		-		-		-	-									+	+
Fauna		-		-		-	-									+	+
Wetlands																+	
Sensitive or Rare Species																	
<i>Socio-economic</i>																	
Economy	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Air Quality	-	-		-	-	-	-	-		-	+		-	-		+	
Noise Levels	-	-		-	-	-	-	-		-	+		-	-			
Cultural Resources		-									+						
Mi'kmaq Land and Resource Use													+	+	+	+	
Transportation				-						-							
Community Resources													+	+	+	+	
Domestic Wells						-					+		+				
Aesthetics		-			-								+	+	+		
Human Health and Safety				+		-						+	+	+	+	+	
Climate						-	-			-	+					+	

Potential impact to the Coal Hollow Brook and St. Andrews Channel is expected to be minimal as only diverted (i.e., non-impacted) surface water outside of the active mine site will enter the watershed. All other water (i.e., all water that has come into contact with the active mine, including groundwater) will enter the workings until full. After that, water will be managed through the existing treatment pond system and will be discharged as effluent into the watercourse leading to Morrison Brook. See Section 6.2.2.2 for additional information.

6.2.2 Proposed Mitigation

The following sub-sections present the proposed mitigative measures to protect aquatic resources.

6.2.2.1 Erosion Control

The drainage control system described in sub-sections 3.2.3 and 3.3.4 will prevent the migration of any impacted runoff from the site.

It is inevitable in a site of this nature, with active waste piles and earth moving activity, that there will be some erosion of exposed surfaces leading to high sediment levels in the runoff. The operator will make every effort to reduce the area subject to erosion so as to reduce the loadings on the treatment ponds, to reduce the frequency at which the ponds have to be cleaned, and to control fugitive dust emissions from exposed surfaces.

Measures that will be applied include the following:

- Design and construction of waste piles with material placed in lifts; side slopes will be progressively vegetated where required;
- Progressive reclamation will occur as part of ongoing operations;
- All areas contoured to their final grade will be fertilized and seeded to promote rapid re-establishment of permanent vegetation;
- Temporarily inactive areas subject to erosion will be stabilized with mulch, or geotextiles as required;
- Clean surface water will be diverted away from active mining area via existing land contours and constructed berms to minimize the volumes to be dealt with;
- Sediment traps will be constructed to slow erosional surface flows and reduce the volume of sediment reaching the main treatment ponds;
- All channels for the drainage control system will be made with a view to minimize channel erosion and will require minimum maintenance; and,
- Work will be completed in accordance with legislation and standards, including the NSDEL Erosion and Sediment Control Handbook for Construction Sites and Environment Canada's Key Elements of an Erosion and Sedimentation Prevention and Control Strategy.

6.2.2.2 Surface Water Management

The essential element in mitigating significant impacts to the receiving systems is the surface water management and treatment system described in sub-sections 3.2.3 and 3.3.4, as referenced in the prior sub-section.

All other water (i.e., all water that has come into contact with the active mine, including groundwater) will enter the workings until capacity is reached. After that, water will be managed through the existing treatment pond system and will be discharged as effluent into the watercourse leading to Morrison Brook.

The treatment pond configuration consists of a series of three ponds providing for batch treatment using flocculants, if required. Use of coagulant is expected to be minimal. The existing discharge location and structure will be used. The use of a sump as a primary settling pond within the active pits prior to pumping to the existing Settling Ponds allows for additional settling of sediment.

Water quality monitoring on Morrison and Coal Hollow Brooks will be completed. In addition, discharge from the Settling Ponds, will also be monitored. The overall approach to surface water monitoring is presented in sub-section 7.5.

The sludge anticipated from the wastewater treatment facilities will be periodically removed from the settling ponds and disposed of in the pit area and buried.

6.2.2.3 Acid Drainage Control

Although acid rock drainage (ARD) is not expected to be a problem at the mine site, ongoing evaluation and monitoring will ensure that any changes to the present situation will be quickly identified. If mining the Hub Seam results in acid rock drainage in the pits, lime can be added to the mine sump prior to pumping or at the influent point to the settling ponds. In the unlikely event of a large volume of ARD being encountered, a specific ARD treatment system will be provided.

Prior to coal extraction, additional test samples for acid consumption/production properties will be analyzed. The results of this testing will be available to guide Pioneer Coal with respect to the potential for acid generation and the subsequent mitigative measures, if required. Through past surface coal mining experiences, Pioneer Coal has proven their monitoring and mitigation methods to successfully protect the receiving environment from ARD.

Refer to sub-section 3.3.3 for further discussion of acid producing/consuming potential.

6.2.2.4 Groundwater Management

Control of groundwater is not anticipated as an unmanageable issue at the site. Ample storage capacity is available within active pits and within the Settling Pond system.

6.2.2.5 Reclamation

Reclamation of previously mined and disturbed areas will involve placing topsoil, contouring and re-vegetation. The ongoing mining operations incorporate progressive reclamation, that is, backfilling and vegetation of slopes. Final site contouring and vegetation will be completed with input from the landowners. A final reclamation plan will be submitted to NSDEL six months prior to cessation of mining work. The activities involved in reclamation are outlined in sub-section 3.4. Note that the materials in the Raised Rock Pile will be placed in the Mining Blocks thereby reducing ARD issues at the site through burial of these materials.

6.3 Terrestrial

The potential effects of the undertaking and the proposed mitigative measures for terrestrial resources are outlined in this sub-section.

6.3.1 Potential Effects

Of the terrestrial resources, potential impacts (both positive and negative) exist for both flora and fauna but are limited in nature. There is no known impact to rare or sensitive species as there are none known in the vicinity. To augment desktop review and prior studies, the proponent proposes field surveys to be completed prior to site disturbance. This work will consist of surveys completed by professional biologists for rare or sensitive species as identified as a potential in sub-section 4.6.3. The negative effects are primarily due to clearing of land and operations (noise and dust). Positive impacts are associated with vegetation and follow up measures as part of land reclamation.

6.3.2 Proposed Mitigation

The following presents the proposed mitigative measures to protect terrestrial resources.

6.3.2.1 Maintain Limit of Work

The extent of proposed area of disturbance (as outlined in Figure 3-3) will be maintained. No disturbance of the land beyond the limits of work will occur.

6.3.2.2 Noise/Dust Control

As many impacts affect wildlife and humans alike, many of the mitigative measures are significant in protecting socio-economic components. These include noise and dust control. The specific mitigation to control noise and dust are outlined in sub-sections 6.4.2.1 and 6.4.2.2.

6.4 Socio-Economic

The potential effects of the undertaking and the proposed mitigative measures for socio-economic resources are outlined in this sub-section.

6.4.1 Potential Effects

Of the socio-economic resources, potential impacts (both positive and negative) exist for many of the components. The negative effects are primarily due to site activities that increase levels of noise and dust. There are effects to the road network as a result of the change to Sheri Lee Lane/Millpond Road and ongoing truck usage. Aesthetics may be impacted due to stockpiling of overburden and waste material. These negative effects are all temporary. Ongoing monitoring will provide feedback to improve operations, where required, and final reclamation is a positive for many components.

There are potential negative effects on community resources because the fishery is downgradient of the site; however, these concerns are mitigated via aquatic protection measures. Positive effects on community resources are the creation of a safe site when reclaimed, as the site is now a health and safety issue due to subsidence and bootleg operations.

Potential effects on cultural resources will be examined in the archaeological impact assessment described in Section 4.8.4. Potential effects on Mi'kmaq land and resource was investigated during the screening on the need for a Mi'kmaq Knowledge Study as described in 4.8.5.

Ongoing monitoring of dust, noise and groundwater levels at stations around the site perimeter will determine what impact has occurred to baseline levels. The monitoring will provide the opportunity for quick action with process changes to rectify the issue, if required.

6.4.2 Proposed Mitigation

The following sub-sections present the proposed mitigative measures to protect socio-economic resources.

6.4.2.1 Dust Mitigation

The primary air quality impact requiring consideration is the control of fugitive dust from the site and related trucking operations. Dust control requires careful and consistently applied mitigative measures throughout the project, if non-compliant or nuisance levels are to be avoided. The proposed mitigation measures for various process components are outlined below. These are similar to measures used at Pioneer Coal's other surface coal mine operations. Pioneer Coal is very familiar with regulatory requirements.

Mining Operations

The control of fugitive dust from the mining operations must center on provision of moisture control measures, such as spraying with water as required. Operations based in relatively deep pits will not generally have much direct offsite impact but could contribute to general dust levels at critical times if not controlled.

On-site Vehicle Operations

To minimize dust produced by on-site vehicle operations, the following may be used as required:

- Wet suppression controls on unpaved surfaces;
- Hardened surfaces where practical;
- Speed reduction; and,
- Use of large haul vehicles so as to minimize trip frequency.

Waste Rock Conveyor

The use of a belt conveyor to transport the waste rock from the pit to the waste rock pile can provide benefits in the control of dust levels on the site due to the reduction of trucking on site.

The conveyor system will be used when it is feasible, given logistics of the site. Material on the conveyor will be kept moistened by the use of sprays, where required, so that wind entrainment will be minimized.

Waste Piles Surface Stabilization

Wind erosion from elevated waste piles containing finely divided material can be a major source of dust at mine sites. Slopes may be stabilized with mulching and / or vegetation, where appropriate.

Off-Site Transportation

The tractor trailers will be fitted with tarp covers to minimize dust emissions and spillage. To eliminate the tracking of site materials on local roads, the coal transport trucks will be washed as necessary. Dust monitoring will be conducted and the results submitted to the regulators as requested (see sub-section 7.5).

The proponent may vary the mitigations depending on specifics of the situation so long as the dust levels are in accordance with the regulatory approval. It is not anticipated that agricultural fields located approximately 1.5 kilometres north of the site will be significantly affected by this operation given the distance. Pioneer Coal is aware that the proposed project will be regulated by the Nova Scotia Air Quality Regulations and will ensure that operations meet these requirements.

6.4.2.2 Noise Mitigation

A number of dwellings in this rural area may be occasionally impacted by sound from the site, as well as by vehicular traffic to and from the site. The proposed mitigation measures are outlined below. The majority of operations will occur in the pit well below ground surface thereby provide excellent noise shielding.

Noise from the equipment and lack of effective mufflers is a source of noise. Regular maintenance of the equipment will reduce noise levels. This combination of measures will adequately mitigate potential noise impacts. Noise monitoring will be conducted and the results submitted to regulators as requested. The mitigation procedures may vary as long as noise levels are in accordance with the regulatory approval.

Refer to sub-section 6.4.2.5 for a discussion on mitigative measures associated with blasting.

6.4.2.3 Aesthetics

The progressive reclamation of the site will involve placing of the overburden and waste rock progressively into the depleted pit areas with contouring of the surface and planting of vegetation. This will allow a significant reduction in stockpiling requirements. Refer to sub-section 3.3.3 for a discussion on expected stockpile dimensions.

6.4.2.4 Domestic Well Monitoring

Pre-existing information from the CBDC /PWGSC work on the Prince Mine Site exists to form the basis of a traditional pre-activity survey for domestic wells located in the area. This work consists of static water level measurements, well yield tests, and a general chemical analysis with metals (i.e., RCap-MS). This information will be supplemented with an updated survey as discussed in Section 4.4.3.

A domestic well survey will be completed prior to commencement of mining to determine status and baseline well conditions for homes within an 800m radius of the Mining Blocks. As part of operations, ongoing monitoring and record keeping will occur for domestic wells and monitoring wells. Effects monitoring for groundwater and reclamation planning are discussed in subsections 7.3.1 and 7.5, respectively.

In the event of water quality and quantity loss to domestic water wells, Pioneer Coal would:

- Provide temporary potable water to the resident;
- Determine cause of the loss; and,
- Discuss options with owner, including deepen existing well to correct the water quality or shortage program or drill new well or make alternative arrangement (i.e., hook up to municipal water supply).

If both parties are not in agreement and cannot resolve the dispute, Pioneer Coal would engage the services of an independent arbitrator to resolve the dispute. The arbitrator will be acceptable to both parties and the process binding.

6.4.2.5 Blasting

All normal precautions relative to blasting operations will be followed; pre-blast surveys, advance notice to the community, warning signals, noise and vibration monitoring, and an approved damage response policy. All permits both Provincial and Federal for storage, transport and placing of explosives, and the necessary approvals will be acquired. Fully trained and certified blast personnel will conduct blasting operations. Pioneer Coal has extensive experience in these operations and is aware of the requirements. Pioneer Coal routinely performs blasting operations across the province.

Pioneer Coal will conduct pre-blast surveys for all structures within 800 metres of the blasting areas prior to any blast being conducted on the site. This survey will include an evaluation of the domestic well, if applicable, for baseline well yield, static water level and water chemistry (general chemistry, metals and bacteria).

Pioneer Coal will, with advice from the CLC, determine the most appropriate time of the day that blasting should be conducted. Pioneer will include an appropriate plan for the notification of the public to be approved by the CLC and NSDEL.

Pioneer Coal will call the nearest weather office, and/or use the site meteorological station, to assess the climatic conditions prior to conducting any blasting. No blasting will be completed if a thermal inversion is anticipated at the time of the proposed blast.

Note that all blasts will be monitored and the results provided to NSDEL, when requested.

Pioneer Coal will develop a flyrock incident reporting procedure and management plan. It will be Pioneer Coal's responsibility to respond to all claims for damages as a result of blasting.

Pioneer Coal will post signage to warn of the presence of the mine and related blasting activity. Prior to blasting, Pioneer Coal will secure the site against inadvertent entry to the blast area.

6.4.2.6 Spontaneous Combustion

A safe work practice for mining in areas of old workings will be consistently followed and will be further augmented by the use of experienced equipment operators. Pioneer Coal has a monitoring program in place to address any initial concerns over spontaneous combustion.

6.4.2.7 Methane

Methane rises to the top of old workings and migrates up dip in slanted or inclined openings. Any methane that may be present is quite readily dissipated to the atmosphere through any openings and break-ins into the old workings. Further, there is a consistent lack of any source ignition in and around the mining operations in association with these old workings.

The methane level in coal seams is known to increase with depth in seams that contain methane. Surface mining activities are conducted at such a shallow depth comparative to underground mining that methane would not be expected to be a problem even in a virgin coal seam that was being surfaced mined. Normal surface mining operations and extraction cycles as conducted in conjunction with the safe work practice would allow dissipation of any amounts of residual methane.

6.4.2.8 Coal Dust

It is likely that any dust in the old workings of the Prince Mine would likely be caked by moisture and not likely to be dispersed in the air. Water has most likely washed through these old workings and cleaned away any mobile dust that may have once existed in these areas.

6.5 Cumulative Effects

The assessment of environmental impacts of a proposed undertaking must include “any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out” as per Section 16(1)(a) of the *Canadian Environmental Assessment Act (CEAA)*. This sub-section presents a detailed cumulative effects assessment of the proposed undertaking.

Although this undertaking is not a formal trigger under *CEAA*, an assessment of potential cumulative effects is presented in this EARD. This assessment addresses some concerns raised by stakeholders regarding the ongoing and potential surface coal mine developments in the region. The NSDEL study recently awarded on cumulative effects is acknowledged by the completion of this detailed cumulative effects assessment. As the results of this independent study are not expected until August 2005, it is understood that the NSDEL wishes to consider cumulative environmental effects in the environmental assessment process of proposed undertakings in the interim.

6.5.1 Methodology

As defined by the Cumulative Effects Assessment Practitioners Guide (Canadian Environmental Assessment Agency, 1999), cumulative environmental effects “are changes to the environment that are caused by an action in combination with other past, present and future human actions.” As a result, historical, existing and potential future activities within the bounds of this assessment are considered to assess cumulative environmental effects.

With respect to the historical activities, underground mining (Prince Mine), surface coal mining (Novaco and Brogan Mine) and bootleg mining (along the Hub Seam) have occurred in the area. This has resulted in both short-term impacts at the time of the activity (e.g., noise, dust, runoff) which are not a present impact; however, there are some long-term impacts that remain. Other historical activities in the area include some forestry and farming practices.

Ongoing activities in a 5km radius include NSPI Point Aconi Generating Station (1 km west) and the Brogan Mine (1km north), as well as some farming and a fish packing plant at Alder Point.

Potential future third party activities may include:

- planned decommissioning and remediation of the Prince Mine Site (e.g., removal of structures as tendered by CBDC and management of the site to remove environmental liability associated with impacted surface water, groundwater, soil and sediment);
- continuation of the Brogan Mine (1km north) with Phase III; and,
- commencement of surface coal mining (2km south) of the Boularderie Island Resource Block.

No other future activities within the approximate bounds of this assessment are known at the time of writing.

Based on these past, ongoing and potential future activities, the following examines the potential significant cumulative environmental effects on the VESCs as identified in Table 6-1. The discussion of each VESC includes: boundaries for consideration of the cumulative effects; the likelihood of effects to occur; and, proposed avoidance or mitigation measures (as appropriate). This text is organized under three sub-headings of aquatic, terrestrial and socio-economic.

6.5.2 Aquatic

Impacts to aquatic VESCs (i.e., surface watercourses, marine environment and aquatic habitat) from past activities in the area are difficult to determine. Many are expected to have been short-term and reversed over time. As such, the following discussion of cumulative effects on the aquatic VESCs considers both ongoing and the potential future activities and effects.

6.5.2.1 Freshwater

The historical water management system at the Prince Mine Site presents a future potential significant negative impact to the aquatic environment. Presently, surface water enters bootleg pits, drains into the Water Level Tunnel and is pumped into the Prince Mine workings. The highly acidic water stored in the Prince Mine workings would be deleterious to the receiving environment if discharged prior to treatment. The capacity of workings will ultimately be reached and a sustainable solution required. The proposed undertaking does provide such a solution; and therefore, would eliminate a significant negative future impact resulting from historical activities.

Similarly, the planned decommissioning and remediation of the Prince Mine Site is a future activity that will positively influence the quality of the receiving water. Removal of impacted materials from the site will have a net positive effect.

The ongoing and potential surface coal mining developments within the regional area consist of the Brogan Mine and the potential surface coal mining operation in the Boularderie Coal Resource Block. The freshwater drainage systems for these sites are separate from the freshwater receiving environment of the proposed undertaking. As such, there are no cumulative effects on one freshwater system. In addition, proper mitigative measures used in surface coal mining (as outlined in sub-sections under 6.2.2) can successfully protect the receiving freshwater from sedimentation, acidic mine drainage, and metals/petroleum impacts. In addition, ongoing monitoring of water discharge and receiving watercourses is proposed (as per subsection 7.5).

6.5.2.2 Saltwater

As outlined in the prior sub-section on cumulative effects on freshwater, the proposed surface water management solution for existing acidic mine water at the Prince Mine Site will have a positive impact on the receiving marine environment. Similarly, the planned future site

remediation of the Prince Mine Site will have a positive impact on the receiving marine environment.

Distinct from freshwater, there are potential cumulative effects on the marine environmental from ongoing and potential activities with the region. The potential surface coal mining developments, as well as the ongoing activities at the Point Aconi Generating Station have a potential to impact the regional marine environment.

As previously discussed in the prior sub-section, proper mitigative measures can successfully minimize marine impacts due to surface water drainage from surface coal mining. It is expected that all approved surface coal mining operations will utilize appropriate mitigative measures such that there is no residual impact to the receiving marine environment.

With respect to the liquid discharges from the Point Aconi Generating Station, it is known that the quality and quantity of these discharges are well documented and that the ongoing monitoring has demonstrated no significant impacts to the receiving marine environment.

6.5.2.3 Fisheries

Based on the discussions presented above of cumulative effects on freshwater and saltwater from current and proposed activities, it is concluded that no cumulative effects on fisheries are expected.

6.5.2.4 Rare or Sensitive Species

No cumulative effects are expected on rare or sensitive aquatic species.

6.5.2.5 Summary

Potential effects of ongoing and future activities have the potential to negatively impact the receiving aquatic environment (specifically freshwater, saltwater, fisheries, and rare or sensitive species); however, environmental protection measures (as outlined in sub-section 6.2.2) have the ability to mitigate these impacts such that cumulative effects are not expected to be significant. Should any impacts occur, they are local, reversible and short term.

6.5.3 Terrestrial

The following discussion presents the cumulative effects assessment on the terrestrial VESCs considering past, current and potential future activities. Given the long term change of the surface terrestrial habitat from many of the past activities, historical activities are included in the assessment of cumulative effects on the terrestrial VESCs.

6.5.3.1 Flora

Historical and proposed surface coal mining activities in the local area (i.e., 5km radius) have a cumulative effect on the flora of the area. Historical forestry and ongoing farming have an impact, as well.

Reclamation of land disturbed from past or ongoing surface coal mining is an essential component of mitigating impacts to flora. Where reclamation is not complete and a landscape remains disturbed, terrestrial habitat (including both flora and fauna) are impacted in the long term. This long term impact can be successfully mitigated via complete reclamation of the land.

6.5.3.2 Fauna

Similarly to flora, cumulative impacts to fauna occur from local activities that remove terrestrial habitat. These activities include surface coal mining, as well as forestry and farming practices.

Reclamation of the land by reintroducing terrestrial habitat will successfully mitigate this potential long term impact. Also noise/dust control and maintaining limits of work are mitigative measures (as outlined in subsection 6.3.2) to reduce impact to fauna.

6.5.3.3 Wetlands

While no impacts to wetlands will occur as a result of this proposed undertaking, it is recognized that other past or proposed activities in the area may have negatively impacted wetlands.

6.5.3.4 Sensitive or Rare Species

Based on a desktop review (as described in subsection 4.6.3), no sensitive or rare terrestrial species are known on the site of the proposed undertaking. As previously noted, a terrestrial survey will be completed prior to any site disturbance. Should a species at risk or a species of concern be identified from field work, a mitigative / avoidance plan will be developed in consultation with stakeholders (including NSDEL and NSDNR).

In terms of effects of other activities on sensitive or rare species, the historical effects are unknown and difficult to address. The effects of current and proposed activities are expected to be minimal as environmental assessment approvals are/were required for many of these local activities (i.e., Point Aconi Generating Station and surface coal mining operations). As part of this EA process, it is expected that suitable surveys were conducted and mitigative / avoidance measures completed, as required.

As such, no cumulative effects on sensitive or rare terrestrial species are expected.

6.5.3.5 Summary

Mitigative measures (including reclamation activities and those identified in sub-section 6.3.2) have the ability to significantly minimize negative impacts for both the proposed undertaking and other potential surface coal mining operations. Where impacts occur, they are reversible, local and short term.

6.5.4 Socio-Economic

The following discussion presents the cumulative effects assessment on the socio-economic VESCs considering current and potential future activities. Historical activities are not included in the cumulative effects assessment on the socio-economic VESCs unless the impacts remain.

6.5.4.1 Economy

Ongoing and proposed activities in the regional area (as described in Section 6.5.1) have positive residual impacts on the local, regional and provincial economy. These benefits are direct in terms of employment, royalties and taxes, as well as indirect (or spin off) benefits.

6.5.4.2 Air Quality

Short-term impacts from dust can be minimized with mitigative measures (as described in subsection 6.4.2.1). While there may be a resulting short term, reversible, negative impact, ongoing monitoring will ensure that the undertaking does not exceed identified thresholds.

Other impacts to air quality (i.e., NO_x emitted from equipment) are expected from activities in the local area; however, the emissions are expected to be insignificant. In terms of the Point Aconi Generating Plant, the air emissions are well monitored.

As the impacts to air quality are very localized and are expected to be minimized with mitigative measures, cumulative effects to air quality are not expected.

6.5.4.3 Noise Levels

Short-term impacts from dust noise can be minimized with mitigative measures (as per subsection 6.4.2.2). While there may be a resulting short term, reversible, negative impact, ongoing monitoring will ensure that the undertaking does not exceed identified thresholds.

As the impacts to baseline noise levels are very localized and are expected to be minimized with mitigative measures, cumulative effects to air quality are not expected.

6.5.4.4 Cultural Resources

The impact of historical activities in the region on cultural resources are difficult to assess. Based on the archaeological and heritage screening, it is predicted that no impacts to cultural resources will occur as a result of the proposed undertaking.

Should a significant cultural resource be identified, mitigation / avoidance plans would be developed in consultation with the NSM.

6.5.4.5 Mi'kmaq Land and Resource Use

The MKS is underway and will determine the potential for impact of the proposed undertaking on Mi'kmaq land and resources. As per cultural resources, it is difficult to assess the potential impact of historical activities on Mi'kmaq land and resource use.

Based on the initial results of this screening, it is likely that no current or proposed activity will result in an impact. Should a Mi'kmaq land and resource use be identified, mitigation/avoidance plans would be developed in consultation with the CMM and Mi'kmaq stakeholders.

6.5.4.6 Transportation

There is a cumulative impact of increased local and regional traffic from the proposed undertaking and other ongoing and proposed activities. While the increased truck traffic cannot be eliminated, its impacts can be mitigated via route selection, and potentially use of rail (if economically feasible). This impact is short term, regional and reversible.

6.5.4.7 Community Resources

Reclamation planning should take into consideration terrestrial ecology, surface water drainage, visual impact, community resources and future land use planning. If existing and potential future surface mine operations reclaim the land based on environmental, as well as social factors, there will be a significant positive cumulative effect in the long term from proper reclamation of derelict lands from surface coal mining.

In terms of beach access near the Point Aconi Generating Station, this will be provided for community use.

6.5.4.8 Domestic Wells

Net positive impacts for domestic wells are predicted based on the benefit from the comprehensive monitoring program and the benefit from having the reclamation program at the site restore the lands thereby improving water quality. Negative impacts from the mining

operations will include possible water quality and/or quality loss that are able to be mitigated by the water supply policy and other measures previously described.

6.5.4.9 Aesthetics

In the short term, aesthetics of the proposed surface coal mining operations and the NSPI Point Aconi Generating Station are a concern to local residents. It is noted that current aesthetics of the Prince Mine Site are not positive and will be improved over the long term with reclamation. The long term cumulative impact in the local area is positive with proper reclamation techniques.

6.5.4.10 Human Health and Safety

The resulting impact of prior coal mining (both organized and bootleg) has resulted in a disturbed landscape where significant safety concerns exist. The proposed undertaking would remove the potential negative impact from past mining in the area. This is a cumulative benefit with other proposed surface mining operations where subsidence exists.

6.5.4.11 Climate

While it is acknowledged that there are greenhouse gases emissions associated with the historical, ongoing and proposed projects, the relative CO₂ equivalent is considered insignificant in the regional sense.

In terms of the global impact of NSPI using the coal as a fuel source, it is acknowledged that there will be associated greenhouse gas emissions, however this is true for any coal used by NSPI. Yet the NS Energy Strategy incorporates many sources of energy from renewables to coal in its plan. As such, coal resource extraction is one component of the Provincial plan in the short term.

6.5.4.12 Summary

The mitigative measures (as identified in sub-section 6.4.2) would allow the elimination of significant negative environmental cumulative effects if implemented at other surface coal mining undertakings in the area. As such, it is expected that no significant cumulative effects will result on the socio-economic VESCs; in many cases, positive cumulative impacts are noted. Where negative impacts do occur, they are expected to be predominantly small, local and reversible.

7.0 FOLLOW UP AND MONITORING

By including inspection, maintenance, contingency / emergency planning and reclamation planning into daily operations, the environmental management practices become integral to the mining operations. In addition, incorporating an open exchange with stakeholders (including the CLC and regulators) allows concerns to be addressed immediately. The ongoing environmental monitoring (dust, noise, surface water, groundwater and aquatic habitat) provides feedback to the quality of environmental protection measures to allow changes in process to occur as part of daily operations.

This section outlines the follow up and monitoring that is part of Pioneer Coal operations.

7.1 Inspection and Maintenance

All project activities will be monitored by the company's supervisory personnel. As well, the ongoing environmental monitoring provides continual feedback on the operations and their impact to the environment. The numerical results of the environmental monitoring (dust, noise, surface water, groundwater and aquatic habitat) are augmented by visual assessment and community liaison. The operation is continually changing as environmental (e.g., weather) and operational conditions vary. As part of operations, regular inspections of the site are made by Pioneer Coal supervisory personnel. It is a dual goal of Pioneer Coal to recover the coal efficiently and minimize negative impact on surrounding environment and community.

7.2 Contingency and Emergency Planning

Pioneer Coal currently has contingency and emergency plans for surface coal operations at other sites. A specific contingency and emergency plan will be completed for the proposed operations at Prince Mine and submitted as part of the IA application. The plan will define responsive action required, responsibilities, assistance agencies and contacts with names, telephone numbers and addresses. Proper procedures for containing, cleaning up and reporting spills, should they occur will be available onsite. The plan will specifically address all contingency situations at the mine, as well as any accidents involving coal transportation aspects.

7.3 Reclamation Planning

While no impacts are expected to groundwater or fish habitat, plans will be in place as a contingency. Final reclamation of the site is part of the scope of work for this project. These items are discussed in the following sub-sections. Figure 3-4 shows a conceptual reclamation plan for the site.

7.3.1 Groundwater

No significant impact is expected to the wells in the area of the mine; however to monitor this component, monitoring wells will be used to assess impact. In this way, any changes can be observed in sufficient time to provide mitigation to those dependent on groundwater supplies.

7.3.2 Final Land Reclamation Planning

The final reclamation plan will be based upon agreement with the landowners as discussed in sub-section 3.4. This subsection also contains a conceptual reclamation plan (Figure 3-4) that was submitted to NSDNR by Pioneer Coal in a report to support the Special Lease application. The final reclamation plan is to be submitted to NSDEL at least six months prior to cessation of mining work.

7.4 Stakeholder Consultation

This aspect of the operation has and will continue to be of value to the proponent and local communities. See the following for specific information on key areas.

Property Purchase

Pioneer Coal will negotiate with local property owners for the purchase of their property.

Compensation to the Community

With the proposed mitigative measures in place, the project will have very little, if any, long-term negative environmental impacts. The land form of the area will be disrupted during the operation, but will be reclaimed to useable land. This, coupled with the employment and economic benefits that the project will provide to the area, are seen as significant compensation of the project.

Community Liaison Committee

Pioneer Coal is committed to using a CLC as a working mechanism of providing regular information to local residents and obtaining input from them. This process has proven very effective to date with other surface coal mining operations. Pioneer Coal will also deal with the municipal, provincial and federal governments on an open and cooperative basis.

7.5 Environmental Monitoring

It is recommended that the monitoring program be designed with the following objectives:

- To provide an early warning of changes to the environment;

- To increase the understanding of cause and effect relationships between specific project activities and the receiving environment; and,
- To account for cumulative effects from surrounding environment, as well as project specific impacts.

The proponent will consider the following principles in the development of the monitoring program:

- Focus on the VESCs of greatest ecological or social concern and those which are least known or understood;
- Allow the attribution of cause and evaluation of relative effectiveness of mitigative measures in the monitoring program; and,
- Fill data or knowledge gaps where is it required for the development of mitigative or compensatory measures.

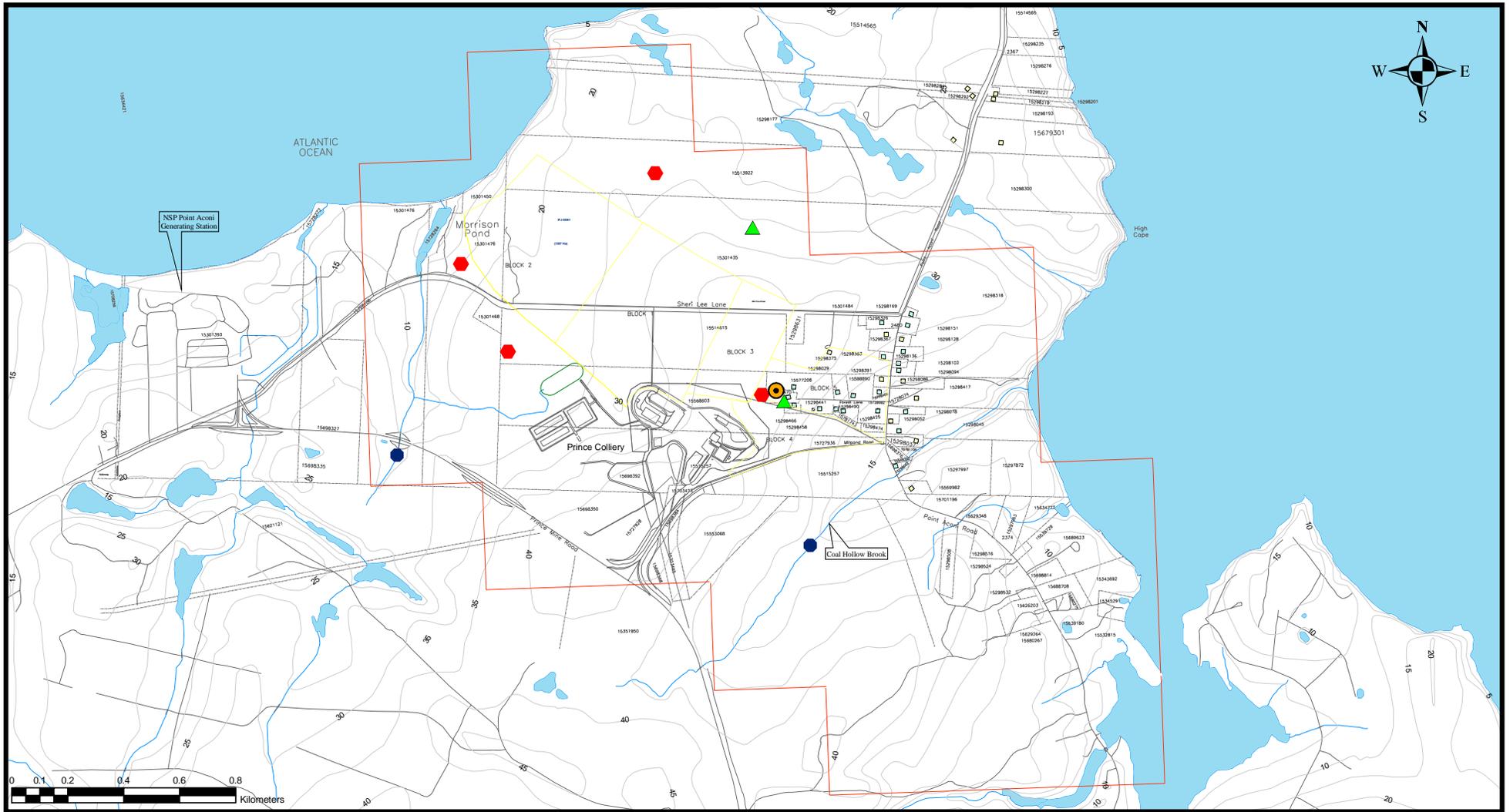
The results and interpretations of the environmental monitoring program will impact the environmental management of the site and operations such that there is a mechanism of responding to notice of early impact.

The regular assessment of data for trends or cause and effect relationships is key to the monitoring program. The data must also be reviewed for any need to change locations of monitors, monitoring frequency and variables and to review any impacts identified by the data. This data must be stored for future reference and reported to regulatory agencies as requested.

Equipment usage (including its calibration and detection limits) will be documented and follow standard procedure.

The following outlines considerations to the specific components to be monitored as part of the program. Detailed programs will be submitted as part of the IA application. Figure 7-1 provides an overview of the preliminary monitoring program locations and types (surface water, dust, etc.)

- Dust:
 - The emissions of dust from the site are a specific concern to the adjacent residents.
 - The ongoing monitoring must allow a continual feedback to operations for evaluation of efficiency of mitigations.
 - Year round operations will require specific attention to dust during summer months.
- Noise:
 - As with dust, noise is a concern to adjacent residents.
 - The ongoing monitoring must allow a continual feedback to operations for evaluation of efficiency of mitigations. This includes instantaneous noises as well as average dBA levels.
 - Baseline noise must be considered in the evaluation of impacts from the site.



Legend

- Property Boundary
- 30- Contour (masl)
- Watercourse
- Mining Blocks
- Special Mining Lease Boundary

Homes within 500 metres of Mining Block

- Homes on Municipal System
- Homes on Wells

- Dust Sample Location and Blast Monitoring (1)
- ▲ Noise Sample Locations
- Surface Water Sample Locations
- Groundwater Sample Locations

Note: (1) At closest structure to each blast.

Title: Preliminary Environmental Monitoring Stations

Date: May 2005

Project: Surface Coal Mine and Reclamation Project- **Figure No.:** 7 - 1
Prince Mine Site
Point Aconi, Nova Scotia

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- Surface Water:
 - Maintenance of water quality and quantity in adjacent watercourses is an important component of environmental protection.
 - Although no direct discharge will be directed to Coal Hollow Brook, flow and general chemistry with metals should be assessed in Coal Hollow Brook.
 - The flow and chemical analysis should be correlated to the sediment pond outlet discharge and monitored as per the IA stipulations, as well as operational and environmental conditions.
 - Surface water will be sampled in accordance with CCME standard water sampling procedures as outlined in Appendix J.

- Salt Water:
 - No sustained measurable impact to downgradient marine environment is expected due to proposed mining operations.

- Groundwater:
 - The monitoring plan must incorporate mechanisms for assessment of groundwater yield and chemistry as per NSDEL requirements. This is key as there are currently domestic wells in the immediate area.
 - Monitoring of these wells and assessment of current array of monitoring wells is required.
 - To better assess any groundwater impacts from mining activity, the static water levels should be correlated to mine depths.
 - Groundwater will be sampled in accordance with CCME standard water sampling procedures as outlined in Appendix J.

A comprehensive environmental monitoring program will be developed for the IA application. The preliminary plan presented in the document and on Figure 7-1 indicates that up to 3 noise and TSP/dust and up to 5 groundwater monitoring locations will be established. A large number of existing groundwater monitoring wells are located at the site that will be evaluated for use in Pioneer Coal's monitoring program. The use of wells with background data is a preferred approach as it provides a longer period of data. Pioneer Coal also intends to use domestic wells at properties purchased for monitoring of groundwater levels. If the wells are not to be used for monitoring, they will be abandoned as per the Well Construction Regulations. This will include immediately sealing the abandoned well using an approved method.

8.0 ENVIRONMENTAL IMPACT STATEMENT

The potential impacts of the project on the VESCs and the proposed mitigative measures to reduce any significant negative impact are presented in Section 6. The monitoring and follow up measures to verify the efficiency of these mitigations are outlined in Section 7.0. This section discusses the predicted residual impacts of the proposed undertaking. The residual impact statement presents both the positive and negative impacts of the project after mitigative efforts have been taken into account. In addition, the proponent's acceptance and signature of this EARD is included in this section.

8.1 Residual Impacts

The following text describes the positive and negative residual impacts, as well as impacts that can be controlled by mitigation:

- Positive Residual Impacts
 - A highly disturbed unsafe site will be progressively returned to a fully reclaimed area;
 - A long term solution to the existing mine water drainage issue at Prince Mine site;
 - Employment of approximately 40-50 people at the site and in the transport of the coal, with significant direct and secondary economic benefits during the period of operation including associated royalties and taxes to government; and,
 - NSPI will have a source of indigenous coal for the period of the project.
- Negative Residual Impacts
 - Land in the mine area will continue to be highly disturbed until progressive and final reclamation restores the area;
 - Residents living close to the mine may be subject to some disruption from the operation due to somewhat elevated levels of dust, noise and general activity close to the site (although still within regulatory limits); and,
 - There is a possibility of change to hydrogeological conditions in the site area.
- Impacts to be Controlled by Mitigation
 - Impact of site surface erosion and mine water will be mitigated via the comprehensive collection and treatment system already in place. No significant impact is expected in the surface water systems;
 - Noise impact from the mine site will be controlled and monitored such that the regulation levels at the receptive monitoring points will not be exceeded;
 - Use of waste rock conveyor, where appropriate, will reduce noise and dust levels relative to the use of trucks alone; and,
 - Dust migration off the site will be controlled and monitored such that the regulation levels at the receptor monitoring points will not be exceeded.

It is apparent that the long term effect of the project will be very positive to the environment. The key advantages of mine reclamation are:

- a safe, contoured, fully vegetated site; and,
- socio-economic benefits from employment and economic enhancements in the region.

The following table, Table 8-1 Residual Impact Assessment, presents a qualitative summary of the effect of each VESC (that are effected) with the following assessment criteria:

- nature of effect, i.e., positive (+) or negative (-);
- magnitude of effect on background levels, i.e., small, moderate or large;
- reversibility of the effect, i.e., reversible (REV) or irreversible (IRR);
- timing of effect during operations or after reclamation, i.e., short (short) or long (long) term; and,
- aerial extend of the effect, i.e., area of construction (local) or watershed (regional).

Table 8-1: Residual Impact Assessment

	Nature	Magnitude	Reversibility	Timing	Extent
Fresh Water	-	Moderate	REV	Short	Regional
	+	Moderate	REV	Long	Regional
Salt Water	-	Small	REV	Short	Regional
Fisheries	-	Small	REV	Short	Regional
Flora	-	Small	REV	Short	Local
Fauna	-	Small	REV	Short	Local
Rare / Sensitive Species	-	Moderate	IRR	Short	Local
Economy	+	Moderate	REV	Short	Regional
Air Quality	-	Moderate	REV	Short	Local
Noise Levels	-	Moderate	REV	Short	Local
Mi'kmaq Land and Resource Use	+	Small	Rev	Long	Local
Transportation	-	Small	REV	Short	Local
Community Resources	+	Moderate	REV	Long	Local
Domestic Wells	-	Moderate	REV	Short	Local
Aesthetics	-	Moderate	REV	Short	Local
	+	Moderate	REV	Long	Local
Human Health / Safety	-	Small	REV	Short	Local
	+	Large	IRR	Long	Local
Climate	-	Small	REV	Short	Local

It is concluded that the undertaking can be executed without significant long term adverse effects on biophysical and socio-economic resources. Taking into consideration the economic and health and safety issues, it is believed that residual impacts on the VESCs will be positive overall.

8.2 Closing and Signature

This Registration document is prepared to comply with the Environment Act, Chapter 1, Acts of 1994-95. A review of the information indicates that there are no adverse effects or significant adverse environmental effects, which may be caused by the undertaking or that such effects can be mitigated.

The project will lead to the reclamation of the existing Prince Mine Site at little or no cost to the federal or provincial governments; creation of 40-50 direct jobs and possibly over 100 indirect jobs; the restoration of derelict lands (pockmarked and subsidence impacted); a long term solution to the existing mine water drainage issue; and the potential to generate new business for the rail line and benefit taxpayers through increased payments to governments for royalties, taxes and further economic spin-off.

Pioneer Coal requests that the Minister of Environment approve the Undertaking, subject to specified terms and conditions and any other approvals required by statute or regulation.

Pioneer Coal Limited

Per: _____
John W. Chisholm
President & Chief Executive Officer
Pioneer Coal Limited

Dated: May 30, 2005

9.0 REFERENCE LIST

The following is a list of select documents and mapping pertinent to the proposed undertaking that were reviewed and/or referenced in the preparation of this EARD.

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