

# ENVIRONMENTAL ASSESSMENT REGISTRATION DOCUMENT FOR MILLER'S CREEK MINE EXTENSION

**CGC Inc. - Fundy Gypsum Plant**  
Miller's Creek, Hants County, Nova Scotia



**ENVIRONMENTAL ASSESSMENT  
REGISTRATION DOCUMENT FOR MILLER'S CREEK  
MINE EXTENSION**

**Miller's Creek, Hants County, Nova Scotia**

**Prepared For:  
CGC Inc. - Fundy Gypsum Plant**

**FEBRUARY 2008**

**REF. NO. 820677 (6)**

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## Environmental Assessment Registration Document Abbreviations

ACCDC	Atlantic Canada Conservation Data Council
ANFO	Ammonium Nitrate - Fuel Oil (explosive)
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Agency
CLC	Community Liaison Committee
CMM	Confederacy of Mainland Mi'kmaq
COSEWIC	Committee on the Status of Endangered Wildlife
CRA	Conestoga-Rovers & Associates Limited
CSP	Corrugated Steel Pipe
DTH	Down-the-Hole (drill)
DFO	Fisheries & Oceans Canada
EA	Environmental Assessment
EARD	Environmental Assessment Registration Document
EC	Environment Canada
EMP	Environmental Management Plan
FG	Fundy Gypsum
FWAL	Freshwater Aquatic Life (CCME guideline)
GIS	Geographic Information System
IA	Industrial Approval
LIDAR	Light Detection and Ranging
LUB	Land Use By-Law
MSC	Meteorological Services Canada
MBCA	<i>Migratory Bird Convention Act</i>
MPS	Municipal Planning Strategy
NPMMC	Newport Plaster Mining & Manufacturing Company
NSDNR	Nova Scotia Department of Natural Resources
NSEL	Nova Scotia Environment & Labour
NSESA	Nova Scotia <i>Endangered Species Act</i>
NSM	Nova Scotia Museum
NSTIR	Nova Scotia Department of Transportation & Infrastructure Renewal
PPV	Peak Particle Velocity
TDS	Total Dissolved Solids
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
USG	United States Gypsum Company
VEC	Valued Economic Component

### Units of Measure

dba	decibels (A-weighting)
kVA	Kilovolt-ampere
masl	Metres above sea level
MW	Megawatt
tpd	Tons per day
cy	cubic yard

**Note: Both imperial and metric units have been used throughout the document. Every effort has been made to standardize units, however units given are as reported.**

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## 1.0 PROPONENT INFORMATION

The proponent is GCG Inc., which operates the Fundy Gypsum (FG) Plant outside of Windsor, Nova Scotia. CGC Inc. is a subsidiary of USG Corporation (USG). Fundy Gypsum has substantial experience in surface gypsum mining in Nova Scotia. They have been operating in the Windsor area of Hants County, Nova Scotia since 1926, and presently have three facilities in this area: Miller's Creek, Wentworth and Hantsport. The surface mines in Miller's Creek and Wentworth are located within 15 kilometres of the Hantsport ship loading facility. FG produces gypsum and anhydrite used in the manufacture of Portland cement, gypsum wallboard, plaster products, soil conditioners and agricultural gypsum.

Throughout this document, you will see reference to Fundy Gypsum Company (FGC). It should be noted that FGC was the corporate entity for the vast majority of the environmental baseline studies and other design work for the Extension Project. However, USG has had a recent restructuring, resulting in the renaming of the local operation to what is noted below as the proponent.

### **Name of Proponent:**

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Windsor NS B0N 2T0  
Tel: (902) 798-4676  
Fax: (902) 798-5639


### **Proponent Contact Person:**

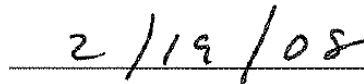
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Jeffrey D. Barth  
Vice President Manufacturing, CGC

  
Date

## **2.0     UNDERTAKING INFORMATION**

### **2.1         NAME OF THE UNDERTAKING**

Fundy Gypsum Miller's Creek Mine Extension.

### **2.2         LOCATION**

The proposed undertaking is located in the Avondale region of Hants County in the central area of Nova Scotia (Figure 2-1).

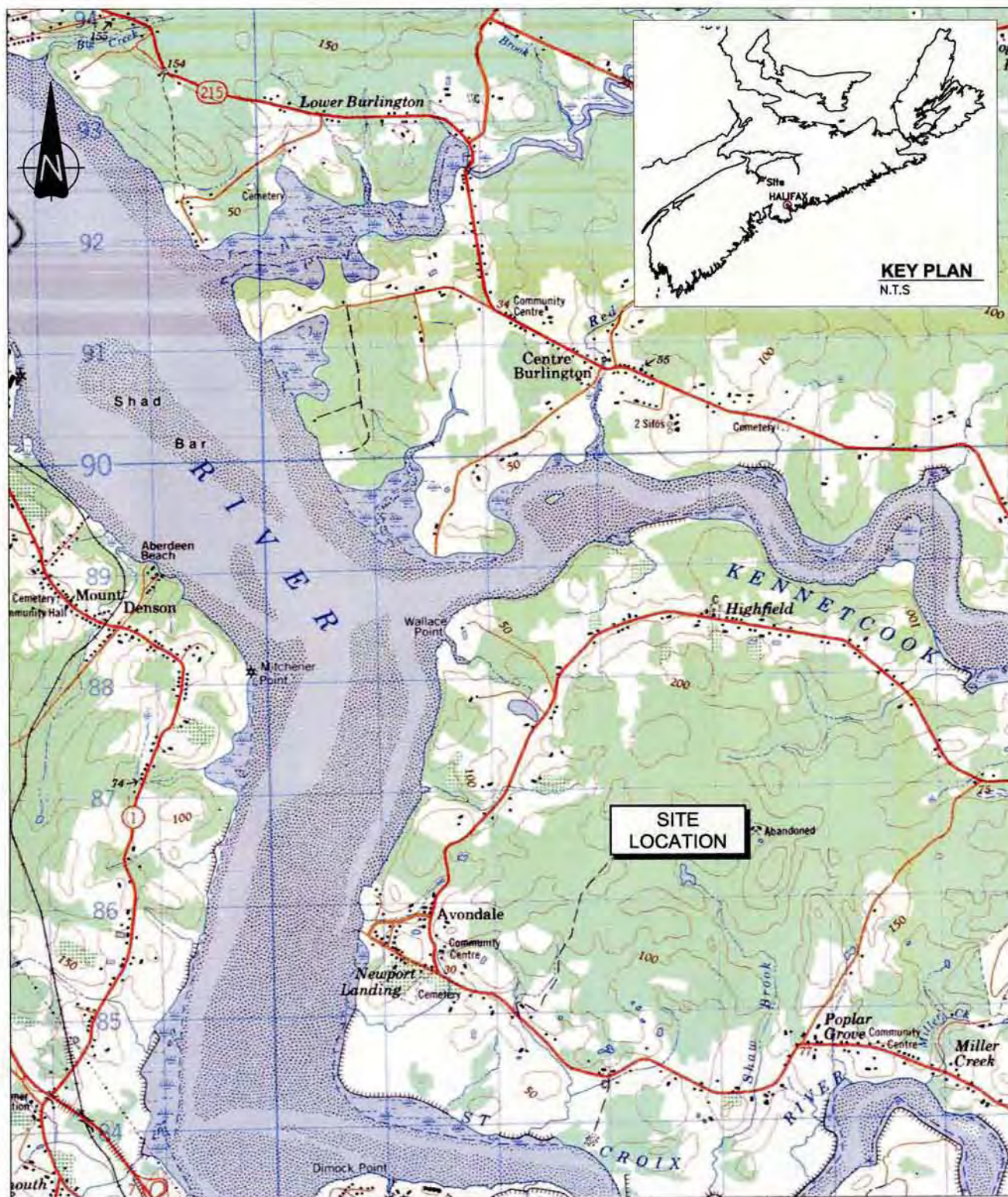


figure 2-1

**SITE LOCATION**  
**ENVIRONMENTAL ASSESSMENT REGISTRATION DOCUMENT**  
**FUNDY GYPSUM**  
*Hants County, Nova Scotia*



### 3.0 SCOPE

#### 3.1 SCOPE OF THE UNDERTAKING

The description of the undertaking is provided in detail in Section 5 and summarized in the following section. The proposed extension project (the "Project") includes the development and operation of a surface mine adjacent to an existing surface mine; use of off-highway haul roads; creation of three overburden and waste rock stockpiles; use of temporary and permanent settling ponds; temporary power distribution; and temporary service buildings. A sound and visual effects berm may be constructed on the western portion of the site in consultation with the Community Liaison Committee (CLC), Nova Scotia Department of Natural Resources (NSDNR) and Nova Scotia Environment & Labour (NSEL).

The land area for the fully developed surface mine extraction area will be about 180 ha with an additional 230 ha for stockpiles, conservation area and roads. FG currently owns 486 ha of land in the proposed project area. The Non-mineral Registration No.002 west of Ferry Road covers an area of 1042 ha. Extraction will commence at the eastern boundary and progress westward. The study area for the purposes of this EA encompasses the foot print of the proposed extension and airshed, noiseshed, downstream receiving waterbodies, watersheds, and groundwater sheds within measurable zones of influence as outlined in subsequent sections.

The existing infrastructure at Miller's Creek, including the storeroom, mobile equipment maintenance garages, crushers, screens and rail loading facilities, will not be relocated to the extension site. Access between the existing mine site to the proposed extension area will be provided through a controlled level crossing at Ferry Road and transportation corridor through the existing mine operation. Rock excavated for production will be transported from the extension area by off-highway haulage trucks to the existing crushing and screening facilities at the Miller's Creek site. Off-site transport of gypsum to markets will be via existing infrastructure.

The settling ponds will be located to collect all of the discharge from disturbed areas, as the mine progresses. They will be located at the base of the stockpile areas, and in the extraction area, to ensure that the overall drainage and flow patterns leading into existing catchment areas are maintained. It is anticipated that at least three settling ponds will be required. Temporary ponds and other sedimentation control measures will be constructed in advance of mine development, to ensure adequate sedimentation control during initial site works and pit development. Permanent measures and settling ponds will be employed during operations. Water from within the extraction area will



be directed to the lowest bench of the mine (sump) and pumped out to existing drainage areas. Settling ponds will be constructed as needed to ensure that limits for maximum suspended solids in the discharge are not exceeded as stipulated in any Industrial Approval that would be granted by NSEL.

A new power distribution system will be installed to provide electricity for the mine dewatering pumps, site trailers, lighting and miscellaneous uses.

The mine will commence development within one year of receiving all required approvals. The life span of the proposed extension is between 30 to 50 years based on proven and probable reserves, and market demand. Decommissioning and reclamation plans are described in detail in Section 5. Reclamation will commence in a progressive fashion with backfilling beginning as is feasible to minimize the aerial extent of the active working area.

### **3.1.1      PURPOSE AND NEED FOR THE UNDERTAKING**

FG requires an extension of the Miller's Creek site to continue its operations in the area beyond the next five to seven years when gypsum resources will be depleted in the Bailey Quarry. There are currently 140 to 150 full-time persons employed by FG and there are an additional 15 to 20 persons associated with FG-related rail operations. The continued operation of the Miller's Creek site is essential for the on-going operation of all three FG facilities. If approved permitting and development are completed for the proposed extension, FG will be able to maintain current production and employment levels.

### **3.1.2      CONSIDERATION OF ALTERNATIVES**

The location of the gypsum deposit is fixed. Extensive drilling of this area has revealed an economic deposit that can be mined using conventional surface mining methods. FG has examined other areas for possible development but no other area offers the combination of favourable geology, physiography and proximity to existing infrastructure to allow for economic extraction of resources. The need for stockpiles was examined as well and the project economics were found to require some permanent stockpiles around the perimeter of the site, but allow for progressive reclamation principles to be incorporated into the project design.

### 3.2 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

The undertaking requires a Class I Environmental Assessment under Schedule A of the Nova Scotia *Environment Act* and *Environmental Assessment Regulations*. As required by the *Environment Act*, it assesses the potential environmental effects of the Project on biophysical and socio-economic Valued Environmental Components (VECs). The *Guide to Preparing an EA Registration Document for Mining Developments in Nova Scotia* (NSEL 1999) was used to focus the assessment and provide a framework for the EA report. This assessment was also based on inputs from members of the public, the Mi'kmaq community, government regulators and the professional judgement of the study team.

The scope of this document has been determined by FG and Conestoga-Rovers & Associates Ltd. (CRA), and is based on the Project components, activities, field studies and regulatory consultations. Regulatory officials from both NSEL and NSDNR have been aware of FG's intention to submit the EARD for this undertaking since September 2005 when the public was informed of the project via the first of many letters to residents. Regulators have assisted project scoping by bringing forth issues of concern and/or uncertainty. The Government of Nova Scotia employs a "One Window" process for reviewing, permitting and monitoring mine development projects in the province. This approach formalizes how government departments, including federal authorities, involved with mine development activities, act collectively to streamline the review process for both government and industry. To date, two meetings (October 25, 2005 and May 4, 2006) have been held with the "One Window" Committee to introduce the Project. The "One Window" Committee for this Project included representatives from NSEL, NSDNR, Fisheries and Oceans Canada (DFO), Environment Canada (EC) and the Canadian Environmental Assessment Agency (CEAA).

Via these meetings, the "One Window" Committee determined that the Miller's Creek extension is not thought to invoke any federal triggers listed under CEAA - no federal funding or federal land is sought for this project.

The Valued Environmental Component (VECs) analysis is based on the project description, the environmental setting, and stakeholder input. The environmental assessment evaluates the potential effects, including cumulative effects, of each Project phase, (*i.e.*, development, operation and decommissioning), as well as malfunctions and accidents, with regard to each identified . The VECs are as follows:



- Air Quality;
- Noise;
- Geology and Hydrogeology;
- Surface Water Resources;
- Fish and Fish Habitat;
- Flora and Fauna Species and Habitat;
- Wetlands;
- Land Use;
- Archaeological and Cultural Resources;
- Population and Economy;
- Visual Environment;
- Transportation;
- Recreation and Tourism; and
- Other Undertakings

Provincial environmental acts and regulations apply to FG in regards to the design, site preparation, operation, and reclamation of the proposed mine extension. In addition to the environmental legislation, other acts and regulations relating to labour standards, best mining practices, and other phases are applicable to the Project. FG is well aware of the applicable acts and regulations that pertain to the proposed mine extension. FG personnel have effectively 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 such acts and regulations at the nearby surface mining projects in Hants County.

The following list provides some pertinent acts that may be applicable for the undertaking and/or were considered in the preparation of this Environmental Assessment Registration Document (EARD):

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

If the Project is approved, it will be subject to an Environmental Assessment (EA) Approval issued with Conditions of Release. The project will also require a provincial

Industrial Approval, Non-Mineral Registration, and a Water Approval. See below for a brief description of each.

**Industrial Approval:** An Industrial Approval (IA) defines specific operational conditions and limitations, including dust, noise, surface water and groundwater discharge criteria and monitoring and land reclamation. An IA application would be completed by FG when/if EA approval is received. This approval is granted by NSEL.

**Non-Mineral Registration:** Per the *Mineral Resources Act*, gypsum is not considered to be a mineral resource. FG currently holds Non-Mineral Registration No. 002 for the gypsum deposit on the Avon Peninsula, which includes the existing and proposed mine sites. This approval has been granted by NSDNR. In Nova Scotia, gypsum is owned by the property owner of the land in which it occurs, unless the mineral estate has been severed from the surface estate and sold to another party. Gypsum production is subject to a provincial tax under the *Gypsum Mining Income Tax Act*. The Project boundaries are within the extent of Non-Mineral Registration No. 002.

**Water Approval** – In accordance with the Activities Designation Regulations under the Environment Act, 5(1)(n) the placement of rock or other erosion protection material in a surface watercourse requires a Water Approval. The stockpiles will cover several small headwater channels. This approval is granted by NSEL.

FG is aware of the municipal legislation applicable to this Project. The Planning Department of West Hants completed a comprehensive review and consolidation of the four existing Municipal Planning Strategies (MPS) and Land Use By-Laws (LUBs) that cover the Municipality of West Hants. Community meetings have been held to discuss and explain the draft version of the updated MPS and LUBs. During the development and operations of this Project, FG will work with the Municipality of West Hants and the updated municipal legislation. The Project area is proposed to be zoned as Agricultural Priority Two (AR-2).

## **4.0 PUBLIC CONSULATATION AND COMMUNICATIONS**

### **4.1 BACKGROUND**

In September 2005, Fundy Gypsum (Windsor, Nova Scotia) publicly announced its decision to begin the preliminary environmental and mine development planning for the proposed extension of its Miller's Creek Mine site. The continuation of this mine site would reach into a new area located on the west side of Ferry Road. Presently, all activity at the Miller's Creek Mine site is limited to the east side of this roadway. The Company's announcement was made via a widely distributed news release that was carried in the Chronicle Herald and the local Hants Journal weekly paper.

Fundy Gypsum (FG) made the announcement because it believed its employees and the community needed to know that the Company intended to continue with its West Hants operations. Prior to the announcement, there had been speculation about the future of the operation and the jobs and local benefits that go with it.

The Company recognized that this announcement would be approximately two (2) years in advance of the actual filing of an Environmental Assessment Registration Document (EARD) with Nova Scotia Environment and Labour. However, FG believed it was important to make an early announcement so that the public consultation process could be started well in advance of the filing of the EARD. The early announcement meant that rather than having to wait for questions about the project to be raised at the time of the EARD filing, both the community and the Company would have an opportunity to address questions and concerns early in the process.

### **4.2 ACTIVITIES**

Following the September 2005 announcement, the Company began a pro-active consultation and community outreach program. The intent of this program was to (a) provide information (as available at the time) about the intended project; (b) elicit possible questions and/or concerns from the local community and other stakeholders, and; (c) attempt to address these questions and/or concerns either through the provision of information or modifications to the project.

The consultation program was undertaken simultaneously with the environmental baseline study program for the project. This approach proved to have some limitations in that some questions raised by the public could not be immediately addressed because the environmental studies that provide those answers often take months or years to complete.

The following summary provides the various activities that have been undertaken by the Company with respect to public consultation and communications:

- Two letters to residents was the first formal contact the Company had with the local community with regard to the project.
- Dedicated phone number (1-888-798-0977) and email address ([millerscreek@usg.com](mailto:millerscreek@usg.com))
- House-to-house delivery of newsletters “Miller’s Creek Mine Update” in March, June, September, December 2006 and March 2007 (Copies are provided in Appendix A.1).
- Several one-on-one meetings with local residents and community representatives as prompted by the “invitation to meet” in the aforementioned newsletters.
- In early 2006, the Company met twice with representatives of an ad hoc community interest group. The two meetings that were held were inconclusive and the group formally terminated discussions with the Company in March 2006.
- A subsequent community group Avon Peninsula Watershed Preservation Society was formed and has been in contact by letter with FG. FG has offered to meet with the group at anytime. To date no meetings have been held.
- FG has maintained an open invitation approach to any and all groups interested in discussing the project or its operations.
- Ad hoc contact discussions with many local residents during field surveys, particularly during the Domestic Well Survey.
- Independent public opinion studies in May 2006 (with local residents) (Appendix A.2) and May 2007 (throughout West Hants) (Appendix A.3) (Section 4.3).
- On April 3<sup>rd</sup> and 4<sup>th</sup>, 2007, the Company held public information sessions (12 noon to 9 pm. each day) in the Belmont Community Hall. This hall is located within two kilometers of the project site
- Many media stories about the project occurred in local print and radio outlets and similar coverage in province-wide print, radio and television outlets. These media stories were often prompted by the Company’s various News Releases that were related to the project. Stories were carried on :
  - CBC Television
  - CBC Maritime Noon
  - Chronicle Herald
  - Valley Today
  - Hants Journal
  - Annapolis Valley Radio
  - Global Television

- FG solicited and also responded to numerous requests from various organizations for briefings on the project, as follows:
  - Confederacy of Mainland Mi'kmaq (information sharing meeting only, not consultation)
  - Glooscap First Nation (information sharing meeting only, not consultation)
  - Nova Scotia Department of Aboriginal Affairs (regarding consultation requirements)
  - Town of Hantsport
  - Town of Windsor
  - Municipality of the District of West Hants
  - Representatives of the Planning Department of the Municipality of the District of West Hants
  - Mr. Chuck Porter, MLA Hants West
  - West Hants Community Health Board
  - Hants County Federation of Agriculture
  - West Hants Chamber of Commerce
  - Rotary Club of West Hants
  - Hants Regional Development Authority
  - Gyro Club of Windsor
  - NS Liberal Party Caucus: Portfolio Critics
  - NS New Democratic Party Caucus: Portfolio Critics

### **4.3 OPINIONS OF THE COMMUNITY-AT-LARGE**

In Spring of 2006, the Company sought to learn in greater detail the questions and/or concerns that the local community may have had about the project. Thus, the Company engaged an independent public opinion expert to conduct an opinion study in the local community of the proposed project. The results of this study were valuable in identifying the main outstanding questions and concerns. The study found that water was the priority concern and, in response, the Company upgraded its water-related studies. The results of the survey can be found in Appendix A.2.

In the Spring of 2007 and following the continuation of the Company's consultation and communications program, a second public opinion survey was commissioned. This second study, conducted region-wide (Hants West) was equally valuable. Among other things, this study indicated the Fundy Gypsum and its proposed project were well received in Hants West. The results of this second opinion survey can be found in Appendix A.3.

Several months later, the three local Municipalities separately passed Motions of Support for the Miller's Creek Mine Extension Project. These municipalities were: Town of Windsor, Town of Hantsport, and the Municipality of the District of West Hants. Please refer to Appendix A.4 for the specifics of the Motions that were passed.

#### **4.4 PUBLIC COMMENTS AND STEPS TAKEN TO ADDRESS PUBLIC QUESTIONS AND CONCERNS**

The public information sessions held on April 3<sup>rd</sup> and 4<sup>th</sup>, 2007 at the Belmont Community Hall were attended by approximately 140 members of the public. Information presented to the public in the form of a poster display is provided in Appendix A.5. The majority of the attendees were from the Avon Peninsula area. Comments were recorded and are categorized (Table 4-1) in five topics: community input/feedback, company integrity, project design, project operations, environment/socio-economics, and groundwater. Responses were provided where relevant at the public information sessions. Where FG has specifically addressed a public concern in this EARD, we have referenced the section in the far right column.

**TABLE 4-1: CATEGORIZED COMMENTS FROM PUBLIC INFORMATION SESSION**

<b>Comment/Issue Raised</b>	<b># of Comments</b>	<b>Response Given at Public Meeting</b>	<b>Location in EARD</b>
<b>Community Input/Feedback</b>			
Establish a complaints procedure and continue communication	2	Formation of a Citizen's Liaison Committee will occur when EA approval has been granted	Various
<b>Company Integrity</b>			
How can the community be assured that FG will not default on its responsibilities	2	There is a financial bond placed before the project commences.	Various
<b>Project Design</b>			
Will Ferry Road be removed?		No, Access will be maintained for public	Section 5.2 – Project Description
Limit visual impact and vehicle noise	4	Will consider in mine planning	Section 5.6.2 – Operation and Maintenance
Will the railway be moved?	2	No.	Section 5.6.2 – Operation and Maintenance
How high is Belmont dump and needs vegetated screening (trees)	1	75 m FG to consider tree planting	Section 6.12
Can the pit be backfilled with waste material?	2	Depends on economics, consultation with the Citizen's Liaison Committee and if Project approval is granted	Section 5.6
Proximity of pit at the west end to	1	FG to evaluate in mine plan –	Section 6.12



**TABLE 4-1: CATEGORIZED COMMENTS FROM PUBLIC INFORMATION SESSION**

<b>Comment/Issue Raised</b>	<b># of Comments</b>	<b>Response Given at Public Meeting</b>	<b>Location in EARD</b>
homes – what type of barriers will be installed		evaluating vegetated berms	
Consider public viewing location of the facility and reclamation process	1	Open house planned for June – bus tours of the existing mine	Section 6.12
Have a progressive reclamation plan in place	7	Determined through the Citizen’s Liaison Committee and FG	Section 5.6.3
Why has no rehabilitation been done in the Wentworth area?	1	There has been. Most is not seen from the road to the casual observer. The tailings pond was capped and seeded. The overburden pile was contoured and seeded and pond made. The screen pile was seeded. Over 250,000 trees have been planted.	Section 5.6.3.1
Have a progressive bonding program in place	2	FG will comply with NSEL & NSDNR requirements for reclamation.	Section 5.6.3
What is depth of Bailey Quarry What is depth of this proposed pit	3	25 m below sea level  Depth depends on market conditions and drilling results	Section 5.6.2
Company statement guaranteeing that the mine outline as presented is the final limit	1	NSEL & NSDNR will stipulate final limits in any approval given.	Various
How can you put overburden on land	1	Previous agreements signed with land owner at that time are still valid	Section 5.6.2.4
Gov’t says there is good gypsum in Burlington, Summerville and Walton, why not put mine there.	1	The claim is questionable. The proposed West Mine is close to the processing infrastructure.	Section 3.1.1
Railway bridge is in bad shape	1	West Hants Railway Company owns the bridge	None
<b>Project Operations</b>			
What is allowable peak particle velocity	1	Stipulated condition in the Industrial Approval	Section 5.6.2.1
Reduce blasting effects on homes	1	New blasting technology has improved effects Blasting monitoring will be undertaken	Section 5.6.2.2
Noticeable reduction in blast noise and vibration in the past year or so	1	FG continually seeks to have improvements in this area.	None
I have wood rights, will I be able to continue cutting?	1	Yes.	None
Noise Pollution Limit hours of operation to two shifts: e.g. 5 am to 1 pm, 130 pm to 930 pm or 6 am to 2 pm, 230 pm to 1030 pm. Excessive noise from truck back-up beepers and blasting	7	FG to address in the EARD	Section 6.9
Light pollution	3	Lights are only on equipment and on existing buildings.	Section 6.12
<b>Environment/Socioeconomic</b>			
Loss of aesthetic farming life with close proximity to open pit operations, noise/visual	2	FG to detail mitigative measures in the EARD.	Section 6.11.2

**TABLE 4-1: CATEGORIZED COMMENTS FROM PUBLIC INFORMATION SESSION**

<b>Comment/Issue Raised</b>	<b># of Comments</b>	<b>Response Given at Public Meeting</b>	<b>Location in EARD</b>
Concern for frogs (wood)	1	Herptiles to be addressed in the EARD	Section 6.4
As an alternative to fossil fuels, will FG consider air conveyance and building board plants	1	FG will continue to rely on fossil fuels to transport finish product	Section 6.14
Schedule for development of recreational areas, access to lands during pit development and access limitations to the Conservation Area	10	To be addressed in the EARD Discussions with Citizen's Liaison Committee Lands that FG is not using will not be restricted. The Meadow Quarry pond has been used by the public for years. The Hants West wildlife association has built a parking lot for the winter fishing derby on company property.	Section 6.5
Are there rare plants and will clear cutting be allowed	1	Yes, in the proposed Conservation Area No cutting in environmentally sensitive areas	Section 6.5
Concern for habitat fragmentation, meaning more animals and more hunters on private land	3	To be addressed in the EARD	Section 6.6
How will proposed Conservation Area be protected	3	FG to discuss options with NSDNR	Section 6.6
How will unknown bat caves be protected on site	1	Most sinkholes are filled with water, surveys found no evidence of warm air venting or bat droppings to indicate bat roosting habitat. Acoustic bat detector did not find a significant number of feeding bats in the area.	Section 6.6
Protect riparian habitat around watercourses	2	To be addressed in the EARD	Various
What about impacts on history and agriculture Best perceived land issue - agriculture vs mining vs forested	4	FG to address in the EARD	Various Section 6.11
Submit archaeological, historical and cultural resources studies to the museum	1	Report will be used in the EARD and consideration will be given to further requests for information	Section 6.16
What about integrity of the Avon River – heard that shallow draft boats were ordered as it was silting up.	1	FG will investigate with NSEL	None
A foul smell at Ferry Road, what is the long term water quality supply	1	NSEL Inspected Pond - no foul smell was noted.	None
Air quality monitoring for particulates	1	Air quality monitoring is carried out as required by NSEL regulations for mine operations	Section 6.8
Want copies of the studies	1	The EARD will be made public for review and comment	Section 3.0
Property value – Potential farm buyer knew about mining but not I, I lost the sale, will there be compensation?	2	Final pit limits were only finalized recently	Sections 3.0 and 5.0

**TABLE 4-1: CATEGORIZED COMMENTS FROM PUBLIC INFORMATION SESSION**

<b>Comment/Issue Raised</b>	<b># of Comments</b>	<b>Response Given at Public Meeting</b>	<b>Location in EARD</b>
What is the process if a stream is filled in by the stockpile	1	FG work with DFO and NSEL to determine habitat compensation which will include onsite or offsite habitat enhancement projects	Sections 6.2 and 6.7
<b>Groundwater</b>			
Who decides how a water supply for a home is replaced if FG damages it	3	FG will rectify. The homeowner and FG discuss and determine the best option	Section 6.3.2
How will resident be protected if refuse to participate in a domestic well survey in 2006	1	FG to conduct domestic well surveys at any home on the Avondale "Loop" that now wants to participate. Everyone should participate to protect themselves.	None
Will run-off change on the Belmont side after mining starts	1	Review watershed map FG to address in the EARD	Section 6.3.1
Rural communities should have self-determination and ability to protect water/soil resources	1	FG has been part of the community for 50 years and a CLC will be formed should the extension project be approved.	None
Watershed services and features should be protected	3	To be addressed in the EARD	Various
What are guarantees to prevent salt water intrusion	1	To be addressed in the EARD	Section 6.3.2

#### **4.5        CONCLUSION**

In closing, the Company believes that it has conducted a consultation and communications program marked by the following : (a) a high degree of proactivism, (b) multiple forms of communication with local residents including small group meetings and a two-day Public Information Session in April 2007 where individuals were given an opportunity to provide feedback regarding the project, (c) regular communication of information to the local community, through newsletters, media interviews and articles, news releases and company statements, (d) tracking of public opinion through the use of an independent public opinion research professional firm whose two surveys helped prioritize the questions and concerns of the local community, (e) modifications and additions to the environmental baseline studies program as a result of the feedback from the community, (f) briefings of local Municipal Councils and community organizations, the three local Municipalities passing Motions of Support in Spring/Summer 2007 (See Appendix A.4). The Company is committed to continuing dialogue with the local community while the proposed project is being developed and operated. FG recognizes the important role that the Community Liaison Committee (CLC) will play in the project.

## 5.0 DESCRIPTION OF THE UNDERTAKING

### 5.1 MINE HISTORY

Cultural Resource Management Group (CRM) completed a significant amount of historical research for FG that included interviews, archival research and field surveys. Historic photos and mapping can be found in their report in Appendix H.1.

Although the gypsum deposits in Nova Scotia were recognized as early as the seventeenth century, there appear to be no historical accounts of mining operations prior to 1779 (Jennison 1911: 16; Shand 1979: 82). While it is possible that the Acadians mined and utilized local gypsum, there is no historical evidence to substantiate this. The gypsum industry in the Avondale area evidently began soon after the arrival of the Planters, who commonly used gypsum as fertilizer (Shand 1979: 83). The first quarries would have been small-scale operations, privately owned by local farmers or leased to others as a source of extra income. Extracted material was sorted in the quarries and hauled to the river by horse and cart in the summer or by sled in the winter. The gypsum was sold to local traders or shipped to various points along the Eastern Seaboard and became a standard item of commerce between Nova Scotia and the United States (Jennison 1911: 16; Shand 1979: 85-87; Adams 1991: 9-10). The first vessel built in Newport Landing (Avondale) to transport gypsum from Hants County was constructed in 1807 by Nicholas Mosher (Shand 1979: 87). By the beginning of the nineteenth century, these small quarries began to expand, providing employment for local residents (Mosher 1979: 9). By the late nineteenth century, the gypsum quarries began to consolidate into the hands of a small group of companies (Adams 1991: 10).

In the 1830s, Newport Landing (Avondale) emerged as the scene of large-scale wooden shipbuilding enterprise, which rivalled the economic importance of gypsum mining in the area. Both industries were influential in the community and developed side by side until 1892, which marked the end of the shipbuilding activity in the area (Shand 1979: 93). Technological advances in mining led to increased productivity and the gypsum industry continued to flourish, particularly with the establishment of the Newport Plaster Mining and Manufacturing Company (NPMMC) (*Plates 1 & 2, Appendix H.1*). One of the principal owners was Jerome Berre King, a pioneer in the gypsum industry in New York and Nova Scotia, who soon controlled the Hants County gypsum industry - quarries, vessels, and railroads - from his headquarters at Staten Island, New York (Mosher 1979: 12).

J.B. King established the NPMMC around the turn of the century and by 1906 had begun purchasing gypsum in Avondale. In 1907, King acquired the shipyard in Newport

Landing and in 1908 purchased a 5 acre lot in Avondale from George Mounce, the site of the first NPMMC quarry. The 1909 Faribault and Fletcher map identifies this quarry, also known as the “tunnel quarry”, just east of the Belmont Road (1909). In his 1911 report on gypsum deposits in the Maritimes, Jennison reported that the “old quarry, which was operated here some years ago, has been reopened at a lower level, by driving a tunnel large enough for drainage and railway track” (Jennison 1911: 81). It is not known how long this quarry was in operation, but it is not mentioned in the 1913 description of the active NPMMC quarries (Cole 1913: 38). The NPMMC ceased operations at Avondale in 1920 (Mines Report 1921), when the company was hit by a general strike and the business was transferred to the Wentworth facilities on the St. Croix River. When King died in 1924, his Staten Island Plant became part of the United States Gypsum Company and his mine operations in Nova Scotia became part of the Canadian Gypsum Company, while his ships became part of the Panama Gypsum Company (Foley 1995: 36).

Locally published historical reports on Newport Landing (Paul Webb 2005) depict a gypsum quarry in the northern portion of the Mining Permit No. 0024 (now Non-Mineral Registration No. 002) bounds in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. The associated infrastructure is depicted including roads, a wharf, a stockpile shelter (called the “Plaster Shed”) and eventually a railway for steam engines.

No exploration for gypsum is known to have taken place between the 1920s and 1950s. The gypsum quarries west of the Ferry Road operated by Newport Plaster Mining and Manufacturing stopped operating due to a strike in the early 1920s. Several other small quarries ceased operations before the twentieth century. In 1953, 39 holes were drilled to explore for a large gypsum deposit west of the Ferry Road. This was to replace the Dark Quarry in Wentworth which was being depleted. Although some reserves were found, the decision was made to open up the Miller’s Creek Quarry in 1956 due to the proximity of the Midland Railroad at Mantua. Mining activity at this area continues to this day.

Fundy Gypsum currently mines gypsum at Miller’s Creek and nearby Wentworth; and anhydrite at the Wentworth site only. The Miller’s Creek site operates a drill, blast, haul, crush and screen operation. The rock is transported from Miller Creek approximately 15 km by rail, which is operated by the Windsor Hantsport Railway Company, and shipped out of its ocean terminal in Hantsport.

Mapping and interpretation of the geology west of the Ferry Road by Dr. R. G. Moore of Acadia University began in 1973 for the Fundy Gypsum Ltd. The test drilling resumed in 1996. Additional core drilling and interpretation of the area took place in 1998, 2000,

2005 and 2006. Small core drilling programs will continue throughout the life of the deposit to assist the operators with the quality control and determine the most economical recovery of the gypsum.

In 1956, land and gypsum rights were purchased at the Miller's Creek site and the construction of a new crushing, screening, storage shed and railcar loading facility took place. In 1959, the Fundy Gypsum (FG) was incorporated as a subsidiary of the United States Gypsum Company.

FG, with its mines in Wentworth and Miller's Creek, has produced close to one quarter of the gypsum produced in Nova Scotia and a fifth of the gypsum mined in Canada.

The existing Miller's Creek surface mine operation occupies approximately 477 hectares, or approximately 36% of the existing land mass bordered by Lawrence Road, Ferry Road, and the Kennetcook and St. Croix Rivers.

The proposed Project, at full development, will occupy approximately 15% of the land mass bordered by Ferry Road and the Avon, St. Croix and Kennetcook Rivers.

## **5.2        PROJECT DESCRIPTION**

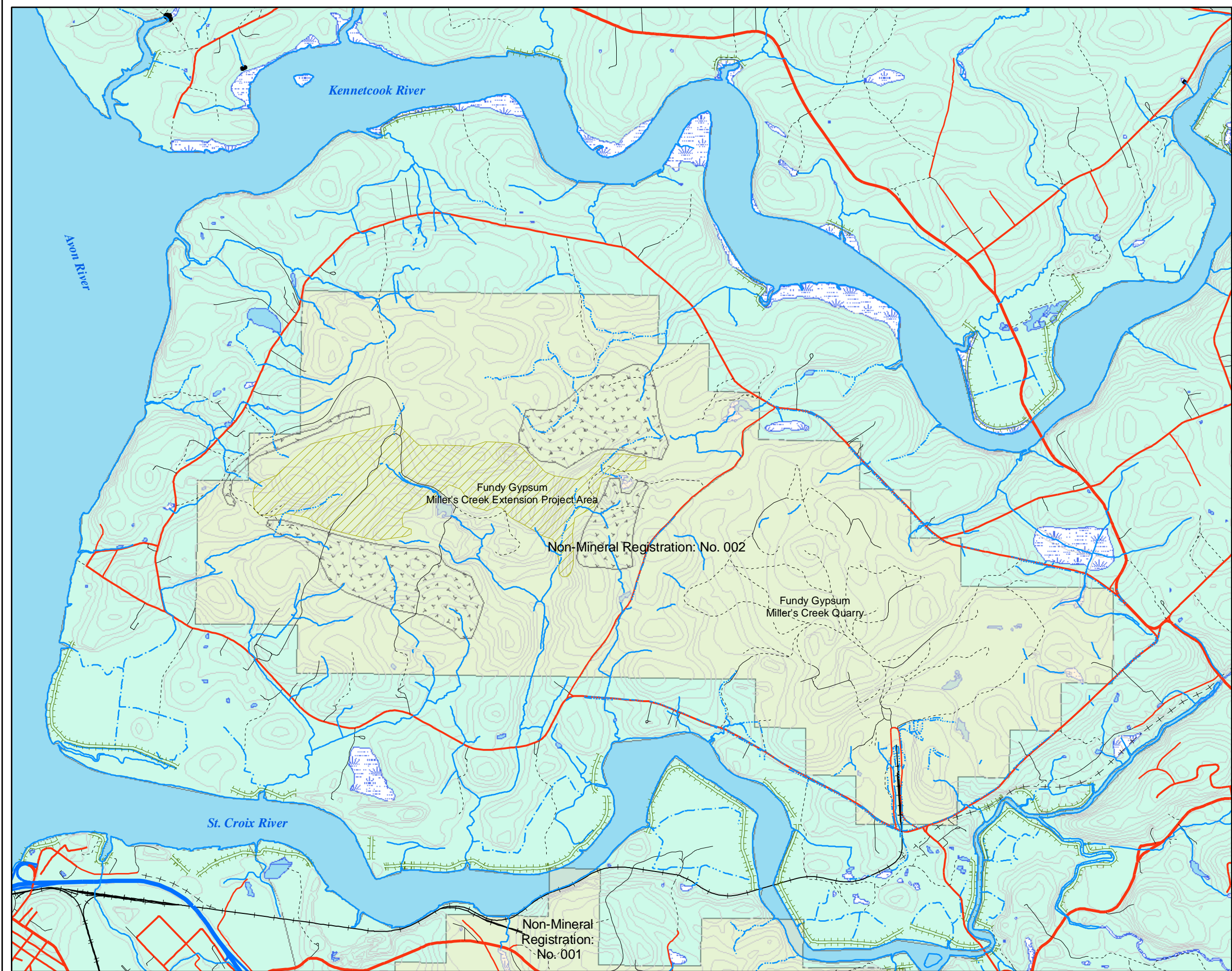
FG proposes to gradually replace the existing surface gypsum mine at Miller's Creek. The Project includes the development of a deposit adjacent to the existing operations, west of Ferry Road, and the construction of associated, limited infrastructure. The Project is within the area included in the current Non-Mineral Registration No. 002 filed with NSDNR (Figure 5.2-1). The Project will include a gypsum extraction area, rock and overburden stockpiles, roads, a Conservation area (Section 6.5.2.2, Figure 6.5-1), earthen berms, settling ponds, power distribution system, mine dewatering equipment and some small service buildings.

The maximum Project footprint is approximately 420 hectares consisting of:




- |  |        |
|--|--------|
| • Extraction                             | 180 ha |
| • Stockpiles, Roads, Settling Ponds, etc | 200 ha |
| • Proposed Conservation Area             | 40 ha  |

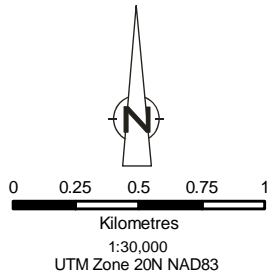
The areas listed above present the total area that may be impacted over the life of the project. The actual disturbed area at any one time during the life cycle of the mine will be much smaller as Fundy will seek to minimize the disturbed area at any one time.





**Legend**

-  Proposed Mine Pit
-  Proposed Stockpiles
-  Non Mineral Registration



Source: Nova Scotia Topographic Database  
SNS&MR - NS Geomatics Centre  
NS Mineral Rights Database - DPME 51, July 9, 2007  
NS Natural Resources - Mineral Resources Branch

820677B (REP06) GIS-DA0521 Dec. 10, 2007

Figure 5.2-1

NON-MINERAL REGISTRATION  
Miller's Creek Extension Project  
FUNDY GYPSUM  
Hants County, Nova Scotia

Progressive reclamation and partial backfilling of areas depleted of gypsum within the mine boundaries may limit the actual Project footprint.

Mine activities will include drilling, blasting, loading and hauling. The rock mined for production will be transported by off-highway, haulage trucks to existing crushing and screening facilities. A level crossing with a public right-of-way will be constructed at the Ferry Road intersection (See Figure 5.3-1). Overburden and direct mine waste associated with the deposit will be stockpiled around the perimeter of the mine. A new power distribution system will be installed to provide electricity for the mine de-watering pumps, service buildings and miscellaneous uses. There is no requirement for a tailings treatment facility characteristic of base metal mines. There is no chemical process effluent associated with gypsum mining.

Initial production is estimated at 100,000 ton per annum increasing to a production rate of between 1.5 and 2 million ton per annum as reserves in Miller's Creek are depleted over the next 10 to 12 years. The additional volume of rock produced from the mine extension area is estimated to extend the life of the active Bailey Quarry an additional 5 years. The production life of the mine extension is estimated at approximately 30 to 50 years. Proven reserves remaining in Miller's Creek plus the proven and probable reserves in the mine extension area can sustain 35 years of production at the current extraction rate. Additional gypsum may be recoverable if the waste to gypsum ratio decreases or core drilling delineates additional reserves which could extend the life of the mine an additional 15 years.

### 5.2.1 SCHEDULE

The anticipated schedule leading to production is indicated in Table 5-1. It is emphasized that implementation of each activity is dependent on the successful completion of the former.

**TABLE 5-1: FG MINE EXTENSION SCHEDULE**

<b>Year</b>	<b>Activity</b>
2008	<ul style="list-style-type: none"><li>• Main Haul Road Construction<ul style="list-style-type: none"><li>◦ Installation of Environmental Controls as required</li></ul></li><li>• Core Drilling</li></ul>
2009	<ul style="list-style-type: none"><li>• Main Haul Road Construction<ul style="list-style-type: none"><li>◦ Installation of Environmental Controls as required</li><li>◦ Utility Road Construction</li></ul></li><li>• Core Drilling</li></ul>
2010	<ul style="list-style-type: none"><li>• Main Haul Road Construction<ul style="list-style-type: none"><li>◦ Installation of Environmental Controls as required</li></ul></li></ul>

**TABLE 5-1: FG MINE EXTENSION SCHEDULE**

Year	Activity
	<ul style="list-style-type: none"> <li>○ Utility Road Construction</li> <li>• Settling Pond Construction</li> <li>• Overburden Removal</li> <li>• Power Line &amp; Transformer Installation</li> </ul>
2011	<ul style="list-style-type: none"> <li>• Overburden Removal</li> <li>• Service Building Installations</li> </ul>
2012	<ul style="list-style-type: none"> <li>• Overburden Removal</li> <li>• First Production <ul style="list-style-type: none"> <li>○ ~ 100,000 net tonnes per year (tpy)</li> </ul> </li> </ul>
2013 – 2018	<ul style="list-style-type: none"> <li>• Production Gradually Increased <ul style="list-style-type: none"> <li>○ ~200,000 to ~1,000,000 net tpy dependant upon recovery, production requirements and remaining reserves in Miller’s Creek</li> </ul> </li> <li>• Mine Sump Construction and Dewatering Pump Installation</li> <li>• Initial Reclamation Commences</li> </ul>
2018 – 2023	<ul style="list-style-type: none"> <li>• Continued Increase in Production <ul style="list-style-type: none"> <li>○ ~1,000,000 to ~2,100,000 net tpy</li> </ul> </li> <li>• May be possible to commence backfilling in those areas depleted of gypsum reserves</li> <li>• Reclamation Continues</li> </ul>
2023 - 2057	<ul style="list-style-type: none"> <li>• Continued production <ul style="list-style-type: none"> <li>○ ~1,500,000 to ~2,000,000 net tpy</li> </ul> </li> <li>• Continued Backfilling &amp; Reclamation</li> <li>• Sump and Dewatering Pump Relocations as necessary</li> </ul>

The process of reclaiming mines that go through provincial EA is typically done in several stages. At the EA stage a “conceptual reclamation plan” is presented to the public during public consultation and refined based on public input. This refined “conceptual reclamation plan” is presented in the EARD for review by regulators and the public for its general approach and some details on the timing, key aspects, type of reclamation and projected end use of lands after the reclamation is complete. Should the Project receive EA approval there will be often be a Condition of Release that stipulates the need to prepare a “preliminary reclamation plan” for review by NSEL and NSDNR and the CLC as part of the application for an Industrial Approval (IA). This plan is used to determine the value of the Reclamation Bond that the proponent will need to provide in order for the project to proceed.

The needs and wishes of a community as well as the mining process may change as the project proceeds resulting in the requirement for a “Final Reclamation Plan” to be submitted six months prior to the end of the extraction phase of the mine life. This Plan is prepared by the proponent in consultation with the CLC, NSEL, NSDNR and possibly

other parties such as a community group or technical organization such as Ducks Unlimited. This “final reclamation plan” is then approved and the proponent begins the work. The plan often includes monitoring components for aspects such as surface water quality, groundwater quality, water levels, vegetation growth and wetlands health. When the proponent completes all of the requirements of the EA conditions, IA conditions and any other reclamation related condition, the proponent is able to get back the reclamation bond value in full. Nova Scotia does also allow for portions of the bond to be released if progressive reclamation is part of the project. For example, if 20 percent of the area has been reclaimed to the goal in the “conceptual reclamation plan”, a portion of that may be released if NSEL and NSDNR complete inspections and are satisfied with the work completed.

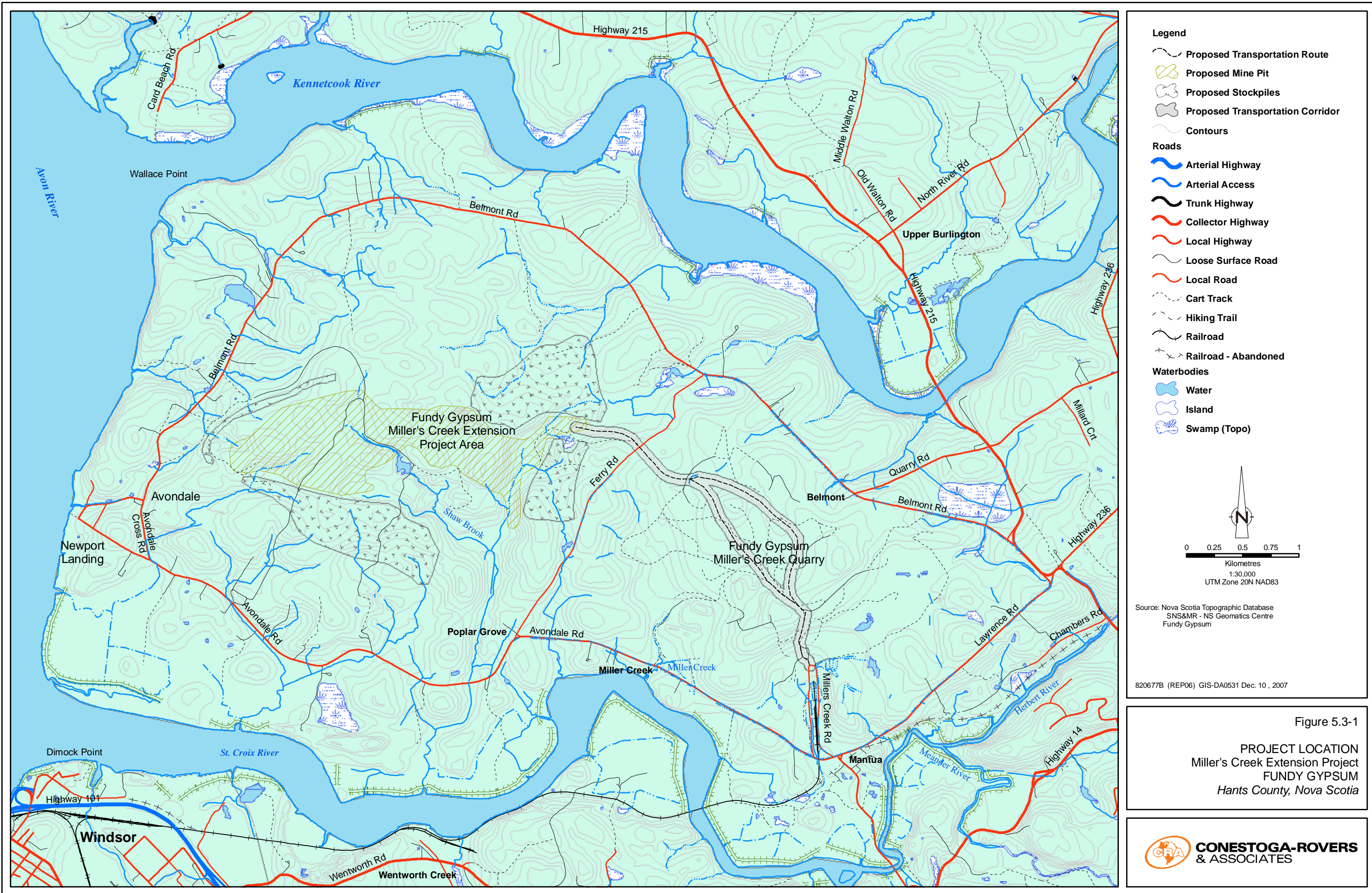
### **5.3        GEOGRAPHICAL LOCATION**

The Project site is located on the Avon Peninsula in Hants County, Nova Scotia (Figure 5.3-1). The proposed extension of the existing surface mining operation is bound by Avondale, Belmont and Ferry Roads. The Avon Peninsula is surrounded by the Kennetcook River to the north, the St. Croix River to the south and the Avon River to the west.

The proposed active surface footprint of the site is approximately 420 hectares within FG’s Non-Mineral Registration area west of Ferry Road, which contains an area of 1042 hectares. FG currently owns 486 hectares within the Project site. Negotiations for additional property acquisitions are currently ongoing.

The Project site is located within topography which is generally higher than that of the surrounding areas. Salt marshes along the river banks give way to gently undulating plains further inland. Surface elevations across the site range from approximately 20 to 75 metres above sea level (masl) and slopes range from 1 to 3%, with some local grades of up to 10%. The site is characterized by a series of low rolling hills (described as knobs or knolls), with moderately incised drainages and valleys. The topography of the area has been influenced by the underlying bedrock, exhibiting karst features and numerous pits and excavations, evidence of gypsum extraction dating back to the mid-19<sup>th</sup> century in some instances. Some sinkholes support small ponds and a former spoil area is now a small lake created by a beaver dam.





The Avon Peninsula is occupied by approximately 34% forested stands, 6% cleared or partially cleared forest, 39% agricultural use, 10% previously mined areas, and approximately 3% urban (residential, industrial, commercial). The remaining 8% consists of wetlands/scrub lands and transportation/power corridors.

Residential development in the immediate vicinity of the Project is relatively low, with the closest public road located approximately 395 metres (1300 feet) away. There are approximately 300 residences/structures within a three kilometre radius from the centre of the surface mine extension. The nearest communities are Avondale, Belmont, Poplar Grove, and the Town of Windsor.

#### **5.4        PHYSICAL COMPONENTS**

The Project physical components include the following:

- Mine;
- Haul Roads;
- Overburden and Waste Rock Stockpiles;
- Settling Ponds;
- Power Distribution; and
- Service Buildings: Motor Control Centers (MCC's), Blast Warning System Tower and Building, Site Trailer/Building, First Aid Station, Washroom and Lunchroom Facilities, Petroleum Storage Facilities

#### **5.5        DESIGN STANDARDS**

The design of the Miller's Creek Mine Extension Project is based on internationally, nationally and provincially accepted standards and criteria. The Project will be developed and operated in accordance with all applicable national, provincial and municipal legislation for mining and construction projects in Nova Scotia. In particular, the General Safety Regulations pursuant to the *Occupation Health and Safety Act*, the *Nova Scotia Environment Act* and Regulations, the National Building Code, Nova Scotia codes and the Nova Scotia Environment and Labour (NSEL) Sediment and Erosion Control Handbook have been used in the design and will continue to be used throughout the duration of the Project. All development activities will be completed under the supervision of qualified staff with the appropriate credentials for work in Nova Scotia.

In order to assess the economic and environmental feasibility of mining the resources west of Ferry Road, the proponent has completed a variety of studies and assessments.

In addition, the proponent has gathered a variety of inputs about the general biophysical location as a result of operating the existing site east of Ferry Road for over 50 years. The following items were completed and/or are in process of completion. These inputs will be used in the design and assessment of the proposed gypsum mine extension:

- Review of existing baseline information on surface water, groundwater, soils, and sediment;
- Groundwater assessment was completed, including a desktop review of wells in the area as per the NS Well Log Database, installation of 10 wells in bedrock and overburden in 2006 within and adjacent to the extension, and water level and water quality monitoring;
- Terrestrial ecology evaluation;
- Environmental screening (desktop assessment of cultural and natural heritage resources in the area) completed by the Nova Scotia Museum (NSM) in 2004;
- Compilation and review of published information on the local site and region related to biophysical and socio-economic considerations;
- Botanical field investigations were undertaken within the study area in late summer and fall of 2005 focusing on priority species of risk. Additional detailed investigations conducted during spring and early summer of 2006 and spring 2007;
- Initial aquatic habitat assessment was completed in autumn of 2005. Additional aquatic habitat surveys are conducted in 2006 and 2007;
- Breeding birds and amphibians surveys were conducted in 2006 and 2007;
- Assessment of wetland habitat within the study area was completed in 2006 and 2007;
- Surface water sampling program underway since late 2004 at five locations where watercourses leave the Project site, and increased to six locations in November 2005;
- Noise monitoring related to blasting is ongoing and baseline data collection is completed for the extension project.
- Collection of baseline data for suspended particulates (dust) in 2007.
- Core drilling program within the proposed areas has been conducted under existing approvals from NSDNR to assist in development of detailed mining plan;
- Archaeological background study of the proposed site has been completed, including a Heritage Research Permit application, desk top review and initial site visit, and a detailed field reconnaissance program was undertaken in 2006;



- First Nations study of Mi'kmaq Land and Resource Use was completed by Confederacy of Mainland Mi'kmaq (CMM) to determine likelihood of Mi'kmaq interests and site knowledge;
- A two-day formal public information session was completed April 2007 in Belmont on the extension of Fundy Gypsum extension project;
- Ongoing discussions with elected officials and staff of Municipal and Provincial governments about proposed extension to the west of Ferry Road, including One Window Committee meetings on October 25th, 2005 and May 4th, 2006;
- Aerial photographs and Light Detection and Ranging (LiDAR) – flight survey completed in May 2006 to provide current photographs and very detailed topographical information; and
- 3D mine modeling software used for mine design and volume calculations.

Social and environmental concerns have been considered in the planning and preliminary design of the Project. These are detailed in this assessment of potential effects on valued environmental and socio-economic concerns. To support this assessment, additional information sources pertinent to the review of mining projects were consulted.

## **5.6 SURFACE MINE DEVELOPMENT PLAN**

In mining, there is no distinction between site preparation and operational phases as they are all part of the same mining activity.

The mine development and future operations are based on a plan proposing a fleet of 100 ton, off-road haulage trucks matched with 13-15.5 cubic yard wheel loaders and large hydraulic excavators. The haulage and primary wheel loader/hydraulic excavator fleet production capability, fleet productivity, operating schedules, owning and operating cost will be continuously monitored and analyzed throughout the life cycle of the Project. As the mine advances through its life cycle, analysis may indicate larger, off-road haulage trucks or alternate shift schedules be employed. The following sections detail mine development process.

### **5.6.1 SITE PREPARATION - OVERBURDEN REMOVAL**

Development of the Miller's Creek Mine Extension area will include road building, construction of settling ponds, erosion and sediment controls, overburden removal,

stockpiling of soil and rock and rock extraction. Clearing and grubbing will take place prior to gypsum extraction operations and will follow a work progression schedule limiting the disturbance to those areas required for active mining activities.

Clearing and grubbing requirements vary across the site as there are larger disturbed areas from forest harvesting and smaller cleared areas associated with old mine pits and extensive access roads and all-terrain vehicle trails. The forested area consists of a mixture of coniferous and deciduous trees of various age classes. See section 6.6.2 (Table 6.6-6) for a more detailed description of forest habitats.

Merchantable timber will be sold and the remaining will be used to the greatest extent possible for reclamation activities on site.

There are no buildings present within the mine extension area, so no demolition activity is required. Should petroleum impacted soil or groundwater, or hazardous materials be identified, they will be handled, transported and disposed of according to all applicable legislation.

The topsoil material overlying portions of the site is mapped as the Queens soil series, consisting of light reddish-brown loam over reddish-brown clay loam. The removal of overburden will be completed in a progressive nature according to the mine development plan. This will minimize the aerial extent of disturbed area at any one time. Overburden will be removed by excavators, trucks and dozers and stockpiled.

Overburden removal will be restricted to the winter months, when the ground is frozen or the summer months when the ground is dry. The overburden will be removed using the fleet of 100 ton haulage trucks matched with hydraulic excavators. Some stripping operations may permit the use of the wheel loaders if the ground is frozen or firm enough to support the loaders and haulage trucks. Operations must be restricted to these months to allow the material to be placed in the stockpiles. The material to be stripped does not have the bearing capacity to support the haulage trucks or any of the other pieces of mobile equipment when wet. The material must be frozen or dry when worked or placed in the stockpiles. The overburden varies in thickness from zero, in those areas where the gypsum is at surface or outcrops, to 44 metres thick. Approximately 33 million ton of overburden will be stripped from the area over the life of the Project.

Where topsoil and organic material can be separated from the underlying till, it will be stockpiled for use during reclamation activities. Run-off from the site will be directed to settling ponds to allow time for any suspended sediments to settle prior to leaving the

site. Material directly beneath the unconsolidated till will all be drilled and blasted for excavation.

## **5.6.2      OPERATION AND MAINTENANCE**

### **5.6.2.1    EQUIPMENT**

The mining equipment and accessories used in the operations will vary through the life of the project. The expected types of equipment and accessories that may be used for overburden removal, drilling, blasting, loading and hauling run of mine gypsum include:

- excavators (shovel and backhoe configuration)
- 100 ton off-road haul trucks
- 13-15.5 cubic yard capacity wheel loaders
- Snow plow and sanding trucks
- Mobile equipment support equipment: skid steer loaders, mini excavators, small wheel loaders, boom truck
- bulldozers
- rotary, down-the-hole (DTH) and hydraulic top-hammer drills
- grader(s)
- water truck(s)
- excavator mounted hydraulic rock breaker
- Utility vehicles: pick-ups, mechanic service vehicles, fuel & lube truck(s)
- sump pump(s), rafts and discharge pipe(s)
- blasting shelters
- ammonium nitrate (ANFO) and explosives delivery trucks
- tractor and float

### **5.6.2.2    ROADS**

All roadways in the mine extension will be designed, constructed and maintained to enable vehicles to pass each other safely and of sufficient width to accommodate the proposed traffic. The main, permanent haulage roads will be constructed three times the width of the largest unit proposed to operate on the roads. Adequate shoulder berms will be constructed and maintained along the edge of those portions of the road where the vertical drop is greater than three metres. The grade on the roadways will not exceed 12% on any 300 metre section of these roadways.

Temporary roads and ramps within the quarry and some roads less than 300 metres in length may exceed 12%. These roads and roadways will be designed, constructed and maintained to minimize hazards caused by slipping or skidding vehicles and constructed to ensure that the grades do not exceed the design capacity of the vehicles and equipment proposed to use the roads.

A Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) approved level crossing on Ferry Road will be constructed to transport material from the mine extension area to the existing processing and rail load out facilities located to the east of Ferry Road (see Figure 5.6-1). The public will maintain the right-of-way; mobile equipment and utility vehicles accessing the mine extension area will be required to stop at posted signs. FG has, and will continue, an ongoing dialogue with NSTIR regarding the features of the proposed crossing.

#### **5.6.2.3     ACCESS**

The mine and stockpile areas will be marked and identified in an adequate manner to prevent inadvertent entry by a person or persons. Signage will be posted around the perimeter of the property prohibiting access. The main access roads will be gated and the blasting signals will be posted at conspicuous locations around the site and at points of entry.

#### **5.6.2.4     MINE DEVELOPMENT**

The mine will be phased into production over several years as the reserves in the existing Bailey Quarry are depleted. The new pit will be developed in stages to smooth production schedules and optimize Project economics. Initial development will include access road construction as described previously. The overall mine development for the area west of Ferry Road is shown on Figures 5.6-2 to 5.6-4, which is a plan view of the site showing pit sequencing. The drawing shows pit layout and design along with their relative locations.

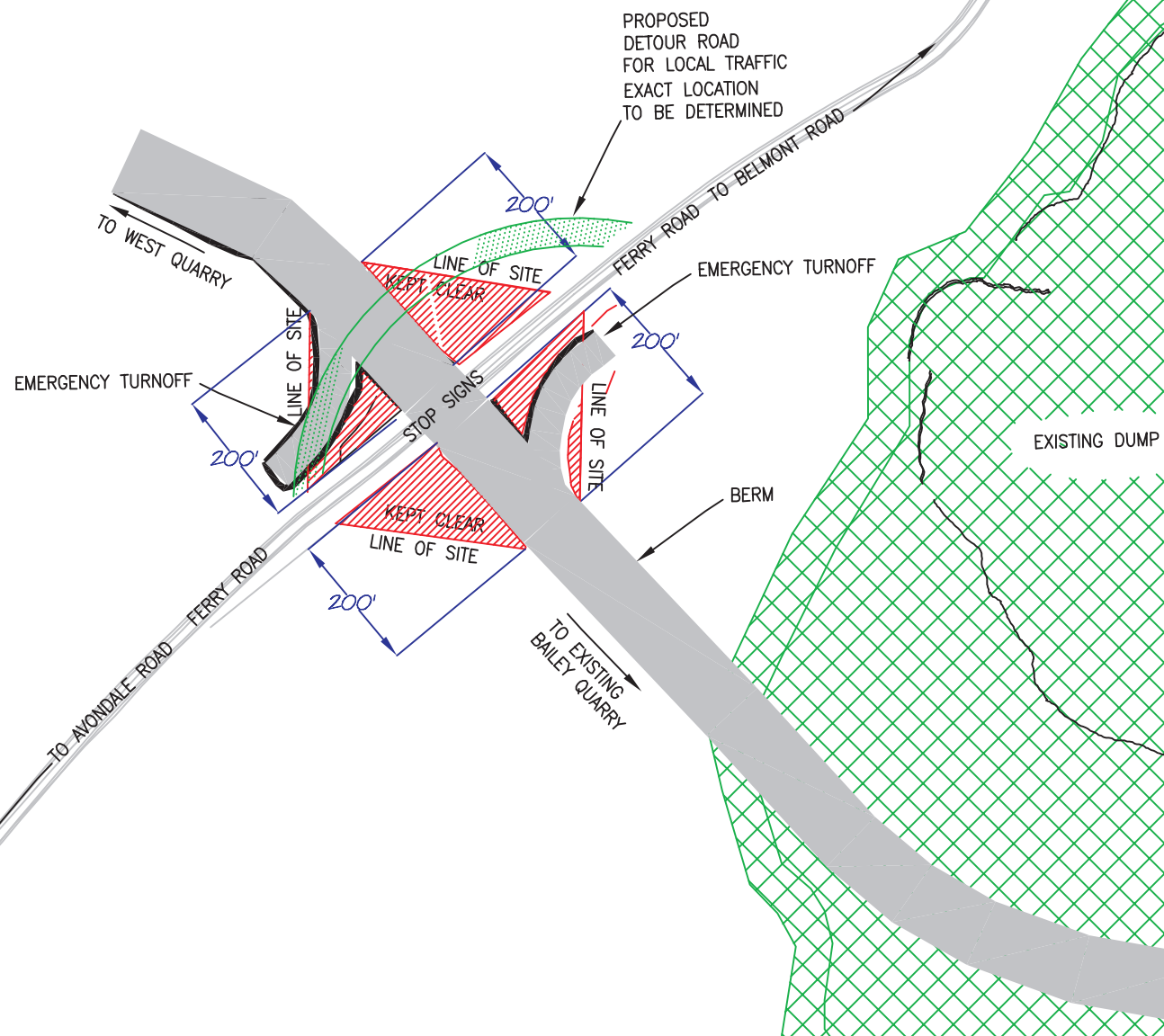
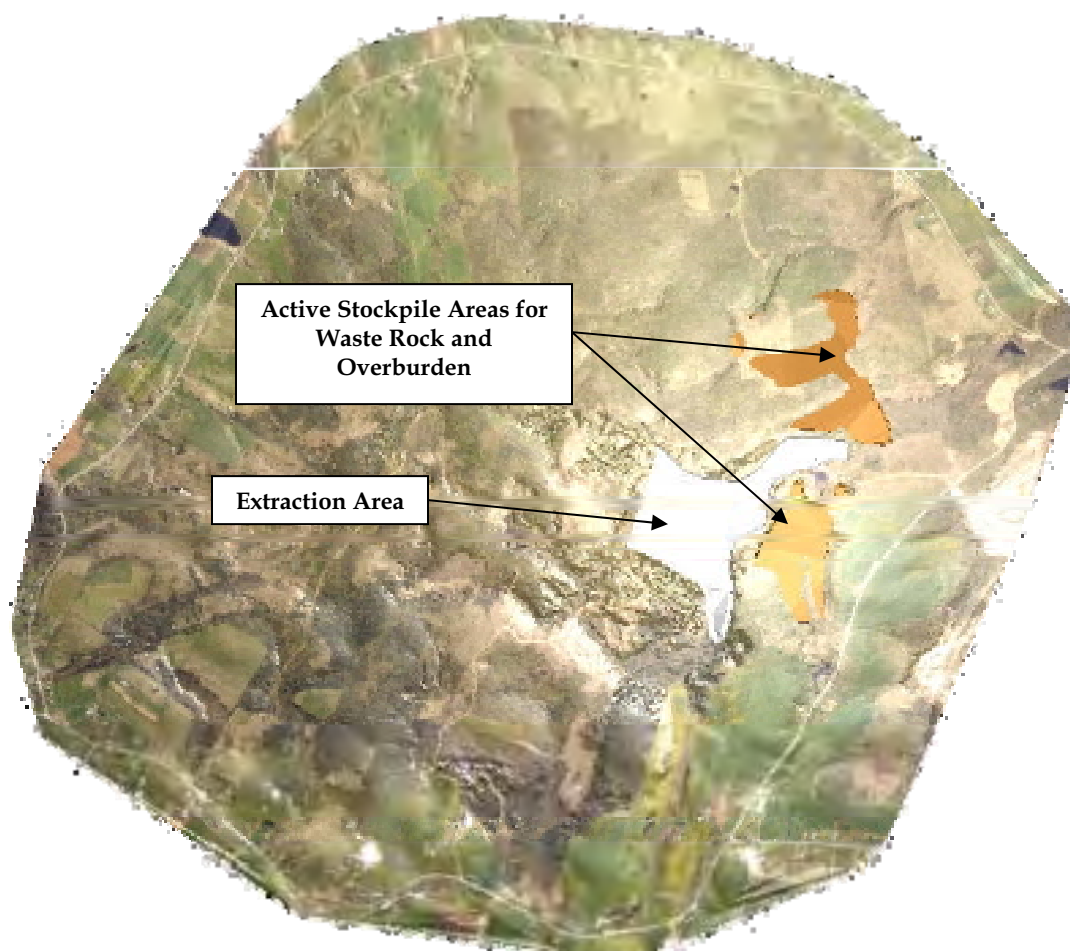
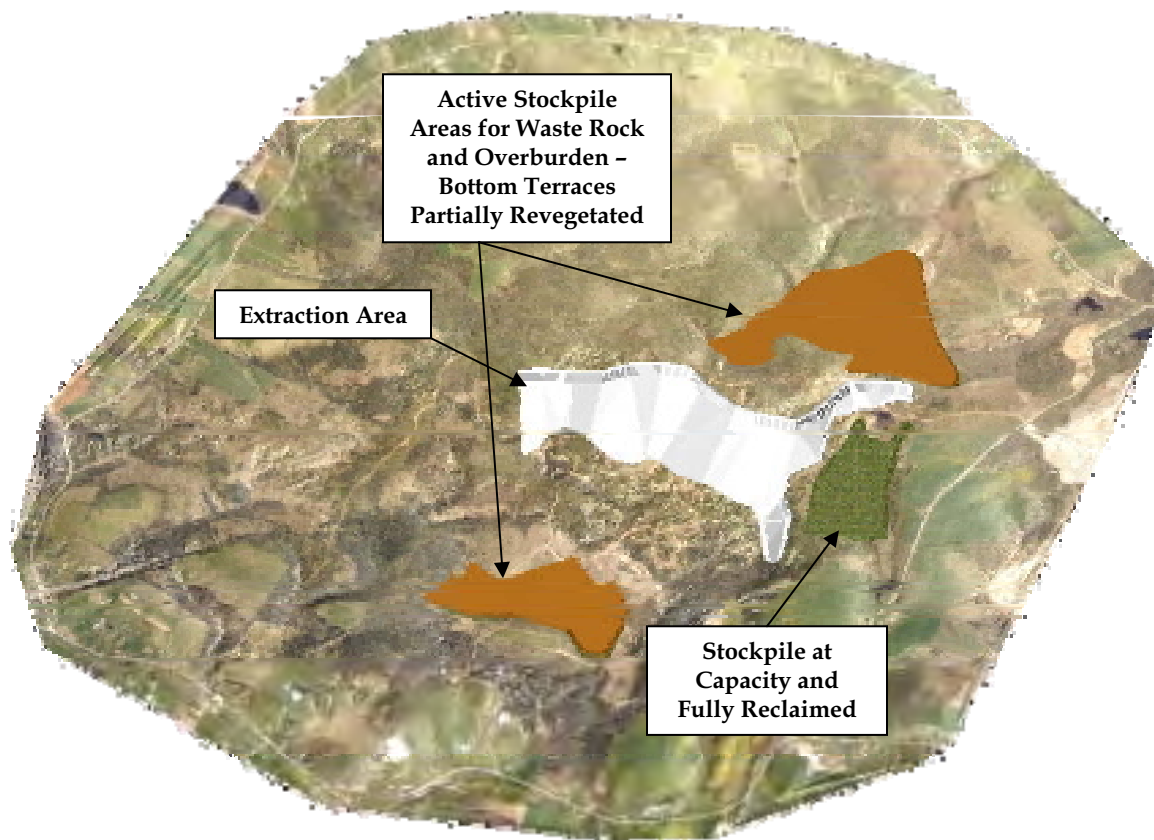


Figure 5.6-1  
 PROPOSED FERRY ROAD INTERSECTION  
 FUNDY GYPSUM  
 Hants County, Nova Scotia

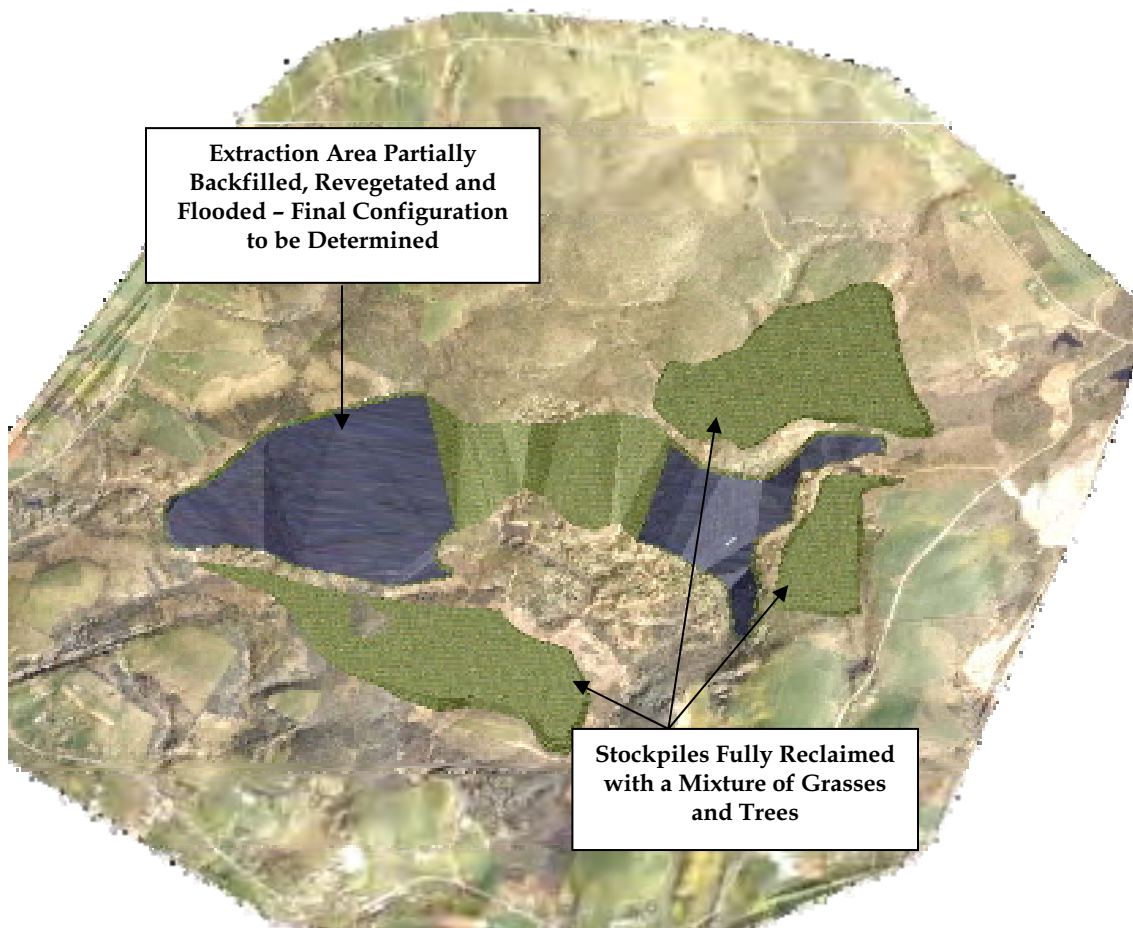


**Figure 5.6-2: Conceptual View of Miller's Creek Mine Extension Area After the First 10 Years of Production**



**Figure 5.6-3: Conceptual View of Miller's Creek Mine Extension Area After 20 Years of Production**



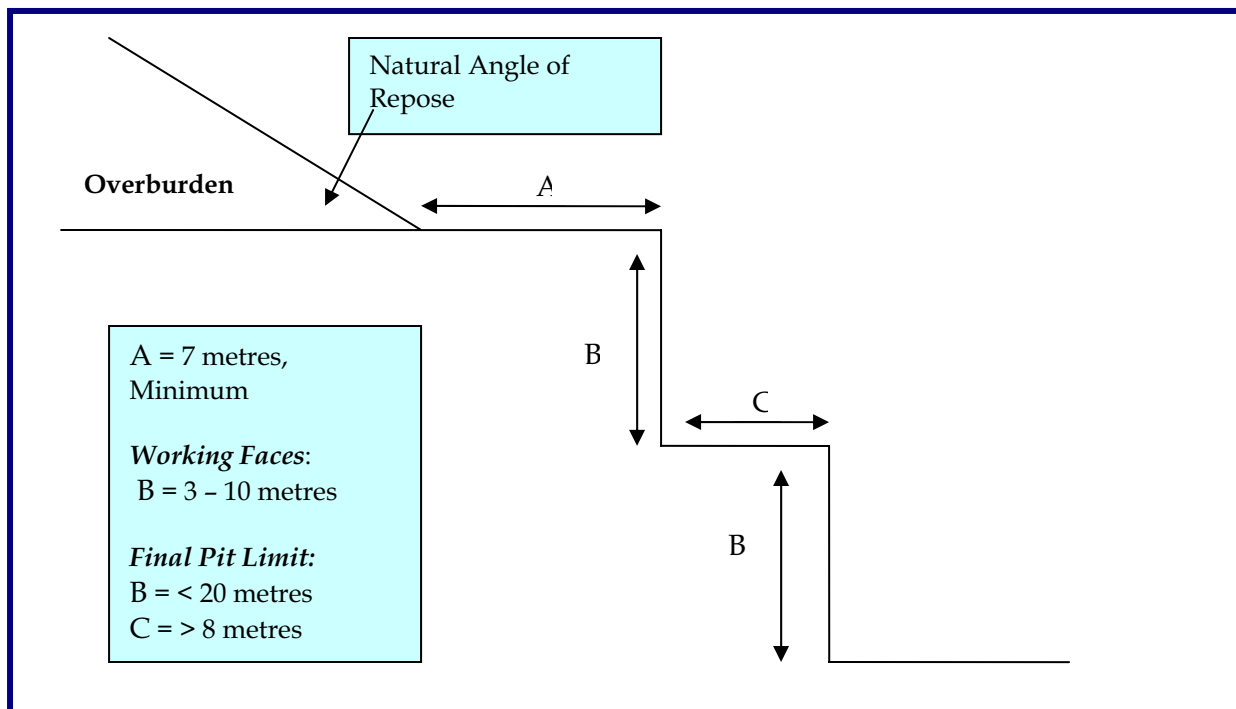


**Figure 5.6-4: Conceptual View of Miller's Creek Mine Extension Area at Full Development After Final Reclamation**

The gypsum deposit strikes predominantly east to west. The mine boundary will follow the strike of the gypsum deposit along the north and southwest stratigraphic units that define the recoverable reserves. The east and west mine boundaries are defined by the geologic structure. The southeast mine boundary is defined by a proposed Conservation Area. The deposit is approximately 3,170 metres long and varies in width from 320 metres at its narrowest point to a maximum width of 950 metres.

The terrain is typical karst topography characterized by uneven terrain and numerous sink holes. Ground surface elevations within the proposed development area vary from 18 to 73.8 metres above sea level. The mine will be developed to a maximum depth of 70 metres below surface, 10 metres below sea level. The average depth of the mine will be approximately 50 metres below surface.

The overburden overlying the deposit will be removed a minimum distance of seven metres from the edge of the mine. The removed material will be stockpiled in one of three sites identified outside the perimeter of the mine (Figure 5.3-1). Stockpiles consisting mostly of rock will be sloped to a maximum angle of 1:1.5 (vertical:horizontal), while overburden stockpiles will be sloped to 1:3 (V:H). The in situ material around the perimeter of the mine will be sloped to the natural angle of repose of the material or to a maximum slope of 1:1.5 (V:H) as per current practice. The mine will be developed in a series of working benches and faces from 3 to 10 metres in height. The rock type, structure and stratigraphic units in any particular area of the deposit will determine mine development and the actual bench height. The bench face angles will vary dependant upon the waste units, dip and strike of the rock, but predominantly will be maintained at or near vertical or 90°. The unconsolidated and blasted material within the mine boundaries will be maintained at a level less than 1.5 metres above the maximum reach of the equipment being used to work or remove the material. The final pit limit will be designed, developed and maintained in a series of benches with walls or bench faces less than 20 metres in height separated by 8 metre intermediate benches (Figure 5.6-5).



**Figure 5.6-5: Bench Design**

#### 5.6.2.5 DRILLING AND BLASTING

The primary objective of blasting is to ensure a safe, optimum operation at a reasonable unit cost that minimizes noise, vibration, dust, gas generation and fly rock. The blast design, products, blasthole depths and diameters will be determined by the structure, strength and resilience of the rock. The rock properties and structure vary considerably over the proposed Project area. Each blast will be designed per the conditions present in the area under development.

The Miller's Creek operation presently operates a fleet of three crawler mounted drills. A fourth unit is sometimes transferred from Wentworth to assist operations. The same and/or similar units will be operated in the proposed mine extension. The present drill fleet is comprised of the following equipment:

- Two (2) Tamrock Pantera 1500's, Hydraulic Top-Hammer Drills
- One (1) Ingersoll Rand DM30, Rotary Down-the-Hole (DTH) Drill
- One (1) Atlas Copco ROC 860, Down-the-Hole Drill (Wentworth Unit)

The drill fleet has the capability of drilling varying diameter blast holes to various depths. The minimum blast hole drilled will be 108 mm in diameter. The maximum blast hole will be 143 mm in diameter. The blast hole patterns will be dependant upon the hole diameter, the bench height (depth of hole), the structure and the competency of the rock being drilled and blasted. The minimum blast hole pattern will be 2.5 metres x 2.5 metres. The maximum blast hole pattern will be 3.7 metres x 4.3 metres. The powder factor will average approximately 0.15 kg of explosive per gross tonne of rock blasted.

Blasting operations will be scheduled for the late afternoon, between the day and evening shifts in the mine. One (1) to four (4) blasts (shots) will be fired per day dependant upon production requirements. Peak production demands will necessitate drilling and blasting approximately 20,000 to 25,000 ton of material per day. The average will vary between approximately 11,500 and 16,200 ton per day (tpd), depending upon volumes scheduled in any particular year. The geologic structure will determine the bench height, blast hole drill depth and the subsequent blast designs. Each blast is and will continue to be different, but will average approximately 5,000 ton per shot.

The Project will use the same blasting products, accessories, loading procedures and initiation systems as presently employed in the Bailey Quarry. The explosive column in each hole will be bottom-primed. A non-electric detonator and shock tube will be secured to each primer. The holes will be individually delayed to control the weight of

explosives detonated per delay. The shot will be initiated by electric blasting caps. Other than the electric blasting caps to initiate the blast sequence, all detonators, shock tube and delays will be non-electric.

The predominant blasting agent will be ANFO – a mixture of ammonium nitrate and diesel fuel. The bulk ammonium nitrate will continue to be stored in a secure silo at Miller's Creek. A federally inspected and approved bulk, "ANFO" truck will deliver the ammonium nitrate to the blast sites at which point the fuel oil is added as the nitrate is delivered to each hole. Federally approved ANFO "sausages" will be used in some of the wet holes. Water gel-based explosives will also be used in some instances where wet holes are encountered. The blasting caps, detonators, shock tube and blasting accessories will continue to be stored in secure, federally and provincially approved magazines on the Miller's Creek site. FG's current ANFO (Mechanical) explosives operations at Miller's Creek are covered under a Manufacturing Certificate (2008(03)-C0005AM) issued by the Explosives Regulatory Division of Natural Resources Canada.

The same safety measures in place at the existing Bailey Quarry will be adopted for the Project. Prescribed signage will be posted around the perimeter of the mine. A warning horn and siren will be mounted in the mine area to signal the start of a blasting sequence. The same signals that have been in use at Miller's Creek for decades will be implemented at the new site.

Even the best designed blast will generate a certain amount of energy that will radiate from the blast site in the form of ground vibration or air blast. The present Industrial Approval as issued by the Nova Scotia Environment and Labour (NSEL) for the Miller's Creek Quarry stipulates:

*"6. Blasting*

*a) The blast design shall ensure that the following parameters are not exceeded at the nearest residential dwelling:*

*Concussion (Air Blast): 128 dBa*

*Ground Vibration: 12.5mm (0.5 inch) per second maximum"*

The nearest residential dwellings to the present Bailey Quarry are approximately 420 metres from the mine boundary. The blasts are monitored with Instatel Blastmate units (2-DS-477 Blastmate II and 1 Minimate Blastmate). One to two seismographs monitor every blast. The seismographs are deployed on Company owned property at sites an equivalent or lesser distance than the nearest residential dwellings. On occasion, upon a neighboring resident's request, the seismographs have been set up to monitor air blast

and ground vibration at an individual residential dwelling. In these instances, the monitoring results are always explained and shared with the home owner.

Monthly summary reports of the blast monitoring results are submitted to the NSEL. Since November 2003, the monthly average air blast readings have ranged from 103 to 112 dBa. The stipulated air blast parameter has been exceeded on two occasions, the last one in January 2006. Over the same period, the monthly average peak particle velocity (PPV) of the ground vibration ranged from 0.14 to 0.45 mm per second. The stipulated PPV has never been exceeded. Data prior to November 2003 is available, but not applicable for comparison to present blasting practices.

Several innovations have been adopted and implemented since November 2003. Additional delays have been added to the blasts to control the weight of explosives detonated per delay. The delay intervals have been changed. In some instances the amount and type of stemming has changed to ensure the explosive charge is confined. Holes less than three metres deep have been eliminated.

New blasthole drills have been added to the fleet. The new drills are smaller, more agile and maneuverable than the rotary table units previously operated. They have virtually eliminated the necessity to drill slant holes – often a source of noise. They have also provided the operating flexibility to drill various diameter and depth holes which in turn controls the amount of explosives detonated per delay.

All blasting operations will be carried out in accordance with Nova Scotia Occupational Health and Safety Regulations, under the direct control of a certified Blaster. Explosives will be delivered to the site as required for each blast. Standard safety procedures will include a site inspection prior to blasting to ensure the area is clear and that all persons are at a safe distance. The Blaster will conduct a post-firing inspection of the site before giving permission for activities to resume.

#### **5.6.2.6 QUALITY AND GRADE CONTROL**

Currently, the Miller's Creek site processes between 5,000 to 17,500 ton per day (tpd). Gross mobile tons, which includes processed rock, waste rock, and overburden, vary between 10,000 to 30,000 tpd. The mine extension will maintain similar volumes of gypsum processing on a daily basis. The existing mill facilities can process up to 20,000 tpd; however, rock movement is and will continue to be limited by the rail haulage capacity.

No modifications, expansions or alterations are scheduled for the existing crushing and screening facility.

Market demand dictates that the mined product meets strict quality standards. Quality testing begins with exploration drilling, where a continuous core sample, is collected from the bedrock down to a depth of 50 to 100 metres below ground surface. The cored holes are 100 to 500 metres apart. These cores are split and tested for gypsum quality. The various rock layers are noted and interpreted as to how they are laying (*i.e.* flat, vertical or on an angle) between the cored holes. The proposed mine boundary is determined by outlining the area that contains the cored holes with a suitable quality and quantity of gypsum.

This information is used to determine when the rock will be blasted and if or when it will be blended with other areas of the mine. The highly variable nature of the rock dictates that the mining operations be flexible as to where the production is taken from. Unlike a granite quarry, where uniform rock allows one bench at a time to be mined, in the Miller's Creek gypsum deposit, several benches of rock need to be worked at any given time so that high and low purity gypsum can be produced and blended on a continual basis to maximize the recovery of reserves.

After the rock is processed through the existing crushing and screening facility for sizing, it is again sampled and tested for the quantity and quality of the gypsum. These tests are done every 30 minutes and the results are relayed to the mine department so that they can move the equipment to other areas of the mine as needed to produce a product that meets all quality specifications.

The estimates of gypsum reserves used in mine planning are based on current specifications for the end use of the product. Changes in technology that result in modifications to the quality specifications could result in a reduction or increase in estimated reserves.

#### **5.6.2.7     LOADING AND HAULING**

A mixed fleet of front-end wheel loaders and hydraulic excavators will be employed to load the blasted gypsum, waste rock and overburden onto off-road haulage trucks (see Section 5.6.2.1). Actual loading selection will be dependant upon the material to be loaded, equipment available and operating conditions. Present mine plan proposes a fleet of 13-15.5 cubic yard front end wheel loaders and 90 ton hydraulic excavators matched to a fleet of 100 ton haul trucks. The gypsum that meets quality specifications

will be hauled across the Ferry Road to the existing mill operations for processing. Waste rock and overburden will be hauled to one of the designated stockpile areas around the perimeter of the extraction area. During a regular production shift, it is estimated that haul trucks will cross Ferry Road 8 to 12 times per hour.

The processed gypsum will continue to be transported by rail to Fundy Gypsum's ship loading facility in Hantsport where it will be loaded onto ocean-going vessels for shipment to the eastern seaboard of the United States.

#### **5.6.2.8      WASTE ROCK AND OVERBURDEN MANAGEMENT**

Any material encountered during mining that is unsuitable for processing will be stockpiled around the perimeter of the proposed extraction area. The typical location and relative spatial extent are shown in Figure 5.3-1. The total estimated maximum height of the proposed stockpiles is 60 metres above sea level (masl). Surface elevations across the site range from approximately 20 to 75 metres above sea level. The maximum height of the existing stockpiles around the existing Miller's Creek site is 87 masl or about 31 metres above the surrounding terrain.

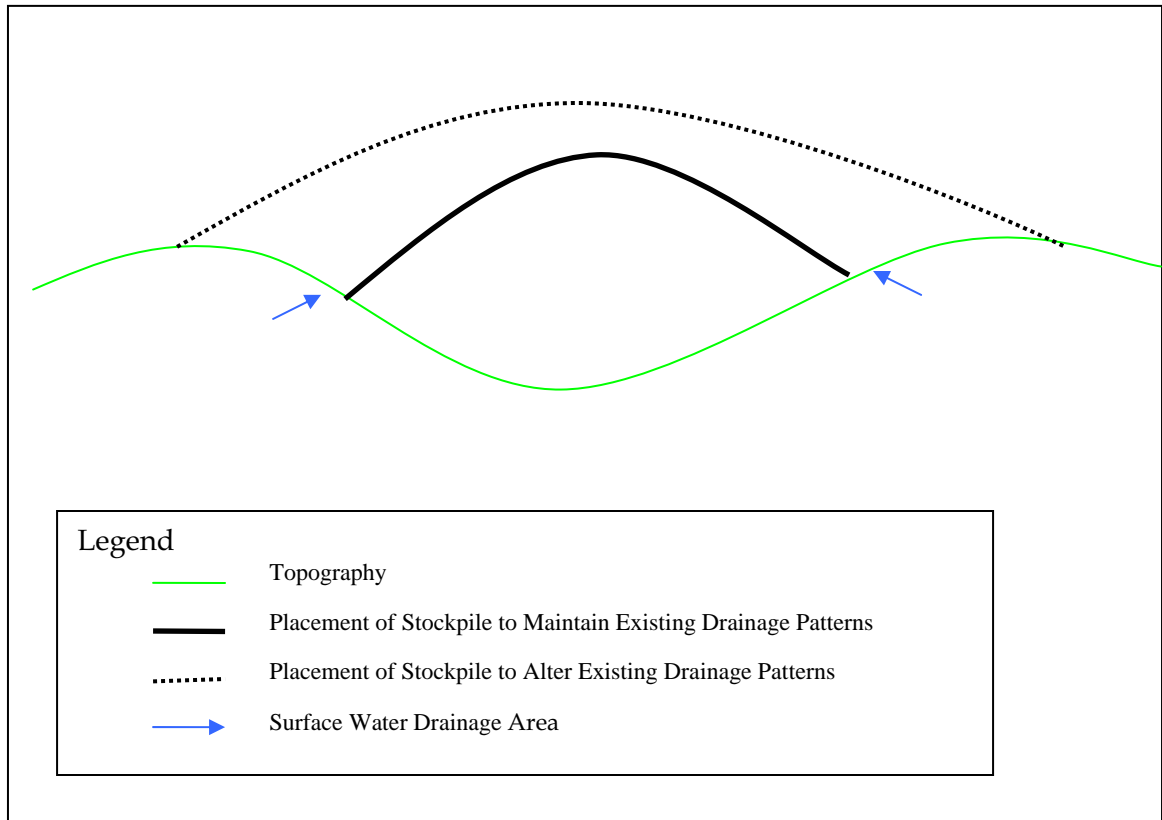
To address the spatial and quantitative issues with stockpiles of the proposed mine extension, CRA used Geographic Information System (GIS) software (ESRI ArcGIS® and ESRI Spatial Analyst®) to create a visual impact assessment of the area. Reflective mapping is initiated from viewpoints in the surrounding landscape (outside looking in) and has the objective of determining whether and to what extent the development is visible from its surroundings. The following assumptions were built into the model:

- All vegetative cover within the proposed mine extension boundaries is removed;
- Forest and vegetative cover remains in currently vegetated areas outside the proposed mine extension boundaries;
- No progressive reclamation of the mine;
- Height of the observer is 1.8 metres (approximately 6'0");
- Observer viewing radius is 360 degrees;
- Elevations derived from LIDAR data; and
- Stockpiles were assumed to be a consistent 60 masl.

This information is described in the visual environment section in this document.



To manage surface water runoff, all stockpiles will be surrounded by a perimeter ditch that will drain to a settling basin prior to discharge to area watercourses (Figure 5.6-6). The discharge water will be monitored in compliance with NSEL requirements. This water management plan ensures that water quality and quantity are maintained in the watercourses.



**Figure 5.6-6: Stockpile Surface Water Drainage**

#### **5.6.2.9 POWER REQUIREMENTS**

The new mine area is expected to require between 1,250 and 1,500 kilovolt- amps (kVA) or approximately 1.2 megawatts (MW) to power the services anticipated for the operation.

There are 2,293 MW of electricity produced in Nova Scotia from various sources. The new FG mine area operation will use approximately 0.052% of the power produced in Nova Scotia. This nominal percentage will not result in significant greenhouse gas production should the project proceed.

#### **5.6.2.10 PROJECT PERSONNEL AND WORK SCHEDULE**

FG comprises three separate operating areas: Miller's Creek, Wentworth and Hantsport. The Miller's Creek and Hantsport departments are year-round operations. There are two quarries in the Miller's Creek department: the Bailey Quarry and the depleted Miller's Creek Quarry. Both quarries are presently being used to deposit overburden, screened fines, and rock, other than gypsum and are being actively reclaimed. Wentworth Quarry is a seasonal operation. Employees are cross-trained and routinely transfer between the departments, dependent upon production, maintenance and vacation or illness relief requirements. Staffing at the Miller's Creek department peaks at 87 employees during the busiest production months of the year, usually January through March. The staffing level drops to approximately 76 full-time employees during the rest of the year. Students are hired to provide vacation relief during the spring and summer months.

There will be no significant increase in employment levels during the development phase of the Project. Existing personnel and equipment will be transferred from the Wentworth department to construct access roads and install the necessary environmental controls. Work will be scheduled during the winter months when operations are suspended in the Wentworth Quarry. The development of the mine extension will be phased in over an estimated five year period. Upon completion, production will be gradually increased as the reserves in the Bailey Quarry are depleted. At full production, the average staffing level may reach 91 employees. Contract mining companies may be utilized to assist in a portion of the development work and the initial stripping operations. The Project will not increase the annual production volumes, but operations will continue to be affected by the cyclical nature of the building and housing industry. Markets, mine recovery, stripping ratios, fleet size and mobile equipment maintenance agreements will play a role in determining the final staffing level requirements.

The operating schedule for the Miller's Creek Mine Extension will be consistent with the approved operating schedule of the existing mine. The mine schedule will be in operation 5 days per week, with 2 shifts per day. Production and development demands may dictate an occasional 24 hour per day, 5 day per week schedule and possibly some Saturday shifts. The mill department will continue to operate on a three shift rotation, 5 to 6 days per week.

The Project will not impact current rail car loading and haulage. Train scheduling will continue to be matched to the Hantsport shipping schedule.

#### **5.6.2.11 WATER MANAGEMENT**

The processing of gypsum is simple (crushing only) and does not require water or chemicals for processing. Therefore, there is no process waste water to manage on site.

Water is used for dust suppression, when required, and will be sourced from site settling ponds.

#### **5.6.2.12 EFFLUENTS AND EMISSIONS**

##### **Erosion and Sediment Control**

Surface water management will be important during development and operation to address erosion and sediment control. Sediment-laden stormwater runoff will be prevented from entering surface waterbodies. The perimeter slopes of the mine will be angled into the active pit, thus creating a catchment that always drains into the mine. The edge of the pit will remain vegetated and undisturbed. As described above, surface water will be directed to the lowest point in the mine pit and retained, to allow sediment to settle out. The treated water will then be discharged into the surrounding catchment areas.

FG is familiar with and utilizes NSEL's Sediment and Erosion Control Handbook for Construction Sites. This document will be used in the design of all mitigative measures. In addition, industry best practices and internal FG best practices will be consulted and reviewed in the development of a comprehensive erosion and sedimentation prevention and control strategy. In accordance with best management practices and standard NSEL requirements, erosion and sediment controls will be in place to ensure that effluent generated during mine operations are managed appropriately. Design criteria applied to erosion and sediment control structures will follow industry accepted practices, which typically use a 100-yr return period design storm (depending on design life of project). Design criteria would be reviewed with NSEL during the Industrial Approvals stage to ensure adequacy.

Diversion berms and ditching will be constructed to direct surface water runoff from the site as part of the surface water management plan. Where required, the berms and ditching will be vegetated to minimize erosion. As needed during establishment of grass

cover, temporary erosion and sedimentation control measures will be in place (*e.g.*, rock dams with geotextile, hay mulching, etc.). Where possible, clean water will be diverted around disturbed areas to minimize treatment volumes.

Settling ponds will be located at the base of the stockpile areas to ensure that the overall drainage and flow patterns leading into the existing catchment areas are maintained. The ponds will be designed to ensure that the limits of any Industrial Approval (IA) that may be granted by NSEL for the project are not exceeded.

In accordance with the NSEL IA, all stockpile and storm run-off from the site will meet or be below the allowable maximum suspended solids concentrations in grab samples (50 mg/L) and monthly average concentrations (25 mg/L). These levels will be monitored to ensure compliance.

### **Solid Waste**

Solid waste generated at the Project site will consist of unusable rock, organics and other naturally occurring materials from the pit. Waste rock from the pit will be used, as appropriate, for infrastructure development with the excess being stored in the waste rock stockpile. Garbage produced on the mine site will be brought back to the existing facilities and trucked away for appropriate reuse or disposal to a provincially approved waste disposal facility.

### **Liquid Effluents**

Currently there are no planned requirements for sewage treatment at the mine extension site. All of the administration, processing and support facilities will remain at the existing site location. The extraction and processing (crushing to size) of gypsum is dry, no liquids are used; therefore, there is no process wastewater to handle or treat.

### **Airborne Emissions**

Vehicle exhaust will represent the majority of air emissions from the site. Emissions produced will include carbon monoxide, carbon dioxide, oxides of nitrogen, sulphur dioxide, and dust. Emissions from the burning of hydrocarbons will be managed through the use of clean burning, low-sulphur diesel fuel and propane. All equipment will be properly maintained and inspected and engine idling will be reduced when not in use to further decrease emissions from the site.

Blasting produces similar emissions to vehicle exhaust plus dust and hydrogen sulphide. Blasting gases readily dissipate in the atmosphere following detonation. Dust and particulate are confined to the open pit areas.

Dust will be generated in the open pit, on haul roads, stockpiles, and the blasthole drilling. Fundy will implement operational dust reduction methods (primarily water applied to roads) to reduce potential fugitive dust emissions at the mine site and during transportation. An annual dust control assessment test will evaluate the effectiveness of the dust control mitigation measures undertaken under the air pollution control program. A QA/QC program will also be undertaken to ensure the air pollution control program is fully operational.

Greenhouse gases typically include carbon dioxide, methane and nitrous oxide. Typically, increased levels of carbon dioxide result from the burning of fossil fuels or deforestation. Increases in carbon dioxide emissions will be minimized as on site reclamation processes proceed. Methane emissions generated on site will not be significant. Methane is considered a chemical process greenhouse gas and is generated through the decomposition of organic matter and the carbonization of coal. Emissions of methane, if any, produced on site will not be significant. Nitrous oxide is generated predominantly through industrial and agricultural processes with a smaller contribution from vehicle exhaust. Well maintained mobile equipment and replacement as equipment ages will minimize nitrous oxide emissions.

### **Noise Emissions**

The Project will create noise from the blasting, excavation and transportation operations. The main contributors to noise on site will be blasting and heavy equipment such as excavators, drills and haul trucks.

Fundy has a blast monitoring program at the existing Miller's Creek site. Data are collected daily for each blast; a monthly summary is submitted to NSEL. Any exceedances must be highlighted and mitigative measures proposed to avoid further exceedances.

Fundy will control operations and equipment to ensure that noise levels are kept within recommended limits for surface mining operations. Mine site noise levels will be periodically measured at the property boundaries and at the nearest receptors to ensure regulation levels are not exceeded. Fundy will investigate exceedances of noise guidelines attributed to Project activities and will reduce them to acceptable levels. A

sampling program to collect representative noise level data will be undertaken when surface clearing begins.

Certain equipment noises associated with mining activities have a specific regulated safety requirement *i.e.* back-up beepers.

### **Hazardous Waste**

There is no planned storage of hazardous materials or petroleum products at the Project site during the early stages of development. As the mine develops westward, a petroleum storage building that will contain diesel fuel and lubricants will be constructed. The explosives and ammonia nitrate storage facilities will remain at the existing locations. FG's mobile maintenance department will perform regular maintenance on equipment; some contract maintenance will also be done.

### **Petroleum, Oil and Lubricants (POL)**

Fundy Gypsum is very familiar with the requirements for petroleum management. The Project will require the use, storage and handling of petroleum products such as fuel oil, gasoline and lubricants (POL). Mobile equipment will be fueled within the pit or at a central facility in the extension area using tankage and infrastructure that is approved for use in Nova Scotia. Storage of any POL will be in compliance with applicable legislation as well. Any location where fuelling is taking place will be equipped with a spill kit and the operators will be trained in their use. Storage of POL will be mainly at existing facilities where the majority of the routine maintenance would take place. Limited storage may take place at the extension area in compliance with applicable legislation for quantities and container types.

Within the context of the current site, the storage and handling of bulk quantities of POL is administered by the following regulations that have been enacted within the *Nova Scotia Environment Act (NSEA)*:

- Petroleum Management Regulations,
- Emergency Spill Regulations, and
- Used Oil Regulations.

Federal acts and regulations exist that apply to the storage and handling of POL, however, they generally only apply to Federal sites and would not be applicable to the subject property. In general, the applicable provincial requirements mirror federal legislation and have been developed in consideration of them.

### Petroleum Management Regulations

The NSEA Petroleum Management Regulations (PMR) apply to all underground (UST) and aboveground (AST) storage tanks with a capacity greater than 4,000 L. New USTs with capacities of less than 2,000 L are prohibited. The PMR require registration of storage tanks with NSEL, and establish construction and installation standards, reporting procedures, tank removal, and updating standards. Delivery of petroleum products to an unregistered tank is prohibited. NSEL must be notified of proposed new installations at least three days in advance of the planned installation and a Storage Tank System Installation Report must be submitted within 30 days of completion of the installation. Similar notification requirements exist for altering or removing existing tank systems.

The regulations require that tanks be installed in accordance with the *Nova Scotia Construction, Installation and Operating Standards for Petroleum Storage Tank Systems* ("the Standard"), which provides detailed design codes for new tank systems, the most significant of which include corrosion protection and leak detection systems. The PMR specifies periodic maintenance checks of these systems. ASTs must also be inspected daily or as specified by the Province and, where required by the Standard, observation wells must be checked at least monthly. The PMR also specify inventory reconciliation requirements for USTs and ASTs. Reconciliation does not apply to tanks connected to heating appliances. Inventory control records must be kept for at least two years.

The PMR also requires constant supervision of all fuel transfers. Spills must be cleaned up immediately and reported in accordance with the Emergency Spill Regulations.

### Emergency Spill Regulations

The NSEA Emergency Spill Regulations (ESR) specify verbal and written reporting requirements for releases of various substances. With respect to typical POL products expected to be handled at the subject site, the following minimum quantities would require reporting:

- Flammable Liquids    100 L
- Used Oil                100 L
- Contaminated Used Oil        5 L (see Used Oil Regulations)

Spills must be reported "as soon as (the responsible) person knows of the unauthorized release" (ESR Part 6). 'Responsible person' is defined under Section 69 of the NSEA. All spills are to be reported verbally, by telephone, to the Provincial Emergencies Reporting Centre. NSEL may, at their discretion, require a written report within a specified



timeframe. If required, written reports must outline the actions taken to investigate the cause of the release, assess the adequacy of the response, remediate any impacts, dispose of contaminated materials and prevent future recurrences.

#### Used Oil Regulations

Under the *NSEA* Used Oil Regulations (UOR), used oil, including contaminated used oil, can only be sold, transferred or otherwise disposed of to an approved used oil collector, as defined under the regulations. UOR Sections 12 and 13 provide exceptions to this requirement for uncontaminated used oil. Under Section 12, sellers of crankcase oil must provide a used oil return facility for the general public. Section 13 prescribes conditions under which used oil may be used as a fuel source. Foremost amongst the requirements to permit burning of used oil is the need to verify, through laboratory analysis, that the used oil is not contaminated and the need to obtain NSEL approval. No person can possess confirmed contaminated used oil unless NSEL is notified, using a prescribed form, within seven days of receipt of laboratory analysis demonstrating contamination to be present. Contaminated used oil cannot be diluted, nor can other substances be added to used oil for the purposes of disposing of these other substances. The land application of used oil is prohibited.

#### **5.6.2.13 EMERGENCY RESPONSE AND CONTINGENCY PLANNING**

As a requirement of the Industrial Approval application/amendment for this mining operation, FG will prepare for NSEL's approval, a contingency plan for accidental events. FG currently operates with the "Windsor Plant (FG), Crisis Response Plan & Emergency Procedures, 2007/2008" (Appendix I.1).

FG also has a plan on file with Transport Canada, Transport Dangerous Goods Directorate, for the transportation of explosives products: "Emergency Response Assistance Plan 2-0161, For Application during Emergencies in the Transportation of Explosives" (Appendix I.2)

An environmental management plan (EMP) is an integral part of the project description. This plan will be submitted as part of the application for IA. It will include an overview of issues as identified in the environmental assessment. These include: discharges of liquid effluents, protection of groundwater resources, noise and dust control, protection of flora and fauna, solid and hazardous wastes management, and contingency planning.

The EMP will include detailed mitigative measures and proposed monitoring plans.

### 5.6.3 DECOMMISSIONING AND RECLAMATION

FG considers the goal and responsibilities of reclaiming mined sites to be a key element of the project plan, and will return the land to a state of equal or better status than prior to disturbance. Reclamation is understood as not only operational activities of overburden removal and stock piling, backfilling overburden, contouring and placing of topsoil and revegetation, but also as an integral part of project planning that keeps future land use foremost in mind.

Fundy Gypsum will develop a detailed reclamation plan in consultation with NSDNR and NSEL with input from other stakeholders, including the community. The progressive reclamation plan will be integrated with the mine plan and will address the key areas of land use, water resources, restructuring and recontouring, revegetation, restoration of services, aesthetics and safety, and future land use.

The goal of reclamation is to produce a landscape that is safe, stable and compatible with the surrounding landscape and final land use. This is generally achieved by grading, contouring, capping with soil, revegetating, flooding mined areas and time. FG has been turning previously mined or disturbed land back to a natural state for decades – land that is now used for wildlife, farming and recreation.

FG typically uses their own resources for reclamation activities, although some contract tree-planting and hydroseeding has been done. Dozers and excavators regrade and contour the side slopes of piles to ensure that they are stable. Rock lined ditches are constructed as necessary, to control run-off and prevent erosion of the exposed soils. The slopes are seeded with a naturalization mix of native grasses, fescue, trefoil and clover. A view of a typical meadow created is shown in Photo 5.6-1. A reforested area around the old Miller's Creek Quarry is visible in the background.



**Photo 5.6-1: Typical meadow**

In areas where wetlands may be created, a shoreline is sloped to ensure access to and from the water's edge. Photo 5.6-2 shows a typical shoreline that is created.



**Photo 5.6-2: Typical shoreline created around a wetland.**

FG is currently in discussions with Ducks Unlimited to develop a partnership agreement for the management of several wetlands around the existing quarries.

After vegetation is established, trees are routinely planted to aid in renaturalization. The variety of trees is mixed, and in the past has included poplar, ash, birch, spruce, pine maple, larch, willow and fir. Since 1985, FG has planted over 300,000 trees around its operations. Photos 5.6-3 and 5.6-4 show mature tree growth around an old stockpile adjacent to Avondale Road.

**Photos 5.6-3 & 5.6-4: Mature tree growth around an old stockpile.**





### 5.6.3.1 PAST RECLAMATION PROJECTS

FG has a history of progressive reclamation. Photos 5.6-5 to 5.6-7 show an exposed pile of fine gypsum and soil located across from the FG main office along Wentworth Road. In the early 1990s, overburden was hauled from the Wentworth Quarry to cap the pile to allow for revegetation. Following hydroseeding, the local Scout troop planted 5,000 trees to assist with naturalization. Today the pile is covered with mature trees and a variety of grasses and shrubs.



**Photo 5.6-5: 1983**



**Photo 5.6-6: 1992**



**Photo 5.6-7: 2006**

Photos 5.6-8 to 5.6-10 show the capping of tailings pond when it had reached capacity. Soil was hauled from the mine and spread over the area, then seeded. Today it is a grassy field across from the Wentworth Quarry mobile maintenance operations. In 2007, 1,000 trees were planted in this area by the local Scout troop.



**Photo 5.6-8: Topsoil placement - Early 1990s**



**Photo 5.6-9: Topsoil placement - Early 1990s**



**Photo 5.6-10: 2006**

Miller's Creek Duck Pond (Photos 5.6-11 and 5.6-12) is a wetland created at the top of a screened fines pile adjacent to the Miller's Creek Quarry. In the late 1990s, the area was no longer in use, thus it was graded, contoured and hydroseeded with a mixture of grasses, fertilizers and paper mulch. Ditches and ponds were constructed to control run-off and prevent erosion. In 2003, the local Scouts planted 5,000 trees in the area. Today, the wetland and surrounding area support a variety of waterfowl, deer, hawks and killdeer.



**Photo 5.6-11: Before - 1997**



**Photo 5.6-12: After - 2006**

### 5.6.3.2 PRESENT RECLAMATION PROJECTS

The large stockpile visible from Ferry and Belmont Roads has been used to place rock and soil from the Bailey Quarry that is unsuitable for production. In 2006, this area reached its maximum height and reclamation began. In April 2006, two dozers and an excavator cut down the slope and contoured it in preparation for seeding. In July 2006, about 20% of the west slope was seeded with a mixture of grasses and wildflowers (Photo 5.6-13). Photo 5.6-14, taken in August 2007, shows the successful revegetation of the same slope. At the base of this slope, a marsh provides habitat for beaver, waterfowl, deer and a variety of birds.



**Photo 5.6-13: Belmont Stockpile – Prior to Revegetation, July 2006**





**Photo 5.6-14: Belmont Stockpile – After Successful Revegetation, August 2007**

During the spring and summer of 2007, an additional 20% of the top and slope of the stockpile was revegetated. The following photos (5.6-15 and 5.6-16) present a view of the top of the pile before and after revegetation. An older, previously reclaimed stockpile is visible in the background of the photos.



**Photo 5.6-15: Before - June 2007**





**Photo 5.6-16: After – August 2007**

Figure 5.6-17 presents a view of backfilling activity and reclamation in the Miller's Creek Quarry. The foreground shows new established forest cover on reclaimed land and the far right slope shows established vegetation on an old stockpile.



**Photo 5.6-17: Present backfilling in the old Miller's Creek Quarry.**

### **5.6.3.3 FUTURE RECLAMATION PROJECTS**

The Miller's Creek Quarry was mined from 1957 to the mid 1970s. Although it is not being actively mined, portions of the site are being used to deposit soil and rock from the active Bailey's Quarry. Future reclamation plans for this site include the creation of shoreline with areas of flatter slopes, revegetation and flooding to create a lake or lakes. After reclamation, this site would be ideally suited for wildlife and recreation, such as hiking, fishing and boating. The size of the lake(s) will depend on the amount of backfill material and the water level, but could easily be 30 to 50 acres. The following photos (5.6-18 and 5.6-19) present a west view of the mine today and a conceptual view of what it could look like in the future after reclamation is completed.



**Photo 5.6-18: The existing Miller's Creek Quarry.**



**Photo 5.6-19: A conceptual view of the Miller's Creek Quarry after final reclamation.**

Several types of important habitat will be created in the process including: emergent zones, shallow marsh, wet meadow and upland. This diverse ecosystem and flatter slopes will sustain many plants and animals, and allow easy access to the water's edge for humans and animals.

The Bailey Quarry has been mined since 1973. Reclamation plans for this mine are similar to those proposed for the Miller's Creek Quarry. The following photos (5.6-20 and 5.6-21) present a view of what the Bailey Quarry looks like today and a conceptual view of what it could look like in the future, following reclamation.



**Photo 5.6-20: A view of the existing Bailey Quarry**



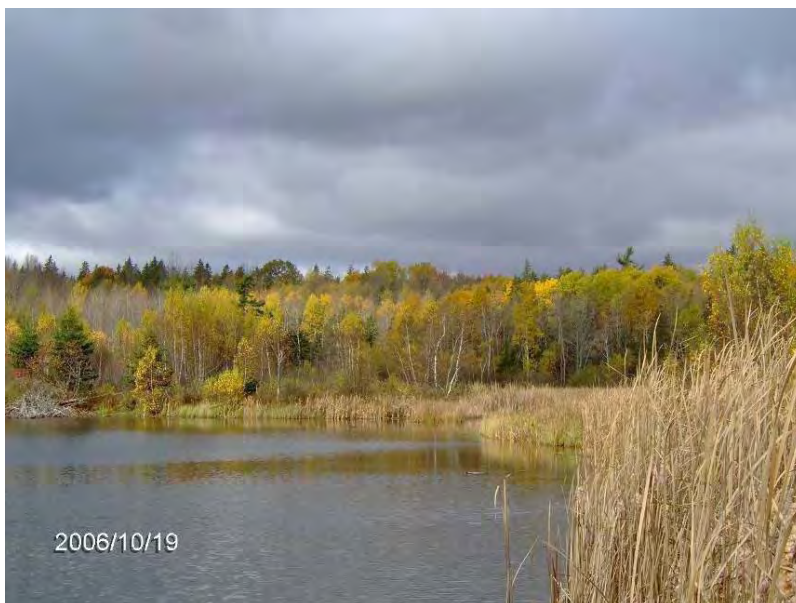
**Photo 5.6-21: A conceptual view of the Bailey Quarry after final reclamation.**

There are very many potential after uses for quarries as listed below. These may range from water-based after uses including fishing, marinas, rowing or water supply reservoirs to land-based after uses including nature conservation, agricultural or forestry uses through to built development after uses such as housing or commercial and industrial sites. The choice of which of several after uses may be appropriate depends on local constraints, but these can be summarized as planning and financial issues; technical; and environmental issues. There are often several potential choices. Generally these are made by the owners of the site in conjunction with their consideration of planning and financial issues. Major projects are only developed in quarries where there is potential for economic gain. There can be significant technical problems in developing a mine to accommodate some of the activities listed below. Similarly some financial and environmental issues may be significant in the choice that is made.



<b>Dry Restoration Options</b>	
Nature conservation	Education/Tourism
Arable/pasture (open agriculture)	Residential
Horticulture (including hothouses etc .)	Hotel
Forestry	Golf course
Sport/Recreation (open and covered)	Campus developments ( <i>e.g.</i> hospital, prison)
Car parking	Rail interchange (inter-modal/landfill)
Storage – warehousing and tank farms	Scientific (astronomy/satellite)
Industrial/Commercial ( <i>e.g.</i> Green Park)	Technical (materials/vehicle/structure testing)
Leisure	Energy Generation
Retail	Museums – quarrying, stoneworking etc.
Landfills	Co-disposal Pulverised Fuel Ash (low + high pH)
Sculpture park (within a sculptural landform)	Industrial and special landfills
<b>Restoration Incorporating Water Options</b>	
Water supply/reservoirs	Park
Sailing/marinas/harbours	Conservation/wildlife habitat
Power boating	Fishery
Rowing	Industrial cooling (convection and spray)
Model boating	Pumped storage (power generation)
Swimming	Watercourse management/supplement
Fishing	Water treatment/storm management
Campground	

A good example of a mine after use is FG's Meadow Pond Quarry, last mined in the early 1900s, which is shown in Photos 5.6-22 to 5.6-23. The restoration has occurred naturally over time, leaving behind a very active wetland of over 20 hectares in size. Today the wetland supports a variety of waterfowl and aquatic species and is used by a local wildlife group for fishing and other recreational uses. The site contains forested areas, gypsum outcrops and a variety of flora.



**Photo 5.6-22: Meadow Pond**



**Photo 5.6-23: Meadow Pond**

United States Gypsum (USG) Corporation, FG's parent company, also has a long history of restoring lands previously used for mining. The following photos (5.6-24 and 5.6-25) present before and after views of a mine site that was decommissioned in 2000. USG was the recipient of the Virginia State Reclamation Award for its reclamation of this site.



**Photo 5.6-24: Locust Cove Mine - Before**



**Photo 5.6-25: Locust Cove Mine - After**