

Sovereign Resources Inc.

Environmental Assessment Registration

# **Sovereign Resources Quarry Modification Project**

Project Number: NSD17650

July 2005



**SOVEREIGN RESOURCES INC.  
DRAFT ENVIRONMENTAL ASSESSMENT REGISTRATION  
SOVEREIGN RESOURCES QUARRY MODIFICATION PROJECT**

**PROJECT NO. NSD17650**

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**REPORT TO**

**SOVEREIGN RESOURCES INC.**

**ON**

**ENVIRONMENTAL ASSESSMENT REGISTRATION  
SOVEREIGN RESOURCES QUARRY MODIFICATION PROJECT  
ROCKY LAKE DRIVE, BEDFORD, NS**

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**July 2005**

## EXECUTIVE SUMMARY

Sovereign Resources Inc, a subsidiary of Municipal Enterprises Limited of Bedford, Nova Scotia, owns and operates a quarry on the east side of Rocky Lake Drive between Bedford and Waverley, Nova Scotia. This quarry operation was purchased from Tidewater Construction Limited in February 2002. Under varying ownership, the quarry has been in operation for more than 20 years. This quarry is currently approved for an area of approximately 19 hectares (44 acres) including rock crushing. Sovereign Resources now proposes to expand the permitted quarry boundary to include an additional 180 ha (445 acres) of land under company ownership to allow long-term quarry development to proceed into the future (the Project). The estimated lifespan of the Project is approximately 50 years.

Sovereign Resources is required to register this Project as a Class I Undertaking pursuant to the Nova Scotia *Environment Act* and Environmental Assessment Regulations. This environmental assessment (EA) report fulfils the primary requirements for project registration under this legislation and has been prepared by Jacques Whitford Limited on behalf of Sovereign Resources.

Sovereign Resources is aware of concerns of the adjacent communities with regard to the previous Tidewater proposal for quarry expansion (*e.g.*, additional trucking on Rocky Lake Drive) and has sought to address these concerns in its current proposal. For example, there will be no crushing at the Sovereign Resources quarry and, upon Project Approval, in an effort to minimize the volume of truck traffic on Rocky Lake Drive, all truck traffic associated with the removal of rock aggregate from the Sovereign Resources quarry will enter and exit through the existing Municipal Enterprises quarry. Modification of the Sovereign Resources quarry is not expected to result in a net increase in aggregate production and trucking at the existing/adjacent Municipal Enterprises quarry. However, if market demands change, the volumes will fluctuate.

Sovereign Resources, in cooperation with the EA Study Team, has undertaken a comprehensive stakeholder/public consultation program to communicate Project details and solicit public input for consideration during preparation of the EA Report. Stakeholder consultation has included meetings with the Monitoring Board (a joint community-regulatory-owner liaison committee originally established during the Tidewater quarry operation as a condition of regulatory approval), the Waverley Ratepayers Association, and local elected representatives. Consultation with the general public was primarily achieved through the distribution of a Project Information Bulletin, public open house meeting, and follow-up consultations with select individuals by the EA Study Team. In addition, Sovereign Resources has maintained ongoing consultations with Nova Scotia Environment and Labour (NSEL) regarding the scope and preparation of the EA Report. These consultations have proven to be very informative and helpful in Project design and scoping of the EA Report (*i.e.*, identification of potential issues of concern). For example, early consultations with the Monitoring Board resulted in Sovereign

Resources amending its proposed quarry boundaries to the 50 m contour to reduce impacts on the existing viewshed.

The scope of this EA has been determined based on regulatory and stakeholder consultations, the professional judgement and expert knowledge of the EA Study Team, and the results of field studies conducted in support of this EA. The *Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia* (NSEL 2002) was also used to help focus the scope of the assessment and ensure a thorough consideration of applicable issues.

The EA Report focuses on those components of the environment that are valued by society and/or serve as indicators for environmental change. These components are known as Valued Environmental Components (VECs) and Valued Socio-economic Components (VSCs). The EA for this Project evaluates potential Project-related effects with regard to the following VECs/VSCs:

- Air Quality;
- Noise and Vibration;
- Groundwater Resources;
- Surface Water and Hydrology;
- Wetlands;
- Rare and Sensitive Flora;
- Wildlife;
- Land Use;
- Visual Environment; and
- Archaeological and Heritage Resources.

Field studies were conducted between June and October, 2004 to investigate and establish the existing conditions and to determine appropriate mitigation, if necessary, to minimize environmental effects from the proposed Project. These surveys consisted of: vegetation survey; breeding bird survey; mammal survey; herpetile survey; and fish and fish habitat survey. These surveys were undertaken by qualified terrestrial and freshwater ecologists employed by Jacques Whitford. An assessment of potential archaeological and heritage resources was undertaken by a qualified archaeologist. A hydrology study was conducted by Hydro-Com Technologies Ltd. A reconnaissance survey of road conditions and existing traffic levels was conducted by Atlantic Road and Traffic Management. In February 2005, an ambient noise monitoring survey was conducted. Additional information, in support of the field studies and the assessment, was gathered through a review of: air photos; site mapping; and other information sources.

For each VEC/VSC, existing conditions (*i.e.*, pre-Project) are described in context of the boundaries established for the assessment. Potential interactions are investigated and evaluated based on current

scientific knowledge with regard to each interaction. Effects are analyzed qualitatively, and, where possible, quantitatively, using existing knowledge, professional judgement and appropriate analytical tools.

Where applicable, mitigative measures are identified and the significance of the predicted environmental effects of the Project are evaluated based on specific evaluation criteria which considers the magnitude, frequency, duration, geographical extent and reversibility of the potential effect.

Predicted environmental effects from the Project include loss of plant and animal habitat including wetland habitat. None of this habitat loss is considered significant with the possible exception of potential hydrologic effects on a wetland supporting a plant species of “undetermined” status. Offsite groundwater and surface water quality will not be significantly affected.

Predicted socio-economic effects include minor visual effects as well as some minor ongoing effects from noise and dust (similar to those currently experienced). If the Project is approved, Sovereign Resources has committed to maintaining a substantial undeveloped buffer zone around the quarry to help alleviate these concerns.

The EA Report proposes various mitigative measures to be implemented during the life of the Project, including, but not limited to: adherence to the Pit and Quarry Guidelines (NSDOE 1999); development to 50 m contour; establishment of undeveloped buffer zones; avoidance of streams and some wetlands; no crushing onsite; no transport of aggregate exiting the Sovereign Resources quarry to Rocky Lake Drive; preparation of a quarry development plan; dust control; erosion and sediment control; clearing outside bird breeding season; no blasting during temperature inversion conditions; progressive reclamation; and consideration of tree plantings and berm construction to reduce noise and visual effects.

Proposed monitoring programs include: dust and noise monitoring; pre-blast survey; follow-up bird survey; rare plant monitoring program; groundwater monitoring well program; monitoring fish habitat; surface water runoff monitoring program; and blast and vibration monitoring. It is also proposed that the Monitoring Board, established under an existing approval, remain active for the life of the Project

Implementation of the proposed mitigation, monitoring and follow-up studies, and adherence to the applicable regulations, approvals and guidelines will reduce or eliminate any adverse environmental effects. No significant adverse residual environmental effects are therefore likely to occur as a result of this Project. Continued operation of the quarry will result in economic benefits, including continued employment, ongoing business opportunities, and provision of quality aggregate within reasonable proximity to the Halifax Regional Municipality (HRM).

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## 1.0 PROPONENT AND PROJECT IDENTIFICATION

### 1.1 Proponent Information

Sovereign Resources Inc. (Sovereign Resources; formerly 3057565 Nova Scotia Limited), is a subsidiary of Municipal Enterprises Limited of Bedford, Nova Scotia. The company was incorporated in Nova Scotia in 2001. Through its parent company, Sovereign Resources has significant experience in pit and quarry developments in New Brunswick and Nova Scotia. Municipal Enterprises is one of the largest road construction contractors in Nova Scotia. A copy of Registry of Joint Stocks for Sovereign Resources is included in Appendix A.

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\_\_\_\_\_  
**Signature of President**

\_\_\_\_\_  
July 28, 2005  
**Date**

## **1.2 Project Information**

**Name of the Undertaking:** Sovereign Resources Inc. Quarry Modification Project  
**Location of the Undertaking:** Rocky Lake Drive, Bedford, Nova Scotia

## **2.0 PROJECT INFORMATION**

### **2.1 Description of the Undertaking**

Sovereign Resources owns and operates a quarry on the east side of Rocky Lake Drive between Bedford and Waverley, Nova Scotia (Figure 2.1). The quarry operation was purchased from Tidewater Construction Limited in February 2002. At the time of the sale, the Industrial Approval issued by Nova Scotia Environment and Labour (NSEL) was transferred to 3057565 Nova Scotia Limited, which later became Sovereign Resources (refer to Appendix B). This Approval allows for the operation of a rock quarry, including crushing, for an area of approximately 19 hectares (44 acres). Also included in the sale was a large tract of land immediately adjacent to and surrounding the quarry. Sovereign Resources now proposes to expand the permitted quarry boundary to include an additional 180 ha (445 acres) to allow long-term quarry development to proceed into the future (the Project). The estimated lifespan of the Project is approximately 50 years.

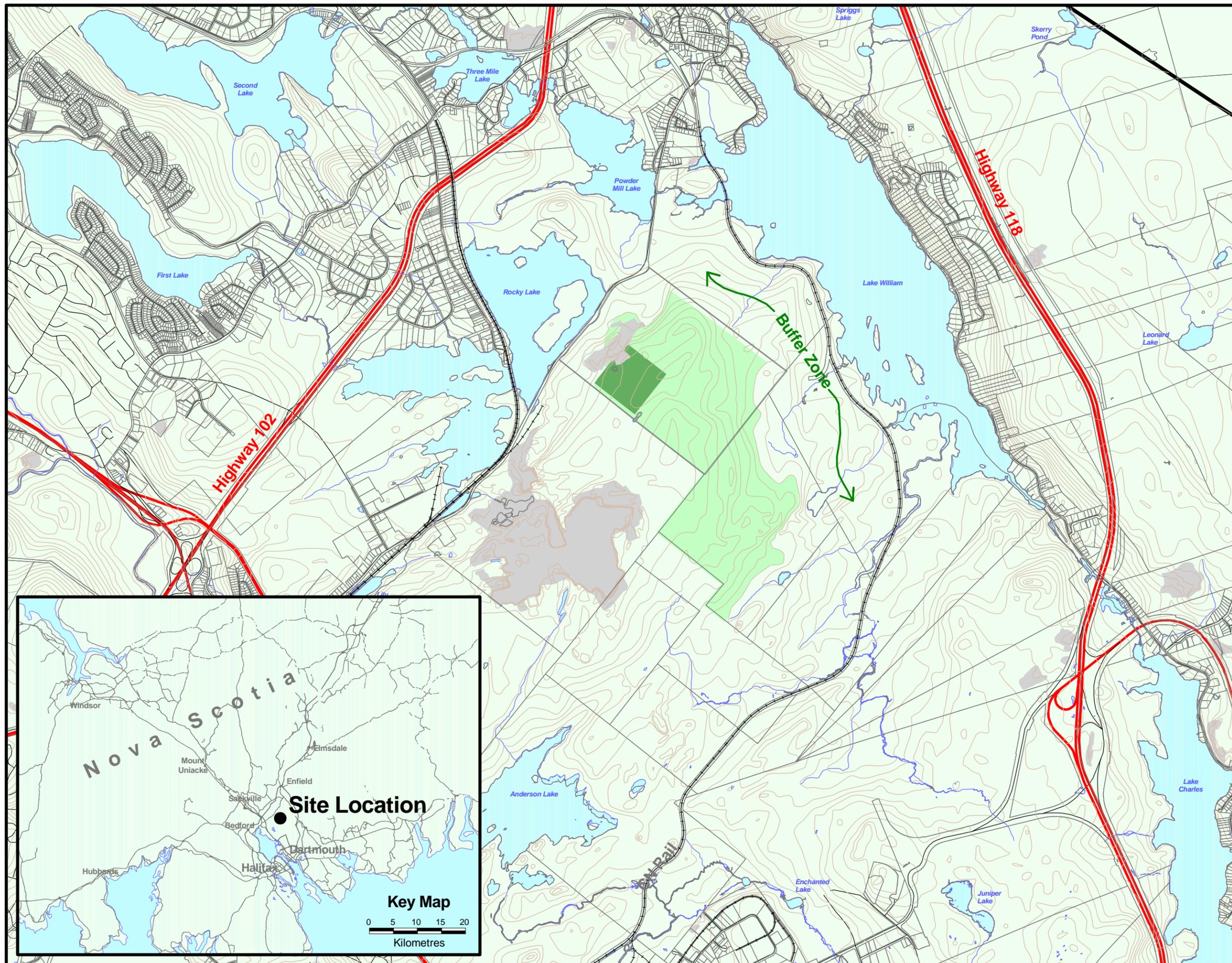
Sovereign Resources is required to register this Project as a Class I Undertaking pursuant to the Nova Scotia *Environment Act* and Environmental Assessment Regulations. A detailed description of the proposed undertaking is provided in the following sections.

### **2.2 Project Background and Quarry History**

Under varying ownership, the quarry has been in operation for more than 20 years. In 1982, Tidewater Construction Company purchased approximately 166 ha (410 acres) in Waverley to develop a quarry. Tidewater began operation of the quarry in 1986. A subsidiary of Municipal Enterprises Limited (a numbered company which later became Sovereign Resources) later purchased the quarry and adjacent lands from Tidewater. Sovereign Resources, through its parent company, has extensive quarry experience in the Rocky Lake area. The Municipal Enterprises quarry on Rocky Lake Drive has been in operation since the early 1970s at its present location.

Sovereign Resources is sensitive to the public's concerns for quarry expansion and has made an effort to address these issues in their Project design. For example, there will be no crushing at the Sovereign Resources quarry and, in an effort to minimize the volume of truck traffic on Rocky Lake Drive, all truck traffic associated with the removal of rock aggregate from the Sovereign Resources quarry will enter and exit through the existing Municipal Enterprises quarry, should the proposed Project proceed. Modification of the Sovereign Resources quarry is not expected to result in a net increase in aggregate production and trucking at the existing adjacent Municipal Enterprises quarry. However, these volumes may fluctuate as market demands fluctuate.

Figure 2.1  
Site Location



**Project Features**

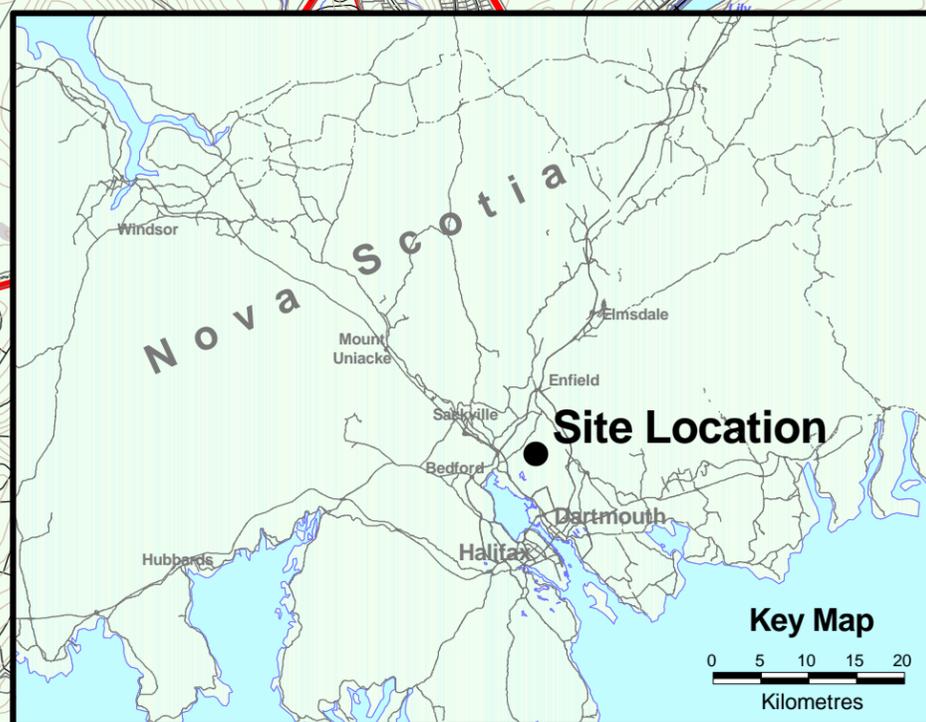
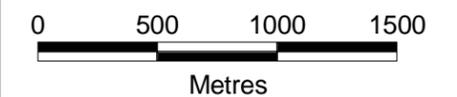
- Proposed Sovereign Resources Quarry Modification Area
- Approved Sovereign Resources Quarry
- Existing Quarry

**Topographic Features**

- Elevation Contour (m)
- Stream
- Waterbody
- Property Boundary

Topographic Data Source: Nova Scotia Digital Topographic Database (NSTDB) from Service Nova Scotia. Elevation contour data is at 5 metre intervals

Scale 1:30,000



Map Parameters  
Projection: 3° MTM  
Datum: ATS77  
Zone: 5  
Date: March 2005  
Project: NSD17650

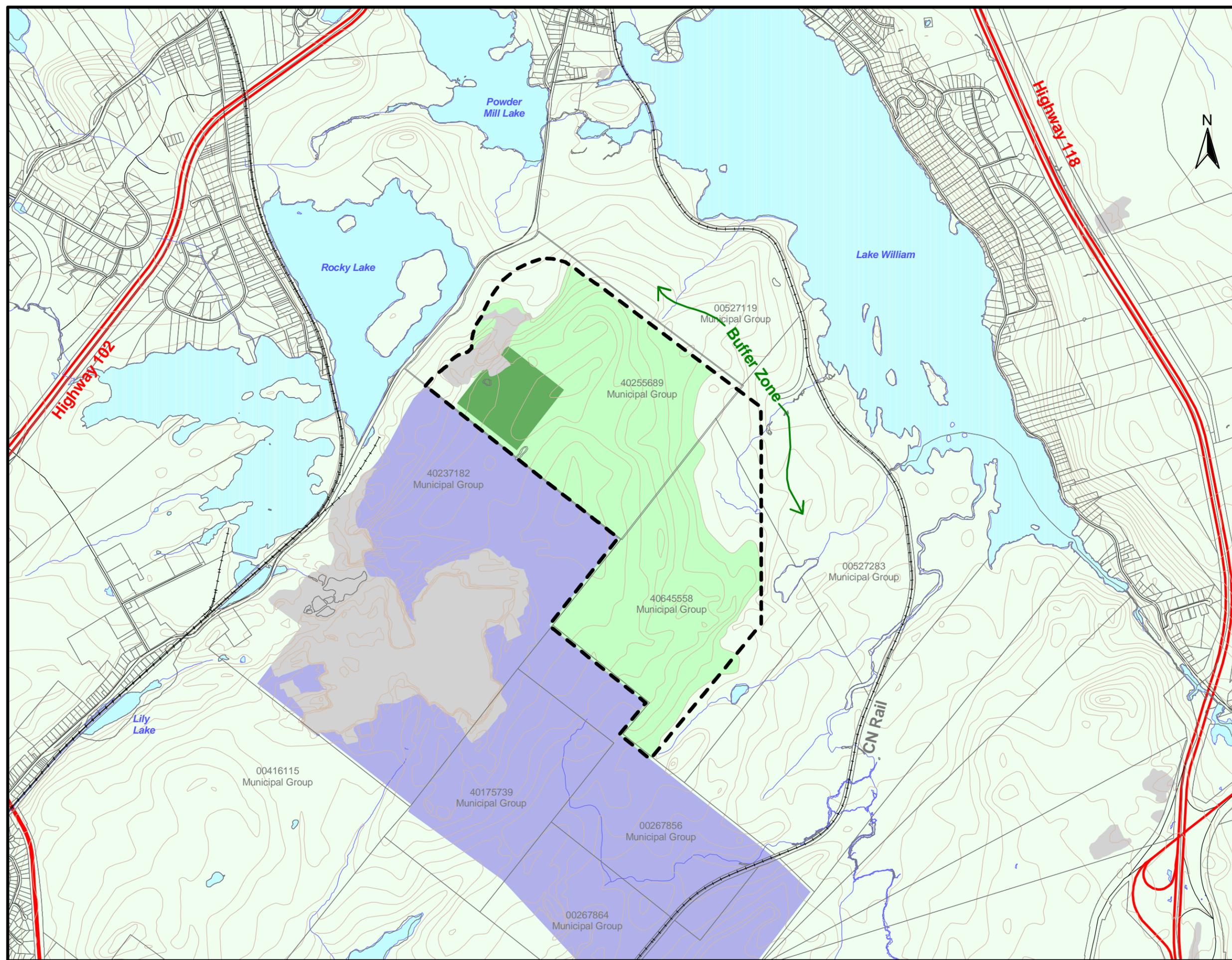
In addition to the design mitigation discussed above, Sovereign Resources undertook a comprehensive process to develop and confirm the proposed modification area (*i.e.*, proposed boundary of the quarry area). This process began considering all of the land owned by Sovereign Resources (see Figure 2.2). A large portion of the land was immediately eliminated due to the presence of and proximity to large surface water bodies (*i.e.*, area east of the proposed quarry area). A preliminary boundary was identified and a number of field studies were conducted (*e.g.*, flora and fauna, wetlands, hydrology, etc.). This preliminary quarry area was presented to NSEL and the Sovereign Resources Monitoring Board as part of the issues scoping exercise and public/stakeholder consultation program (see Section 4). The results of the field surveys and the above meetings led to the development of the currently proposed quarry modification area. This boundary was primarily developed in consideration of potential impacts to visual aesthetics (see Section 5.9); however, it also minimizes direct impacts on a number of wetlands (see Section 5.5).

### **2.3 Geographical Location**

The Sovereign Resources quarry is located on the east side of Rocky Lake Drive between the communities of Bedford and Waverley in the Halifax Regional Municipality (HRM), Nova Scotia. It is situated immediately north of the Municipal Enterprises quarry (Rocky Lake quarry) also on Rocky Lake Drive. The proposed quarry area is contained within lands owned by Municipal Enterprises Group of companies. The boundary of the existing permitted area and the proposed modification to the boundaries are shown on Figure 2.2. The Project area is bounded by Rocky Lake Drive to the west and the Municipal Enterprises quarry to the south. A large undeveloped parcel of forested land immediately north of the proposed Project area, along Lake William, was recently purchased from Archibald Holdings by Sovereign Resources to prevent a high density residential development along the lake front. Upon approval of this proposed Project, it is intended that the lands acquired from Archibald Holdings remain as an undeveloped greenbelt for the duration of quarry operations on the Sovereign Resources site. Generally, the study area for the assessment is bounded by Rocky Lake to the northwest, Powder Mill Lake to the north and Lake William to the northeast.

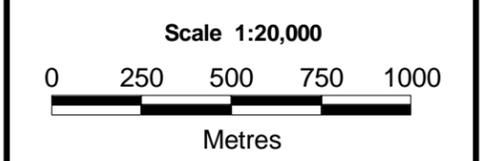
The quarry is located on lands that are 90 m (295 feet) above sea level at the highest point. The nearest communities are Waverley, located north of the site along Rocky Lake Drive, and Lakeview located across Rocky Lake. The nearest residence is approximately 730 m from the boundary of the existing Sovereign Resources quarry. No additional residences are located within the 800 m setback distance as a result of the proposed Project. In accordance with the Pit and Quarry Guidelines (NSDOE 1999), an 800 m setback distance will be maintained between the working face and the nearest residence. More information on land use adjacent to the Project area is contained in Section 5.8.

Figure 2.2  
**Project Boundaries**



- Project Features**
- Proposed Sovereign Resources Quarry Modification Area
  - Approved Sovereign Resources Quarry
  - Existing Quarry
  - Approved Municipal Quarry
  - Proposed Sovereign Resources Quarry Boundary (Pre-October 2004)

- Topographic Features**
- Elevation Contour (m)
  - Stream
  - Waterbody
  - Property Boundary
- Topographic Data Source: Nova Scotia Digital Topographic Database (NSTDB) from Service Nova Scotia. Elevation contour data is at 5 metre intervals



Map Parameters  
 Projection: 3° MTM  
 Datum: ATS77  
 Zone: 5  
 Date: March 2005  
 Project: NSD17650



## 2.4 Physical Components

The existing Sovereign Resources quarry site consists of a rock-lined laydown area, historically used for temporary crushing equipment; stockpiles of various aggregates; a quarry floor and working face; two settling ponds; and a gated access road. Historically (*i.e.*, under previous ownership), crushing equipment was transported to the site as required (*i.e.*, after blasting). There is no fuel storage, storage of dangerous goods, pipelines, port facilities or railways associated with the existing quarry facility, and none are currently proposed for this Project (refer to Section 2.6.3).

The current elevation of the quarry floor is approximately 52 m above sea level (ASL), and the top of the working face is approximately 70-75 m ASL. There are overburden and topsoil stockpiles on the site which have been present since Tidewater operated the quarry. These stockpiles are stable and are currently regenerating with natural vegetation.

There are a few aggregate stockpiles onsite totalling less than 90,000 tonnes of aggregate. This aggregate will likely be transported via the Sovereign Resources quarry exit until the stockpiles are depleted. If the proposed Project receives EA approval, operational truck traffic from the quarry (*i.e.*, for future operations) will only enter and exit through the Municipal Enterprises quarry. Presently, there is no scale or scale house at the existing facility. Stockpiled aggregates sold from this quarry are brought to the Municipal Enterprises quarry to be weighed prior to being hauled to the buyer(s).

Two onsite settling ponds collect surface runoff and quarry drainage. The ponds are located at the northwest corner of the site and are each approximately 980 m<sup>2</sup>. The ponds drain to the north, eventually draining to Powder Mill Lake. These ponds have been actively used for the collection of runoff from the former Tidewater quarry operation. Since no recent quarrying has occurred at this site, the ponds now act as passive collection systems that drain water from the former developed areas.

Access to the existing Sovereign Resources quarry is directly from Rocky Lake Drive at this current time. The quarry access road has been surfaced with asphalt to minimize the generation of dust, as well as to minimize maintenance (*i.e.*, grading) to the access road. Sovereign Resources intends to construct a new private access road between the modified Sovereign Resources quarry and the Municipal Enterprises quarry and, upon EA approval, discontinue operational use of the existing access road during operation of the modified quarry (see Section 2.5). This existing access to Rocky Lake Drive will remain open for the access of emergency and service vehicles if required.

## 2.5 Site Preparation and Construction

Since acquiring the quarry and adjacent lands, Sovereign Resources has not constructed or installed any additional infrastructure. Activities and infrastructure associated with the proposed Project include:

clearing and grubbing; stripping and stockpiling of topsoil and overburden; construction of a new access road to the Municipal Enterprises quarry; drilling and blasting; hauling; construction and installation of additional erosion and sediment control structures, as required; and progressive rehabilitation.

The long term development of the Sovereign Resources quarry will be implemented according to a Quarry Development Plan. Upon EA Approval and as part of the application for approval/amendment under Part V of the *Environment Act* and the Activities Designation Regulations, Sovereign Resources will prepare a Quarry Development Plan which will guide the short and long term development of the Sovereign Resources quarry. Preparation of such a plan is not typically required for quarry development projects; however, given the size and lifespan of the proposed Project as well as public interest, the Plan will ensure that the Project is developed and constructed, operated and reclaimed in an economically feasible, efficient, socially and environmentally responsible manner.

It is anticipated that the Plan will have two main sections:

1. **Development Philosophy:** this section of the Plan will describe the guiding principles, objectives, and commitments under which the quarry will be developed. This will include objectives, principles and commitments from the EA and terms and conditions of the Environmental Assessment Approval. For example, Sovereign Resources will develop the quarry in a manner that will minimize impacts on the visual environment as well as minimize off-site transport of dust and noise. In addition, this section of the plan will include details regarding the process for revisions and amendments to the Plan, stakeholder involvement, complaint and issue resolution, and compliance and monitoring.
2. **Development Procedures:** this section of the Plan will describe the specific procedures and details for development of the quarry such as grades and elevations, location and sizing of erosion and sediment control structures, and access road development, as well as requirements for mitigation and monitoring and best management practices. That is, this section of the Plan will describe how the Project will be developed with respect to the guiding principles and commitments provided in the first section. For example, this section of the Plan will include details related to size and location of flow retention ponds to minimize off-site transport of sediment laden runoff and potential impacts on surrounding lakes as well as requirements monitoring of surface water, air quality, noise and vibration. This section of the Plan will also include details on the location and construction of the proposed quarry access road to minimize impacts on the visual environment and noise and off-site transport of dust.

Given the expected 50-year lifespan of the Project, it is reasonable and likely that the quarry will be developed in sectors or stages (*i.e.*, may be based on a specific land area or duration of development (in the range of 5-10 years)). As such, the development procedures (referred to above) will be prepared

progressively for each stage/sector of development. The specific procedures and details will be prepared for each specific sector/stage of development for all phases of the proposed Project (*i.e.*, construction, operation and reclamation) and will prescribe how each phase will be undertaken to ensure compliance with the development philosophy.

Sovereign Resources will construct and operate the modified quarry in accordance with all conditions of approval provided by NSEL. Sovereign Resources appreciates that historically, there have been concerns regarding production and transportation of aggregates along Rocky Lake Drive associated with the operation of this quarry by others. To address these concerns, Sovereign Resources proposes some modifications to a typical quarry operation. The key elements of the proposed Project are:

- there will be no crushing equipment onsite, temporary or permanent;
- a new (private) access road will be constructed between the Sovereign Resources quarry and the Municipal Enterprises quarry;
- blasted rock will be hauled along the new access road to the adjacent Municipal Enterprises quarry, and not along Rocky Lake Drive;
- processing of blasted rock (*i.e.*, crushing, stockpiling and transportation of aggregate) will take place at the Municipal Enterprises quarry; and
- sale and transportation of aggregates will take place at/from the Municipal Enterprises quarry.

Another key element of the proposed Project is that operation of the Sovereign Resources quarry is not expected to result in increased aggregate production rates and trucking at/from the adjacent Municipal Enterprises quarry. That is, the volume of aggregate produced, and subsequently the volume of quarry truck traffic on Rocky Lake Drive, from the Municipal Enterprises' quarry, will not increase as a result of the Project. Fluctuation of volumes may occur, however, as a result of changing market conditions over time. Production and trucking of aggregate from the quarry will be monitored and results provided to the Monitoring Board as required.

Clearing of the proposed quarry area will take place as required (*i.e.*, in advance of drilling and blasting). Clearing activities will take place outside of the breeding season for most bird species (*i.e.*, April 1 to August 1). Grubbing and stripping of topsoil and overburden will be conducted only as needed, in advance of drilling and blasting, to minimize exposure and potential subsequent erosion of soil.

Development of the quarry may occur in a number of ways, depending on the quality of rock required and available. The development scenarios include, but are not limited to: advancement of the existing working face in an easterly direction; establishment of a new working face elsewhere in the proposed quarry area; or advancement of the working face of the adjacent quarry in a north easterly direction, across the property boundary (*i.e.*, from Municipal Enterprises to Sovereign Resources lands). The latter

scenario is considered the most likely at this time. Regardless of how the quarry is developed, the rock removed from the proposed quarry area will be hauled to the Municipal Enterprises quarry along a private road for processing, and the volume of rock blasted/extracted and processed will not result in increased production or trucking overall from both quarries as a result of this Project. Furthermore, development will occur in consideration of potential visual and acoustic effects.

The location of the proposed access road between the two quarries has not yet been confirmed; however, it will be located so as not to interfere with the activities at both quarries. The road will be designed in consideration of potential visual and acoustic effects. The access road will be constructed to accommodate the anticipated loads and will likely be surfaced with gravel and/or rock. As previously indicated, upon Project approval, no new rock/aggregate will be hauled along Rocky Lake Drive from the Sovereign Resources quarry.

## **2.6 Operation and Maintenance**

### **2.6.1 Quarry Operation Activities**

The proposed Project activities will be undertaken in accordance with the Pit and Quarry Guidelines (NSDOE 1999). These guidelines apply to all pit and quarry operations in the Province of Nova Scotia and provide separation distances for operations and guidance on activities including blasting, liquid effluent discharge level limits, suspended particulate matter limits, sound level limits, and requirements for a rehabilitation plan and security bond.

The Industrial Approval for the existing quarry facility allows for production of up to 90,000 tonnes of aggregate annually. Due to the proposed modified operation of the quarry (*i.e.*, no aggregate production onsite and no incremental increase of aggregate at the adjacent Municipal Enterprises quarry), there will be no specified production rate established for the quarry. The number of blasts per year is not known; however, similar to aggregate production, there will be no incremental increase in blasting as a result of the Project.

Clearing, grubbing, stripping and drilling will likely be undertaken by personnel presently employed at the Municipal Enterprises' quarry. A qualified company will conduct all blasting. The blasting subcontractor is responsible for blast designs and methods in accordance with the General Blasting Regulations made pursuant to the Nova Scotia *Occupational Health and Safety Act* (1996). Blasting activity will be conducted in accordance with the Pit and Quarry Guidelines. A blast design will be prepared and submitted to NSEL. A pre-blast survey of all residences and wells within 800 m of the proposed modification boundary will be undertaken, if required. Blasting agents will not be stored within the Sovereign Resources quarry. Blasting agents are and will continue to be stored according to provincial regulations, at the Municipal Enterprises quarry. Additional information on blasting is provided in Section 5.2.

Since hauling of blasted rock from the Sovereign Resources quarry will be hauled via a private access road to the Municipal Enterprises quarry for crushing and transport to markets, and current aggregate and production and trucking levels are not expected to increase as a result of this Project, off-site transportation is not considered to be a significant issue. Information on existing quarry-related traffic including traffic routes and volumes is included in Appendix C. Blasting agents will not be stored within the Sovereign Resources quarry. Blasting agents are and will continue to be stored according to provincial regulations, at the Municipal Enterprises quarry.

The operating schedule of the Sovereign Resources quarry will be consistent with the approved operating schedule of the Municipal Enterprises quarry. The quarry may be in operation 24 hours/day, 7 days/week, 365 days/year. Blasting at the Municipal Enterprises quarry occurs approximately 20-30 times/year, predominantly between the months of April and December. There is not expected to be any incremental increase in blasting above that which occurs currently at the Municipal Enterprises quarry alone. As with the current blasting schedule at the Municipal Enterprises quarry, blasting will be undertaken mid-day and will be avoided during thermal inversion conditions.

## **2.6.2 Effluents and Emissions**

### **Erosion and Sediment Control**

In accordance with best practices and standard NSEL requirements, erosion and sedimentation controls will be in place to ensure that effluent generated during operations is managed appropriately. This will include diversion of clean surface drainage away from disturbed areas and stabilization of all disturbed areas and potentially erodible soils with rock, hydroseed, or mulch. Sovereign Resources will coordinate quarry activities with seasonal constraints (*i.e.*, avoid periods of heavy precipitation and snow melt) to the extent possible and will minimize the amount and duration of exposed soil, where feasible. Prior to seasonal shutdowns, Sovereign Resources will ensure the quarry site is left in a stable condition to minimize the potential for erosion and subsequent sedimentation during these non-operational periods.

Hydro-Com Technologies has conducted a hydrological study to evaluate the potential impacts of the Project on quality and quantity of surface water (lakes, streams and wetlands) in the vicinity of the quarry area (refer to Appendix D). The findings of this study indicate that, at the ultimate level of development, flow retention structures must be designed to accommodate a peak flow of 15.1 m<sup>3</sup>/s and have a volume of 83,600 m<sup>3</sup>. It is important to note that these values are considered a worst case scenario and can be reduced to near pre-development levels with incorporation of mitigative measures such as flow retention and revegetation.

Discharge from the developed Sovereign Resources quarry will flow into the Municipal Enterprises quarry. Outflow from the retention structures into the Municipal Enterprises quarry will be monitored in accordance with the requirements of the Industrial Approval. It is anticipated that the limits will be in accordance with the Pit and Quarry Guidelines (NSDOE 1999) which specify a total suspended solids concentration limit of 50 mg/L for an individual grab sample and 25 mg/L as a maximum monthly average. Other parameters may be monitored in accordance with the Industrial Approval and/or at the request of NSEL. In the unlikely event that overflow from the quarry exceeds final effluent discharge limits as determined through monitoring or is sediment laden (based on a visual inspection), contingency measures that may be employed include pumping of sediment laden water to vegetated areas (away from watercourses) or through filter bags for additional filtration and/or use of additional filtration devices or structures. More specific details related to erosion and sediment control, where required, will be identified in the application for Industrial Approval.

### **Air Emissions**

Dust will be generated from drilling and blasting operations, aggregate stockpiles and movement of vehicles. Dust emissions will be controlled with the application of water and/or other dust suppression measures (refer to Section 5.1). To further minimize generation of dust, the working areas and laydown areas will be covered with blasted rock. Topsoil and organic soil deposits excavated during the overburden removal will be specifically managed for revegetation of exposed soils and subsequent reclamation. As described in 5.1.2, routine monitoring of airborne particulate emissions (dust) will be conducted to ensure particulate emissions do not exceed the following limits at the site property boundaries, as specified by the Pit and Quarry Guidelines (NSDOE 1999):

- Annual Geometric Mean 70  $\mu\text{g}/\text{m}^3$
- Daily Average (24 hrs) 120  $\mu\text{g}/\text{m}^3$

Additional information on dust control is contained in Section 5.1.

Combustion emissions will be generated from the operation of vehicles and equipment. This will include small quantities of greenhouse gas (GHG) emissions, including CO<sub>2</sub>, SO<sub>2</sub> and NO<sub>x</sub>. Given the scope of the planned operations, these emissions will be minimal and localized. Emissions will be reduced through proper equipment maintenance and inspection, and reduction of engine idling when not in use.

### **Noise Emissions**

Noise emissions will be generated from blasting and operation of heavy equipment such as loaders and trucks (*e.g.*, engine noise and backup safety alarms). As per the Pit and Quarry Guidelines and the

Guideline for Environmental Noise Measurement and Assessment (Noise Guidelines) (NSDOE 1989), sound levels from quarry operations will be maintained at a level not to exceed the following sound levels (Leq) at the property boundaries:

Leq 65dBA 0700-1900 hours (Days)  
60dBA 1900-2300 hours (Evenings)  
55dBA 2300-0700 hours (Nights)

In addition, routine monitoring of noise at the property boundaries and at the nearest receptors will be undertaken to identify the levels and the proportion contributed by the quarry. Sovereign Resources will investigate exceedances of noise guidelines attributed to Project activities and will reduce them to acceptable levels (*i.e.*, according to the Noise Guidelines). Additional information on noise control is presented in Section 5.2.

### **Solid Waste**

Solid waste generated onsite will be minimal (office and domestic refuse). All solid waste will be properly collected, separated, and stored according to the Solid Waste-Resource Management Regulations until such time that it can be transported to a provincially approved waste disposal facility.

### **2.6.3 Hazardous Materials and Contingency Planning**

There is no planned storage of hazardous materials or petroleum products at the quarry site. In all cases where there may be future storage of any controlled or regulated materials including hazardous materials or petroleum hydrocarbons, storage, use and handling of these materials will be in compliance with applicable regulatory requirements.

Refuelling of equipment will be conducted onsite on a regular basis, under contract by a tanker truck. Refuelling activities will not be conducted within 100 m of any surface water, and equipment operators will remain with the equipment at all times during refuelling in accordance with the Petroleum Management Regulations of the Nova Scotia *Environment Act*.

In the event of a leak or spill during refuelling, maintenance, or general equipment operation, immediate action will be taken to stop and contain the spilled material. All contaminated material will be collected and stored in an appropriate manner so as not to be re-released to the environment until such time as it will be transported to an approved treatment/disposal facility. All spills will be reported to the 24-hour environmental emergencies reporting system (1-800-565-1633) in accordance with the Emergency Spill Regulations of the Nova Scotia *Environment Act*. A Hazardous Materials Response and Contingency Plan will be prepared in support of the application for the Industrial Approval.

Potential for accidents and malfunctions associated with the project to have significant effects on the environment is small. Typical accidents and malfunctions could include small spills of hydrocarbon (e.g., hydraulic hose), failure of erosion and sediment control structures, and forest fires. In the unlikely occurrence of one of these events, environmental components such as surface water and terrestrial habitat, could be adversely affected. It is however anticipated that the application of emergency response and contingency planning will minimize these environmental effects, likely short term and highly localized. Significant adverse environmental effects are unlikely to result from accidents or malfunctions. As a requirement of the Industrial Approval application/amendment for this quarry, Sovereign Resources will prepare a contingency plan for accidental events for NSEL approval. The Canadian Standards Association publication, *Emergency Planning for Industry (CAN/CSA-Z731-95)*, will be consulted as a reference in the preparation of the contingency plan.

## **2.7 Decommissioning and Reclamation**

Sovereign Resources will undertake a progressive rehabilitation program at the quarry site. The rehabilitation process begins with the preservation of topsoil and overburden for future grading and revegetation of the quarry. As distinct areas within the quarry become inactive, the area will be graded to a stable slope, covered with existing stockpiled topsoil, and hydroseeded. At the end of the quarry operation (within six months of abandonment), rehabilitation will consist of: grading and contouring of all slopes and exposed rock faces in consideration of rock falls, slope stability, and safety; spreading existing stockpiled topsoil; and hydroseeding. The laydown area and quarry floor will be covered with quarried materials, graded, as required, and levelled to allow for future commercial, industrial, recreational, or residential land use. A quarry development plan specifically addressing all aspects of the quarry development including the development sequencing and reclamation practices will be prepared. This development plan will be updated on a regular basis over the life of the quarry as development planning proceeds.

## **3.0 SCOPE AND METHODOLOGY**

### **3.1 Overview and Approach**

The EA methodology for this Project has been developed to satisfy regulatory requirements for an EA of a Class I Undertaking under the Nova Scotia Environmental Assessment Regulations.

The approach and methodology used are based on accepted environmental assessment practice, focusing on environmental and socio-economic issues of greatest concern. Assessing all of the potential issues associated with a proposed undertaking is impractical, if not impossible (Beanlands and Duinker 1983). It is therefore generally acknowledged that an environmental assessment should focus on those components of the environment that are valued by society and/or serve as indicators for environmental change. These components are known as Valued Environmental Components (VECs) and Valued Socio-economic Components (VSCs). The environmental assessment for this Project evaluates potential effects with regard to each VEC or VSC.

A focused environmental assessment therefore requires a process of scoping to define the Project components and activities that are to be considered in the assessment, to identify the key issues and to set the spatial and temporal boundaries of the assessment. The following sections provide more information on the scoping and methodology involved in this assessment.

### **3.2 Scope of the Undertaking**

The proposed Project, as described in Section 2, consists of gradual expansion of the existing quarry footprint to include an additional 180 ha (445 acres) over a long term period (*e.g.*, 50 years). The proposed activities will include progressive clearing, grubbing and stripping of overburden, drilling, blasting, and hauling. There will be no crushing at the quarry. All blasted rock will be hauled to the adjacent Municipal Enterprises quarry for aggregate production via a private access road between the two quarries. Other activities will include construction/installation of erosion and sediment control structures (*e.g.*, settling ponds), dust control, and progressive rehabilitation.

All truck traffic associated with the removal of rock aggregate will enter and exit through the Municipal Enterprises quarry. Operation of the Sovereign Resources quarry (*i.e.*, aggregate production rate, trucking volume) will not increase current rates/levels of activities at the Municipal Enterprises quarry on average. That is, the volume of aggregate produced and hence the volume of truck traffic on Rocky Lake Drive from Municipal Enterprises/Sovereign Resources will collectively remain at levels similar to those produced by Municipal Enterprises alone under their existing approvals. It should be noted that quarrying activity normally fluctuates according to construction contracts and general level of construction activity in the Province.

### **3.2.1 Purpose and Need for the Undertaking**

The purpose for the Project is to allow Sovereign Resources to gain access to additional sources of aggregate and continue operations at the quarry. The quarry is currently operating under Approval No. 84-073, issued by NSEL on December 18, 1986. This approval provides for the operation of a rock quarry, including crushing, for an area approximately 19 ha (44 acres). A copy of the NSEL approval is included in Appendix B.

The aggregates produced at the quarry are an important requirement in municipal and residential construction projects in the region and are of an appropriate quality for highway construction and maintenance projects. This quarry, as well as other quarries in Nova Scotia, is an important component of the natural resource sector of the economy and provides essential raw materials to the province's construction industry. The quarry also provides direct and indirect employment for its workers and suppliers, as well as for the transportation and construction industries.

### **3.2.2 Project Alternatives**

Other methods of carrying out the undertaking may include different methods of resource extraction, alternative locations, alternative transportation modes, and other reclamation and decommissioning options.

The proposed method of resource extraction is blasting. Alternative methods of aggregate extraction (*i.e.*, mechanical) are not practical in this case due to the nature and characteristics of the rock and the scale of the operation.

Consideration of an alternative location for the quarry is not a practical alternative as it would likely require construction of new facilities and introduction of quarrying activity to new areas. This Project is proposed to occur in an area that is already exposed to quarrying activities. The Project will not require the construction of any new facilities, other than an onsite private access road, nor is it expected to increase current production rates and trucking volumes beyond those already generated by the existing Municipal Enterprises quarry. An alternative location scenario would also either require crushing onsite or trucking the aggregate on public highways to another location for crushing. Trucking volumes would therefore also be increased under this alternative scenario. Rail transportation is also an option, but is not considered efficient since it would also require trucking to and from the rail yards.

Sovereign Resources is proposing a progressive reclamation plan to be implemented as specific areas within the quarry are no longer in use. Within this plan, Sovereign Resources may explore alternatives to habitat reclamation such as wetland reconstruction. Reclamation alternatives will be determined in consultation with NSEL.

### 3.3 Scope of the Environmental Assessment

The proposed Project involves expansion of a quarry footprint beyond four hectares. Therefore, the Project must be registered under the Environmental Assessment Regulations of the Nova Scotia *Environment Act* as a Class I Undertaking. This report fulfils the primary requirements for project registration under this legislation.

#### 3.3.1 VEC/VSC Identification

The scope of the EA in relation to the proposed Project has been determined based on regulatory and stakeholder consultations, the professional judgement and expert knowledge of the study team, and the results of field studies conducted in support of this EA. The *Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia* (NSEL 2002) (EA Guide) was also used to help focus the scope of the assessment. NSEL does not provide explicit terms of reference for environmental registrations for Class I Undertakings. In this case, Jacques Whitford has also relied on previous experience with successful environmental approval applications for several other quarry projects in Nova Scotia. Table 3.1 shows the components recommended for consideration by the EA Guide.

<b>Component</b>	<b>Scoping Considerations</b>	<b>VEC/VSC</b>
<i>Biophysical Environment</i>		
Geology	Geology, in itself, is not a valued environmental component. Geological features of the site including mapping are presented in the discussion of effects on groundwater.	Groundwater Resources
Surface Water	Project will interact with surface water onsite. Surface water impacts (particularly with respect to Lake William) were identified as issues of concern during public consultation. Hydrological conditions and potential impacts on water quantity and quality, including potential effects on Lake William are addressed.	Surface Water and Hydrology
Groundwater	Project will interact with groundwater resources. Impacts to domestic wells were identified as an issue of concern during public consultation. Impacts on groundwater quality and quantity, with an emphasis on domestic well impacts are addressed.	Groundwater Resources
Wetlands	Project will result in direct and indirect impacts on several wetlands within or immediately adjacent to the proposed quarry boundaries. Although not identified as an issue of concern during public consultation, wetlands are valued resources, protected by the Nova Scotia <i>Environment Act</i> and Regulations.	Wetlands
Flora and Fauna Species and Habitat	Project will result in habitat loss and noise disturbance to wildlife. Rare plant species were identified in the study area during vegetation surveys. Rare species are protected by the Nova Scotia <i>Endangered Species Act</i> and the federal <i>Species at Risk Act</i> . Migratory birds are protected by the <i>Migratory Birds Convention Act</i> . Flora and fauna are assessed separately as rare and sensitive plants and wildlife.	Rare and Sensitive Plants Wildlife

<b>Table 3.1 Scoping of VECs/VSCs Using EA Guide for Pit and Quarry Developments (NSEL 2002)</b>		
<b>Component</b>	<b>Scoping Considerations</b>	<b>VEC/VSC</b>
Fish and Fish Habitat	Fish and fish habitat are protected by the federal <i>Fisheries Act</i> . There are no streams within the Project area; however, streams flow to Lake William which contains fish habitat. Discussion of impacts on surface water quality and quantity addresses potential effect on habitat.	Surface Water and Hydrology
Atmospheric Conditions/Air Quality	Project activities will result in release of air emissions (particularly dust). Dust was also identified as a concern during public consultation.	Air Quality
Noise Levels	Project activities will result in noise emissions ( <i>e.g.</i> , blasting, trucking). Noise was also identified as a concern during public consultation.	Noise and Vibration
<b><i>Socio-economic Conditions</i></b>		
Economy	Project is not proposed to increase production rates beyond that at the Municipal Enterprises quarry. No new jobs are predicted at this time as the quarry will be operated by existing employees at the Municipal Enterprises quarry.	N/A
Land Use and Value	Project may interact with surrounding land uses including residential and recreational land use. Impacts on land use were identified as a concern during public consultation.	Land Use
Transportation	Project is not proposed to increase production rates beyond that at the Municipal Enterprises quarry. Hauling of blasted rock from the Sovereign Resources quarry will be via a private access road joining the quarry to the Municipal Enterprises quarry, where crushing and offsite transport of aggregate will occur. Upon Project approval, there will be no transport of aggregate from the Sovereign Resources quarry along Rocky Lake Road. There is therefore no anticipated net change in traffic. Details on existing quarry traffic is provided in Section 2 and Appendix C.	N/A
Recreation and Tourism	Existing and planned recreation and tourism activities are discussed with respect to land use.	Land Use
Human Health	Potential effects on human health are addressed through the assessment of air, noise, groundwater and surface water impacts. A separate VEC is therefore not required.	Air Quality Noise and Vibration Groundwater Resources Surface Water and Hydrology
Cultural and Heritage Resources	An archaeological and heritage resources survey for the study area was conducted by a qualified archaeologist. The archaeological potential for the study area is low, however, mitigation is provided should a resource be encountered during Project activities.	Archaeological and Heritage Resources

Although the EA Guide does not specifically require consideration of visual/aesthetic impacts, Visual Environment has also been added as a VSC based on stakeholder concerns raised during consultations.

Table 3.2 lists the final VECs/VSCs to be assessed in this report and includes rationale for their selection.

VEC/VSC	Rationale for Selection			Where VEC/VSC is addressed in report
	Public/Stakeholder Concerns	Regulatory Considerations	Professional Judgement	
Air Quality	✓	✓	✓	Section 5.1
Noise and Vibration	✓	✓	✓	Section 5.2
Groundwater Resources	✓	✓	✓	Section 5.3
Surface Water and Hydrology	✓	✓	✓	Section 5.4
Wetlands		✓	✓	Section 5.5
Rare and Sensitive Flora		✓	✓	Section 5.6
Wildlife	✓	✓	✓	Section 5.7
Land Use	✓	✓	✓	Section 5.8
Visual Environment	✓		✓	Section 5.9
Archaeological and Heritage Resources		✓	✓	Section 5.10

### 3.3.2 Spatial and Temporal Boundaries

Boundaries provide a meaningful and manageable focus for an environmental assessment. Temporal and spatial boundaries encompass those periods and areas within which the VECs and VSCs are likely to interact with, or be influenced by, the Project. Spatial boundaries for this assessment are generally limited to the immediate Project area unless otherwise noted. Temporal boundaries are generally limited to the duration of, and for a period of time after, the Project activities, which in this case include the entire lifetime of the quarry including reclamation and decommissioning activities (*e.g.*, >50 years). Some spatial boundaries may extend beyond the quarry boundaries (*e.g.*, Surface Water and Hydrology, and Visual Environment). Although most quarry activity will occur between April and December, this environmental assessment assesses potential effects of the Project throughout the year. Temporal boundaries also address other temporal issues such as seasonal sensitivities (*e.g.*, bird breeding). Additional information on assessment boundaries is provided in Section 3.4.2.

## 3.4 Impact Assessment Methodology

### 3.4.1 Field Studies and Data Collection

Field studies were conducted by Jacques Whitford between June and October, 2004 and June 2005 to investigate and establish the existing conditions and to determine appropriate mitigation, if necessary, to minimize environmental effects from the proposed Project. These surveys consisted of: vegetation surveys; breeding bird surveys; mammal survey; herpetile survey; and fish and fish habitat surveys. These surveys were undertaken by qualified terrestrial and freshwater ecologists employed by Jacques Whitford. An assessment of potential archaeological and heritage resources was undertaken by a qualified archaeologist. A hydrology study was conducted by Hydro-Com Technologies Ltd. A reconnaissance survey of road conditions and existing traffic levels was conducted by Atlantic Road and

Traffic Management. In February 2005, an ambient noise monitoring survey was conducted. Additional information, in support of the field studies and the assessment, was gathered through a review of: air photos; site mapping; and other information sources, such as HRM Planning and Development Services, the Nova Scotia Museum (NSM), Statistics Canada, the Nova Scotia Department of Transportation and Public Works (NSTPW), the Nova Scotia Department of Natural Resources (NSDNR) and the Atlantic Canada Conservation Data Centre (ACCDC).

### **3.4.2 Effects Analysis Methodology**

As noted in Section 3.1, a focussed approach is used for the EA using VECs/VSCs and boundaries identified in a scoping process described in Sections 3.2 and 3.3. In its most basic terms, the effects assessment methodology is to describe Project activities that could interact with the existing conditions of VECs/VSCs within the relevant boundaries and to predict the resulting effects, both positive and negative. Environmental assessment is used as a planning tool not only to identify predicted impacts, but also to design mitigative strategies to reduce adverse effects as well as propose monitoring programs where significant risk or uncertainty remains.

For each VEC/VSC, existing conditions (*i.e.*, pre-Project) are described. The description is restricted to a discussion of the status and characteristics of the VEC/VSC within the boundaries established for the assessment. Potential interactions are investigated and evaluated based on current scientific knowledge with regard to each interaction. Effects are analyzed qualitatively, and, where possible, quantitatively, using existing knowledge, professional judgement and appropriate analytical tools.

Where applicable, mitigation measures are identified and the significance of the predicted environmental effects of the Project are evaluated based on specific evaluation criteria which considers the magnitude, frequency, duration, geographical extent and reversibility of the potential effect.

Table 3.3 presents the temporal and spatial boundaries and effects significance criteria for each VEC/VSC for this assessment. With regard to significance criteria, definitions are provided for a significant adverse environmental effect and a positive effect.

The significance of residual (*i.e.*, after mitigation has been applied) effects is then determined for each VEC/VSC.

Requirements for follow-up and monitoring are linked to the sensitivity of a VEC/VSC to predicted environmental effects. The likelihood and importance of such effects, as well as the level of confidence of the effects prediction are also taken into consideration.

<b>VEC/VSC</b>	<b>Assessment Boundaries</b>	<b>Significance Criteria</b>
Air Quality	<p><b>Spatial boundaries</b> for the assessment of air quality include the airshed within which sensitive receptors (<i>e.g.</i>, residential communities) could potentially experience a measurable reduction in regulated air quality parameters (<i>e.g.</i>, airborne particulates). In this case, 5 km is considered a sufficient spatial boundary.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities.</p>	<p>A <b>significant adverse environmental effect</b> with respect to air quality is defined as one that would reduce air quality, such that the level of total suspended particulate matter exceeds 120 µg/m<sup>3</sup> over a 24 hour averaging period or 70 µg/m<sup>3</sup> over an annual averaging period. These limits are specified as the ‘maximum permissible ground level concentrations’ under the Nova Scotia Air Quality Regulations and as the ‘maximum acceptable’ limits under the <i>Canadian Environmental Protection Act (CEPA) Ambient Air Quality Objectives</i>.</p> <p>A <b>positive effect</b> occurs when there is a predicted or expected improvement in ambient air quality and mitigative measures in the area affected by Project activities.</p>
Noise and Vibration	<p><b>Spatial boundaries</b> for the assessment of Project-related noise include all sensitive receptors (<i>e.g.</i>, residential areas, schools, etc.) within 5 km of the Project area. The 5 km range is the distance at which the noise output from blasting will attenuate to near ambient noise levels. An appropriate spatial boundary for the assessment of Project-related vibration effects includes all structures within 5 km of the Project area.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities. Other temporal considerations include those times of day and seasons when industrial noise could become more of a nuisance.</p>	<p>A <b>significant adverse environmental effect</b> with respect to noise may be defined by any of the following:</p> <ul style="list-style-type: none"> <li>• a noticeable change in noise level (approximately 5 dBA) which results in exceedance of the Noise Guideline levels;</li> <li>• a noticeable change in noise level (approximately 5 dBA) above existing noise levels in areas where the guideline levels are already exceeded; or</li> <li>• a change in noise level of approximately 10 dBA above existing noise levels in areas where the Guideline levels are not exceeded.</li> </ul> <p>The severity of change combined with the resulting overall L<sub>eq</sub> (equivalent continuous sound level measurement) will determine mitigation requirements and residual effect.</p> <p>A <b>significant adverse environmental effect</b> with respect to vibration is defined as one which results in exceedance of the limits for concussion and/or ground vibration as defined by the Pit and Quarry Guidelines (NSDOE 1999) on a recurring basis (<i>i.e.</i>, not an isolated incident).</p> <p>A <b>positive effect</b> occurs when Project-related activities result in a reduction in ambient noise level.</p>

<b>Table 3.3 Assessment Boundaries and Significance Criteria</b>		
<b>VEC/VSC</b>	<b>Assessment Boundaries</b>	<b>Significance Criteria</b>
Groundwater Resources	<p><b>Spatial boundaries</b> for the assessment of groundwater resources are based on a combination of aquifer hydraulic properties, expected groundwater flow directions and the distance between the quarry and wells that may be affected by excavation and/or blasting. Area of influence or capture area of a typical domestic well is usually less than 100 m. Vibration damage to a well is generally a function of distance between the energy source and the well and seismic properties of the aquifer materials. Risk from blasting is expected to be minimal beyond about 200 m, but an 800 m area of influence is used to be conservative and is consistent with the setback from structures in the Pit and Quarry Guidelines.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities.</p>	<p>A <b>significant adverse environmental effect</b> on groundwater resources is defined as one in which the Project causes one or more of the following:</p> <ul style="list-style-type: none"> <li>• yield from an otherwise adequate well supply decreases to the point where it is inadequate for intended use;</li> <li>• the quality of groundwater from an otherwise adequate well supply that meet guidelines deteriorates to the point where it becomes non-potable or cannot meet the Guidelines for Canadian Drinking Water Quality (Health Canada 2003); and/or</li> <li>• the aquifer is physically or chemically altered to the extent that interaction with local surface water results in stream flow or chemistry changes that adversely affect aquatic life or surface water supply.</li> </ul> <p>A <b>positive effect</b> is defined as one on which the quantity or quality of well or spring water is improved as a result of Project activities, such as improving drainage.</p>
Surface Water and Hydrology	<p><b>Spatial boundaries</b> for the assessment of surface water and hydrology are based on watershed areas potentially affected by surface runoff and/or groundwater discharges from the Project. In this case, the watersheds are Lake William, Rocky Lake and Powder Mill Lake.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities. Other temporal boundaries include those times when fish and/or habitat are particularly sensitive (<i>e.g.</i>, spawning or migration).</p>	<p>A <b>significant adverse environmental effect</b> on surface water quality is one that exceeds CCME Guidelines for the protection of aquatic life (CCME 1999) and the Pit and Quarry Guidelines (NSDOE 1999). According to the CCME Guidelines, total suspended solids (TSS) should not exceed 10 mg/L when background concentrations are equal to or less than 100 mg/L. If background TSS is greater than 100 mg/L, then TSS should not exceed 10% of background concentrations. In accordance with the Pit and Quarry Guidelines, all stormwater runoff and all liquid effluents must meet the following TSS concentrations prior to discharge into a watercourse: 50 mg/L (maximum concentration in any grab sample) and/or 25 mg/L (maximum arithmetic monthly average concentration).</p> <p>A <b>significant adverse environmental effect</b> on fish habitat, and ultimately fish, is one that changes hydrology and surface quality sufficiently to cause:</p> <ul style="list-style-type: none"> <li>• death or life threatening injury to one or more individuals of a listed species (<i>e.g.</i>, <i>Species at Risk Act (SARA)</i>);</li> <li>• death or life threatening injury on non-listed species in sufficient numbers to adversely affect species populations and ecological functioning of the fish community;</li> <li>• long-term or permanent displacement of any species from preferred feeding, spawning or rearing habitats (including critical habitat for SARA listed species) or migratory routes; and/or</li> <li>• destruction or adverse modification of critical habitat (as defined by <i>SARA</i>).</li> </ul> <p>A <b>positive effect</b> is defined as one that enhances the quality of surface water for aquatic life or recreational purposes.</p>

<b>Table 3.3 Assessment Boundaries and Significance Criteria</b>		
<b>VEC/VSC</b>	<b>Assessment Boundaries</b>	<b>Significance Criteria</b>
Wetlands	<p><b>Spatial boundaries</b> for the assessment of wetlands includes wetlands occurring within or immediately adjacent to the proposed quarry boundaries such that their hydrologic regime could be affected.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities. Other temporal boundaries include those periods of increased sensitivity to wildlife inhabiting the wetlands (<i>e.g.</i>, bird or herpetiles breeding).</p>	<p>A <b>significant adverse environmental effect</b> on wetlands occurs when there is a net loss of wetland functions in a wetland of significant value as determined through a recognized wetland evaluation system.</p> <p>A <b>positive effect</b> may enhance the quality, increase the species diversity, or increase the area of the wetland.</p>
Wildlife	<p><b>Spatial boundaries</b> for the assessment of wildlife include wildlife and their habitat occurring within or immediately adjacent to the proposed quarry boundaries such that they could be disturbed by noise or other stimulus.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities.</p>	<p>A <b>significant adverse environmental effect</b> on wildlife occurs when the population of a species is sufficiently affected to cause a decline in abundance and/or change in distribution beyond which natural recruitment (reproduction and immigration from unaffected areas) would not return the population to its former level within several generations.</p> <p>A <b>positive effect</b> occurs when Project activities help to increase populations and/or diversity of species.</p>
Rare and Sensitive Flora	<p><b>Spatial boundaries</b> for the assessment of rare and sensitive flora includes those flora species and associated habitat that occur within or immediately adjacent to the proposed quarry boundaries such that their habitat could be affected by Project activities.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities.</p>	<p>A <b>significant adverse environmental effect</b> on rare and sensitive flora occurs when the population of a species is sufficiently affected to cause a decline in abundance and/or change in distribution beyond which natural recruitment would not return the population to its former level within several growing seasons.</p> <p>A <b>positive effect</b> occurs when project activities help to increase species populations and/or diversity.</p>
Land Use	<p><b>Spatial boundaries</b> for the assessment of land use include lands within 5 km of the proposed quarry modification area boundaries with a focus on those land uses that could be directly affected by noise or other stimulus (<i>e.g.</i>, views). In general, the focus is on the communities of Lakeview and Waverley.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities. Other temporal boundaries include those periods of increased land use activity (<i>e.g.</i>, summer).</p>	<p>A <b>significant adverse environmental effect</b> on land use occurs when a change in existing patterns and lands uses are disrupted to a widespread degree adversely affecting all or a portion of a community's use and enjoyment of the lands.</p> <p>A <b>positive effect</b> may enhance a community's use and enjoyment of lands or enhance the social value of lands consistent with its intended use.</p>

<b>VEC/VSC</b>	<b>Assessment Boundaries</b>	<b>Significance Criteria</b>
Visual Environment	<p><b>Spatial boundaries</b> for the assessment of visual environment considers residential areas within visual reference of lands to be modified by the Project.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities. Other temporal considerations include times of greater visibility (<i>e.g.</i>, greater outdoor activity and after leaf fall).</p>	<p>A <b>significant adverse environmental effect</b> on visual environment occurs when there is a high level of adverse change to a valued visual resource (generally inconsistent with existing visual context) experienced by a significant part of the viewing community such that engineering design and landscape treatment cannot mitigate the impacts.</p> <p>A <b>positive effect</b> is defined as one that improves the existing visual character of the environment resulting in positive viewer response.</p>
Archaeological and Heritage Resources	<p><b>Spatial boundaries</b> for the assessment of archaeological and heritage resources include the area within or immediately adjacent to the proposed quarry boundaries.</p> <p><b>Temporal boundaries</b> are continuous throughout the life of Project operations including decommissioning and reclamation activities.</p>	<p>A <b>significant adverse environmental effect</b> on archaeological and heritage resources is defined as any Project-related disturbance to, or destruction of, archaeological or heritage resources considered by affected Aboriginal and other communities, or provincial heritage regulators to be of major importance due to factors such as rarity, condition, spiritual importance, or research importance, and that cannot be mitigated.</p> <p>A <b>positive effect</b> is one that results in enhanced understanding of local, regional, or cultural heritage through increased knowledge, or provides physical protection for a site that might otherwise have been destroyed through natural or non-Project anthropogenic events, in the absence of the Project.</p>

## 4.0 PUBLIC INVOLVEMENT

Sovereign Resources recognizes the importance of good community relations and communication with the nearby public. In particular, public input has been solicited and considered in this EA.

In the late 1980s, a Monitoring Board, consisting of a representative of the quarry (then Tidewater), the Waverley Ratepayers Association, and NSEL, was established in response to community concerns regarding the operation of the quarry. The development of this Monitoring Board was listed as condition of regulatory approval for the operation of the quarry (Approval No. 84-073). This Monitoring Board continues to function with the quarry currently under the ownership of Sovereign Resources. Sovereign Resources proposes that this Monitoring Board remain active for the life of the Project.

On October 27, 2004 the Monitoring Board met to discuss ongoing monitoring results of the existing Sovereign Resources quarry and discuss Sovereign Resources' proposal for quarry modification. Several issues with regard to the proposal were discussed including: impacts to horizontal viewplanes; wetland impacts; and recommendations for public consultation. At this meeting, the Monitoring Board recommended Sovereign Resources consider revising its proposed boundaries to minimize potential impacts to the viewshed. Preliminary viewshed analyses confirmed that by moving the proposed boundary back to the 50 m contour (thereby adding to the buffer area), impacts to the viewshed would be improved. Section 2.2 contains more information on the proposed boundary modification process.

With respect to further public consultation, the Monitoring Board recommended distribution of an information bulletin to residents in the village of Waverley and the portion of Lakeview between the railway line and Rocky Lake. They also recommended a meeting with the Waverley Ratepayers Association and a public information meeting.

Based on guidance provided by the Monitoring Board, Sovereign Resources developed a public information program which involved distribution of a Project Information Bulletin and an open house public meeting. Approximately 900 bulletins were distributed in the communities of Waverley and Lakeview between December 1 and 3, 2004 (refer to Appendix E for a copy of the Bulletin). The Bulletin provided information on the proposed Project including a location map. The Bulletin included information for a contact person at Jacques Whitford to which public comments could be directed, and an invitation to a public open house on December 15, 2004.

On December 9, 2004, Sovereign Resources met with the executive of the Waverley Ratepayers Association (WRA). The objective of this meeting was to present Project information including the results of the preliminary viewshed analysis and obtain any feedback on issues and concerns of the WRA.

The public open house was held at the Waverley Fire Hall on December 15, 2004 from 4 pm to 8 pm. Representatives from Sovereign Resources and their consultants were in attendance with graphic displays to provide additional Project information and answer questions. Approximately 125 people attended the meeting, the majority of which were residents of Waverley. Feedback forms were made available to allow individuals to record their comments, issues or concerns. Fifty-one feedback forms were completed; these were reviewed by the EA Study Team to help identify key issues.

Table 4.1 summarizes the issues and concerns raised at the open house and disposition of these issues in this report.

<b>Table 4.1 Public Issues and Concerns Raised at the Open House Meeting</b>	
<b>Issues/Concerns</b>	<b>Where Addressed in EA Report</b>
Need for the project	Section 3.2.1
Details on expected quarry development plan and rate of growth	Section 2.5
Operation of heavy machinery at night	Section 2.6.1
Noise and vibration from blasting	Section 5.2
Noise emissions and transmission of noise across Lake William	Section 5.2
Dust emissions and transport of particulates	Section 5.1
Pollution of Silverside beach with dust and debris	Section 5.1, 5.8
Particulate deposition in Lake William	Section 5.4
Siltation of watercourses and runoff to Lake William	Section 5.4
Changes to the horizon	Section 5.9
Visibility of quarry from higher elevations	Section 5.9
Light emissions	Section 5.9
Increase in truck traffic	Section 2.6.1
Effects on road conditions from truck traffic	Appendix C
Truck traffic routes through Waverley	Section 2.6.1; Appendix C
Impacts to residential wells	Section 5.3
Effects on groundwater quality and quantity	Section 5.3
Leaching of contaminants	Section 5.4
Impacts on wildlife	Section 5.7
Impacts to threatened species	Section 5.6; Section 5.7
Impacts on property values	Section 5.8
Incompatible land use	Section 5.8
Impacts on local school from traffic and blasting	Section 5.8
Human health impacts	Section 5.1; Section 5.2; Section 5.3
Purchase of Archibald property and preclusion of residential development	Section 5.8; Section 5.9
Planned use of buffer zone along Lake William	Section 5.8
Impacts on current recreational use of buffer zone	Section 5.8
Consultation with Lakeview community	Section 4
Ongoing public involvement (e.g., monitoring board)	Section 4
Remediation plans	Section 2.7
Monitoring requirements	Section 5; Section 6

The key issues raised by the public at the open house included blasting vibration and noise (57% of respondents listed this as an issue), dust emissions (37%), viewshed impacts (39%), and water quality effects (particularly with regard to Lake William) (18%). Feedback received during the open house assisted in issues scoping for the EA and also helped identify areas that required additional technical

analysis and/or more site-specific consideration (e.g., viewshed analysis, air quality impact assessment). This feedback also helped identify potential mitigative options for consideration.

As part of the follow-up visual impact assessment, contact was made by representatives of Jacques Whitford with some individuals in select geographical locations (e.g., Silversides subdivision) in an effort to collect additional information and photographs to assist with the analysis.

Sovereign Resources has also maintained ongoing communications with local elected officials to keep them informed of the Project status and public communication efforts.

A draft EA report was submitted to NSEL and the Monitoring Board for review and comment. Table 4.2 summarizes issues raised during these reviews and response to these comments.

<b>Reviewer</b>	<b>Primary Issue/Concern</b>	<b>Response</b>
NSEL – Environmental Assessment Branch	Additional information on quarry operation schedule	Section 2.6.1 has been revised to include specifics on the proposed operating schedule of the quarry.
NSEL – Pollution Prevention Branch	Hydrologic modeling and analysis	Additional hydrological analysis has been conducted and included as an addendum to the February 2005 hydrology study (Appendix D).
NSEL – Regional Office	Additional detail on quarry development plan and monitoring programs	Section 2.5 has been revised to include additional information on the Quarry Development Plan. Additional information on monitoring programs has been provided in relevant VEC sections. Specific details related to monitoring programs will be included in the Quarry Development Plan.
NSEL – Water and Wastewater Branch (Surface Water)	Additional detail on baseline water conditions and water quality monitoring program	A second fish and fish habitat survey was conducted in June 2005 to collect additional baseline water quality data and characterize fish and fish habitat. These results have been incorporated in a revised Section 5.4 and Appendix F. Additional information on a water quality monitoring program will be included in a Quarry Development Plan.
NSEL – Water and Wastewater Branch (Hydrogeology)	Interactions with groundwater and well resources	Section 5.3 has been revised to incorporate updated Well Log Database information, clarify excavation levels with respect to groundwater levels, and clarify distance to wells.
NSEL-Air Quality Branch	Clarification of air emissions monitoring program and proposed mitigation	Section 5.1 has been revised to clarify use of Municipal Enterprises sampling data and proposed monitoring program for Sovereign Resources. Discussion of greenhouse gas emissions and mitigation to reduce emissions has also been added.
Service Nova Scotia and Municipal Relations	Consideration of Halifax Regional Municipality as EA reviewer	It is not common practice for NSEL to include municipalities in the review of draft EA documents. HRM will be provided an opportunity to review the final EA document.
Environment Canada	Management of effluent, air emissions, and hazardous materials and wastes.	Section 2.5 has been revised to include additional information on the Quarry Development Plan which will include information on effluent management (e.g., surface runoff). Section 5.1 has been revised to address specific comments regarding particulate matter and greenhouse gas emissions.
Monitoring Board	Continuation of Monitoring Board	The EA report has been revised to explicitly include Sovereign’s intent to maintain the existence of the Monitoring Board during the life of the Project.

The EA registration document is subject to a mandatory public review and will be posted on the NSEL website as well as placed in several public viewing locations near the quarry and elsewhere in HRM. The Minister of Environment and Labour considers public comment on the EA document prior to making a determination under the Environmental Assessment Regulations.

In general, Sovereign Resources is committed to ongoing public communication as required during the life of the Project. This communication may take the form of periodic information bulletins, and/or media announcements, as well as rapid acknowledgement of public issues/concerns if they arise.