



SAND & GRAVEL PIT EXTENSION ENVIRONMENTAL ASSESSMENT REGISTRATION DOCUMENT

Cooks Brook, Halifax County, Nova Scotia

**Prepared For:
Gallant Aggregates Limited**

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GLOSSARY OF ABBREVIATIONS

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.

ACCDC	Atlantic Canada Conservation Data Centre
ARD	Acid Rock Drainage
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Act or Agency
CEPA	Canadian Environmental Protection Act
CO / CO ₂	Carbon monoxide / Carbon dioxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRA	Conestoga-Rovers and Associates
CRM	Cultural Resource Management Group
dB / dBA	Decibel (A-scale)
EA	Environmental Assessment
EARD	Environmental Assessment Registration Document
ESR	Emergency Spill Regulations
ha	Hectare
IA	Industrial Approval
kg	Kilogram
km	Kilometre
km/h	Kilometre per hour
Lpm	Litres per minute
loam	Rich soils containing a relatively equal mixture of sand and silt and a somewhat smaller proportion of clay.
m	Metres
MBCA	Migratory Bird Convention Act
mg/L	milligrams per Litre
mm	millimetres
MSC	Meteorological Service of Canada
NO _x / NO ₂	Nitrogen oxides / Nitrogen dioxide
NPRI	National Pollutant Release Inventory
NSDNR	Nova Scotia Department of Natural Resources
NSE / NSEL	Nova Scotia Environment, currently (since 2008), but historically referred to as NS Department of Environment and more recently as NS Environment & Labour depending on the timeframe.
NSEA	Nova Scotia Environment Act
NSESA	Nova Scotia Endangered Species Act
NSM	Nova Scotia Museum
PID	Property Identification Number

PM 10 /PM 2.5	Particulate matter (10 – less than 10 microns, 2.5 less than 2.5 microns)
PMR	Petroleum Management Regulations
POL	Petroleum, Oil and Lubricants
SARA	Species at Risk Act
SO _x / SO ₂	Sulphur oxides / Sulphur dioxide
SPL	Sound pressure levels
t	Tonnes
till	Glacial drift composed of an unconsolidated, heterogeneous mixture of clay, sand, pebbles, cobbles, and boulders.
TSP	Total suspended particulates
UOR	Used Oil Regulations
VEC	Valued Environmental Component
µg/m ³	Microgram per cubic metre

1.0 PROPONENT INFORMATION

The proponent is Gallant Aggregates Limited (Gallant) - a Nova Scotia registered firm. The Nova Scotia Registry of Joint Stocks information of the proponent is included in Appendix A.

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President, Gallant Aggregates Ltd.

Oct 30, 2012
Date

2.0 THE UNDERTAKING

2.1 NAME

The name of the undertaking is *Cooks Brook Sand & Gravel Pit Extension*.

2.2 LOCATION

The project properties (PID 00552927 and 00552901) are located behind civic 15157 Highway 224, Cooks Brook, Halifax County, Nova Scotia – see Figures 1 and 2. The coordinates at the centre of the site are E 475880, N4985350 (UTM Zone 20 NAD83 CSRS).

3.0 PROJECT SCOPE

3.1 SCOPE OF THE UNDERTAKING

The scope of the proposed pit extension is similar to past activities at the site and encompasses the activities associated with construction, operation, and decommissioning of the sand and gravel pit, as follows:

- site preparation;
- resource excavation;
- on-site processing: including crushing and/or screening, washing and stockpiling;
- transportation/trucking;
- rehabilitation; and,
- closure.

The project boundaries and proposed pit outline are shown in Figures 2 and 3. Excavation of aggregates will occur from the surface elevation of the existing pit to an elevation one meter above the local groundwater table. The proposed Pit Extension includes the development and operation of a sand and gravel pit totalling approximately 5.7 ha, in addition to the existing permitted pit of 3.8 ha, and will adhere to all setback and other requirements of the *Nova Scotia Environment (NSE) Pit and Quarry Guidelines* (1999) and as prescribed in Industrial Approval 2004-042655 (Appendix B). The existing elevation of the site is 30 masl closest to Highway 224 to approximately 20 masl at the trail southeast of the site. The final pit floor will be above 20 masl throughout and at least 1 m above the groundwater table. Mobile facilities will be employed within the pit for the processing plant, storage areas; overburden; use of temporary settling ponds in the pit. No permanent facilities are required to support the extension of the pit. All aggregate materials are “free dig” therefore no blasting is required.

The study area, for the purposes of this Environmental Assessment (EA), encompasses the footprint of the proposed extension, airshed, noiseshed, downstream receiving waterbodies, watersheds, and groundwater sheds within measurable zones of influence as outlined in subsequent Sections.

The anticipated average production rate is approximately 75,000 metric tonnes of aggregate per annum. The operating schedule will be based typically on 12 hour days, 5 days per week, as market demand requires with the possibility of 15 hour days, 7 days

per week during peak demand. The extractable reserves in the project footprint are estimated to be 500,000 tonnes of sand and gravel.

The pit extension project is anticipated to commence April 2013, pending Environmental Assessment approval and receipt of an amended Industrial Approval. The project duration is anticipated to be 6 years of extraction activity, depending on market demand, followed by a period of reclamation activity.

Site run-off will be collected and directed to a temporary settling pond. Temporary ponds and other sedimentation control measures will be constructed in advance of pit development, to ensure adequate sedimentation control during initial site works and pit development. Water from within the extension area will be directed to the lowest pit elevation (sump) and released to the environment. 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 IA amendment that would be granted by NSE.

Decommissioning and rehabilitation plans are described in Section 5.5. Rehabilitation will commence in a progressive feasible manner to minimize the areal extent of the active working area.

3.1.1 PURPOSE AND NEED FOR THE UNDERTAKING

Gallant Aggregates Ltd. (Gallant) has been operating a sand and gravel pit on the adjacent properties (PID 00552927 and 40453458) since 2004. The resource on this property has now been exhausted. The sand and gravel resource continues east onto the adjacent property (PID 00552901) and therefore requires an extension of its existing permitted pit to supply the demand for aggregate in road building, maintenance programs and infrastructure development in the region. The pit currently operates under an existing Industrial Approval (No. 2004-042655), issued Nov. 19, 2004, which expires Nov. 19 2014 (Appendix B).

The Project is an important economic component of the natural resource sector and provides essential raw materials to the construction industry. The pit development and processing operations provide direct employment for Gallant employees and suppliers, as well as indirect employment in the transportation and construction industries.

Environmental management is a priority to Gallant. It is the corporate objective for operations to meet and/or exceed the current standards to achieve a high level of environmental performance. This Environmental Assessment Registration Document (EARD) presents these environmental goals and outlines the Gallant's methodology to

continue to protect the environment. Company personnel have the proven ability to meet environmental goals.

3.1.2 CONSIDERATION OF ALTERNATIVES

Alternatives to an undertaking are defined as functionally different ways of achieving the same end. There is no viable alternative to aggregate extraction. Aggregate may be found in other areas. The location of this pit is fixed by the local surficial geology.

One alternative to the undertaking is a “do nothing” alternative. A “do nothing” approach results in no aggregate extracted from this area and no benefits to Nova Scotia. The “do-nothing” alternative would have effects on potential revenues that would not be realised, and potential employment and skills development associated with the Project that would not occur. While there are a limited number of sites within 20 km of the proposed project that could be developed, this area has already hosted several pit operations and the extent of the resource is known.

The expanded Cooks Brook Pit will continue to serve concrete sand and construction aggregate markets through the Halifax Regional Municipality, East Hants County and South Colchester County.

Alternative methods of carrying out the undertaking are defined as means of similar technical character or methods that are functionally the same. The analysis addresses alternatives to extraction methods; site layout and infrastructure configuration; processing options. The planned process is to screen, wash and stockpile material for shipping. The wash plant will be self contained and will not require a constant supply of water nor release wash water to the environment.

Alternatives to the processing of sand and gravel on-site are cost prohibitive and not in line with corporate philosophy on maximizing sustainable practices. Off-site processing would involve the transport of material via local roadways to other facilities. This may in effect move the material further away from the intended market thereby raising the cost of the product due to double shipping costs.

3.2 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This document serves to provide information required by NSE to approve an extension to an existing sand and gravel pit owned and operated by Gallant Aggregates Ltd. in

Cooks Brook, Nova Scotia. The proposed Project must be registered for Environmental Assessment under the Environmental Assessment Regulations of the Nova Scotia Environment Act as a Class I Undertaking.

The scope of this document has been determined by Gallant and Conestoga-Rovers & Associates (CRA), being based on the Project components, activities, field studies and regulatory consultations. The *Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia* (NSE 2009) was also used to determine/focus the scope of the assessment. Provincial regulatory officials have been aware of the intention to submit the EARD for this undertaking. Provincial regulators have assisted in scoping by bringing forth issues of concern and/or uncertainty. No federal environmental triggers have been determined.

Methodologies and approaches to reflect current environmental and socio-economic conditions are contained in this EARD, as are results and implications of the completed formal public consultation program. Baseline data was collected as a part of preparation of this EARD. Additional information was found in publicly available documents related to the area and data collected by the proponent and consultants on existing environmental conditions. The approach to site operations, including environmental management and monitoring, is based on knowledge gathered on similar projects. CRA personnel have experience in conducting environmental assessment for similar projects. Gallant has in-house environmental expertise as it relates to the design and operation sand and gravel pits.

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:

- Geology;
- Surface Water Resources and Wetlands;
- Groundwater Resources;
- Flora and Fauna Species and Habitat;
- Air Quality / Noise;
- Socioeconomic and Land Use; and,
- Archaeological and Cultural Resources.

Provincial environmental legislation and regulations apply to Gallant in regards to the design, site preparation, operation, and rehabilitation of the proposed pit extension. In addition to the environmental legislation, other acts and regulations relating to labour standards, best practices, and other phases are applicable to the Project. Gallant is aware of the applicable acts and regulations that pertain to the proposed pit extension. Gallant 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 as demonstrated by past work at Cooks Brook, Elmsdale and many other sites.

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 an amendment to the existing provincial Industrial Approval (IA) (Appendix B) for the site. An IA defines specific operational conditions and limitations, including dust, noise, surface water and groundwater discharge criteria and monitoring and land rehabilitation. An application to amend the IA would be completed by Gallant when/if EA approval is received. This approval application is reviewed by and granted by NSE.

Gallant is aware of the municipal legislation applicable to this Project and will work with the local HRM Planning office and staff as required.

4.0 PUBLIC INVOLVEMENT

Public consultation is a key element in the environmental assessment process in that it allows the proponent to gather and use information from communities surrounding the project site and use this information in final project design. Gallant understands the value of public engagement and appreciates the community input on the project and envisions a long and mutually beneficial public engagement program for the Project.

4.1 METHODS OF INVOLVEMENT

The intent of the public involvement program was to (a) provide information about the intended project; (b) elicit questions / concerns from the local community and other stakeholders; and (c) attempt to address those questions / concerns either through the provision of information or accommodating changes to the Project design.

The consultation program was undertaken following the completion of the environmental baseline study program for the project. This approach was used to be able to provide the public with current information on that environmental status of the properties in question. The local community is already familiar with Gallant as an operator in this area and familiar with extractive industries as there are several pits, quarries and mines in the vicinity. There have not been any reported issues with the existing site under previous or current operating industrial approvals.

The following listed activities have been undertaken by the Company with respect to public consultation and communications:

- Notice of Intent to conduct a project (mail out and bulletins)
- Letter of introduction of the project to the First Nations Community
- Discussions with stakeholders, government agencies
- Public Information Session for EA – Cooks Brook Fire Hall - October 11, 2012

Materials used as part of the public consultation program are located in Appendix C.

4.1.1 PUBLIC INFORMATION SESSION

A Public Information Session was held on October 11, 2012 (4 pm to 8 pm) at the Cooks Brook Fire Hall. The Session was advertised by community mail out (400 addresses) in the Cooks Brook and Gays River area. The Project area does not have a local paper with

the coverage to inform all local communities, nor does it have a community radio station, therefore Gallant relied on handbill delivery by mail box drop as indicated. The open house was also advertised on post office bulletin boards in Middle Musquodoboit and Shubenacadie for 10 days prior to the event.

A series of panels provided an explanation of the proponent and the project which explained the following:

Poster Name	Poster Description
Who is Gallant Aggregates?	Introduction to the company, where they operate and are headquartered.
The Pit Extension Project	Specific details on the project being proposed and key components, including project timelines, size and what types of material are being extracted.
Processing	Description of the aggregate processing methodology.
Environmental Baseline Studies	An overview of the various studies completed and key results. Outline of the process to return the site to a state at least equal to that prior to disturbance.
Map	A photo map outlining the current and proposed boundaries of the project.

Participants were asked to sign in to the Session and were provided with an overview of the panels and structure of the Session. A summary of the number of participants and their home community is provided in Table 4.1. Participants then viewed the various panels and information and were assisted by company representatives and consultants with any questions that they had. Comments from the participants were recorded on flipcharts for other participants to view. This format allows all participants to get a sense of the primary issues/concerns raised, how Gallant answered these questions, and how they used this information to address specific aspects of the Project. A summary of the comments is provided in Table 4.2.

TABLE 4.1: HOME COMMUNITIES OF PUBLIC INFORMATION SESSION PARTICIPANTS

Location	Number of People
Cooks Brook	7
Gays River	1
Chaswood	2
Coldstream	1
Total	11

4.1.2 FIRST NATIONS

A registered letter, dated October 19, 2012, was sent, and delivery confirmed, to Chief Jerry Sacks, Indian Brook First Nation (Appendix C) describing the project and offering information sharing. To date, no response has been received from Indian Brook regarding this project.

Gallant will engage in further discussions as warranted and are cognizant of the “Made in Nova Scotia Process” for Mi’kmaq engagement. A separate copy of the EARD will be sent by Gallant to Indian Brook if required. Any First Nation's concerns that are forthcoming to Gallant Aggregates will be submitted to NSE as part of the public review of the EARD.

First Nations input through the EA public review process is important and encouraged by Gallant. Gallant will be pro-active in its attempt to address any First Nation's concerns.

4.1.3 REGULATORY AGENCY CONSULTATION

Prior to commencing the environmental assessment process, Gallant engaged in discussion / meetings with NSE officials to understand the process of expanding their existing operation and the legislative requirements in the successful approval of the project. These discussions/ meetings served to assist with defining the project footprint and identifying possible impediments to the project that can't be addressed through design or management, of which none were noted. Gallant will continue to be in contact with these regulatory agencies and others identified in the EA process as the project progresses.

4.2 PUBLIC COMMENTS AND METHODS USED TO ADDRESS ISSUES AND CONCERNS

An important element of public consultation is to use the information in the final design of a project. Gallant recorded all comments made at the Public Information Session, and any emailed or phoned in concerns (see Table 4.2) and have used this feedback in the project's final design as noted in the table and throughout this document.

TABLE 4.2: SUMMARY OF COMMENTS AND CONCERNS RAISED BY STAKEHOLDERS

Question/Issue	Response
How big is the deposit?	The sand and gravel is localized for several 100 m within the area. Other operators have accessed the eastern end of the deposit.
How will the site be reclaimed?	The site will be reclaimed using standardized practices and in accordance to provincial guidelines. The slope closest to the road will be 45° and the rest of the site will be gently sloped towards Cooks Brook, and the whole site revegetated.
Will there be any more trucks on the road that we are used to?	No. There will be a similar number of trucks as been used in the past.
Is this project any different than what has been done in the past?	No. This is just extension of the existing operations. Every other parameter remains the same.
How long will the pit be in operation?	The pit will operate for a couple of months per year with trucking extending to 10 months or as demand requires. Overall the pit life is estimated to be approximately 7 years.

5.0 DESCRIPTION OF THE UNDERTAKING

5.1 GEOGRAPHIC SETTING

The project site is located behind civic 15157 Highway 224, Cooks Brook, Halifax County, Nova Scotia (Figure 1) which is approximately 14 km west of Middle Musquodoboit and 20 km northeast of access to Highway 102 at Elmsdale. The coordinates at the centre of the project site is E 475880, N4985350 (UTM Zone 20 NAD83 CSRS).

The site is located in a rural-residential area of central Nova Scotia, typified by rolling topography with abundant surface water. Roland (1982) classifies the area as Central Lowlands, characterized as being underlain by relatively weak strata of Carboniferous age.

The site slopes towards McGeorge Lakes and Cooks Brook which flows west into Gays River. The project properties (PID 00552927, 40453458 and 00552901) are owned Gallant Aggregates. Figure 2 provides local context of the project, pit configuration and identifies adjacent land ownership.

5.2 PROJECT COMPONENTS

The Project is the extension of the existing pit that had an annual production estimated to be 75,000 tonnes of aggregate. The extension will have a similar production rate, however, this may increase or decrease depending on market demand. No permanent infrastructure other than the construction and maintenance of settling ponds to control site run off is required.

Site activities will include the extraction, crushing, screening, washing, stockpiling, loading and hauling of aggregate. The aggregate will be transported by trucks to existing markets as required over existing highways. The operation will consist of a lay down area for the portable crushing equipment and screens, wash plant, various aggregate stockpiles, and weigh scales, as well as the physical features of the site such as the pit floor and active working faces, and site settling pond(s).

Organic overburden (*i.e.* topsoil/grubbings) will be used in the progressive rehabilitation of the existing and proposed pit or stockpiled for future rehabilitation activities.

Within 2 kilometres of the proposed pit there are 70 recorded civic addresses. Given the rural/agricultural nature of the area it can be assumed that most of these locations are residential. Therefore, within a distance of the two pit properties the following number of potential residences has been determined: 100 m - 6; 200 m - 11; 500 m - 22; 1.0 km - 44, and; 1.5 km - 52; 2 km - 70.

The proposed active area of the pit has been determined by using setbacks, as defined by the current Industrial Approval, for water and wetland features (30 m), road right-of-ways, property lines where there is a structure on the adjoining property (30 m), property lines where no structure is on the adjoining property (15 m), and existing offsite houses/structures (90 m). Figure 3 identifies setbacks.

5.3 SITE PREPARATION AND CONSTRUCTION

Gallant began the existing pit operations in 2004. The area has had similar activity prior to this time by other operators. The site is accessed from Highway 224 and access roads are already in place. Some upgrades to the access road on the east end of the property may be required. Equipment used for grubbing the site will be required in the early phase of the project and subsequently throughout the project life as the pit develops. Mobile equipment - excavators, loaders, crushing, screening, and wash plants, will be put in place during operations.

The surrounding forested areas consist of a mixture of coniferous and deciduous trees of various age classes. The project site was harvested for merchantable timber in February and early March 2012. Any remaining vegetation and wood material will be used to the greatest extent possible for rehabilitation activities on site.

The removal of topsoil and grubbing will be completed in a progressive nature according to the development plan. This will minimize the extent of disturbed area at any one time. This material will be removed by excavators, trucks and dozers and then stockpiled for use during rehabilitation activities. Run-off from the site will be directed to a settling pond(s) to allow time for any suspended sediments to settle prior to leaving the site.

There are no plans for the bulk storage of petroleum fuels on site. No hazardous materials will be stored on site. Fuel will be transferred to equipment by mobile fuelling as required. Should petroleum impacted soil or groundwater be identified, the affected material will be handled, transported and disposed of according to all applicable legislation.

5.4 OPERATION AND MAINTENANCE

Excavators and front end loaders will be used to excavate material from the active working faces. Material will be processed onsite through a portable wet-deck screening plant and portable sand classifier. The various aggregate products will be stockpiled in adjacent areas within the pit. Piles will be constructed so as to ensure segregation of material and prevent contamination by mixing of different piles. A combination of conveyor belts and front end loaders will be used to move material from the screens and classifier to the stockpiles. Front end loaders will be used to load stockpiled material onto trucks. Products will be weighed and transported from the pit via tandem (16 tonne capacity) and tractor trailer (25 tonne capacity) trucks along the existing access road to Highway 102 or other major routes to markets. The average number of vehicle movements is anticipated to be five to eight trucks per day, depending on market demand. This is consistent with the current truck volumes.

Gallant is aware of spring weight restrictions and will adhere to them.

The equipment and accessories used in the operations will be fairly consistent through the life of the project and may include:

- excavators; front end loaders;
- mobile processing plant: wet-screening, classifier and wash circuits
- dump trucks
- Utility vehicles: pick-ups, mechanic service vehicles, fuel & lube truck(s)
- tractor and float

Access ramps already exist at the pit and will be continued to be maintained throughout the life of the project. Ramps that may be required within the pit to access the resource in other areas 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. Final design of all aspects of the pit will be in accordance with appropriate legislation.

Erosion and Sediment Control

Surface water management will be important during site development and operation to address erosion and sediment control. Sediment-laden stormwater runoff will be prevented from entering surface waterbodies. Surface water collected in the pit will be

directed to a sediment control pond that will be designed to allow sediment to settle from the water prior to the water being released to the environment.

Gallant is familiar with and utilizes NSE'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 will be consulted and reviewed in the development of a comprehensive erosion and sedimentation prevention and control strategy. Typically, a 100 year return period storm is used in design (may be dependant on life of project). Design criteria would be reviewed with NSE during the IA Amendment stage to ensure adequacy.

Ditching may be constructed to direct surface water runoff to settling ponds on the site as part of surface water management. Ditching may 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.).

The maximum suspended solids concentration levels will be monitored for compliance as directed and mitigation will be implemented if a non-compliance occurs.

Solid Waste

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

Liquid Effluents

No on-site sewage treatment system will be installed. Portable toilets may be used on site as required and will be maintained by Gallant or their subcontractor.

The wash plant will include a wet-deck screening plant, portable sand classifier, conveyors and stackers. The wet-deck screening plant will separate various sizes of stone (+5 mm) from the sand (-5 mm) while also washing the stone and creating a sand slurry which will feed into the portable sand classifier where the sand will be graded and sized to meet various sand specifications prior to be stockpiled using stacking conveyors. Water used in both the wet-deck and classifying operations will be sourced from a series of primary and secondary settling ponds in a closed circuit with the wash plant. These ponds will be dredged to remove deposited waste materials whenever required to maintain optimum efficiency within the system. During storm

events, overflow water from the settlement ponds including site run-off will be released to the environment via an emergency spill-way to a tertiary settlement pond and drainage spill-way channel. These ponds already exist and were used in previous operations. Maintenance will be required to reactivate them for future service.

Airborne Emissions

Equipment exhaust and dust 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.

Dust will be generated in the pit through most activities. Gallant will implement operational dust reduction methods (primarily through the application of water) to reduce potential fugitive dust emissions at the site. The wash plants are designed to reduce the amount of small particles within the aggregate. If required, truck covers could be used to reduce the generation of dust during transportation of aggregate.

Noise Emissions

Noise emissions will result from extraction, processing, and transportation operations. The contributors to noise on site will be heavy equipment such as crushing, screening and wash plants, excavators, loaders and trucks.

Gallant will control operations and equipment to ensure that noise levels are kept within recommended limits for pit operations. Site noise levels may be periodically measured at the property boundaries as directed by NSE. Gallant will investigate exceedences of noise guidelines attributed to Project activities. Certain equipment noises associated with extraction activities have a specific regulated safety requirements such as back-up beepers – other methods, such as strobes could be used as warning indicators.

Hazardous Waste

Materials needed for pit site operations will be stored in accordance with applicable legislation. No explosives will be used or stored at the site.

Petroleum, Oil and Lubricants (POL)

Gallant is familiar with the requirements for petroleum management. The Project will require the use and handling of petroleum products such as fuel oil, gasoline and lubricants on site. Mobile equipment will be fueled within the pit from fuel trucks. No bulk storage of fuel will be established on site. If temporary storage of any POL is

required, the activity will be conducted in compliance with applicable legislation for quantities and container types. Any location where refuelling is taking place will be equipped with a spill kit and the operators will be trained in their use.

Within the context of the current site, the 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 legislation 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.

Gallant is aware of the legislation around POL and will comply with the current and any updated regulations.

5.5 DECOMMISSIONING AND REHABILITATION

Rehabilitation is the final phase of the project to return the area to a condition that is consistent with the natural surroundings and community use. Two types of rehabilitation could be completed - progressive (during operations on stable areas) and final rehabilitation (after the cessation of extraction activities).

The goal of rehabilitation 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, and time. Progressive rehabilitation is understood as an integral part of project planning that keeps potential future land uses in mind. Gallant considers the goal and responsibilities of reclaiming a pit to be a key element of the project plan, and will return the land to a state equal to or better than that that existed prior to disturbance within the scope of exiting industry practices.

Gallant plans to use their own resources for rehabilitation activities, although some contract tree-planting and hydroseeding contractors may be required. Dozers and excavators will be used to regrade and contour the side slopes of pit walls to ensure that

they are stable and meet the legislated slope requirements. Rock lined ditches and drainage channels will be constructed as necessary to control run-off and prevent erosion of the exposed soils. Steeper slopes will be graded to 45°. These will encompass the area closest to Highway 224. The rest of the site will be a gradual slope (<10°). The slopes will typically be seeded with a naturalization mix of native grasses, fescue, trefoil and clover.

It is anticipated that the rehabilitation program will be completed within a two year period from the end of the extraction phase being completed. Additional details on timelines will be developed as part of the IA Application amendment process and conditions of an EA approval if granted.

The proposed pit outline measures roughly 450 m long by 125 m wide as shown on Figure 3. The footprint of the extension is 5.7 ha and the existing permitted area is 3.8 ha for a total disturbed area of 9.5 ha.

6.0 VALUED ENVIRONMENTAL/SOCIO-ECONOMIC COMPONENTS (VEC) AND EFFECTS MANAGEMENT

Conestoga-Rovers & Associates (CRA) conducted field studies from April to August 2012 to determine the existing baseline conditions of the proposed pit extension. From these studies CRA, in consultation with the proponent and regulators, was able to determine appropriate mitigation, as required to minimize environmental effects from the proposed pit extension project. These surveys consisted of: plant survey; wetlands survey; and breeding bird survey. These surveys were undertaken by qualified biologists employed by or under contract to CRA. A desktop assessment and field reconnaissance of potential archaeological and heritage resources was undertaken by a professional archaeologist in April 2012.

Additional information, in support of the field studies, was gathered through a review of digital imagery, site mapping, Nova Scotia Museum, Atlantic Canada Conservation Data Centre (ACCDC), and NSE.

Spatial boundaries are defined by the Project footprint, as directed by prescribed setbacks, and the immediate area surrounding it, within which the VECs are likely to interact with, or be influenced by, the Project. Temporal boundaries are of short duration, limited to the Project and post-Project (i.e. Rehabilitation) activities.

Potential environmental effects of a project and the significance of an effect consider the geographic extent, magnitude, frequency, and duration of each effect. The prediction of the residual environmental effect is developed through professional judgment and the application of proposed mitigative measures.

6.1 GEOLOGY

This region of Nova Scotia is dominated by mainly Carboniferous rocks (shale, limestone, sandstone, gypsum) upon which deep soils derived mainly from glacial outwash (Roland 1982) have developed. These Central Lowlands provide a topography that is variable in nature from lowland plains to rolling hills that rarely exceed 90 metres above sea level. The climate is conducive to farming; mainly beef or dairy herds, and forage and cereal crops. Forests are generally comprised of softwood but tolerant hardwoods are found on well drained hills. The Project area is classed as well drained, fine textured soil on hummocky terrain that lies in the southern extent of the Central Lowlands (Neily et al 2003). The site slopes towards McGeorge Lakes and a wetland that parallels Cooks Brook. Cooks Brook flows west into Gays River.

6.1.1 EXISTING ENVIRONMENT

Soils

The soils of the region have, for the most part, been derived from glacial drift (Agriculture Canada, 1963). Regionally, the soils are predominantly the Queens (northwest to and southeast of the site) and the Wolfville (west of the site) Series. The imperfectly drained Queens Series is formed from reddish-brown clay loam till derived from shale and sandstone. The Wolfville Series has good drainage and is derived from reddish-brown loam to sandy clay loam till derived from shale and sandstone. The alluvial Bridgeville Series is adjacent to the project area to the south along Cooks Brook from McGeorge Lakes to Gays River. This area is described as imperfectly drained and subject to flooding. Mapping and field study indicate that this area is predominantly wetland.

The proposed Project area is covered entirely by the Hebert Series. This Series is described as brown sandy loam over strong-brown to brown sandy loam derived from strong-brown gravelly sandy loam parent material. Hebert Series is usually located “along larger rivers and streams. The parent material is gravel and interbedded sand and finer sediments of mixed origin. Topography (3 to 8 % slopes) is gently undulating to kame-type hills and river terraces” (Agriculture Canada, 1963), slightly stony, and has good to excessive drainage. Figure 6-1 illustrates the distribution of the various soil type in the vicinity of the project. The Hebert Series correlates to the Forest Ecosystem Classification ST1.

Surficial Geology

The Musquodoboit Valley is host to four major till types which all have a strong relationship with parent material in terms of composition and distribution. The majority of the Valley is underlain by Lawrencetown Till followed by Quartzite Till and to lesser extents, slate and Granite Till sheets. The Lawrencetown Till is characteristically a compact clay or sandy till matrix, which has formed the parent material for much of the soils used for agricultural purposes in the area. The other till sheets are more commonly associated with occurrence of Goldenville Formation – Quartzite Till, Halifax Formation – Slate Till, and Cambrian-Ordovician granites – Granite Till (Figure 6-2).

Locally, Lawrencetown Till dominates the soil stratigraphy comprising 20 to 40 metres, locally 90 metres, of red to brown clayey-glacial till. A considerable occurrence of glacio-fluvial deposits has been mapped at Cooks Brook which is composed of water sorted sands with silt and gravel units.

Bedrock Geology

The Musquodoboit Valley region is dominated mainly by the Meguma and Windsor Groups. The Meguma Group includes two formations - the lower, Goldenville Formation, composed of metamorphosed sandstones interbedded with subordinate slates; and the upper, Halifax Formation, dominated by slates and sheared siltstones and minor sandstones (Figure 6-2). The strata are Cambrian-Ordovician in age (CSPG 1985). The Windsor Group includes evaporites (gypsum, anhydrite, limestone) and associated shales, mudstones, and siltstones with limited (thin and discontinuous) occurrences of halite. The Windsor Group strata were deposited during the Lower Carboniferous Period (Mississippian Age) under relatively low energy marine conditions.

Locally, the project is underlain by the Carrolls Corner Formation (Windsor), which consists mainly of anhydrite and gypsum stratified with minor dolostone and mudstone. This formation directly overlies the Gays River Formation, which onlaps (through marine transgression) the older Meguma. Lead and zinc mineralization known as a Mississippi Valley-type (MVT) deposit (Paradis et al, 2007) occurs in the Gays River Formation. This mineralization occurs about 2 km west of the project site at the ScoZinc Limited mine with a potential extension of the mineralization occurring along the 40 km north east trend from the mine passing about 1.2 km north of the project site.

Acid Rock Drainage

Acid rock drainage (ARD) refers to the outflow of acidic water from (usually abandoned) metal mines or coal mines or disturbance from construction in some environments where mainly iron sulphides may be exposed in the strata. When these environments are disturbed and come into contact with water, oxygen, and iron reducing bacteria, the sulphide minerals, become oxidized and acid is generated in the process. The presence of iron reducing bacteria serves as a catalyst that accelerates acid production and the potential for generation of acid rock drainage (ARD). There are no reports of Halifax Formation slate, the main concern for generating ARD, in the area where the disturbance will occur and it is not intended that bedrock will be quarried if encountered. The carbonate host rocks underlying the aggregate resource are acid consuming and would buffer any ARD present.

Based on available regional geology maps, there are no known occurrences of acid generating rocks in the immediate project area. A visual inspection performed by a geologist of the exposed sand and gravel faces on both ends of the Property did not reveal geological materials that may have originated from rock strata that are potentially acid generating.

Karst Topography

Karst is a topographic feature with distinctive characteristics of relief and drainage arising from a higher than normal degree of solubility in rock, especially carbonate rocks and evaporates (Jennings 1971), such as those found in the Windsor Group which accounts for about 5.5% of the province's geology. The solution processes developed over many thousands of years manifests itself at the surface in the form of sinkholes, vertical shafts or pipes, disappearing streams, and springs to complex caves and underground drainage systems. Solution caves are known to occur in gypsum and limestone areas (Davies & Browne 1996).

The Windsor Group Karst development across the province can be variable. Several periods of glaciation have exposed, eroded and reburied earlier developed karst leaving a thick deposit of glacial drift over many of these beds. However, where the strata have become exposed at the surface, a distinctive highly karstified landscape is evident. Karst topography does not easily lend itself to development. Typically these areas are avoided for development because of the potential for sinkholes. The extent and distribution of karst landforms in Nova Scotia is unknown. In general, karst areas in Nova Scotia have remained, except for mining and farming activities, undeveloped. No surface karst features have been identified on the proposed site, and since extraction to bedrock will not occur, it is unlikely that these features will be encountered.

6.1.2 POTENTIAL EFFECTS, PROPOSED MITIGATION, MONITORING AND FOLLOW-UP

Acid Consumption and Production in Bedrock

The management of any materials that are deemed through testing to be acid producing will be in accordance with an Acid Rock Management Plan. Where encountered, care will be taken to ensure that potentially acid generating rock is stockpiled in association with other buffering material. Surface runoff from all stockpiles will be collected and directed to settling ponds in pit. Surface water affected by the acid generating material will therefore not be discharged directly to natural watercourses.

All water collected in the pit as a result of runoff will be directed towards a settling pond. Water leaving the site will be subject to an effluent monitoring program to ensure compliance with established performance standards for water quality.

Paleontology

The Lower Windsor Group contains known marine fossils such as crinoids, brachiopods and corals. It is not anticipated that pit extraction activities will encounter any bedrock. Prior to the glaciers covering this area, there was ongoing sinkhole activity in the

gypsum and limestone rocks. Many prehistoric animal remains have been found in these Karst features throughout the province. As noted, karst features, *i.e.* sinkholes, have been documented near the site (less than 2 km).

No paleontological specimens or pre-historic remains have been reported on or near the project site. Gallant will report to and work with the Nova Scotia Museum and other interested parties if paleontological resources are found on the Project site.

6.2 SURFACE WATER RESOURCES AND WETLANDS

6.2.1 EXISTING ENVIRONMENT

Surface Water Resources and Wetlands was selected as a VEC because of the potential for Project activities to interact with the freshwater environment. Indicators of the VEC include aquatic life, fish habitat and surface water quality as well as potential water uses for agriculture, recreation, industry or potability. There are no agricultural, recreational, industrial or potable uses of the surface water located on the Gallant Property. No streams were located in the Project area; however, surface drainage from a portion of the site is directed towards Cooks Brook and ultimately Gays River.

Regional

Nova Scotia contains an abundance of surface water features in all areas of the province. High annual rainfall and moderate to low evapotranspiration rates and a short summer period combine to make available a large volume of water for surface water bodies. The effects of glaciation have resulted in a multitude of wetlands and small lakes as well as a dense network of small streams. The province contains some 46 primary watersheds whose networks of streams and 6,670 lakes together cover about 215,000 hectares, or more than 4% of the province.

The project site is within the largest drainage basin in the province, the Shubenacadie-Stewiacke River system. This system is north and northwest of the pit site and drains an area of approximately 2,800 square kilometers. By contrast, the nearby Musquodoboit River system drains approximately 600 square kilometers.

Local

The watershed divide which separates the Musquodoboit River system from the Shubenacadie-Stewiacke River system is located approximately 2 kilometres southeast of the site (Figure 6-3). Gays River watershed with its headwaters in Lake Egmont, is a sub-system of the Shubenacadie-Stewiacke River system and drains approximately 20.1 km² (21,100 ha). Cooks Brook passes to the south of the property and joins Gays River

about 600 m west of the property. The McGeorge Lakes (6.6 ha) are located east of the property. The lakes receive flow from Wilson, Cooks and Ervin Brooks. The project site (5.7 ha) is less than 0.15% of the total Cooks Brook watershed that drains approximately 3580 ha.

The natural drainage of the site is generally uncontrolled, except the permitted pit, and therefore, run off generally follows the surface topography and discharges diffusely into the wetland adjacent to Cooks Brook or McGeorge Lakes to the southeast. No streams or channels were identified on the project site and there are no direct drainage pathways to Cooks Brook or McGeorge Lakes

There are no recorded surface water withdrawals permitted within the immediate area (pers. comm., B. Matlock, NSE, Oct. 2012).

Wetlands

Wetlands have been selected as a VEC because of potential interactions between the proposed Pit extension and the physical environment. Wetlands can have many functions, known as wetland functional attributes, which play important roles in natural ecosystems. Wetlands can minimize erosion and control flooding, and can reduce contaminant loads. Wetlands may also be closely linked to local hydrogeology, in that they may be groundwater recharge and discharge areas. They also perform various important biological functions, such as providing habitat for wetland species, as well as for upland species which require wetland habitat at some point in their life history. Humans also utilize wetlands for various recreational activities such as bird watching, hunting, and harvesting of wild plants, as well as commercial operations such as cranberry production and peat harvesting. In Nova Scotia, wetlands are protected under the provincial Environment Act and an approval is required for their alteration.

The study area for the evaluation of wetlands encompassed the Expansion Pit and the riparian area of Cooks Brook within and adjacent to the property boundary.

Air photo interpretation, a review of NSDNR's Significant Habitats of Nova Scotia and a field survey revealed a wetland near the project site. No wetlands are present within the planned area of disturbance at the Project site. The NSDNR Significant Habitats of Nova Scotia shows one wetland (two types) near the Project site.

The wetland survey was conducted on August 13, 2012. The wetland area is depicted on Figure 6-3. The wetland was evaluated in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (U.S. Army Corps of Engineers, 2011).

The wetland is a dense tall shrub swamp dominating the riparian area of Cooks Brook near the Project site. Swamps are dominated by trees and shrubs and can be seasonally or permanently flooded (NSE, 2011). They are usually found along drier areas of floodplains and riparian areas of stream and rivers. No rare species were identified in the wetland area.

Several small, shallow ponded areas are present near the edge of the disturbed area, southwest of the project site. These areas would receive water from surface run-off from the surrounding disturbed areas. These ponded areas are not within the footprint of the project disturbance area.

6.2.2 POTENTIAL EFFECTS, PROPOSED MITIGATION, MONITORING AND FOLLOW-UP

Potential Effects

Suspended sediment and silt in site runoff is the main concern that could potentially cause adverse effects to the receiving environment. The existing conditions at the site are such that there are no direct pathways (streams, ditches) to Cooks Brook and McGeorge Lakes, drainage occurs via overland flow. The receiving environment is further buffered from the project site by a minimum 30 m setback from undisturbed areas (stream, wetland or property boundary). The nature of the sediments on site is such that surface water could be quickly drained through the sand and gravel deposit.

Proposed Mitigation

Water quality will be maintained through the use of re-vegetated slopes, drainage ditches and temporary settling ponds to capture and re-direct surface water. Drainage ditches and swales will be utilized to the greatest extent practicable to divert surface water, originating upgradient of the property, around the pit perimeter, thereby minimizing contact of water with the pit floor and working faces. The wash water system to be used for this Project will be a closed circuit system that will have minimal loss to the environment. The ponds will allow for suspended sediment to settle out of the water column. No direct pathway to the environment will be constructed as water will be dispersed through limited evaporation or overland flow to the wetland. Rehabilitation may proceed incrementally as operations continue. Decommissioning and rehabilitation plans are described in Section 5.5.

Monitoring

All water discharging the site from ponds will be monitored and results compared as required by NSE. During operations, where areas that are currently vegetated are disturbed, it will be particularly important to follow NSE Sediment and Erosion Control Handbook techniques for ensuring surface water quality is not degraded.

6.3 GROUNDWATER RESOURCES

Groundwater quality and quantity has been studied extensively in the region. The regional hydrogeology of the Musquodoboit Valley was published in detail by Dr. Chang Lin in 1970 and published in NS Environment Report 70-3 Hydrogeology of the Musquodoboit River Valley, Nova Scotia. This report is an excellent source of information on the hydrostratigraphic units within the Valley Region and their associated water quantity and quality characteristics including maps that indicate the spatial relationship of the units. Many of the unit descriptions described therein can be applied to the project site.

6.3.1 EXISTING ENVIRONMENT

The major hydrostratigraphic units within the regional area are:

- Meguma Group - Halifax Formation slates & Goldenville quartzites
- Cambrian-Ordovician Granites
- Windsor Group - clastics & evaporites
- Surficial Deposits - sand and gravel, and till

Halifax Formation Slates generally yield adequate quantities of water (4-20 Lpm), while the quality can be quite variable and prone to elevated concentrations of iron, manganese and arsenic. Quartzites and granites are very similar in terms of water quantity and quality. The yield range is the same as the slates however, the water quality is lower in iron and manganese but slightly higher in hardness. Windsor Group strata generally do not yield water which is suitable for domestic purposes due to the elevated total dissolved solids, hardness, sulphate, and iron.

The sand and gravel surficial deposits can yield large quantities of water (> 500 Lpm) of good to excellent water quality, but these deposits are under utilized. The tills generally yield adequate quantities and quality of water within 3 to 8 metres of the surface and thus have been highly utilized in the region for domestic water supplies but are prone to

elevated hardness and presence/exceedence in the acceptable level of bacterial matter (fecal and total coliform).

The local hydrogeological regime can be characterized as two separate systems with the degree of interaction between the two systems highly dependant on the topography and local geology. The surficial deposits aquifer systems have a near surface water table within the low (clay till) to highly permeable (sand, gravel) materials. In the surficial materials, groundwater movement is between the individual soil grains and moves under gradients controlled by topography. In the deeper bedrock aquifers, groundwater flow is dependant upon the degree to which fractures and voids within the strata are connected and the hydraulic head differences between these openings. In many areas, these systems will act completely separately from each other as groundwater in the near surface systems discharges directly to surface water bodies e.g. Cooks Brook/McGeorge Lakes. In some areas, the bedrock groundwater system will receive direct recharge from the surface system as water migrates downward.

6.3.2 POTENTIAL EFFECTS, PROPOSED MITIGATION, MONITORING AND FOLLOW-UP

Potential Effects

Potential impacts to water wells from pit operations are generally a function of the pit development plans, distance from the pit, location of a well with respect to groundwater flow directions, and individual well construction details (dug vs. drilled). There are approximately eight private wells on properties adjacent to the project site. Typical impacts from a sand and gravel extraction operation may include water quality deterioration of down-gradient wells from surface runoff and/or accidental releases of deleterious substances, such as such as petroleum, oil or lubricants (POL) within the pit area. There is only one down-gradient well to the site.

Mitigation

Lowering of the groundwater table and decreasing well yield is not expected (either temporary or permanent) because there is an operational commitment that the sand & gravel pit floor will not extend into the groundwater table. Any surface water resulting from precipitation or snowmelt events will be controlled by means of pit floor grading, berms, and ditching.

Effects to the groundwater quality as a result of construction, operation and rehabilitation will be limited in areal extent and groundwater chemistry changes they create due to earth moving and changes in surface water flow patterns. Any release of POL will be dealt with effectively by immediately removing the impacted sediments and

those sediments disposed of in an approved manner and in accordance with provincial legislation.

Monitoring

Water quantity impacts are not predicted for domestic wells. There have been no complaints filed with the company with respect to water quality or quantity from previous work in the area. Gallant will continue to have a clear line of communication through the General Manager for domestic well complaints to be recorded and evaluated in accordance with legislation and NSE specific requirements.

6.4 FLORA AND FAUNA

Flora

Flora and flora habitat is considered a VEC because of its contribution to regional biodiversity and potential interactions between project activities and the physical terrestrial environment. The presence of rare flora may be indicative of rare habitats which may support unusual assemblages of plants and animals. Protecting rare plants is beneficial to ecosystems in that it results in simultaneously protecting rare habitats and the associated species of flora and fauna. Flora is considered rare in Nova Scotia if it has been listed as a rare species by the province (NSDNR General Status Ranks or the Nova Scotia Endangered Species Act (NSESAs)), or if it has been listed rare nationally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the federal Species at Risk Act (SARA). The VEC for rare plants and cyanolichens in this document considers any species of vascular plant listed as rare in any of the above lists. The flora survey was conducted by Tom Neily. ACCDC and NS Communities Culture and Heritage reports can be found in Appendix D. A list of potential priority plant and lichen species for the study area can be found at the end of Appendix E.

Fauna

Fauna are considered a VEC due to their role in biodiversity and ecological integrity. Many faunal species are protected under the Nova Scotia Wildlife Act (1989) or the Migratory Bird Convention Act (MBCA) (1994). In Nova Scotia, a species is considered rare when it is listed as rare or sensitive to anthropogenic disturbance by the province (NSDNR General Status Ranks of Wild Species or the NSESAs), or listed nationally by COSEWIC or SARA. In Nova Scotia, legislation protecting birds includes the MBCA and the Nova Scotia Wildlife Act. The MBCA protects migratory birds and their nests. Most bird species present in Nova Scotia are listed under the MBCA; however, it does not include avian predators such as raptors and introduced species such as European starlings (*Sturnus vulgaris*). The Nova Scotia Wildlife Act specifically protects raptors including eagles, ospreys, falcons, hawks and owls.

Initial field work was conducted within and surrounding the proposed expansion area as provided by CRA. Dillon Consulting (Dillon) completed the field surveys. Based on the initial review of ACCDC data provided by CRA, Dillon identified potential priority species and their habitats (Attachment 1 - Appendix E). Field surveys focused on potential habitat for priority plant species and breeding birds. Targeted areas of the proposed project footprint were walked by a botanist during the late spring/early summer and late summer flowering seasons. The timing of field visits was based on flowering times or visible periods for short listed potential priority plant species. Breeding bird surveys were undertaken as 10 minute point counts following Canadian Wildlife Service protocols for environmental assessment. Point count locations were based on typical and representative habitat at the study area and adjacent background areas. An additional pre-dawn, nocturnal bird survey was completed, focusing on owl species. Owl surveys followed the approach identified in the Bird Studies Canada 2001 document: *Guidelines for Nocturnal Owl Monitoring in North America*.

The early plant survey was completed May 29, 2012 and the summer survey was conducted July 31, 2012. The early breeding bird survey and nocturnal survey was conducted on April 19, 2012. A peak breeding bird survey was conducted on June 14, 2012.

6.4.1 EXISTING ENVIRONMENT

The following sections outline the field survey results. Most of the study area has been disturbed, either through existing gravel extraction or forest clearing. Attachment 2 - Appendix E provides typical pictures of the study area.

Attachment 3 - Appendix E provides the plant survey results. One priority species was identified, a sedge (*Carex houghtoniana*, Nova Scotia Department of Natural Resources-DNR Status Yellow/Sensitive; ACCDC provincial rank S2). Approximately 75 plants were observed in a small (approximately 2 meter wide) patch located within the central clear cut area (GPS point: 0475856 4985294 (UTM 20 NAD83 CSRS), Photos 1 and 2). A search of the surrounding habitat area did not identify additional patches.



Photo 1 Sedge Patch



Photo 2 Achene

Attachment 4 – Appendix E provides the bird survey location summaries and species lists. Daytime survey species identified in April were generally either year-round residents or early migrants (not nesting at this time). Nocturnal species (owls) were potentially nesting in the general area, but not within the project footprint. One DNR sensitive/yellow listed species (Common Loon) was observed flying over the area, but nesting habitat was not present within the project footprint.

Bird species identified in June were expected to be nesting in the general area. Over 30 species were potentially nesting within the project footprint area. The only Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listed species observed was the Barn Swallow. This bird was nesting outside of the project footprint area. This species is also considered sensitive by the Nova Scotia Department of Natural Resources (NSDNR).

6.4.2 POTENTIAL EFFECTS, PROPOSED MITIGATION, MONITORING AND FOLLOW-UP

Project-related effects on fauna and habitat are limited due to the fact that the vast majority of the area proposed has already been disturbed through forestry, or pit related activities. Loss of habitat will occur in the extraction and stockpile areas but will have minimal impact due to the availability of similar replacement habitat in the general area. Many of the faunal species in the area have a familiarity with mining operations and the infrastructure which may reduce typical mortality issues with industrial activities.

Gallant is aware of NSDNR requirements relative to clearing of lands during nesting/fledgling season for bird species and will adhere to these.

Gallant recognizes the value of species-at-risk and has taken steps to mitigate the yellow listed species found on the site through consultation with plant experts and NSE. Ongoing issues of importance to local flora and faunal species will likely be brought forward by the community, academia or regulators. Gallant commits to an open and consultative approach to seeking resolutions on all issues raised.

6.5 ATMOSPHERIC CONDITIONS/ AIR QUALITY

6.5.1 EXISTING ENVIRONMENT

NSE monitors ambient air quality at ten locations across Nova Scotia. Generally, ambient air quality meets or exceeds national standards in most communities. The common air pollutants monitored regularly are respirable particulate (PM 2.5), sulphur dioxide (SO₂), carbon monoxide(CO), ground level ozone (O₃), nitrogen dioxide (NO₂), and hydrogen sulphide (H₂S). Exceedences for these pollutants are, typically, small and infrequent in Nova Scotia.

Meteorology

The site is located at Cooks Brook, Nova Scotia which is approximately 10 kilometres east of Dutch Settlement and 20 kilometres west of Middle Musquodoboit. The nearest climate station with historical data that is representative of that region is the Upper Stewiacke climate station (ID# 8204193) operated by the Meteorological Service of Canada (MSC). The station is located approximately 60 km northeast of Cooks Brook. The following is a summary of average climate conditions at the Upper Stewiacke Station, based on climate normals published by Environment Canada for the period from 1971 to 2000.

Observations from the historical Upper Stewiacke weather data indicate an average total annual precipitation of 1322 mm, which includes 199 cm of average snowfall per year and 1123 mm of average rainfall per year. Rainfall patterns remain fairly constant through out the months of May to August, increasing from September through December. Measurable precipitation occurs on an average of 302 days per year, with 251 days of measurable rainfall and 61 days of measurable snowfall.

The extreme one day rainfall for the station is 133 mm on August 15, 1971 and extreme one day snowfall is 59 cm on February 1, 1992. Average annual temperature is 6.1 °C, with an average monthly range from -6.4 °C to 18.4 °C. Temperature extremes can range from -41.1 °C to 36.1 °C. There is an average of 240 days per year with an associated average temperature above 0 °C.

Historical wind data is not available from the Upper Stewiacke weather station, therefore historical wind data is taken from the Halifax Airport climate station (MSC ID# 202250), which is located approximately 30 km southwest of the site. This is the closest station to the site for which historical wind data exists.

Average wind direction taken from Halifax International Airport (1971 to 2000) is generally westerly from November through to March and southerly April to October. Wind speeds average approximately 18.4 km/h, with an average range of 13.5 km/h in September to 18.6 km/h in February. Maximum hourly speeds can range from 56 km/h in September to 89 km/h in March, with maximum gusts of up to 132 km/h recorded.

Total Suspended Particulate and Fine Particulate Matter

The National Air Pollution Surveillance (NAPS) network is a cooperative program that measures air quality across Canada. The closest NAPS monitoring location to the proposed Pit extension is at Cherry Brook Road, Westphal, NS, (near Dartmouth) approximately 60 km to the southwest. At present, both PM 10 and PM 2.5 levels are monitored at that station. Monthly PM 2.5 measurements for 2006 ranged from 5 $\mu\text{g}/\text{m}^3$ -11 $\mu\text{g}/\text{m}^3$. Monthly PM 10 measurements for 2006 ranged from 8 $\mu\text{g}/\text{m}^3$ -20 $\mu\text{g}/\text{m}^3$. Currently, USEPA regulates PM 10 under the National Ambient Air Quality Standard (NAAQS) at 150 $\mu\text{g}/\text{m}^3$ for a 24-hour sample and an annual average of 15 $\mu\text{g}/\text{m}^3$. PM 2.5 will be further regulated at 30 $\mu\text{g}/\text{m}^3$ for a 24-hour sample in 2010 through the Canada Wide Standards (CWS).

Other Pollutants and Greenhouse Gases

For this project, on site trucking, mobile equipment and utility vehicles have the potential for producing emissions of other air contaminants including carbon monoxide (CO), nitrogen oxides (NO_x), sulphur dioxide (SO_2), ozone, hydrogen sulphide (H_2S) and other greenhouse gases. These are currently regulated through the EPA National Ambient Air Quality Standards (40 CFR Part 50) and the Nova Scotia air Quality regulations (N.S. Reg 187/2010).

6.5.2 POTENTIAL EFFECTS, PROPOSED MITIGATION, MONITORING AND FOLLOW-UP

Temporal boundaries for the assessment of air quality have been developed for the time periods during which Project air emissions will have the potential to degrade the local air quality in and around the Pit extension site. The new Pit is expected to extend the life of the marketable deposit by 6 plus years. Local ambient air quality will be affected throughout that time period. Process emissions will be generated throughout the life of

the project. The extension process and operations are not seasonal; therefore there are no marked temporal boundaries to air emissions throughout the life of the project.

The spatial boundary is the zone of influence of emissions from the extension and existing processing operations that will affect the local ambient air quality. The closest residential property is 90 m from the proposed Pit extension boundary.

Air-borne particulate will be generated during the development and operational phases of this project. On site vehicle operations, as well as trucking operations can contribute to overall dust, as well as increased emissions of nitrogen oxides (NO_x), sulphur dioxides (SO₂), carbon monoxide (CO), ozone, hydrogen sulphide, and greenhouse gases including methane and carbon dioxide (CO₂). The following mitigative measures will be utilized to reduce project emissions:

- Wet suppression controls on unpaved surfaces;
- Speed reduction to keep dust levels at minimum;
- Hardened surfaces where practical;
- Equipment maintained in good working order;
- Use of properly sized equipment to maximize overall processing efficiency;
- Low sulphur diesel fuel;
- Reduced idling; and
- Incorporating native shrubs and trees in the rehabilitation plan to further reduce carbon dioxide levels and other green house gases.

National Pollutant Release Inventory (NPRI) Reporting

The NPRI is a federally administrated program that collects data on annual on-site emissions of substances released to the air, water and land, as well as offsite transfers of substances for disposal or recycling. NPRI reporting is a requirement of sub section 46(1) of the Canadian Environmental Protection Act (CEPA). Gallant is aware of the legislation and will comply with reporting requirements.

Rehabilitation

Progressive rehabilitation will be integrated in the overall pit plan. Dust and exhaust type emissions will be produced from equipment and machinery used for rehabilitation, re-contouring and overburden relocation. Mitigative measures, including wet suppression of unpaved surfaces and roads, will help reduce dust impacts from these activities. Regular machinery maintenance, the use of low sulphur fuel, the overall distance of the reclaimed areas from sensitive receptors and the natural buffers of the

rehabilitation areas will help reduce emissions and dust impacts associated with the equipment utilized in the rehabilitation process.

In summary, assuming appropriate mitigation to minimize dust generation and transport, significant Project-related effects, on air quality, are not likely to occur during development, operation, and rehabilitation phases. Monitoring of particulate emissions will be conducted as required by NSE. Particulate monitoring can be conducted utilizing a Beta Array Monitor or High Volume Sampling.

6.6 NOISE

6.6.1 EXISTING ENVIRONMENT

Noise is defined as any unwanted sound which may be hazardous to health, interfere with speech and verbal communications or is otherwise disturbing, irritating or annoying. Noise is measured as sound pressure levels (SPL) in decibels (dB). This scale is "A" weighted to approximate the way the human ear hears. Noise measurements are therefore represented as dBA units. In general an increase in noise levels from 1 to 3 dBA will not be noticeable, 3 to 5 dBA will be noticeable by most people, 5 to 7 dBA will be easily heard and an increase of 7 to 10 dBA will be considered by most to be twice as loud (USEPA Reference-1974). Because the decibel scale is logarithmic, doubling of the number of noise sources will increase noise levels by 3 dBA. A tenfold increase in the number of noise sources will add 10 dBA to the noise level.

Table 6.6-1 lists some common noises and typical dBA levels. Extremely low levels of sound are in the 20 to 35 dBA range, while sounds causing immediate and noticeable disturbance start at 70 to 80 dBA. A quiet location such as library or inactive residential area will register a sound level of approximately 35 dBA. A tractor-trailer passing at a distance of 10 to 15 metres will create 80 dBA, similar to that of shouting at a distance of one metre.

TABLE 6.6-1: COMMON NOISES AND TYPICAL dBA LEVELS

NOISE LEVEL (dBA)	TYPICAL OUTDOOR NOISE LEVELS	TYPICAL INDOOR NOISE LEVELS
140	Threshold of pain on the human ear	
130		
120		
110	Gas mower at 1 metre	Nightclub music
100		
90		
80	Semi-truck @ 10-15 m travelling 70 to 90 kilometres/hr	Shouting at 1 metre
70	Autos @ 10-15 m travelling 70 to 90 kilometres/hr	
60	Normal conversational speech at 1 metre	
50		
40	Rural daytime	Library
30		
20	Rural night time	
10		Recording studio
0	Threshold of hearing	

The proposed Pit extension is bounded by Cooks Brook (south) and Highway 224 (North) and private property to the east and west. There are several contributing factors to existing noise in this area:

- Existing background noise from road traffic including local traffic, and farm equipment;
- Existing background noise from air traffic;
- Existing background noise from local mining operations;

**6.6.2 POTENTIAL EFFECTS, PROPOSED
MITIGATION, MONITORING AND FOLLOW-UP**

The Pit extension area will create loading, screening and hauling noise. Temporal boundaries for the acoustic environment would be the time periods during which related site noise will have the potential to degrade the local air quality in and around the extension site. The extension project is expected to extend the life of the pit by 6 years. The acoustic environment will be affected throughout that time period. Most of the noise impacts will result from heavy equipment and vehicle operations. Impacts will occur during the development and site operations as the project proceeds, and as a result of decommissioning and rehabilitation. Operations will be intermittent throughout the year, therefore there are no significant seasonal boundaries.

The spatial boundary is the zone of influence of noise emissions from the extension area that will affect the local ambient air quality. The nearest resident to the proposed pit extension boundary is approximately 90 m.

A significant adverse effect occurs where the project increases background noise levels at a residential area above the NSE guidelines or by more than 10 dBA. An adverse effect that does not meet these criteria would be considered as not significant. A positive effect would be project-related activities that decrease the ambient noise levels.

Sources of pit site related noise may include onsite heavy equipment, truck traffic and operation of the screening/wash plant. Table 6.6-2 outlines some typical noise ranges for heavy construction equipment. Noise levels for stationary construction equipment will decrease by approximately 6 dBA at a doubling of the distance from the source.

TABLE 6.6-2: TYPICAL NOISE LEVELS 15 M FROM HEAVY CONSTRUCTION EQUIPMENT

Type of Equipment	Noise Level Range (dBA)
Front Loaders	70-85
Backhoes	70-95
Trucks	85-95
Excavator	85-95
Reference: "Traffic Noise Analysis and Mitigation Manual" Environmental Section, Oregon State Highway Division, 1990	

The level of noise will vary according to the type of development activity. Noise from the equipment and lack of effective mufflers is a source of noise. Regular maintenance of the equipment will reduce noise levels. This measure will adequately mitigate potential noise impacts. All noise emissions will meet the NSE Pit and Quarry Guidelines (1999). Monitoring stations can be set up at any time throughout the process should noise complaints arise.

Rehabilitation

Noise impacts from the rehabilitation processes will result from equipment and machinery used in rehabilitation, re-contouring and overburden relocation. Regular machinery maintenance, the overall distance of the rehabilitated areas from sensitive receptors and the natural buffers of the rehabilitation areas will help reduce impacts of noise associated with the equipment utilized in the rehabilitation process.

Gallant will control operations and equipment to ensure noise levels are kept within the NSE Pit and Quarry Guidelines (1999).

The nearest residence to the proposed extension site is approximately 90 m away. Appropriate mitigation to minimize noise levels to reasonable levels will be made. All noise emissions will meet the specifications outlined in the IA, as well as the Guidelines for Environmental Noise Measurement and Assessment, 1990.

Monitoring stations can be set up at any time throughout the process should noise complaints arise or as required by NSE.

6.7 SOCIO-ECONOMIC ENVIRONMENT

6.7.1 EXISTING CONDITIONS

The Project is located in Cooks Brook, a small unincorporated community in the Halifax Regional Municipality (HRM) that borders the community of Gays River, Colchester County. Cooks Brook lies between the larger communities of Middle Musquodoboit, Lantz and Shubenacadie. The population of the surrounding area is described by Nova Scotia Finance, Community Counts to fall within three broad “communities” named, Middle Musquodoboit, Lantz, and Wittenburg. The total population of these three areas is 6816 (2006 Census – 2011 Census data is unavailable at this time). About 28% of the population is under 20 years of age and 13% is 65 years of age or older. Population growth between 1996 and 2006 was about 3%. English is spoken by over 99% of the population. The average family income for the area ranges from \$56,500 to \$67,000 per annum (the more affluent area being Lantz).

Within 2 kilometres of the proposed project there are 70 recorded civic addresses. Given the rural/agricultural nature of the area it can be assumed that most of these locations are residential. Therefore, within a distance of the two pit properties the following number of residences can be surmised: 100 m - 6; 200 m - 11 0.5 km - 22; 1.0 km - 44, and; 1.5 km - 52.

In the local areas there is a range of land uses focused on resource based industries such as agriculture, forestry and mining. The pit site is located in an agricultural area that extends from the Musquodoboit Valley north into Colchester County. Agricultural land use accounts for approximately 5 % of the Gays River/Cooks Brook area. The regional area has a 50 year mining history at the East Milford gypsum open pit mine, large rock quarries at Elmsdale and Coldstream, limestone quarries at Brookfield and Upper Musquodoboit, and Shaw Resources' sand pits at Hardwood Lands and West Indian Road. The regional area is a mining area.

The regional area is primarily forested with mixed use (mainly residential and small business) located along the secondary roads. Sawmills and a wood pellet manufacturing plant are located near Middle Musquodoboit. Forested lands are primarily privately owned. Private woodlot owners are a significant source of supply to these facilities.

The Pit Expansion project will use existing public roads that require no upgrading or changes in infrastructure (i.e. bridges). The primary route used will be Highway 224 to Shubenacadie or Highway 277 to Elmsdale to access Highway 102 and routes beyond.

The expected average daily number of trucks is 20 which is a small percentage (less than 2%) of the daily truck traffic based on recent data from public sources. Spring weight restriction periods on roads may reduce site activity.

6.7.2 POTENTIAL EFFECTS, PROPOSED MITIGATION, MONITORING AND FOLLOW-UP

The effects of the proposed Pit extension project to the local socio-economic conditions will be observable in several key areas.

Local Employment and Economic Activity

The socio-economic impacts of the pit to the local economy will be limited because of the small nature of the site and utilization of existing Gallant resources. Impacts that may require mitigation are reduced residential and land values due to industrial activities. Given the relative short life of this project, the conceptual rehabilitation plan, and the

existing operation has been in the area since 2004 along with other nearby extractive resource operations, it is unlikely the project will impact current land values.

Recreational Activity

Recreational use of the site has been limited to local use. No evidence of use by off road ATVS was seen during site reconnaissance. The future final land use of the site will be determined in conjunction with the needs of the local community. After closure of the pit, final rehabilitation is intended to return the site to a condition that reflects the surrounding landscape. Disturbed areas will be regraded and revegetated or put to other uses as warranted by future plans for the site.

Visual Impacts

Effects to visual quality of the local area that result from construction, operation, de-commissioning and rehabilitation of the Pit extension area include changes to the short term and long term viewsapes in the local area. The roadways, pit, settling ponds, and stockpiles are already in existence and there will be no change in the visual environment related to these items. Only the west end of the site is visible from the Highway 224. A barrier of trees will shield the site from view. The resultant landscape will mimic the existing rolling hill topography with variety of cover (grass, trees, etc.) and will terrace towards the Brook and Lake.

Land Use

Sand and gravel extraction operations often involve changing the land use of an area. In some cases a new pit will require lands that may have been used for recreation, agriculture or other purposes. In the case of the lands needed for the Pit extension project the existing land use is confined to two types: forestry (although the site is small and the amount of forestry may have been limited to gathering firewood) and previous pit related operations from current and past operators. The land is already owned by the proponent. During operations and since the site has been idled public access has not been restricted. Future land use will depend on the needs of the proponent and the community, *i.e.* returned to a natural state with access to the trail and Lake.

6.8 ARCHAEOLOGICAL AND CULTURAL RESOURCES

Archaeological screenings & reconnaissance of the proposed Pit Extension area was conducted by Cultural Resource Management (CRM) Group Limited under Heritage Research Permit A2012NS031 (Category 'C'), to locate and identify archaeological resources within the proposed impact area, and to offer resource management recommendations. Reconnaissance work was conducted on 17 April 2012. Shovel testing

on the identified High Potential areas was conducted on July 25 and 26, 2012. The study reports (Appendix F) summarizes the findings and recommendations for the site.

6.8.1 EXISTING CONDITIONS

Prior to inspection during field reconnaissance, the majority of the study area had been cleared of vegetation, which aided the visual inspection of the landscape. A number of areas are within, and immediately adjacent to the study area, have been previously impacted by extraction activities. Numerous pits and mounds were also noted within the reforested portion of the study area, indicating some level of previous impact.

The western portion of the study area consisted of undulating and sloping terrain that was mainly unsuitable for Precontact habitation. However, given the proximity to the watercourse, careful attention was paid to any level areas along the edge of the river terrace, closely followed by the southern extent of the study area. Several areas of high archaeological potential were noted along this trail, but were located outside the proposed study area.

All areas of exposure from previous impacts, incidental impacts from vegetation clearing, tree throw and blowouts were examined and found to be devoid of artifacts. In total, three areas within the study area were deemed to exhibit high potential for Precontact and/or early historic native and historic Euro-Canadian archaeological resources. Each high potential area is described below.

High Potential Area 1:

This area (20 m x 10 m), located in the northeast corner of the study area, consists of level terrain that would have been suitable for historic Euro-Canadian utilization. Visual inspection of the area revealed the presence of a possible historic feature - a squared-off mound of dirt resembling foundation remains. Given the dry and level nature of the locale and the presence of a potential historic feature, this area is considered to exhibit high potential for encountering historic archaeological features.

High Potential Area 2:

This area (15 m x 10 m), located along the southeastern limits of the study area, consists of a level point of land along the upper river terrace overlooking McGeorge Lakes where it flows into the river (Cooks Brook). The area would have been suitable for Precontact and early historic Native to historic Euro-Canadian utilization. Given the high, dry and level nature of the locale and its proximity to a watercourse, this area is considered to exhibit high potential for encountering both Precontact and historic archaeological features.

High Potential Area 3:

This area (150 m x 15 m), located along the southern limits of the study area, consists of a long stretch of level ground at the edge of the upper river terrace overlooking the watercourse. As such, it would have been suitable for both Precontact and early historic Native or historic Euro-Canadian utilization. Given the high, dry and level nature of the locale and its proximity to a watercourse, this area is considered to exhibit high potential for encountering both Precontact and historic archaeological features.

Shovel testing was conducted on all three locations and did not find any artifacts and the site is recommended to be cleared of any further archaeological work.

6.8.2 POTENTIAL EFFECTS, PROPOSED MITIGATION, MONITORING AND FOLLOW-UP

The Pit extension project is not likely to have significant adverse effects on archeological and historical features in the area.

Based on results noted above, the following management recommendations are offered for the Pit Extension area:

1. It was recommended that that the areas of high potential for archaeological resources identified in the April 2012 report be further subjected to shovel testing to determine whether or not buried archaeological resources are present and/or determine the age, function and significance of identified features. A follow up survey was completed in July 2012 and not artifacts were identified. It has been recommended that the identified areas be cleared of any further investigation.
2. It is recommended that the remainder of the study area be cleared of any requirement for further archaeological investigation.
3. It is recommended that in the event that archaeological deposits or human remains are encountered during development activities associated with the Cooks Brook Pit Expansion, all work in the associated area(s) should be halted and immediate contact made with the Heritage Division (Laura Bennett: 424-6475).

Heritage Division of Nova Scotia Communities, Culture and Heritage have accepted the recommendations from the April 2012 Screening Report (Appendix F). The recommendations from the July 2012 Shovel-testing survey have been submitted to Heritage Division and their confirmation is pending at the time of writing.

Personnel involved in all ground disturbances related to the site preparation and pit activities will be made aware of the potential for archaeological and/or cultural resources and the appropriate actions to take in identifying and reporting such features.

No additional work or mitigation is required to allow the project, as described, to proceed.

6.9 OTHER PROJECTS IN THE AREA

6.9.1 EXISTING CONDITIONS

The proponent is aware of several existing and planned extraction operations within 20 km of the site. ScoZinc Limited owns and operates a zinc/lead operation in Cooks Brook, approximately 2 km from the site. National Gypsum Canada Ltd. owns and operates the largest open-pit gypsum quarry in the world at Milford Station, approximately 7 km from the Project site. Tuskent Mining Limited owns a gypsum deposit at Murchyville. That site, approximately 12 km from the Project area, is completely permitted but currently under care and maintenance. Gallant's permitted rock quarry is located 14 km from the site in Elmsdale. Several other small pit and quarry operations are within 20 km of the site. The specific status of these sites is unknown.

Beyond 20 km there are numerous gold deposits (former producers) that are in various stages of exploration and development. Atlantic Gold NL is in the process of developing the Touquoy Gold Project at Moose River Gold Mines, approximately 30 km from Cooks Brook. The Touquoy project has received Environmental Assessment Approval.

Significant adverse Project-related effects in conjunction with other undertakings in the area are not likely to occur, assuming the effective application of mitigative measures as outlined in this document.

7.0 EFFECTS OF THE PROJECT ON THE ENVIRONMENT

The Project has operated as a sand and gravel pit under an NSE Industrial Approval (Appendix B) and that resource has been nearly exhausted. Activities associated with the proposed pit extension and operation will be conducted in accordance with terms and conditions of the EA, an amended Industrial Approval, and adherence to the Pit and Quarry Guidelines (NSEL 1999) and specific mitigative measures described in this assessment and all other applicable legislation, policies, and guidelines.

Assuming the mitigative, monitoring, and progressive rehabilitation measures specified in this report are implemented, and the pit is operated according to existing provincial guidelines and approvals, no significant adverse residual environmental or socio-economic effects are likely. Effects are expected to be of small magnitude, low frequency, short duration, and/or limited geographical extent. Continued operation of the pit will result in economic benefits, including employment and an economic source of quality aggregates to local demand markets.

Environmental effects will include the loss of some habitat within the proposed pit extension area. The extension area has been the subject of past extraction and deforestation activities.

A summary of the potential for significant adverse effects and the required mitigative measures follows:

Field surveys conducted to date indicate that this area does include a listed sensitive species (carex) that has been mitigated during field study; therefore, these effects are not anticipated to be significant.

Localized impacts on air quality can be expected through the formation of airborne particulate matter. These impacts are readily controlled through standard mitigative measures (e.g., dust suppression) and follow-up monitoring as necessary.

8.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Environmental effects often include any change to the project that may be caused by the surrounding environment. Discussions on potential environmental effects on the Project are usually limited to climate and meteorological conditions. Climate change is more likely to affect projects with much longer durations, however, reclaimed workings or temporary storage pile may be affected by future severe weather events if not planned for properly. Climate change is not anticipated to significantly affect the operation of the pit over its lifetime. Short period events, *e.g.* heavy rainfall, blizzards or thunder storms, may temporarily shut down operations for safety reasons. Precipitation and runoff may cause temporary delays in pit construction, operation, and rehabilitation activities. Any condition that includes precipitation (*e.g.* rain or snow) may limit the delivery of aggregate material from the site to a project.

Nationally, Canada has been in a warming trend (1.6° C since 1948), however, in Atlantic Canada, the warming peaked followed by a cooling trend to the 1990s with an overall trend increase of 0.5° C from 1948 to 2010 (Environment Canada 2010). The Atlantic Region does show an increase in precipitation of 10% between 1948 and 2010, however this is coupled with extreme years that show departures from precipitation trends of -19.8% in 2001 and +19.2% in 1990. Overall, there is an increasing trend in the number of daily precipitation events above 20 mm and a slight increase in the number of snowfall events above 15 cm (Lewis 1997).

There is a number of planning, design and construction strategies intended to minimize the potential effects of the environment on the Project so that the risk to the Project can be reduced to acceptable levels. Mitigation measures include, but are not limited to, designing and installing erosion and sediment control structures to accommodate appropriate levels of precipitation, and considering weather conditions when scheduling activities, including scheduling of activities to accommodate weather interruptions. All Project activities are conducted out-of-doors and thus weather has been and will be factored into all Project phases and activities.

Earthquakes are mapped by the Natural Resources Canada. Only 19 quakes with a maximum magnitude (M) of 3.2 (near Bridgewater in 2007) have been recorded in Nova Scotia in the last 5 years. No significant earthquakes (M < 5.0) have occurred in Nova Scotia between 1600 and 2006 (Lamontagne et al 2008). There is, therefore, little likelihood of earthquakes being an effect on the project.

Wildfires are limited in Nova Scotia but there is the potential for this to affect the project by limiting when work may be conducted during such an event. There are no permanent structures planned for the site and, however, on-site equipment may be lost

if it can not be evacuated before an approaching fire. The site is stripped of vegetation but is surrounded by forested areas. Fire protection may be available from water from on-site ponds and from the nearby lake if so permitted.

Flooding of the Gays River and Cooks Brook has occurred during seasonal high flows but has not historically affected operations at the site. The site is elevated from the river and has not been affected by any seasonal flooding in the past, but flooding may cause a temporary rise in local groundwater elevations - thus affecting operations.

The regional area has karst potential (*Lower Windsor Group-Carrolls Corner Formation*) and the potential for karst features (*i.e.* sinkholes) to occur in the bedrock. Although no features have been identified on the site and no extraction from bedrock will take place, it is unlikely that any karst features would be encountered. If a karst feature presents itself during operation, activities will cease in the designated areas until such time the feature can be mitigated.

9.0 OTHER APPROVALS REQUIRED

The Proponent is required to register this Project as a Class I Undertaking pursuant to the Nova Scotia Environment Act and Environmental Assessment Regulations. Other relevant provincial regulations include the Activities Designation Regulations, which requires an amendment to the existing Industrial Approval (Appendix B) from Nova Scotia Environment for the extended pit operation.

No municipal approvals are required.

There are no known triggers for environmental assessment under the Canadian Environmental Assessment Act (CEAA).

10.0 FUNDING

This project will be 100% funded by Gallant Aggregates Limited. No federal or provincial funding is required.

11.0 ADDITIONAL INFORMATION

No additional information is provided in support of this document.

12.0 REFERENCES

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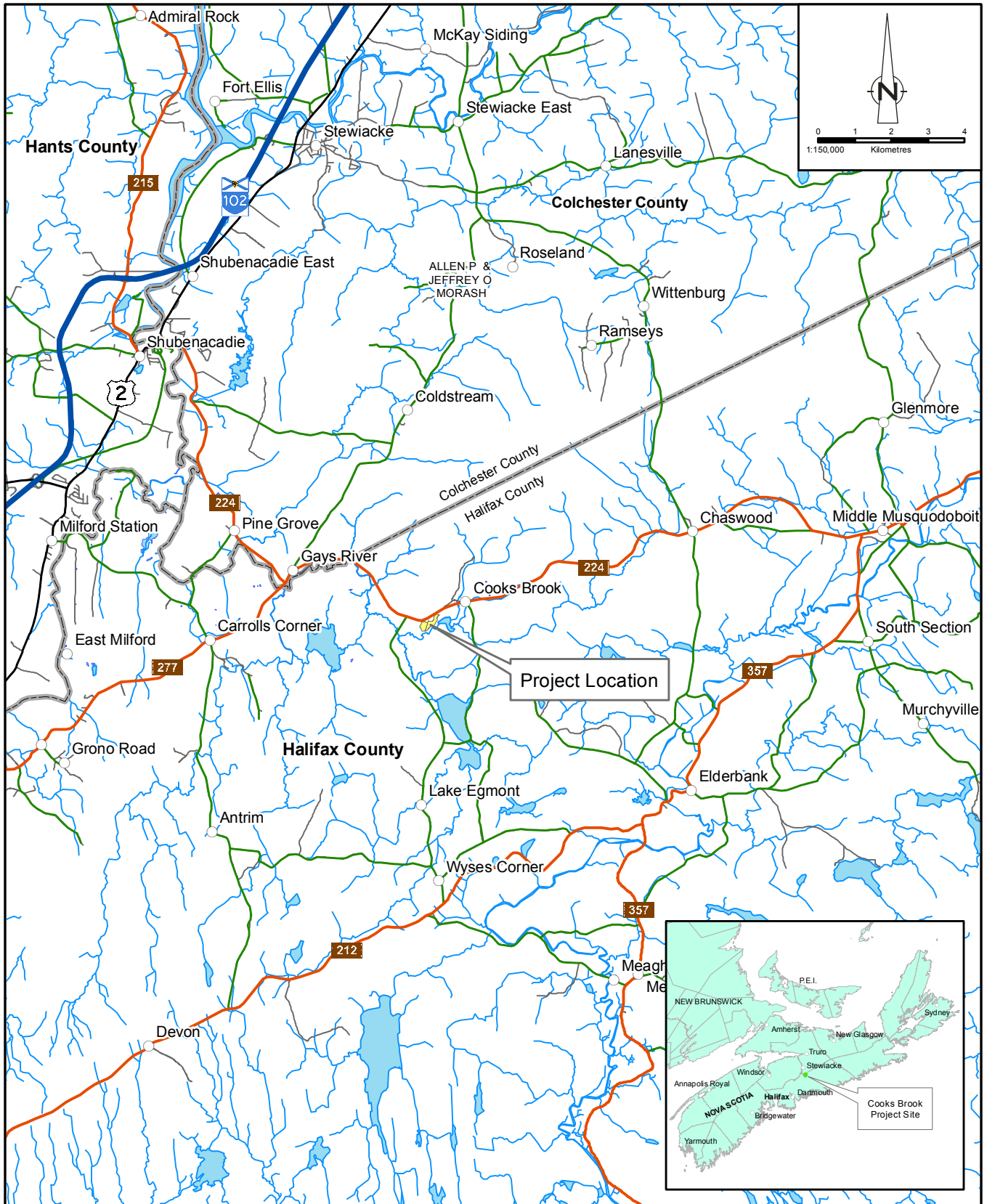
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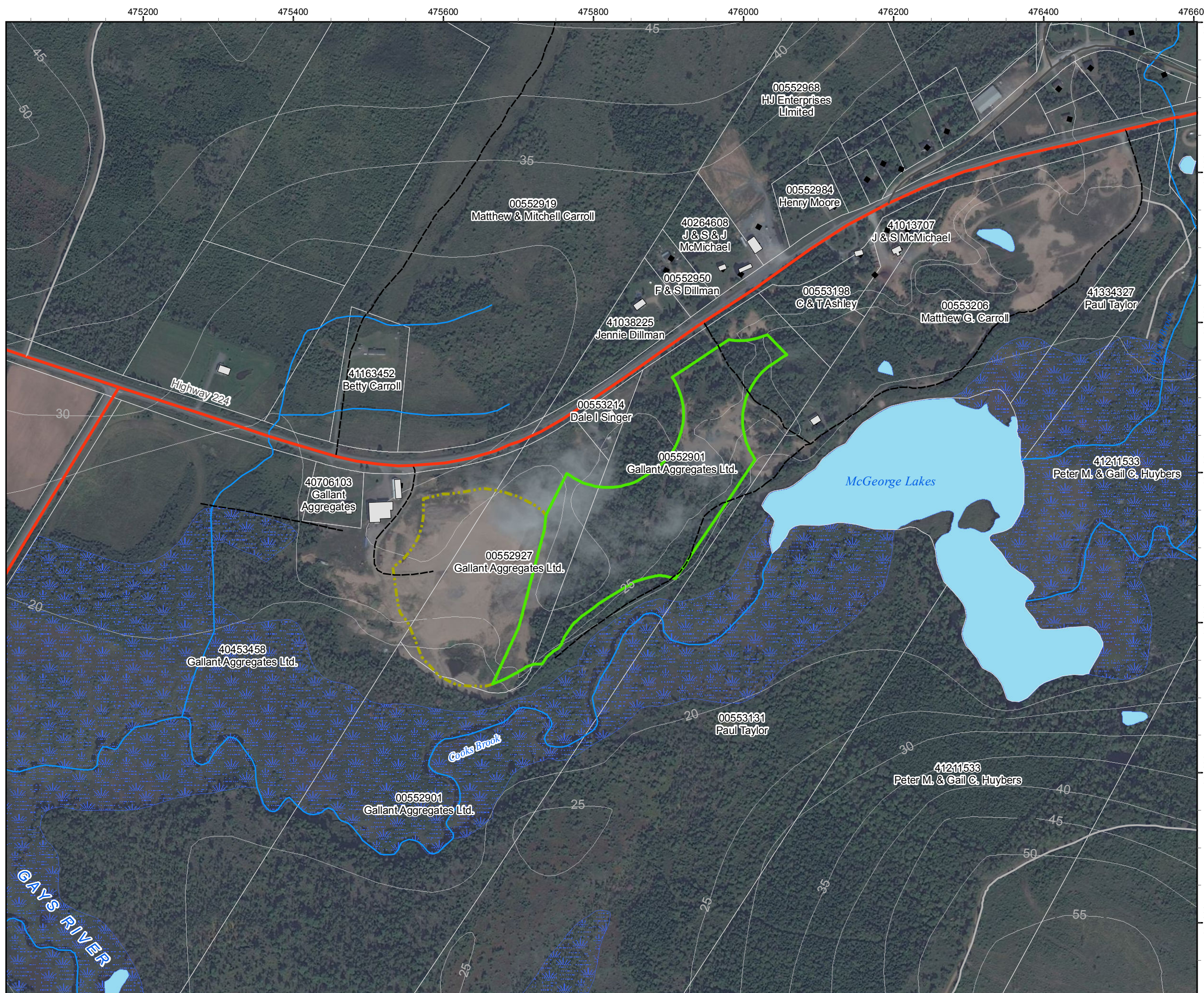
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Source: Service Nova Scotia & Municipal Relations Projection: UTM Zone 20 NAD83 CSRS

figure 1
 SITE LOCATION
 COOKS BROOK PIT EXTENSION
 GALLANT AGGREGATES LIMITED
 Cooks Brook, Nova Scotia





LEGEND:

- Extension Pit
- Permitted Pit
- Property
- Building points
- Buildings
- Streams
- Streams (Intermittent)
- Lakes
- Wetlands (topo)
- Contours
- Local Paved
- Local Unpaved
- Driveway
- Track / Trail

Permitted Property PID 00552927 /40453458
 Expansion Property PID 00552901

SOURCE:
 Base Map: SNSMR GeoNOVA
 Property: SNSMR GeoNOVA
 Air Photo: ArcGIS Basemap - Bing Aerial 2010

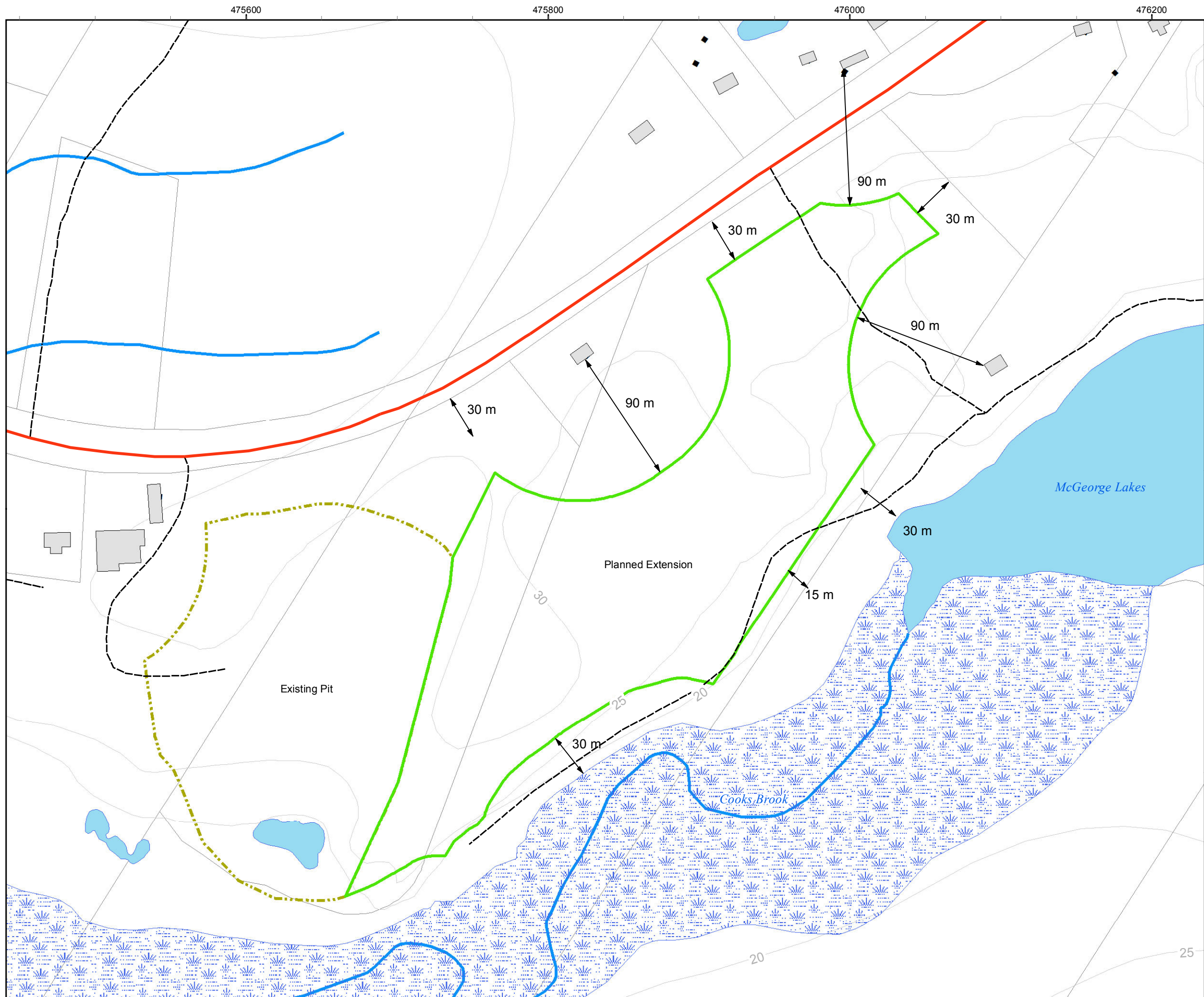


PROJECTION: UTM z20 NAD83	DRAWN / CHECKED BY: JJP / SH	MAP ANGLE: 0° North
SCALE: 1:5,000	DATE: October 12, 2012	PROJECT NO.: 076692

076692 (01) GIS-DA002

figure 2
PROJECT BOUNDARIES
 COOKS BROOK PIT EXTENSION
 GALLANT AGGREGATES LIMITED
 Cooks Brook, Nova Scotia

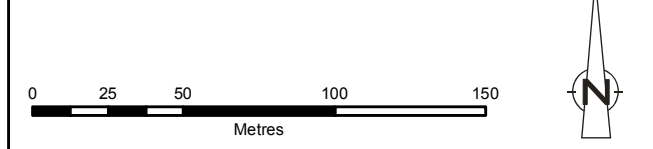




LEGEND:

- Extension Pit
- Permitted Pit
- Property
- Building points
- Buildings
- Streams
- Streams (Intermittent)
- Water
- Wetlands
- Contours
- Local Paved
- Local Unpaved
- Driveway
- Track / Trail

SOURCE:
 Base Map: SNSMR GeoNOVA
 Property: SNSMR GeoNOVA

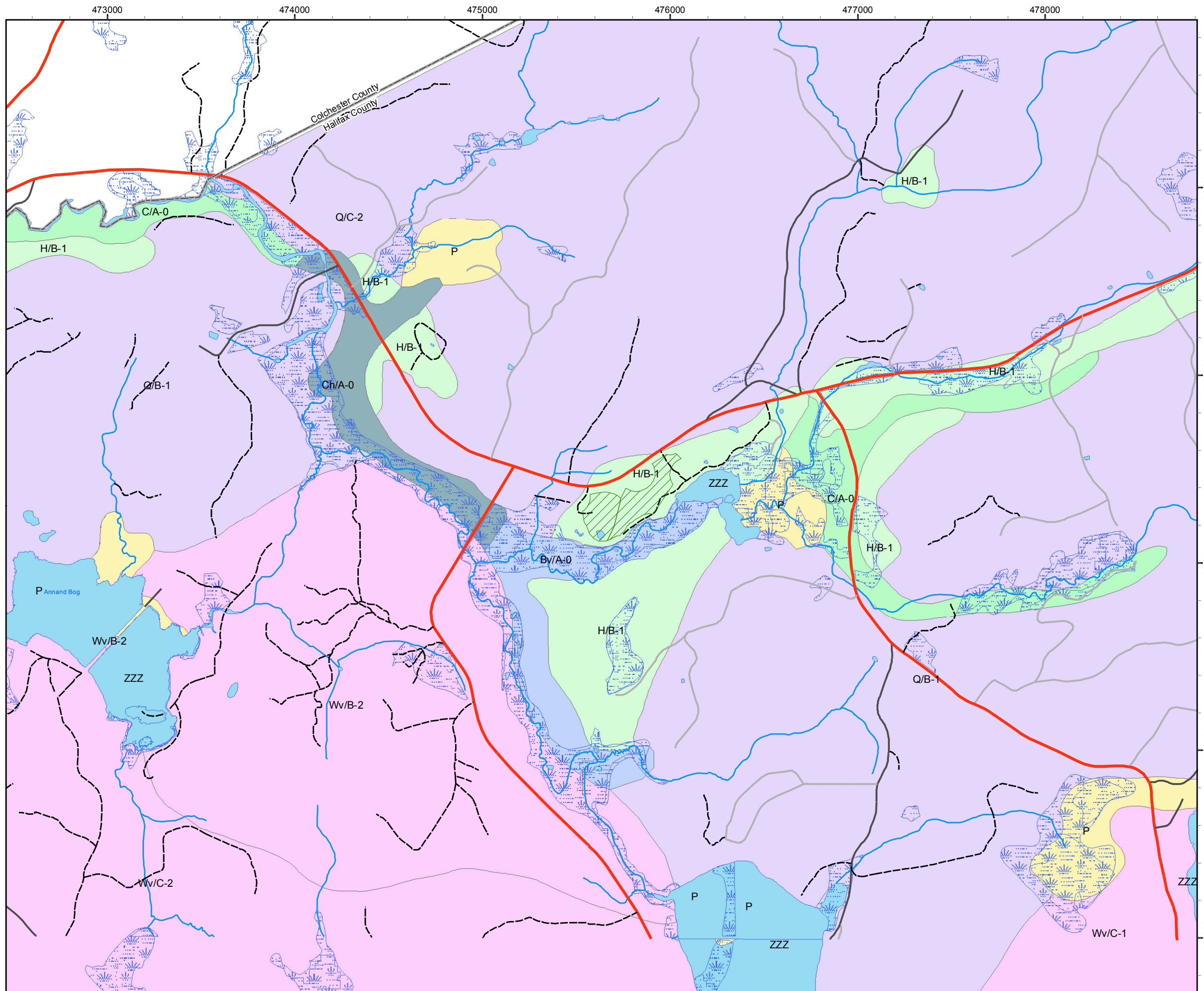


PROJECTION: UTM z20 NAD83	DRAWN / CHECKED BY: JJP / SH	MAP ANGLE: 0° North
SCALE: 1:2,500	DATE: October 12, 2012	PROJECT NO.: 076692

076692 (01) GIS-DA003

figure 3
PROJECT SETBACKS
 COOKS BROOK PIT EXTENSION
 GALLANT AGGREGATES LIMITED
 Cooks Brook, Nova Scotia





LEGEND:

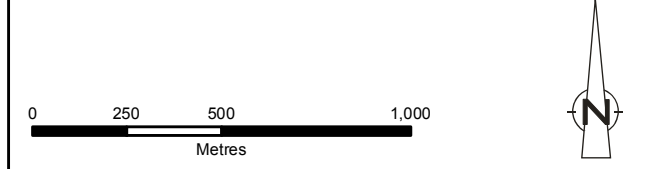
- Bv Bridgeville (ST9/10)
- C Cumberland (ST8)
- Ch Chaswood (ST10)
- H Hebert (ST1)
- P Peat (ST14)
- Q Queens (ST 6/7/12)
- Wv Wolfville (ST5/6/8/9/11/12)
- Water
- Project Pit

- Roads**
- Local Paved
 - Local Unpaved
 - Driveway
 - Track / Trail

Soil Symbol = Series / Topography - Stoniness
(STx) - Forest Soil Classification

Topography		Stoniness
A 0 - 2%	Level or nearly level	0 - Stone free
B 3 - 8%	Undulating	1 - Slightly Stony
C 9 - 16%	Rolling	2 - Moderately Stony
D 17 - 30%	Strongly rolling to hilly	3 - Very Stony
		4 - Excessively Stony

SOURCE:
Base Map: SNSMR
Geology: NSDNR

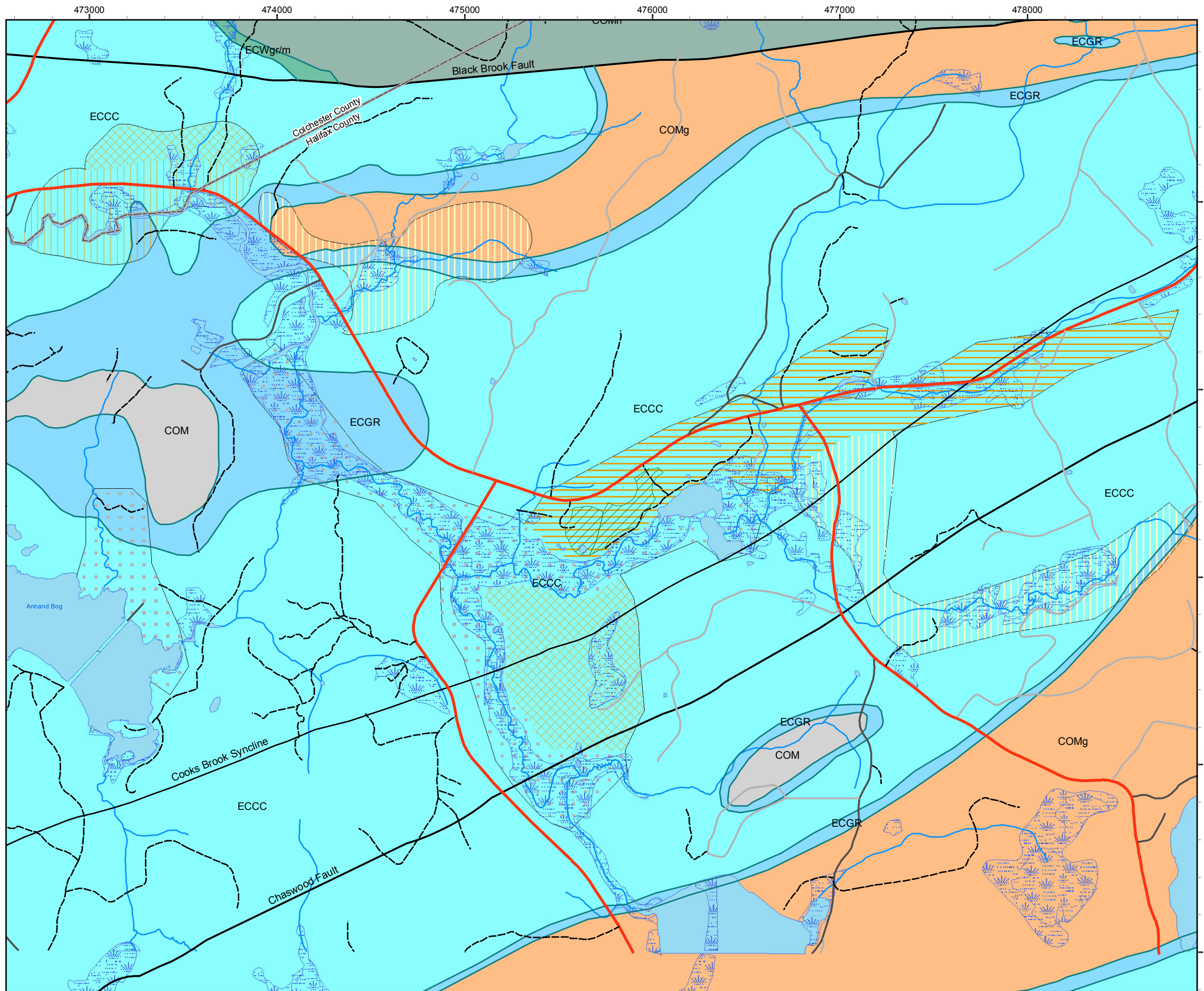


PROJECTION: UTM z20 NAD83	DRAWN / CHECKED BY: JJP / SH	MAP ANGLE: 0° North
SCALE: 1:20,000	DATE: September 3, 2012	PROJECT NO.: 076692

076692 GIS-DA004_Soil.mxd

figure 6-1
REGIONAL SOILS
COOKS BROOK PIT EXTENSION
GALLANT AGGREGATES LIMITED
Cooks Brook, Nova Scotia





LEGEND:

Windsor Group

- ECCC - Carrolls Corner Formation
- ECGR - Gays River Formation
- ECWfr/m - Undivided Gays River and Macumber Fms

Meguma Group

- COMh - Halifax Formation
- COMg - Goldenville Formation
- COM - Undifferentiated Halifax and Goldenville Fms

geological contact approximate
 approximate fault, probable
 SYNCLINE: syncline general

Surficial Geology

- Organic Deposits
- Alluvial Deposits
- Glaciolacustrine Deposits
- Glaciofluvial Deposits (Outwash Fans)
- Glaciofluvial Deposits (Kames and Eskers)
- Silty Till Plain (Ground Moraine)

Roads

- Local Paved
- Local Unpaved
- Driveway
- Track / Trail
- Project Pit

SOURCE:

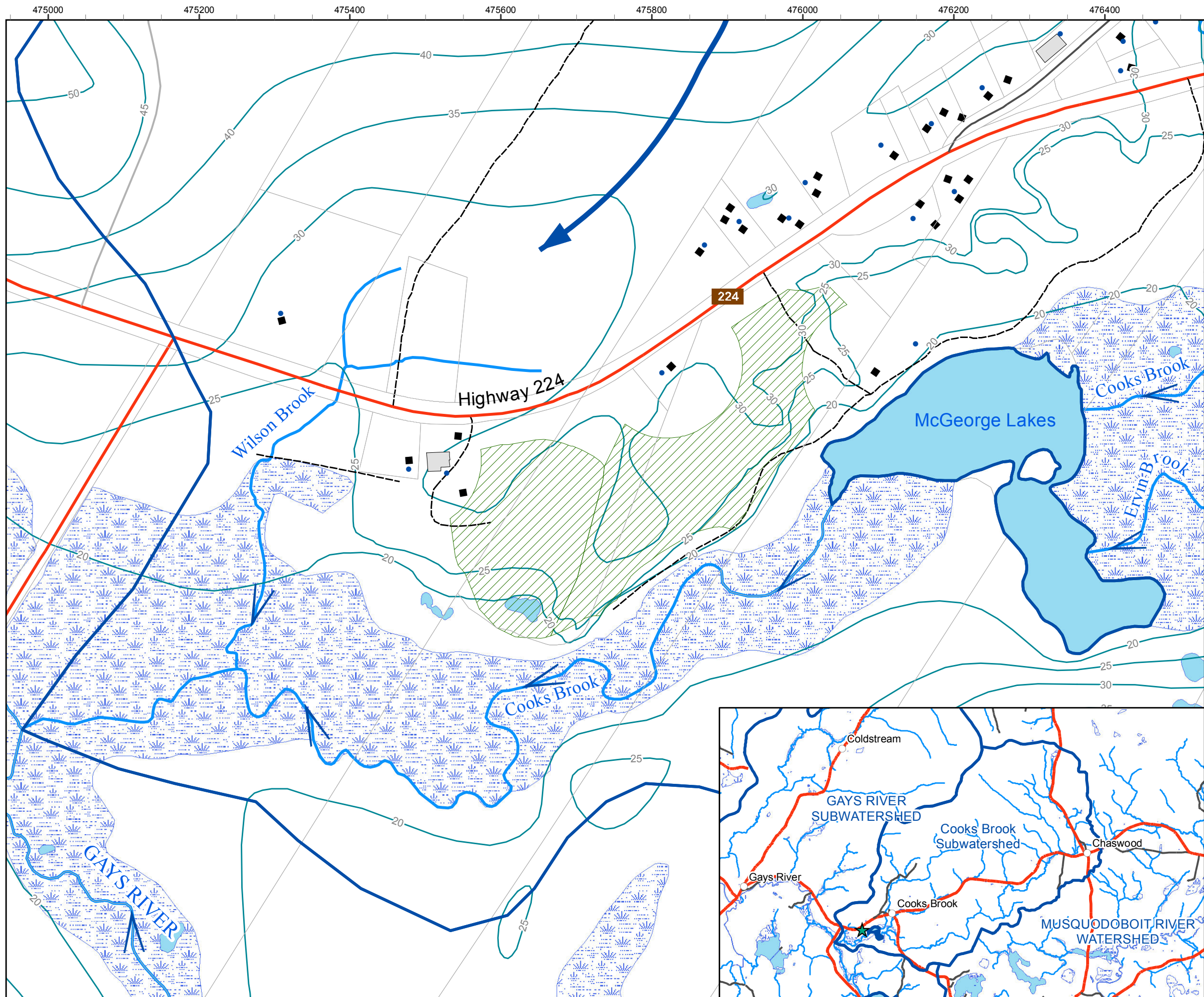
Base Map: SNSMR
 Geology: NSDNR

0 250 500 1,000
 Metres

PROJECTION: UTM z20 NAD83	DRAWN / CHECKED BY: JJP / SH	MAP ANGLE: 0° North
SCALE: 1:20,000	DATE: September 3, 2012	PROJECT NO.: 076692

076692 GIS-DA005_Geol.mxd

figure 6-2
BEDROCK and SURFICIAL GEOLOGY
 COOKS BROOK PIT EXTENSION
 GALLANT AGGREGATES LIMITED
 Cooks Brook, Nova Scotia



LEGEND:

- Possible well locations
- ▭ Cooks Brook Watershed 3572 ha
- ▭ Property
- ▭ Buildings
- ▨ Project Pit

Roads

- Local Paved
- Local Unpaved
- Driveway
- Track / Trail
- Streams (flow direction)

- Water
- Islands
- Wetlands

← Regional Flow Direction

SOURCE:
 Base Map: SNSMR
 Geology: NSDNR

0 50 100 200 300
 Metres

PROJECTION: UTM z20 NAD83	DRAWN / CHECKED BY: JJP / SH	MAP ANGLE: 0° North
SCALE: 1:5,000	DATE: October 12, 2012	PROJECT NO.: 076692

076692 (01) GIS-DA006

figure 6-3
WATER and WETLAND RESOURCES
 COOKS BROOK PIT EXTENSION
 GALLANT AGGREGATES LIMITED
 Cooks Brook, Nova Scotia

GRA CONESTOGA-ROVERS & ASSOCIATES