

UPPER BEAVER GOLD PROJECT

Baseline Studies Overview as of October 1, 2021.



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UPPER BEAVER PROJECT

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Baseline Studies Overview

Agnico Eagle Mines Ltd. (Agnico Eagle) is planning to develop the Upper Beaver Project (the Project) located approximately 5 km northeast of Dobie, Ontario, in the Gauthier and McVittie townships. The nearest larger communities are the towns of Larder Lake and Kirkland Lake, respectively located about 8 km to the southeast and 19 km to the southwest.

What is a baseline study?

A baseline study is prepared by a project proponent (or their hired consultants) to describe the current physical, biological and human environment conditions at a project site and surrounding area prior to project development. The Upper Beaver Project study area includes the Project site and the surrounding area that may be affected by the Project, as well as additional selected areas as they apply to the Project.

Why is it important for the Upper Beaver Project?

Baseline studies support the environmental assessment process. Understanding the current conditions, challenges and future plans of an area related to the Project provides a basis against potential effects of the Project that can be assessed. These assessments assist in decisions on the design and management of the Project to reduce its potential effects.

Baseline studies have been ongoing at the Project site since 2010 with the majority of work occurring in 2011/2012 and 2018 to present.

Objectives for the 2021 work are:

- Update existing information.
- Ensure information includes the entire proposed mine footprint.
- Ensure that data meets the current regulatory requirements.

Physical Environment

Physical environment baseline studies describe the physical conditions and characteristics in the defined study area at and around the Project site. These studies document air quality, noise, hydrology (lakes, rivers, etc.) and climate, hydrogeology (groundwater), geochemistry and geology and surface and groundwater quality.

Human Environment

Human environment baseline studies describe the socio-economic conditions in the defined study area at and around the Project site. These studies document land and resource use, Indigenous traditional knowledge and land use, archaeology, visual aesthetics, and socio-economic.

Biological Environment

Biological environment baseline studies describe the biological conditions and characteristics in the defined study area at and around the Project site. These studies document the soils, vegetation, and wildlife and aquatic biology of the area, estimate the area's biodiversity, and describe any nearby protected areas.

Physical Environment Baselines

Air Quality

What is an air quality baseline study?

Air quality baseline studies document air quality in a defined study area at and around a project site prior to project development. The study assesses the presence and quantity of particulate matter, metals, and other compounds.

How is air quality information gathered?

An air quality monitoring station will be operated at the Project site to obtain first-hand information prior to major construction and operations activities. The data collected by the monitoring stations will be supplemented with and compared to monitoring data obtained from the Ontario Ministry of the Environment and Environment Canada for similar areas.

There are two air quality monitoring stations for the Project. One is located near the Upper Canada Office which includes a Total Suspended Particulate (TSP) sampler, Particulate Matter 10um (PM10), Particulate Matter 2.5um (PM2.5) as well as passive samplers for nitrogen dioxide, sulphur dioxide, volatile organic carbon, and total dustfall. The second station is located at the Project area and includes a PM2.5 sampler and passive total dustfall, NO₂, and SO₂.

What is the current status of the baseline study?

- Air quality monitoring was conducted in 2011 and 2012 at the Upper Beaver Project and is set to begin again in the summer of 2021 to have an additional full year of data including new parameters.
- Data from previous studies showed that there were no recorded exceedances of the Ontario Ambient Air Quality Criteria for TSP or metals, and SO₂ and NO₂ concentrations were reported as low.

Noise

What is a noise baseline study?

Like the air quality baseline, noise baseline studies describe the current background noise levels in particular locations in relation to a project site. There are three classes of acoustical (sound) environment under the Ontario Ministry of the Environment Guidelines (NPC 205/232): Class 1 Area (major population centers), Class 2 Area (combination of the typical noise environment under Class 1 and 3 Areas) and Class 3 Area (rural areas and small communities).



PM10 and Passive Samplers



Noise monitoring equipment



Noise monitoring equipment

How is noise information gathered?

Information generated by previous studies and publicly available information and data (internet, books, published articles, etc.) is reviewed to determine existing noise levels in the defined study area. Additional information can be obtained by means of instruments such as calibrated sound level meters (SLMs) and ground-sensing data loggers.

What is the current status of the baseline study?

- Ambient noise surveys were done in 2012 and 2013. The Project site is considered as Class 3 (a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic).
- Additional noise data collection is ongoing; to fill some gaps in the data. Current results are not yet available.
- The background noise information will be used to assess the potential impact from proposed project.

Hydrology and Climate

What is a hydrology and climate baseline study?

Climate describes the weather conditions over a region, while hydrology is the study of the Earth's surface water, especially its movement in relation to the land. Baseline studies describe the current climate and water conditions in a defined study area at and around a site that could potentially be affected by a project. They document rainfall, temperature, and storm events, describe where water



Hydrology monitoring station on Misema River, downstream of the Upper Beaver Project area



Hydrology monitoring station, outlet of Beaverhouse Lake.

flows, provide mapping of watersheds, lakes, and rivers, and analyze drainage and seasonal variation in climate and surface water levels.

How is hydrological and climate information gathered?

Available public information and data (from government agencies, public archives, etc.) is reviewed. Additional information is obtained from the study area by means of meteorological stations and hydrological monitoring stations installed in lakes and rivers.

What is the current status of the baseline study?

- All surface water leaving the Upper Beaver site drains via local creeks to the Misema River.
- Several hydrological monitoring stations have been established in the study area (outflow of Beaverhouse Lake, Victoria Creek, and Misema River) to analyze the seasonal fluctuations and to establish rating curves (used to predict stream flows based on water levels). These stations have been monitored from 2011 to 2012 and 2018 to present.
- The average annual streamflow pattern of the Misema River and its tributaries (e.g., Victoria Creek) is characterized by high flows in the spring in response to snowmelt (typically April and May), receding flows during early summer (June), low flows in mid to late summer (July, August, and early September), increasing flows during fall (late September to November), and moderately low flows in winter months (January, February, and early March).
- A climate station was established in the summer of 2021 to gather data on precipitation, wind speed, wind direction, and temperature.



Hydrology station on Victoria Creek, upstream of the Upper Beaver Project area.

Hydrogeology

What is a hydrogeology baseline study?

Hydrogeology refers to a part of geology that deals with the occurrence, distribution and effect of water beneath the ground surface (groundwater). Hydrogeology baseline studies describe the current hydrogeological conditions in a defined study area at and around a project site. This includes determining how fast water flows through soil and rock, soil characterization, groundwater level and direction of flow, and groundwater pressure and quality.



Groundwater level monitoring during a pump test.

What is the current status of the baseline study?

A preliminary review of available public information is conducted (from internet sources, published books and studies, etc.). This provides a framework for the study and helps identify information gaps. Experts then complete the study by gathering first-hand information in the field using a variety of methods, including drilling holes, installing monitoring wells, pumping test, slug testing and packer test (to simulate hydraulic conductivities)

What is the current status of the baseline study?

- All surface water leaving the Upper Beaver site drains via local creeks to the Misema River.
- Several hydrogeological studies were completed to define the hydrogeological conditions of the Project area between 2011 and 2018.
- Most local groundwater flow occurs in the overburden soils and the shallow fractured bedrock (assumed to be top 50 m of bedrock) with flows generally to lakes and creeks, including Victoria Creek, the Misema River, York Lake, Ava Lake, and Beaverhouse Lake.
- There are 27 monitoring wells in the study area. Sampling and recording of water levels from these wells is completed quarterly.

Geochemistry and Geology

What is a geochemistry and geology baseline study?

Geochemistry is the study of the chemical make-up of the Earth, rocks and minerals, while geology is the study of the Earth's structure and composition, its history and processes. Geochemical and geological characterization studies describe the conditions of a defined study area at and around a project site. This includes the mineral characterization of rocks, sediment and surface water, determination of

the potential for acid rock drainage (ARD) and metal leaching, and description of the area's structural and superficial geology.

Geochemical and geological studies are important for predicting site water quality and possible treatment requirements as well as material management on surface in stockpiles.

How is geochemical and geological information gathered?

Geological information is gathered from government geological surveys as well as specific geological and related investigations of the study area, including aerial photographs, satellite imagery, and from mining exploration activities such as diamond drilling. Geochemical data is obtained from chemical analysis of rock and soil samples gathered in the defined study area, with extensive sampling carried out in the area proposed for mining development.



Geochemistry geology.

What is the current status of the baseline study?

- A geochemistry study was done in 2012 to investigate the potential for metal leaching and acid rock drainage.
- In 2018 an additional study was conducted to further investigate metal leaching and acid rock drainage in link with the proposed advanced exploration program.
- Samples showed that the risk of acid generation and metal leaching was low.
- Additional sampling is ongoing for the proposed mining development for future assessment.

Surface Water and Groundwater Quality

What is a surface water and groundwater quality baseline study?

These studies collect water samples for testing over a period of one to two years to measure the current quality of surface water and groundwater in a defined study area at and around a project site prior to project development. They take into account findings of other baseline studies and include a review of annual trends and seasonal changes in water quality. The water quality data is compared to federal and provincial water quality standards and objectives, such as the Canadian Water Quality Guidelines for the Protection of Aquatic Life, Provincial Water Quality Objectives and Ontario Drinking Water Standards.

How is surface water and groundwater quality information gathered?

Surface water and groundwater samples are collected from lake and rivers stations and wells located



Groundwater sampling.



Surface water sampling.

in the study area. The sampling methods that are used follow widely accepted sampling guidelines. Once the water samples are collected, they are submitted to a certified laboratory for testing to obtain water quality data.

What is the current status of the baseline study?

- Surface water sampling has been conducted at this site from 2018 to present.
- Ongoing surface water sampling in the local area indicates that baseline water quality is consistent with a mineralized area.
- Results were generally below the Ontario Provincial Water Quality Objectives (PWQO) for protection of aquatic life and/or Interim PWQO and is similar to water quality regionally.

Soils

What is a soils baseline study?

Soils studies characterize the soil conditions in a defined study area at and around a project site. Mapping of soil types is complemented by soil depth mapping and the characterization and analysis of the metal content of the soil.

How is soil information gathered?

Most soil mapping is done using publicly available information and previous studies conducted in the area. The resulting maps are checked with a visual evaluation of the area, and pits are used to classify soils. Soil samples are obtained for laboratory analysis (typical chemical parameters and metals), and the results are compared to the Canadian Council of Ministers of the Environment Soil Quality Guidelines for reference.

What is the current status of the baseline study?

- Much of the site is overlain by moderately thick glaciolacustrine soils, including varved silt and clay, as well as thinner till deposits. Sediments found in the lakes were deposited from the glacier.
- Bedrock outcrops are present, particularly along the shores of York, Ava, and Beaverhouse lakes.

Human Environment Baselines

Land and Resource Use

What is a land and resource use baseline study?

Land and resource use baseline studies describe how people use the land and the resources within a defined study area at and around a project site. Examples of land and resource use include hunting, fishing, farming, forestry, plant harvesting, snowmobiling, camping, and boating.

How is land and resource use information gathered?

A review of publicly available information and databases is conducted, including information from government agencies such as the Ontario Ministry of Natural Resources. Additional information is gathered directly from local land users and other stakeholders through interviews or surveys.

What is the current status of the baseline study?

- The study area is used for activities such as forestry, mineral exploration, hunting, trapping, and fishing.
- Land and resource use in the study area is managed by several land use policies for recreation and tourism, timber production, mineral exploration and development and trapping.
- A large portion of the study area is under active mining claims or mining leases.

Archaeology

What is an archaeology baseline study?

An archaeological baseline study is a study undertaken by a licensed archaeologist who identifies material cultural, physical features and sites, that may be of historical or cultural value or interest for Indigenous and non-Indigenous communities and society, in or near a proposed project site.

How is archaeological information gathered?

Previous background studies, property inspections, and archaeological field studies or surveys conducted in the area around the Project site are reviewed. If areas with a high probability that archaeological sites and features are identified, additional fieldwork is conducted using shallow test pits. Full digs of certain areas may be conducted to uncover and further characterize archaeological sites if appropriate.



Archaeological investigation.

What is the current status of the baseline study?

- There have been several archaeological studies conducted in the study area from 2011 to 2020 to identify areas of historical or cultural value in or near the Project area.
- Two sites have been identified as having moderate cultural heritage value or interest, in the studies area.

Visual Aesthetics

What is a visual aesthetics baseline study?

A visual aesthetics baseline study characterizes the existing landscape and view from locations near a proposed project site.



View of the Project from Beaverhouse Lake.

How is visual aesthetics information gathered?

Visual aesthetics information is gathered in the areas where the landscape has the potential to be changed by the Project. These areas are potentially influenced by the height of the Project's components, existing topography and landscape, and the receptor locations. This is done by taking photographs from a variety of locations from where project components may be visible during the various project phases. Photographs from these receptor locations are taken to characterize the landscape.

What is the current status of the baseline study?

- The landscape of the area is typical of Northern Ontario: dense forest, lakes, rivers, streams and ponds.
- Simulations in close proximity to the Project area will be conducted to assess the visual impacts of the Project.

Socio-Economics

What is a socio-economic baseline study?

A Socio-Economic Baseline Study is conducted to understand the current context of a community. This includes understanding the social, economic, health and well-being aspects. From this baseline, we can then consider the ways and extent to which a community could be affected (either positively or negatively) because of the construction and operation of a project.

How is socio-economic information gathered?

Information gathered to develop the baseline is done through two steps: secondary or desktop research and primary research.

Secondary research involves a review of published data using government websites.

Primary research informs gaps identified during secondary research. This information is gathered through a variety of methods such as surveys, key informant interviews and focus groups.

What is the current status of the baseline study?

- The region in the defined study area (Including Dobie, Kirkland Lake, and Larder Lake, as well as First Nations communities near the Project site) has a long history of mining.
- All communities in the study area are accessible by road and have access to a wide range of community services, including education and health care.
- The Town of Kirkland Lake is the administrative and economic center of the north Timiskaming District. The mining industry is the largest employer in Kirkland Lake.
- Kirkland Lake is a historic gold mining town that had a population of 7,981 in 2016. Over the past 35 years, the population has declined by more than one-third from 12,000 in 1986.

Indigenous Knowledge

What is an Indigenous knowledge baseline study?

IK is an important source of knowledge for a project's impact assessment as it provides valuable information that generates a more holistic understanding of the environments and their interconnections, which supports more sustainable decision-making.

IK provided by Indigenous Nations will inform the description of existing conditions (e.g., characterize the study area, natural environment conditions, cultural characteristics, past and current land uses, etc.).

How is Indigenous knowledge information gathered?

IK is gathered from Indigenous Nations, following community-specific protocols and expectations, and woven together with Western science into the impact statement. Inclusion of IK, including validation of how that knowledge is represented and used to reflect the understand-



Overview of Project area.

ing and knowledge of Indigenous Nations and Peoples, offers a holistic approach to assess the potential impacts of the Upper Beaver project.

What is the current status of the baseline study?

- A traditional knowledge study is going to be conducted in the Project area in collaboration with Indigenous Nations close to the project.

Ambient Light

What is an ambient light baseline study?

Ambient light studies are done to determine the existing baseline atmospheric light conditions within the vicinity of the Project to identify the potential light pollution from the Project.

How is ambient light information gathered?

Ambient light measurements are obtained in the field using light meters. Light measurements are taken to represent every season and are taken at night under clear skies with no visible moon.

What is the current status of the baseline study?

The ambient light baseline program will begin in the summer of 2021 with light measurements being taken at 4 locations in the vicinity of the Project.



Light meter.

Biological Environment Baselines

Aquatic Biology

What is an aquatic biology baseline study?

Aquatic biology baseline studies describe and characterize the current biology of water bodies such as lakes and rivers in a defined study area at and around a project site, especially the habitat and populations of fish and benthic invertebrates (insects such as dragonflies and caddisflies). Fish are compared to the species listed under the Committee on the Status of Endangered Wildlife in Canada, the *Species at Risk Act*, or Species at Risk in Ontario, among others.



Minnow traps.

How is aquatic biology information gathered?

Publicly available information and previous studies are reviewed. Sampling is conducted in areas downstream and upstream of the Project site and in a reference area. Standard habitat evaluation procedures, such as visual inspections of water bodies on foot and by boat, are used. Fish communities are assessed with standard collection methods that do not kill or harm the fish (e.g., temporarily shocking fish for catch and release, seine nets, etc.). Some lethal sampling is required to collect fish tissue samples for assessing metals concentrations. Only the minimum amount of lethal fish sampling is done. Sediment samples are collected from the bottom of a lake or river by coring and/or using a grab sampling device. Benthic invertebrates are also collected with a grab sampling device.

What is the current status of the baseline study?

- Aquatic baseline studies have been conducted in the Project area in 2011, in 2018 and in 2020 to establish fish communities and fish habitat. During these studies, no species at risk were identified.
- During these studies, no species at risk were identified. Further investigations are to be conducted to gather more information on streams, lakes, and rivers within the study area that may be impacted by the project.

Vegetation

What is a vegetation baseline study?

Vegetation baseline studies describes the existing conditions of the plants in a defined study area at and around a project site. It includes mapping of the plant cover (habitat map), listing of plant types (species), and identification of habitat with the potential for supporting plant species at risk.

How is vegetation information gathered?

Existing plant information is gathered from databases maintained by the Ontario Ministry of Natural Resources and the Natural Heritage Information Centre and from other publicly available sources. The information is used to determine if there are any biological concerns and to describe the potential occurrence of provincially significant wetlands, areas of natural and scientific interest, wildlife habitat, and listed species occurrences. Other relevant information sources



Typical vegetation at the Upper Beaver Project.

such as the *Species at Risk Act*, the Committee on the Status of Endangered Wildlife in Canada, and the Species at Risk in Ontario list maintained under the provincial *Endangered Species Act* are also consulted. The study area is mapped using aerial photographs and satellite imagery and checked with visits to the study area to identify and collect plants and confirm the accuracy of the mapped information and plant identification.

What is the current status of the baseline study?

- Desktop and field studies have been done at The Upper Beaver Project in 2011 and again in 2018. These studies are ongoing.

Wildlife

What is a wildlife baseline study?

Wildlife baseline studies describe the terrestrial animals found in a defined study area at and around a project site, along with their habitat use, relative abundance and distribution. In the case of the Upper Beaver Project, the baseline study also included additional study areas for a proposed transmission line to the Project site. Species at risk are identified as those designated by the Species at Risk in Ontario list under the provincial *Endangered Species Act (ESA)*, the *Species at Risk Act (SARA)*, and others. Sensitive wildlife habitats, such as wintering areas, are also described.

How is wildlife information gathered?

A review of existing public records, databases and studies specific to the study area is carried out to determine historical wildlife use. Current information is obtained by means of aerial and



Black bear.

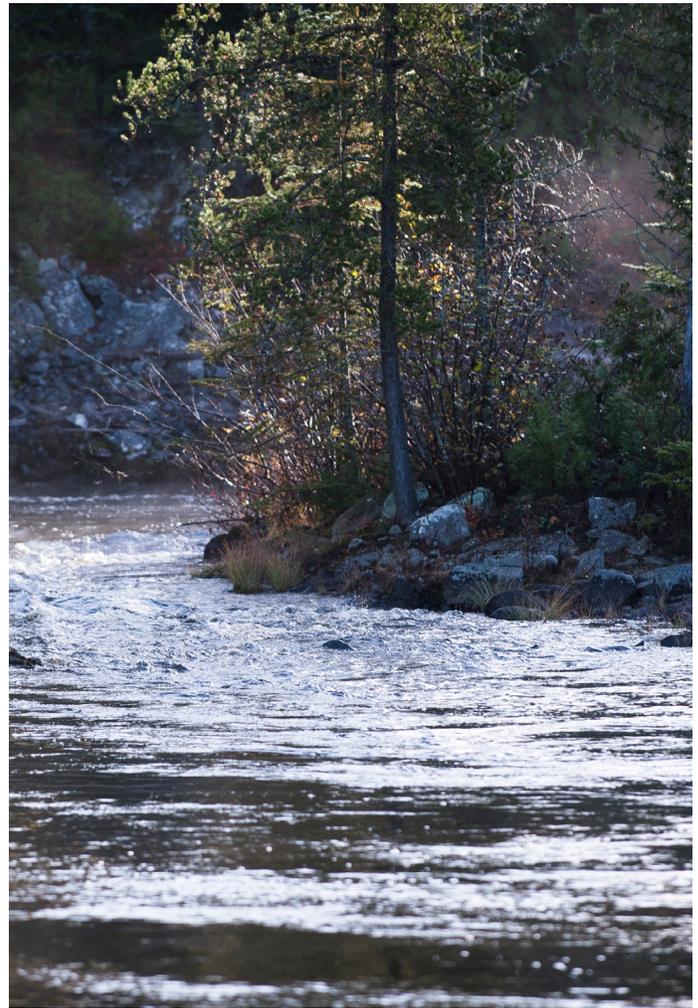
ground surveys using standard surveying methods appropriate to each species class (mammals, birds, reptiles and amphibians) during appropriate seasons.

What is the current status of the baseline study?

- Desktop and field studies were conducted at The Upper Beaver Project 2011 and again in 2018. These studies are ongoing.
- One species at risk, the little brown bat (*Myotis lucifugus*) was identified at The Upper Beaver Project.

Biodiversity and Protected Areas

Biodiversity and protected area baseline studies describe the variety of plant and animal species and the protected and conservation areas established by federal, provincial, and municipal governments near a project site, based on the findings of other biological baseline studies.



Rapids between Ava and York Lake.

How is biodiversity and protected areas information gathered?

Information on biodiversity and protected areas near the Project site is collected primarily from information obtained from publicly available records. Additional information is collected during vegetation, wildlife, and aquatic biology baseline studies.

What is the current status of the baseline study?

- Desktop and field studies were conducted at the Upper Beaver Project in 2011 and again in 2018. These studies are ongoing.



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