

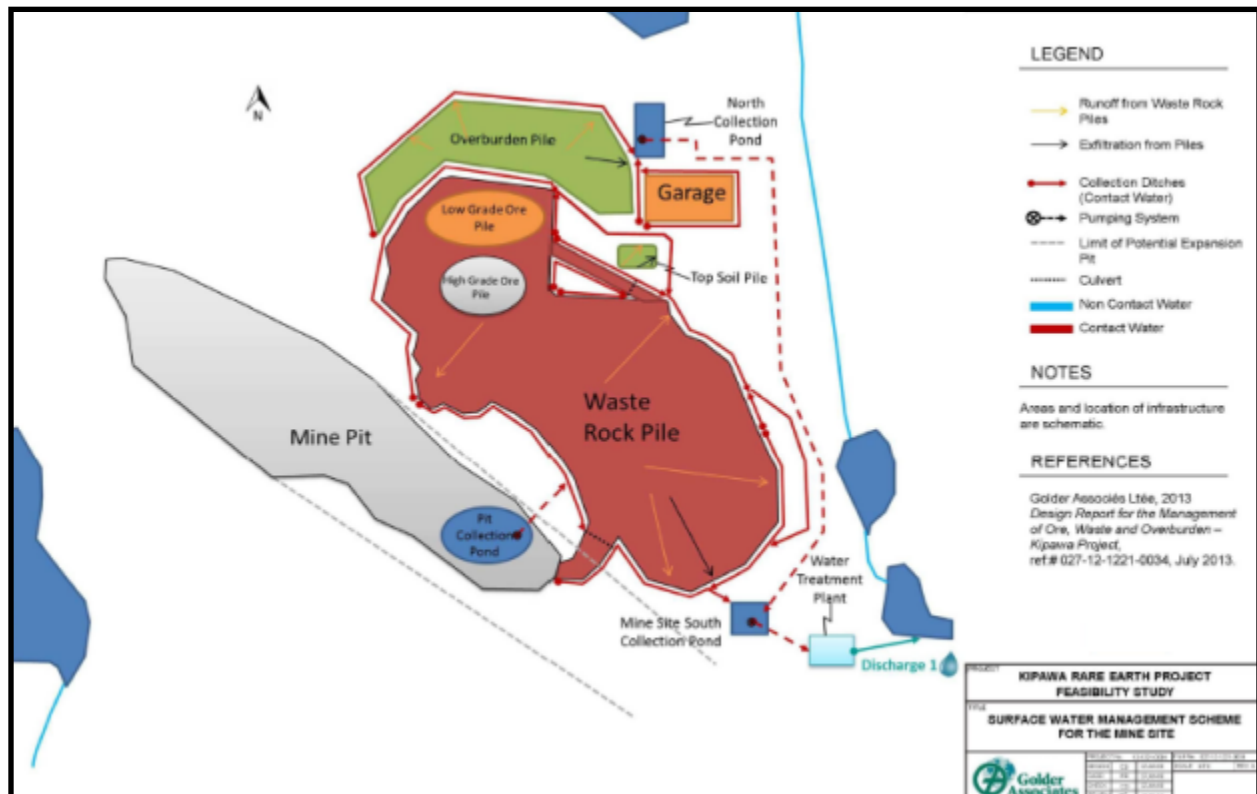
## **Kipawa Rare Earth Project (Original project design by Matamec Explorations Inc.)**

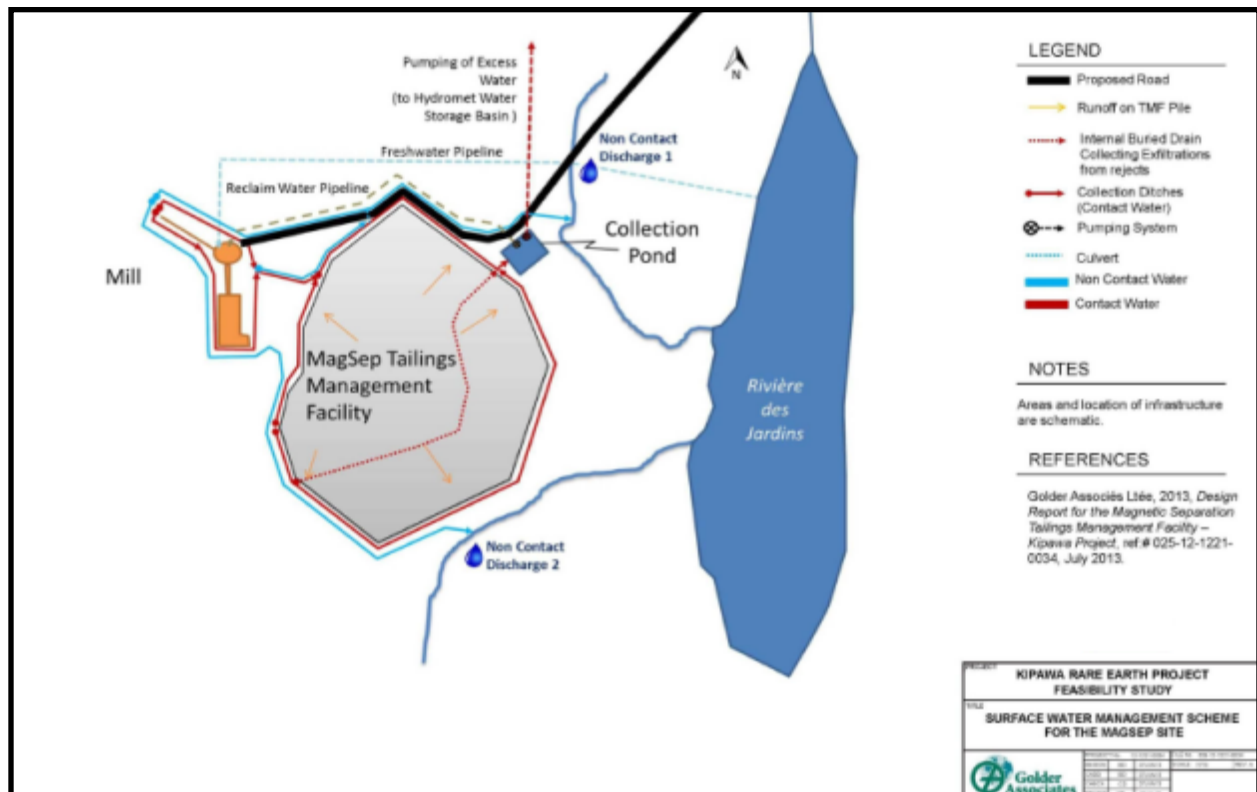
Located 50 km East of Temiscaming

- Within the Kipawa Lake watershed and the Boreal Forest
- Near the upper Kipawa River between Brennan (Sairs) Lake and Sheffield Lake/Desjardins (Garden) River

Mine site will consist of:

- Open pit (1,500 m x 320 m x 110 m) within 600 meters of the Kipawa River
- Waste dump (2 waste rock piles + in-pit waste rock storage)
- Low grade ore stockpile
- High grade ore loading facility
- Mine equipment maintenance facility
- 10.9 km haul road including a 60 meter bridge over the Kipawa River to bring ore to processing plant site
- 2 tailings storage facilities (located 4 km south of processing plant)
- Administrative offices, assay lab and warehouses at processing site





Ores of primary interest include:

- Dysprosium oxide
- Neodymium oxide
- Yttrium oxide
- Terbium oxide
- Total ore tonnage estimated at 19.8 million tonnes
- Matamec will produce 2 mixed rare earth concentrates
- A mixed light rare earth concentrate that will contain Cerium, Lanthanum, Neodymium, Praseodymium
- A mixed heavy rare earth concentrate that will contain Samarium, Europium, Gadolinium, Erbium, Terbium, Dysprosium, Holmium, Ytterbium, Thulium, Lutetium, Yttrium

### **Construction, Production, Processing and Wastes**

- Preproduction year will involve clear-cutting of the vegetation and removal of 1,328,480 tonnes of overburden as well as 130,760 tonnes of top soil.
- Mine will operate 361 days per year.
- Mill feed will operate 365 days per year.
- Mine will feed the mill with 3650 tonnes of ore per day.
- Drilling will occur day and night.
- It is estimated that there will be one production blast per week (this does not include pre-splitting)
- 18.65 Mt of waste rock produced and stored in 2 piles plus a 3rd 'in-pit' waste storage will be used during the last 3 years of the mining operations (year 12-15).
- Processing to be done on site using harsh chemicals including: Sulphuric Acid, Lime or Limestone and Sodium carbonate

- Sulphuric acid used for leaching, limestone or lime for neutralizing and sodium carbonate used for precipitation
- Processing involves grinding and crushing followed by magnetic separation and leaching
- Two tailing streams
  1. MagSep reject – waste rock generated from magnetic separation
  2. Hydromet tailing - produced from the hydrometallurgical processing which involves acid leaching, neutralization, removal of impurities and a final precipitation to produce the rare earth concentrate.
- At end of operations will have 2 piles of dewatered tailings and one waste rock dump

Ore and rock samples were tested:

- Some classified as high risk
- Some leachable for lead, zinc and selenium
- Some waste rock and most of ore samples exceeded NORM (Canadian guidelines for Management of Naturally Occurring Radioactive Materials) criteria.
- Most of the ore and some of the waste rock classified as radioactive

Tailings from magnetic separation found to be leachable for lead, selenium and zinc. They exceed NORM criteria.

Total Wastes Generated:

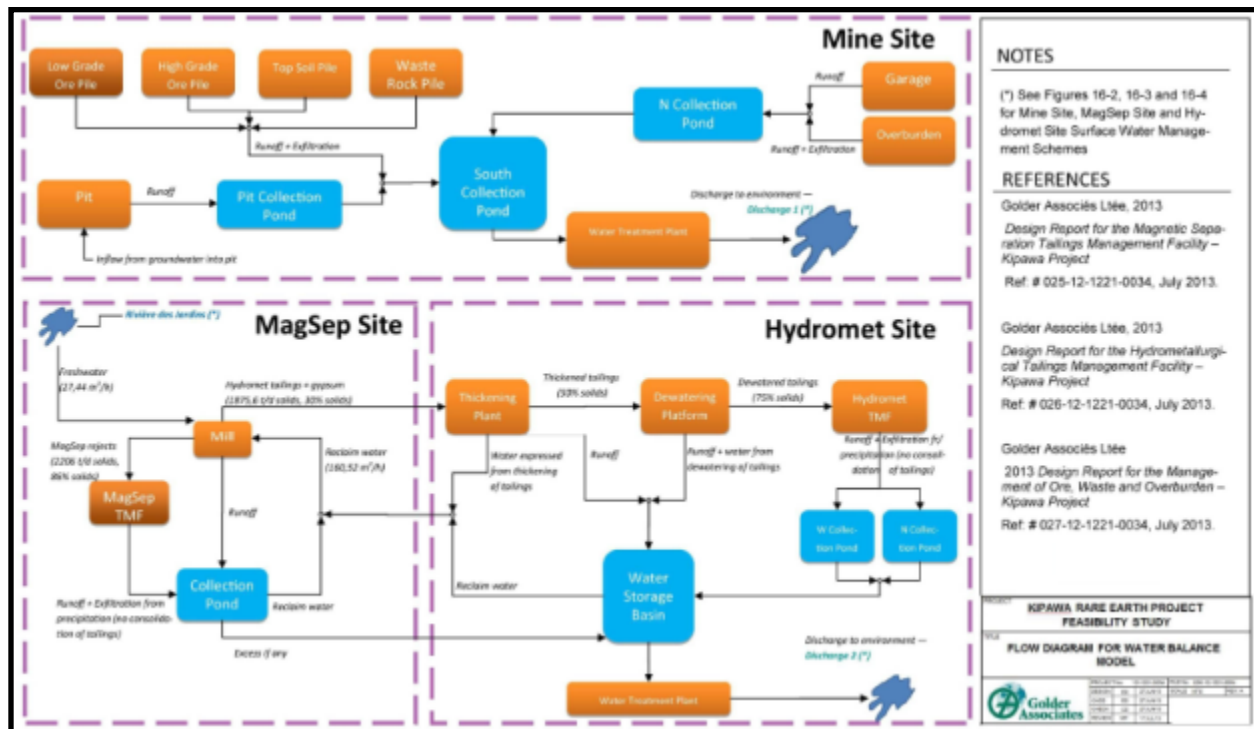
- 18.6 Metric Tonnes (9.3 Mm<sup>3</sup>) waste rock
- 10.9 Metric Tonnes (7.5 Mm<sup>3</sup>) tailings from magnetic separation
- 9.25 Metric Tonnes (6.1 Mm<sup>3</sup>) tailings from chemical processing

### **Hydrology**

- Water use requirements estimated at 190-210 m<sup>3</sup> per hour
- 2 pumping stations Sheffield Lake and Desjardins River.
- Both sites will have a main building and electrical room.
- Flow of groundwater from the open pit is west towards Sheffield Lake
- The open pit will intersect the water table, water flow into the pit is estimated at 200-600 m<sup>3</sup> per day
- Maximum daily pumping from pit has been estimated at 900 m<sup>3</sup> per day.

Two waste water treatment plants

1. Mine site - 3,600 m<sup>3</sup>/day (781,000 m<sup>3</sup> annually)
2. Hydromet site - 3,300 m<sup>3</sup>/day (688,400 m<sup>3</sup> annually)  
Effluent will be released into the environment at these sites  
Additional release may occur at emergency overflow spillways



## Seismic Activity

Seismic activity of the project site is higher than the average for the Province of Quebec. Historic seismic activity for the area includes 16 recorded earthquakes (between 1980 and 2000) of magnitudes of 4 or greater on the Richter scale. An earthquake of 6.2 impacted the region in 1932.

## Potential environmental and social impacts

- Effects on surface water quality and hydrology
  - Higher suspended soils
  - Contamination by effluents and leachate from waste rock, ore piles, magnetic separation and tailings
  - Spills of petroleum products or other chemicals
  - Surface water quality has a direct impact on the ecosystem (fish and waterfowl)
  - Potential for local water contamination by accidental spillage of petroleum products, contaminants or dust
  - Clear-cutting, infrastructure, water intake and effluents can modify hydrology
- Drawdown of groundwater
  - Groundwater inflow into mine pit estimated at a rate of 300 m<sup>3</sup>/day
  - Groundwater quality impacted by accidental spillage, leaching or dissolution of metals
- Soil Quality
  - Accidental spillage could contaminate local soil
- Air Quality
  - Potential for air quality to be impacted by emissions from generators, vehicles, heavy equipment as well as release of contaminants and dust

- Dust may be created during:
  - Vegetation clearing
  - Erosion due to creation of new roads, placement of installations, movement of vehicles, loading and unloading of material, mining, blasting crushing, processing, wind, removal of waste rock and tailings
- Noise and Vibration
  - Noise and vibration created from machinery, vehicles, drilling, blasting and crushing of the ore
- Loss of vegetation and wetlands
  - Vegetation (mixed forest stands) and wetlands lost by clear-cutting and construction of infrastructure, mine site, process plant site, tailings storage and access roads.
- Habitat Loss and Alteration
  - Clear-cutting and infrastructure will reduce habitat available
  - Blasting has potential negative effects on fish health and habitat
    - Blasting can cause damage to internal organs, mortality of fish eggs and disturbance of spawning grounds
  - Loss and modification of fish habitat due to infrastructure and associated changes in hydrology, hydraulics and water quality. Alterations of spawning grounds for Walleye, Lake Trout, Brook Trout due to sedimentation. Fish habitat loss.
- Relocation of seasonal camps and cottages
- Effects on recreational use of area (hunting, fishing, trapping, canoeing)
- Disturbance to archeological sites
  - Two potential archeological sites have been identified near the tailings disposal facilities
- Visual modification to the landscape
- Traffic increases on the Maniwaki Road
  - During construction – 15 trucks per day
  - During operation – 10 trucks per day
  - Additional vehicles for transportation of staff to and from the site
- Potential risk of chemical products being split during transport (from Ontario to Quebec)
- Modifications to biophysical and social environment
  - Workforce and Taxes
  - Estimated taxes to MRC of Temiscaming 399,000 per year (based upon 2013 tax rates) Local population is 3,350, projected employment opportunities 109 non-unionized workforce. Many of these positions require specific skill sets, education or training. If 100% of the opportunities went to local residents this represents 3% of the local population.

## **References**

Roche Ltd., Genivar, Golder and Associates, EHA Engineering, SGS Canada Inc. 2013. Feasibility Study for the Kipawa Project Temiscamingue Area, Quebec, Canada. Prepared for Matamec Explorations Inc.

Golder Associates. 2013. Matamec Kipawa Rare Earth Project Summary Description of a Designed Project.