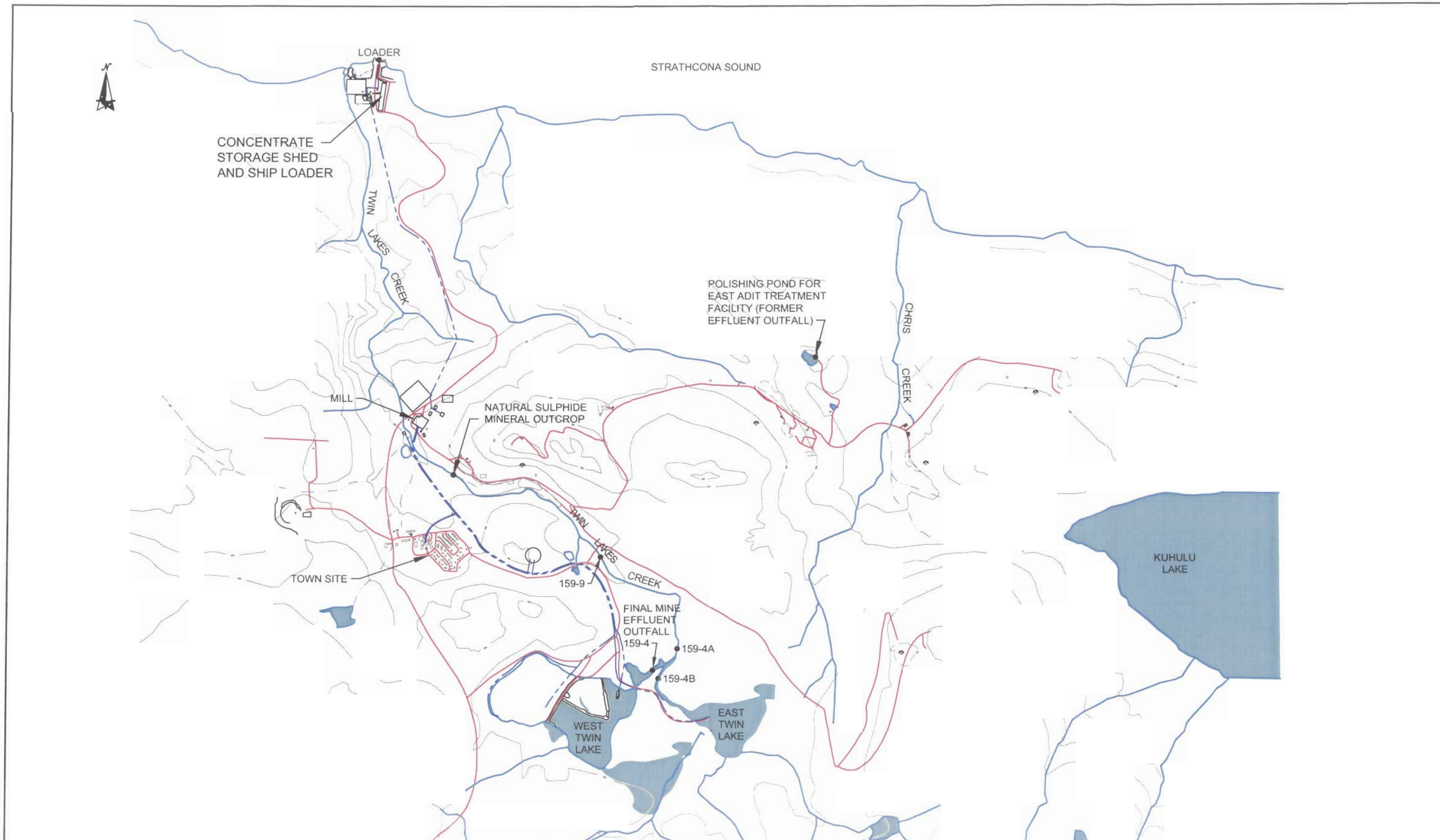

REFERENCE DRAWING FROM GARTNER LEE LIMITED PROJECT # 21-957 FILE NAME: 21957-D3-02.DWG OCT. 1, 2002 CONTOUR INTERVALS 50 m	LOCATIONS OF TERRESTRIAL AND MARINE SAMPLING STATIONS NANISIVIK MINE, JULY 2003	Date: 2004 01 26 Job No.: 15058	Scale: 1 : 30 000 Fig. No.: 2.1	Jacques Whitford Consulting Engineers Environmental Scientists

FILE: SAMPLING

Ore processing at the mill involved dense media separation (installed in 2001) and conventional grinding, flotation and dewatering circuits. Zinc and lead mineral concentrates were produced and hauled in gravel trucks from the mill to the concentrate storage shed, which is located at the dock. Mineral concentrates were loaded onto ocean going ships during the ice-free season. The ship loading conveyor system was originally open, but was enclosed in the early 1980's to minimize losses and blowing of concentrate dust.

Process tailings were pumped approximately 4 km from the mill to the tailings disposal facility, West Twin Disposal Area (WTDA), formerly part of West Twin Lake. The WTDA storage capacity was increased in 1990 with construction of an internal dyke across the lake that created upper and lower storage areas. The upper portion of the lake became a surface tailings deposition area and has been the primary storage area since 1990. With the exception of a raised area that was developed for testing of covers for reclamation of the surface tailings, the lower portion of the lake has remained a subaqueous tailings disposal cell and reservoir for water decanted from the upper area. A large portion of the water in the WTDA was returned to the mill via an overland pump/piping system that was built for the purpose of water reuse in the concentrator. Surplus water was released seasonally through a polishing/retention system. The two WTDA internal dykes were constructed using frozen tailings core construction. The upper storage area dyke has been raised on an incremental basis since 1990 using upstream construction with tailings and shale.

For Nanisivik Mine, there are potentially two effluent discharge points that would be subject to the *MMER*. These are:

- mine effluent discharge from the WTDA into Twin Lakes Creek, also known as station 159-4; and
- the East Adit Treatment Facility.

The polishing pond at WTDA releases water that meets applicable regulations for water quality, although no chemical treatment (such as lime addition) is used. The effluent is released to Twin Lakes Creek via a manually operated control structure (weir). Natural water flows in Twin Lakes Creek are predominantly from East Twin Lake, which has a considerably larger watershed than the West Twin Lake basin. Effluent is normally released from the WTDA only during the months of June, July and August. During the winter months, the entire creek appears to freeze solid, so that there is no flow, natural or otherwise. The effluent control structure is located at the following coordinates (as determined using a hand-held GPS unit in July, 2003):

- 73º 01' 32.249" N, 84º 28' 33.841" W, at elevation approximately 370 m.

At the East Adit, there is a lime treatment pond that collects surface water flows from this area of the mine site. Metals are precipitated by lime in this pond, and the decant is released to a polishing pond.

The polishing pond is contained by a lined berm, and was formerly drained periodically when water levels required. Due to the shut-down of Nanisivik Mine, and mine closure activities that are ongoing, there was no discharge of mine effluent from the East Adit during 2002 or 2003, and it is not expected that there will be any discharge of mine effluent from this location in the future.

- 73º 02' 52.800" N, 84º 26' 13.200" W, at elevation approximately 250 m.

Therefore, the EEM program will focus on the effluent discharged from the WTDA. This would change if there was a need to resume discharge of effluent from the East Adit Treatment Facility at some future time, in which case it is understood that monitoring of effluent quality and water quality would be required at this location, and at a suitable reference area. These potential EEM requirements will be outlined in a "contingency plan" context, in the appropriate sections of this document.

2.2 Climate

Nanisivik is located in a climatic zone classified as "polar desert", which is characterized by cold temperatures and relatively low precipitation. Meteorological data have been collected by Atmospheric Environmental Services (AES) of Environment Canada since 1976 at the Nanisivik Airport (located approximately 10 km southwest of the mine site).

Over the period of record, the maximum daily temperature recorded was 23.0 °C, the minimum daily temperature recorded was -53.0 °C and the mean daily temperature recorded was -14.8 °C. Mean annual precipitation has been recorded at 231 mm, of which approximately 50 mm was in the form of rain. The greatest daily recording of snowfall was 68.4 cm and the greatest daily recording of rainfall was 36 mm. Annual evaporation data at the WTDA has been measured at an average of 187 mm during the period 1993 to 2001 (DIAND meteorological station).

The daily rainfall probable maximum precipitation ("PMP") event is estimated to be approximately 140 mm and the daily snowmelt PMP event is estimated to be 155 mm. The magnitude of these extreme events is low relative to southern Canada (for example, a daily PMP event in Northern Ontario is approximately 500 mm to 700 mm). These low precipitation and snow melt values reflect the characterization of the site as a "Polar Desert".

2.3 Permafrost

Nanisivik is located in the permafrost region of the Canadian Arctic Archipelago where permafrost is characterized as "continuous" (i.e. existing over the landscape as a continuous layer).

The local permafrost conditions have been described as follows:

- permafrost at the northern end of Baffin Island has a potential for high amounts (>20%) of ground ice;
- permafrost at Nanisivik has been found to be deeper than 430 metres in a borehole drilled from the underground workings;
- the subsurface rock temperature was noted to range from -11.7 °C to -9.4 °C in the project feasibility study;
- baseline environmental studies noted that permafrost was encountered in two shallow test pits: at a depth of 25 cm on the north-facing slope of Mt. Fuji and at 60 cm on an exposed dry ridge and that permafrost was not encountered to 85 cm depth in another shallow test pit on an exposed dry ridge; and
- studies related to the reclamation testing covers indicated that on-land deposition of mine wastes leads to rapid permafrost aggradation into the waste material within a one to two winter timeframe.

2.4 Local Geology

The Nanisivik sulphide deposits are hosted in carbonate rocks within a Proterozoic sedimentary sequence. This sequence developed as a Neohelikian intracratonic basin, the Borden Basin, on a peneplaned gneiss complex of Archean-Aphebian age.

The present Borden Basin sequence consists of generally shallow water clastic and carbonate sediments up to 6,100 metres thick, called the Bylot Supergroup. The Supergroup is divided into three Groups, a lower clastic group (the Eqalulik Group), a middle carbonate group (the Uluksan Group) and an upper clastic group (the Nunatsiaq Group).

The Uluksan Group is made up of the lower Society Cliffs Formation and the upper Victor Bay Formation. The Society Cliffs Formation varies in thickness from 260 metres at Arctic Bay to 856 metres at Tremblay Sound. West of Tremblay Sound, it was deposited in a subtidal to intertidal environment. The Society Cliffs Formation is conformably overlain by the Victor Bay Formation, which consists of shales, siltstones, dolostones and coarse carbonate clastics and varies in thickness from 156 metres to 735 metres. The Victor Bay Formation is considered to have acted as a cap rock to mineralization in part of the mine area. All of the economic mineralization at the Nanisivik mine lies within the upper member of the Society Cliffs Formation.

The Nanisivik mine property is up to 7 km wide and up to 15 km long. Rocks outcropping on the property include small exposures of quartzite of the Adams Sound Formation on the southern edge of the lease area. The unit immediately below the Society Cliffs Formation, the Arctic Bay Formation, outcrops in the area but is not exposed on the property. The main units exposed are the Society Cliffs Formation and the overlying Victor Bay Formation, together with Paleozoic sandstones of the Gallery Formation.

In the mine area, dips are usually quite shallow and the main structure is faulting. Major structures that are recognized in the mine include the South Boundary Fault, which marks the southern margin of sulphide mineralization, and the Keystone Graben Fault, which defines the southern margin of the Main Ore Zone horst.

The various massive sulphide deposits contain more than 50 million tonnes of which barren massive pyrite (iron sulphide mineral) bodies occupy most of the area and contain the largest sulphide tonnages. Zones containing sphalerite (zinc sulphide mineral) are present within the massive pyrite bodies, but are confined to a restricted vertical interval. All of the known significant sphalerite deposits are in horsts adjacent to the Keystone Graben. Galena (lead sulphide mineral) mineralization increases in the eastern ore zones.

The South Boundary Zone is wedge-shaped and consists of massive pyrite. The zone is controlled by the South Boundary Fault. The Main Ore Zone is an elongated, sinuous, lenticular body, hosted in carbonate, with a nearly horizontal upper contact. A number of bodies are irregular subvertical veins, while some other bodies underlie gently dipping shale contacts. These variations in structural style occur both in the massive pyrite and in the sphalerite zones.

Each of the sphalerite-rich ore bodies is confined to a restricted vertical interval that varies in thickness and elevation from zone to zone. Flat sulphide contacts cut at low angles across dolostone bedding and sulphides rarely follow the beds.

The Main Zone deposit is about 3 km long. It is oriented east-west, although it is sinuous in plan. The deposit is broadly 'T' shaped, with a flat-topped upper section that is typically about 100 metres wide and 20 metres high. A remarkable feature of this deposit is the constant elevation of the top of the deposit over its entire length. The keel section of the deposit extends to about 80 metres below the upper section. While it is subvertical, no obvious controlling structures have been recognized to date. In places, flat-lying "wings" of sulphides extend out laterally from the keel zone.

Internal structures in the ore zones tend to be complex, and range from massive and banded to chaotic or brecciated. Banding tends to be subhorizontal in both the upper section of the Main Zone and the keel section of the deposit, but it may be parallel to dipping dolostone contacts in some areas. As well, the ore is porous in places and large irregular zones of ice are present in some faces underground.

The accepted geological model is that the Nanisivik deposits are Mississippi-Valley Type. By definition, these are post-depositional, carbonate hosted deposits. Typically, they are coarse-grained and mineralogically simple. They tend to be sphalerite-rich, may be very large and may contain high base metal grades. However, Mississippi-Valley Type deposits include quite diverse deposits, different in shape, grade and mineralogy. This diversity appears to result from source fluid chemistry, rocks through which the fluids pass prior to deposition, source fluid temperature and the nature of the depositional environment.

2.5 Soil

Soil studies were conducted by BC Research Inc. in conjunction with the 1974 vegetation mapping (BC Research 1975a) and reported that virtually no soil formation has occurred in the mine area. The little soil that has developed was found to be located primarily in alluvial plains and meadows where eroded and wind blown material have settled.

Soil moisture varied widely between the various types of ground cover. Soil in the meadow area was wet with a water table near surface. Soil in the mid slope and moss-lichen areas was moist but no free water was observed. Soil in the dry ridge area was generally dry at surface although some isolated moist areas were also observed.

Soil texture was observed to vary widely based, primarily, on the underlying bedrock. Dolomitic rock was observed to produce a relatively small amount of fine material whereas shale was observed to produce abundant fine material. Sample sites were also noted as often having an unweathered surface "capping" overlying finer material.

Naturally occurring sulphide mineralization at surface is well documented throughout the mine area. Surficial soils in the area can be stained red due to oxidation. An extensive survey of metal concentrations in surficial soils throughout the mine area was conducted as part of mineral exploration activities in 1985. Samples were analysed for zinc, lead and copper at the on-site laboratory using a detection limit of 20 ppm. These data document the range of metal concentrations that were present in surface soils in areas peripheral to mining actives as well as across some of the mineralized zones. Prior to this 1985 survey, tailings were deposited underwater in West Twin Lake so that the dispersion of wind blown tailings (which commenced around 1991) did not affect the results. In addition, the East Open Pit, K-Baseline and Oceanview mining areas were undeveloped at the time of the 1985 soil survey mining.

Background soil metal concentrations at the Nanisivik site typically exceed CCME (1999) guidelines for lead, zinc or copper. Background lead concentrations in 1984 ranged from <20 to 12,154 mg/kg, with an average concentration of 227 mg/kg. Zinc concentrations ranged from <20 to 3,383 mg/kg, with an average concentration of 314 mg/kg and copper concentrations ranged from <20 to 453 mg/kg with an average concentration of 64 mg/kg. The generic CCME Commercial guidelines are 260 mg/kg, 360 mg/kg and 91 mg/kg for lead, zinc and copper, respectively. The Parkland soil quality guidelines are 140 mg/kg, 200 mg/kg and 63 mg/kg for lead, zinc and copper, respectively.

The area immediately northeast of the town of Nanisivik, from the fresh water supply tank to Twin Lakes Creek, is of particular relevance to the determination of natural metal concentrations in surface soils, and in the aquatic environment, because it is an area of naturally occurring mineralized soil. Eleven soil samples reported in the 1984 dataset were collected in this area. These samples contained metal concentrations that were, on average, greater than the CCME (1999) guidelines, and correlate with the mapping of natural exposures of a weathered and highly mineralized (gossan) zone on surface. Lead concentrations in these samples ranged from 48 to 2,296 mg/kg, with an average concentration of 662 mg/kg. Zinc concentrations ranged from 93 to 1,404 mg/kg, with an average concentration of 825 mg/kg. These observations will be linked in later sections of this report to the mineralized outcrop that is exposed in the banks and bed of Twin Lakes Creek, and to total metal loadings to Twin Lakes Creek.

2.6 Topography

The mine area consists of a few intermittent planar areas predominately surrounded by relatively steep high-relief hills rising out of Strathcona Sound.

The surface topography is moderately steep rising from sea level to a local high of 650 metres immediately west of the mine area ("Mt. Fuji"). The approximate elevations of several areas around the minesite are listed in Table 2.1 and shown in Figure 2.1.

Table 2.1 Approximate Elevations of Mine Facilities

Location	Approximate Elevation (m)
Industrial Complex	260
Town site	325
Freshwater storage tank	375
lower portion of WTDA (West Twin Lake)	370
Freshwater supply (East Twin lake)	372
01 Portal (main entrance to underground mine)	300
Oceanview Open Pit	260
Area14 mining area	450
Landfill/STOL air strip	360
Tank Farm	25

2.7 Terrestrial Environment

2.7.1 Vegetation

A 1974 baseline environmental study completed by BC Research Inc. (BC Research, 1975a) describes the terrestrial environment in the mine area. This included (among other topics) vegetation/ground cover mapping. Approximately 96% of the mine area was classified as "dry ridge" characterized by low productivity, sparse cover and low wildlife utilization. The generally sparse and rocky ground cover was found to be interspersed with small areas of denser vegetation coverage typically in small isolated areas where moisture was retained in surface soils.

The 1974 study of vegetation in the mine area included study sites selected to be representative of the range of plant communities in the area. Quadrats measuring 0.5 x 2.0 metres were studied for elevation, aspect, percentage and types of ground cover and identification of vegetation species. The plant community in the mine area was found to be predominantly made up of the following species:

- *Salix arctica* (Arctic willow);
- *Dryas integrifolia* (Arctic or mountain avens);
- *Carex rupestris* (sedge);
- *Ploygonum viviparum* (alpine bistort);
- *Saxifraga oppositifolia* (purple saxifrage);
- *Eriphorum* (cottongrass); as well as
- mosses (several species), lichens (several species), bryophytes and other vascular plant species.

The ground surveys resulted in the definition of five classes of land areas based on vegetation density and species (Table 2.2).

Table 2.2 Ground Cover Classifications

Land Classification	Percentage of Study Area
Dry Ridge	96.5%
Alluvial	1.9%
Meadow	0.9%
Mid Slope	0.4%
Moss-Lichen	0.3%

The dry ridge ground cover dominates the mine area (96.5%). This type of ground cover was characterized by sparse vegetation consisting of only a few species such as Arctic willow, avens and purple saxifrage. The ground surface commonly showed evidence of frost heaving and rock polygons. The areas mapped as dry ridge can contain small isolated pockets of denser and more varied vegetation where finer soils or other factors are present, which allow surface moisture retention.

The alluvial ground cover was found on sloping topography and was characterized as containing approximately 34% ground cover comprised primarily of Arctic willow and avens. These areas were observed to appear "streaked" on air photos due to the linear distribution of vegetation.

The meadow ground cover was found in flat areas or surface depressions where finer soils could accumulate and retain moisture. These areas were characterized as containing the densest vegetation cover observed (average 65%) comprised primarily of vascular species but no lichens.

The mid slope ground cover was identified as drier than alluvial but not as barren as dry ridge. The mid slope areas were characterized by low density of ground cover (average 10%) with the vegetation occurring in clumps separated by bare ground. Four species of vascular plants and moss were identified in these areas.

The moss-lichen ground cover was identified only on the north slope of Mt. Fuji, west of the townsite. This area was characterized by dense coverage comprised primarily of moss. Five species of lichen and five species of vascular plants were also identified in this area.

Observations collected by JWEL during 2003 (JWEL 2003a) indicate that the terrestrial habitat present at the site is essentially unchanged since it was described by BC Research (1975a).

2.7.2 Wildlife

A quantitative evaluation of mammals in the mine area was attempted by BC Research (1975a) as part of the baseline environmental studies that were conducted in 1974. However, the mammal density was determined to be too low to allow an evaluation. Small mammal traps were set near the (future) townsite and near the airport in late July 1974 but no animals were caught. Nonetheless, signs of four mammal species were observed: lemming, Arctic fox, Arctic hare and caribou.

Lemming signs consisted of small mammal runways, straw piles (winter shelters) and droppings. These were observed in the Meadow, Moss-Lichen and Dry Ridge areas. Two Arctic fox scats were observed. Arctic hare pellets were observed in one location. Caribou were not seen in the study area but past presence was indicated by "very old" antlers located near the airport. One resident of Arctic Bay (Isaac Attagutsiak) was reported to have indicated that he had not seen caribou in the area since 1948.

Anecdotal evidence collected during mine operations indicates that Polar Bears have occasionally passed through the mine area en-route to feeding locations (in the order of once per 5-6 years). The bears did not stop in the mine area or make attempts to hunt or feed in the mine area.

Observations of bird life were also made by BC Research (1975a). Eight species of birds were observed in the mine area, including Snow Bunting, Ptarmigan, Baird's Sandpiper, Snow Goose, Eider Duck, Semipalmated Plover, Jaeger and Raven. The Borden Peninsula was reported as having been previously identified as an important breeding area for some migratory species including Ptarmigan, Baird's Sandpiper and Snow Goose.

The Snow Bunting was the most common species observed with 22 birds seen. The mine area was observed to include most of the typical types of habitat used by Snow Bunting including coastal areas, rough stony terrain and mossy areas.

Snow Geese were observed in 1973 (by mine personnel) and in 1974 (BC Research) using Kuhulu Lake and some Meadow areas. Droppings were generally observed in the Meadow areas. Seven eider ducks were observed in July 1974 on the Twin Lakes and a total of 60 were seen during aerial census flights of seabird colonies. Ptarmigan droppings were observed in two locations in the study area. One pair of Semipalmated Plovers was observed in July 1974 on an alluvial fan west of the Twin Lakes. One pair and one individual Baird's Sandpiper were observed in Meadow and Dry Ridge areas. One observation of Long-tailed Jaeger flying over Strathcona Sound was recorded in July 1974. Four ravens were seen during the 1974 terrestrial studies. Raven was the only species observed in the mine area that was classified by BC Research (1975a) as non-migratory.

2.8 Aquatic Environment

The primary surface drainage in the mine area is Twin Lakes Creek, and its tributaries, which drain the East and West Twin Lakes, Townsite and West Adit areas into Strathcona Sound. The other significant drainage pathway on the mining property is Chris Creek.

2.8.1 Twin Lakes Creek

Twin Lakes Creek originates at East Twin Lake (having been diverted to separate it from West Twin Lake), and flows a distance of approximately 7.3 km from its origin to the marine waters of Strathcona Sound. East Twin Lake is one of two lakes (the other being West Twin Lake) that contribute to the flow of water in the creek. West Twin Lake has been used for the disposal of tailings from the Nanisivik mine since operations began in 1976. The mine is presently undergoing decommissioning. Water from the tailings area, which meets federal mine effluent quality regulations, passes through a final settling pond and discharge weir before entering Twin Lakes Creek. There is no active effluent treatment system (such as precipitation with lime) at this location.

Twin Lakes Creek was described by BC Research (1975a) as being the largest watercourse in the region of the mine development. Twin Lakes Creek is naturally fishless, as are East Twin and West Twin lakes. The creek has an average gradient of 5% (BC Research 1975a), and there are several significant cascades and waterfalls along its length, which prevent access by fish.

The stream flowing out of East Twin Lake (see Photographs 1 and 2) was diverted when the mine started operations, so that flows from the tailings area and West Twin Lake could be regulated, measured and monitored at a discharge weir. The substrate and habitat in this area are generally similar to those in lower portions of the creek (i.e., the mixing zone within 600 m downstream from the point of effluent discharge). Stream substrate is dominated by small boulder and cobble-sided rocks, grading down to pebbles. Almost no fines are present, and there is no aquatic vegetation present. In steeper areas, there is much exposed bedrock and several significant waterfalls occur along the length of the creek (see Photographs 3, 4 and 5). Stream bank habitat is primarily bedrock and rubble. In low-lying areas near the head of the stream there is some grassy meadow habitat, but this is the exception, not the rule. There is no tree or shrub cover at Nanisivik, so the stream is not shaded in any way, except in areas where the stream banks are steep enough to partially shade the stream at some times of the day.

Photo 1 Stream bed substrate at site ETL, upstream from the point of mine effluent discharge.

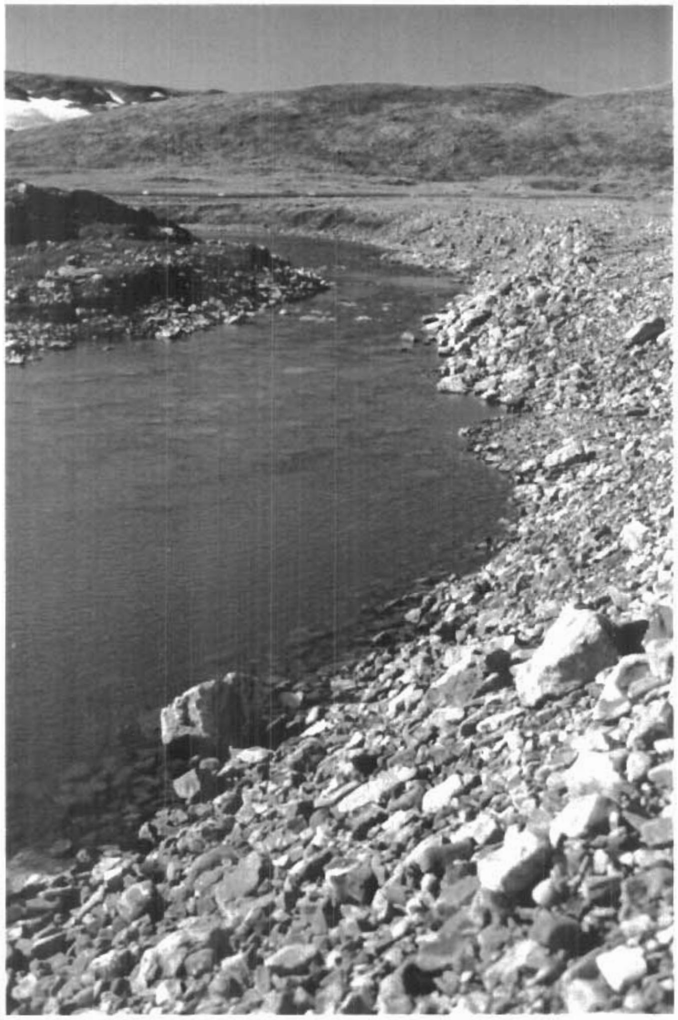

Photo 2 View upstream from site ETL, towards East Twin Lake.

Photo 3 View of a typical riffle section of Twin Lakes Creek, several hundred metres downstream from the effluent discharge weir.

Photo 4 View of a small cascade (about 1.5 m drop) about 400 m downstream from the effluent discharge weir.

Photo 5 A 10 m waterfall located approximately 600 m downstream from the point of effluent discharge in Twin Lakes Creek.

The release of decant water (mine effluent) from West Twin Lake is manually controlled at a weir (see Photographs 6 and 7) according to the mine operating plan for maintaining water cover over tailings in the Reservoir. Discharge from East Twin Lake is natural, except to the extent that a relatively small volume of water is extracted from the lake for freshwater use in the town and the mill (prior to mine closure).

Twin Lakes Creek flows directly below the West Adit area, which includes three portals, two waste rock piles (the 02 South and 09 South waste rock dumps), the West Open Pit, exposed natural highly mineralized outcrops northeast of the Townsite (see Photograph 8), and the industrial complex (mill) site. Twin Lakes Creek enters Strathcona Sound west of the dock.

Photo 6 The effluent discharge weir from the West Twin Lakes tailings area.

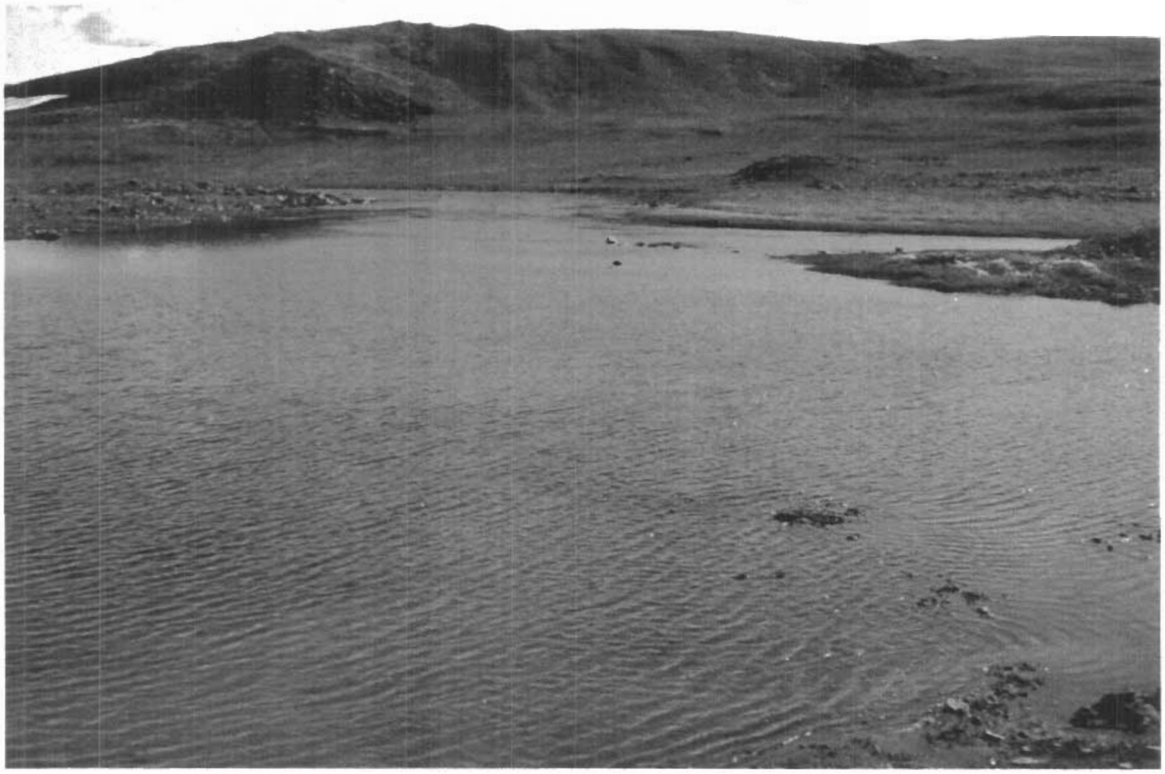

Photo 7 View downstream from the effluent discharge weir. The flow from East Twin Lake enters at the far right, and the combined flows leave directly away from the viewer, turning to the left in the distance.

Photo 8 View of Twin Lakes Creek as it passes by the natural sulfide mineral zone near the mine, about 3 km downstream from the point of effluent discharge.

Water quality in Twin Lakes Creek is modified by runoff from the areas listed above and receives a seasonally-varying load of heavy metals. The potential sources of metals in Twin Lakes Creek have been extensively investigated by Nanisivik Mine (Nanisivik Mine Limited, 1995, 1999, 2000) and are considered to include both naturally occurring exposures of sulphides and mine activities. Trends in metal concentrations in Twin Lakes Creek that have been identified from the metal loading studies are as follows (Nanisivik Mine Limited, 2000).

- In June during the initial thawing and initial runoff, most of the zinc loading occurs from the two waste rock dumps located near the mine entrance, which are being actively reclaimed.
- Zinc concentrations decline in July, once flow in the creek has stabilized. Some zinc is still contributed from the area of industrial operations, but contributions from the waste rock piles decrease greatly.
- During the later part of August and the early part of September, when ground thaw is at its maximum depth, the bulk of zinc loading originates from the natural sulfide outcrop located within the creek.
- Lead and cadmium concentrations can show similar trends to the zinc results, but the concentrations are much lower.
- Zinc loadings are correlated with, but lag a few days behind, periods of heavy precipitation.

2.8.2 East Adit Treatment Facility

The East Adit Treatment facility consists of a lime treatment pond, and a polishing pond. Effluent from the polishing pond was formerly discharged into an unnamed watercourse, which drains into Strathcona Sound. This unnamed watercourse is an intermittent stream which flows in a rocky gully. Seepage from the surrounding hillsides and other gullies join this flow on the way to the Sound. There is no fish habitat present, although standing water appears to be present in several pools within a few hundred metres of the effluent discharge point.

As was noted above, there was no discharge from the East Adit treatment system in 2002 or 2003. Due to mine reclamation activities, it is unlikely that there will be any discharge from this potential effluent discharge point in future. During periods of discharge, the flow from the East Adit area is visible at the ground surface only part of the time. Over much of the discharge flow path, the flow is subterranean, in the coarse rocky substrate. As flow moves downgradient, it is joined by flow from other areas, and eventually enters Strathcona Sound.

2.8.3 Effluent Plume Delineation in Twin Lakes Creek

The mine effluent plume in Twin Lakes Creek was delineated using thermal and conductivity techniques in July, 2003 (JWEL, 2003b). Information regarding the plume delineation is provided below.

Effluent discharged into Twin Lakes Creek forms a plume that initially hugs the left bank, and gradually mixes across the full width of the stream. A plume delineation study carried out on the evening of July 11, 2003, found that the effluent discharge was both warmer (13.7ºC) and had higher specific conductance (740 µs/cm) than the water in Twin Lakes Creek (temperature 6.3ºC, specific conductance 30.1 µS/cm). It was determined that both of these parameters were potentially useful tracers of the mixing of the effluent in the stream channel.

Based on conductivity measurements obtained from the plume delineation study (JWEL, 2003b and Figure 2.2), at a distance of 100 m downstream, the effluent concentration ranged from 76.5% at a distance of 1 m from the left bank, to 0% effluent at a distance of 1 m from the right bank. At 255 m downstream, the effluent concentration ranged from 25.6% effluent near the left bank, to 1% effluent near the right bank. By 400 m downstream, the effluent concentration ranged from 15.2% near the left bank, to 11.5% near the right bank. Finally, after plunging over a 10 m waterfall (see Photo 5) approximately 600 m downstream of the effluent discharge point, the effluent concentration stabilized at 13.8% effluent across the full width of the creek.