# *Appendix 6.2-A*

*Baseline Report – Geology, Landforms and Soils*

AJAX PROJECT

**Environmental Assessment Certificate Application / Environmental Impact Statement for a Comprehensive Study**

KGHM AJAX MINING INC.
AJAX PROJECT



# BASELINE REPORT – GEOLOGY, LANDFORMS AND SOILS

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# KGHM AJAX MINING LTD.
# AJAX PROJECT

## BASELINE REPORT - GEOLOGY, LANDFORMS AND SOILS
## VA101-246/34-1

| Rev | Description | Date |
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## EXECUTIVE SUMMARY

This report describes the baseline geology, landforms, and soils conditions at the site of the Ajax Project, a proposed Open Pit copper-gold mine being developed by KGHM Ajax Mining Inc. (KAM) approximately 3 km southwest of Kamloops in south-central British Columbia. The key Project facilities include the Tailings Storage Facility (TSF), the South Mine Rock Storage Facility (SMRSF), East Mine Rock Storage Facility (EMRSF), West Mine Rock Storage Facility (WMRSF), In-Pit Mine Rock Storage Facility (IPMRSF), Plant Site, Water Supply Pipeline and transmission Line.

Knight Piésold Ltd. completed Reconnaissance Terrain and Terrain Stability Mapping to define the surficial geology and glacial landforms for the Ajax Project and to analyze the stability of the terrain. The Local Study Area (LSA) is divided into the Mine Site Study Area and the Transmission Line and Water Supply Pipeline Study Areas. Information on the regional seismicity, bedrock geology, stratigraphy and faults was compiled from previous reports.

This report includes descriptions of the geology and baseline terrain stability of the Aberdeen Hills area in the south part of Kamloops. The Aberdeen Hills are outside the LSA but are included because the area has a documented history of terrain instability that dates back to before the area was developed.

### Regional Geology

The Study Areas are situated within central British Columbia, where the level of recorded historical seismic activity is low. The bedrock geology consists of volcanics, volcanoclastics, and picrite of the Nicola Group Volcanics. The northwest trending, 34 km long, Iron Mask Batholith is intruded into the Nicola Group Volcanics. Several mineral deposits are associated with this intrusion including Ajax, Afton, Crescent, and Pothook.

The youngest identified bedrock in the vicinity of the Study Areas belongs to the Kamloops Group, and occurs in the Aberdeen Hills area. The Kamloops Group and the picrite unit of the Nicola Group are weaker rocks, particularly when altered, and are historically prone to landslides. The Kamloops Group bedrock occurs outside the LSA in the Aberdeen Hills subdivision of Kamloops.

The picrite unit has been associated with landslides in the Afton Pit at the west margin of the Water Supply Pipeline Study Area. This unit is expected to be encountered at depth within the Ajax Project Open Pit, and its presence is to be accounted for in the design of the Open Pit.

The major faults within the Nicola Group Volcanics and the Iron Mask Batholith include the Cherry Creek Tectonic Zone (CCTZ), the Edith Lake Fault Zone (ELFZ) and the East Pit Fault. These faults follow a regional northwest - southeast trend. Other faults are related to the contacts between individual geological units, such as the contacts between the Iron Mask Batholith, the Nicola Volcanic Group, and the Kamloops Group.

### Terrain Characterization

There are three mapping Study Areas for the Terrain and Terrain Stability Mapping: (1) the Water Supply Pipeline Study Area, (2) the Mine Site Study Area and (3), and the Transmission Line Study Area. The Mine Site Study Area encompass the full extent of the catchment areas upslope from the sites of the proposed mine footprint. The Water Supply Pipeline Study Area comprises an approximately 1 km-wide corridor along the proposed water supply pipeline alignment. The

Transmission Line Study Area mapping was undertaken within an approximately 1 km-wide corridor along the proposed transmission line alignment.

The Study Areas lie within the Thompson Plateau, a subdivision of the Interior Plateau Physiographic Region. The elevation of the Study Areas varies between approximately 850 and 1,100 m above sea level. Slope angles are generally gentle; moderately-steep and steep slopes occur locally and are generally associated with drumlinized terrain and incised watercourses.

Terrain Mapping was used to categorize, describe, and delineate surficial materials, landforms and geological processes. Reconnaissance Terrain Mapping was completed through aerial photograph interpretation, geomorphic interpretation of the a Digital Elevation Model (DEM) generated from the LiDAR Survey data and site reconnaissance.

The Study Areas are characterized by glacial landforms and Terrain Mapping confirmed glacial till to be the predominant surficial geology unit. The landforms in areas of glacial till comprise drumlins and flutings, both of which have a northwest-southeast orientation. Drumlins and flutings were mapped at the sites of the proposed Open Pit, TSF, SMRSF, WMRSF and EMRSF. The streamlined drumlin landforms are indicative of the presence of dense lodgement till, and it is interpreted that lodgment till is much more widespread in the Study Areas than ablation till.

Several landforms that are indicative of the presence of ice-contact glaciofluvial deposits were identified in the vicinity of Peterson Creek and Humphrey Creek and in areas to the south and west of Goose Lake. These include kame complexes, kame terraces, terraced kame delta deposits, and minor eskers. Glacial lake deposits were mapped in the Water Supply Pipeline Study Area. Paraglacial eolian sediments (loess) with a northwest-southeast orientation were identified, locally, in particular in the northwest part of the footprint of the proposed TSF. Colluvium, recent lake deposits and organic swamps were mapped, locally. Fluvial deposits were mapped in the active channel of Peterson Creek and the flood plain adjacent to the creek. Anthropogenic areas originating from historic mining were mapped in the northern part of the Mine Site Study Area.

Two recent natural terrain landslides were identified in the Study Areas, one in glacial fluvial deposits near the southeast margin of the proposed EMRSF and the other in an area of eolian deposits in the east part of the Mine Site Study Area. No landslides were identified on the roadside cut and fill slopes within the Study Areas. Regionally, the Aberdeen Hills area, located approximately 3 km northeast from the site of the proposed Open Pit, is identified as having a history of terrain instability that pre-dates subdivision development. The risk of snow avalanches within the study areas is anticipated to be low as the moderately steep and steep slopes are relatively short.

**Terrain Stability and Erosion Potential**

Terrain Stability Mapping was used to describe the predicted response of the terrain to timber harvesting/vegetation stripping at proposed sites for infrastructure development. The Terrain Stability Mapping indicates the majority of the Study Areas are ‘stable’, having a ‘negligible’ to ‘low’ likelihood of landslides in relation to mine construction disturbance. No areas of ‘unstable’ terrain were identified at the proposed mine facility sites. There are generally only small, isolated areas of ‘potentially unstable’ terrain within the footprints of the proposed mine facilities. No areas of ‘potentially unstable’ natural terrain were identified along the route of the Water Supply Pipeline. The Transmission Line alignment crosses local areas of ‘potentially unstable’ terrain comprising the incised side slopes of Peterson Creek.

The Terrain Mapping did not identify any existing widespread areas of sheet erosion within the Study Areas. Gully erosion was observed in cut slopes in glacial till, particularly in the west part of the Mine Site Study Area. Gully erosion was also identified on moderately inclined natural slopes in areas of drumlinized terrain. Silt-rich, glacial lake deposits, paraglacial eolian sediments and recent lake deposits were identified locally at several proposed mine site facility sites. Organic soils, comprising peat, were also mapped locally. These soils are expected to be particularly prone to erosion during the construction phase of the Project, once the surface vegetation is stripped. The enhanced erosion potential of these soils will be accounted for in the *Erosion and Sediment Control Plan*.

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## ABBREVIATIONS

| | |
|---|---|
| the Project | Ajax Project |
| KAM | KGHM Ajax Mining Inc. |
| API | Air Photo Interpretation |
| BC | British Columbia |
| BGC | Bruce Geotechnical Consultants |
| CCTZ | Cherry Creek Tectonic Zone |
| DEM | Digital Elevation Model |
| ELFZ | Edith Lake Fault Zone |
| EMRSF | East Mine Rock Storage Facility |
| FoS | Factor of Safety |
| GIS | Geographic Information System |
| IPMRSF | In-Pit Mine Rock Storage Facility |
| KP | Knight Piésold Ltd. |
| LiDAR | Light Detection and Ranging |
| M | Magnitude |
| masl | Meters Above Sea Level |
| MOF | Ministry of Forestry |
| MRSF | Mine Rock Storage Facility |
| P | Potentially unstable |
| RTSM | Reconnaissance Terrain Stability Map |
| S | Stable |
| SMRSF | South Mine Rock Storage Facility |
| SSN | Stk'emlupsemc te Secwepemc Nation |
| TSF | Tailings Storage Facility |
| U | Unstable |
| WMRSF | West Mine Rock Storage Facility |
| WP | Waypoint |

# 1 – INTRODUCTION

## 1.1 PROJECT DESCRIPTION

KGHM Ajax Mining Inc. proposes to develop the Ajax Project (Project), an open pit copper-gold mine at the historic Afton Mining Camp, south of the City of Kamloops, British Columbia (BC). The Project is located in the South-Central Interior of British Columbia, southeast of the junction of the Trans-Canada Highway No. 1 and the Coquihalla Highway (No. 5), within the Thompson Nicola Regional District.

The Project lies in the traditional territory of the Secwepemc Nation. Within the Secwepemc Nation, the Tk'emlúps te Secwepemc and the Skeetchestn Indian Band are the Aboriginal groups in closest proximity to the Project. In a cooperative effort, the Tk'emlúps te Secwepemc and Skeetchestn Indian Bands have formed the Stk'emlupsemc te Secwepemc Nation (SSN), as a division of the greater Secwepemc Nation. The Ashcroft Indian Band and Lower Nicola Indian Band, whose members are part of the Nlaka'pamux Nation also assert their Aboriginal rights to the Project area-an area of common interest with the SSN.

The Ajax property includes two historic pits: the Ajax West Pit, and the Ajax East Pit. Both pits were formerly mined in the 1980's and 1990's. As many as 25 rock types have been recognized in the Project area, some of which are "hybrid" units resulting from the intermixing of multiple rock types.

Key Project facilities include the Tailings Storage Facility (TSF), which is planned as a conventional tailings storage facility; water management ponds; Peterson Creek diversion, and the Tailings Embankments, which will be constructed using mine rock; and four mine rock storage facilities (MRSFs). The four MRSFs include:

- South Mine Rock Storage Facility (SMRSF)
- East Mine Rock Storage Facility (EMRSF)
- West Mine Rock Storage Facility (WMRSF), and
- In-Pit Mine Rock Storage Facility (IPMRSF).

Several facilities that will be part of the operation phase but not remain after project closure include:

- plant facilities and administration buildings
- reclamation stockpiles
- explosives facility
- truck stop and fuel storage
- water supply pipeline
- power lines, and
- access roads.

The mine plan for the Project predicts an operation based on a mill throughput of 65,000 tonnes of ore per day from the Ajax Pit with up to a 23 year mine life. The construction phase of the Project will be approximately two and a half years, and following the 23 year operation the decommissioning and closure phase is expected to take up to 5 years. Over the mine life the Project will produce approximately 140 million pounds of copper and 130,000 ounces of gold annually with the concentrate shipped by truck to the Port of Vancouver. The General Arrangement for the Project is shown on Figure 1.1.

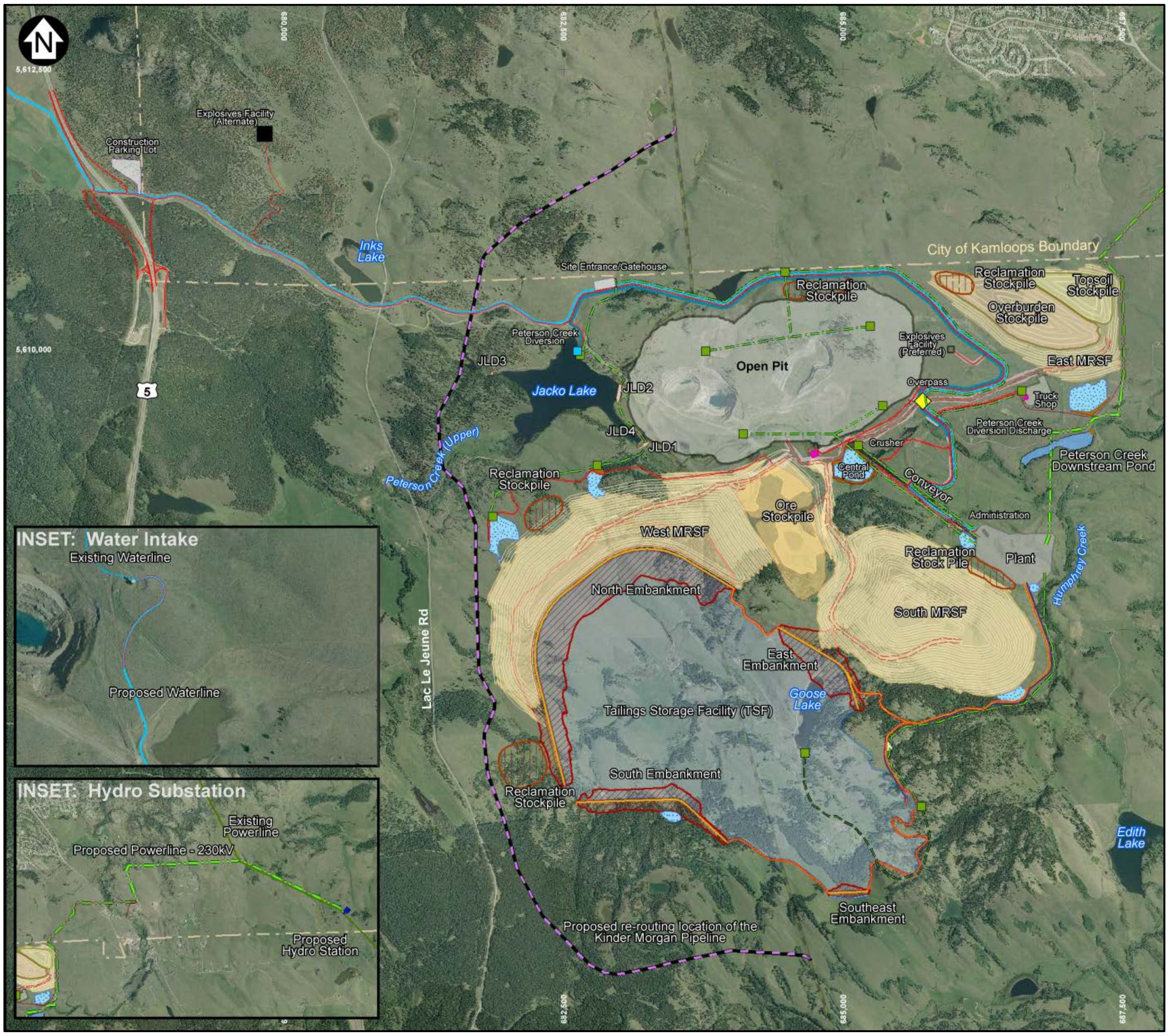



**Figure 1.1 Ajax Project - General Arrangement**

## 1.2 SCOPE OF REPORT

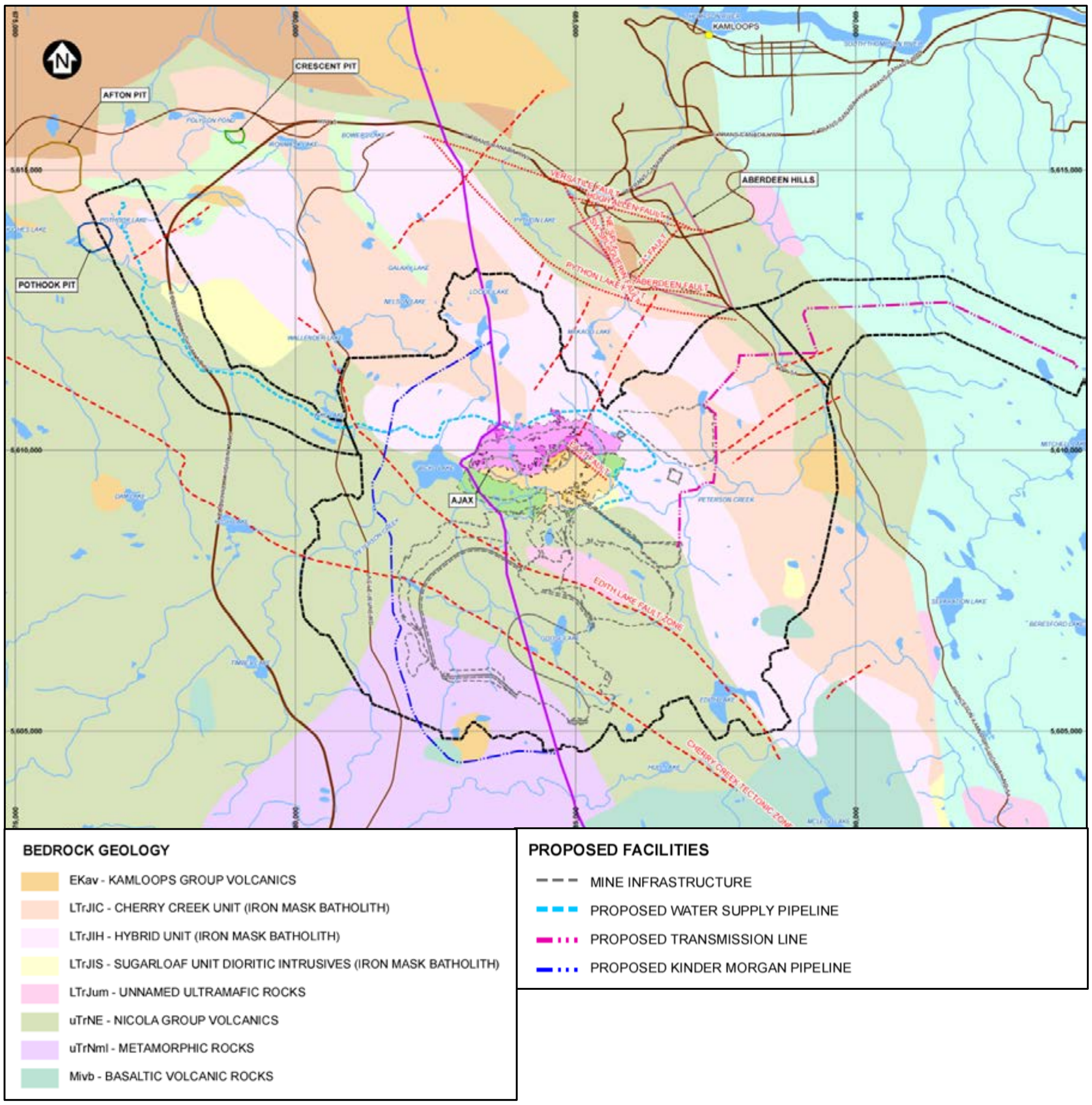
This report describes baseline geology, landforms, and soil conditions in the Project area. Information from previous reports on seismicity, bedrock geology, stratigraphy, mineral deposits, rock properties, and faults for the project area has been used to establish the geological setting.

Knight Piésold Ltd. (KP) undertook Reconnaissance Terrain and Terrain Stability Mapping through aerial photograph interpretation, geomorphic interpretation of the a Digital Elevation Model (DEM) generated from the LiDAR Survey data and site reconnaissance. The site reconnaissance was undertaken from September 2 to 4, 2014. Terrain mapping is a method to categorize, describe and delineate surficial materials, landforms and geological processes within the natural landscape. Terrain Stability Mapping is a method to delineate areas of ‘stable’, ‘potentially unstable’ and ‘unstable’ terrain’. Terrain Stability Mapping describes the predicted response of the terrain to timber harvesting/vegetation stripping at the proposed sites for infrastructure development.

# 2 – GEOLOGICAL SETTING

## 2.1 INTRODUCTION

Information from previous reports on seismicity, bedrock geology, rock properties, stratigraphy, mineral deposits, and faults for the project area has been reviewed to compile the geological setting. The Ajax Project geological setting described in this section is shown on Figure 2.1.




**NOTES:**

1. BEDROCK GEOLOGY MAP COMPLIED BY BGC (2011) FROM GEOLOGICAL SURVEY OF BRITISH COLUMBIA BASE MAP (LOGAN AND MIHALYNUK, 2006).
2. SUPPLEMENTED WITH ABERDEEN HILLS GEOLOGY MAP FROM GEOTEX CONSULTANTS LTD. (1996) AND AJAX DEPOSIT WORK BY KGHM.

**Figure 2.1 Ajax Project - Bedrock Geology**

## 2.2 REGIONAL TECTONICS AND SEISMICITY

A seismicity assessment was completed for the project area by Klohn Crippen Berger (2011), this included a review of the regional seismicity and a probabilistic seismic hazard analysis. The Klohn Crippen Berger (2011) review of regional tectonics and seismicity is summarized below:

*The project area is situated within central British Columbia, where the level of recorded historical seismic activity has been low. The active tectonic zone in the offshore region to the West of British Columbia is dominated by complex interactions of plate boundaries consisting of various plates including the Pacific Plate, Juan de Fuca Plate, Explorer Plate and North American Plate. Complex tectonic movements are ongoing along the plate boundaries, including oceanic floor spreading, transform faulting and subduction (Riddihough, 1982; Adams and Clague, 1993).*

*British Columbia is located within the North American Plate, along the northeast margin of the Pacific Plate, and consists entirely of continental crust. Inland from the plate boundary, the continental mass is largely mountainous with complex geology and tectonics. Large scale faulting with historical movements of up to several hundreds of kilometers is common. However, most on-land faults within British Columbia are not recognized as being active at present. Most of the Pacific Ocean basin is underlain by the Pacific Plate, which is the largest tectonic plate in the region and is almost entirely composed of mafic oceanic crust. About 90% of the earthquakes in the world occur in a band of seismicity that follows the tectonically active margins. However, the rate of seismicity at the Pacific Northwest is somewhat lower than the seismicity in the other portions of the Pacific Plate.*

*The Juan de Fuca, Explorer and Gord (of northern California) Plates comprise the Cascadia Subduction Zone along the active plate margin with the North American Plate. These plates are subducting beneath the North American Plate, although the Explorer Plate is progressively slowing down as it is jammed against the North American Plate and becoming partially coupled to the north moving Pacific Plate (Riddihough, 1977). The Cascadia Subduction Zone extends from the northern terminus of San Andreas Fault off Northern California to the southern end of the Queen Charlotte Fault off the north end of the Vancouver Island. The Cascadia Subduction Zone follows a distinctive curve from a north-south strike off the coast of Washington and Oregon to a nearly north-westerly strike off Vancouver Island with a change in strike of about 30 degrees.*

*North of the Subduction Zone, the Pacific Plate moves relative to the North America Plate. Along the west coast, this motion is largely accommodated by dextral transcurrent motion along the Queen Charlotte and Fairweather Faults, as illustrated on Figure 2.2.*

*The seismic hazard for regions in and around the Subduction Zone comes from three sources: (1) Crustal seismicity in the North American Plate; (2) Great earthquakes of the Cascadia Subduction Zone on the interface between the North American and subducting Juan de Fuca Plate; and (3) Deep earthquakes within the subducting slab ("in-slab" earthquakes). It is the deep in-slab earthquakes that dominate the hazard in this region as their rates are approximately five times higher than the rates of shallow crustal earthquakes and their shaking levels are also greater for the same size (Adams and Halchuck, 2002). Well known historical earthquakes in the Georgia Straight/Puget Sound region (Magnitude 6.9 in 1949, Magnitude 6.7 in 1965 and Magnitude 6.8 in 2001) are in-slab earthquakes. The last great subduction interface-earthquake occurred approximately 310 years ago. These great earthquakes can have magnitudes as large as Magnitude 9 and have approximate mean recurrence rate of 600 years (Adams, 1990).*

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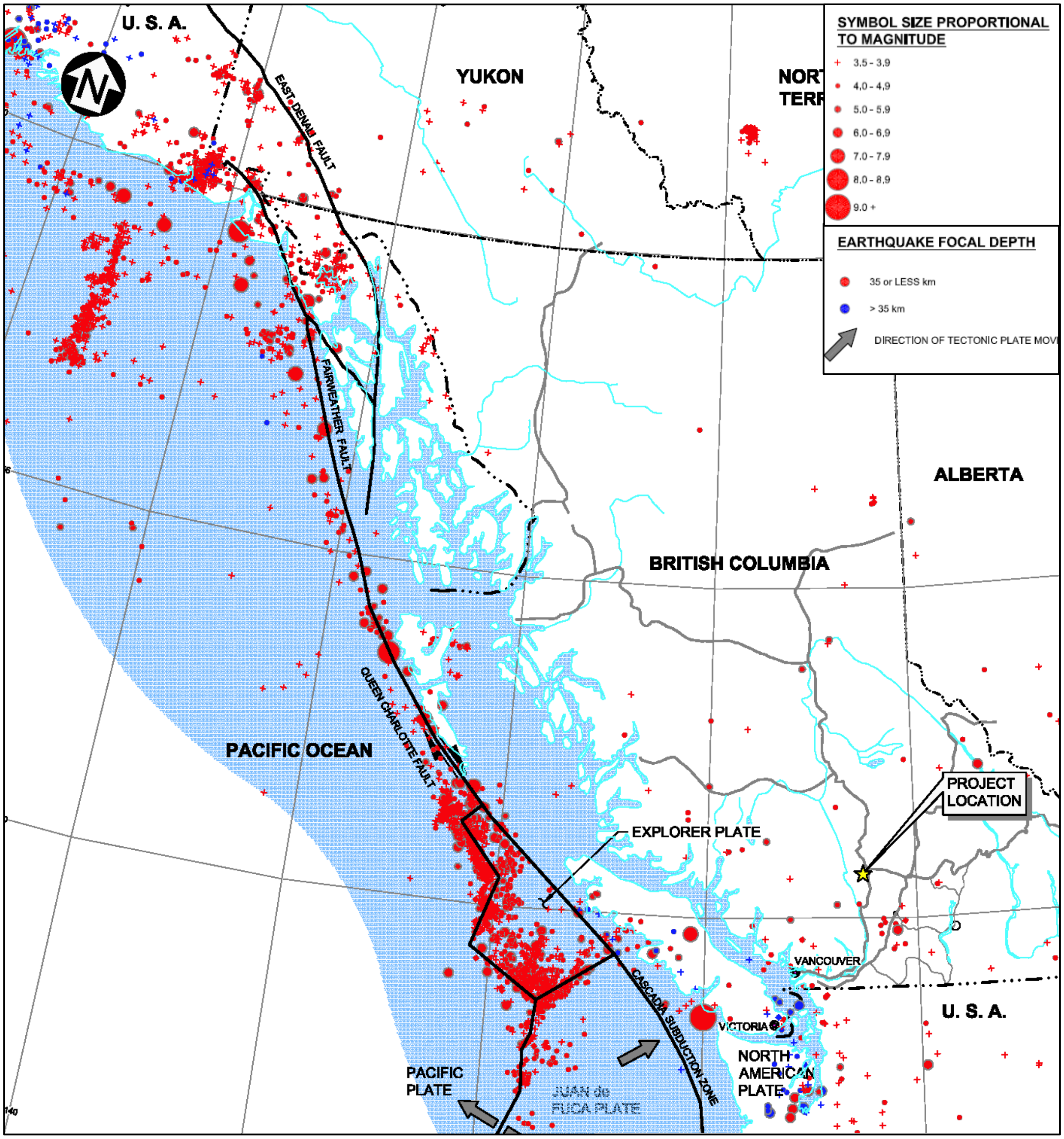



**NOTES:**

1. Global coordinate system is UTM with NAD83 datum, Zone 10, Central Meridian.
2. Historical earthquakes data from NRCAN, USGS, and NGDC databases.
3. Included recorded earthquakes from 1600 to 1972 (Magnitude >6.0) and from 1973 to 2009 (Magnitude >3.5).

**Figure 2.1 Regional Tectonics and Historical Seismicity**

*The seismic hazard can come from the same three sources; shallow crustal earthquakes, great subduction interface earthquakes, and deep in-slab earthquakes. However, the subducting Juan de Fuca Plate is located too far away to cause any significant hazard due to either the great interface earthquake or deep in-slab earthquakes. There have been no deep historical earthquakes with* *depths greater than 20 km within about 225 km of the project area. The hazard at the project area is dominated by shallow crustal earthquakes only. The seismic activity north of the Project is low in an area confined by the Queen Charlotte Fault to the west and the North Rocky Mountain Trench to the east. The seismic activity generally decreases on the easterly direction towards the project area from the active Subduction Zone. However, relatively more historical earthquakes have occurred in the Southern Rocky Mountain area located east of the project area.*

*Major faults onshore within British Columbia generally trend in a north-westerly direction consistent with the overall regional tectonic pattern, but many faults also strike across this trend. Most reports describe the major fault movements in British Columbia as having occurred several tens of millions years ago, and there has not been a published case of Quaternary surface rupture associated with an earthquake. None of the major regional and local faults are considered active except for the Hell Creek Fault which is located 125 km from the project area.*

## 2.3 BEDROCK GEOLOGY

The bedrock geology at the site comprises the Lower Paleozoic to Early Jurassic arc-volcanic, plutonic and sedimentary rocks of the Quesnel Terrane in the Intermontane Belt, overlain by the Eocene Kamloops Group and Miocene basalt. The predominant stratigraphic units are the Upper Triassic Nicola Group volcanics and sedimentary units. These have been intruded by the northwest-trending, Late Triassic to Early Jurassic Iron Mask Batholith, with dimensions up to 34 km long and up to 5 km wide. The youngest bedrock units make up the Kamloops Group. The BGC Engineering Inc. (2011) review of the regional geology for the project area is summarized in the extract below:

*Bedrock geology is comprised of volcanics, volcaniclastics, and picrite of the Upper Triassic Nicola Group presented on Figure 2.1. The interlayered tuffs, breccias, flows and flow breccias are typically well-indurated and weakly metamorphosed (greenschist facies), giving a green-grey colour to the Nicola Volcanics. Several mineral deposits and showings are associated with the Iron Mask Batholith including Afton, Ajax East, Ajax West, Crescent, and Pothook, which intrude the Nicola Group Volcanics, shown on Figure 2.1. Multiple intrusive phases of the Iron Mask Batholith have been identified in the area, including (listed oldest to youngest):*

- *Pothook phase (diorite)*
- *Iron Mask Hybrid phase (diorite)*
- *Cherry Creek phase (syenite, monzonite, and diorite)*
- *Sugarloaf phase (diorite)*

*Mining will target ore zones related to the Sugarloaf diorite as it occurs at the faulted contact of the Nicola Group Volcanics and the Iron Mask Hybrid diorite at the southern limit of the Iron Mask Batholith. When highly serpentinized, the picrite unit is weaker and more altered than the associated rocks of the Nicola Group. Serpentinization and hornfelsing of the bedrock has occurred locally with emplacement of the Iron Mask Batholith. Serpentinization of the picrite within the batholith is through-going, while windows of hornfelsed Nicola Group Volcanics occur along the faulted contact with the Sugarloaf diorite. The regional structural geology setting of the Iron Mask Batholith is dominated by north to northwest-trending high and moderate angle faults (Logan and Mihalynuk, 2005). These features may be major basement faults of the Nicola Group.*

The middle Eocene sedimentary rocks of the Kamloops Group unconformably overlie the rocks of the Nicola Group and Iron Mask Batholith within the region. The tuffaceous sandstones, siltstones and shales of the Kamloops Group have not been identified within the Project infrastructure development area.

Most of the regionnal bedrock types are characterized by a medium strong to strong uniaxial compressive strength. The Picrite unit and Kamloops Group are weaker units, particularly when altered, and are prone to landslides. The Kamloops Group bedrock occurs outside the LSA in the Aberdeen Hills subdivision of Kamloops. The picrite unit has been associated with landslides in the Afton Pit at the west margin of the Water Supply Pipeline Study Area. This unit is expected to be encountered at depth within the Ajax Project Open Pit.

## 2.4 FAULTS AND FRACTURES

Major faults within the Nicola Group Volcanics and the Iron Mask Batholith follow a regional northwest - southeast trend. Other faults observed are related to the contacts between individual geological units. A study of the major faults of the project area was conducted by Dr. K. V. Campbell (2011) and the results have been summarized as follows:

*The most common faults observed in the mapping are northwest (300° - 330°) striking. The Cherry Creek Tectonic Zone (CCTZ), approximately 2 km southwest of the Open Pit, is representative of this trend. The Edith Lake Fault Zone, located approximately 1 km southwest of the proposed Open Pit, is possibly associated with this trend. The East Pit Fault mapped within the proposed Open Pit area has similar trend to this regional fault set, and appears to be the dominant fabric through the study area. Faults are located on Figure 2.1.*

*Other sets include inferred normal faults striking approximately north-south (350° - 005°) that are observed to truncate faults of the northwest-trending set, generally northeast striking faults interpreted to be post intrusion of the Iron Mask Batholith, generally east-west striking faults inferred from aeromagnetic linear features and the faulted contacts between the geology units defined in the Open Pit area.*

*The Aberdeen Hills development straddles the southern edge of a fault-bound mid-Eocene (about 50 million years old) basin containing poorly cemented sedimentary and volcanic rocks. Eocene rocks of the Kamloops Group are faulted against Upper Triassic rocks of the Nicola Group and Early Jurassic intrusions of the Iron Mask Batholith in the Aberdeen Hills area.*

Geotex Consultants Ltd. (Dr. Peter Read), working for Golder Associates on behalf of the City of Kamloops (CoK), completed detailed geological mapping of the Aberdeen Development Area (Geotex, 1996). The mapping identified several geological faults in the vicinity of the Aberdeen Hills located on Figure 2.1.

## 2.5 GEOLOGICAL HISTORY

The geological history of the project area was determined from published geological literature by Fulton (1960, 1969, 1974, and 1975) and Logan et. al. (2005). The stratigraphy and key sequence of geological events is summarized below (ordered oldest to youngest):

The oldest bedrock at the project area comprises the Triassic age Nicola Group Volcanics. During the Jurassic period, the Nicola Group Volcanics were intruded by syenite to diorite comprising the Iron Mask Batholith. Following the emplacement of the Iron Mask Batholith, the volcanic and intrusive rocks were subject to a sustained period of erosion and weathering and tectonic activity leading to faulting.

A volcanic episode during the Tertiary period deposited pyroclastic material (tuff and tuff breccia). This volcanic activity is interpreted to have occurred in a coastal or shallow water environment and resulted in the formation of the Kamloops Group. The Kamloops Group strata are restricted to the Aberdeen Hills area and not found within the Study Areas. The fine-grained units are intensively weathered to soft montmorillonite-rich clays. The beds generally have the same northeast dip direction and similar dips as the natural slopes.

The advance of the Pleistocene ice sheet deeply gouged and sculpted the bedrock. About 14,500 years ago, when the Cordilleran Ice Sheet was thickest and most extensive at the climax of Fraser Glaciation (Fulton, 1975), ice flowed generally from the northwest to the southeast across the Project area. The rounded ridge tops suggest the entire area was completely overridden by ice at this time, depositing Glacial till at the base of the ice sheet.

Deglaciation occurred between about 14,000 and 11,000 years ago. Deglaciation took place by downwasting so that the uplands emerged from beneath the ice while tongues of ice remained in the valley bottoms (Fulton, 1969). Stagnant ice in the valley bottoms impounded a large but temporary Glacial Lake along the Thompson, South Thompson and North Thompson River Valleys called 'Glacial Lake Thompson'. Downwasting ice often forms characteristic subglacial and ice-marginal landforms on gentle surfaces, such as, eskers, kames, and meltwater channels. Temporary Glacial Lakes formed in depressions in front of the ice margin. The Geological Survey of Canada's regional surficial geology map (Fulton, 1974) shows 'Rill Complex' deposits adjacent to Peterson Creek. 'Rill Complexes' comprise morainal deposits that were channelized by meltwater, resulting in local occurrences of channel gravels. 'Kettle Terrace Deposits' are mapped along several of the tributary drainage lines to Peterson Creek. These deposits comprise sands and gravels according to the published mapping and are interpreted to be kame terraces and delta terraces. Pro-glacial glaciofluvial deposits were laid down by meltwater channels after the ice had retreated.

Glacial lake deposits, which had been exposed following the breaching of the ice dam in the South Thompson River valley, were mobilized by wind and deposited in upslope areas as eolian sediments (loess) in the para-glacial period.

Glacial sediments and weathered bedrock have been re-worked on steeper slopes to form colluvium. The glacial sands and gravels were locally incised by stream flow along Peterson Creek creating terraces. Fluvial sediments continue to be deposited along the active water courses during post-glacial times.

# 3 – TERRAIN AND TERRAIN STABILITY MAPPING METHODOLOGY

## 3.1 INTRODUCTION

The baseline terrain and soil conditions were defined by conducting Terrain and Terrain Stability Mapping for the Project area. Both mapping techniques involve sub-dividing the areas into polygons. Terrain and Terrain Stability Mapping are powerful tools in the earliest, hazard-avoidance phase of the terrain hazards assessment process.

Terrain includes landforms, types and textures of surficial materials, morphology and geomorphic processes. Terrain mapping (as defined by Howes and Kenk, 1997) is a method to categorize, describe and delineate characteristics and attributes of surficial materials, landforms and geological processes within the natural landscape. Information on the terrain maps, in particular the texture and drainage of the soils, provides information on the pre-mining ‘land capability’ and is used in reclamation studies.

The key issue for terrain resources is the potential for alteration of terrain stability related to construction activities (in particular, timber harvesting and road construction resulting in an increased incidence of mass wasting events (landsides and erosion). In addition to posing a risk to human life and safety, mass wasting events can affect a number of additional biophysical and socio-economic receptors including: soil resources, forest productivity, water quality (primarily related to turbidity, temperature, and nutrient levels), fisheries values (primarily related to channel condition, turbidity, temperature, and nutrient levels), wildlife values, property and infrastructure, and cultural and archaeological resources.

Terrain Stability Mapping describes the predicted response of the terrain to timber harvesting/vegetation stripping at proposed sites for infrastructure development. Terrain Stability Mapping is a method to delineate areas of ‘stable’, ‘potentially unstable’ and ‘unstable’ terrain in relation to proposed timber harvesting and road construction operations (MoF, 1999). The performance of engineered roadside slopes is managed by undertaking Terrain Stability Assessments (TSA’s) during detailed design in those areas that have been found from mapping to be ‘unstable’ or ‘potentially unstable’ In a TSA prescriptive designs are developed based upon the findings of a risk analysis.

## 3.2 MAPPING STUDY AREAS

There are three mapping Study Areas for the Terrain and Terrain Stability Mapping: (1) the Water Supply Pipeline Study Area, (2) the Mine Site Study Area and (3), and the Transmission Line Study Area. The Mine Site Study Area encompass the full extent of the catchment areas upslope from the sites of the proposed mine footprint. The Water Supply Pipeline Study Area comprises an approximately 1 km-wide corridor along the proposed water supply pipeline alignment. The Transmission Line Study Area mapping was undertaken within an approximately 1 km-wide corridor along the proposed transmission line alignment. The mapping Study Areas are illustrated on Figure 3.1.

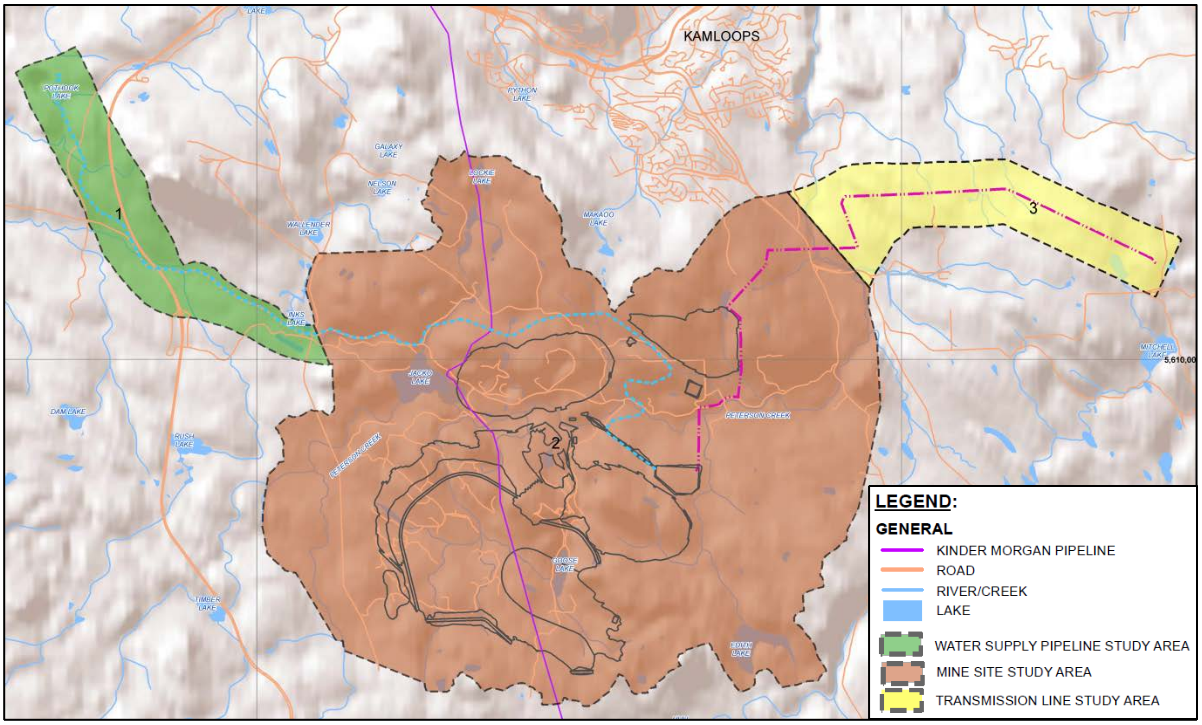



**Figure 3.1 Terrain Mapping Study Areas**

## 3.3 PREVIOUS WORK

The terrain maps were developed from original mapping undertaken in 2013 by Polar Geoscience Ltd. (Polar), (Polar Geoscience Ltd., 2013). Polar undertook Air Photo Interpretation (API) of digital stereo pairs in 3-D using a stereoscope. The air photos inspected were taken in 2000 at a nominal scale of 1:17,000 and included the following contact prints:

- 30BCC00009, Nos. 135 to 139
- 30BCC00010, Nos. 2 to 7
- 30BCC00010, Nos. 69 to 77
- 30BCC00051, Nos. 194 to 197
- 30BCC00052, Nos. 90, 91
- 30BCC00052, Nos. 93 to 97

## 3.4 MAPPING PROCEDURE

Knight Piésold refined the original mapping by:

- Developing Slope Angle Maps - Slope Angle Maps of the Study Areas were prepared using the *ArcView* GIS software with the '*3d-Analyst*' extension. The Slope Angle Maps were generated from the 5 m LiDAR Survey contours (received by KP July 3, 2013). The slope angle classes used correspond with those in the *Terrain Classification System for British Columbia* (Howes and Kenk, 1997).
- Undertaking geomorphic interpretation of the Bare Earth Digital Elevation Model (DEM). The Bare Earth DEM was examined in 3D using the *Global Mapper* Software package after applying

the '*slope shader*' function. The vertical scale was exaggerated to accentuate the landforms. The morphological features and surficial geology units were digitized within *Global Mapper* then exported to the GIS software program *ArcMap* to produce a map of landforms and surficial geology.

- Examining the ortho-rectified imagery, generated as part of the LiDAR Survey.
- Undertaking field-truthing: Field-truthing was undertaken by KP from September 2 to 4, 2014 by James Haley P.Eng. and Leif Paulson. The field-truthing included examination and description of natural soil and bedrock exposures as well as exposures in cut slopes. Hand-excavated test pits were dug in areas where there are no surface exposures. Descriptions of the observations at the field-truthing sites are presented in Table B.1 in Appendix B.
- Reviewing the findings of 285 machine-dug test pits, undertaken in the Mine Site Study Area as part of a geotechnical site investigation to support project design.
- Mapping 'recent' and 'relict' landslides within the Study Areas from aerial imagery and site reconnaissance. 'Recent' landslides are those judged, based upon the degree of re-vegetation, to have occurred within approximately the last 50 to 100 years and are distinguished from older 'relict' landslides.

## 3.5 TERRAIN STABILITY MAPPING

Terrain stability refers to the likelihood of a landslide initiating in a terrain polygon following timber harvesting and road construction for mine development. The British Columbia forest industry is the most frequent user of Terrain Stability Mapping. Similar maps are used by the mining industry, usually associated with mine site development. Terrain stability class criteria were developed for the Study Areas and were used to develop Terrain Stability Maps. Three terrain stability classes were used:

- *Stable* (S) – Identified as terrain with a 'negligible' to 'low' likelihood of landslide initiation following timber harvesting and road construction for mine development.
- *Potentially unstable* (P) – Expected to contain areas with a 'moderate' likelihood of landslide initiation following timber harvesting and road construction for mine development.
- *Unstable* (U) – Expected to contain areas where there is a 'high' likelihood of landslide initiation following timber harvesting and road construction for mine development.

A 'moderate' likelihood of landslide occurrence is representative of an approximately 10% to 30% annual probability along a 1 km-long section of road alignment, assuming side-cast construction practices. A 'high' likelihood translates to an annual probability in excess of 30%.

## 3.6 RELIABILITY AND LIMITATIONS OF MAPPING

Terrain survey intensity level refers to the amount of field checking carried out for a Terrain or Terrain Stability Mapping project. There are five terrain survey intensity levels used for Terrain and Terrain Stability Mapping in British Columbia. The survey intensity levels represent the extent of field checking done during mapping, expressed as a scale ranging from A (most checks) to E (least checks). The Terrain Survey Intensity Level is a measure of the reliability of the mapping (MoF, 1999).

The Mine Site Study Area mapping was undertaken to Terrain Survey Intensity Level 'C', approximately 24% of the polygons were field-checked. The mapping along the Water Supply Study

Area and the Transmission Line Study Area were undertaken to Terrain Survey Intensity Level D and E, respectively. The differences in terrain survey intensity level reflect the varying amounts of ground disturbance that are proposed in the three areas. In addition, there are access restrictions to private land in both the Water Supply and Transmission Line Study Areas.

The availability of 1 m LiDAR contour base mapping for the Study Areas facilitated the delineation of certain features of significance to the mapping, e.g. the lateral margins of Kame deposits and glaciofluvial terraces. Factors limiting the accuracy of the mapping are the limited presence of soil exposures away from the roads and tracks. The availability of LiDAR-derived topographic contours facilitated determination of accurate slope angles, which helped in the Terrain Stability Mapping.

The hand-excavated test pits, undertaken as part of the field-truthing, were typically taken to depths of approximately 0.5 m. The relatively shallow depth of the soil sampling meant limited information could be obtained on the thickness of the soil units. Supplementary information on the nature of the surficial soils at the site was obtained from test pits undertaken in the 2014 geotechnical site investigation.

# 4 – TERRAIN CHARACTERIZATION

## 4.1 PHYSIOGRAPHY AND SITE SETTING

The Study Areas lie within the Thompson Plateau, a subdivision of the Interior Plateau Physiographic Region. The Thompson Plateau is characterized by gentle undulating uplands with rounded hill tops, separated by large valleys (Holland, 1976). The Thompson Plateau is a late Tertiary erosional surface that has been dissected by the Thompson River and its tributaries, and by the Similkameen and Okanagan Rivers (Holland, 1976). The closest community to the Study Areas is the Aberdeen Hills area of Kamloops, located approximately 3 km northeast from the site of the proposed Open Pit.

The elevation of the Study Areas varies between approximately 850 and 1,100 m above sea level (masl). The slope angles are generally gentle (6 to 26%). A band of steeper terrain extends in a northwest direction across the Mine Site Study Area crossing south of Jacko Lake. This area comprises a series of rounded hills predominantly with moderate (27 to 49%) to moderately steep (50 to 70%) side slopes and locally with steep (>70%) bedrock side slopes. The slopes are typically steeper on the northwest sides of the hills; locally this creates ‘crag and tail’ type drumlinized terrain that indicates a direction of ice advance to the southeast. There are moderate to moderately steep side slopes alongside Peterson Creek in the east part of the Mine Site Study Area. The terrain along the Water Supply Pipeline Study Area and Transmission Line Study Area is predominantly gently inclined. The transmission line alignment crosses moderately steep slopes adjacent to Peterson Creek.

The Study Areas are located in a historically active area of Open Pit mining comprising the currently inactive East and West Ajax Pits surrounded by small waste rock piles from the historic mining. The Afton Pit is located at the western margin of the Water Supply Pipeline Study Area. The Coquihalla Highway crosses northwards across the Water Supply Pipeline Study Area. Lac Le Jeune Road is parallel to the Coquihalla Highway and approximately 2 km to the east. Within the mine site, Inks Lake Road heads east towards the site of the proposed mine and west, crossing under the Coquihalla Highway, to the site of the existing New Afton Mine. The alignment of the proposed Water Supply Pipeline follows Inks Lake Road. Goose Lake Road heads westwards into the centre of the Mine Site Study Area and then southwards following the western shoreline of Goose Lake. In addition, there is a network of farming and exploration trails within the Study Areas.

Drainage is characterized by localized ponds, small creeks and ephemeral streams. There are several lakes in the Mine Site Study Area, including Jacko Lake in the northwest, Goose Lake in the south and Edith Lake in the southeast. Jacko Lake has been enlarged by the construction of an earth fill embankment at the lake’s eastern extent originally in the early 1900’s. The primary outlet of Jacko Lake is Peterson Creek. Peterson Creek flows in an east direction from Jacko Lake and deviates northwards in the east part of the Mine Site Study Area. The Peterson Creek watershed drains into the South Thompson River near its confluence with the North Thompson River. The South and North Thompson Rivers converge at the city of Kamloops to form the Thompson River, which the Cherry Creek watershed joins further to the west. Humphrey Creek flows northwards into Peterson Creek in the east part of the Mine Site Study Area.

The majority of the study areas are located within the cool, dry Interior Douglas Fir Biogeoclimatic Zone. The west part of the Transmission Line Study Area crosses a north-north west oriented band of the very dry and hot Bunchgrass Biogeoclimatic Zone. This Biogeoclimatic Zone also extends up the Peterson Creek watershed towards the Open Pit. There is another region of the very dry and hot Bunchgrass Biogeoclimatic Zone in the west part of the Water Supply Pipeline Study Area. In addition, there are areas of the very dry and hot Ponderosa Pine Biogeoclimatic Zone in the west part of the Water Supply Pipeline Study Area and east part of the Transmission Line Study Area.

## 4.2 LANDFORMS AND SURFICIAL GEOLOGY

The area is characterized by landforms that reflect the area's history of glaciation. The landform map of the Mine Site Study Area is presented on Drawing C002-KA39-7530-00-009, Appendix A. The surficial geology across the Study Area is depicted by the terrain maps (Appendix A, Drawings C029-KA39-7530-00-011 to 013). A legend for the terrain maps is presented as Drawing C029-KA39-7530-00-011. The following landforms and surficial geology were identified in the terrain mapping of the Study Areas. The field truthing waypoints (WP) are located on Figure 4.1.

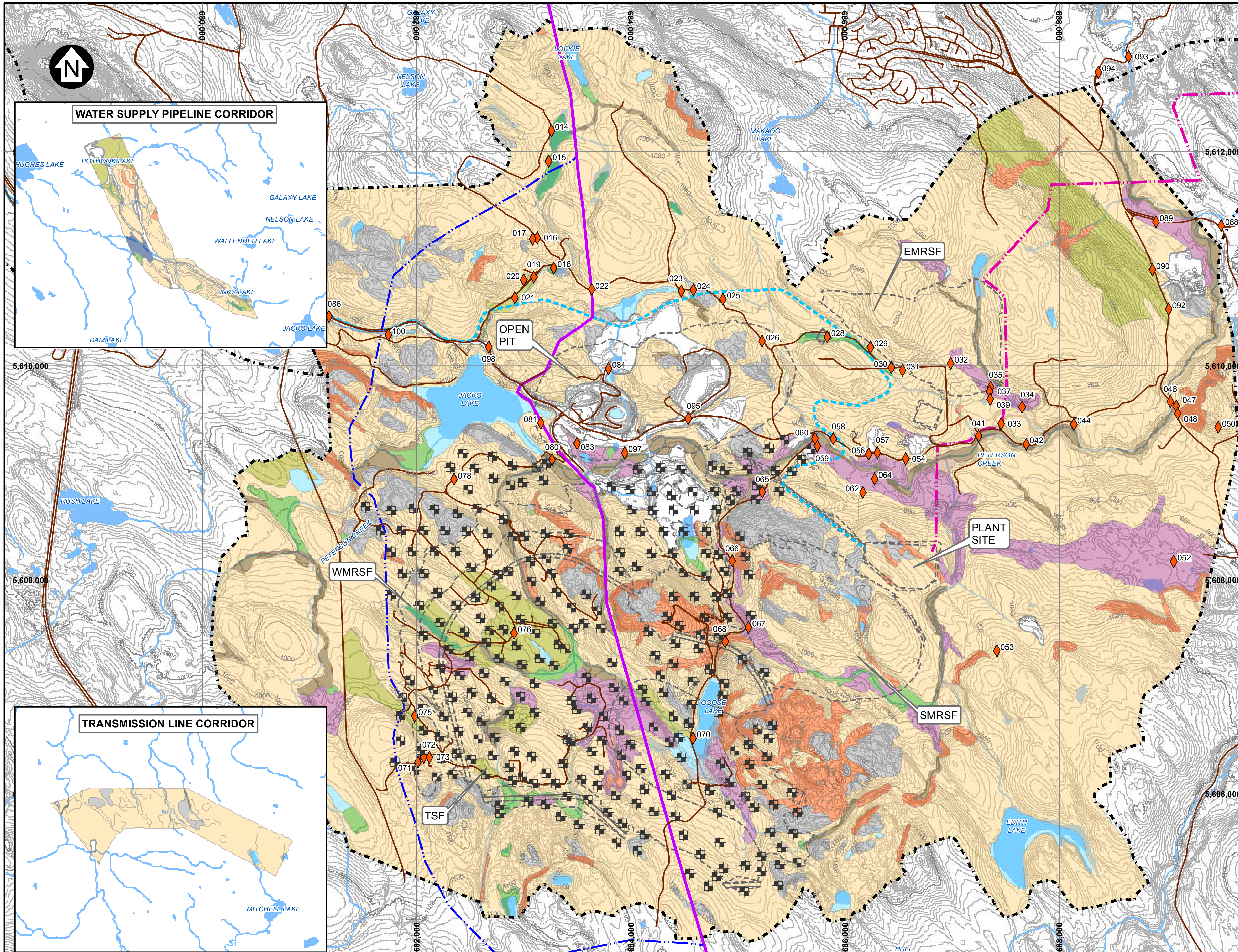
### 4.2.1 Glacial till Deposits

Glacial till is the predominant surficial geology unit. The landforms in areas of glacial till comprise drumlins and flutings, both of which have a northwest-southeast orientation. Drumlins and flutings were mapped at the sites of the proposed Open Pit, TSF, SMRSF and WMRSF. Glacial till can be further subdivided into loose to compact ablation till and dense lodgement till. The widespread distribution of drumlins suggests that lodgement till predominates within the study areas. The orientations of the drumlins confirm that the predominant direction of ice advance was towards the southeast. Lodgement till is interpreted to be the predominant foundation soil at the site of the SMRSF, WMRSF and TSF basin. The occurrences of the ablation till are mapped within the EMRSF and in the west portion of the Mine Site Study Area (WP 98 and WP 86).

### 4.2.2 Glaciofluvial Deposits

Kames and eskers were identified locally in the terrain mapping. These glaciofluvial landforms are indicative of coarse grained soils with minor but varying quantities of fines. Kame deposits are laterally discontinuous mounds, terraces or terraced deltas of gravel and sand with trace silt deposited by ice-marginal streams. Large numbers of kame mounds create an irregular hummocky landscape known as a kame complex. Kame deltas are formed by sub-glacial meltwater streams depositing sediment at the ice margin. The kame mounds typically formed where streams deposited coarse sediment in cavities in the ice sheet. Kames have a significant proportion of fines and can therefore have hydraulic conductivities that are several orders of magnitude lower than esker deposits. Eskers are sinuous ridges that consist of sand and gravel with some cobbles with little or no fines that were deposited in sub-glacial channels. Areas comprising glaciofluvial deposits are generally well-drained.

The terrain mapping identified a northwest–southeast oriented band of ice-contact glaciofluvial deposits in the area to the west and south of Goose Lake within the southern part of the TSF footprint. The deposits generally exhibit hummocky kame morphology in the area to the west of Goose Lake and ridge-like esker morphology in the area to the south of Goose Lake. A narrow band of kame deposits with a northwest–southeast orientation was mapped in the east part of the footprint of the EMRSF. Ice-contact Kame deposits were also mapped, locally, in the southern part of the SMRSF.




**LEGEND:**

**GENERAL**

- TEST PIT KP
- WAY POINT
- KINDER MORGAN PIPELINE
- ROAD
- RIVER/CREEK
- CONTOUR 5m LIDAR
- CONTOUR 100m LIDAR
- LAKE
- LOCAL STUDY AREA (LSA)
- TERRAIN UNIT

**PROPOSED FACILITIES**

- MINE INFRASTRUCTURE
- PROPOSED WATER SUPPLY PIPELINE
- PROPOSED TRANSMISSION LINE
- PROPOSED KINDER MORGAN PIPELINE

**SURFICIAL GEOLOGY**

| | |
|---|---|
| A | ANTHROPOGENIC AREA |
| F,Fp | ALLUVIUM |
| Ff | FLUVIAL FAN |
| O | ORGANIC ACCUMULATION |
| E | EOLIAN SEDIMENT |
| C | COLLUVIUM |
| L | LAKE DEPOSIT |
| LG | GLACIAL LAKE DEPOSIT |
| FG | GLACIOFLUVIAL DEPOSIT |
| M | GLACIAL TILL |
| D/R | WEATHERED BEDROCK |

**NOTES:**

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N.
2. ORIGINAL FIGURE IS PRODUCED AT A NOMINAL SCALE OF 1:20,000 FOR 24X36 ("D" SIZE) PAPER, LOCATED IN APPENDIX 6.2-A.
3. TERRAIN MAPPING UNDERTAKEN TO TERRAIN SURVEY INTENSITY LEVEL C.
4. FACILITIES BASED ON AUG'14 VERSION OF THE GENERAL ARRANGEMENT.

350 175 0 350 700 1,050 1,400 1,750 m

KGHM AJAX MINING INC.

AJAX PROJECT

**FIELD TRUTHING LOCATIONS WAYPOINTS AND TEST PITS**

Knight Piésold CONSULTING

P/A NO. VA101-246/34 | REF NO. 1

FIGURE 4.1 | REV 0

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
|---|---|---|---|---|---|
| 0 | 26JUN'15 | ISSUED WITH REPORT | JAS | AMD | JEH |

SAVED: M:\1\01\00246\34\A\GIS\Figs\Report1_Baseline\TerrainMapSurficialGeology.mxd; Jun 26, 2015 4:06 PM; adinca

Extensive hummocky ice-contact kame deposits were identified in the vicinity of Humphrey Creek. The mapping showed this deposit extends upstream on both sides of Peterson Creek from its confluence with Humphrey Creek. Kame deposits were observed east of the Open Pit on the south side of Peterson Creek approximately 1.35 km upstream from its confluence with Humphrey Creek, as shown on Figure 4.2 (WP 59).

**Figure 4.2 Kame Mounds South of Peterson Creek (WP 59)**

The terrain mapping confirmed the local presence of glaciofluvial outwash deposits in the vicinity of Peterson Creek. The results of the terrain mapping suggest there are isolated occurrences of outwash sands and gravels on the north side of Peterson Creek, and none were mapped in the vicinity of the proposed EMRSF. The furthest downstream location where outwash sands and gravels were identified in the vicinity of Peterson Creek is the northeast part of the Mine Site Study Area at WP 89. Glaciofluvial outwash deposits were also mapped within the southwest part of the Open Pit, shown on Figure 4.3.

**Figure 4.3 Glaciofluvial Outwash of Sands and Gravels Within the Southwest Portion of the Proposed Open Pit (WP 83)**

#### 4.2.3 Glacial Lake Deposits

Fine grained glacial lake deposits were mapped in the Water Supply Line Study Area (WP 6 and 8). The glacial lake deposits encountered comprised firm to stiff silts that are locally laminated. The areas of glacial lake deposits are interpreted to be generally poorly-drained.

#### 4.2.4 Eolian Sediments (Loess)

Paraglacial eolian deposits (wind-blown loess), predominantly comprising silt and fine sand, have been identified, locally within the Mine Site Study Area and the Water Supply Pipeline Study Area. The deposit includes a gravel component in parts and is interpreted to have been locally re-worked by flash floods consistent with the 'diamict facies' mapped by Roberts et al (1992). There areas of eolian sediments are on the northwest-southeast oriented hills in the west part of the footprint area of the TSF. Additional deposits were found on northeast facing slopes in the southwest and northeast part of the Mine Site Study Area. Another band of eolian sediments was mapped along the floor of a northeast oriented valley to the north of Jacko Lake (Figure 4.4). Eolian sediments were also mapped to the south of Inks Lake in the east part of the Water Supply Pipeline Study Area. The areas of eolian sediments are interpreted to be generally poorly-drained.

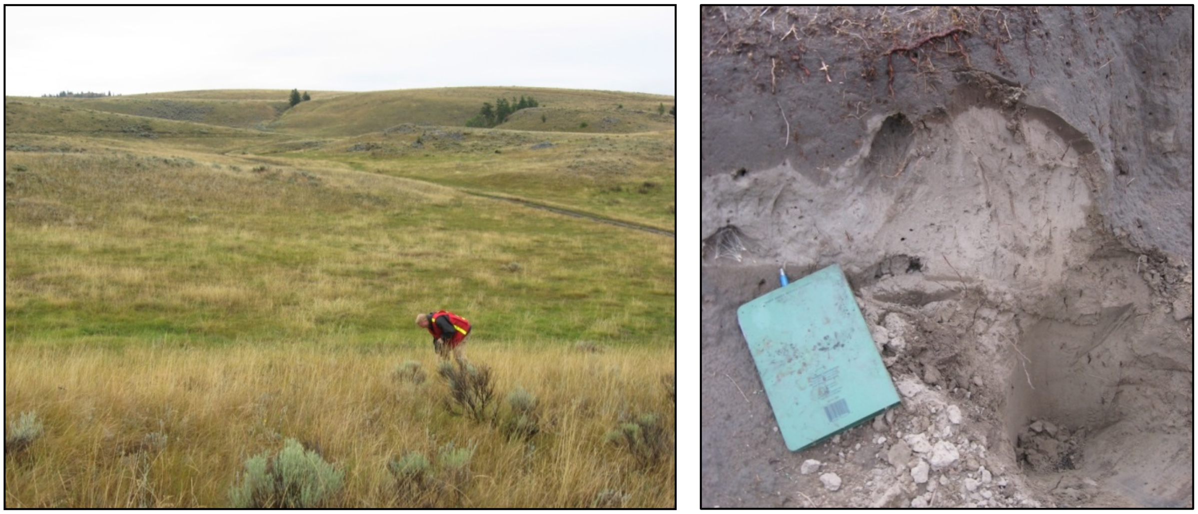


**Figure 4.4 Eolian Sediments North of Jacko Lake (WP 21)**

### 4.2.5 Lake Deposits

Recent lake deposits have formed in surface depressions, locally. Some deposits are covered in standing water year round, whereas others are only temporarily covered in standing water, e.g. WP 15 (Figure 4.5). Minor lake deposits were mapped at the sites of the proposed EMRSF, SMRSF, and TSF basin. The Lake Deposit encountered at WP 15 comprised firm fibrous peat with shell fragments. At WP 70, at the south end of Goose Lake, soft grey silt with trace sand was encountered.

**Figure 4.5 Lake Deposit in the Northern Portion of the Mine Site Study Area (WP 15)**

### 4.2.6 Colluvium Deposits

The terrain mapping confirmed the presence of a broad area of terrain comprising bedrock outcrops in hilltop settings surrounded by moderately steep colluvial slopes. This area extends in a northwest direction across the Mine Site Study Area and includes the northeast parts of the WMRSF and TSF footprints. Local areas of bedrock exposure were mapped at the sites of the TSF, EMRSF, SMRSF, WMRSF and Open Pit.

### 4.2.7 Fluvial Deposits

The active fluvial channel of Peterson Creek is up to about 5 m wide in the Mine Site Study Area. The flood plain adjacent to the creek is up to approximately 50 m wide, locally. Fluvial deposits were mapped locally at the sites of the EMRSF, WMRSF, TSF and Open Pit. The fluvial deposits can be subdivided into channel deposits and flood plain deposits. The active channel deposits comprise sands and gravels with cobbles, whereas, the flood plain deposits were found to comprise soft sandy clayey silt with some gravel.

### 4.2.8 Organic Deposits

Organic swamps were mapped, locally, at the sites of the TSF, EMRSF, WMRSF and SMRSF. The organic swamp deposits were found to generally comprise firm dark grey fibrous peat, as shown on Figure 4.6 (WP 28). The organic swamps are very poorly-drained with standing water being present for most of the year.

**Figure 4.6 Organic Deposits South of Proposed EMRSF (WP 28)**

### 4.2.9 Anthropogenic Areas

Anthropogenic areas comprising Open Pits and waste rock piles from historic mining were mapped. The historic Ajax Open Pits and waste rock piles are located in the north part of the Mine Site Study Area. The historic Afton mine rock piles and Open Pit are located at the west end of the Water Supply Pipeline Study Area. An old waste rock pile in the east part of the historic Ajax East Open Pit is shown on Figure 4.7.

**Figure 4.7 Historic Waste Rock Pile in Historic Ajax East Open Pit**

## 4.3 LANDSLIDES WITHIN THE STUDY AREAS

Relatively few landslides were identified in the Study Areas. Two landslides were noted and comprise debris slides. The first is a very shallow (<0.5 m thick) recent debris slide with plan dimensions of approximately 7m x 7m (WP 34, Figure 4.8) located near the southeast corner of the proposed EMRSF footprint. The debris slide occurred on natural terrain with a slope of 50% in an area of hummocky ice-contact glaciofluvial sands and gravels. A second recent debris slide was mapped in an area of natural terrain in the east portion of the Mine Site Study Area (Drawing C029-KA39-7530-00-012, Appendix A). The debris slide is located in an area of moderate to moderately steep northeast facing slopes that are interpreted to comprise Eolian sediments (WP 50, Figure 4.9).

A possible relict debris slide was identified in the east part of the Mine Site Study Area (WP 50). The feature was inspected in the field. The natural slope angle in the area is approximately 35 to 40%. The feature comprises a spoon-shaped depression, approximately 40 m wide x 60 m long x 15 m deep that is vegetated with grass. A soil 'lobe' extends down the centre-line of the feature but there is no discernible landslide deposit at the toe of the slope. If it is a landslide, debris has been removed from the slope toe making it very old. The feature is likely to have formed from ongoing erosion as opposed to a single detachment event.

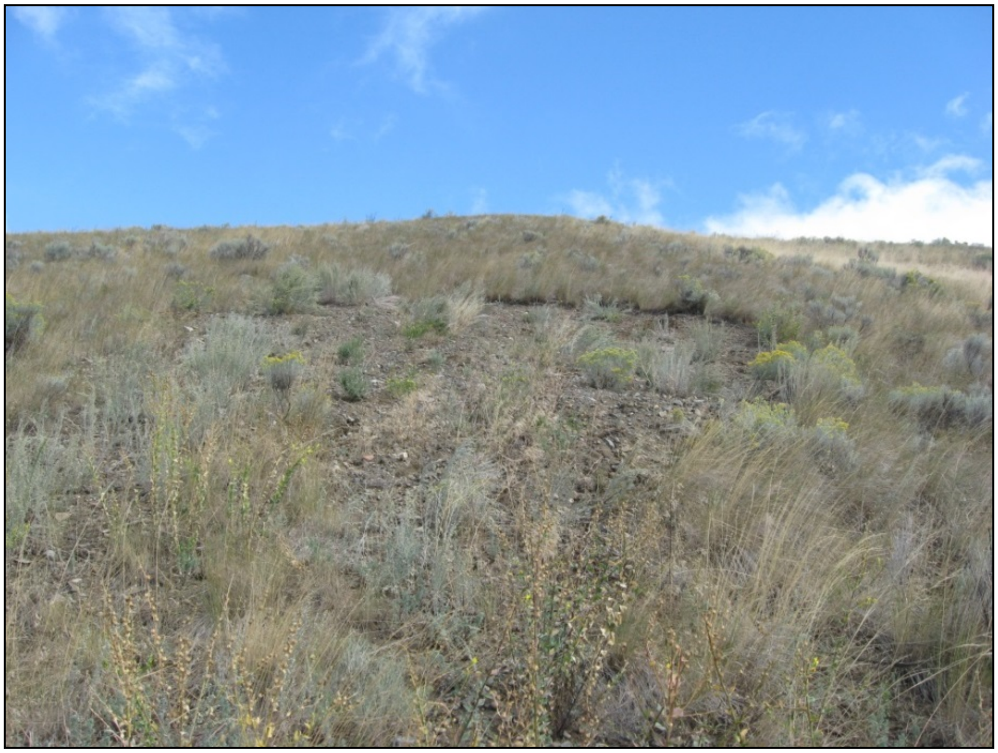


**Figure 4.8 Recent Shallow Debris Slide in Hummocky Sands and Gravels (WP 34)**

**Figure 4.9 Recent Debris Slide in Eolian Sediments (WP 50)**

### 4.4 LANDSLIDES IN THE ABERDEEN HILLS AREA

Aberdeen Hills is situated in the southwest part of the City of Kamloops (CoK), and outside the Study Areas. The topography slopes towards the north-northeast at an overall slope angle of approximately 14 to 16%. The Aberdeen Hills area has a history of terrain instability that dates back to before the area was developed and which is today managed by a sophisticated network of pumping wells. There is potential for large-scale landslides in the slopes of the Aberdeen Hills where the weak volcanic Kamloops Group bedrock is locally weathered to swelling clays and there are adverse groundwater conditions. The distance between the Aberdeen Hills Area and the site of the Open Pit is approximately 3 km.

Detailed baseline descriptions of the geology and terrain stability of the Aberdeen Hills area are presented in KP letter (2014b) and summarized below.

*Geotex Consultants Limited (1996) undertook surficial geology mapping of the Aberdeen Hills area and mapped six landslides. The mapped landslides included two that had been documented in previous geotechnical studies – 'Slide A' and the 1995 Van Horne Slide. All six landslides are located in areas underlain by Kamloops Group bedrock. Most of the slides were interpreted to have occurred in the last 30 years, however 'Slide A' is an ancient slide that is not known to have moved in recent times. The instability of the Kamloops Group bedrock is largely attributed to layers of volcanic ash (tuff) which alter to highly plastic swelling clays. Past failures have occurred on sliding surfaces at or near the interface between the surficial soils (commonly glacial till) and underlying Kamloops Group Bedrock.*

*Eleven stability assessment regions have been identified by Golder Associates (2011) within the Aberdeen Hills area. Slope stability assessments are routinely undertaken for these areas by consultants on behalf of the CoK. The baseline stability condition for the Aberdeen Hills area is ascribed to be the FoS values determined for the eleven stability assessment regions in the most recent slope stability assessment (Golder Associates, 2011). The FoS values determined in the Golder Associates study are summarized in Table 4.1; the Van Horne Slide Stability Assessment Region has the lowest FoS of 1.24 and is therefore the critical stability profile*.

**Table 4.1 Summary of Findings of 2010 Slope Stability Assessment**

| Stability Assessment Region | Factor of Safety | Target Factor of Safety |
|---|---|---|
| Area 'A' | 1.38 | 1.3 |
| Dunraven | 1.91 | 1.3 |
| **Van Horne Slide** | **1.24** | **1.3** |
| Ravenwood | 1.47 | 1.5 |
| Sierra Vista (Santa Rosa) | 3.02 (2006) | 1.5 |
| The Links | 1.83 | 1.5 |
| Glasgow | 2.73 | 1.5 |
| Guerin | 1.64 | 1.5 |
| Gloaming Ridge | 1.73 | 1.3 |
| Sifton South | 2.01 | 1.5 |
| Fleming (Sifton North) | NA | |

**NOTES:**
1. Source: Golder Associates (2011). 2010 Aberdeen Stability Review.

## 4.5 LANDSLIDES IN THE AFTON PIT

The Open Pit of the Afton Mine, located at the west margin of the Water Supply Line Study Area, has experienced landslides within the weak picrite unit of the Nicola Group. This unit is expected to be encountered at depth within the Ajax Project Open Pit, and its presence is to be accounted for in the design of the Open Pit.

## 4.6 EROSION POTENTIAL

The terrain mapping did not identify any existing widespread areas of sheet erosion within the area. Gully erosion was observed in cut slopes in glacial till, particularly in the west part of the Mine Site Study Area (e.g. WP 98, Figure 4.10).

Gully erosion was identified on moderately inclined natural slopes in areas of drumlinized terrain. An approximately 2.5 m deep gully was identified at the southeast corner of the EMRSF footprint (WP 34, Figure 4.8). The soil exposed in the gully is a relatively coarse-grained ice-contact glaciofluvial deposit. It is possible that the gully formed as a result of preferential seepage flow through this relatively high permeability stratigraphic unit.

Silt-rich eolian sediments, glacial lake deposits and lake deposits were identified locally at several proposed mine site facility sites. Organic soils, comprising peat, were also mapped locally. These soils are expected to be particularly prone to erosion during the construction phase of the Project, once the surface vegetation is stripped.

**Figure 4.10 Gully Erosion in Cut Slope (WP 98)**

## 4.7 SNOW AVALANCHE POTENTIAL

The location and altitude of the study areas render them potentially susceptible to snow avalanche hazards during the winter. The mapping did not highlight the presence of any clearly discernible snow avalanche paths in treed areas. Snow avalanches generally occur on terrain with slope angles of approximately 50 to 80%. There is a possibility of relatively small avalanches occurring in the local steeper areas of terrain after removal of mature vegetation. However, the risk of snow avalanches is considered low as the moderately steep and steep slopes within the Study Areas are relatively short.

# 5 – TERRAIN STABILITY

## 5.1 TERRAIN STABILITY CLASSIFICATION SCHEME

A Terrain Stability Classification Scheme was developed for the Study Areas using terrain attributes, in particular, the surficial geology, the natural slope angle and the morphology. Observations of the terrain attributes at the landslide sites were used to establish terrain stability class criteria. The terrain stability class criteria are presented in Table 5.1.

**Table 5.1 Terrain Stability Classes**

| Terrain Stability Class | Landslide Likelihood Upon Construction | Terrain Attributes |
|---|---|---|
| Stable | Negligible to Low | Plains of fluvial or glaciofluvial deposits (Fp and FGp), Glacial Lake Deposits (L) and Organic Swamps (Op or Ov) |
| | | Gentle to moderate (5 to 40%) hill slopes, comprising Eolian sediments |
| | | Gentle to moderate (5 to 50%), hill slopes, comprising glaciofluvial sands and gravels (FGh), without 'recent' landslides |
| | | Gentle to moderately steep (5 to 60%), hill slopes, comprising glaciofluvial sands and gravels (FG and FGt), without 'recent' landslides |
| | | Gentle to moderately steep (5% to 60%), hill slopes, comprising Glacial till (M) or colluvium (C), without 'recent' landslides |
| | | Gentle to moderately steep (5% to 60%), hill slopes, comprising weathered bedrock (D or R), without 'recent' landslides |
| Potentially Unstable | Moderate | Moderate to Moderately steep (> 40%), hill slopes comprising Eolian sediments |
| | | Moderately steep (> 50%), hill slopes comprising glaciofluvial sands and gravels (FGh), without 'recent landslides' |
| | | Moderately steep to steep (> 60%), hill slopes comprising glaciofluvial sands and gravels (FG and FGt), without 'recent landslides' |
| | | Moderately steep to steep (> 60%), hill slopes comprising Glacial till (M) or colluvium (C), without 'recent' landslides |
| | | Moderately steep to steep (> 60%), hill slopes comprising weathered bedrock (D or R), without 'recent' landslides |
| Unstable | High | Sites of 'recent' landslides |

The Terrain Stability Classification Scheme applies principally to the likelihood of landslide initiation along roads assuming conventional side-cast construction practice. It can also be applied to landslide susceptibility in areas of natural terrain, once stripped of vegetation.

The 'unstable' areas in relation to mine construction comprise the sites of 'recent' landslides. A lower-bound natural slope angle of 60% for 'potentially unstable' terrain was generally assigned. A lower-bound natural slope angle of 40% for 'potentially unstable' terrain was assigned to the areas of eolian sediments based upon the assessed natural slope angle in the northeast part of the Mine Site Study Area where a recent landslide was observed. A lower-bound natural slope angle of 50% for ‘potentially unstable’ terrain was assigned to the areas of hummocky ice-contact glaciofluvial deposits based upon the measured natural slope angle at the site of the observed landslide. Glacial lake deposits can be prone to landsliding but these soils only occur in areas of gently sloping terrain in the Study Areas. Consideration was given to the possibility that cohesive glacial till at the site might have a relatively high plasticity and a shear strength that is sensitive to changes in moisture content. Atterberg Limits tests were undertaken on samples of glacial till at the mine site as part of the 2014 site investigation program. The test results are generally indicative of silts of low to medium plasticity. It was concluded from these results that the shear strength is unlikely to be much affected by changes in the natural moisture content and that a lower-bound slope angle of 60% is appropriate for delineating areas of ‘potentially unstable’ terrain in areas of glacial till. Areas of exposed bedrock are expected to be the least prone to landsliding.

## 5.2 TERRAIN STABILITY MAPPING

Terrain Stability Maps have been developed for the Study Areas and are presented in Appendix A as Drawings C029-KA39-7530-00-020 to 022. The Terrain Stability Mapping indicates the majority of the Study Areas to be ‘stable’, having a ‘negligible’ to ‘low’ likelihood of landslides in relation to mine construction. The sites of ‘recent’ landslides were classified as ‘unstable’ terrain. The mapping indicates there are small areas of ‘potentially unstable’ terrain within the Study Areas. The areas of ‘potentially unstable’ terrain predominantly comprise the moderately steep to steep side slopes of drumlins and the moderately steep incised slopes adjacent to the main watercourses. Areas of ‘potentially unstable’ terrain have also been identified, locally, in the moderately steep portions of hummocky ice-contact glaciofluvial deposits and in the moderate to moderately steep portions of the northeast-facing eolian sediment slopes in the northeast part of the Mine Site Study Area.

No areas of ‘unstable’ terrain were identified at the sites of the proposed facilities. There are generally only small, isolated areas of ‘potentially unstable’ terrain within the footprints of the proposed facilities. No areas of ‘potentially unstable’ natural terrain were identified along the route of the proposed Water Supply Pipeline Study Area. The Transmission Line Study Area crosses local areas of ‘potentially unstable’ terrain adjacent to Peterson Creek.

# 6 – CONCLUSIONS

## 6.1 REGIONAL GEOLOGY

The Study Areas are situated within central British Columbia, where the level of recorded historical seismic activity is low. The bedrock geology consists of volcanics, volcanoclastics, and picrite of the Nicola Group Volcanics. The northwest trending, 34 km long, Iron Mask Batholith is intruded into the Nicola Group Volcanics. Several mineral deposits are associated with this intrusion including Ajax, Afton, Crescent, and Pothook.

The youngest identified bedrock in the vicinity of the Study Areas belongs to the Kamloops Group, and occurs in the Aberdeen Hills area. The Kamloops Group and the picrite unit of the Nicola Group are weaker rocks, particularly when altered, and are historically prone to landslides. The Kamloops Group bedrock occurs outside the LSA in the Aberdeen Hills subdivision of Kamloops.

The picrite unit has been associated with landslides in the Afton Pit at the west margin of the Water Supply Pipeline Study Area. This unit is expected to be encountered at depth within the Ajax Project Open Pit, and its presence is to be accounted for in the design of the Open Pit. The major faults within the Nicola Group Volcanics and the Iron Mask Batholith include the Cherry Creek Tectonic Zone (CCTZ), the Edith Lake Fault Zone (ELFZ), and the East Pit Fault. These faults follow a regional northwest - southeast trend. Other faults are related to the contacts between individual geological units, such as the contacts between the Iron Mask Batholith, the Nicola Volcanic Group, and the Kamloops Group.

## 6.2 TERRAIN CHARACTERIZATION

The Study Areas lie within the Thompson Plateau, a subdivision of the Interior Plateau Physiographic Region. The elevation of the Study Areas varies between approximately 850 and 1,100 m above sea level. Slope angles are generally gentle; moderately steep and steep slopes occur locally and are generally associated with drumlinized terrain and incised watercourses. A band of steeper drumlinized terrain extends in the southeast general trend of the drumlins across the Mine Site Study Area south of Jacko Lake.

The Study Areas are characterized by glacial landforms and Terrain Mapping confirmed glacial till to be the predominant surficial geology unit. The landforms in areas of glacial till comprise drumlins and flutings, both of which have a northwest-southeast orientation. Drumlins and flutings were mapped at the sites of the proposed Open Pit, TSF, SMRSF and WMRSF. The streamlined drumlin landforms are indicative of the presence of dense lodgement till, and it is interpreted that lodgment till is much more widespread in the Study Areas than ablation till. Several landforms that are indicative of the presence of ice-contact glaciofluvial deposits were identified in the vicinity of Peterson Creek and Humphtey Creek and in areas to the south and west of Goose Lake. These include kame complexes, kame terraces, terraced kame delta deposits and minor eskers. Glacial lake deposits were mapped in the Water Supply Pipeline Study Area. Paraglacial eolian sediments (loess) with a northwest-southeast orientation were identified, locally, in particular in the northwest part of the footprint of the proposed TSF. Colluvium, recent lake deposits and organic swamps were mapped, locally. Fluvial deposits were mapped in the active channel of Peterson Creek and the flood plain adjacent to the creek. Anthropogenic areas originating from historic mining activities existing in the area were mapped in the northern part of the Mine Site Study Area.

Two recent natural terrain landslides were identified in the Study Areas, one in glacial fluvial deposits near the southeast margin of the proposed EMRSF, and the other in an area of eolian deposits in the east part of the Mine Site Study Area. No landslides were identified on the roadside cut and fill slopes within the Study Areas. Regionally, the Aberdeen Hills area, located approximately 2,900 m northeast from the site of the proposed Open Pit, is identified as having a history of terrain instability that pre-dates subdivision development. The risk of snow avalanches within the study area is anticipated to be low as the moderately steep and steep slopes are relatively short.

## 6.3 TERRAIN STABILITY AND EROSION POTENTIAL

The Terrain Stability Mapping indicates the majority of the Study Areas are ‘stable’, having a ‘negligible’ to ‘low’ likelihood of landslides in relation to mine construction disturbance. No areas of ‘unstable’ terrain were identified at the proposed mine facility sites. There were generally only small, isolated areas of ‘potentially unstable’ terrain within the footprints of the proposed mine facilities. No areas of ‘potentially unstable’ natural terrain were identified along the route of the Water Supply Pipeline alignment. The Transmission Line alignment crosses local areas of ‘potentially unstable’ terrain comprising the incised side slopes of Peterson Creek.

The Terrain Mapping did not identify any existing widespread areas of sheet erosion within the Study Areas. Gully erosion was observed in cut slopes in glacial till, particularly in the west part of the Mine Site Study Area. Gully erosion was also identified on moderately inclined natural slopes in areas of drumlinized terrain. Silt-rich, glacial lake deposits, paraglacial eolian sediments, and recent lake deposits were identified locally at several proposed mine site facility sites. Organic soils, comprising peat, were also mapped locally. These soils are expected to be particularly prone to erosion during the construction phase of the Project, once the surface vegetation is stripped. The enhanced erosion potential of these soils will be accounted for in the *Erosion and Sediment Control Plan*.

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## 8 – CERTIFICATION

This report was prepared, reviewed and approved by the undersigned.

PROFESSIONAL
PROVINCE OF
J. E. HALEY
# 33730
BRITISH COLUMBIA
ENGINEER

Prepared: J. Haley June 26th, 2015

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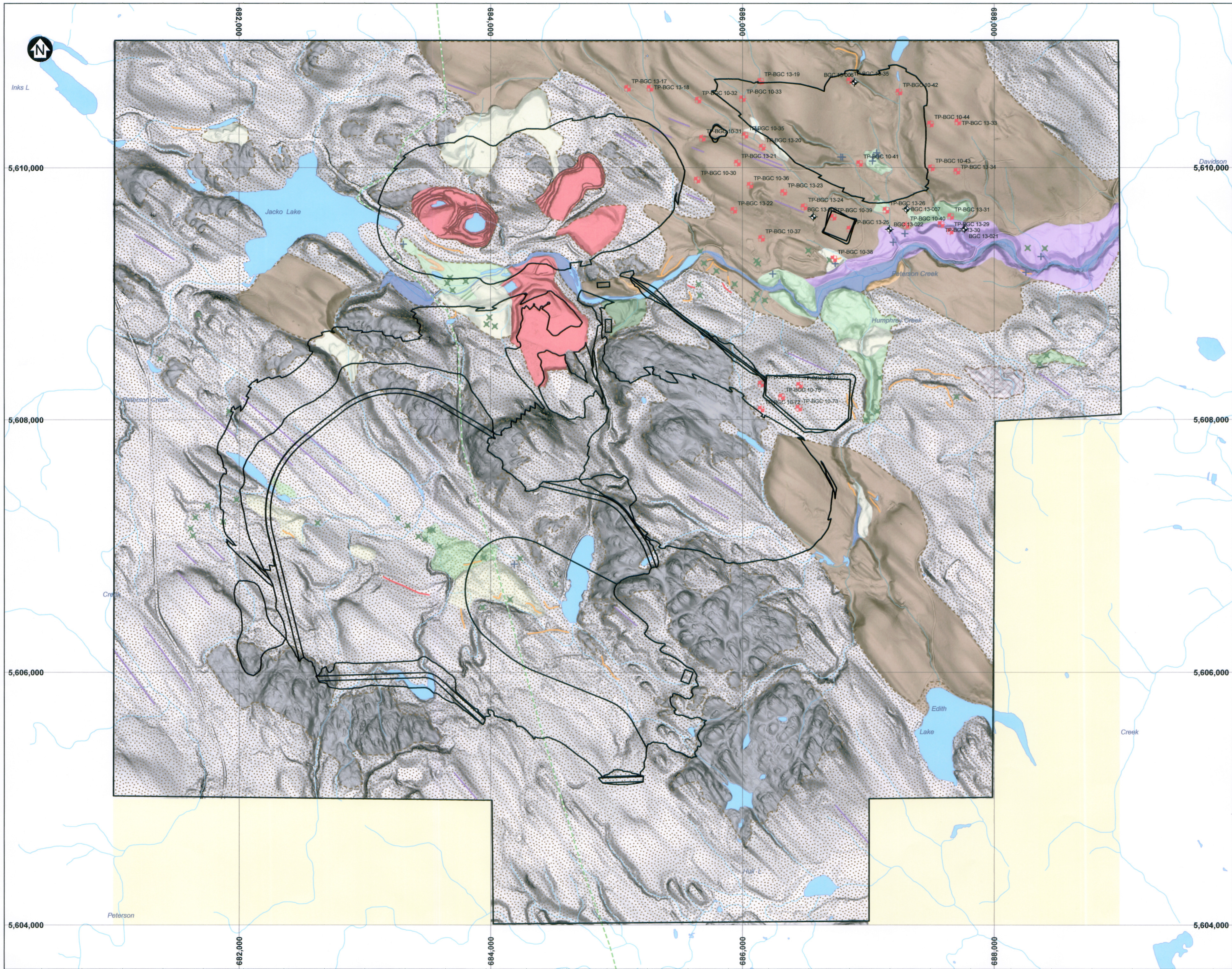
# APPENDIX A

## DRAWINGS

(Pages A-1 to A-8)





## LEGEND

**GENERAL**

- DRILLHOLE
- TESTPIT
- KINDER MORGAN PIPELINE
- RIVER/CREEK
- LAKE
- STUDY AREA

**LANDFORMS**

- MELTWATER SCARP
- KAME
- KETTLE
- ESKER
- FLUTING

**PROPOSED FACILITIES**

- MINE INFRASTRUCTURE

**SURFICIAL GEOLOGY**

- ANTHROPOGENIC
- ALLUVIUM
- GLACIOFLUVIAL TERRACE
- KAME TERRACE
- KAME DELTA
- KAME COMPLEX
- HUMMOCKY TILL
- COMPACT OR COMPACT TO DENSE TILL BLANKET
- DENSE DRUMLINIZED TILL
- BEDROCK

**FOR INFORMATION ONLY**

**NOTES:**

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N.
2. BASE MAP IS BASED ON LIDAR SURVEY BARE EARTH DIGITAL ELEVATION MODEL WITH SLOPE ANGLE SHADER FUNCTION APPLIED IN GLOBAL MAPPER SOFTWARE.
3. THIS FIGURE IS PRODUCED AT A NOMINAL SCALE OF 1:15,000 FOR 24x36 ("D" SIZE) PAPER. ACTUAL SCALE MAY DIFFER ACCORDING TO CHANGES IN PRINTER SETTINGS OR PRINTED PAPER SIZE.
4. FACILITIES BASED ON OCT'13 VERSION OF THE GENERAL ARRANGEMENT.

500 250 0 500 1,000 1,500 m
SCALE

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J. Haley July 6th, 2015

**Knight Piésold CONSULTING**

**KGHM AJAX MINING INC.**

**AJAX PROJECT**

**FINDINGS OF SURFICIAL GEOLOGY AND LANDFORM MAPPING**

| DRG. NO. | DESCRIPTION |
|---|---|
| - | - |

REFERENCE DRAWINGS

| REV | DATE | DESCRIPTION | DESIGN | DRAWN | CHK'D | APP'D |
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REVISIONS

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED | APPROVED |
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| 0 | 06JUL'15 | ISSUED FOR INFORMATION | JAS | AMD | RWS | RWS |

REVISIONS

| P/A NO. | DRAWING NO. | REVISION |
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| VA 101-246/34 | C029-KA39-7530-00-009 | 0 |

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## TERRAIN UNIT MAP LEGEND

Example: aCk - R
- texture
- surficial material
- geomorphological process
- surface expression

### TEXTURE

- a blocks (>256 mm; angular)
- b boulders (>256 mm; round)
- c clay (<0.002 mm)
- d angular and rounded particles; >2 mm
- e fibric organics
- g gravel (rounded particles, >2mm)
- h humic organics
- k cobbles (64-256 mm, rounded)
- m mud (silt and /or clay)
- p pebbles (2-64 mm, rounded)
- r rubble (2-256 mm, angular)
- s sand (0.63-2 mm)
- u mesic organics
- x 2 to 256 mm, angular
- z silt (0.002-0.63 mm)

### SURFICIAL MATERIALS

- A anthropogenic material
  - subclasses:
  - A(b) Borrow Pit
  - A(r) Road
  - A(p) Open Pit
  - A(w) Waste Rock
- C colluvium
- D weathered bedrock
- E eolian sediments

Superscripts: ^A = active, ^I = inactive

- F fluvial sediments
- FG glaciofluvial sediments
- I ice
- L lacustrine sediments
- LG glacial lake sediments
- M morainal material (glacial till)
- O organic materials
- R bedrock
- U undifferentiated materials
- V volcanic sediments

### SURFACE EXPRESSION

- a moderate slope(s) (27-49%)
- b blanket
- c cone
- cl cliff
- d depression
- e plateau (no upslope catchment)
- f fan
- g gully slope
- h hummocky topography
- j gentle slope(s) (6-26%)
- k moderately steep slope(s) (50-70%)
- l lobe
- m rolling topography
- p plain (0-5%)
- r ridge topography
- s steep slope(s) (>70%)
- t terraced
- u undulating topography
- v veneer
- w mantle of variable thickness
- x thin veneer
- y1 topographically confined hill slope
- y2 topographically confined plain
- z1 hill top (rounded)
- z2 hill top (sharp)

### GEOMORPHOLOGICAL PROCESSES

- A snow avalanches
- B braided channel
- E glacial meltwater channels
- F slow mass movement
- G glacial processes
- H kettled
- I irregularly sinuous channel
- J anstomosing channel
- L abundant seepage
- M meandering channel
- N nivation
- O decomposition of plant remains
- R rapid mass movement
- S solifluction
- U sheet erosion
- V gully erosion
- W weathering
- X permafrost processes
- Z general periglacial processes

### GEOMORPHOLOGICAL PROCESSES: SUBCLASSES AND SUBTYPES

- F" slow mass movement, initiation zone
- Fc soil creep
- Fe slow earthflow(s)
- Fg rock creep
- Fk tension cracks
- Fr slow rockslide(s)
- Fs slow debris slide(s)
- R" rapid mass movement, initiation zone
- Rb rockfall(s)
- Rd debris flow(s)
- Rr rapid rockslide(s)
- Rs rapid debris slide(s)
- Rt debris torrent(s)

**FOR INFORMATION ONLY**

### TERRAIN SYMBOLS

- . components on either side of the symbol are of approximately equal proportion
- / the component in front of the symbol is more extensive than the one that follows
- // the component in front of the symbol is considerably more extensive than the one that follows
- _ the component in front of the symbol overlays the one that follows

**LEGEND:**

- ROAD
- STREAM

**NOTES:**

1. BASE MAP: (C) MICROSOFT BING MAPS. INSET (C) ESRI ARCGIS ONLINE MAPPING.
2. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N.
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PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, J. E. HALEY # 33730, July 6th 2015

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AJAX PROJECT

**PROJECT LOCATION MAP AND TERRAIN UNIT MAP LEGEND**

| P/A NO. | DRAWING NO. | REVISION |
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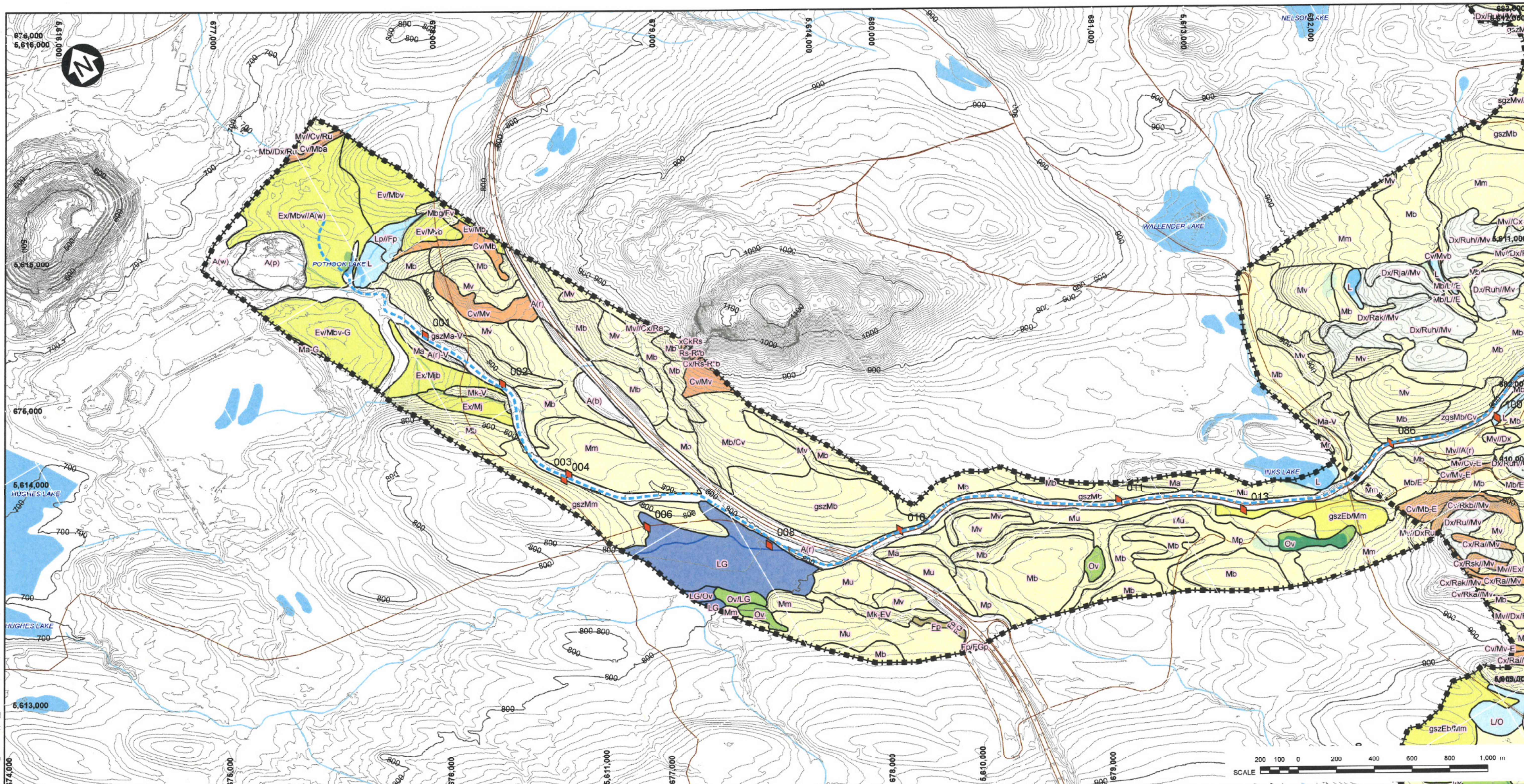


## LEGEND:

**GENERAL**

- WAY POINT
- KINDER MORGAN PIPELINE
- ROAD
- RIVER/CREEK
- CONTOUR 5 m LIDAR
- CONTOUR 100 m LIDAR
- CONTOUR 20 m TRIM
- LAKE
- STUDY AREA
- TERRAIN UNIT

**PROPOSED FACILITIES**

- MINE INFRASTRUCTURE
- PROPOSED WATER SUPPLY PIPELINE

**SUFICIAL GEOLOGY**

| | |
|---|---|
| A | ANTHROPOGENIC MATERIAL |
| F,Fp | ALLUVIUM |
| Ff | FLUVIAL FAN |
| O | ORGANIC SWAMP |
| E | EOLIAN SEDIMENTS |
| C | COLLUVIUM |
| L | GLACIAL LAKE DEPOSIT |
| L | LAKE DEPOSIT |
| FG | GLACIOFLUVIAL SANDS AND GRAVELS |
| M | GLACIAL TILL |
| D/R | WEATHERED BEDROCK |

**FOR INFORMATION ONLY**

**NOTES:**

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COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N.
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3. REFER TO DRAWING C029-KA39-7530-00-010 FOR TERRAIN UNIT LEGEND.
4. TERRAIN MAPPING UNDERTAKEN TO TERRAIN SURVEY INTENSITY LEVEL D.
5. 'RECENT' LANDSLIDES ARE THOSE OBSERVED IN THE AIR PHOTO RECORD OR IN SITE RECONNAISSANCE AS BEING DEVOID OF VEGETATION, BEING ONLY PARTLY RE-VEGETATED OR BEING RE-VEGETATED WITH PIONEER SPECIES E.G. ALDER.
6. 'RELICT' LANDSLIDES PRE-DATE THE AIR PHOTO RECORD.
7. FACILITIES BASED ON AUG'14 VERSION OF THE GENERAL ARRANGEMENT.

| DRG. NO. | DESCRIPTION |
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| REFERENCE DRAWINGS | |

| REV | DATE | DESCRIPTION | DESIGN | DRAWN | CHK'D | APP'D |
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J. E. HALEY
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July 6th 2015
J. Haley

**Knight Piésold**
CONSULTING

KGHM AJAX MINING INC.

**AJAX PROJECT**

**TERRAIN MAP**
**(SHEET 1 OF 3)**
**WATER SUPPLY PIPELINE STUDY AREA**

| P/A NO. | DRAWING NO. | REVISION |
|---|---|---|
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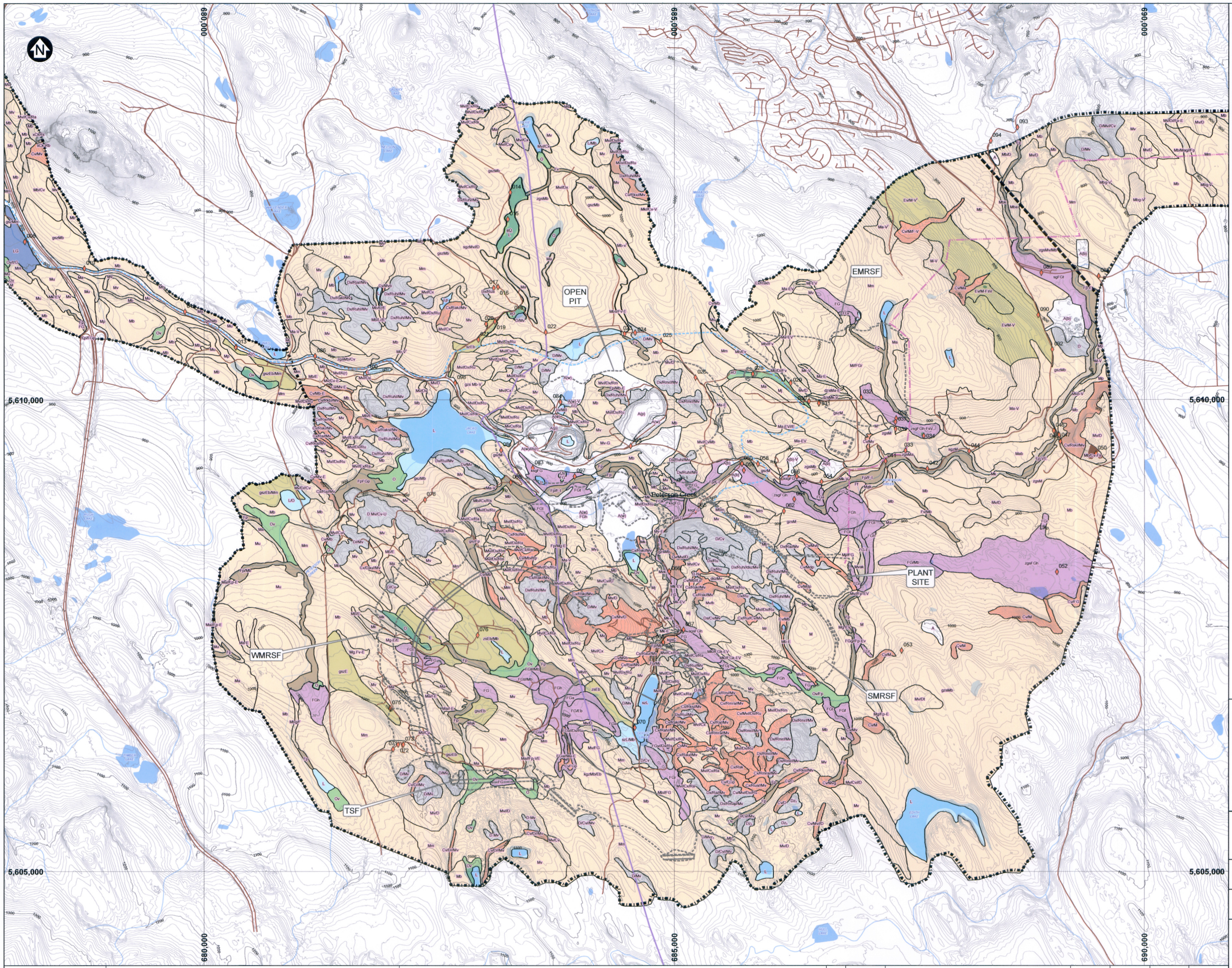



**LEGEND:**

**GENERAL**

- WAY POINT
- KINDER MORGAN PIPELINE
- ROAD
- RIVER/CREEK
- CONTOUR 5 m LIDAR
- CONTOUR 100 m LIDAR
- LAKE
- STUDY AREA
- TERRAIN UNIT

**SUFICIAL GEOLOGY**

- A ANTHROPOGENIC MATERIAL
- F,Fp ALLUVIUM
- Ff FLUVIAL FAN
- O ORGANIC SWAMP
- E EOLIAN SEDIMENTS
- C COLLUVIUM
- L LAKE DEPOSIT
- LG GLACIAL LAKE DEPOSIT
- FG GLACIOFLUVIAL SANDS AND GRAVELS
- M GLACIAL TILL
- D/R WEATHERED BEDROCK

**PROPOSED FACILITIES**

- MINE INFRASTRUCTURE
- PROPOSED WATER SUPPLY PIPELINE
- PROPOSED TRANSMISSION LINE

**TERRAIN HAZARDS**

- RECENT DEBRIS SLIDE
- RELICT DEBRIS SLIDE

**FOR INFORMATION ONLY**

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N.
2. THIS FIGURE IS PRODUCED AT A NOMINAL SCALE OF 1:20,000 FOR 24x36 ("D" SIZE) PAPER. ACTUAL SCALE MAY DIFFER ACCORDING TO CHANGES IN PRINTER SETTINGS OR PRINTED PAPER SIZE.
3. REFER TO DRAWING C029-KA39-7530-00-010 FOR TERRAIN UNIT LEGEND.
4. TERRAIN MAPPING UNDERTAKEN TO TERRAIN SURVEY INTENSITY LEVEL C.
5. 'RECENT' LANDSLIDES ARE THOSE OBSERVED IN THE AIR PHOTO RECORD OR IN SITE RECONNAISSANCE AS BEING DEVOID OF VEGETATION, BEING ONLY PARTLY RE-VEGETATED OR BEING RE-VEGETATED WITH PIONEER SPECIES E.G. ALDER.
6. 'RELICT' LANDSLIDES PRE-DATE THE AIR PHOTO RECORD.
7. FACILITIES BASED ON AUG'14 VERSION OF THE GENERAL ARRANGEMENT.

400 200 0 400 800 1,200 1,600 2,000 m

SCALE


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PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — J. E. HALEY # 33730

J. Haley July 6th, 2015

**Knight Piésold CONSULTING**

**KGHM AJAX MINING INC.**

**AJAX PROJECT**

**TERRAIN MAP (SHEET 2 OF 3) MINE SITE STUDY AREA**

| P/A NO. | DRAWING NO. | REVISION |
|---|---|---|
| VA101-246/34 | C029-KA39-7530-00-012 | 0 |

REFERENCE DRAWINGS

| DRG. NO. | DESCRIPTION |
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REVISIONS

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 0 | 06JUL'15 | ISSUED FOR INFORMATION | JEH | KK | [signature] | [signature] |

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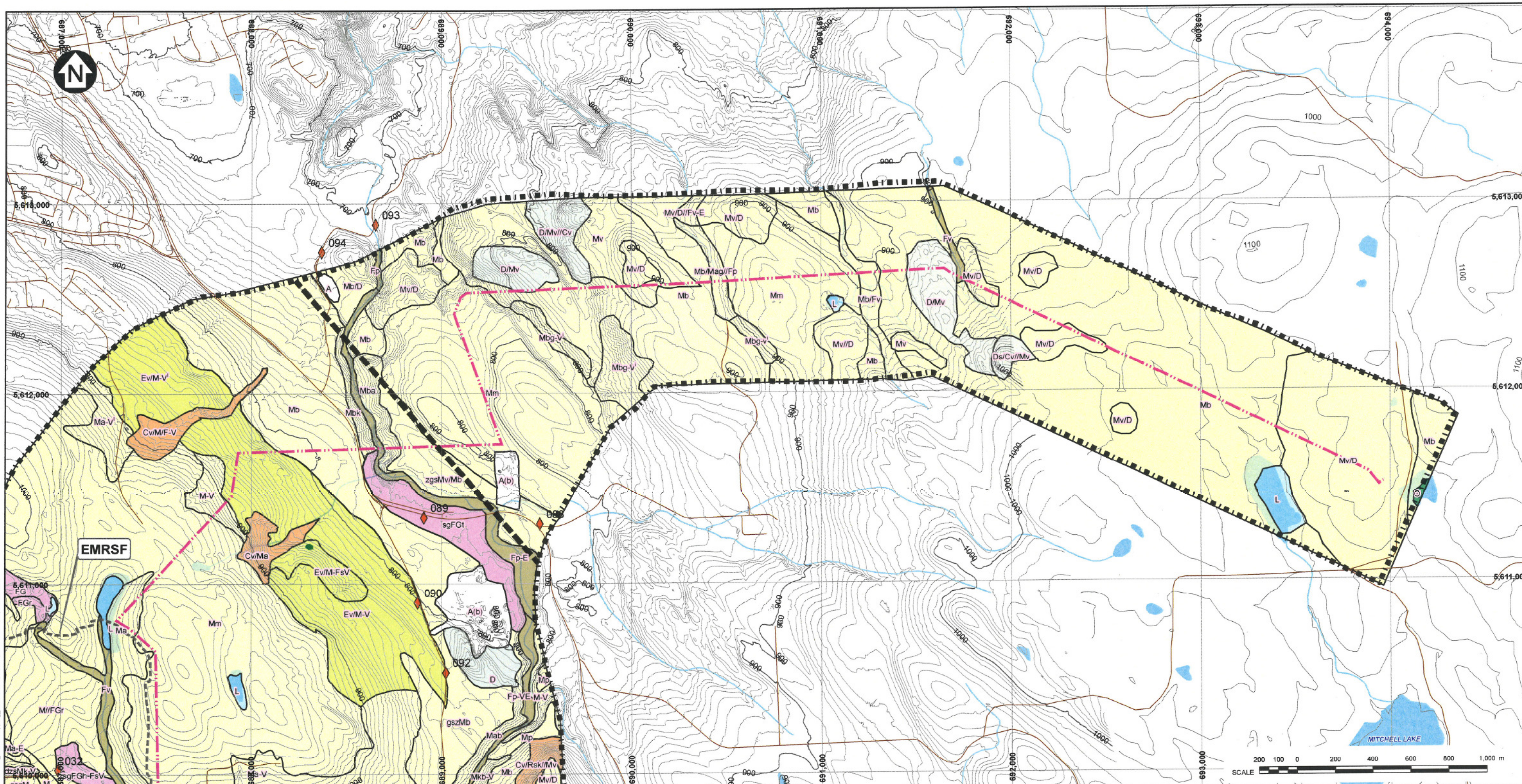


**LEGEND:**

**GENERAL**

- WAY POINT
- KINDER MORGAN PIPELINE
- ROAD
- RIVER/CREEK
- CONTOUR 5 m LIDAR
- CONTOUR 100 m LIDAR
- CONTOUR 20 m TRIM
- LAKE
- STUDY AREA
- TERRAIN UNIT

**PROPOSED FACILITIES**

- MINE INFRASTRUCTURE
- PROPOSED TRANSMISSION LINE

**TERRAIN HAZARDS**

- RECENT DEBRIS SLIDE

**SUFICIAL GEOLOGY**

| | |
|---|---|
| A | ANTHROPOGENIC MATERIAL |
| F,Fp | ALLUVIUM |
| Ff | FLUVIAL FAN |
| O | ORGANIC SWAMP |
| E | EOLIAN SEDIMENTS |
| C | COLLUVIUM |
| L | GLACIAL LAKE DEPOSIT |
| L | LAKE DEPOSIT |
| FG | GLACIOFLUVIAL SANDS AND GRAVELS |
| M | GLACIAL TILL |
| D/R | WEATHERED BEDROCK |

**FOR INFORMATION ONLY**

**NOTES:**

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N.
2. THIS MAP IS PRODUCED AT A NOMINAL SCALE OF 1:20,000 FOR 11x17 (TABLOID) PAPER. ACTUAL SCALE MAY DIFFER ACCORDING TO CHANGES IN PRINTER SETTINGS OR PRINTED PAPER SIZE.
3. REFER TO DRAWING C029-KA39-7530-00-010 FOR TERRAIN UNIT LEGEND.
4. TERRAIN MAPPING UNDERTAKEN TO TERRAIN SURVEY INTENSITY LEVEL E.
5. 'RECENT' LANDSLIDES ARE THOSE OBSERVED IN THE AIR PHOTO RECORD OR IN SITE RECONNAISSANCE AS BEING DEVOID OF VEGETATION, BEING ONLY PARTLY RE-VEGETATED OR BEING RE-VEGETATED WITH PIONEER SPECIES E.G. ALDER.
6. 'RELICT' LANDSLIDES PRE-DATE THE AIR PHOTO RECORD.
7. FACILITIES BASED ON AUG'14 VERSION OF THE GENERAL ARRANGEMENT.

| DRG. NO. | DESCRIPTION |
|---|---|

REFERENCE DRAWINGS

| REV | DATE | DESCRIPTION | DESIGN | DRAWN | CHK'D | APP'D |
|---|---|---|---|---|---|---|

REVISIONS

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 0 | 06JUL'15 | ISSUED FOR INFORMATION | JEH | KK | RCB | RCB |

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PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — J. E. HALEY # 33730

July 6th, 2015

J. Haley

**Knight Piésold**
CONSULTING

KGHM AJAX MINING INC.

## AJAX PROJECT

### TERRAIN MAP (SHEET 3 OF 3) TRANSMISSION LINE STUDY AREA

| P/A NO. | DRAWING NO. | REVISION |
|---|---|---|
| VA101-246/34 | C029-KA39-7530-00-013 | 0 |

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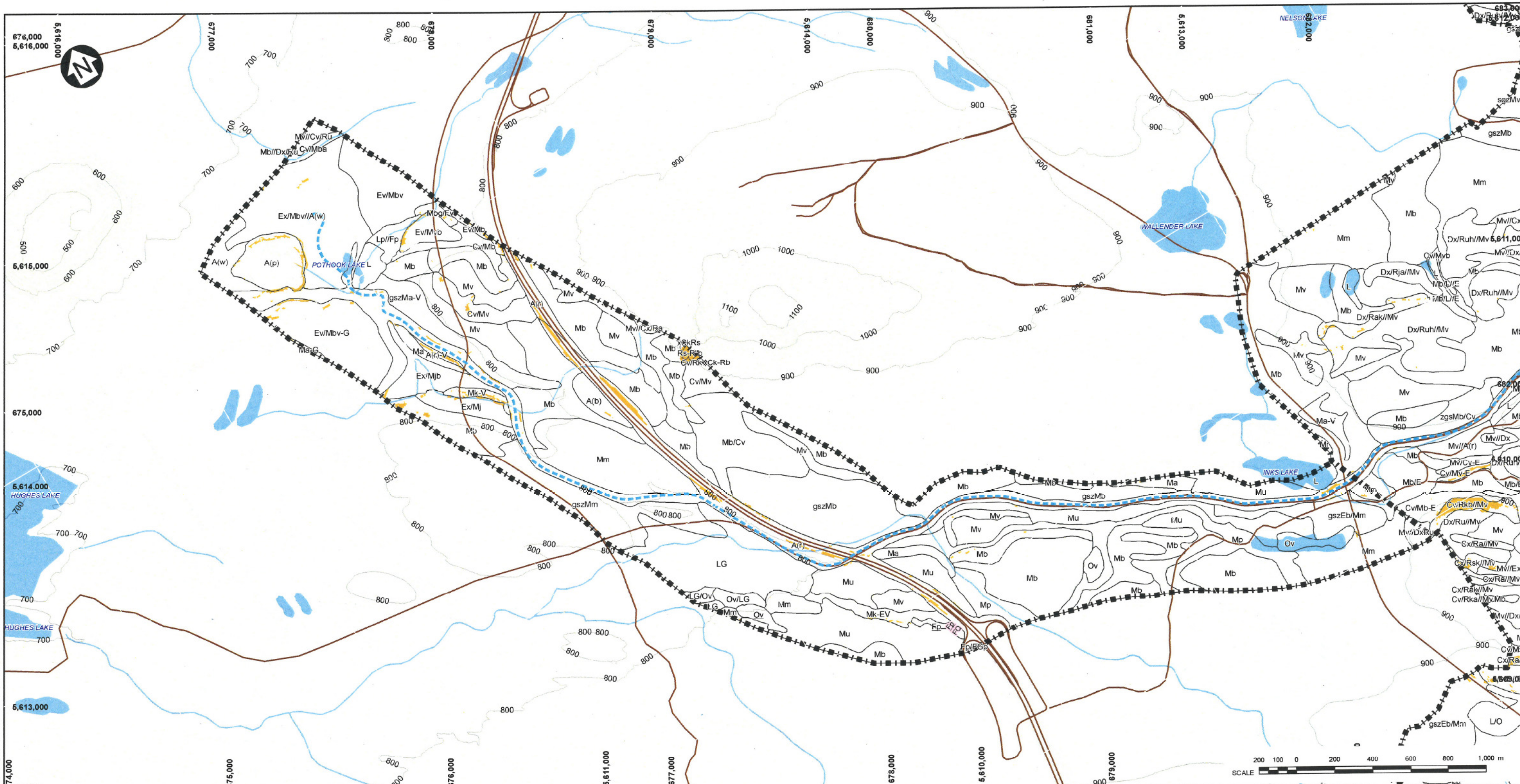


**LEGEND:**

GENERAL
- KINDER MORGAN PIPELINE
- ROAD
- RIVER/CREEK
- CONTOUR 5 m LIDAR
- CONTOUR 100 m LIDAR
- CONTOUR 20 m TRIM
- LAKE
- STUDY AREA
- TERRAIN UNIT

PROPOSED FACILITIES
- MINE INFRASTRUCTURE
- WATER SUPPLY PIPELINE

STABILITY CLASS
- POTENTIALLY UNSTABLE
- UNSTABLE

**FOR INFORMATION ONLY**

**NOTES:**
1. COORDINATE GRID IS IN METRES.
COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N.
2. THIS MAP IS PRODUCED AT A NOMINAL SCALE OF 1:20,000 FOR 11x17 (TABLOID) PAPER. ACTUAL SCALE MAY DIFFER ACCORDING TO CHANGES IN PRINTER SETTINGS OR PRINTED PAPER SIZE.
3. REFER TO DRAWING C029-KA39-7530-00-010 FOR TERRAIN UNIT LEGEND.
4. TERRAIN STABILITY MAPPING UNDERTAKEN TO TERRAIN SURVEY INTENSITY LEVEL D.
5. FACILITIES BASED ON AUG'14 VERSION OF THE GENERAL ARRANGEMENT.

| DRG. NO. | DESCRIPTION |
|---|---|
| REFERENCE DRAWINGS | |

| REV | DATE | DESCRIPTION | DESIGN | DRAWN | CHK'D | APP'D |
|---|---|---|---|---|---|---|
| REVISIONS | | | | | | |

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED | APPROVED |
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PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — J. E. HALEY # 23730

July 6th 2015 J. E. Haley

**Knight Piésold**
CONSULTING

KGHM AJAX MINING INC.

**AJAX PROJECT**

**TERRAIN STABILITY MAP**
**(SHEET 1 OF 3)**
**WATER SUPPLY PIPELINE STUDY AREA**

| P/A NO. | DRAWING NO. | REVISION |
|---|---|---|
| VA101-246/34 | C029-KA39-7530-00-020 | 0 |

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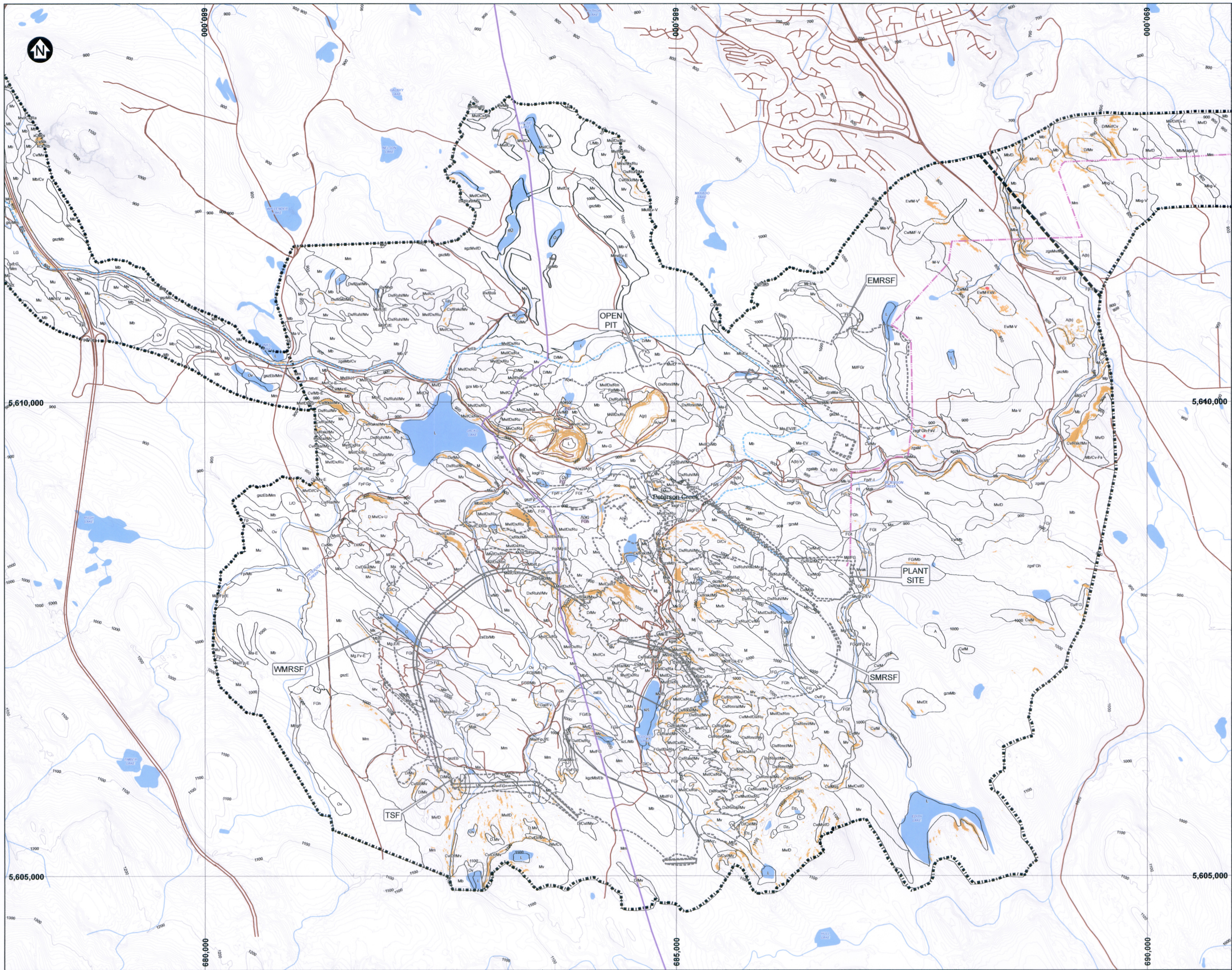



**LEGEND:**

**GENERAL**

- KINDER MORGAN PIPELINE
- ROAD
- RIVER/CREEK
- CONTOUR 5 m LIDAR
- CONTOUR 100 m LIDAR
- LAKE
- STUDY AREA
- TERRAIN UNIT

**STABILITY CLASS**

- POTENTIALLY UNSTABLE
- UNSTABLE

**PROPOSED FACILITIES**

- MINE INFRASTRUCTURE
- PROPOSED WATER SUPPLY PIPELINE
- PROPOSED TRANSMISSION LINE

# FOR INFORMATION ONLY

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N.
2. THIS FIGURE IS PRODUCED AT A NOMINAL SCALE OF 1:20,000 FOR 24x36 ("D" SIZE) PAPER. ACTUAL SCALE MAY DIFFER ACCORDING TO CHANGES IN PRINTER SETTINGS OR PRINTED PAPER SIZE.
3. REFER TO DRAWING C029-KA39-7530-00-010 FOR TERRAIN UNIT LEGEND.
4. TERRAIN STABILITY MAPPING UNDERTAKEN TO TERRAIN SURVEY INTENSITY LEVEL C.
5. FACILITIES BASED ON AUG'14 VERSION OF THE GENERAL ARRANGEMENT.

400 200 0 400 800 1,200 1,600 2,000 m

SCALE


DISCLAIMER

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PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA J. E. HALEY # 33730

J. Haley July 6th, 2015

**Knight Piésold CONSULTING**

**KGHM AJAX MINING INC.**

**AJAX PROJECT**

**TERRAIN STABILITY MAP (SHEET 2 OF 3) MINE SITE STUDY AREA**

| DRG. NO. | DESCRIPTION | REV | DATE | | DESIGN | DRAWN | CHK'D | APP'D | REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | | | | | | | | 0 | 06JUL'15 | ISSUED FOR INFORMATION | JEH | KK | RW | RW |
| REFERENCE DRAWINGS | | REVISIONS | | | | | | | REVISIONS | | | | | | |

| P/A NO. | DRAWING NO. | REVISION |
|---|---|---|
| VA101-246/34 | C029-KA39-7530-00-021 | 0 |

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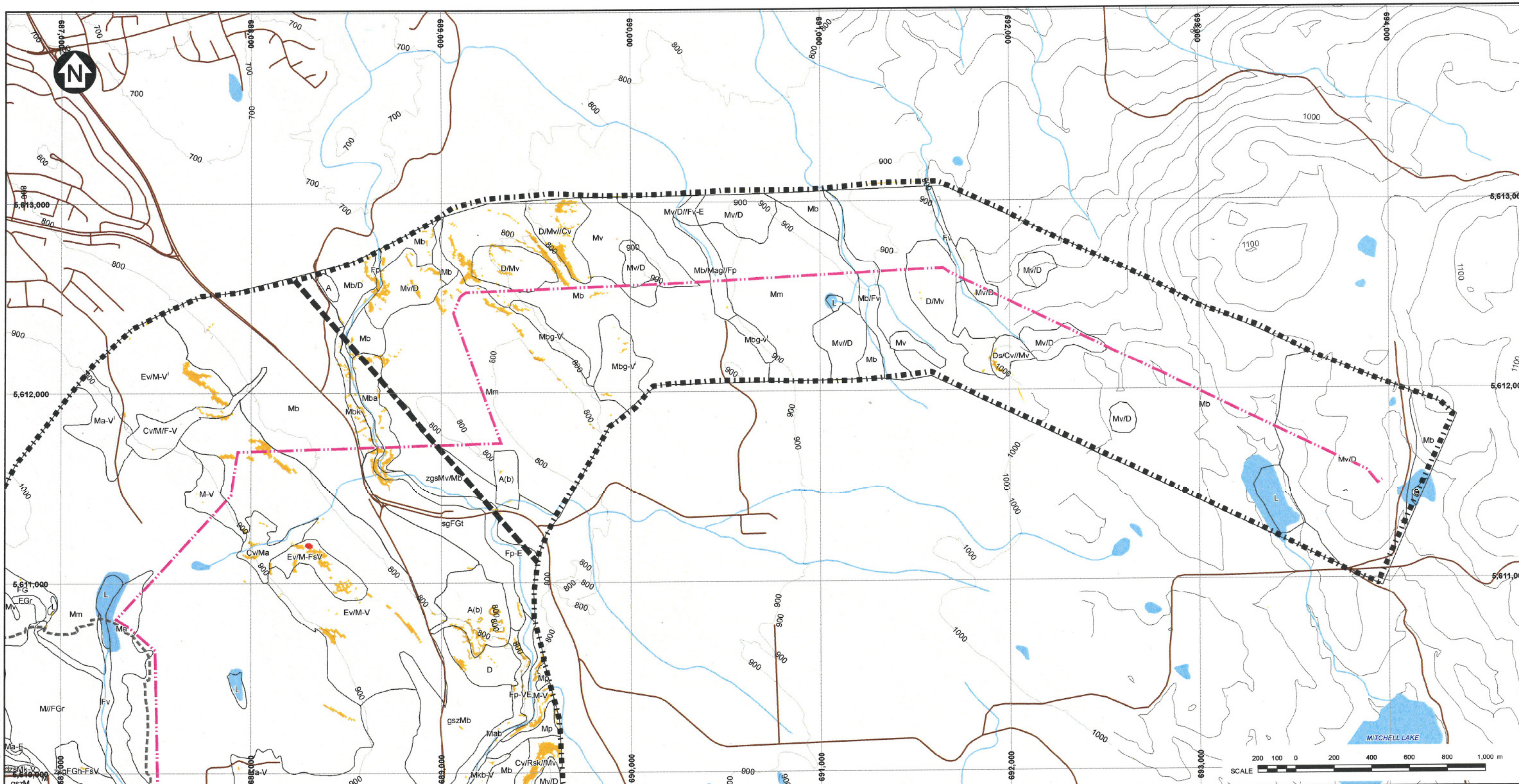


**LEGEND:**

**GENERAL**

- KINDER MORGAN PIPELINE
- ROAD
- RIVER/CREEK
- CONTOUR 5 m LIDAR
- CONTOUR 100 m LIDAR
- CONTOUR 20 m TRIM
- LAKE
- STUDY AREA
- TERRAIN UNIT

**PROPOSED FACILITIES**

- MINE INFRASTRUCTURE
- PROPOSED TRANSMISSION LINE

**STABILITY CLASS**

- POTENTIALLY UNSTABLE
- UNSTABLE

**FOR INFORMATION ONLY**

**NOTES:**

1. COORDINATE GRID IS IN METRES.
COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N.
2. THIS MAP IS PRODUCED AT A NOMINAL SCALE OF 1:20,000 FOR 11x17 (TABLOID) PAPER. ACTUAL SCALE MAY DIFFER ACCORDING TO CHANGES IN PRINTER SETTINGS OR PRINTED PAPER SIZE.
3. REFER TO DRAWING C029-KA39-7530-00-010 FOR TERRAIN UNIT LEGEND.
4. TERRAIN STABILITY MAPPING UNDERTAKEN TO TERRAIN SURVEY INTENSITY LEVEL E.
5. FACILITIES BASED ON AUG'14 VERSION OF THE GENERAL ARRANGEMENT.

DISCLAIMER

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PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — J. E. HALEY # 33730 — July 8th 2015 — J Haley

**Knight Piésold** CONSULTING

KGHM AJAX MINING INC.

AJAX PROJECT

**TERRAIN STABILITY MAP (SHEET 3 OF 3) TRANSMISSION LINE STUDY AREA**

| P/A NO. | DRAWING NO. | REVISION |
|---|---|---|
| VA101-246/34 | C029-KA39-7530-00-022 | 0 |

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED | APPROVED |
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| 0 | 06JUL'15 | ISSUED FOR INFORMATION | JEH | KK | RCB | RCB |

REVISIONS

| DRG. NO. | DESCRIPTION |
|---|---|
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REFERENCE DRAWINGS

| REV | DATE | DESCRIPTION | DESIGN | DRAWN | CHK'D | APP'D |
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REVISIONS

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## APPENDIX B

## FINDINGS OF FIELD TRUTHING

(Pages B-1 to B-5)

Knight Piésold CONSULTING

# TABLE B.1

## KGHM AJAX MINING INC.
## AJAX PROJECT

## RECONNAISSANCE TERRAIN AND TERRAIN STABILITY MAPPING (RTSM)
## FINDINGS OF FIELD THRUTHING

Print Jun/26/15 17:01:30

| Field Truthing Location | Description |
|---|---|
| WP 1 | Exposure in 7 m high roadside Cut Slope: Hard brown grey SILT, some sand, some subangular to subrounded fine to coarse gravel, trace subrounded cobbles (Till) |
| WP 2 | Exposure in 5 m high roadside Cut Slope: Hard brown grey SILT, some sand, some subangular to subrounded fine to coarse gravel, trace subrounded cobbles (Till). Gully erosion. |
| WP 3 | Dense brown SILT, some sand, some subangular to subrounded fine to coarse gravel, trace subrounded cobbles (Till) |
| WP 4 | Stiff grey brown gravelly SILT, trace sand, trace subrounded cobbles; gravel is subangular to subrounded and fine to coarse (Till) |
| WP 6 | Pit to 0.4 m: 0 to 0.3 m: Stiff, friable, dark grey organic SILT with many roots, 0.3 to 0.4 m: Stiff light grey friable SILT (Glacial Lake Deposit?) |
| WP 8 | Pit to 0.5 m: Firm to stiff dark grey friable SILT with many roots. |
| WP 10 | Dense brown SILT, some fine sand, some subrounded to subangular fine to coarse gravel, trace cobbles (Till) |
| WP 11 | Very stiff brown grey SILT, some fine sand, some subrounded to subangular fine to coarse gravel (Till) |
| WP 13 | Pit to 0.3 m in grassland area: 0 to 0.1 m: Topsoil; 0.1 to 0.3 m: Compact light grey sandy SILT, some subangular to subrounded fine to coarse gravel; sand is fine (Reworked Loess?). |
| WP 14 | Firm to stiff brown grey gravelly SILT, some fine sand; gravel is subangular to subrounded and fine to coarse (Till) |
| WP 15 | Pit to 0.6 m at site of old lake: 0 to 0.3 m: Firm dark grey fibrous PEAT; 0.3 to 0.6 m: Firm green grey SILT with trace roots and shell fragments. |
| WP 16 | Roadside cut slope: Very stiff brown light grey gravelly SILT, some fine sand; gravel is subangular to subrounded and fine to coarse (Till) |
| WP 17 | Bedrock |
| WP 18 | Pit to 0.4 m: Firm dark grey fibrous PEAT |
| WP 19 | Compact brown light grey sandy SILT; sand is fine (Loess) |
| WP 20 | Stiff grey brown SILT, some fine sand, some subangular to subrounded fine to coarse gravel (Till) |
| WP 21 | Dense light grey SILT, some fine sand |

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**TABLE B.1**

**KGHM AJAX MINING INC.**
**AJAX PROJECT**

**RECONNAISSANCE TERRAIN AND TERRAIN STABILITY MAPPING (RTSM)**
**FINDINGS OF FIELD THRUTHING**

Print Jun/26/15 17:01:30

| Field Truthing Location | Description |
|---|---|
| WP 22 | Pit to 0.3 m: Dense grey brown gravelly fine SAND, some silt, trace subrounded cobbles; gravel is subangular to subrounded and fine to coarse (Till) |
| WP 23 | Pit to 0.6 m: 0 to 0.3 m: Firm dark grey organic SILT, trace sand, trace roots; 0.3 to 0.6 m: Firm green light grey SILT, some fine sand (Alluvium) |
| WP 24 | Bedrock outcrop |
| WP 25 | Pit to 0.3 m: Dense brown grey sandy SILT, some subangular to subrounded fine to coarse gravel (Glacial Till) |
| WP 26 | Exposure in drilling sump excavation: Dense grey brown silty fine to medium SAND, some subrounded to subangular fine to coarse gravel, trace roots (Till) |
| WP 28 | Pit to 0.6 m: 0 to 0.5 m: Firm black fibrous PEAT; 0.5 to 0.6 m: Soft dark grey organic SILT. Groundwater inflow at 0.5 m. |
| WP 29 | Old Pit: Weak moderately weathered Granodiorite with very closely spaced discontinuities |
| WP 30 | Pit to 0.3 m: Dense brown sandy SILT, some subangular to subrounded fine to coarse gravel (Till) |
| WP 31 | Pit to 0.3 m: Firm to stiff grey brown sandy SILT some subangular to subrounded fine to coarse gravel, trace cobbles (Till) |
| WP 32 | Pit to 0.4 m: Compact grey brown fine to medium SAND and subangular to subrounded fine to coarse GRAVEL, some silt, trace subangular cobbles (Kame mound) |
| WP 33 | Pit to 0.3 m: Dense grey brown silty gravelly fine to medium SAND, trace subrounded cobbles; gravel is subangular to subrounded and fine to coarse |
| WP 34 | Pit to 0.3 m: Compact grey brown fine to medium SAND and subangular to subrounded fine to coarse GRAVEL, some silt (kame deposit). Shallow debris slide on 50% slope (approx. 7 m x 7m x 0.2 m) |
| WP 35 | approx. 2.5 m gully (formed by seepage erosion?): 0 to 0.5 m: Compact grey brown fine to medium SAND and subangular to subrounded fine to coarse GRAVEL, trace to some silt, trace subrounded cobbles; 0.5 to 2.5 m: Compact brown grey sandy subangular to subrounded fine to coarse GRAVEL, trace subrounded cobbles (Kame Deposit) |
| WP 37 | Compact grey brown gravelly fine to medium SAND, trace to some silt; gravel is subangular to subrounded and fine to coarse (Kame Deposit) |
| WP 39 | Compact grey brown gravelly fine to medium SAND, some silt, trace cobbles; gravel is subangular to subrounded and fine to coarse (Till) |
| WP 41 | Pit to 0.5 m: Compact brown grey fine to medium SAND, some silt some subrounded to subangular fine to coarse gravel (Till) |

Knight Piésold CONSULTING

**TABLE B.1**

**KGHM AJAX MINING INC.**
**AJAX PROJECT**

**RECONNAISSANCE TERRAIN AND TERRAIN STABILITY MAPPING (RTSM)**
**FINDINGS OF FIELD THRUTHING**

Print Jun/26/15 17:01:30

| Field Truthing Location | Description |
|---|---|
| WP 42 | Exposure in roadside Cut Slope: Compact brown gravelly fine to medium SAND some silt trace cobbles; gravel is subangular to subrounded and fine to coarse (Ablation Till?) |
| WP 44 | Pit to 0.3 m: Dense grey brown sandy gravelly SILT, gravel is subangular to subrounded and fine to coarse, sand is fine to medium (Basal Till?) |
| WP 46 | Exposure in roadside Cut Slope: Stiff grey SILT, trace sand, trace clay, with some cobble to boulder sized pockets of fine to medium sand, trace silt (Basal Till?) |
| WP 47 | Pit to 0.4 m: Compact brown fine to medium SAND and subangular to subrounded fine to coarse GRAVEL, trace silt (Glaciofluvial Sands and Gravels) |
| WP 48 | Pit to 0.5 m: Dense brown silty gravelly fine to medium SAND; gravel is subangular to subrounded and fine to coarse. At 0.5 m…becomes difficult to dig, subangular gravel sized fragments recovered. |
| WP 50 | Natural slope = 35 to 40%.Spoon-shaped depression, approx. 40 m wide x 60 m long x 15 m deep, vegetated with grass. A soil 'lobe' extends down the centre-line but there is no discernible landslide deposit at the toe of the slope. If it is a landslide a lot of debris has been removed from the slope toe making it very old. The feature is interpreted to largely be the result of ongoing erosion. |
| WP 52 | Pit to 0.5 m: Compact grey brown gravelly fine to medium SAND, trace to some silt; gravel is subangular to subrounded and fine to coarse (Kame) |
| WP 53 | Compact brown fine to medium SAND, some silt, some subangular to subrounded fine to coarse gravel (Ablation Till?) |
| WP 54 | Compact brown grey gravelly fine to medium SAND, some silt; gravel is subangular to subrounded and fine to coarse (Ablation Till?) |
| WP 56 | Pit to 0.3 m in cut slope: Loose to compact grey brown fine to coarse SAND and angular to subrounded fine to coarse GRAVEL, trace subrounded cobbles, trace silt (Kame) |
| WP 57 | Pit to 0.2 m in cut slope: Loose to compact brown grey gravelly fine to coarse SAND, trace subrounded cobbles; gravel is subangular to subrounded and fine top coarse (Glaciofluvial Sands and Gravels) |
| WP 58 | Pit to 0.3 m in cut slope: Very stiff grey brown SILT, some sand, some subangular to subrounded fine to coarse gravel (Basal Till?) |
| WP 59 | Pit to 0.3 m: Compact brown gray fine to coarse SAND and subangular to subrounded fine to coarse GRAVEL, some subrounded cobbles, trace silt (Kame Mound) |
| WP 60 | Pit near Peterson Creek: 0 to 0.35m: firm dark grey organic SILT, trace sand, trace roots; 0.35 to 0.4 m: Subrounded COBBLES, some fine to coarse sand, some subangular to subrounded fine to coarse gravel, trace silt. Groundwater inflow at 0.35 m. |
| WP 62 | Pit to 0.5 m: Compact brown grey fine to medium SAND, some silt some subrounded to subangular fine to coarse gravel, trace cobbles (Ablation Till?) |

Knight Piésold CONSULTING

**TABLE B.1**

**KGHM AJAX MINING INC.**
**AJAX PROJECT**

**RECONNAISSANCE TERRAIN AND TERRAIN STABILITY MAPPING (RTSM)**
**FINDINGS OF FIELD THRUTHING**

Print Jun/26/15 17:01:30

| Field Truthing Location | Description |
|---|---|
| WP 64 | Compact grey brown fine to coarse SAND and subangular to subrounded fine to coarse GRAVEL, trace to some silt, trace cobbles (Kame Mound) |
| WP 65 | Pit to 0.3 m in 2 m cut slope: Loose grey brown fine to coarse SAND and subangular to subrounded fine to coarse GRAVEL, trace subrounded cobbles (Glaciofluvial Sands and Gravels) |
| WP 66 | Pit to 0.3 m in 5 m cut slope: Dense green light grey silty fine to medium SAND, some subangular gravel, trace subrounded cobbles and boulders (Basal Till?) |
| WP 67 | Pit to 0.3 m in 5 m cut slope: Compact brown fine to medium SAND, some subangular to subrounded fine to coarse gravel, trace to some silt (Kame) |
| WP 68 | Pit to 0.3 m in 60% natural slope: Compact brown fine to medium SAND, some subangular to angular gravel, trace to some silt, trace subangular cobbles (Colluvium) |
| WP 70 | Pit to 0.5 m: Soft grey SILT trace sand (Lake Deposit?); groundwater seepage at base |
| WP 71 | Bedrock outcrop |
| WP 72 | Bedrock outcrop |
| WP 73 | Bedrock outcrop |
| WP 75 | Pit to 0.5 m: Compact green grey fine SAND, some silt, some subangular to subrounded fine to coarse gravel (Reworked Loess?) |
| WP 76 | Pit to 0.3 m: Compact grey brown silty fine SAND (Loess). Slope angle = 7% |
| WP 78 | Pit to 0.3 m: Compact orange brown sandy SILT, some subangular to subrounded fine to coarse gravel, trace subrounded cobbles (Till). Slope angle =10% |
| WP 80 | Pit to 0.5 m: Soft brown grey sandy SILT, some clay, some subangular to subrounded fine to coarse gravel (Fluvial Deposit) |
| WP 81 | Pit to 0.3 m: Hard grey SILT, some sand, some subangular to subrounded fine to coarse gravel (Basal Till) |
| WP 83 | Pit to 0.3 m: Compact grey brown fine to coarse SAND and subangular to subrounded fine to coarse GRAVEL, trace subrounded cobbles, trace silt |
| WP 84 | Old Waste Rock Dump: Subangular to angular COBBLE sized fragments, some angular to subangular fine to coarse gravel size fragments some fine to medium sand, some subangular to angular boulder sized fragments, trace silt |
| WP 86 | Pit to 0.4 m in 4 m cut slope: Compact grey brown gravelly fine to medium SAND, some silt; gravel is subangular to subrounded and fine to coarse (Ablation Till?) |

Knight Piésold
CONSULTING

# TABLE B.1

## KGHM AJAX MINING INC.
## AJAX PROJECT

## RECONNAISSANCE TERRAIN AND TERRAIN STABILITY MAPPING (RTSM)
## FINDINGS OF FIELD THRUTHING

Print Jun/26/15 17:01:30

| Field Truthing Location | Description |
|---|---|
| WP 88 | Pit to 0.4 m: Compact brown gravelly fine to medium SAND, some silt; gravel is subangular to subrounded and fine to coarse (Till) |
| WP 89 | Pit to 0.4 m: Compact grey brown fine to coarse SAND and subrounded fine to coarse GRAVEL, trace silt (Glaciofluvial Sands and Gravels) |
| WP 90 | Pit to 0.3 m in 3 m roadside cut slope: Compact brown fine to medium SAND, some silt, some subrounded to subangular fine to coarse gravel (Till) |
| WP 92 | Pit to 0.3 m in 1 m roadside cut slope: Stiff grey sandy SILT, some subangular to subrounded fine to coarse gravel (Till) |
| WP 93 | Pit to 0.3 m in 5 m cut slope: Very stiff brown grey sandy SILT, some subangular to subrounded fine to coarse gravel, trace cobbles (Basal Till?) |
| WP 94 | Pit to 0.45 m in cut slope: Compact brown fine to medium SAND, some silt, some subangular to subrounded fine to coarse gravel (Ablation Till?) |
| WP 95 | Old Waste Rock Dump: Compact grey cobbley angular to subangular fine to coarse GRAVEL sized fragments, some fine to coarse sand, trace subangular boulder sized fragments |
| WP 97 | Pit to 0.5 m: Compact brown grey fine to medium SAND, some subangular to subrounded fine to coarse gravel, trace subrounded cobbles, trace silt (Glaciofluvial Sands and Gravels) |
| WP 98 | Pit to 0.3 m in 7 m cut slope: Compact grey brown fine to medium SAND, some silt, some subangular to subrounded fine to coarse gravel (Till). Some gully erosion on slope. |
| WP 100 | Pit to 0.4 m: 0 to 0.25 m: Firm dark grey organic SILT, some fine to medium sand, trace roots; 0.25 to 0.4 m: soft to firm grey brown sandy SILT, some subangular to subrounded fine to coarse gravel, trace roots |

M:\1\01\00246\34\A\Report\Report 1 - Baseline Report_Rev 0\Appendix\Appendix B - Table\[Table B.1 Field Truthing.xlsx]Summary Table

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|---|---|---|---|---|
| REV | DATE | DESCRIPTION | PREP'D | RVW'D |