Appendix D

Tailings Management Facility Preparation Plan

ALDERON
IRON ORE CORP

16 March 2012

Tilman Bieger, Regional Manager &
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ATTENTION: Tilman Bieger & Michelle Roberge

Dear Tilman and Michelle:

Re: Kami Project Tailings Management Facility Preparation Plan

Please find attached in PDF format the proposed Tailings Management Facility Preparation Plan for the Kami Iron Ore Mine in Labrador.

Please contact me if you require any clarification or additional information.

Thank you,

Todd Burlingame
Executive Vice-President Environment & Aboriginal Affairs

cc: Bernard Potvin, Fay Pitman, Jim McCarthy, Colleen Leeder

Encl.

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Tailings Management Facility Preparation Plan

Kami Iron Ore Mine and Rail Spur, Labrador

Prepared for

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File No. 121614000.322

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1.0 INTRODUCTION

Alderon Iron Ore Corp. (Alderon) has retained Stassinu Stantec Limited Partnership (Stassinu Stantec) and AMEC Environment and Infrastructure, a division of AMEC Americas Ltd. (AMEC), to complete a Tailings Management Facility (TMF) preparation plan which outlines the preparation and summarizes the construction of the tailings impoundment area(s) planned in support of the development of The Kami Iron Ore Mine, in western Labrador.

The Kami Iron Ore Mine site is located 6 km south from the Wabush Mines lease owned by Cliffs Natural Resources Inc. (Cliffs) and in the vicinity of the towns of Wabush, Labrador City and Fermont as shown on Figure 1-1. The Kami Iron Ore Mine and Rail Spur Project is located entirely within Labrador, and includes construction, operation, rehabilitation and closure of an open pit (Rose Pit), waste rock disposal areas, processing infrastructure, a TMF, ancillary infrastructure to support the mine and process plant, and the rail component. The mine will produce up to 16 million metric tonnes of iron ore concentrate per year for approximately 15 years. Ore will be mined from an open pit using conventional drill and blast techniques and transported via haul truck to two primary crushers near Rose Pit. The process plant will have two lines of grinding and screening, gravity and magnetic concentrate. The TMF has design capacity of 140 million m^3 of tailings; the remaining 50 million m^3 will be deposited in an exhausted section of the Rose Pit.

This plan is based on a preliminary design for the TMF, as shown on the Site Location Plan in Figure 1-2, which comprises two phases (detailed further in Section 3.0):

- Tailings Impoundment Phase 1 Years 1 to 8
- Tailings Impoundment Phase 2 Years 9 to 16

Prior to construction of the dams and dykes for tailings impoundment, it will be necessary to dewater the area and establish engineered decant/effluent management structures within the entire footprint of the tailing management facility. It should be noted that while use of each TMF phase will occur at different times, the engineered decant/effluent structures required for both phases will be constructed during initial TMF preparation. This will include connection of these structures to the Polishing Pond. Further details regarding the proposed schedule of activities are presented in Section 4.0. All activities will be conducted in a manner which will manage water, control erosion and Total Suspended Sediment (TSS) of the TMF during both construction and operation. Construction design and mitigation includes site preparation work that will include removal of the small standing waterbodies and interconnecting streams that originate in the TMF and establishment of drainage and collection features which will control flow and direct accumulation of liquids to the polishing pond for necessary treatment prior to release.

Figure 1-1 Project Location Plan

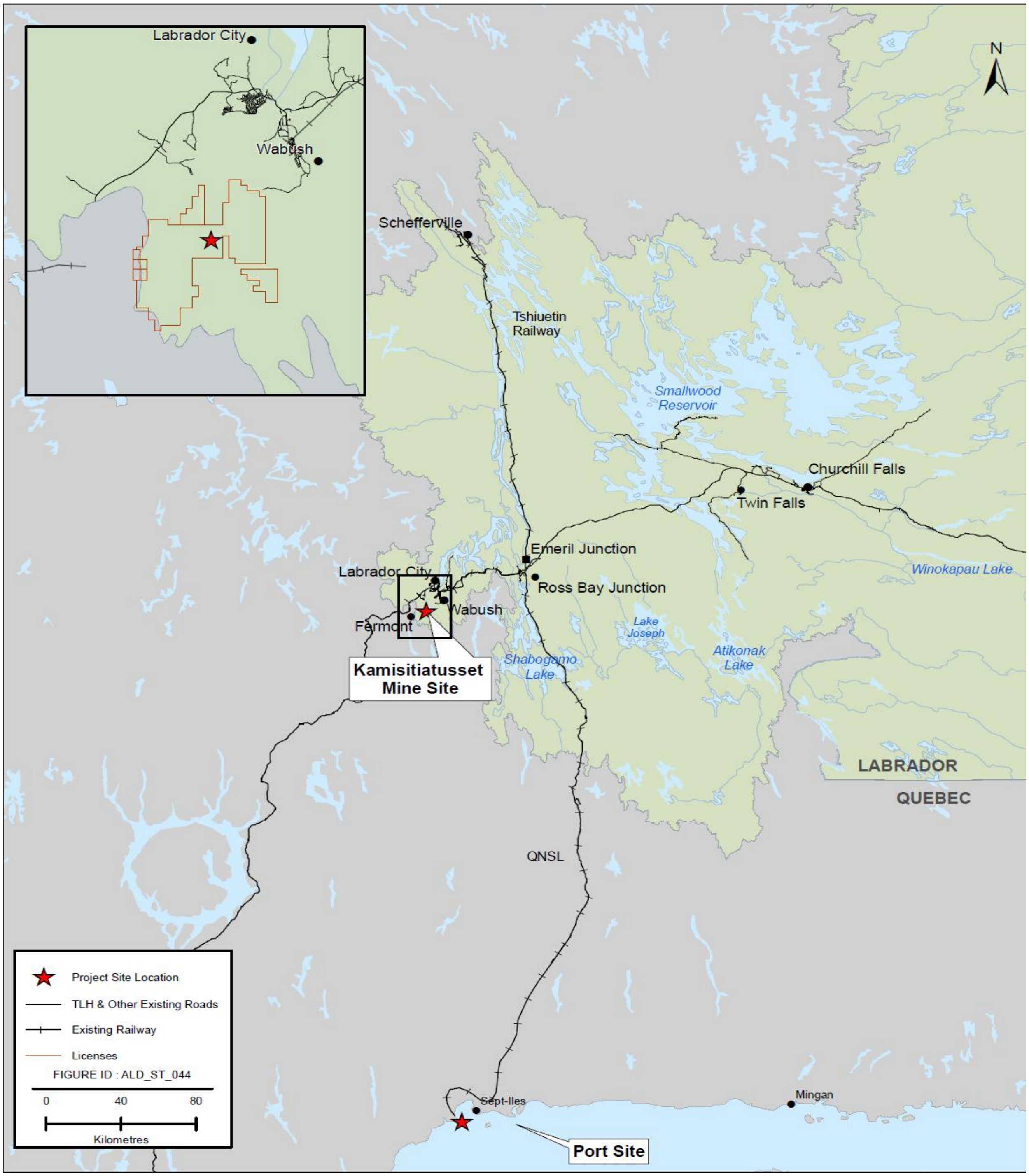
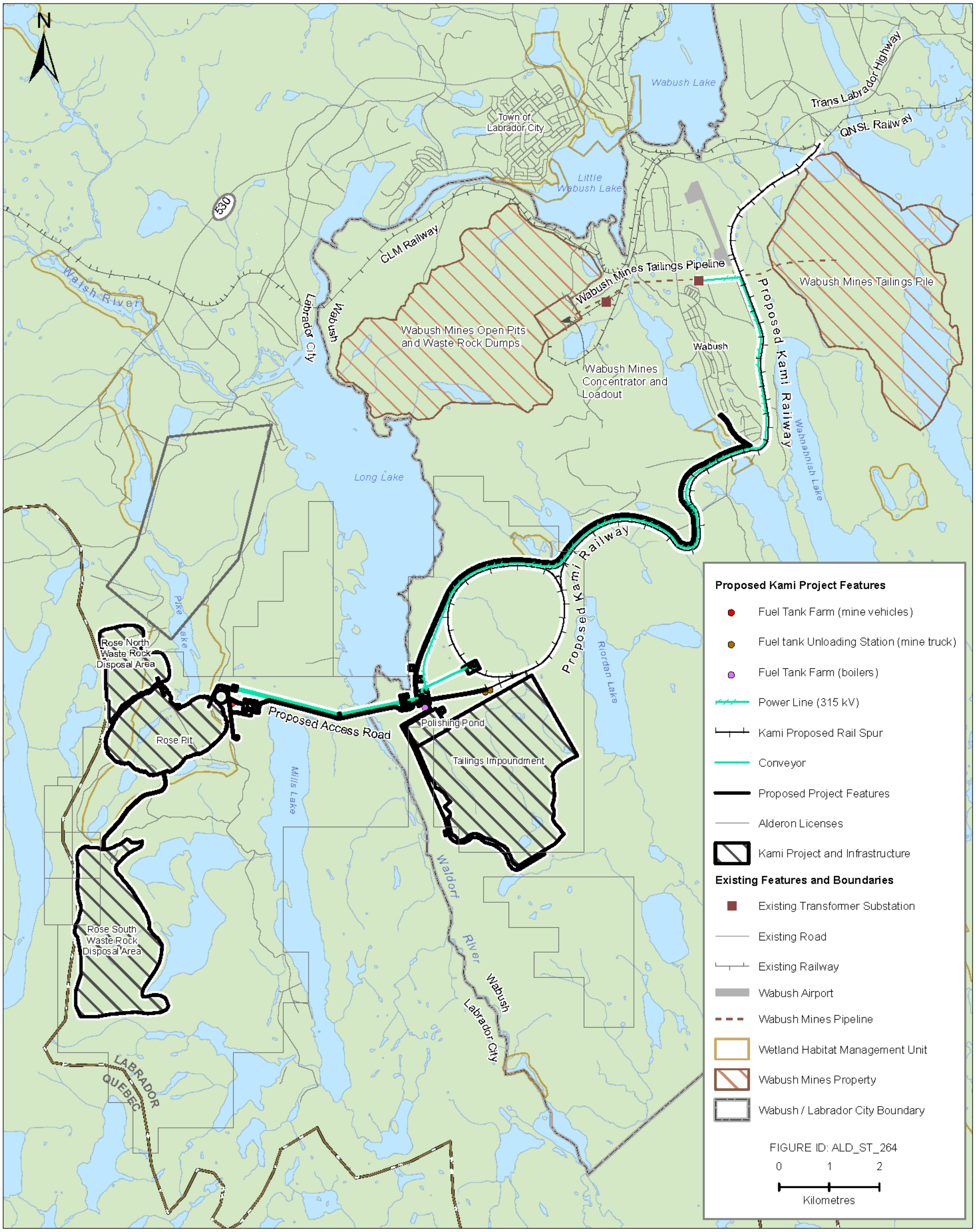


Figure 1-2 Site Location Plan



All aquatic habitat within the footprint of the TMF will be completely dewatered, removed, and engineered decant/effluent structures installed as part of the preparation activities prior to tailings and/or effluent being introduced into the TMF.

Under Section 35(1) of the *Fisheries Act*, the footprint and water management requirements (dewatering and removal of the existing small ponds and streams within the TMF structure) will most likely result in the harmful alteration, disruption or destruction (HADD) of fish habitat. As a result, Authorization by the Minister of Fisheries and Oceans Canada (DFO) under Section 35(2) will be required prior to any HADD occurring. Before any Approval or Authorization can be issued by DFO, Alderon Iron Ore Corp. will be required to submit an acceptable Fish Habitat Compensation Plan to offset the quantified habitat losses. In order to remain conservative; it is currently assumed that all fish habitat within the TMF, as well as a portion downstream, would be included in the HADD determination and appropriate compensation required. Hydraulic investigations are continuing to determine the extent of downstream alterations beyond the TMF footprint.

Prior to any site preparation, fish in these streams and small standing waterbodies will be captured and transferred to locations approved by Fisheries and Oceans Canada (DFO).

1.1 Tailings Management Facility

The TMF is located in the central portion of the Project area, southeast of Long Lake (Figure 1-3). There are two small streams (labelled as TDA01 and TDA02), and a tributary to stream TDA02 designated as TDA02 East identified within the TMF. These streams drain from the southeast into Long Lake. While both are identified as “indistinct” on 1:50,000 topographic mapping, they were included in fish and fish habitat surveys completed in 2011 to describe the habitat and how fish may be using it. This information will be used in the HADD determination.

Additional detail on stream measurements, winter habitat conditions, photographs, and fish species information were provided to DFO between March 8-13 2012, and is summarized below.

1.2 Streams in the TMF

1.2.1 Stream TDA01

This 2.8 km stream flows in a northwest direction into Long Lake. On average, the stream width is 1.0 m, the average measured stream velocity is 0.088 m/s, and the average water depth is 36 cm. The overall substrate composition is fines, and the riparian area is dominated by shrubs. The overall watershed drainage area is estimated at 354.7 ha based on GIS delineation.

Figure 1-3 Tailings Management Facility Streams

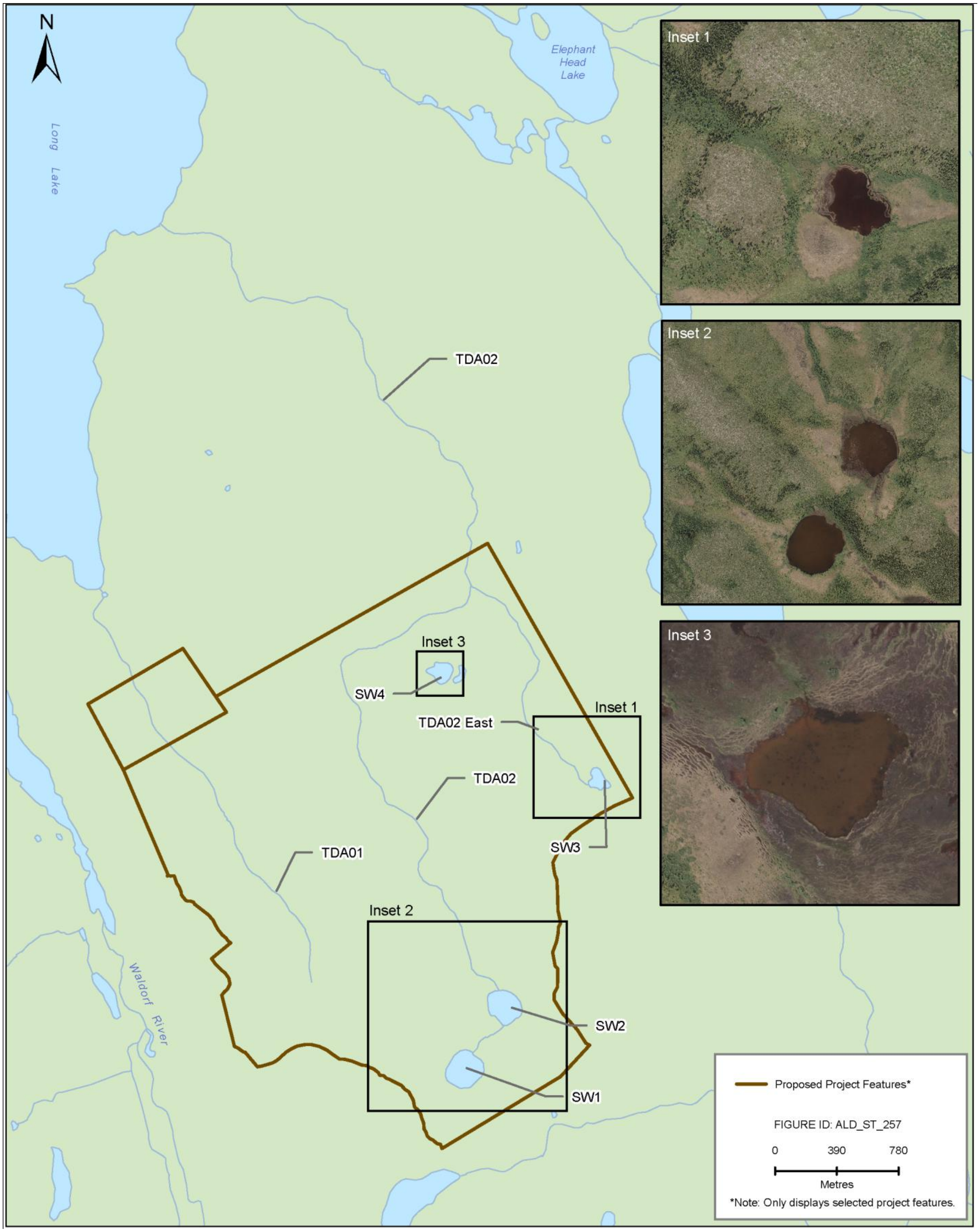


Photo 1-1 Typical Stream Habitat, TDA01

TDA01 begins as a series of slow flats, seepages, and frequent areas of underground flows for the uppermost 500 m (Photo 1-1). It then transitions into sections of pools, flats, and a few riffles segregated by numerous underground flow areas for the next 1,000 m. Continuous stream habitat extends downstream from this point, with flats and riffles prominent for the next 300 m, followed by deep runs, deep flats and riffle for another 350 m until the stream flows into a bog. The bog extends for approximately 450 m at which point stream habitat is evident (200 m upstream of Long Lake) and flows as a series of shallow runs and riffles followed by a deep flat, deep run, and chute at the inflow to Long Lake.

Aquatic vegetation was absent for almost all sections except for 6 percent cover noted within the area 1,900 to 2,350 m upstream of Long Lake. The riparian area was dominated by shrubs throughout the stream section, with secondary dominance by trees in the upper portions and grasses in the lower areas near Long Lake. Electrofishing confirmed the presence of brook trout throughout the various sections of this stream and burbot were captured in the downstream portion, nearer to Long Lake.

1.2.2 Stream TDA02

TDA02 is a 6.8 km stream that flows northwest into the eastern side of Long Lake. The average stream width is 2.5 m, the average measured stream velocity is 0.142 m/s, and the average water depth is 27 cm. Substrate composition included almost equal proportions of all types except bedrock. The riparian area was predominately shrubs. The overall watershed drainage area is estimated at 1,175.3ha based on GIS delineation; of which 458.6ha is within the TMF footprint.

Stream TDA02 originates at a small standing waterbody (SW1 on Figure 1-3). A narrow stream flows from SW1 to a second small waterbody (SW2), a distance of 272 m. This stream section is less than 1 m wide, with a substrate consisting of fines and organics (Photo 1-2).

Photo 1-2 Typical Stream Habitat, Upper Portions of TDA02

The upper 1,800 m of the steam is characterized by a series of meandering slow flat runs and riffles interspersed with drops and a few small pools. The stream enters a boggy area and transitions into flats and pools for the next 450 m. At 2,250 m downstream of SW2, it becomes a deep steady with a few riffle sections and several moderate sized pools. Downstream of these pools, the stream transitions back into predominately flats of varying depths, interspersed with riffles for 750 m. In the next 750 m, stream character is mainly riffle and run habitat with a few flats (Photo 1-3). This location is approximately the most northern extent of the TMF – Phase 2. At 3,900 m downstream of SW2, the stream widens out into a flat with deep pools prior to entering another boggy area extending for the next 150 m. Downstream of this boggy area, the stream is comprised mainly of a series of riffles and runs until it becomes an extended flat just upstream of a beaver dam located 5,250 m from the start of the survey. Below the beaver dam, the stream becomes a series of rapid and run sections interspersed with riffles for 600 m, transitioning into a 500 m section of deep flats interspersed with riffles, and then a 300 m series of rapids and fast runs with chutes as it nears Long Lake (Photo 1-4).

Photo 1-3 Typical Habitat, Near Northern Extent of TMF Phase 2

Aquatic vegetation was noted for the majority of the stream but showed an overall decrease from upstream to downstream, with the highest percentages (9 percent) noted in the upper reaches and several lower sections having no aquatic vegetation. Overall, the riparian vegetation was comprised mainly of shrubs and grasses, with trees becoming more prevalent as the stream nears Long Lake. Electrofishing confirmed the presence of brook trout, pearl dace, and slimy sculpin in this stream.

Photo 1-4 Habitat within TDA02 near Outflow to Long Lake

1.2.3 Stream TDA02 East

Stream TDA02 East is a tributary of stream TDA02 that runs for 1.6 km from SW3 to where it joins with TDA02, approximately 3.5 km upstream of Long Lake (Figure 1-3). The average stream width is 0.8 m, the average measured stream velocity is 0.134 m/s, and the average water depth is 22 cm (Photo 1-5). The substrate composition is primarily sand and gravel in the lower portions (300 m) with organics dominating in the headwater (450 m); the riparian area is dominated by grasses.

TDA02 East begins as a steady flowing through a bog at the outflow of the waterbody SW3. The steady extends through the bog for approximately 450 m until it becomes subsurface. A defined channel reappears approximately 150 m further downstream and extends as a steady that leads to riffle and pool features 150 m upstream of the confluence with stream TDA02. Aquatic vegetation was not found during the survey and the riparian area was comprised mainly of grasses and shrubs. Fish presence was not determined for this stream.

Photo 1-5 Typical Stream Habitat, TDA02E

1.3 Standing Waterbodies in the TMF

As noted above and indicated on Figure 1-3, there are four small standing waterbodies, within the TMF, that appear as small ponds on 1:50,000 topographic mapping. These waterbodies are shallow headwater depression areas associated with the wetland complex with substrate comprised of fines and organics. Three are located on the streams described above and the fourth has no connecting streams. The following descriptions are based on helicopter overflights, air photos, 1:50,000 topographic mapping and ground surveys. The surface areas of these waterbodies were determined from the topographic map.

1.3.1 SW1

SW1, which is shown on Figure 1-3, has a surface area of 41,550 m^2 (4.2 ha), is less than 1 m deep, and has a substrate consisting of fines and organics. No fish sampling was conducted in this waterbody. Based on downstream sampling of TDA02 and the absence of obstructions to fish passage, it is likely that SW1 provides fish habitat in some capacity.

1.3.2 SW2

SW2 has a surface area of 34,940 m^2 (3.5 ha), is less than 1 m deep, and has a substrate of fines and organics. Fish sampling in the outlet stream (TDA02) found brook trout that have unobstructed access to SW2. It is likely that SW2 provides fish habitat in some capacity.

1.3.3 SW3

SW3 has a surface area of 11,585 m^2 (1.2 ha), is less than 1 m deep, and has a substrate comprised of fines and organics. Fish presence in SW3 was not determined.

1.3.4 SW4

SW4, which is shown on Figure 1-3, has a surface area of 15,000 m^2 (1.5 ha), is less than 1 m deep, and has a substrate comprised of fines and organics, as determined from overflights and air photos. The topographic map indicates no streams flow into or out of SW4; this was confirmed by helicopter overflights and air photos. Based on the absence of connectivity to any identified fish habitat, SW4 is not productive or sustained fish habitat.

A second smaller waterbody, indicated on the topographic map as being adjacent to SW4 was determined from air photos not to be a waterbody (see inset on Figure 1-3). No name was assigned to this feature and no further information was obtained for it.

2.0 REGULATORY REVIEW

2.1 Regulatory Requirements

The four standing waterbodies described above, as well as the small interconnecting streams within the TMF footprint, will have resident fish relocated, habitat dewatered and engineered decant/effluent structures and channels installed as part of site preparation and early construction. These streams drain out of the north side of the TMF and no other streams flow into the TMF. The engineered drainage will collect runoff and tailings slurry decant water throughout the TMF and direct it to the Polishing Pond. It is recognized that the remaining stream habitat downstream of the TMF may also be included in the HADD determination if adequate flow cannot be maintained by the remaining watershed located outside the TMF. It should be noted that additional hydrology is being completed to determine the potential alterations to habitat downstream in both TDA01 and TDA02. For example, a small reach of TDA01 will remain below the Polishing Pond upon construction completion and will receive final discharge. As described in Section 3.2, water output will be increased because the TMF includes portions of the TDA01 and TDA02 drainages. Therefore water will be available but whether the additional water is harmful is yet to be determined.

Under Section 35(1) of the *Fisheries Act*, the site preparation and construction within the TMF footprint, as well as water management requirements, will most likely result in the harmful alteration, disruption or destruction (HADD) of fish habitat. As a result, Authorization by the Minister of Fisheries and Oceans Canada (DFO) under Section 35(2) will be required prior to any HADD occurring. Before any Approval or Authorization can be issued by DFO, Alderon Iron Ore Corp. will be required to submit an acceptable Fish Habitat Compensation Plan to offset the quantified habitat losses. The quantity of habitat loss to be offset will be determined by DFO as will the acceptability of the Fish Habitat Compensation Plan. This process will also be required for any other Project footprint that is determined to cause a HADD of fish habitat.

3.0 TAILINGS MANAGEMENT FACILITY

3.1 Processing and Properties

Tailings will be placed by conventional – slurry method and deposited into an engineered impoundment. The tailings will be dewatered at the mill by way of dewatering cyclones used to separate the coarse fraction from the fine and to perform a primary dewatering step. The fine fraction reporting to the cyclone overflow is low in percent solids and is directed to one of the two thickeners (one per process line) for further dewatering. The resultant tailings will have an estimated 45% solids content by water. The tailings solids reporting to the impoundment will have a gradation representative of silty sand with an estimated D50 of 150 to 200 µm.

The drained density of the tailings in the impoundment will depend on the grain size, specific gravity and discharge / placement method. The specific gravity of the tailings solids has been estimated to be 3.00. A range of void ratios from 0.5 to 0.7 have been estimated based on published values and previous experience.

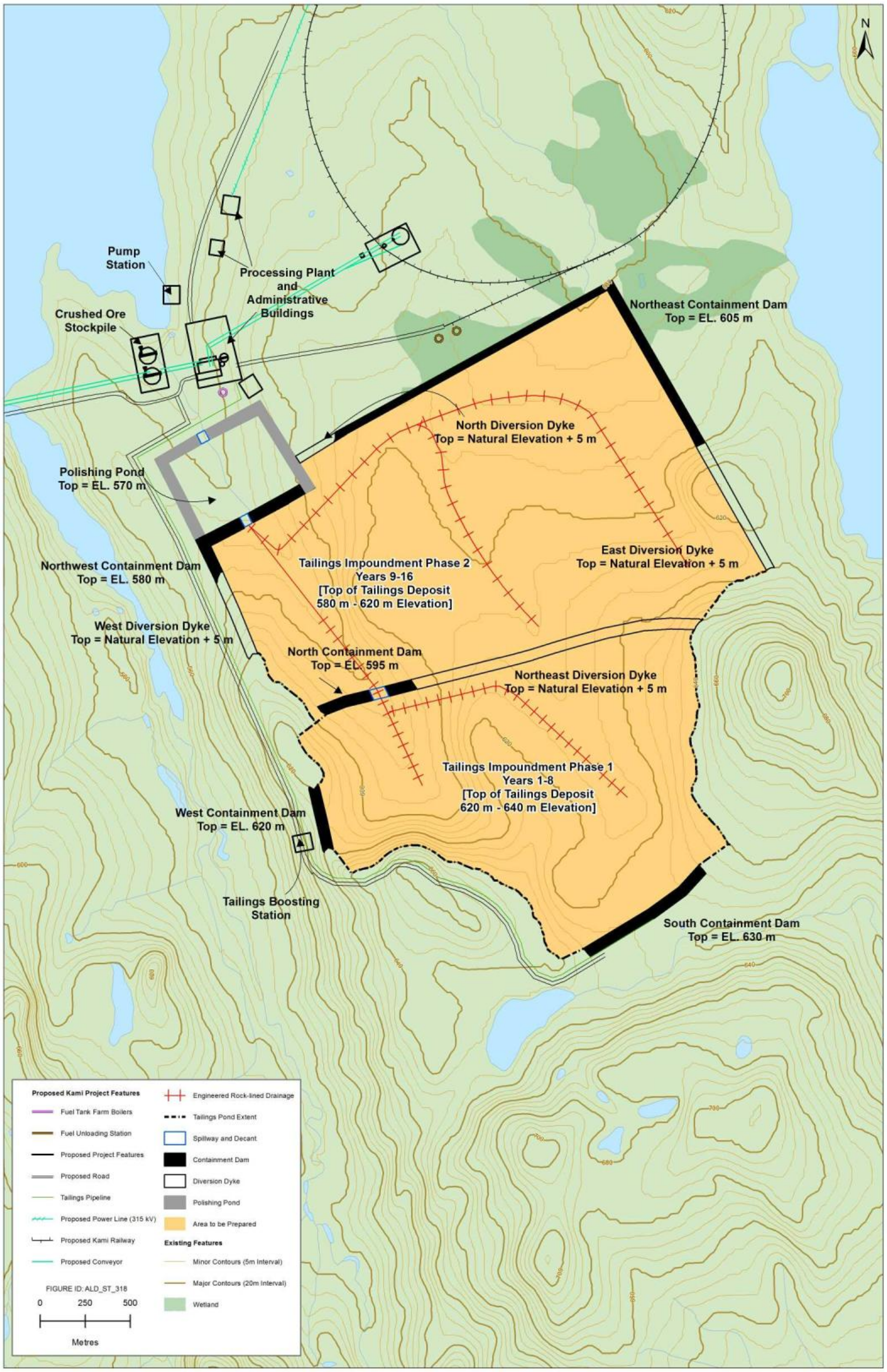
It is estimated that the tailings supernatant will be inert, with negligible metal and chemical levels. The potential water quality issue of colloidal Total Suspended Solids (TSS) or “red water” is common to iron ore mines in western Labrador. Flocculant and coagulant will be used in the thickening of the fine tailings prior to tailings discharge to the TMF.

3.1.1 General Layout

In consultation between Stassinu Stantec, BBA and Alderon, the preferred location for the TMF was determined to be in the eastern portion of the claim block, directly south of the proposed processing plant site and rail loop, as shown in Figure 1-2. Constraints on the location of the TMF included: planned site infrastructure, location of environmentally protected areas, natural topography and property boundaries. The proposed location of the TMF was chosen for the large available area south of the plant site that is necessary for the chosen sub-aerial deposition method, for the minimal environmental / wetland impact and for the favorable topography. The gently undulating topography of this site creates natural valleys which will be exploited for much of the impoundment capacity.

The appropriate tailings management approach for the Kami Project is disposal of thickened tailings in an engineered impoundment, using natural topographic lows to minimize the requirement of containment structures. A conceptual layout of the TMF for Phase 1 and Phase 2 is provided in Figure 3-1.

Figure 3-1 Conceptual Layout of the TMF Phases 1 and 2



3.1.2 Deposition

The tailings discharge will be initiated in the southern part of the TMF, at the highest elevation and the furthest distance southeast of the processing plant. This approach ensures that tailings drainage will consistently be directed northwestwards, following the natural drainage path of the surrounding topography. Initiating deposition in the southeasterly area will also allow for progressive rehabilitation of the tailings as the discharge point moves north and westward.

The thickened tailings will be discharged via spigot and allowed to drain naturally via gravity. The resulting tailings beach will have a low angle slope towards the north and west suitable for progressive revegetation as the impoundment fills and the discharge point moves north and westward. For winter tailings deposition, fine and coarse tailings will be deposited from a single pipe with the second pipeline on standby (empty). For the summer tailings deposition, fine and coarse tailings will be delivered in separate pipes to permit use of the coarse tailings for tailings dam raises and stacking.

3.1.3 Engineered Drainage

As part of the water management regime for operation, the natural low-lying drainage within each TMF will have engineered structures installed. The structures will assist in slowing and pooling runoff water and slurry effluent as it migrates through each TMF and towards the polishing pond. This will allow greater capacity in terms of retaining heavy inundation of flow during high rainfall, snowmelt or slurry discharge situations. The engineered drainage would consist of rip rap lined channels, where required, between interconnected check dams/berms. The rip rap would retard water velocity and increase retention of suspended sediment. The check dams would further reduce water velocity and cause pooling, thereby increasing the capacity to contain sediments. The material for the channels and check dams is expected to consist of waste rock generated from pit development or site quarry material. The slopes of check dams would generally be consist with those outlined below for containment dykes; however overall heights would be less than 1.5m with no appreciable crest width. The up-gradient slope may contain a filter fabric material until finer sediments starts to seal the larger voids between the rip rap. It should also be noted that the drainage from the eastern portion of the TMF (Phase 1 and 2) will require either additional trenching or pooling in order to overcome the slight elevation increase between the two small drainage basins. Final design will be determined prior to construction. Figure 3-1 outlines the general layout of the TMF phases and the engineered drainage locations. All aquatic habitat within the footprint of the TMF will be completely dewatered and replaced with engineered channels/structures needed to direct decant water and runoff to the Polishing Pond during early preparation activities.

3.1.4 Containment Dams and Diversion Dykes

The containment dams and diversion dykes will be earthfill structures composed of a low permeability homogeneous earthfill core supported by a free draining rockfill shell. The low permeability earthfill core will control seepage out of the dam and, where necessary, can maintain water levels in the tailings impoundment area should water quality deficiencies warrant temporary containment.

The homogeneous earthfill dam will have side slopes of 2 horizontal to 1 vertical (2H:1V) and a crest width of 6.0 m. The rockfill shell will have an up-gradient slope of 3H:1V, a down-gradient slope of 2H:1V and a crest width of 10.0 m. The structures shall be built on competent foundations with any soft organics or deleterious soft alluvium removed from the dam footprint.

The borrow sources for the dam fill material are expected to consist of site sourced till for the core and waste rock generated from pit development or site quarry for the shell. Filter criteria will be applied to ensure protection of the core against seepage erosion. The filter zone requirements will depend on the grain size distribution of the core material.

3.1.5 Spillway and Decant Structures

The spillway, decant structures in the engineered channel, containment dams and cutoff dams are used to provide controlled release of runoff and decant water to the structure/area down-gradient of each. The decant system will be designed to cope with the day to day management of the tailings impoundment area as well as storm condition surges.

3.1.6 Polishing Pond

The Polishing Pond will be located in the northwest corner of the TMF. It is designed to handle all runoff and tailings slurry from the entire TMF (i.e., both Phase 1 and Phase 2). The outflow from the tailings impoundment area will discharge into the Polishing Pond via surface decant for the removal of any particulate carried over from the tailings impoundment area.

3.2 Water Balance and Water Management

The surface area of the proposed TMF is estimated to cover 7,065,410 m^2 which includes the tailings impoundment, dams, dykes and associated water features. The area also consists of the Reclaim water pumphouse (Stassinu Stantec, 2011d).

Water input sources into the TMF include direct precipitation and tailings slurry water. Outputs from the TMF include evaporation, infiltration, runoff and reclaim to the processing plant. Final effluent discharge will occur at the Polishing Pond outflow which will flow into the small remaining lower section of TDA01 (see Figure 3-1). Based on Stassinu Stantec (2011a), the mean annual precipitation is 851.6 mm/yr and 56 mm/h and 67 mm/h are expected peak intensity precipitation rates for the 1 in 25 year and 1 in 100 year return period storms, respectively. In addition to atmospheric inputs, the nominal expected rate of tailings solids and water discharged into the tailings area is 3,341 t/h and 4,083 t/h respectively which indicates a bulk tailings slurry solids content of 45% (BBA, 2011a).

The operational case water balance estimated that the total water output from the TMF would increase from 70% under existing climate normal conditions by approximately 10% to 80% or

0.153 m^3/s. The net evapotranspiration loss will primarily arise from vegetation loss and subsequent reduction in transpiration from the existing case evapotranspiration estimate. Tailings water is also estimated at a nominal rate of 4,083 t/h or 1.13 m^3/s. The total average daily water throughput to the tailings impoundment area is therefore estimated at 111,178 m^3/d. If a minimum tailings impoundment area volume of 50,000 m^3 and maximum depth of 5 m are used, the mean hydraulic residence time in the tailings impoundment area will be approximately 10.8 hours. Conservatively, using the lowest specific gravity of 2.0 and an average water temperature of 10ºC, the tailings impoundment area has the potential to settle tailings particles down to the 5-6 micron (µm) range. Detailed design of the tailings impoundment area will consider the need to baffle flows within it to reduce internal velocities, which would thereby reduce the potential re-suspension of sediment (tailings). Non-scour velocities will be maintained at the overflow weir from the tailings impoundment area to the Polishing Pond to prevent incipient motion and re-suspension of deposited sediment in the Polishing Pond.

Evaporation from the Polishing Pond will have a small impact on water loss. Using the mean estimated lake evaporation for Labrador of 350 mm/yr (Rollings, 1997), the evaporative loss would be approximately 3,500 m^3/ha/y for pond surfaces, peaking at approximately 100 mm in July and is only assumed to occur from May to October each year. The preliminary process water balance indicates that a total of 1.13 m^3/s of tailings slurry water will drain to the tailings impoundment area and Polishing Pond of which a nominal fraction is expected to evaporate, 0.98 m^3/s will be reclaimed to the process water reservoir and the balance, 0.156 m^3/s is expected to be discharged after treatment from the Polishing Pond into the remaining lower reaches of TDA01. The process water recycling rate is > 86% which is indicative of a high rate of water conservation and reuse.

4.0 PREPARATION PLAN / SEQUENCING

4.1 Polishing Pond and Water Management Structures

Early construction and site preparation will include the construction of the Polishing Pond and the engineered water control structures within the TMF as described in Sections 3.1.3 and 3.1.5. The general sequencing will be to relocate resident fish, dewater the small waterbodies and streams and to construct engineered effluent/decant structures to reduce TSS and direct effluent to the Polishing Pond. This sequence will begin early in TMF site preparation and construction so that all runoff will be managed through the Polishing Pond as soon as possible.

4.2 Fish Transfer

Fish will be removed from the small standing waterbodies and streams that will be permanently lost. To accomplish this, fish will be live captured and transported to safe release point(s) in the same watershed, most likely Long Lake or the lower reaches of TDA02, if further hydraulic investigations indicate adequate flows will be available and the remaining habitat will not be harmfully altered

An experimental license will be obtained prior to any fishing activity. All plans will be discussed with DFO to ensure agreement on the:

- criteria for completion of fish removal; and
- release locations for fish transfer.

4.2.1 Removal of Fish from Standing Waterbodies in the TMF

Barrier nets, or a cofferdam, will be set across the outlets of SW1, SW2 and SW3 to prevent fish from entering them from the outlet streams as fish are being removed. Fyke traps, minnow traps and other applicable live-capture methods will be employed in each of SW1, SW2, and SW3 and checked morning and evening of each day until all fish are removed. It is proposed that the effort extend as long as fish are being captured and removed. The endpoint will be when no fish are captured in a 24-hour period.

4.2.2 Dewatering of Standing Waterbodies in the TMF

SW1, SW2, SW3, and SW4 will be completely dewatered before engineered drainages/structures are constructed. The engineered, rock-lined channels with check dams will be constructed to drain precipitation and collect seepage. The pumped water will be discharged down gradient of the small standing waterbodies with water free to filter through vegetation back to the stream, if suspended sediment is present, or directly to the outlet stream if the water is clean.

The sequence would be SW1 pumped towards SW2 and then SW2 pumped downstream. Likewise, SW3 would be pumped into TDA02 East and SW4 would be pumped to TDA02.

4.2.3 Stream Dewatering and Removal of Fish

During early site preparation and construction, the entire length of TDA01 will be dewatered as the engineered channel and Polishing Pond is constructed. Therefore fish in this stream will be captured using electrofishing gear working in a downstream direction. Fyke traps, or other suitable traps, may be set to capture and hold fish. As sections are fished, block nets or permeable ditch blocks will be placed to prevent upstream migration. Areas will be deemed to be fished out following one or two thorough passes with electrofishing. Verification can be determined with occasional additional passes. Once fish are removed from TDA01, construction of the Polishing Pond will commence. As stated previously, once the Polishing Pond is complete and operating, the outflow will enter the lower reaches of TDA01.

Within TDA02, only that portion of the stream within the direct footprint of the TMF will be dewatered during early construction. The remaining habitat downstream of the TMF will not be part of the engineered water management system and will therefore be maintained as much as possible, although it is possible that habitat just downstream will not receive adequate flows. As stated previously, any areas harmfully altered downstream of the TMF would be included in the HADD determination and subsequent habitat compensation to offset any losses. As a result, it will be important to maintain clean water flow downstream during dewatering activities.

The stream sections within the TMF area under construction will begin to dewater to some extent as the associated standing waterbodies are dewatered. As a result, fish relocation activities, similar to those described above, will occur within the streams at the same time. Fish relocation would continue downstream to such a point where adequate flows within TDA02 are identified, which could include areas below the footprint of the TMF. A block net will be put in place at this point in the stream until the engineered structures are in place and permanently directing runoff/effluent to the Polishing Pond to prevent fish from migrating back up-gradient during high flow events and becoming stranded.

4.3 TMF Access Road and Tailings Pipeline Area

An access road will be required adjacent to the tailings pipeline from the processing building to the south containment dam. The road will be located west of the tailings pipeline as shown on Figure 3-1. The access road will provide personnel with access for construction, maintenance and repair, and rehabilitation of the TMF and associated infrastructure.

The proposed tailings pipeline is currently proposed to travel along the western border of the TMF to the south containment dam as shown on Figure 3-1. The tailings will be pumped a distance of 5.5 km to the south containment dam. Design for the tailings line is based on having two, three-stage pumping systems at the concentrator with a 406 mm diameter (16”) rubber lined, Victaulic pipeline. A single-stage booster pump at kilometer 3 is assumed to be required.

4.3.1 Clearing

Vegetation clearing (e.g., trees, shrubs, etc.) may be required in advance of construction of the access road or tailings pipeline, containment dams / dykes and control structures. Listed below are environmental protection procedures (EPP) that will be followed where possible:

- clearing activities will comply with the requirements of all applicable permits;
- clearing or removal of trees will be kept to a minimum;
- clearing will consist of cutting to within 15 cm of the ground and disposing of all standing trees, as well as removing all shrubs, debris and other vegetation from the area;
- disposing of cleared un-merchantable timber, slash and cuttings by burning will comply with applicable legislation;
- slash and any other material or debris will not be permitted to enter any watercourse, and will be piled above spring flood levels;
- chain saws or other hand-held equipment will be used in clearing vegetation except where alternative methods or equipment is approved by Alderon Iron Ore Corp., such as mechanical harvesters. The use of mechanical clearing methods, such as bulldozers, will not be permitted except where it can be demonstrated that there is no merchantable timber, and where the resulting terrain disturbance and erosion will not result in the loss of topsoil or the sedimentation of nearby waterbodies outside the TMF;
- as much as possible, a minimum 15 m buffer zone of undisturbed vegetation will be maintained between the development area and all other waterbodies;
- timber shall be felled inward toward the work area to avoid damaging any standing trees within the immediate work area;
- workers will not destroy or disturb any features indicative of a cultural or archaeological site; and
- where feasible, vegetation clearing will be scheduled to avoid disturbance during the critical nesting period.

4.3.1.1 Grubbing and Disposal of Related Debris

The principle concerns associated with grubbing and disposal of related debris are the potential adverse effects on freshwater ecosystems and water quality through the release of sediment into watercourses. Listed below are environmental protection procedures (EPP) that will be followed where possible:

- grubbing of the organic vegetation mat and/or the upper soil horizons will be restricted to the minimum area required;
- the organic vegetation mat and upper soil horizon material that has been grubbed will be spread, in a manner to cover inactive exposed areas;
- any surplus of such material will be stored or stockpiled for progressive site rehabilitation and revegetation purposes. Topsoil and organics will be stored in low (1 to 2 metre high) stable piles. The location of the stockpiles will be recorded and accessible for future rehabilitation purposes;
- measures will be implemented to reduce and control runoff of sediment-laden water into water courses during grubbing Erosion control measures will be implemented in areas prone to soil loss;
- the length of time that inactive grubbed areas will be left exposed to the natural elements will be minimized to prevent unnecessary erosion. Mitigations such as the placement and maintenance of silt curtains will be used to prevent erosion from exposed areas; and
- during grubbing, grubbed material will not be pushed into areas that are to be left undisturbed. Grubbing material will be buried with 60 cm of soil cover.

4.3.2 Road Construction

Based on previous experience in Labrador, it is generally recognized that fill placement is the preferred method over cut for road construction. Silts and fine sands are frequently encountered associated with a high groundwater table and very soft or quick conditions often result in cuts. In addition, embankments often create a catchment for snow drifting. Therefore construction of roads will require borrow material.

4.3.2.1 Fill Placement and Compaction

In preparation for road construction, all organic materials and loose soils should be excavated from the embankment footprint area. For grading purposes, the excavated areas will be built back to grade with structural fill. Excavated areas should be proof-rolled prior to placement of structural fill. Any softened or disturbed areas evident upon proof rolling will be removed and replaced with suitably compacted structural fill.

Structural fill will be placed in lifts and compacted to a minimum of 95% Standard Proctor Maximum Dry Density. Structural fill will generally be placed in 300 mm to 500 mm lifts and suitably compacted with a minimum 10 tonne vibratory roller.

In rockfill materials where Standard Proctor tests cannot be performed, compaction shall continue until no visible movement of the fill under an approved vibratory compactor is observed.

4.3.3 Tailings Pipeline Installation

When preparing a trail for pipeline installation the area must be cleared of all unsuitable material as described in section 4.1.1. The pipeline must be supported by cribbing to minimize deflection of the pipe. Cribbing should be placed every 20 to 50 m depending on the terrain and topography.

4.4 Containment Dams / Diversion Dykes

Containment dams and diversion dykes will be constructed as shown on Figure 3-1. The dams will be constructed in areas where natural topography has been deemed unsuitable for containment of the tailings. Diversion dykes will guide surface runoff and tailings transport water to areas for treatment. The containment dams and diversion dykes have been designed to add 5 m to the natural elevation of the region.

4.4.1 Deposition Regions

Based on preliminary estimates, the TMF can be divided into two general regions: 1) the southern region (estimated capacity for Years 1 to 8 – Phase 1) and the northern region (estimated capacity for Years 9 to 16 – Phase 2). It is recommended that tailings discharge be initiated in the southern region, at the highest elevation and the furthest distance south from the processing plant. This approach will ensure that tailings drainage will consistently be directed northwestwards, through the engineered drainages which will follow the natural drainage path of the surrounding topography. Initiating deposition in this southeasterly area will also allow for progressive rehabilitation of the tailings deposit as the discharge point moves north and westward. Adequate preparation of the TMF, including draining and construction of the engineered drainages will assist in directing drainage to settling areas and the polishing pond.

4.4.2 Clearing, Grubbing and Site Preparation

Clearing, grubbing and site preparation will be required prior to the construction of containment dams and diversion dykes and will follow procedures outlined in Section 4.3.1.

4.4.3 Starter Dams / Dykes

The starter dams and dykes shall be built on competent foundations with any soft organics or deleterious soft alluvium removed from the dam footprint. The starter dams will be constructed at the beginning and as the water level is raised, the dam will be progressively raised. The completed homogeneous earthfill dam will have side slopes of 2 horizontal to 1 vertical (2H:1V) and a crest width of 6.0 m. The final footprint of the dams will be 30 m wide.

4.4.4 Strategy for Progressive Raising of Tailings

Progressive raising of the tailings area will be completed by advancing the containment wall up-gradient using the coarsest fraction of tailings solids. In this up-gradient raising method, material is moved from the tailings beach and used to construct progressive lifts over the deposited tailings. An advantage of this construction method is that the required volumes of borrow material are minimized and use / storage of tailings solids is maximized, and with proper deposition management (spigotting), material movement requirements are minimized.

4.4.5 Tailings Impoundment Area

The tailings impoundment area shall be sized such that solids settle out prior to discharge of the overflow into the Polishing Pond. For the ultimate tailings impoundment area, the pool should have a minimum surface area of approximately 10,000 m^2 and a depth, at the outlet of at least 5 m. The outlet of the tailings impoundment area would be designed to ensure non-scour velocities as runoff-effluent enters the Polishing Pond.

4.4.6 Polishing Pond

The Polishing Pond will have one pool with a total surface area of at least 10,000 m^2. Reclaim water for the processing plant would be sourced directly from the Polishing Pond via a pumphouse. The overflow from the Polishing Pond will discharge into the remaining lower reaches of TDA01 subject to release criterion.

4.5 Control Structures

Seepage through the containment dams will be controlled by construction of low permeability homogeneous earthfill cores and by discharging the tailings from the dam crests to form a progressive up-gradient beach that encourages free water drainage away from the dams towards the impoundment area. Any seepage through the dams shall be collected and directed to sump / collection points for redirection to the impoundment area. Seepage through the foundation of the containment dams is anticipated to be minimal based on the assumption of bedrock or native till founding strata.

A monitoring well system will be installed down-gradient of the containment dams to detect seepage quality. As necessary, the detected seepage can be redirected to the tailings impoundment area via pumpback wells.

4.5.1 Pipeline Positioning

The pipeline will be positioned along a cleared area in the shortest and flattest route extending to the endpoint. Placing the pipeline as flat and direct as reasonably possible will ensure the pressure required to pump the tailings to the TMF will be kept to a minimum.

4.5.2 Spillway / Decant Structure Installation

The spillway structure / decant structure into the Polishing Pond should be progressively risen as sedimentation accumulates behind the containment dam.

A variety of construction materials and design options are possible ranging from wooden timber “stop logs” to metal. Construction details are conceptual at this stage of the Project.

4.6 Sequencing Plan

The preparation for the TMF and sequencing operations are presented in Appendix A (Sequence for TMF Construction and Operation).

5.0 DISCHARGE POINT

The final discharge point will be the release from the Polishing Pond into the remaining lower reaches of TDA01. The total amount of effluent from the TMF is not expected to exceed 0.156 m^3/s.

5.1 Monitoring

The following actions will be taken to mitigate the potential adverse effects on the environment:

- effluent released to the environment from the Polishing Pond (final discharge point) will adhere to all provincial and federal regulations; and
- environmental monitoring downstream of the final discharge point will be conducted as prescribed by MMER and the Certificate of Approval to document compliance.

6.0 REFERENCES

Grandillo, A., J. K. Powell, M. Kociumbas and R. W. Risto, 2011. Technical Report – Preliminary Economic Assessment Report – of the Kamistiatusset (Kami) Iron Ore Property, Labrador, for Alderon Iron Ore Corp, 43-101 Technical Report, September 8, 2011. Prepared by: BBA, Stassinu Stantec and Watts, Griffis and McQuat.

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APPENDIX A

Sequence for TMF Construction and Operation

Table A – 1 Sequence for TMF Construction and Operation Phase 1

#	Activity	Environmental Protection	Timing
1	Remove TDA01 (within footprint of TMF and Polishing Pond) • Remove fish and release to acceptable location • Dewater TDA01 • Replace TDA01 within TMF footprint with engineered rock-lined drainage ditch • Construct Polishing Pond	• Prevent TSS in habitat below Polishing Pond • Safe release of fish • Compensate for lost habitat in TDA01	Early Construction (1 year duration)
2	Removal of TDA02 (within footprint of TMF) • Cofferdams at outlets of all small waterbodies (SW1-SW4) • Remove fish from waterbodies as well as connecting streams and release to acceptable location • Dewater SW1 – SW4 • Remove fish from remaining TDA02 stream within TMF footprint and release to acceptable location • Dewater remaining TDA02 stream within TMF footprint • Install engineered rock-lined drainage ditch throughout TMF footprint (Phase 1 and 2) to direct runoff and effluent to Polishing Pond	• Prevent TSS in remaining habitat below TMF footprint (TDA02) • Safe release of fish • Compensate for lost habitat in TDA02	
3	Construct West and South Containment Dams	• No issues	Construction (1 year duration)
4	Construct North Containment Dam	• No issues	
5	Construct NE Diversion Dyke • Construct diversion dyke to contain Phase 1	• With engineered structures, no issues	
6	Commission TMF (Phase 1) • Tailings deposited in Phase 1 TMF	• Polishing Pond operating • Monitoring under MMER commences at final discharge from Polishing Pond • No issues	Year 1

Table A – 2 Sequence for TMF Construction and Operation Phase 2

#	Activity	Environmental Protection	Timing
7	Construct North, East & West Diversion Dykes (Phase 2)	• No issues	Year 8 - 9
8	Construct Northeast Containment Dam • Contains the Phase 2 area of the TMF	• Contains tailings and effluent within Phase 2 TMF • With engineered structures already in place since early construction, no issues	
9	Construct Northwest Containment Dam	• No issues	
10	Commission Phase 2 TMF • Tailings deposited in Phase 2 TMF	• Polishing Pond remains in operation • Monitoring under MMER remains in effect • No issues	Year 9

Note;

1. Preparation and construction of Phase 2 will be concurrent with the last 2-3 years of Phase 1 Operation
2. any removal of fish from downstream of TMF and compensation for the habitat is based on the assumption that flows to this habitat will be significantly reduced and compensation will be required