Baffinland Iron Mines LP
Mary River Expansion Stage 3

Definitive Study Report

Section 9 – Facilities Description

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9. Introduction

9.1 General

The Facilities Description document is a key communication document with the primary function of being a consolidated general description of the Mary River 12 Mtpa Expansion Project in Nunavut, Canada, referred to as the Project.

The Facilities Description has been written to describe 'what' will be installed in each area of the project to a level of detail that will enable the reader to get a quick and accurate understanding of project scope.

This document is not the master document of design information or criteria that is used to develop the project design. The relevant design criteria, specifications, equipment lists and associated documents must be referred to for detailed information.

This document has been developed to align with the approved budget prepared for the Stage 3 Definitive Study Report.

9.2 Work Breakdown Structure

The Facilities Description has been developed on an area by area basis that is aligned with the project Work Breakdown Structure (WBS). Refer to the PEP Section C Appendix A (WBS H354004-00000-103-120-0002-AP0A).

The Level 1 descriptions in this document are as listed in Table 9-1.

Table 9-1: Work Breakdown Structure – Level 1

Area	Title
1000	MINE
2000	IRON ORE PROCESS PLANT AND ONSITE INFRASTRUCTURE
3000	RAIL
4000	PORT
5000	OTHER OFF SITE INFRASTRUCTURE
6000	CONSTRUCTION FACILITIES AND SUPPORT
7000	IMPLEMENTATION CONTRACTOR'S SERVICES
8000	OWNER'S COST
9000	CONTINGENCY/ESCALATION/RISK

9.3 Project Descriptions

9.3.1 Area 1000 – MINE

Definition of WBS elements related to mine development, mining of ore, waste management, mine hydrology and mine operations to produce and deliver ore to Area 1500 is developed and discussed in Section 5 of the Definitive Stage 3 Study Report.

Area 1000 includes:

Area 1500 – Site Development

Site development related to stripping, development of new haul roads in the mine is detailed within Section 5 of the Definitive Stage 3 Study Report.

Area 1600 – Services and Utilities

Services and utilities to directly support mining operations are described within Section 5 of the Definitive Stage 3 Study Report.

Area 1700 – Mobile Equipment

Area 1800 – Mine Ancillary Facilities

Area 1900 – Mine Materials Handling

9.3.2 Area 1500 – Site Development

9.3.2.1 Area 1510 – Site Development and Plant Roads

Appendix A-1 provides layouts and arrangements aligned to the scope described below.

Tote Road Realignment

a) Installation of the railway requires redirection of the Tote Road to provide an alternative route which does not interfere with the rail alignment at the mine. The realignment includes construction of a new Tote Road from a point adjacent to the existing Laydown #1 to a point between the Quarry Access Road and the south end of the runway. The re-alignment includes provision of a single road crossing for the rail line which will be fitted with safety signage on both the road and rail track to advise of protocols for crossing either road or track. No other safety devices will be installed.

   The re-alignment contains provisions for two ramps to provide access to grade, one located either side of the rail crossing. The southern off ramp will be graded into the extended Laydown #2 for access to the Laydown area and the service road to the Construction Camp, Landfill, Emulsion Plant and Railway (see below).

New Service Road

b) Due to interference with the railway alignment, the existing landfill/emulsion plant and treated effluent road will be replaced by a new service road constructed along the south side of the railway alignment. The new service road will tie into the existing Tote Road near Laydown #2 which enables access to the Tote Road realignment (above). The southern end of the new service road will tie into the existing treated effluent road approximately 300m back from the effluent discharge area.

   The road will not be sealed.

c) The new service road will provide access to:

   - Train driver drop off and pick up areas
   - Construction Camp
   - Existing landfill
   - Existing emulsion Plant
   - Existing effluent discharge area

   The new road will tie into a new access for the construction camp and existing roads to the landfill and emulsion plant.

d) A turn out area will be provided at the northern and southern end of the service road to provide safe parking for vehicles for train driver changeout. Safe man access from the service road to the rail track will be provided. This access is to allow train operators to mount and demount locomotives and provide a safe platform for off track train roll by inspections.

e) Steel pipe utility crossing for the water pipe and electrical supply cables for the camp.

f) A utility bench will be provided along the road between the road and the rail track for installation of the re-aligned treated effluent discharge pipe.

g) Four drainage culverts will be provided to connect existing drainage channels beneath the road.

Haul Road to Crushers

a) An extension to the existing haul road system will be provided to provide HME access from the existing crusher pad to the new crusher pad. A haul road of about 300m length will be installed. The road will not be sealed.

Diversion Berm and Channel

a) A single diversion channel and berm will be installed south of the new Haul road to divert an existing stream to culverts installed in the rail and new service road.

Stockpile and Crusher Sedimentation Pond

a) A new granular walled HDPE lined sedimentation pond will be constructed to capture run off from the newly constructed primary crusher pad. The settling includes and emergency overflow spillway to an existing water course. During normal operation the pond is pumped empty using mobile pumps and hoses (existing equipment).

Shape Drainage Path into Natural Watercourse

a) To the North of the new primary crusher pad, a drainage ditch will be provided to redirect existing stream channels to flow to the North of the crusher pad into an existing stream flowing to the North West.

Earthworks for Construction Accommodation, Permanent Mine Accommodation, New workshop

New pads are required to allow for construction of a new construction camp and truck shop. The scope includes:

a) Construction pad camp will be a pad 300m x 150m. Construction of the pad will require relocation of an existing power line and water supply pipeline to the edge of the new pad. Refer to Appendix A2 and A12. The layout in Appendix A12 defines the arrangement driving the size of the accommodation pad. Appendices A2 and A12 will require revision to reflect the final scope of the accommodation facility acquired for the project.
b) Construction of a pad for a new truck shop notionally 30m x 30m in size. Refer to Appendix A -9.

Rail Embankment within the Mine Area

Definition of the scope of the rail system is contained within WBS 3000 descriptions.

9.3.3 Area 1600 – Services and Utilities

9.3.3.1 Raw Water Pipeline

a) The existing raw water pipeline is to be re-routed and extended in length to suit the new construction camp pad. Refer to Appendix A-4. Final layout of this pipeline will be required upon selection of the accommodation camp contractor.

To minimize down time and execution risk the strategy is to construct a new length of pipeline along the new route and cut / splice it to the existing.

The pipeline is a 100mm HDPE pipe with heat tracing and insulation. The pipeline needs to be secured from movement due to thermal cycling by placing granular fill on top of the pipeline and strategic points.

Modification of the pipeline to the new discharge location includes:

- Supply and install pipeline (100mm dia. HDPE DR11 with 50mm insulation, butt fused) along new route around the planned construction camp. Pipeline to be guided and anchored using steel pegs driven into ground and crushed rock placed over pipe as required.
- Supply and install series constant watt heater cable along new length of pipeline, 2 circuits, Thermon TEK as per existing. Installation details to match existing Port Treated Effluent Pipeline including splice and termination details (external junction box).
- Cut existing pipeline and heat trace cable at specified locations (two locations).
- Fuse existing pipe to new pipe and splice heat trace cables at two (2) connection locations.
- Complete pipe insulation at pipe joints as per existing Port Treated Effluent Pipeline details.
- Demolish 385m of existing pipeline.

9.3.3.2 Treated Effluent Pipeline

a) The existing treated effluent pipeline is to be re-routed and extended in length to suit the new primary crushing and railway layout and laid on an earth pipe bench constructed along the new service road. Refer to Appendix A-4.

To minimize down time and execution risk the strategy is to construct a new length of pipeline along the new route and cut / splice it to the existing. 1305m of new pipe is estimated to be required.

The pipeline is a 50mm HDPE pipe with heat tracing and insulation. The pipeline needs to be secured from movement due to thermal cycling by placing granular fill on top of the pipeline and strategic points.

Modification of the pipeline to the new discharge location includes:

- Supply and install pipeline (50mm dia HDPE DR11 with 50mm insulation, butt fused) along new route. Pipeline to be guided and anchored using steel pegs driven into ground and crushed rock placed over pipe as required.
- Supply and install series constant watt heater cable along new length of pipeline, one circuit, Thermon TEK as per existing. Installation details to match existing Port Treated Effluent Pipeline including splice and termination details (external junction box).
- Cut existing pipeline and heat trace cable at specified locations (two locations).

- Fuse existing pipe to new pipe and splice heat trace cables at two (2) connection locations.
- Complete pipe insulation at pipe joints as per existing Port Treated Effluent Pipeline details.
- Demolish 1105m of existing pipeline.

9.3.3.3 Area 1610 – Mine Power Supply and Distribution

Refer to Appendices A5 and A7 for details of the scope described below.

Mine Construction Camp (Appendix A5 Items B1 and B2)

a) Install two (2) new 5kV power cables between power generation E-House and Construction Camp E-house - route length of 580m.

b) Cut existing 5kV cable at construction camp. Re-route cable to new construction camp E-House.

c) Terminate three (3) cables (two new plus one existing) in the construction camp E-House.

d) Terminate two (2) new cables in the power generation E-House.

e) Install new length of 5kv cable to extend existing cut end (feed to Aerodrome and Weatherhaven) to the new Construction Camp E-House – estimated length 280m.

f) Splice new length of cable to cut end of existing. Terminate new cable in the Construction Camp E-House.

g) Modify existing ground conductors and install new dual ground conductors along power cable route between E-Houses (joint onto existing conductors).

h) Supply and install grounding system accessories as required.

Relocate E-house #11 (Appendix A5 reference B3 and B4 (A&B))

a) Decommission E-house #11 and disconnect existing power cables (ref B4B)

b) Relocate modular E-House to new primary crushing pad (ref B4A)

c) Supply and install E-House grounding system including ground rods and copper conductor.

d) Disconnect two existing 1000A MV junction boxes in 5kV feeders to E-Houses #8 and #11 (three terminations in each junction box). Splice existing 5kV cables for power feed to E-House #8. Two (2) splices required.

e) Relocate two existing 1000A MV junction boxes to new position along existing power cables (ref B3).

f) Cut two (2) existing 5kV power cables at junction boxes. Terminate cables in junction boxes (four terminations).

g) Install two (2) new 5kV power cables from relocated junction boxes to new E-House #11 location.

h) Terminate cables in junction boxes and in E-House #11. Four (4) terminations.

i) Install dual ground conductors along power cable route between JB and new E-House position. Connect ground conductors as required to complete network.

Modify Feeders to E-House #8 (Appendix A5 reference B5)

a) Cut two (2) existing 5kV power cables to E-House #8

b) Disconnect power cables from E-House #8, re-route existing cable and install new length of cable as required to for installation of the new truck workshop.

c) Splice new cable to existing (two splices)

d) Terminate new cables in E-House #8 (two terminations)

Truck Workshop 600V Feeder, (Appendix A5 reference B5)

a) Install 600 V cable between existing E-house #8 and new Truck Workshop.

b) Terminate cable in E-house #8 (other end termination by TX003).

Rail Signalling 600V Feeders, including

a) Install two (2) 600 V cables from existing Aerodrome E-house to Rail System Signalling Equipment (switches, two locations).
b) Install 600V cable from power generation E-House to Rail System Signalling Equipment (weigh bridge).
c) Terminate cables (x2) in Aerodrome E-house and cable (x1) in power generation E-House (other end terminations by TR001).

9.3.3.4 Area 1650 - Communications and IT Infrastructure

Fibre optic cable networks will be extended per;

Re-located E-House for Crushers –Refer to Appendix A6 items A1 to A2

a) Install new Cable from position A1 to position A2. Provide sufficient patch leads to connect fibre cable to control system.

New Mine Truck Workshop – Refer to Appendix A6 items A1 to A3

a) Install new fibre cable from A1 at 47310VP-005 and then to the New Mine Truck Workshop reference A3. Splice and Patch the cables as required. Provide sufficient patch leads to connect fibre cable to control system. Test the cables and commission.

9.3.4 Area 1700 – Mobile Equipment

Area 1700 consists of the following sub-sections:

- Area 1710 – Mining Production Mobile Equipment
- Area 1720 – Production Support Mobile Equipment
- Area 1730 – Services Mobile Equipment

9.3.4.1 Area 1710 – Mining Production Mobile Equipment

Mine production equipment requirements are divided into two categories;

- Equipment required for 2019, which will be shipped in the 2018 sealift and form part of the capital phase of the project.
- Equipment required for 2020 and beyond which will begin delivery on the 2019 sea lift and will be managed from a sustaining capital budget. Table 9-2 defines the planned mine mobile equipment requirements.

Table 9-2: Mine Mobile Equipment Requirements

Equipment Type	Size Classification	Quantity purchased from Capital Budget (12 Mtpa Project Scope (2018 Seal lift)	Quantity purchased from sustaining capital budget (2019 sealift and beyond)
Off Highway Haul Trucks	~ 220 tonne (CAT 793F or equivalent)	One (1)	Nine (9)
Hydraulic face shovels	~ 61 tonne bucket capacity	Nil	Two (2)
Wheel Loaders (FEL)	~ 40 tonne bucket capacity (CAT 994 K or equivalent)	One (1)	Nil

Equipment Type	Size Classification	Quantity purchased from Capital Budget (12 Mtpa Project Scope (2018 Seal lift)	Quantity purchased from sustaining capital budget (2019 sealift and beyond)
Blast Hole Drilling Rigs	(drill diameter 152-270mm, to suit bench depth of 20m)	Nil	Five (5)
Tracked Dozer	Blade capacity 19 to 22 m^3 (CAT D10 or equivalent)	One (1)	Two (2)
Road Graders	24 ft blade width. (CAT 24M or equivalent)	Nil	One (1)

9.3.4.2 Area 1720 – Production Support Mobile Equipment

See Table 9-2

a) 2 off water/sander bodies on CAT 777 truck bodies

b) 1 off tow haul tractor and trailer to suit haul trucks

9.3.4.3 Area 1730 – Services Mobile Equipment

c) Purchase and delivery to site of one (1) fuel lube truck based upon a CAT 740B articulated dump truck chasis.

d) Purchase and delivery to site of one (1) stemming front end loader typically matching Cat IT28 specification.

9.3.5 Area 1800 – Mine Ancillary Facilities

Area 1800 consists of the following sub-sections:

- Area 1810 – Explosive Storage
- Area 1820 – Mine Maintenance Facilities
- Area 1830 – Mine Accommodation Area

9.3.5.1 Area 1810 – Explosive Storage

This area has no scope.

9.3.5.2 Area 1820 – Mine Maintenance Facilities

A new mine truck shop will be provided shown in Appendix A8. The truck shop will be provided on design build basis. The scope that follows represents the scope of the design build contractor TX003.

Mine Truck Workshop includes two truck bays: a dual-purpose wash and lube bay, and a general repair and maintenance bay. The building and generally includes concrete floor, overhead crane, external tool crib, parts storage and HVAC modules.

Civil and Earthworks

a) Reinforced concrete building foundation, floor slab and sump(s), maximizing the use of precast concrete, including:

- Floor slabs and sump(s) for truck wash system.
- Supply all materials required to construct foundations, floor slab and sump(s).
- Place fill and final grade base of excavation for sump(s), construct sump and backfill with aggregate provided by others.
- From finished grade constructed by others, place structural fill as required to achieve levels for construction of foundations and floor slab.
- Backfill around foundations and at slab edges to achieve final finished grade.

Building structure and enclosure, including:

a) Design building structure, cladding / flashing, doors / openings including specified truck doors, stairs, platforms, walkways and awnings as required to provide safe access to man doors and safe access to electrical panels and other equipment.

b) Design equipment and utility modules connected to primary workshop building.

c) Design opening in primary workshop building for modular lunchroom and washroom designed, supplied and installed by others.

d) Supply all materials and equipment to construct building structure and enclosure including doors and associated controllers.

e) Construct building structure and enclosure supported from Contractor installed foundations.

f) Supply timber, steel, grating, roofing, associated fixtures and other materials and hardware required to construct safe access.

g) Commission and bring into operation the truck doors

h) Decommission and relocate the existing “Aerodrome Office” at Milne to the Mary River and connect into the Truckshop via an arctic corridor to create a Mine Workshop Service Building. Included in this scope of work;

- Construct timber cribbing and place module on cribbing
- Design, supply and install an arctic corridor for connecting the building to the workshop building.
- Connection of sewage tanks, plumbing, heat tracing and construction of an insulated timber enclosure around the sewage tank.
- Connection of 208V power, data and fire alarm systems to the Mine Truck Shop.

Electrical service entrance and electrical services, including:

a) Design service entrance including step-down transformer(s), distribution panels and fused disconnects; with provision to connect Employer specified 600v power supply cable.

b) Design electrical services including power supplies to fixed workshop equipment, internal / external lighting, receptacles, emergency lighting, exit lights and cable routing and raceway.

c) Design all earthing, grounding and bonding systems.

d) Supply all electrical equipment and materials required to construct the electrical service entrance and electrical services including panels, cable, raceway, fittings, fixtures and receptacles.

e) Construct the electrical service entrance and electrical services.

f) Commission and bring into operation the electrical service entrance and electrical services.

Building heating and ventilation (HVAC) system, including:

a) Design building heating and ventilation system including diesel fired heaters, make-up air units, diesel tank and diesel supply / distribution system; preinstalled in an external modular unit and pre-commissioned to the maximum extent possible.

b) Design building exhaust fans and recirculation (ceiling) fans.

c) Supply all equipment and materials required to construct the building heating and ventilation system including unit heaters, make-up air units, diesel tanks, diesel pumps, HVAC control panel, pump control panel, power and control cables, flue vents, ductwork, piping, valves and associated equipment, materials and hardware.

d) Construct the building heating and ventilation system including, where applicable, modification of existing building heating and ventilation system.

e) Commission and bring into operation the building heating and ventilation system.

Overhead Crane, 15 tonne capacity, Class ISO M3 including:

a) Design overhead crane including girder crane, crane rails, maintenance platform with ladder access, power supply, controls and support structures.

b) Supply all equipment, power and control cables / rails, structures and other materials required to construct the overhead cranes.

c) Construct overhead crane and associated structures, systems and equipment.

d) Commission and bring into operation the overhead cranes including load testing.

Truck Wash System, preassembled and pre-commissioned in a modular building or similar, including:

a) Design recycled water truck wash system suitable for manual washing for CAT 793 haul trucks and similar equipment.

b) Supply all equipment, structures and electrical and control systems for the complete truck wash system.

c) Construct the truck wash system.

d) Commission and bring into operation the truck wash system.

Tool Crib and Parts Storage modules consisting of three (3) 40' ISO shipping containers, including:

a) Design modules with internal shelving for parts and tool storage and internal access from the workshop.

b) Supply complete modules.

c) Install modules on concrete block foundations.

Utilities Module, including:

a) Modular building (potentially a shipping container), preassembled and pre-commissioned with specified equipment.

b) Air compressor with accumulator for operation of workshop hand tools and similar.

c) Oil and grease distribution system.

d) EVAC system.

Utility piping system, including:

a) Design utility piping distribution with hose reels for all Utilities Module systems.

b) Supply pipe, pipe fittings, pipe supports, hose reels and other materials to construct system.

c) Construct piping system with hose reels.

d) Pressure test and flush clean piping system ready for service.

Fire alarm system, including:

a) Design addressable fire alarm and detection system.

b) Supply all equipment, cabling, materials and documentation required to construct the system.

c) Supply fibre optic patch cable and conduit for connection of the fire alarm control panel to the communication network cabinet.

d) Install all equipment and cabling.

e) Program and configure fire alarm control panel and devices, including communication link to the main fire alarm panel located in the Port Site Complex (PSC).

f) Commission and bring the system into operation.

g) Supply fire alarm system verification report.

Communications and IT systems, including:

a) Design, supply and install a wireless communication system for use in the workshop. The wireless network will interface directly with the client supplied fiber optic backbone. The client will supply fibre optic cable between buildings as part of the data and voice networks. There is a requirement for a VoIP handset in the workshop for voice communication.

b) Supply wireless communication equipment (Routers and wireless access points) that shall conform to 802.11n, to enable the wireless network to operate at Link Speeds of: minimum 300Mbps and maximum of 600Mbps.

c) Supply Category 6 Ethernet cable for connection of RJ45 outlet to the communication cabinet for VoIP handset.

d) Power and test communication equipment and cabling.

e) Supply inspection and test reports.

9.3.5.3 Area 1830 – Mine Accommodation Area

Operations personnel will be accommodated in a new 800 man camp. Refer to WBS 6110. The new camp will replace both the MSC and the mine site Weatherhaven camps.

Project scope includes:

a) Decommission and relocate to Milne Port (3) dormitory wings (90 rooms) from the existing Mine Site Complex (MSC), including associated sewage, plumbing, electrical, fire, and IT systems.

b) Relocate the arctic corridor and locker room modules as required. Refer to WBS 4920 for installation of relocated facilities.

c) Make safe and winterize unused sections of the MSC Camp.

d) Purchase and install a complete hard walled camp facility comprising but not limited to:

- Single accommodation rooms with ensuite bathrooms to house 800 people. The Project has a limited exposure USD 12.2m for supply of this facility as this facility will be used to house relocated operations personnel.
- Food storage, preparation and dining areas.
- Camp laundry and linen storage areas.
- Personal laundry facilities.
- Recreation facilities.
- Water tanks and distribution.
- Waste water treatment plant and waste disposal.
- Power generating plant it is expected that the final contract will include for supply of 4MW of generating capacity. Integration of this power supply into the mine grid will be determined after award of contract for camp supply.

The camp will be purchased second hand and relocated Newfoundland to the minesite and installed on a pew pad south of the rail alignment and located between the airport and the current mine operations area.

9.3.6 Area 1900 – Mine Materials Handling

Area 1900 consists of the following sub-sections:

- Area 1910 – Inloading
- Area 1920 – Primary Crushing and Stockpiling.

9.3.6.1 Area 1910 – Inloading

Three (3) existing Cat 998 loaders will be used to feed the primary crushers.

9.3.6.2 Area 1920 – Primary Crushing and Stockpiling

The overall arrangement of the Primary Crushing and Stockpile area is shown in Appendix A1 and schematically in Figure 9-1.

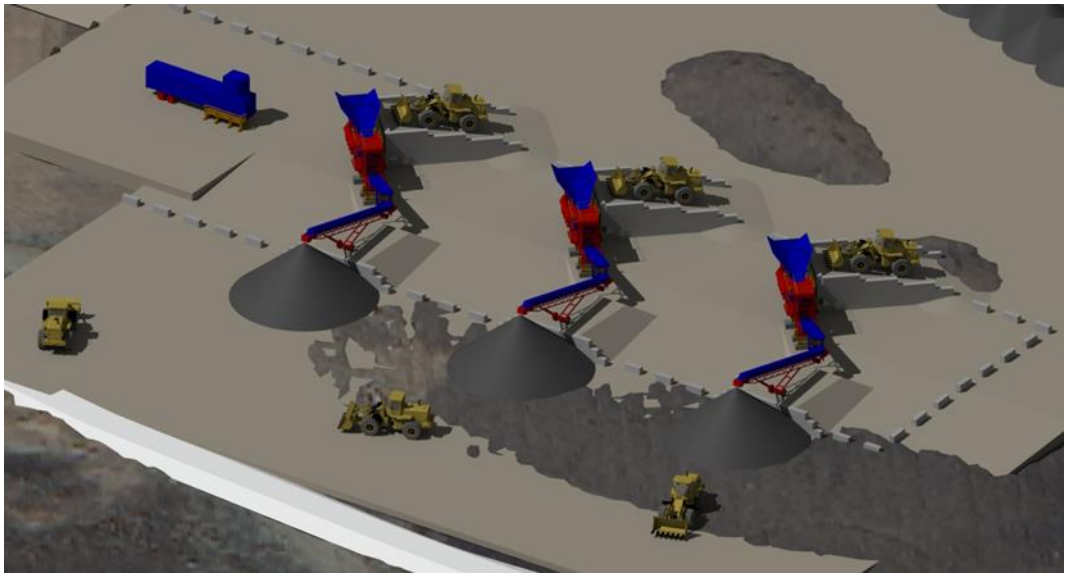


Figure 9-1: Primary Crushing and Train loading Schematic

Civil

a) Construction of a new pad for the installation of three relocated jaw crusher units, and allow installation of discharge conveyors and creation of a pad to receive primary crushed ore and load trains. The unsealed pad is nominally 200m x 100m.

b) Construction of three crusher feed ramps. The ramps will be formed using pre cast concrete sections and earth filled. Refer to Appendix A9.

c) Installation of pre cast foundation blocks (five per crusher string) to found the relocated crushers and discharge conveyor. Refer to Appendix A10.

d) Installation of pre cast concrete sections to build three retaining walls adjacent to the discharge of the primary crusher mobile conveyor units. Refer to Appendix A11.

e) Install old truck tyres and pre-cast concrete barriers as required to limit large mobile equipment movement in operating areas and provide safe access for personnel to the crushers ref Figure 9-1.

f) Construction of drainage channels running North West to a new sedimentation pond.

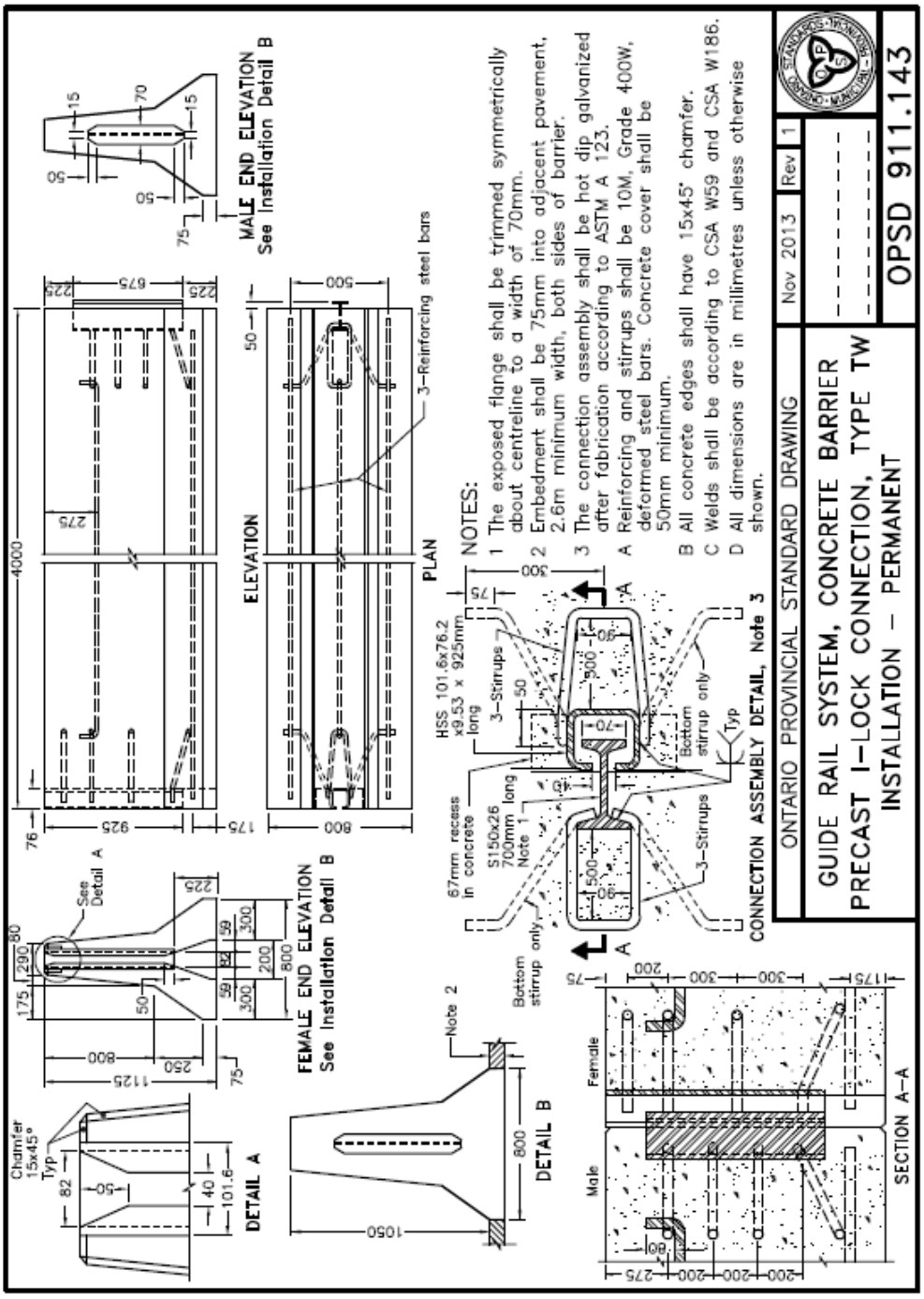


Figure 9-2: Primary Crusher Area Barriers

Mechanical

Refer for Appendix A1 for details.

a) Decommission three existing crusher and screening spreads located at the existing crusher pad.

b) Relocate the jaw crusher trailer including feed hopper, grizzly and conveyor to the new crusher location shown on drawing Appendix A1.

c) Modify crusher strings A & B to become rear feed, see **Figure 9-3**.

d) Modify the jaw crusher trailer conveyor to lower the conveyor angle and the head pulley.

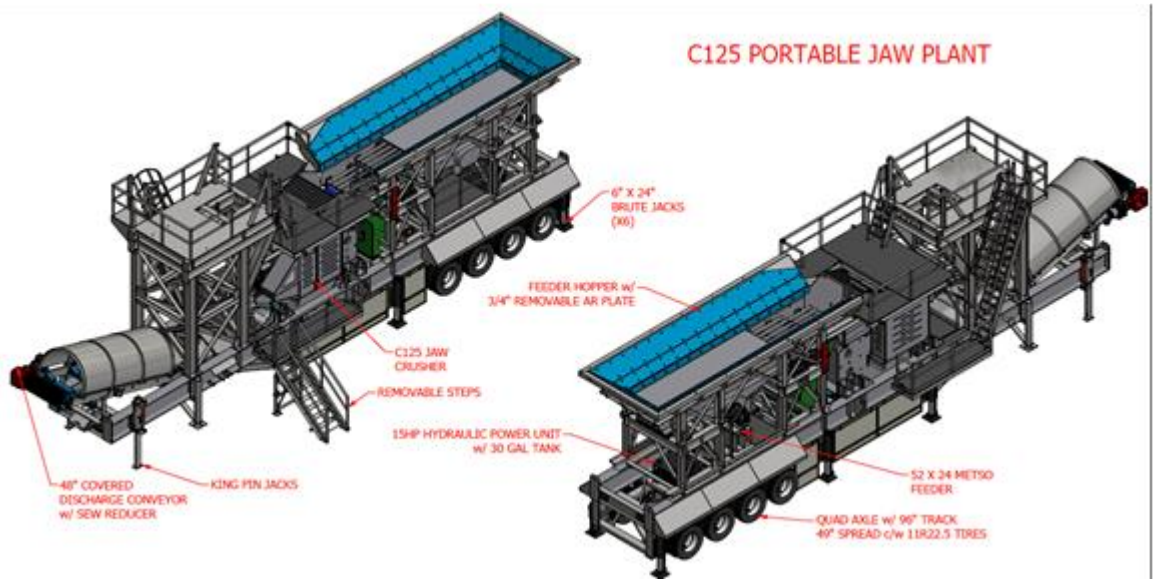


Figure 9-3: Primary Crusher Modifications

e) Replace grizzly sections on all jaw crusher units (three off) with upgraded grizzly bars.

f) Relocate three mobile stacker conveyors to the new primary crusher area and upgrade conveyor drives to 40hP (all three units).

g) Purchase four (4) 20 tonne bucket capacity Front End Loaders (FEL), CAT 992 or equivalent to manage the primary crushed ore stockpiles and load primary crushed ore into the trains.

Electrical

a) Relocate the existing Crusher C MCC trailer to the new primary crusher pad. Modify the electrical systems to power and control three (3) relocated jaw crusher trailers, three (3) relocated and modified stacker conveyors and area lighting (defined below).

b) Supply and install power cables for the MCC trailers to equipment including raceway and grounding cables.

c) Supply and Install area lighting (poles and flood lights) on the new primary crusher pad to suit crusher operation and train loading. Allowance 8 poles with 4 lights per pole.

- Flood lights will be mounted on wooden poles (30' class 2 red pine).
- Depending on location and available power sources, either 347V or 120V power will be used for lighting. Cables supplying power to the lights will be direct buried.
- Floodlight to be 400 W MH, 120/277/347 V tri-voltage, Super CWA Pulse Start ballast, standard yoke with wall/wood pole/pipe bracket, CSA standard, dark bronze finish, lamp included.

Instrumentation and Control

a) Modify control systems and HMI in existing relocated trailer to control the new/modified primary crusher systems.

9.4 Area 2000 – Iron Ore Process Plant and Onsite Infrastructure

Area 2000 consists of the following major sub-areas:

- Area 2300 – Process Plant
- Area 2800 – Utilities and Onsite Infrastructure
- Area 2900 – Process Ancillary Facilities

9.4.1 Area 2300 – Process Plant

The Bulk Materials Handling and Processing System at Milne Port is covered by the following WBS elements.

- 2300 Process Plant
  - 2330 Secondary Crushing and Screening
- 4000 – Port
  - 4120 Ore Unloading and Stockpile
  - 4210 Stockpiling
  - 4229 Reclaiming
  - 4620 Ore Dock No.2
  - 4710 Ship Loading Conveyor
  - 4720 Ship Loading

- 4800 – Utilities and on site infrastructure.

The descriptions that follow are aligned to this WBS and are presented in WBS order.

The process plant defined in Area 2300 will be provided by contractor CM001 under a design build and commission basis. The requirements for CM001 are defined Appendix A13. The overall layout for the port including the processing facilities is shown in Appendix A15. The process flow diagram defining the functional requirements is shown in Appendices A51 and A52.

Bids for CM001 are being evaluated and all bidders have confirmed compliance with the required plant performance specification. Each bidder has different approaches to plant design; the following descriptions are functional in nature as they relate to CM001 and the battery limits for CM001 supply. For scope outside the battery limits of CM001, detailed facilities descriptions are provided.

9.4.1.1 Area 2330 – Secondary Crushing and Screening

The secondary crushing facilities provide functionality per:

a) Reclaim of primary crushed ore from the crusher feed stockpile by way of a gravity fed reclaim tunnel with mass controlled apron feeders to generate a stream of primary crushed ore for feed to the screen plant by way of conveyors.

b) Screening ore to generate, oversize (+32mm), lump (-32 + 6mm) and fines (-6mm) materials.

c) Crushing of oversize material to meet a top size of +32mm and recirculation of crusher product over the screens to create a closed loop screening circuit.

d) Discharge of lump to feed onto a lump transfer conveyor which discharges to Stockpile No2 Yard Conveyor (refer to WBS 4210).

e) Discharge of fines from the screening plant to feed a wheel mounted radial stacker for intermediate stacking of fines adjacent to the screening building.

Civil and Foundations

a) Pre cast ground beams will be provided to contractor CM001 on which to install the crusher and screening building. The scope of CM001 requires the CM001 contractor to provide mass or other style foundation to absorb dynamic loads and loads to be transferred to the ground beams from their equipment and structures.

b) Conveyors and other structures will be supported by pre-cast concrete and, or, fabricated steel footings provided by the CM001 contractor.

c) Earthwork for the crushing and screening area is defined in WBS 2810.

Structural, Mechanical, Electrical and Instrumentation

The secondary crushing and screening facilities will be designed and supplied by the contractor awarded package CM001 refer to Appendix A13. The following provides an outline of intended discipline functionality to be provided by the CM001 contractor.

a) Provision of the crushing and screening process plant consistent with functional specifications on throughput, feed specification, product lump and fine ore specifications and plant throughput. The crushers and screen buildings are provided with N+0 redundancy for all process equipment.

b) Supply and installation of a primary crushed ore vault (reclaim tunnel) containing a mass controlled ore reclaim mechanism, a tunnel for man and maintenance vehicle access which houses the reclaim conveyor.

c) Supply and installation of a screen feed conveyor to discharge over screen house to generate oversize, lump and fine ore fractions.

d) Supply and installation of a steel framed, clad screen building to screen incoming primary crushed ore and recirculating secondary crushed product. The screen building will be fitted with local dust collection facilities and an overhead travelling crane to allow for screen maintenance. The screen building will receive primary crushed ore and secondary crusher recycle material, screen this material and produce an oversize stream, a lump product stream and fine ore stream. Lump ore will be conveyed away from the screen building on a Lump Product Transfer conveyor. Fine ore will be conveyed to a fine ore stockpile area adjacent the screen building. Oversize ore will be conveyed to the crusher building for secondary crushing. The screening building will be insulated but not heated.

e) Supply and installation of oversized recirculation conveyor to return oversized material to be crushed in a new secondary crusher building.

f) Supply and installation of a secondary crushing building to receive +32 mm material and crush to suit a -32mm size distribution. The crusher building will be steel framed and clad. The crusher building will be fitted with local dust collection facilities and an overhead travelling crane to allow for crusher maintenance. The crushers will be provided with bins and feeders to allow for constant mass feed under choke conditions to the crushers. Crushed material will fall directly to the screen feed conveyor.

g) The crusher building will be insulated but will not be heated.

h) Supply and installation of a fine ore stacking conveyor which will typically be a rubber tyred wheel mounted radial stacker.

9.4.2 Area 2800 – Utilities and Onsite Infrastructure

Area 2800 consists of:

- Area 2810 – Site Development & Plant Roads
- Area 2840 – Power
- Area 2850 – Communications and IT Infrastructure

9.4.2.1 Area 2810 – Site Development and Plant Roads

Civil, Earthworks and Drainage (refer to Appendix A14)

a) Installation of two new lined sedimentation ponds; one servicing the crusher feed stockpile and one servicing the fines stockpile. Other areas including pads for conveyors and process buildings drain directly to existing water courses.

b) Prepare crusher feed stockpile area including run off containment and base for reclaim tunnel (excavation and fill as required for CM001 equipment layout).

c) Construct pads for the crusher building, screening building (one off), crusher services building, conveyor foundations and other associated equipment.

d) Construct interconnecting roads, nominally 10m wide granular surface.

e) Construct fines stockpile pad.

9.4.2.2 Area 2840 Power

Refer to WBS 4830

9.4.2.3 Area 2850 Communications and IT

Refer to WBS 4830

9.4.3 Area 2900 – Process Ancillary Facilities

9.4.3.1 Area 2910 – Process Buildings

Crusher services Building

a. A crusher services building will be provided by contractor CM001 on a design supply and install basis. The building will be of modular construction installed on timber cribbing or similar and will contain;

- Mud Room at main entry door
- Secondary external door with breezeway
- Lunchroom suitable for 12 people
- Washrooms

- Two (2) offices
- Bulk Materials Handling and Processing operator control office (room similar to standard office with operator control screen(s) capable of monitoring and controlling the full system)
- Laboratory room, nominally 10m x 16m in size (empty room, internal fit-out and laboratory equipment by others)
- Data network
- Fire alarm system
- Heating System
- Fresh water (non-potable) plumbing system including water tank with fill nozzle accessible for refill by tanker truck and reticulation to washroom and laboratory facilities
- Sewage plumbing system including sewage tank with fittings to empty by mobile vacuum truck and plumbing from washroom and laboratory facilities

Crusher Workshop

A workshop will be provided as part of contract Cx003 to allow for enclosed maintenance of bulk materials handling equipment. The arrangement of the building is shown in Appendix A15. The scope of the building is defined as;

a) Crusher Workshop is generally an open plan building with concrete floor, overhead crane, and external tool crib, parts storage and HVAC modules.

b) Reinforced concrete building foundation and floor slab, maximizing the use of precast concrete, including:

- Design foundations and floor slabs.
- Supply all materials required to construct foundations and floor slab.
- From finished grade constructed by others, place structural fill as required to achieve levels for construction of foundations and floor slab.
- Place pre-cast concrete, install grout and as required form and pour cast-in-place concrete to complete construction in accordance with approved Contractor drawings.
- Backfill around foundations and at slab edges to achieve final finished grade.

c) Building structure and enclosure, including:

- Design building structure, cladding / flashing, doors / openings including specified truck doors, stairs, platforms, walkways and awnings as required to provide safe access to man doors and safe access to electrical panels and other equipment.
- Supply all materials and equipment to construct building structure and enclosure including doors and associated controllers.
- Construct building structure and enclosure supported from Contractor installed foundations.
- Supply timber, steel, grating, roofing, associated fixtures and other materials and hardware required to construct safe access.
- Commission and bring into operation the building doors

d) Electrical service entrance and electrical services, including:

- Design service entrance including step-down transformer(s), distribution panels and fused disconnects; with provision to connect Employer specified 600v power supply cable.
- Design electrical services including power supplies to fixed workshop equipment, internal / external lighting, receptacles, emergency lighting, exit lights and cable routing and raceway.
- Design all earthing, grounding and bonding systems.
- Supply all electrical equipment and materials required to construct the electrical service entrance and electrical services including panels, cable, raceway, fittings, fixtures and receptacles.
- Construct the electrical service entrance and electrical services.
- Commission and bring into operation the electrical service entrance and electrical services.

e) Building heating and ventilation (HVAC) system, including:

- Design building heating and ventilation system including diesel fired heaters, make-up air units, diesel tank and diesel supply / distribution system; preinstalled in an external modular unit and pre-commissioned to the maximum extent possible.
- Design building exhaust fans and recirculation (ceiling) fans.
- Supply all equipment and materials required to construct the building heating and ventilation system including unit heaters, make-up air units, diesel tanks, diesel pumps, HVAC control panel, pump control panel, power and control cables, flue vents, ductwork, piping, valves and associated equipment, materials and hardware.

- Construct the building heating and ventilation system including, where applicable, modification of existing building heating and ventilation system.
- Commission and bring into operation the building heating and ventilation system.

f) Overhead Crane, 25 tonne capacity, Class ISO M3 including:

- Design overhead crane including girder crane, crane rails, maintenance platform with ladder access, power supply, controls and support structures.
- Supply all equipment, power and control cables / rails, structures and other materials required to construct the overhead cranes.
- Construct overhead crane and associated structures, systems and equipment.
- Commission and bring into operation the overhead cranes including load testing.

g) Tool Crib and Parts Storage modules consisting of three (3) 40’ ISO shipping containers, including:

- Design modules with internal shelving for parts and tool storage and internal access from the workshop.
- Supply complete modules.
- Install modules on concrete block foundations.

h) Fire alarm system, including:

- Design addressable fire alarm and detection system.
- Supply all equipment, cabling, materials and documentation required to construct the system.
- Supply fibre optic patch cable and conduit for connection of the fire alarm control panel to the communication network cabinet.
- Install all equipment and cabling.
- Program and configure fire alarm control panel and devices, including communication link to the main fire alarm panel located in the Port Site Complex (PSC).
- Commission and bring the system into operation.
- Supply fire alarm system verification report.

i) Communications and IT systems, including:

- Design, supply and install a wireless communication system for use in the workshop. The wireless network will interface directly with the client supplied fiber optic backbone. The client will supply fibre optic cable between buildings as part of the data and voice networks. There is a requirement for a VoIP handset in the workshop for voice communication.
- Supply wireless communication equipment (Routers and wireless access points) that shall conform to 802.11n, to enable the wireless network to operate at Link Speeds of: minimum 300Mbps and maximum of 600Mbps.
- Supply Category 6 Ethernet cable for connection of RJ45 outlet to the communication cabinet for VoIP handset.
- Power and test communication equipment and cabling.
- Supply inspection and test reports.

j) Area lighting

- Flood lights mounted on 30 foot poles will be provided in the area of the crusher services building and crusher workshop to supplement lighting on the outside of buildings and conveyors.

k) Handover completed building with all systems operating after successful commissioning.

9.5 Area 3000 – RAIL

Area 3000 scope includes the supply and installation over the 109.6 km mainline and approximately 5km of yard and siding track including rolling stock and support buildings. The full alignment of the rail system is shown in Appendices A16 to A18.

Area 3000 consists of the following major sub-areas:

- Area 3100 – Terminals/Yards
- Area 3200 – Mainline Ch 2.80 km to 90.00 km
- Area 3300 – Mainline Ch 90.00 km to CH 106.00 km
- Area 3400 – Sidings
- Area 3500 – Bridges
- Area 3600 – Locomotives and Rolling Stock
- Area 3700 – Services and Utilities
- Area 3900 – Rail Ancillary Facilities

The final design of the rail system (superstructure) will be completed under a design build contract TR001. Contract specifications for the work to be done are contained in Appendix A48. In addition to specifying the requirements for track construction the specification details requirements for the provision of train control systems and wayside monitoring equipment.

Route Wide Considerations

The rail infrastructure will include the provision of track lubricators along the rail alignment to reduce rail and wheel wear as well as limiting friction in the rail wheel interface through curves. The TR001 contractor will provide the final design for these installations.

Ballast laydown areas will remain once the project is completed to support the rail line during it operational phase. These laydown areas will be used to store material and ballast during operations.

Roads need to be re-aligned at grade crossings where the road and rail do not cross within a range of 70º and 110º of each other. Therefore, road alignments are required at all grade crossing identified.

Rehabilitation site have been identified by the environmental team and as such these are seen as opportunities where the civil and earthworks contractors for packages CC002 and CC003 will potentially be spoiling excess unsuitable material.

Quarries identified and used during the construction project can be retained for future use or they can be closed.

9.5.1 Area 3100 – Terminals/Yards

Area 3100 consists of the following sub-sections:

9.5.1.1 Area 3110 – Mine Terminal

The Mine track facilities are represented in **Figure 9-4**.

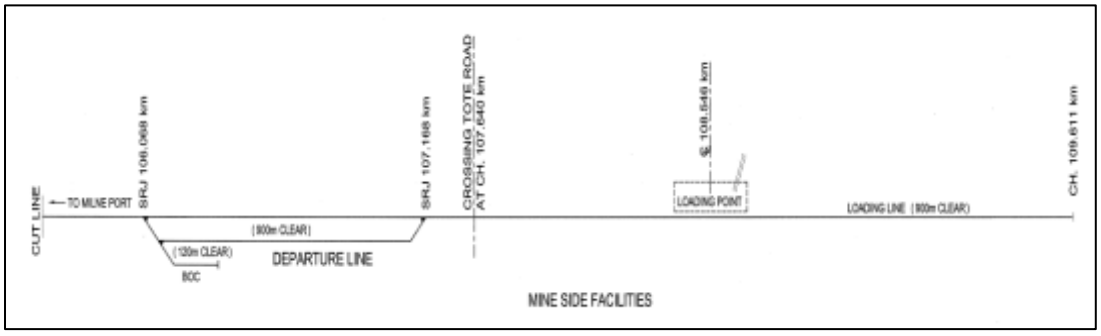


Figure 9-4: Mine Track Diagram

a) Loading staging line for empty train 900 m. (mainline chainage)

b) Loading pull through line to stop block 900 m. (mainline chainage)

c) Departure Siding 900 m.

d) The extent of work included in this section is defined below

The tables that follow describe locations where construction water (**Table 9-3**), ballast laydown areas (**Table 9-4**), earthworks quarries (**Table 9-5**), earthworks spoil and rehabilitation areas (**Table 9-6**) have been located for this area of the project.

Table 9-3: Construction Water Source

Rail Chainage (km)	Construction Water Source
Mine	Construction water point

Table 9-4: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No. 14	107+840	10,515	Next to rail embankment

Table 9-5: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
Q42	109+000	North	1-3	62,500	Diorite/ Diabse	125,000

Table 9-6: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site (Route km)
Not applicable

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-7**. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-7: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)

900	8	117
1200	0	0
1400	2	26
1800	0	0

There is one stream between km 106+000 and km 109+600 that cannot be supplied with a culvert as the rail is in a cutting at the required location. It is also not technically possible to daylight the culvert in the required location as the extent of daylighting required is too excessive. Therefor a cut-off drain will be provided to guide water to the next available drainage culvert.

One grade crossing exists at km 107+000. This will be a grade crossing with only regulatory road and rail signage provided. Approximately 900 m of road will be re-aligned to enable a grade crossing at this location.

9.5.2 Area 3200 – Mainline CH 2.80 km to CH 90.00 km

Area 3200 consists of the following sub-sections:

9.5.2.1 Area 3210 – CH 2.80 km to CH 10.00km

Refer to Appendices A22 through A23

The tables that follow describe locations where construction water (**Table 9-8**), ballast laydown areas (**Table 9-9**), earthworks quarries (**Table 9-10**), earthworks spoil and rehabilitation areas (**Table 9-11**) have been located for this area of the project.

Table 9-8: Construction Water Source

Rail Chainage (km)	Construction Water Source
None	Not applicable

Table 9-9: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No. 2	5+500	16,312	Access road from Laydown next to Tote road to rail embankment required - approximately 120m length

Table 9-10: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
PQ1a	4+500	East	0	300,000	Granitic Gneiss	600,000
PQ1b	5+200	East	0	135,000	Granitic Gneiss	270,000
PQ1c	6+200	East	0	120,000	Granitic Gneiss	240,000
Q4	7+200	East	0	7,500	Granitic Gneiss	7,500
Q5	7+500	East	0	7,400	Granitic Gneiss	7,400
Q6	7+800	East	0	6,350	Granitic Gneiss	6,350

Table 9-11: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site (Route km)
7+200
7+800
9+600

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-12**. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-12: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	31	352
1200	4	66
1400	0	0
1800	0	0

There are 13 culverts between km 2.8 and km 10 that will be installed in areas where the rail alignment is in a cut, these culverts will be provided with an inlet and as this section is in a hard rock excavation the culverts will be provided with a daylight excavation through the hard rock.

One grade crossing will be provided at km 2+880. This will be a road under rail crossing, allowing vehicular access to the rail yard, the rail unloader and the rolling stock maintenance facilities. The design will be that of a corrugated steel plate arch bridge.

Another grade crossing exists at km 9+700. This will be at a grade crossing with only regulatory road and rail signage provided. Approximately 800 m of road will be re-aligned to enable a grade crossing at this location.

9.5.2.2 Area 3220 – CH 10.00 km to CH 20.00 km

Refer to Appendices A24 through A25

The tables that follow describe locations where construction water (**Table 9-13**), ballast laydown areas (**Table 9-14**), earthworks quarries (**Table 9-15**), earthworks spoil and rehabilitation areas (**Table 9-16**) have been located for this area of the project.

Table 9-13: Construction Water Source

Rail Chainage (km)	Construction Water Source
15+000	Construction water point

Table 9-14: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No. 3	11+800	22,496	Access road from Laydown next to Tote road to rail embankment required - approximately 40m length

Table 9-15: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
PQ1a	16+200	East	0	31,700	Gravel	118,000

Table 9-16: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site (Route km)
Not applicable

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-17** All culverts to be installed will be corrugated steel pipe culverts.

Table 9-17: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	28	379.50
1200	8	103.00
1400	2	42.00
1800	0	0

One grade crossing exists at km 12+450. This will be a grade crossing with only regulatory road and rail signage provided. Approximately 300 m of road will be re-aligned to enable a grade crossing at this location.

9.5.2.3 Area 3230 – CH 20.00 km to CH 30.00 km

Refer to Appendices A26

The tables that follow describe locations where construction water (**Table 9-18**), ballast laydown areas (**Table 9-19**), earthworks quarries (**Table 9-20**), earthworks spoil and rehabilitation areas (**Table 9-21**) have been located for this area of the project.

Table 9-18: Construction Water Source

Rail Chainage (km)	Construction Water Source
None	Not applicable

Table 9-19: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No. 4	20+800	22,257	Next to rail embankment

Table 9-20: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
PQ2	28+900	East	0.5-3	80,000	Granitic Gneiss	160,000

Table 9-21: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site (Route km)
20+700
21+900
28+600
29+100
29+400

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-22**. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-22: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	34	488
1200	2	35
1400	2	42
1800	0	0

There is one stream between km 20 and km 30 that cannot be supplied with a culvert as the rail is in a cutting at the required location. It is also not technically possible to daylight the culvert in the required location as the extent of daylighting required is too excessive. Therefore, one cut-off drain will be provided to guide water to the next available drainage culvert. This cut-off drain will follow the shortest hydraulic path available.

A concrete jersey barrier will be provided between km 20+590 and km 20+670 to manage the road and rail interface where the road and rail alignment are in close proximity and specifically where the rail is in a cutting next to the road.

The road will be re-aligned between km 29+500 and km 29+600 where the road and the rail alignment clash.

9.5.2.4 Area 3240 – CH 30.00 km to CH 40.00 km

Refer to Appendices A27 to A29

The tables that follow describe locations where construction water (**Table 9-23**), ballast laydown areas (**Table 9-24**), earthworks quarries (**Table 9-25**), earthworks spoil and rehabilitation areas (**Table 9-26**) have been located for this area of the project.

Table 9-23: Construction Water Source

Rail Chainage	Construction Water Source

(km)	
35+000	Construction water point

Table 9-24: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No. 5	30+950	12,000	Next to rail embankment
No. 6	39+250	10,387	Next to rail embankment

Table 9-25: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
Q16	31+700	East		54,400	Gravel	81,700
Q19	39+200	East		4,000	Gravel	4,000

Table 9-26: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site (Route km)
40+000

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-27**. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-27: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	24	384
1200	5	100
1400	3	75
1800	0	0

A concrete jersey barrier will be provided between km 39+500 and km 39+680 to manage the road and rail interface where the road and rail alignment are in close proximity and specifically where the rail is in a cutting next to the road.

9.5.2.5 Area 3250 – CH 40.00 km to CH 50.00 km

Refer to Appendices A30

The tables that follow describe locations where construction water (**Table 9-28**), ballast laydown areas (**Table 9-29**), earthworks quarries (**Table 9-30**), earthworks spoil and rehabilitation areas (**Table 9-31**) have been located for this area of the project.

Table 9-28: Construction Water Source

Rail Chainage (km)	Construction Water Source
43+500	Construction water point
48+000	Construction water point

Table 9-29: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No 7	44+140	22,415	Next to rail embankment - short haul road maybe required

Table 9-30: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
PQ4a	41+600	East	0	90,000	DolomiticLimestone	180,000
PQ4b	42+500	East	0	90,000	DolomiticLimestone	180,000
PQ5a	45+700	East	0	120,000	Dolomitic Limestone	240,000
PQ5b	46+800	East	0	250,000	Dolomitic Limestone	500,000
Q23	48+600	East	0	4,000	Dolomitic Limestone	4,000

Table 9-31: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site (Route km)
40+000

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-32**. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-32: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	24	431
1200	9	189
1400	4	82
1800	0	0

There are three streams between km 40 and km 50 that cannot be supplied with a culvert as the rail is in a cutting at the required locations. It is also not technically possible to daylight the culvert in the required location as the extent of daylighting required is too excessive. Therefore, three cut-off drains will be provided to guide water to the next available drainage culvert. These cut-off drains will follow the shortest hydraulic path available.

A concrete jersey barrier will be provided between km 47+300 and km 47+450 to manage the road and rail interface where the road and rail alignment are in close proximity and specifically where the rail is in a cutting next to the road.

The road will be re-aligned between km 48+300 and km 50+000 where the road and the rail alignment clash. This road re-alignment avoids multiple grade crossings. This road re-alignment avoids multiple grade crossings.

9.5.2.6 Area 3260 – CH 50.00 km to CH 60.00 km

Refer to Appendices A31 to A33

The tables that follow describe locations where construction water (**Table 9-33**), ballast laydown areas (**Table 9-34**), earthworks quarries (**Table 9-35**), earthworks spoil and rehabilitation areas (**Table 9-36**) have been located for this area of the project.

Table 9-33: Construction Water Source

Rail Chainage (km)	Construction Water Source
51+000	Construction water point
55+100	Construction water point
60+000	Construction water point

Table 9-34: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No 8	53+300	11,000	Next to rail embankment

No 9	57+500	37,593	Next to rail embankment at Midway Loop

Table 9-35: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
Q24	51+250	East	0	42,000	Dolomitic Limestone	42,000
PQ6a	56+200	East	0	180,000	Dolomitic Limestone	360,000
PQ6b	57+100	East	0	150,000	Dolomitic Limestone	300,000

Table 9-36: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site Route (km)
52+200
56+200

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-37**. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-37: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	26	379
1200	7	166
1400	0	0
1800	0	0

There are two streams between km 50 and km 60 that cannot be supplied with a culvert as the rail is in a cutting at the required locations. It is also not technically possible to daylight the culvert in the required location as the extent of daylighting required is too excessive. Therefore, two cut-off drains will be provided to guide water to the next available drainage culvert. These cut-off drains will follow the shortest hydraulic path available.

The road will be re-aligned between km 50+000 and km 52+000 where the road and the rail alignment clash. This road re-alignment avoids multiple grade crossings.

One grade crossing exists at km 55+585. This will be a grade crossing with only regulatory road and rail signage provided. Approximately 300 m of road will be re-aligned to enable a grade crossing at this location.

9.5.2.7 Area 3270 – CH 60.00 km to CH 70.00 km

Refer to Appendices A34 to A35

The tables that follow describe locations where construction water (**Table 9-38**), ballast laydown areas (**Table 9-39**), earthworks quarries (**Table 9-40**), earthworks spoil and rehabilitation areas (**Table 9-41**) have been located for this area of the project.

Table 9-38: Construction Water Source

Rail Chainage (km)	Construction Water Source
Not applicable	

Table 9-39: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
Not applicable			

Table 9-40: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
Q26	60+300	East	0	2,597,000	Dolomitic Limestone	5,190,000
Q27	63+350	East	0	90,000	Dolomitic Limestone	136,000
PQ9	66+000	West	0	90,000	Dolomitic Limestone	225,000

Table 9-41: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site Route (km)
63+000
63+300

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-42** All culverts to be installed will be corrugated steel pipe culverts.

Table 9-42: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	40	588
1200	2	48
1400	1	31
1800	1	51

There are eight streams between km 60 and km 70 that cannot be supplied with a culvert as the rail is in a cutting at the required locations. It is also not technically possible to daylight the culvert in the required location as the extent of daylighting required is too excessive. Therefore, eight cut-off drains will be provided to guide water to the next available drainage culvert. These cut-off drains will follow the shortest hydraulic path available.

9.5.2.8 Area 3280 – CH 70.00 km to CH 80.00 km

Refer to Appendices A36 to A37

The tables that follow describe locations where construction water (**Table 9-43**), ballast laydown areas (**Table 9-44**, earthworks quarries (**Table 9-45**), earthworks spoil and rehabilitation areas (**Table 9-46**) have been located for this area of the project.

Table 9-43: Construction Water Source

Rail Chainage (km)	Construction Water Source
Not applicable	

Table 9-44: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
Not applicable			

Table 9-45: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
PQ10a	73+100	North	0	90,000	Dolomitic Limestone	180,000
PQ10b	74+200	North	0	60,000	Dolomitic Limestone	120,000

Table 9-46: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site Route (km)
72+200

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-47**. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-47: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	24	319
1200	6	97
1400	2	56
1800	4	61

9.5.2.9 Area 3290 – CH 80.00 km to CH 90.00 km

Refer to Appendices A38 to A 39

The tables that follow describe locations where construction water (**Table 9-48**), ballast laydown areas (**Table 9-49**), earthworks quarries (**Table 9-50**), earthworks spoil and rehabilitation areas (

Table 9-51) have been located for this area of the project.

Table 9-48: Construction Water Source

Rail Chainage (km)	Construction Water Source
80+000	Construction water point
86+000	Construction water point

Table 9-49: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No. 10	84+360	22,615	Next to rail embankment
No. 11	87+660	22,444	Next to rail embankment

Table 9-50: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
PQ12a	84+500	North	0	120,000	Dolomitic Limestone	240,000
PQ12b	84+500	North	0	60,000	Dolomitic Limestone	120,000
PQ13	85+700	North	0	90,000	Dolomitic Limestone	180,000

Table 9-51: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site Route (km)
89+300
89+800

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-52**. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-52: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	25	292
1200	5	81
1400	1	12
1800	4	65

There is one stream between km 80 and km 90 that cannot be supplied with a culvert as the rail is in a cutting at the required locations. It is also not technically possible to daylight the culvert in the required location as the extent of daylighting required is too excessive. Therefore, one cut-off drain will be provided to guide water to the next available drainage culvert.

Three grade crossings exist at km 84+520, km 85+800 and km 87+635 respectively. These will be at grade crossings with only regulatory road and rail signage provided. Approximately 250 m of road will be re-aligned at each grade crossing to enable a grade crossing at these locations.

9.5.3 Area 3300 – Mainline CH 90.00 km to CH 106.00 km

Area 3200 consists of the following sub-sections:

9.5.3.1 Area 3310 – CH 90.00 km to CH 100.00 km

Refer to Appendices A40 to A41

The tables that follow describe locations where construction water (**Table 9-53**), ballast laydown areas (**Table 9-54**), earthworks quarries (**Table 9-55**), earthworks spoil and rehabilitation areas (**Table 9-56**) have been located for this area of the project.

Table 9-53: Construction Water Source

Rail Chainage (km)	Construction Water Source
93+000	Construction water point
96+000	Construction water point

Table 9-54: Ballast Laydown Areas

Stockpile Number	Rail Chainage	Approximate Ballast Quantity at Stockpile	Notes
No. 12	92+000	22,618	Next to rail embankment

Table 9-55: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
Q36	91+000	North	0	63,000	Dolomitic Limestone	94,500
PQ14a	96+700	North	0	40000	Dolomitic Limestone	80,000
PQ14b	96+000	North	0	15,000	Grandiorite	30,000

Table 9-56: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site Route (km)
93+000

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-57**. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-57: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	38	546
1200	3	58
1400	1	24
1800	0	0

There are eight streams between km 90 and km 100 that cannot be supplied with a culvert as the rail is in a cutting at the required locations. It is also not technically possible to daylight the culvert in the required location as the extent of daylighting required is too excessive. Therefor eight cut-off drains will be provided to guide water to the next available drainage culvert. These cut-off drains will follow the shortest hydraulic path available.

Two grade crossings exist at km 92+179 and km 96+730 respectively. These will be at grade crossings with only regulatory road and rail signage provided. Approximately 250 m and 450 m of road will be re-aligned at each grade crossing to enable a grade crossing at these locations.

9.5.3.2 Area 3320 – CH 100.00 km to CH 106.00 km

Refer to Appendices

The tables that follow describe locations where construction water (**Table 9-58**), ballast laydown areas (**Table 9-59**), earthworks quarries (**Table 9-60**), earthworks spoil and rehabilitation areas (**Table 9-61**) have been located for this area of the project.

Table 9-58: Construction Water Source

Rail Chainage (km)	Construction Water Source
102+000	Construction water point
105+000	Construction water point

Table 9-59: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No. 13	104+500	13,443	Next to rail embankment

Table 9-60: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
PQ15a	101+500	North	1-3	40,000	Diorite/ Diabse	80,000
PQ15b	102+300	North	1-3	22,500	Diorite/ Diabse	45,000

Table 9-61: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site Route (km)
Not applicable

The extent and type of culverts that will be installed in this area of the project is summarized in. All culverts to be installed will be corrugated steel pipe culverts.

Table 9-62: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	12	134.20
1200	3	56.12
1400	2	36.60
1800	2	63.44

There is one stream between km 100 and km 106 that cannot be supplied with a culvert as the rail is in a cutting at the required locations. It is also not technically possible to daylight the culvert in the required location as the extent of daylighting required is too excessive. Therefore, a cut-off drain will be provided to guide water to the next available drainage culvert. The cut-off drain will follow the shortest hydraulic path available.

9.5.4 Area 3400 – Sidings

Area 3400 consists of the following sub-sections:

9.5.4.1 Area 3410 – Midway Siding

The midway siding includes a 900m clear passing loop as well as a 300m clear back track. The back track provides an area where track maintenance machines can be staged and where they can be placed temporarily while the mainline and passing loop is used to cross the main line trains.

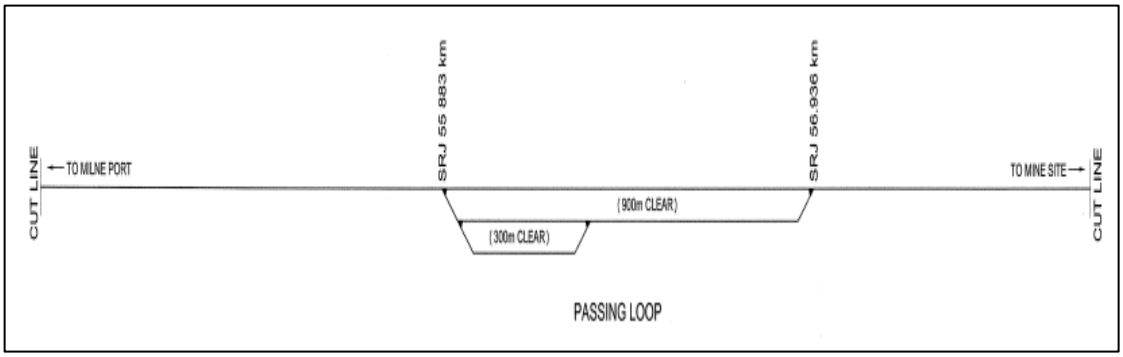


Figure 9-5: Midway Passing Loop and Backtrack

9.5.5 Area 3500 – Bridges

Four steel beam bridges will be built to allow the rail line to pass over waterways. The bridges will be steel decked and supported from piled abutments. Detailed design supply and installation of the piles and bridge structures will be undertaken by contractor CC003.

9.5.5.1 Area 3510 – Bridge 15.839 km

Refer to appendix A 44

4 span crossing 15.100 m per span, located at km 15.839.

9.5.5.2 Area 3520 – Bridge 70.690 km

Refer to Appendix A45

2 span crossing 20.235 m per span, located at km 70.690.

9.5.5.3 Area 3530 – Bridge 86.355 km

Refer to Appendix A46

2 span crossing 20.235 m per span, located at km 86.355.

9.5.5.4 Area 3540 – Bridge 102.217 km

Refer to Appendix A47

Three span crossing with one centre span of 20.100 m and two outside spans of 20.235m per span, located at km 102.217.

9.5.6 Area 3600 – Locomotives and Rolling Stock

Area 3600 consists of the following sub-sections:

9.5.6.1 Area 3610 – Locomotives

Five diesel electric locomotives will be purchased and commissioned to provided power units for the ore trains. The locomotive requirements are contained in Appendix A49 and summarized as:

- Traction power – 3280 kW
- Track Gauge – 1435mm
- Vehicle Gauge – AAR Plate M
- Axle Mass – 33 tal maximum
- Suitable for operating in Arctic Conditions.

9.5.6.2 Area 3620 – Rolling Stock

Ore Wagons

152 gondola style ore cars will be supplied to Milne for Rail operations. The specification for the ore cars is contained in Appendix A 50. The ore cars will have the following attributes:

- Payload – 108 tonnes maximum
- Tare – 22 tonnes maximum
- Track Gauge – 1435mm
- Vehicle Gauge – AAR Plate M
- Axle Mass – 32.5 tal maximum

- Couplers – 146 rail cars must have one rigid and one rotary coupler. 6 cars will have couplers at both ends.
- Suitable for operating in Arctic Conditions.

Other Rolling Stock

The rail operations and maintenance contractor under package ZR001 will include the following support equipment and rolling stock, flat cars, ballast cars, cold air blowers, snow clearing equipment, hi-rails steam generators for cleaning iced culverts and ice build-up, locomotive refueling truck, Skyjack Scissor Trolleys, Forklifts, Telehandlers, locomotive sanding unit, single car mobile brake testing equipment and any other dedicated track mounted (tampers, ballast regulators, rail grinding, ultrasonic rail testing etc.) and road-rail type vehicles.

Supply of all small equipment and support equipment required to maintain the locomotive, rail car and maintenance equipment fleet is to be supplied by the rail operations and maintenance contractor under package ZR001.

9.5.7 Area 3700 – Services and Utilities

Area 3700 consists of the following sub-sections:

9.5.7.1 Area 3710 – Communications and IT Infrastructure

Site Data Network

a) At each site, Milne Port and Mine site will be expanded, adding additional fiber optic branches interconnecting to the process areas.

b) All process control systems, process CCTVs, fire detection systems etc. will use the fiber/copper network (hardwire).

Satellite Communications

a) Existing satellite communications systems will be upgraded to improve bandwidth for data upload and download.

Railway and Intersite Communication

a) Fourteen (14) existing communications towers provide a VHF data link between Milne Port and Mary River. Seven (7) of the towers also serve as radio repeaters for the existing Tote road.

b) Communication requirements for the link between the sites will be reviewed and options to improve the bandwidth and system reliability assessed. A significant improvement could be achieved by running a dedicated fiber optic cable to replace the microwave link. The installation would require:

- Arctic grade low temperature armoured fiber cable
- Specialized transceivers and pre-amplifiers/repeaters for (over 80 km distance). The pre-amplifiers/repeaters can be located in the existing communication sheds
- Fiber patch panels, core switches and peripherals.

This option would also render some of the existing communications towers obsolete, simplifying the overall system and reducing the number of remote generators.

In addition to the data link assessment, the existing radio repeater locations will be assessed to ensure reliable coverage of the new rail alignment.

Some modification of the system is expected and may include either relocating the existing tower(s), increasing the height of existing tower(s) or adding new tower(s). This assessment will also include review of opportunities to reduce the number of radio repeaters and thereby simplifying the overall system.

c) Under this section the train control and occupancy control as well as wayside monitoring equipment will be discussed from an overall project perspective. These are overarching disciplines across the entire rail line and it is best described in an overall approach instead of breaking these disciplines down into further facility details.

Train Control System

This rail line will not have line side signals nor track circuits. These types of tracks are often referred to as “dark territory”. Train movements in dark territory operations are controlled by rail traffic controllers and train occupancy control systems as outlined in the Canadian Rail Operating Rules (CROR). The CROR is overseen by Transport Canada and provides the parameters to operate all railways in Canada. The system consists of Rail Traffic Control and Occupancy Control Systems.

Train controls and control equipment will be provided by contractors performing the delivery of contract TR001 under a design, supply and install basis.

Rail Traffic Controllers (RTCs)

a) The rail control room will be stand-alone and dedicated for the rail control operation. The rail control room will be equipped with a rail traffic controller computer, VOIP phone and dispatch radios. The current design is based on an off-site control room supplied and operated by the ZR001 contractor responsible for the operating and maintenance of the rail infrastructure.

b) RTCs issue clearances (movement authorizations) by voice over the radio from a pre-fabricated train control room at the port. These clearances give permissions to train

crews to use a section of the track between two named points (milepost sign or station). This is known as Occupancy Control System (OCS).

c) The RTC is responsible for the following:

- Control and route trains safely and expeditiously to maintain their schedule.
- Maintain and plan safe access track times for track maintenance work or inspections of sidings.
- Authorize train movement by way of train orders for reduced track speeds, planned train meets and train bypassing.
- Advise train crews of improper track conditions and notify of obstacles on the tracks, such as vehicles, trespassers, high water conditions, snow drifts and fires.
- Coordinate and plan with emergency response personnel, such as police and fire when required to deal with emergency situations, train derailments and accidents.

Occupancy Control System (OCS)

a) The Occupancy Control System is a procedure to operate trains at main track speeds without any signal protection. Each train movement and track work personnel must obtain clearance to occupy the main track. The RTC oversees the operation and issues clearances via radio to use the main track.

b) The clearance to use the main track remains in effect until fulfilled, superseded or cancelled. Provision to operate OCS is outlined in CROR 301 – 315. All track maintenance work requires the issuance of General Bulletin Orders to all train operators advising them of scheduled maintenance work.

c) A computer assisted system is typically used for train control by the RTC in the rail control room. This system is a highly effective, low-cost dispatching system which helps control train and on-track work equipment movements within un-signalled territory. Direct radio communications between the RTC and the train operator provides instantaneous control. Train clearances are graphically displayed to aid the RTC according to origin and destination, and color-coded according to type.

d) A global positioning system (GPS) may be outfitted on the trains for additional information for the RTS; however, OCS will remain as the main control of train

movement on the track.

Figure 9-6: Computer Assisted Manual Block System

Wayside Monitoring Equipment

a) Faulty equipment detectors – This includes for faulty bearing detection (acoustic), and will be placed at a single position south of the Fulls Unloading line at Milne Port.

b) Weigh in motion system (incorporating skew loading and vehicle identification system) - north of the Mine front end loading platform, but before the mine departure siding southern switch at 107.168km

c) Dragging equipment detection – This equipment will detect any loose hanging pipes and equipment on the locomotives and cars and will be placed the port and mine areas in a location where the trains arriving and departing are operating at mainline speeds. S third installation will be near the midway siding and will be installed at a final location to be determined with the TR001 contractor.

d) Car identification tagging system – Each car to be equipped with a tag and a static tag reader will be located at the port entrance line in order to record train composition

e) Flat wheel detector – This measurement tool will detect flat wheels as a result of skidding and the placement of this equipment will also be on the Fulls Unloading line at Milne Port

f) Hot wheel detection system – locations to be determined by the contractor and approved by the Employer

g) Skew bogie detection/monitoring system – south of the port entrance switch on the mainline at 2.447km in order to cover bi-directional measurement.

h) The wayside monitoring equipment will communicate and provide real time reporting via the communication backbone infrastructure which will also forward information to the remote train control centre.

9.5.8 Area 3900 – Rail Ancillary Facilities

9.5.8.1 Area 3910 – Rail Buildings (refer to Appendix A71)

A rail workshop for servicing locomotives and wagons will be provided. An existing modular building will be relocated and attached to the workshop to provide offices and worker facilities for the rail operations group. (normally included in CX001 scope).

The workshop includes;

a) Reinforced concrete building foundation, floor slab and pits; complete with rail track for locomotives and wagons; maximizing the use of precast concrete, including:

b) Design foundations, floor slabs, maintenance pits and rail track.

c) Supply all materials required to construct foundations, floor slab, pits and rail track.

d) Place fill and final grade base of excavation for pits, construct pits and backfill with aggregate provided by others.

e) From finished grade constructed by others, place structural fill as required to achieve levels for construction of foundations and floor slab.

f) Place pre-cast concrete, install grout and as required form and pour cast-in-place concrete to complete construction in accordance with approved Contractor drawings.

g) Backfill around foundations and at slab edges to achieve final finished grade.

h) Install rail track as shown on layout drawings.

i) Building structure and enclosure, including:

- Design building structure, cladding / flashing, doors / openings including specified truck doors, stairs, platforms, walkways and awnings as required to provide safe access to man doors and safe access to electrical panels and other equipment.
- Design equipment and utility modules connected to primary workshop building.
- Design opening in primary workshop building for modular lunchroom and washroom designed, supplied and installed by others.
- Supply all materials and equipment to construct building structure and enclosure including doors and associated controllers.
- Construct building structure and enclosure supported from Contractor installed foundations.
- Supply timber, steel, grating, roofing, associated fixtures and other materials and hardware required to construct safe access.
- Commission and bring into operation the building doors
- Electrical service entrance and electrical services, including:
- Design service entrance including step-down transformer(s), distribution panels and fused disconnects; with provision to connect Employer specified 600v power supply cable.
- Design electrical services including power supplies to fixed workshop equipment, internal / external lighting, receptacles, emergency lighting, exit lights and cable routing and raceway.

- Design all earthing, grounding and bonding systems.
- Supply all electrical equipment and materials required to construct the electrical service entrance and electrical services including panels, cable, raceway, fittings, fixtures and receptacles.
- Construct the electrical service entrance and electrical services.
- Commission and bring into operation the electrical service entrance and electrical services.

j) Building heating and ventilation (HVAC) system, including:

- Design building heating and ventilation system including diesel fired heaters, make-up air units, diesel tank and diesel supply / distribution system; preinstalled in an external modular unit and pre-commissioned to the maximum extent possible.
- Design building exhaust fans and recirculation (ceiling) fans.
- Supply all equipment and materials required to construct the building heating and ventilation system including unit heaters, make-up air units, diesel tanks, diesel pumps, HVAC control panel, pump control panel, power and control cables, flue vents, ductwork, piping, valves and associated equipment, materials and hardware.
- Construct the building heating and ventilation system including, where applicable, modification of existing building heating and ventilation system.
- Commission and bring into operation the building heating and ventilation system.

k) Overhead Cranes, two (2) Class ISO M3 cranes: one 20 tonne and one 10 tonne, including:

- Design overhead cranes including girder crane, crane rails, maintenance platform, power supply, controls and support structures.
- Supply all equipment, power and control cables / rails, structures and other materials required to construct the overhead cranes.
- Construct overhead cranes and associated structures, systems and equipment.
- Commission and bring into operation the overhead cranes including load testing.

l) Workshop Equipment, including:

- Supply and install Air Compressor: Appropriate to drive air tools and charging the train brake system
- Supply and install Wheel Lathe: Floor mounted lathe for profiling of rail car wheels

- Supply and install Portable Locomotive Wheel Lathe: Portable CNC Wheel Profile lathe to cut wheels without lifting body from bogies.
- Supply and install Hydraulic Bearing Press: Appropriate for pressing off/ on of wheel bearings from axle.

m) Utility piping system, including:

- Design utility piping distribution with hose reels for workshop compressed air system.
- Supply pipe, pipe fittings, pipe supports, hose reels and other materials to construct system.
- Construct piping system with hose reels.
- Pressure test and flush clean piping system ready for service.

n) Fire alarm system, including:

- Design addressable fire alarm and detection system.
- Supply all equipment, cabling, materials and documentation required to construct the system.
- Supply fibre optic patch cable and conduit for connection of the fire alarm control panel to the communication network cabinet.
- Install all equipment and cabling.
- Program and configure fire alarm control panel and devices, including communication link to the main fire alarm panel located in the Port Site Complex (PSC)
- Commission and bring the system into operation.
- Supply fire alarm system verification report.

o) Communications and IT systems, including:

- Design, supply and install a wireless communication system for use in the workshop. The wireless network will interface directly with the client supplied fiber optic backbone. The client will supply fibre optic cable between buildings as part of the data and voice networks. There is a requirement for a VoIP handset in the workshop for voice communication.

- Supply wireless communication equipment (Routers and wireless access points) that shall conform to 802.11n, to enable the wireless network to operate at Link Speeds of: minimum 300Mbps and maximum of 600Mbps.
- Supply Category 6 Ethernet cable for connection of RJ45 outlet to the communication cabinet for VoIP handset.
- Power and test communication equipment and cabling.
- Supply inspection and test reports.

p) Handover completed building with all systems operating after successful commissioning.

The rail services building attached to the workshop will be;

a. Constructed by relocating the existing Port Construction Office, a 48ft x 60ft ,modular building installed on timber cribbing.

b. Include attached wash car relocated from the port construction complex.

c. Include design, supply and installation of a new arctic corridor module to interconnecting the buildings.

d. Include internal offices, lunchroom, kitchenette and rail operations control room.

e. Area lighting will be provided by contractor CX001 and include installation of flood lights near the workshop and associated rail track and switches.

9.6 Area 4000 – PORT

Area 4000 consists of the following major sub-areas:

- Area 4100 – Port Terminal
- Area 4200 – Ore Handling
- Area 4600 – Wharf and Marine Structures
- Area 4700 - Loadout
- Area 4800 - Utilities and Onsite Infrastructure
- Area 4900 – Port Ancillary Facilities

Appendices A51 and A52 are the Process Flow diagrams defining the functional requirements for the port process plant. Appendix A14 shows the proposed layout for the port area.

9.6.1 Area 4100 – Port Terminal

The functional scope for this area remains unaltered from the Stage 2 Study Report. This area includes:

a) An ore unloading track runaround track after the dumper and a departure line.

b) Rail spurs to the workshop, for bad order and good order cars, and quarry/ballast access with turning wye.

c) A rotary car dumper.

d) Automated hydraulic car positioner for the car dumper.

e) Ore dump pocket and reclaim system beneath the car dumper.

f) Conveyor to create a crusher feed ore stockpile.

At the time of writing this report, two firm bids have been received for supply of plant for area 4100. Both bidders provide the functionality required to meet the functional requirements of the specification defined for contract CM001,and all bidders are proposing similar equipment to meet the needs of the CM001 specification. Detailed design for this plant has yet to be completed, however, the functional requirements of each element of the plant will remain unchanged as described in the following sections.

Area 4100 consists of the following sub-sections:

- Area 4110 – Ore Unloading Track
- Area 4120 – Ore Unloading and Stockpile

9.6.1.1 Area 4110 – Ore Unloading Track

The port terminal and yard layout is presented in **Figure 9-7**.

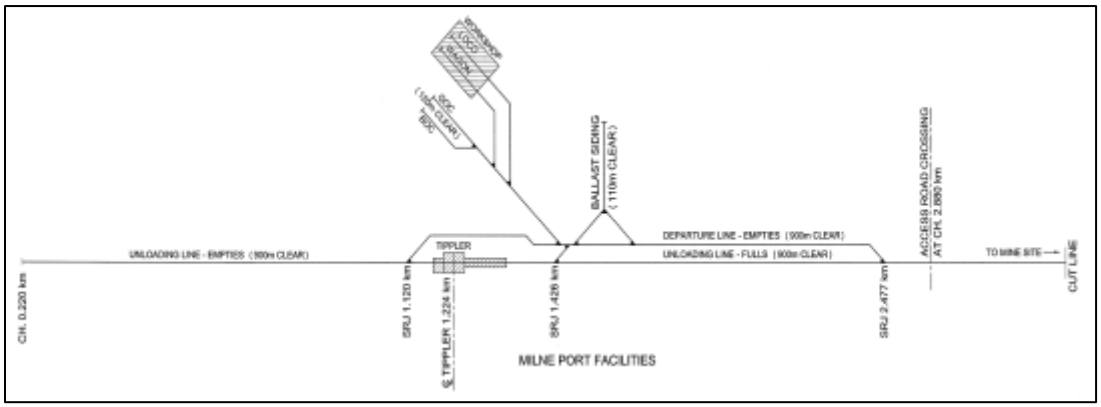


Figure 9-7: Port Site Track Diagram

The scope of the port terminal rail unloading track works contains the following elements. Refer to Appendix A14, A19, A20 for details.

a) Unloading lines 2800 m (mainline chainage)

b) Departure Siding 900 m

c) Locomotive Run-around loop 347 m

d) Locomotive Workshop Spur 390 m

e) Ore Car Workshop Spur 215 m

f) Bad Order Car Spur 205 m

g) Good Order Car Spur 160 m

h) Ballast Spur 400 m

i) Triangle Link 375 m

j) Cross Over 120 m.

The tables that follow describe locations where construction water (**Table 9-63**), ballast laydown areas (**Table 9-64**), earthworks quarries (**Table 9-65**), earthworks spoil and rehabilitation areas (**Table 9-66**) have been located for this area of the project.

Table 9-63: Construction Water Source

Rail Chainage (km)	Construction Water Source
Port	Construction water point

Table 9-64: Ballast Laydown Areas

Stockpile Number	Rail Chainage (km)	Approximate Ballast Quantity at Stockpile (m^3)	Notes
No. 1	1+800	15,349	On triangle for ballast siding

Table 9-65: Earthworks Quarries

Quarry No.	Route km	Quarry location relative to Track alignment	Overburden (m)	Area (m^2)	Type of Material	Volume (m^3)
Q1	0+900	East	0	300,000	Granitic Gneiss	2,300,000

Table 9-66: Earthworks Spoil and Rehabilitation Sites

Rehabilitation/Spoil Site (Route km)
Not applicable

The extent and type of culverts that will be installed in this area of the project is summarized in **Table 9-67** All culverts to be installed will be corrugated steel pipe culverts.

Table 9-67: Drainage Culverts

Culvert Size (Ømm)	Total number	Sum of Length (m)
900	7	120
1200	1	30
1400	0	0
1800	0	0

There will be six culverts between km 1 and km 2 that will be installed in areas where the rail alignment is in a cut. These culverts will be provided with an inlet and as this section is in a hard rock excavation, the culverts will be provided with a daylight excavation through the hard rock.

9.6.1.2 Area 4120 – Ore Unloading and Stockpile

This area defines the plant scope from the point where ore wagons enter the immediate area of the car dumper and ore discharges onto the Primary Crushed Ore Stockpile. Definition to the stockpile, reclaim system and downstream crushing and screening plant described in the section detailing project scope for WBS 2300.

a) A single, one car barrel rotary car dumper will be provided to unload ore cars. The dumper will have the capacity to unload ore cars at a rate of one car unloaded every 61 to 90 seconds (depending on vendor selected) when a train is present and registered in the indexing machine.

b) The car dumper will be enclosed within a building notionally 60m long, 16.5m wide and 10m high. The building will be open at each end to allow entry and egress of trains. Insulation will be provided for the sheet metal structure and cladding; no heating will be provided within the dumper building.

c) A hydraulic room will be provided to house hydraulic equipment to power the grippers and other ancillary dumper devices. The building will be approximately 4m long, 5 m wide and 3m high. The building will be both insulated and heated.

d) A single electro hydraulic indexer device will index the loaded train through the dumper. The indexer shall be equipped with grippers to hold cars immediately and before the dumper stationary whilst dumping is in progress. Hydraulic equipment required for indexer operation will be located on the indexer carriage.

e) Beneath the dumper barrel a surge bin will be provided.

f) An apron feeder system will be located beneath the surge bin to provide a constant feed of ore to the rail unloading conveyor.

g) Dust control within the dumper building and vault shall be provided by way of contractor CM001.

h) To accommodate the rail unloader, bin feeder and tail end of the primary crushed ore stockpile feed belt, a concrete basement shall be constructed into an excavation beneath the rail line. The basement will be formed from pre-cast concrete segments, fabricated off site to minimize on site concrete construction work.

i) From the base of the dumper vault a corrugated prefabricated tunnel will be installed for the rail unloading conveyor, to provide personnel and equipment access into the rail unloading basement. After installation of the tunnel, the excavation for the tunnel will be backfilled.

j) Installation of the dumper basement and primary crushed ore tunnel will be undertaken by the contractor providing earthworks constructions services under contract CC002. Electro mechanical supply and installation of the primary crushed ore tunnel will be by contractor CM001.

k) The rail unloading conveyor will be installed to receive ore from the apron feeder and discharge the ore onto a single conical primary crusher feed stockpile with a total capacity of 25ktonnes and a live capacity of ~ 10 ktonnes. No dust suppression equipment will be provided at the conveyor discharge point. The head of the conveyor will be founded on piled foundations.

l) Contractor CM001 will provide a modularized E-Room to house HV, MV, LV switchgear, motor control centres, variable speed drives, small power and lighting distribution boards, process control equipment, communications equipment and fire suppression equipment. The E-room will provide po0wer for;

- Rotary car dumper, indexer and associated equipment
- Rail unloading apron feeder system and rail unloading conveyor
- Rail workshop and services building
- Rail signalling equipment at the port terminal.

m) Area lighting will be provided by contractor CM001 mounted from structures provided by the CM001 Contractor.

Civil and Foundations (refer to Appendices A53 to A57)

Design of the dumper basement has considered preliminary design information as shown in Appendices A53 to A57). Bidders responding to contract CM001 note that their designs may offer the potential for a reduction in the depth of excavation required for the dumper installation. Reduction in the order of 5m may be realized, however, this would require relocation of the dumper to ensure its foundations remain founded on rock or development of a revise foundation concept. Such analyses and decisions need to be made in the execution phase after award of CM001. The CAPEX reflects the concepts shown herein.

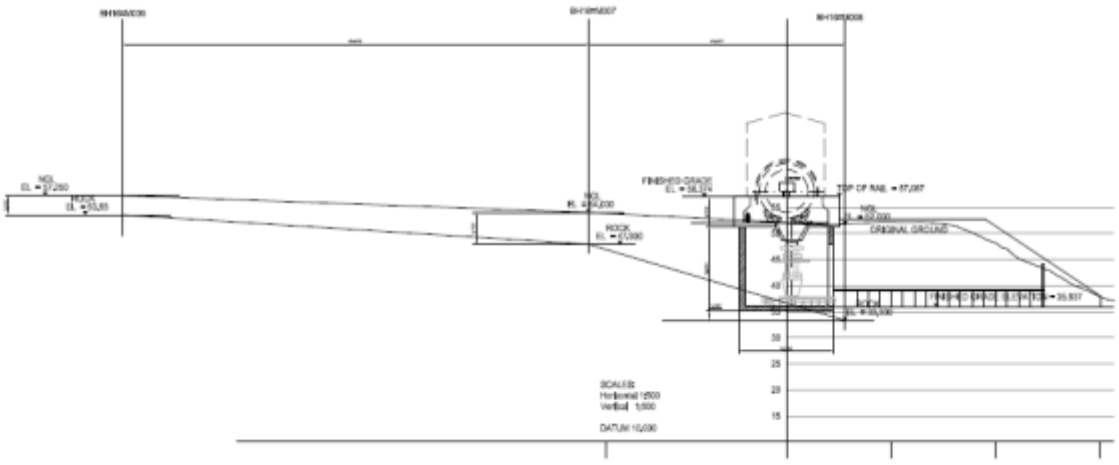


Figure 9-8: Car Dumper Foundation Concept

The scope of the project as represented by the capital cost estimate is contained in appendices A53 to A57 and summarized below.

a) Excavations to allow for installation of the dumper pocket and the tunnel excavation for the tail of the primary crushed ore stockpile conveyor.

b) Supply of pre-cast concrete beams to construct the retaining walls for the dumper pocket and tunnel entry.

c) Installation of pre-cast concrete to allow the contractor CM001 to install the dumper, reclaim bins, feeders and the primary stockpile reclaim belt.

d) Supply and installation of prefabricated plate arch tunnel for the conveyor (budget held within CX001)

e) Backfill the outside of the dumper pocket and over the rail unloading tunnel.

f) Installation of a piled foundation on which to allow contractor CM001 to base the cantilevered section of the primary crushed ore stockpile which extends over the primary crushed ore stockpile to the conveyor discharge. Pile caps will be installed ready for foundation work by contractor CG001. Refer to Appendix A57 and A58 for location of piles and typical pile cap details. Detail design of piles will be undertaken by contractor CG001.

Structural, Mechanical, Electrical and Instrumentation

a) Supply and installation of a single car rotary dumper to empty ore from the ore wagons at a rate between 61 and 90 seconds per car.

b) Supply and installation of an automated rail car indexing system to increment the train through the dumper cell, one car at a time.

c) Supply and installation of car grippers to hold stationary the ore cars immediately before and after the dumper cell during dumping operations.

d) Supply and installation of power packs (hydraulic) to provide hydraulic energy for all rail unloader equipment.

e) Supply and installation of a hopper of sufficient capacity to maintain train unloading rates at 61 to 90 seconds, whilst ore is withdrawn at rates defined by the flow sheet developed by CM001 contractor.

f) Supply and installation of apron feeder system at the base of the ore bin to provide controlled mass withdrawal of ore to then discharge on to the primary crushed ore conveyor.

g) Provide dust control for the rail dumper building to provide a safe working environment for operations personnel.

h) Supply and installation of buildings to enclose the dumper cell and hydraulic building to provide protection from snow build up.

i) Supply and installation of a single conveyor belt to convey primary crushed ore to discharge onto the primary crusher feed stockpile.

j) Supply and installation of a tunnel to house the crusher feed stockpile co Supply and installation conveyor from the bottom of the dumper vault until the tunnel intersects with the natural surface contour. Typically, the tunnel will be a steel arch tunnel with concrete footings.

k) Supply and installation of local equipment controls to provide for equipment operation and maintenance, and, the overarching control system to provide for integrated control and management for the complete ore system (dumper to shiploader) as a single system in a single control room.

9.6.2 Area 4200 – Ore Handling

Area 4200 consists of the following sub-sections:

- Area 4210 – Stockpiling
- Area 4220 – Reclaiming

9.6.2.1 Area 4210 – Stockpiling

In general the existing shiploader No.1 stockpile will be reconfigured and used for stockpiling fines only. Modifications required to the existing shiploader reclaim are included in WBS 4731 (considered part of shiploader No.1). In general, the reconfiguration includes:

a) The eastern half of the existing stockpile No.1 (6 kidney piles) will be decommissioned to make room for the construction of Stockpile No.2.

b) The south end of the existing reclaim conveyor will be re-aligned as shown in appendix A14, A79 and A80.

c) The south western quadrant (three kidney piles) will be re-aligned to suit the conveyor and the piles will be increased in size to provide the required stockpile capacity.

d) The north western quadrant (three kidney piles) will remain their existing location but will be increased in size to provide required stockpile capacity.

Stockpile No/1 stacking and reclaim will be carried out using existing equipment. Associated mobile equipment is included in WBS 4880.

A new lump ore stockpile, Stockpile No.2, will be developed and associated with the new ore dock and shiploader No.2. Stockpiling and reclaiming for Stockpile No.2 is described in sections describing WBS 4210 and 4220.

Stockpile No.1– Civil Work

a) A runoff containment berm and drain will be installed to run around the Western and Southern edges of the area required for placement of three new kidney stockpiles, which will be used for fine ore storage.
b) An extension to the existing stockpile pad will be built in the southwestern corner of the stockpile #1 area to provide space to re-align three kidney stockpiles. Refer to Appendix A57 for piling assumptions.
c) A 10m wide haul road will provide be provided to enclose the new kidney stockpiles and provide road access to the remaining (existing piles).

d) A conveyor berm will be built to allow for reorientation of the Southern half of stockyard #1 reclaim conveyor. Sleepers recovered from the southern half of existing stockyard #1 reclaim conveyor end will be reclaimed and repositioned to provide foundations for the relocated southern extent of the stockyard #1 reclaim conveyor. Refer to Appendix A57 for piling inclusions.

e) New foundations will be built to provide for installation of;

- Head, tail, drive and belt tensioning device for the new re-orientated southern extent of the stockyard #1 reclaim conveyor system.
- A new tail, drive and belt tensioning device for the northern extent of the stockyard #1 reclaim conveyor system.
- Supply and installation of piled foundations on which contractor CM001 will install conveyor drive and tail assemblies. Pile caps will be installed ready for foundation work by contractor CM001.

Stockpile #2 Civil Earthworks and Drainage

a) Installation of a vehicle access road network to provide:

- Access along the Eastern extent of Stockpile #2 which is graded to drain from the mid-point to the north and south. The Eastern edge of the road will be installed with a berm to deflect run off presenting from the east of the stockpile.
- Access Road along the western edge of stockpile #2. The southern half the road shall be built from fill materials. The northern extent will be set at grade.
- Installation of two lined sedimentation ponds located at the south of the stockpile area.

b) Stacker/Reclaimer berm and rail drainage and road construction. Berm construction will provide for creation of a platform for installation or rails for the stacker/reclaimer system, foundations for the yard conveyor and an access road to the stacker and reclaimer. Bids received confirm the need to build a berm with a crest width of 16.4m and height above grade of 2.5m. Development of prepared surfaces for the base of the stockpile has not been considered in the scope of the project. Ore will be stacked directly onto unprepared ground surfaces at grade. The berm materials will be won from existing quarries at Milne.

c) Construction of piled foundations;

- Yard conveyor tail structure
- Yard conveyor drive house
- Yard conveyor to shiploader transfer tower and or shiploader surge bin.

Stockpile No.2 - Structural, Mechanical, Electrical and Instrumentation

The structural, mechanical, electrical and instrumentation scope for the Stockpile #2 is to be provided by a single design build contractor under contract CM001 which includes provision of:

a) Stockpile conveyor and capacity to transport 16,000 tph of ore from the lump conveyor discharging the crushing and screening plant and then discharging lump ore to the bins and transfers on Dock 2 which then provides feed to shiploader No.2 (refer WBS 4730)

b) Installation of a rail mounted stacker and reclaimer units with a capacity reclaim ore with a peak rate of 16,000tph. The stacker reclaimer shall be equipped with a tripper car to lift ore from the ground conveyor level to a transfer chute feeding the stacker/reclaimer boom. The tripper car is fitted with devices to allow ore to be direct fed to the shiploader and bypass the stacker boom. The Stacker reclaimer has been configured to develop two lump stockpiles notionally 21 m in height with a base width of 84m; with a flat top configuration this stockpile provides for a total of 8Mtonne storage of which 6.68Mtonne is live and directly reclaimed, 0.52Mtonne of lump ore (50% in each stockpile) will be dozed into the area accessible by the reclaimer to create a single bench typically 14.5m wide and 5.25m high which can then be accessed as a discrete bench by the reclaimer. Dozing operations will occur in sections of the pile which have been cleared of ore by the reclaimer. Refer to Appendix A59 for stockpile profile.

c) Upon complete construction of the stockpile, after shipping of all the lump ore to meet the 12Mtpa shipping rate for lump and fines, 1.33Mtonne of lump ore will remain on the ground. In the event of an extended shipping season, the potential exists for this ore to be dozed into the active reclaim area and it can be loaded onto ships increasing the shipped volume for that season.

d) The boom length of the stacker reclaimer is notionally 60m. The machine has luff capability to allow reclaim of yyy tonne of lump ore from two stockpiles, one each side of the rail track. The stacker reclaimer has a slew capability to allow stacking on either side of the stacker reclaimer berm.

e) Provision of trailing cables for the stacker reclaimer including cable reel devices is included within the scope of supply of the CM001 contractor as is supply of HV, MV, LV, small power distribution, lighting panel, distribution rooms is included within the scope of the CM001 contractor.

f) The stacker/reclaimer will be able to stack ore in many modes:

- Cone
- Chevron

- Strata
- Windrow
- Advanced Block.

Each train load has an ore load of 7632 tonnes (72 cars by 106 tonne per car) comprising 5876 tonne of lump after crushing and screening. Approximately 1,225 trains will be required to fill the expected 7.2 Mtonne of reclaimed ore. Detailed design of the stacking system (choice of stacking mode) is required in the next phase to ensure grade variation arising from mining plans is efficiently reduced to meet customer specifications during the stacking and reclaiming process. CM001 vendors have noted use of chevron stacking as the preferred stacking method. Consideration should be given in detailed design to the use of an advanced block style of stack build to minimize energy cost during the stacking operation.

g) Supply and installation of all rail systems including, ties, rails, clips, etc, required for operation of the stacker reclaimer is included within the scope of contract CM001. It is expected that the rail gauge will be 11- 12m and that the single stacker conveyor will be located within the gauge of the rails as will be a personnel and maintenance access road.

h) Supply and installation of local equipment controls to provide for equipment operation and maintenance, and, the overarching control system to provide for integrated control and management for the complete ore system (dumper to shiploader) as a single system in a single control room.

9.6.2.2 Area 4220 – Reclaiming

Stockpile No. 1 Reclaim

a) Existing equipment will continue to be used as per existing operations and operating practices.

Stockpile No. 2 Reclaim

a) Common equipment used for stockpiling is described in Areas 4210 above.

9.6.3 Area 4600 – Wharf and Marine Structures

Area 4600 consists of the following sub-sections:

- Area 4610 – Ore Dock No 1
- Area 4620 – Ore Dock No 2

9.6.3.1 Area 4610 – Ore Dock No.1

There is no project scope in this area.

9.6.3.2 Area 4620 – Ore Dock No.2

A new ore dock, Ore Dock No.2 will be constructed. The dock will be capable of berthing Cape Size vessels with a capacity of up to 230,000dwt in addition to Panamax ore carriers with dimensional limits per Appendix A61.

The ore dock will serve two primary functional objectives which consist of the following:

- Provide a safe, efficient and secure deep-water berth for a range of design vessels including Panamax and Cape Size bulk ore carriers.
- Provide a means of support for the shiploaders, conveyors and associated mechanical equipment used for loading the vessel.

To achieve these objectives the ore dock will include symmetrical breasting and mooring points, a fender system and mooring hardware. The ore dock will efficiently accommodate the range of design vessels for the design and operating conditions.

This report is written to align with the capital cost estimate dated April 2017. Completion of negotiations for contact CM001 will enable firm selection of the ship loader configuration to be installed during construction. At the time of report writing options exist with the bids offered by CM001 to provide either:

- Two quadrant loaders with a capacity of 8000 tph each
- One dual linear loader with a capacity of 16,000 tph
- Two hybrid cantilevered radial shuttling shiploaders with a capacity of 8000 tph each.

The estimate (CAPEX) and the section that follows is based in installation of two quadrant shiploaders as defined in Appendices A60 to A63.

The Stage 3 Definitive Study process called for submission of bids for the design build of the No.2 Ore Dock. Two bidders have been preselected for further negotiations to conclude a contract. The bidders have proposed:

- Closed cell dock
- “Combi wall” construction techniques.
- Circular sheet pile dolphins

The bids received allowed for installation of two quadrant loaders to meet the functional needs of the project. The capital estimate was based upon the Circular sheet pile concept offered be EBC. The following provides a functional description of the dock facility to be provided within the scope of the CG001 contract. Further negotiation is required to finalise design details to provide a more definitive facility description. Notwithstanding, all bidders have complied with the functional requirements following.

The Ore Dock shall provide support for all shiploading facilities and resist all applied loads (including berthing and mooring of Cape size vessels)

The Ore Dock shall have all necessary access and space required for the operation of the berth. All items necessary for the operation of the marine facilities and as required by the shiploader design shall be accommodated by the Ore Dock.

Fill materials for construction of the dock and access causeway will be won from quarries extant in the Milne port area.

Vertical Quay and Dock Area

a) The main berth face will consist of structure(s) that act as combined breasting and shiploader support platform. These structure(s) will accommodate fenders to absorb the energy of the berthing vessel, provide contact points for the moored vessel and mooring line points as required.

b) The main berth face will be equipped with a removable fender system which will provide an impact surface against which the vessel will make contact. The fender will absorb the impact energy so as to protect the vessel and the berth.

c) Mooring equipment will consist of bollards (or equivalent) spaced along the main berth face so as to facilitate the spring lines for the range of design vessels.

d) Removable ladder(s) will be provided on the main berth face as required, extending to three (3) rungs below the lowest low water level as a minimum.

e) The quay level of the facility shall be determined based on extreme water level analysis. The quay layout dimensions shall be adequate for the function specified in this specification, including associated construction, installation, operation and maintenance requirements. The adequacy of the quay level and layout shall be the responsibility of the Design Build Contractor (CG001 – Ore Dock).

Access Causeway

a) A causeway shall be constructed to support the conveyor system and provide access for pedestrians and service vehicles from the shore to the ore dock. Access for mechanical, conveyor and electrical systems will also be provided to the ore dock.

b) Double lane access to the ore dock will accommodate the following vehicles.

- All terrain loader for conveyor clean-up and snow removal.
- Pickup truck.
- Fire truck.

- Maintenance Boom Truck.
- Revetment maintenance vehicle – accessible to repair armour stone on both sides of the causeway.
- Mobile crane for ongoing maintenance.
- Mobile Crane.
- Manitowoc 2250 with MAX-ER attachment (and additional counterweight, rated to 500t capacity).

Berthing and Mooring Infrastructure

a) The number and spacing of the berthing and mooring infrastructure shall be determined by a detailed berthing and mooring analysis for the range of vessels specified in this document. Mooring assemblies will be located so that mooring layouts meet standards outlined by the following:

- OCIMF, and/or
- BS6349.

b) The berthing and mooring infrastructure shall as a minimum include the following items:

- Fender assembly, complete with chains
- Mooring assembly (Bollards / Quick Release Hooks)
- Motorized capstans
- Walkway / stairway supports
- Handrails
- Adequate working and access space
- Edge protection to prevent abrasion by mooring lines
- Messenger rope reels

c) The layout of the location of berthing infrastructure shall take into consideration the hatch layouts of the various ships and ensure that the shiploading requirements can be met. The fender system shall be mounted in a way that no diver access is required to remove and replace the fender.

d) A minimum of 2.5m distance is required between the mooring assembly edge and any platform edge. Each mooring assembly shall be equipped with a mooring capstan. Handrail shall be fitted to ensure safe operations, without impeding mooring operations.

Walkways and Quay Furniture

a) Clear pedestrian access to the walkway, stairways and ladders giving access to mooring infrastructure and the gangway shall be provided.

b) Walkways shall provide pedestrian access linking together all the berthing and mooring infrastructure to the quay area and shall also permit access for small-wheeled trolleys.

c) The walkways shall be designed for carrying the mooring lines from the vessels to the mooring assemblies and the grating level within the walkway shall not exceed a slope of 1 in 10 and there shall be no steps between walkway terminations and the connecting structures. The minimum clear width of walkways shall be 1.4m.

d) The structural form shall ensure that no obstructions are present on the seaward side of the walkway at a height greater than 1.2m above grating level to enable easy handing of lines. All members along the uppermost limit of the structure shall be rounded so as not to chafe or abrade lines being passed along. Ends of handrails shall be detailed so that mooring lines cannot catch on the handrail.

Access Tower / Gangway

a) Access Tower / Gangway are to be provided on the quay to allow boarding of personnel. The access tower / gangway design needs to take into consideration the range of design vessel sizes. The access towers / gangways and its components shall comply with national manned elevator codes, lifting appliance codes and shall meet all national working at heights requirements where applicable.

b) The location of the gangway shall be designed for safe access from the design vessels to the quay areas and should be located at a safe distance from any carrier mooring line or any equipment. The position shall be optimised from the "Spotting Line" with regard to the vessels to use the berthing facilities. The end steps from the gangway (i.e. on board the carrier) shall ensure safe step-down at all times on to the carrier's main deck.

c) If self-levelling steps are not to be used, the maximum safe gradient of the gangway is taken as 35 degrees, unless the local authorities use a smaller angle.

Shiploader

a) The main berth structure will also provide a foundation for dual quadrant shiploader and a feed conveyor system. It is assumed piling will be required to support shiploaders and shiploading equipment. Assumptions, pending final design by contractor CG001 are shown in Appendix A57.

b) Shiploaders have been specified with the following criteria:

9.6.4 Area 4700 – Loadout

Area 4700 consists of the following sub-sections:

- Area 4710 – Ship loading – Conveyor
- Area 4730 – Ship loading

Design and construction of the Loadout falls within the remit of contract CM001 on a turnkey basis with the exception of the foundations which are designed and contracted by CG001. The Facilities description follows the functional format as has been used for other areas to be provided by contractor CM001. Bids received for contract CM001 confirm the functional scope may be delivered via a number of routes all of which fall within the contingent estimate amounts contained within the CAPEX estimate. Key functional criteria for the shiploader includes:

- One to two quadrant loaders.
- Design ship loading rate, each ship loader = 8,000 t/h, if two are provided.
- Design ship loading rate, two loaders operating simultaneously or of a single unit = 16,000 t/h.
- Ship loader geometry suitable for loading all hatches of a Cape Size ship, without warping (moving) the ship, using both quadrants.
- Ship loader geometry suitable for loading all Hatches of a Panamax ship, without warping (moving) the ship, using one of quadrants only (to allow some redundancy in the system particularly during late season ship loading).

9.6.4.1 Area 4710 Shiploading Conveyor

Civil and Foundations

a) Civil development of the dock structure to accommodate the dockside conveyors and any bins, diverter chutes, feeders and such will be undertaken during construction of the dock structure.

b) Piled foundations will be provided for the transfer tower connecting the No.2 stockpile yard conveyor to the dock conveyors. Pile caps will be provided to allow founding of structural foundations to be provides by contractor CM001.

c) Spread footing type footings will be used to support the conveyor trusses connecting the shiploaders.

Structural, Mechanical, Electrical and Instrumentation

a) Supply and installation of a transfer point to allow measured ore splitting from from No.2 yard Conveyor which then feeds shiploader 2A and 2B.

b) The specified functional requirements will be achieved by either:

- A flow splitter and single transfer conveyor to control flow to both shiploaders.
- A hopper with feeder and transfer conveyors to provide surge capacity and to control flow to both shiploaders.

c) Supply and installation of all electromechanical equipment required to:

- Integrate the operations of the shiploaders with that of the reclaiming system
- Optimize the stop and start of No.2 Yard conveyor.
- Maximize the loading rate of the two shiploaders, during and after hatch changes.
- Supply and installation of local equipment controls to provide for equipment operation and maintenance, and, the overarching control system to provide for integrated control and management for the complete ore system (dumper to shiploader) as a single system in a single control room.

9.6.4.2 Area 4730 – Shiploading

Shiploader No.1 Reclaim Conveyor Modifications (Structural, Mechanical, Electrical and Instrumentation)

To facilitate development of the new Stockpile No 2 system the existing (Stockpile No 1) reclaim conveyor will be modified, including:

- Shorten existing conveyor by approximately 222m, this shortened conveyor will be referred to as Reclaim Conveyor 1A.
- Construct and new Reclaim Conveyor 1B with a length of 295m, at an angle to the existing, to replace the removed section of conveyor.

The new arrangement is shown in **Figure 9-9**. The design of the new conveyor is based on the existing reclaim conveyor.

Refer to Appendices A79 and A80 for detail of the plan and elevation.

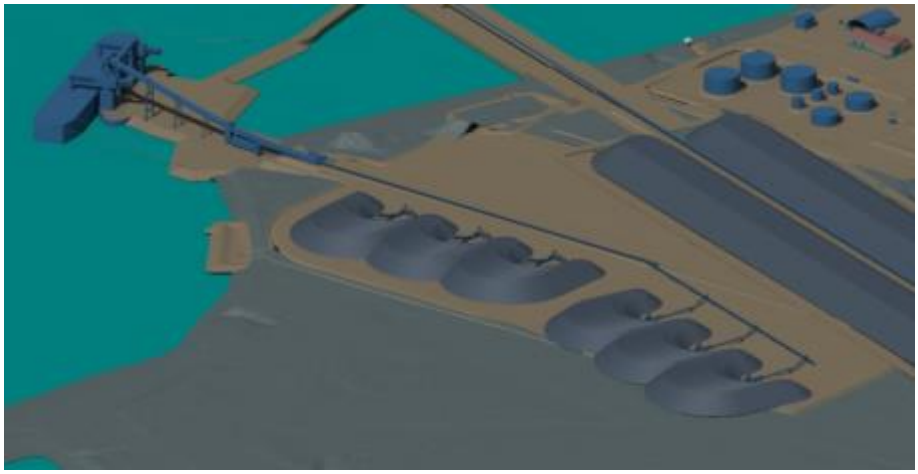


Figure 9-9: Fines Stockpile and Ship Loading Arrangement

The primary design criteria are summarized in **Table 9-68**.

Table 9-68: Fine Ore Handling Design Criteria Summary

Item	Element	Unit	Design Criteria
1	Product Size Specification - Fines	mm	+6.3 -0.10
2	Conveyor design capacity	tph	6 000
3	Conveyor normal operating capacity	tph	4 500
4	Ore SG		2.8
5	Conveyor Belt (same as existing)		ST2250
6	Idlers (same as existing)[1]		Carry - Series 35, 3 roll / Return - Series 25, 2 roll
7	Take-up		Gravity
8	Drive location		Head end (unclad)

New piled foundations will be constructed to support;

a) Relocated conveyor 1A tail pulley.

b) New conveyor 1B transfer tower and drive house including if required the take up tower.

c) New conveyor 1b tail pulley.

[1] Note: Modifications to the existing reclaim conveyor, including changing the idler arrangement, are currently being considered by Baffinland. Final design of Reclaim Conveyor 1B shall be matched to the as-built condition of the existing system at the time of modification.

Piled foundations will be installed by contractor Cg001 and will include pile caps ready for installation of structural steel.

The scope of the work to modify the reclaim conveyor is summarised below:

a) Design, supply and installation of all modifications to the existing conveyor and the new conveyor.

b) Remove existing conveyor sections including concrete sleepers, these will be used for the new Reclaim Conveyor 1B.

c) Supply and install additional conveyor modules including sleepers, steel frames and idlers sets as required.

d) Remove tail pulley and frame, and relocate to the new position for shortening of Reclaim Conveyor 1A. This will be placed on piled foundation. Piling to be supplied by others.

e) Install new transfer tower on piled foundations. Pile foundation to be supplied by others.

f) Install new raised head-end and gantry module (24m long), relocated conveyor sections and new tail pulley to construct conveyor 1B. The tail pulley and structure will be placed on a piled foundation (pile foundation by others).

g) Supply and install new drive for Conveyor 1B including VSD and associated electrical switchgear and cables.

h) Supply & Install new 600 V MCC feeder cubicle for Reclaim Conveyor 1B in E-House 2342-BLD-001.

i) Supply and Install new 350kW Variable Speed Drive in E-House 2342-BLD-001.

j) Install and terminate 600V Cable between MCC and VSD.

k) Install and terminate 600V Cable between VSD and drive at Reclaim Conveyor 1B head-end.

l) Supply and install field control station at Reclaim Conveyor 1B drive, complete with control cable to MCC.

m) Supply and Install Electrical safety circuit between Local Control Station and conveyor safety instruments.

n) Supply and install instrumentation on Conveyor 1B and associated panels and cabling

o) Transfer chutes to transfer the ore from Conveyor 1B to Conveyor 1A.

p) Network and control system changes (PLC/HMI) to suit.

q) Ensure that there will be enough I/O on the Existing Control System at the head end of the Stockyard Conveyor 1A to add new Conveyor Safety devices to the re-aligned conveyor

r) Add new Multicore cable to the conveyor cable racking (by others) between the Junction boxes at the head end of Conveyor 1B and the head end of Conveyor 1A. Pull new single pair cables for Safety devices onto the cable racking (By others) to the head-end of the Reclaim Conveyor 1B. Test all the safety devices and ensure that they are ready for the conveyor to be commissioned. Safety devices will typically be Belt Alignment switches, emergency stops, start-up alarm, belt tear device and speed switch.

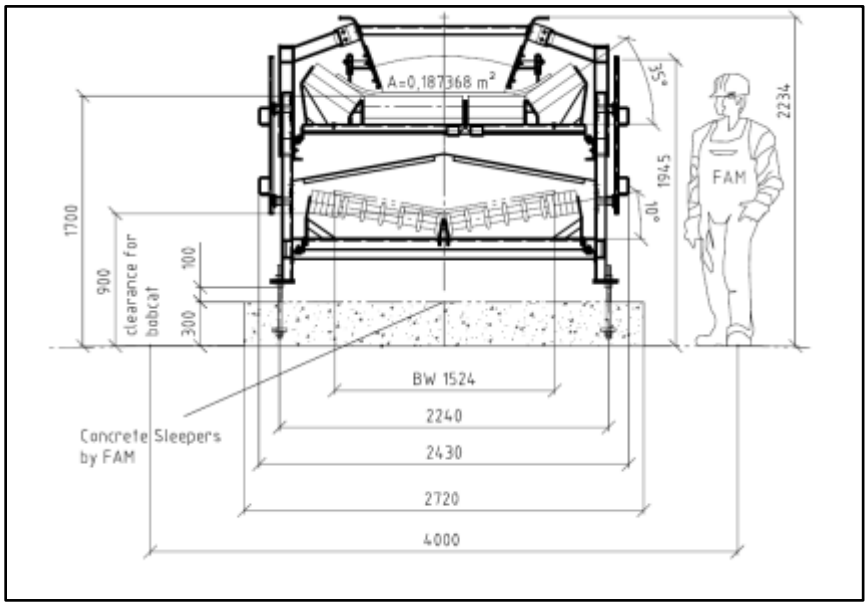


Figure 9-10: Cross Section of Existing Reclaim Conveyor

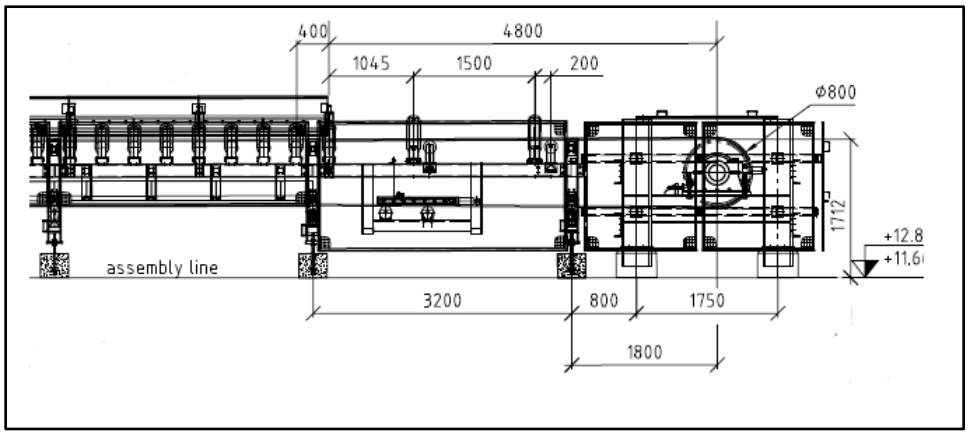


Figure 9-11: Elevation of Existing Reclaim Conveyor Showing Tail End

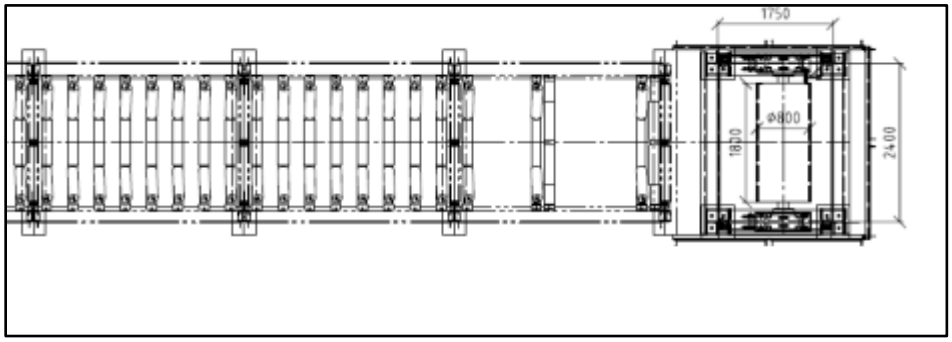


Figure 9-12: Plan view of Existing Reclaim Conveyor Showing Tail End

Civil and Foundations (refer to Appendix A57)

a) Foundations for the shiploaders will be piled and installed during construction of the dock.

b) Pile foundations will be installed to support the quadrant shiploader, quadrant rail.

Structural, Mechanical, Electrical and Instrumentation

a) Two quadrant style 8000 tph shiploaders will be provided. The shiploaders will be supplied as a part of contract CM001 and will be supplied with power supplies from E – rooms provided by contractor.

b) Supply and installation of local equipment controls to provide for equipment operation and maintenance, and, the overarching control system to provide for integrated control and management for the complete ore system (dumper to shiploader) as a single system in a single control room.

9.6.5 Area 4800 – Utilities and On-site Infrastructure

Area 4800 consists of the following sub-sections:

- Area 4810 – Site Development (Mass earthwork, roads, grading, site drainage, sediment handling)
- Area 4830 – Power
- Area 4840 -Fuel Systems
- Area 4880 – Production Mobile Equipment
- Area 4890 – Production Services Equipment

Within area 4800 is work to reconfigure existing pipework related to treated effluent discharge.

Treated Effluent Disposal

a) The treated effluent discharge pipeline is to be extended to discharge at a new position, refer to Appendix A64 for detail of the pipeline route.

b) The length of new pipe required is 854 m. The pipeline is routed next to the new fuel system marine offload pipeline and is laid on a earth berm prepared by others. The pipeline needs to be secured from movement due to thermal cycling.

c) The modification of the pipeline to the new discharge location includes:

d) Remove end section of existing pipeline back to suitable field splice location (removed length of pipe will not be reused).

e) Supply and install pipeline (2” dia. HDPE DR11 with 50mm insulation, butt fused) to new effluent discharge point on earth berm provided by others. Pipeline to be guided and anchored using steel pegs driven into ground and crushed rock placed over pipe as required.

f) Terminate the existing heat trace cables where the pipe is removed.

g) Supply and install two new heat trace controllers (Thermon type as per existing) inside the existing welding shop service entrance E-room (Seacan). Connect 600V power supply including fused disconnect switches to provide power to the heat trace controllers. Controller installation shall include associated RTD’s and accessories.

h) Install heat trace cold lead power cables (600V TECK90) from controller to pipeline (at section where new pipe spliced to existing).

i) Supply and install series constant watt heater cable along new pipeline, 2 circuits, Thermon TEK as per existing. Installation details to match existing Port Treated Effluent Pipeline including splice and termination details (external junction box).

j) Complete pipe insulation at pipe joints as per existing Port Treated Effluent Pipeline.

9.6.5.1 Area 4810 – Site Development (Mass earthwork, roads, grading, site drainage, sediment handling)

9.6.5.2 Area 4830 – Power (refer to Appendices A67 to 70)

The existing Port site power generation system will be expanded from 7x 1350 kW generators to 11x 1350 kW generators. The expansion requires installation of four (4) new generator modules and one (1) new switchgear e-house. In order to balance the electrical loads between the power generation e-houses, modifications to existing feeders are also requied. Work includes;

a) Supply and install hardwood timber and Styrofoam insulation to construct four (4) generator module foundation frames as shown on appendix A66.

b) Install four (4) off 1350 kW Power Generation Modules (free issue).

c) Install all PE002 vendor supplied generator module fixtures including, but not limited to:

- Air intake hood
- Exhaust stack
- Entry/exit stairs

d) Install one (1) power generation switchgear E-House and associated external access stairs.

e) Supply and install ground grid including ground rods, conductor and all interconnections. Backfill ground grid.

f) Supply and install cable tray connecting to each power generation module and new switchgear E-House, including multi-level cable rack along back of new generators (on existing power berm).

g) Supply and install bonding conductor to cable trays

h) Install interconnection power cables from power Generation Units into the Switchgear building – 5 kV, 600V and control cables. Seal all cable entry points.

i) Install interconnecting 5kV, 600V and control cables between existing E-House #2 and new E-House #3. Seal all cable entry points.

j) Move Shiploader No1 E-house feeder cables (5 kV) from existing distribution board #1 feeder (F3, in E-House #1) to new distribution board feeder (F15, in E-House #3). Note: Existing cable will be shortened in length.

k) Move Fuel Farm E-house feeder cables (5 kV) from existing distribution board #2 feeder (F10, in E-House #2) to new distribution board feeder (F18, in E-House #3). Note: Existing cable will be shortened in length.

l) Replace existing 1200A breaker in E-House #2 with 2000A breaker (F11).

Power Distribution:

a) Install a new PSC E-House and feeders (Appendix A70 reference A9), including:

- Install power distribution E-house module (single module, installed on gravel pad)
- Supply and install vertical cable tray on E-House.
- Supply and install E-House grounding system including ground rods and copper conductor.
- Complete preparation of E-house in accordance with vendors' instructions, including removal of shipping items and connection of fire suppression system.
- Install and terminate 5kV power cable between new PSC E-house and existing Type 1 PSC E-House (E-House #1).
- Install and terminate 600V power cable between new PSC E-house and existing Type 1 PSC E-House (E-House #1).
- Install and terminate dual ground conductors between E-Houses

b) Supply and install road crossing conduit pipes (6" schedule 80 steel pipe trenched and backfilled) at the following locations:

- Fuel tank farm road, S-W corner
- Stockpile road, N-W corner of fuel tank farm
- New Yard Conveyor #1 berm / causeway to dock
- New crusher building area (details TBC)

c) Modify the existing Ship Loader E-House Feeders (Appendix A70 reference A4), including:

- Cut, re-route and splice (joint) existing 4160 V feeder cables (4 off) through culvert/sleeves under new Stockyard No. 2 Conveyor earthworks berm

d) Install a new Construction Camp Feeder (Appendix A70 reference A5), including

- Install and terminate 5kV power cables between generation distribution E-House and Construction Camp E-house (E-House installed by TX002).
- Terminations will be onto switchgear.
- Splice cables where required – route length of 1320m with 500m reels supplied.
- Install dual ground conductors on power cable route between E-Houses.
- Supply and install grounding system accessories as required.

e) Install a feeder to the Crusher Building E-house (Appendix A70 reference A6), including:

- Install 5kV power cables between Power Generation E-House #3 and Crusher Building E-House (E-House installed by CM001). Terminate cables in Power Generation E-House #3 (other end termination by others)
- Install 5kV power cables between Construction Camp E-house and Crusher Building E-House (E-House installed by CM001). Cut power cables connecting to Construction Camp E-House and splice to new cables (to extend cable run to the Crusher Building E-House).
- Splice cables where required – route length of 1320m with 500m reels supplied
- Install dual ground conductors on power cable route between E-Houses
- Supply and install grounding system accessories as required.

f) Install 600V feeders for the Rail Services Area (Appendix A70 reference A7 & A8), including:

- Install 600 V cable between Rail Unloading E-house and Rail Workshop Building.
- Install 600V cables between Rail Unloading E-house and Rail System Signalling Equipment (switches, two locations)
- Terminate cables (three off) in Rail Unloading E-house (other end terminations by TX003 and TR001).

g) Install 5 feeders to the Stockpile No 2 Conveyor / Ship Loader E-House (Appendix A70 A10) including:

- Install 5kV power cables between Power Generation E-Houses and Stockyard No2 Conveyor / Ship Loader E-house(s) (E-house(s) installed by CM001).
- Terminate cables at Power Generation (other end termination by CM001).
- Splice cables where required – route length of 600m with 500m reels supplied.

- Install dual ground conductors between E-Houses.
- Supply and install grounding system accessories as required.

9.6.5.3 Area 4840 – Fuel Systems

Work Scope includes installation of new tanks within the existing bunded fuel storage area at Milne with associated piping modifications; relocation of the marine manifold building with associated modification of the marine pipeline and installation of a power generation refueling facility. The scope includes design, supply and installation of;

Process/Mechanical

a) TK-003 – 15,000,000 Litre Tank – Artic Diesel

b) TK-010 – 750,000 Litre Tank – Jet A-1 Fuel

c) TK-011 – 3,000,000 Litre Tank – Artic Diesel

Structural

a) All pipe and equipment supports

b) Tank Roof

c) Tank Roof vent

d) Tank Stairs

e) Marine Manifold and Building Relocation including existing nine precast concrete foundation blocks

f) Fuel Receiving Building

Electrical

a) Tank lighting

b) Tank electrical grounding

c) Electrical and control cabling, cable tray, conduits, junction boxes and mounting hardware

d) Systems and Process Control

e) Level gauge with remote display

f) Remote tank level display

Piping

a) Internal tank draw down piping

b) Internal water draw off piping

c) All tank nozzles, openings, gauge hatches, manways and water drain valves

d) Modify piping inside the dyke to suit three new tanks

e) Relocate marine manifold building with a modified and extended marine pipeline

f) Piping system for genset re-fueling

9.6.5.4 Area 4850 – Communication and IT infrastructure

Appendix A65 indicates the areas where work is to be carried out and the sections below refer to the key points indicated on the sketch.

Data Network

Appendix A65 indicates the areas where work is to be carried out and the sections below refer to the key points indicated on the sketch.

a) Modify existing fibre optic cable to shiploader No.1 - Reference A1

- Prepare the Existing Fibre Optic Cable to run under the Yard Conveyor. This Cable will be re-routed under the culvert. Cut the cable, pull cable back and re-route the cable under the Culvert. Allow 20 metres of new cable to make up wastage during cut and splice actions. This will require the supply of 2 x 24 core fibre splice domes. Connect one dome at each end of the 20 meter cable extension. Re-Splice the cable after the re-routing has been completed. Test cable to ensure that there is minimal DB losses.

a) Provide two Fibre optic interface points for CM001 data and control network.

- Provision must be made to allow for redundancy of the Port Site fibre optic cable network interface with the BMH systems from CM001.
- Pull 2 new 24 core Fibre Optic cable from the Generation house Reference A4 to Reference Point A5 and from A4 to Reference Point A5. Install new splice trays and Patch panels to accommodate these two new routes. Provide sufficient patch leads to complete fibre optic terminations. Test and commission.

9.6.5.5 Area 4870 – Process Control System

The process control system for the Milne Port will consist of;

a) An integrated control system for the new Bulk Materials Handling and Processing equipment supplied by CM001, from the train loading system though to Shiploader No. 2. Area control cabling and a central control room will be provided by CM001.

b) Separate PLC systems for existing and modified plant as per existing (modified to suit upgraded plant where applicable).

9.6.5.6 Area 4880 – Production Mobile Equipment

a) Supply of one (1) front end loader with bucket capacity of approximately 12tonne (CAT 988 or equivalent) for loading fine ore at the screening building.

b) Other production equipment required for the 12Mtpa operation is existing.

9.6.5.7 Area 4890 – Services Mobile Equipment

a) Supply of two used passenger busses (1 x 24 seats, 1 x 48 seats)

b) Supply of one (1) telehandler (Cat 1255D or equivalent)

9.6.6 Area 4900 – Port Ancillary Facilities

Area 4900 consists of the following sub-sections:

- Area 4910 – Port Buildings
- Area 4920 – Port Accommodation Area

Further details as to individual components that make up Area 4910 – Port Buildings are as follows:

9.6.7 Area 4910 – Port Buildings

9.6.8 Area 4920 – Port Accommodation Area

The permanent camp (PSC) at the port will be expanded by the addition of 90 additional rooms and facilities relocated from the Mine at Mary River (refer to WBS 1830). Refer to Appendix A78 for a preliminary camp layout.

9.7 Area 6000 – Construction Facilities

This area includes:

- Area 6110 Temporary Buildings (Office, Warehouse, Change House, Canteen etc.)
- Area 6120 - Construction Plants
- Area 6130 - Temporary Utilities (Power, Fuel, Air, Water, Sewage etc.).
- Area 6140 - Temporary Transportation Facilities
- Area 6150 - Weather Protection

- Area 6160 - General Purpose Scaffolding, Cribbing and Dunnage
- Area 6170 – Temporary Construction (Fences, Signage, Barricades etc.)
- Area 6180 – Roads, Bays, Parking Areas and Laydown Area.

9.7.1 Area 6110 Temporary Buildings (Office, Warehouse, Change House, Canteen, etc.)

a) A fully fitted out 800-man construction camp will be bought, dismantled, transported and re-erected at the Mine site. The camp is an existing camp located near Fermont Labrador. The camp will be shipped through the consolidation hub at Valley Field. The camp is complete and includes.

- Single occupancy rooms with ensuite bathrooms
- Food preparation, kitchen and meal area for the camp
- Camp Laundry facilities (personal and housekeeping)
- Exercise room
- Change rooms
- Water treatment plant (sewage)
- Fire protection system
- Power Generation for camp and camp facilities.
- Waste Management facilities
- TV and Internet connections.

The camp will be of a hard walled and modular construction.

The camp will be built on a new pad located south of the Tote Road and proposed rail alignment and north west of the office and crushing facilities at the Mary River mine site. The location is shown Appendix 15..

An additional incinerator facility similar to those currently on site will be purchased and installed for waste disposal.

b) A new with a capacity to house 380 people will be installed at Milne Port. The camp includes for:

- Soft walled single occupancy rooms and common ablution and bathroom facilities shared, one per wing. The remaining camp construction elements will be hard walled.
- All fit out for rooms and facilities provided.

- Food preparation, kitchen and meal area for the camp
- Camp Laundry facilities (personal and housekeeping)
- Exercise room
- Change Rooms
- Water treatment plant (sewage)
- Fire protection system
- Power Generation for camp and camp facilities.
- Waste Management facilities
- TV and Internet connections.

c) Relocation, installation and re-commissioning of the Steensby Camp (located at Milne). The camp will provide approximately 50 beds.

d) Operation of the camps, including servicing of water supply, sewage treatment, collection of air lifted consumables (food), power supply and waste disposal will be contracted to the Milne camp provider.

e) Existing Mine Site Construction offices will be refurbished and furnished for use by the EPCM team and support staff. The office is expected to house up to 16 personnel.

f) The existing Pit office at Mary River capable of housing 16 people will be relocated to Milne port for use by the EPCM construction team and support staff. The scope of this work includes:

(Refer to drawing Appendix A72) for building layout), including:

- Disconnect and make safe electrical services
- Remove and pack all internal furniture, partitions etc. for transport to Port
- Remove internal and external trim and flashing connecting modules
- Install temporary bracing to all modules for transport, seal modules for transport to prevent excessive dust and water ingress.
- Transport modules to Port Site
- Remove existing damaged roofing from all modules and install new rubber membrane roof on all modules completely replacing existing roofing
- Remove temporary bracing and install modules on new timber cribbing

- Install flashing, seal roof joints, install internal trim, install partitions and furniture and establish office to original design.

g) An existing series of trailers “Port Construction Complex” will be relocated to co-exist with the relocated Mary River Pit Office.

Refer to sketch Appendix A72 for layout of primary building, complete complex consists of:

- Trailer 1: Lunchroom module as shown in Appendix A74.
- Trailer 2: Aerodrome office module as shown in Appendix A75
- Trailer 3: Atco office module similar size to other modules, no reference drawing.
- Car Wash Module as shown in A76 with external sewage tank in site constructed timber enclosure
- E-Room: 20’ shipping container fitted with electrical equipment generally as per sketch Appendix A77.

The work to make functional for the Project includes;

- Disconnect and make safe electrical services
- Remove and scrap site constructed timber roof, floor and walls interconnecting existing trailers 1, 2 & 3 (as per sketch Appendix A73)
- Relocate trailers 1, 2 & 3 to a position adjacent to the Port Site Construction Office and install on timber cribbing and provide safe access at all external doors.
- Relocate washcar to adjacent to Port Site Construction Office
- Dismantle, relocate and re-construct washcar sewage tank with enclosure at new washcar location
- Relocate e-room and connect electrical services to relocated modules / trailers

9.7.2 Area 6120 - Construction Plants

All construction plant required for the project will be provided by contractors engaged directly in the supply of materials, labour and equipment to construct the scope of the Project. Such facilities will be bought to site and then demobilized at the completion of each contractor’s mandate. Provision exists within construction contracts for BIM to exercise the right to buy out any construction plant bought to site. No provision exists within the capital cost estimate for such purchases.

9.7.3 Area 6130 - Temporary Utilities (Power, Fuel, Air, Water, Sewage, etc.)

- Power – all power for construction work will be provided by contractors with BIM providing fuel on site. Power for temporary EPCM and camp facilities are supplied by infrastructure works defined in WBS 4800.
- Fuel - fuel storage for construction is described in WBS 4840.
- Air - compressed air required by contractors for construction will be provided by the contractor.
- Sewage Treatment – sewage treatment plants are provided within the scope of contracts TX001 and TX002. Sewage collection, treatment and disposal will be undertaken by contractor CC002. Permanent sewage piping modifications are described in WBS 4800.

9.7.4 Area 6140 - Temporary Transportation Facilities

Temporary transportation comprises two elements:

- Sight Vehicles
- Construction of temporary docks, and roads to receive and allow transport of heavy modules using Self Propelled Module Transporters (SPMT)

Site Vehicles

a) 25 Pick-up trucks will be purchased for Owner's Team, EPCM use.

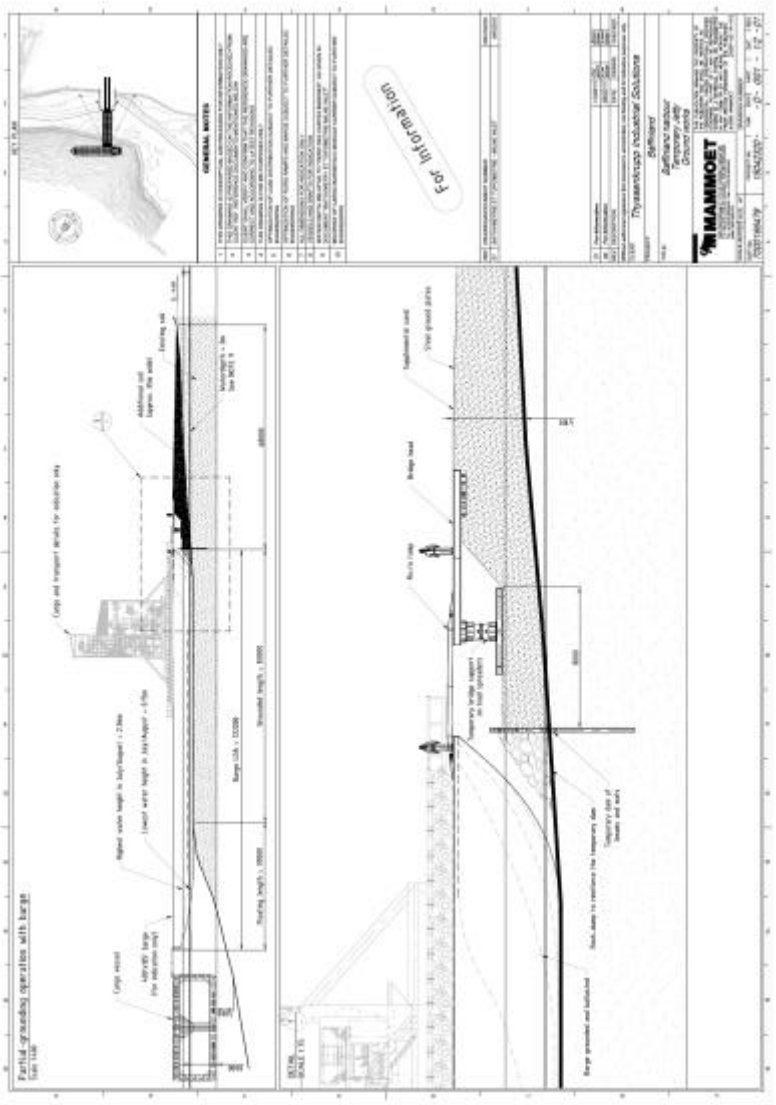
b) Personnel transportation of contractor personnel on site is the responsibility of the contractor.

Temporary Dock and SPMT Road

a) A new rock fill temporary dock will be built west of the existing stockpiles to allow tie up of special purpose barges to allow offload of heavy modules and equipment by contractor CM001. A temporary barge dock may be incorporated into the rock fill dock as required by the contractor (CM001) for their offload (to be provided by contractor).

A typical ramp arrangement provided by Thyssen Krup is shown in Figure 9-13.

Figure 9-13: Temporary Ramp and SPMT Offload Structure



b) A rock fill road will be constructed with as crest width of 24m and graded to allow passage of SPMT machines between the temporary dock and the secondary crushing and screening area. The road is to allow for offload and transport of modules associated with:

- Car dumper module
- Crusher house module

- Screen house module
- Stacker or Stacker reclaimer machines
- Miscellaneous other pre-assemblies and equipment transported directly to Milne by contractor CM001.

c) A separate road will be required to transport the dumper mechanical modules from the temporary construction dock to the rail alignment to allow the dumper module to be unloaded into the basement provided by CC002.

9.7.5 Area 6150 - Weather Protection

Provision of weather protection for all equipment and construction works rests with contractors mobilized to site.

9.7.6 Area 6160 - General Purpose Scaffolding, Cribbing and Dunnage

All scaffolding, cribbing and dunnage will be provided by contractors. No scope exists for supply of such materials as free issue to contractors.

9.7.7 Area 6170 – Temporary Construction (Fences, Signage, Barricades etc)

Supply and installation of temporary construction fences, barricades and signage is the responsibility of construction contractors mobilized to site.

9.7.8 Area 6180 – Roads, Bays, Parking Areas and Laydown Area

- **Roads, Bays, Parking Areas**

Laydown Area

Three laydown areas for contractor use will be developed.

9.8 Reference Documents

Document Number	Title	Revision	Date	Appendix Number
H353004-00000-220-272-0005-0001	*Mine Site Block Plan Layout*	*0*	*30/3/2107*	*A - 1*
H353004-00000-220-272-0007-0001	Mine Site Construction Accommodation Earthworks Layout	0	13/13/2017	A - 2
H353004-00000-220-272-0014-0001	Mine Site 2017 Laydown Layout	0	13/12/2017	A - 3
H353004-CX001-244-248-0001 AP0F	Mine Effluent & Raw Water Sketch	N/A	N/A	A - 4
H353004-CX001-244-248-0001 AP0A	Mine Electrical Sketch	N/A	N/A	A - 5
H353004-CX001-244-248-0001 AP0C	Mine Fibre Optic Sketch	N/A	N/A	A - 6
H353004-10000-260-288-0001-0001	Power Distribution 4160V and 600V Distribution Single Line Diagram SHT 1 of 2	0	29/3/2017	A - 7
H353004-18000-220-272-0001-0001	Mine Site Mine Truck Workshop General Arrangement	0	14/2/2017	A - 8
H353004-41000-231-260-0002-0001	Mine Site Primary Crusher Feed Ramp Concrete Arrangement and Details	0	17/2/2017	A - 9
H353004-19000-231-260-0001-0001	Mine Site Primary Jaw Crusher Foundation Arrangement and Details	0	12/2/2017	A - 10
H353004-19000-231-260-0001-0003	Mine Site Primary Crusher Area Retaining Wall Details	0	17/2/2017	A - 11
H353004-00000-220-272-0008-0001	Mine Site Contractors Accommodation Layout	A	9/12/2016	A - 12
H354003-CM001-200-242-0001	*Specification – Scope of Works, Bulk Materials Handling and Processing*	*0*	*15/12/2016*	*A - 13*
H354003-00000-220-272-0001-0001	Port Site Block Plan Overall Layout	0	10/3/2017	A - 14

Document Number	Title	Revision	Date	Appendix Number
H354004-29000-220-272-0001-0001	Milne Port Crusher Workshop General Arrangement	0	17/1/2017	A - 15
H353004-00000-224-272-0001-0001	Rail Site Plan and Longitudinal Section Ch 0.220km to Ch 37.000km	1	10/2/2017	A - 16
H353004-00000-224-272-0002-0001	Rail Site Plan and Longitudinal Section Ch 37.25 to Ch 74km	1	10/2/2017	A - 17
H353004-00000-224-272-0003-0001	Rail Site Plan and Longitudinal Section Ch 74.25 to Ch 109.611km	1	10/2/2017	A - 18
H353004-00000-224-262-0001-0001	Rail Site Diagrammatic Layout Milne Port to Mine Site	0	16/12/2016	A - 19
H353004-00000-224-272-0027-0001	Rail Site Line Plan and Longitudinal Section Ch 106.9km to 109.611km	0	10/2/2017	A - 20
H353004-00000-224-272-0004-0001	Rail Site Line Plan and Longitudinal Section Ch 0.160km to 4.800km	0	10/2/2017	A - 21
H353004-00000-224-272-0005-0001	Rail Site Line Plan and Longitudinal Section Ch 4.820km to 9.440km	0	10/2/2017	A - 22
H353004-00000-224-272-0006-0001	Rail Site Line Plan and Longitudinal Section Ch 9.46km to 14.080km	0	10/2/2017	A - 23
H353004-00000-224-272-0007-0001	Rail Site Line Plan and Longitudinal Section Ch 14.10km to 18.720km	0	10/2/2017	A - 24
H353004-00000-224-272-0008-0001	Rail Site Line Plan and Longitudinal Section Ch 18.74km to 23.360km	0	10/2/2017	A - 25

Document Number	Title	Revision	Date	Appendix Number
H353004-00000-224-272-0009-0001	Rail Site Line Plan and Longitudinal Section Ch 23.380km to 28.000km	0	10/2/2017	A - 26
H353004-00000-224-272-0010-0001	Rail Site Line Plan and Longitudinal Section Ch 28.020km to 32.640km	0	10/2/2017	A - 27
H353004-00000-224-272-0011-0001	Rail Site Line Plan and Longitudinal Section Ch 32.660km to 37.280km	0	10/2/2017	A - 28
H353004-00000-224-272-0012-0001	Rail Site Line Plan and Longitudinal Section Ch 37.300km to 41.920km	0	10/2/2017	A - 29
H353004-00000-224-272-0013-0001	Rail Site Line Plan and Longitudinal Section Ch 41.940km to 46.560km	0	10/2/2017	A - 30
H353004-00000-224-272-0014-0001	Rail Site Line Plan and Longitudinal Section Ch 46.580km to 51.200km	0	10/2/2017	A - 31
H353004-00000-224-272-0015-0001	Rail Site Line Plan and Longitudinal Section Ch 51.220km to 55.840km	0	10/2/2017	A - 32
H353004-00000-224-272-0016-0001	Rail Site Line Plan and Longitudinal Section Ch 55.860km to 60.480km	0	10/2/2017	A - 33
H353004-00000-224-272-0017-0001	Rail Site Line Plan and Longitudinal Section Ch 60.500km to 65.120km	0	10/2/2017	A - 34
H353004-00000-224-272-0018-0001	Rail Site Line Plan and Longitudinal Section Ch 65.140km to 69.760km	0	10/2/2017	A - 35

Document Number	Title	Revision	Date	Appendix Number
H353004-00000-224-272-0019-0001	Rail Site Line Plan and Longitudinal Section Ch 69.780km to 74.400km	0	10/2/2017	A - 36
H353004-00000-224-272-0020-0001	Rail Site Line Plan and Longitudinal Section Ch 74.420km to 79.040km	0	10/2/2017	A - 37
H353004-00000-224-272-0021-0001	Rail Site Line Plan and Longitudinal Section Ch 79.060km to 83.680km	0	10/2/2017	A - 38
H353004-00000-224-272-0022-0001	Rail Site Line Plan and Longitudinal Section Ch 83.700km to 88.320km	0	10/2/2017	A - 39
H353004-00000-224-272-0023-0001	Rail Site Line Plan and Longitudinal Section Ch 88.340km to 92.960km	0	10/2/2017	A - 40
H353004-00000-224-272-0024-0001	Rail Site Line Plan and Longitudinal Section Ch 92.980km to 97.600km	0	10/2/2017	A - 41
H353004-00000-224-272-0025-0001	Rail Site Line Plan and Longitudinal Section Ch 97.620km to 102.240km	0	10/2/2017	A - 42
H353004-00000-224-272-0026-0001	Rail Site Line Plan and Longitudinal Section Ch 102.240km to 106.880km	0	10/2/2017	A - 43
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