Rio Tinto

IOC

Construction and Development

WATER MANAGEMENT PLAN

Sponsor's approval is required for this document

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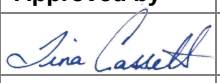
Revision Record				
Revision	**Description of change**	**Prepared by**	**Approved by**	**Date**
01	Review to update procedures if applicable	Tina Cassell		February 21, 2023

References

Nº	Reference	Title
1	CR-E-E-FRM	Effluent Management Plan – Mining Operations
2	CR-E-E-PRO	Dewatering Pits and Lakes
3	CR-E-E-PRO	Internal Water Sampling
4	CR-E-E-PRO	MDMER Final Discharge Point Monitoring
5		Mine Site Water Management Plan
6		Water Management SOP
7	EPP	Environmental Protection Plan
8	CR-E-E-PRO	Land Management and Disturbances Procedure
9	CR-E-E FRM	Land Management and Disturbances Permit Request

INTRODUCTION

PURPOSE

The purpose of the Water Management Plan is to fulfil the Iron Ore Company of Canada's (IOC) commitment to the Government of Newfoundland and Labrador as stated in the Environment Assessment Registration (EA) to provide a Water Management Plan (WMP) for expansion and development.

This WMP will be incorporated into IOC's existing Mine Site Water Management Plan.

The purpose of the WMP is to provide a description of the management, design, and proper operating procedures for the dewatering systems in the IOC mine site. This document describes the existing environment, the proposed dewatering systems for the mine and future water management. This is a living document and will be reviewed on an annual basis, in case of significant environmental non-compliance or when more design information is made available and changed as necessary.

WATER MANAGEMENT OBJECTIVES

The key objectives of IOC's WMP are as follows:

- Ensuring compliance with discharge and monitoring requirements as specified in Government Legislation, approvals, and Regulations.
- Ensuring conformance with Rio Tinto's Water quality protection and water management E11.
- Anticipating and proactively managing in-pit water issues; and,
- Effectively managing site runoff to reduce soil erosion and sediment transport to receiving waters.

OVERVIEW

The IOC site can be separated into two working areas: the mine area and the processing plants. This document specifically covers construction, expansion and development in the mining area. Upon handover of Projects and integration into IOC's existing operations this document will be incorporated into the WMP for the entire mine site which covers the water management systems for the mining area. This Plan does not include the processing plants.

WATER MANAGEMENT RESPONSIBILITIES

IOC departments that have water management responsibilities in the mining area include but are not limited to the following:

- Mine Operations.
- Mine Maintenance.
- Heath, Safety, and Environment Group (HSE); and,
- Mine Operations Technical Services.

For the purposes of construction activities for future expansion and development, contractors working in the project area also have water management responsibilities.

PIT INFLOW MANAGEMENT

The principal objectives of managing pit inflows are to create and maintain a dry environment for drilling, blasting and excavating material, and to reduce adverse effects of groundwater on the development of sinking cuts. These objectives are accomplished by developing and maintaining a dewatering system that includes the following aspects:

- Diverting surface flows around the pit area with diversions and ditches.
- Collecting groundwater seepage and surface runoff from the mining area and directing it into designated sumps within the pit.
- Preventing surface ponding on the pit floor by directing flows into sumps with the use of ditches.
- Extracting groundwater with dewatering wells, to draw the water table below the operating level in the pit; and,
- Maintaining drawdown conditions in sumps by pumping water out of the pit to designated discharge points.

SURFACE RUNOFF AND ROAD MAINTENANCE

Run-off from haul roads, waste rock dumps and overburden stockpiles during spring freshet and summer storms contributes to sedimentation and risk of elevated total suspended solids (TSS) in receiving waters. This section of the Water Management Plan describes the standards under which design, construction, and maintenance are undertaken to minimize the environmental and operational impacts of an uncontrolled release of run-off to sediment collection area and water bodies. Specific objectives include:

- Proper geometric and geotechnical engineering of roads, ramps and ditches that incorporates safety, economics, efficiency, and environmental diligence.
- Construction and maintenance of settling ponds.
- Planned and scheduled construction activities.
- A regime of inspections and planned maintenance of roads and ditches as specified in Standard Operating Procedures.
- A process for periodic monitoring and auditing of results achieved toward the primary objective.

In addition to the above objectives, proper road maintenance will help to reduce the amount of inflow to the pit resulting from surface runoff. This is accomplished by:

- Developing and maintaining adequate ditches along haul roads.
- Maintaining proper grade on haul roads.
- Maintaining berms to prevent runoff flowing over pit walls.
- Developing and maintaining proper diversions for natural waterways away from the pit.

Haulage roads will be maintained by an IOC road maintenance crew and activities will include grading, dust suppression and resurfacing. Snow clearing and traction control (gravel spreading) will also be carried out as required. Surface runoff diversion ditching will require occasional maintenance, cleanout and grading. Diverted water will be pumped to an effluent treatment system (sedimentation pond), if needed, prior to release.

WATER FLOW DESCRIPTION

Runoff is the component of rain or snow melt that flows overland to a receiving water body. Rainfall runoff has to be dealt with on an ambient basis, whereas snow accumulates in a snow pack that will not be a concern until it melts during the spring freshet. This additional water, when it is in-pit is directed to the sumps and is ultimately pumped out and discharged to the designated discharge location.

The precipitation that falls on the exterior to the pit, will be collected and conveyed through a series of ditches. The water will be directed to sedimentation ponds that will collect water and allow for settling of solids in the water before it is released into the environment. Since this water has not come in contact with the mining operation, it is assumed that it does not have to undergo any further treatment other than settling out TSS before being released to the environment.

FINAL DISCHARGE POINTS

Final Discharge Points (FDP) will be established in locations where impacted water (effluent) is discharged into a receiving body of water. These discharge points will be registered with both the federal and provincial governments. All the discharges have sampling schedules as mandated under MDMER and the provincial government under the Certificate of Approval (CofA). Any FDP site will be held to the same MDMER sampling point regulations. The discharge of deleterious substances is closely monitored to ensure that there are no exceedances.

CONTROL AND MONITORING

Road conditions are inspected on a regular basis and recorded in the shift logbook. Information recorded will include the general conditions of the road, camber of the road surface, berm conditions, intersections, and drainage of the road. Any minor maintenance will be done during that shift as directed by the supervisor. Other work that would require designs and planning would be reported to the Mine Planning team in Technical Services.

Seasonal Considerations

Mining in Labrador is a cold weather operation, ensconced in snow and ice from November to late March. Water run off due to mild spells or winter rains are rare events. Slippery snow roads are treated primarily with crushed stone as a traction medium. Late winter snow removal from sides of haul roads will help to minimize the effects of spring melts. Snow removed from haul roads and active pits is placed in designated snow dumps, in areas that are out of the way and will not create further issues when the snow starts to melt.

Spring freshets cause higher than normal surface water flows from surrounding hills, waste dumps, roads, and other areas. Road ditches will collect the runoff water and direct it to sumps, settling ponds or vegetation before it is released into the receiving waterbody. Roads typically become muddy as fines are collected in running water and carried to ditches. This continuous operation of heavy haulage equipment causes road surface erosion and suspended solids in surface water.

Summer in Labrador West typically brings frequent rainfalls that deliver a monthly average of approximately 100mm of precipitation. Ditches and settling ponds will require regular inspection and occasional maintenance, cleanout, and grading to maintain water flow. Haul road surface geometry and surface materials require constant monitoring and remediation due to the heavy traffic and constant grader operations.

Since work to control run-off water in spring months is reactionary, considerable planning and preparation is required before the snow arrives. Fall work therefore consists of the following:

- A survey of road surfaces to identify areas where grades need to be re-established.
- Clearing of ditches, culverts, and perimeter settling ponds.
- Grading haul roads to define crowns and cross-falls.
- Redefining diversion ditches to direct surface flow into ditches on the perimeter of the pit to settling ponds.
- Completion of construction and reconstruction project work on roads, ditches and settlement areas.

Road Runoff Maintenance Plan

Road maintenance is completed by a dedicated IOC road crew. Runoff along haul roads is managed by crowning the road surface slightly and directing runoff water to the edge of the road at regular intervals through the berms. It is then collected in ditches and directed to sumps, settling ponds or vegetation before it is released into the receiving waterbody.

Contingency

When there is ingress of surface water from a haul road to an open pit, the required actions are as follows:

- determine the location of ingress and asses the area.
- build or repair a berm if appropriate.
- construct ditches to channel the water away from the pit.
- maintain ditches and culverts so water can be conveyed freely; and,
- re-grade the road to prevent ponding.

In the case of runoff being caused by extreme weather (i.e., heavy rainfall event) the applicable BRRP protocol must be followed. For extreme weather rain events, the guidelines to activate emergency response are as follows, in an event of:

I. 100mm of rain within 24 hours or less; or,

II. 50mm of rain forecasted for three consecutive days.

If 100mm of rain falls within 24 hours (approximately 1:1000-year event) vulnerable operations must stop and equipment must be removed from the area. If there is 50mm or more rain for three consecutive days, vulnerable operations must stop, and equipment must be removed from the area.

SOIL EROSION AND SEDIMENT CONTROL

The sediment control strategy at the IOC Labrador City Operations currently involves the collection of runoff and conveyance to sediment detention structures. Within each pit watershed, runoff water naturally concentrates on ramps and flows to the sumps in active pits, or into the lakes in the dormant pits. Outside of the pit surface catchments, runoff either follows natural overland flow paths, or is intercepted by roads. Storm water, snowmelt, and runoff flows that are intercepted by roads are conveyed in ditches to sumps, settling ponds or vegetation. Rather, runoff collected by the roads is either directed down into pit sumps along haul road ditches or is shed from the road surface at regular intervals. In the latter instance, runoff is allowed to flow either overland or along natural drainage courses to the receiving lakes.

Overland Flow

Overland flow management is implemented along the haul roads by cutting slots in the safety berms at 50 to 100m intervals and grading the roads to shed the water to these points. This practice will most likely be applied to the longer stretches of haul roads that are already constructed to development areas. Where applicable; future haul roads may have runoff collection ditches which will direct water to the appropriate sedimentation pond or sump.

Waste Dumps

Waste dumps do not typically generate a lot of fine sediment in runoff at IOC, but the quality of rock placed in the dumps will vary and erodible fines, like limonite, may be present within some zones in the dump. Waste dumps are monitored on a weekly basis by the Geotechnical personnel in the Mine Technical Services group, for stability, material type, water pooling and other factors which may cause the waste dump to be unsafe. Measures for managing runoff from waste dumps are like those adopted for haul roads which are:

- On operating waste dumps, maintain discharge points at regular intervals (60m) along the crest of the dump platform, where surface drainage will be directed to decant down the face of the dump into a settling pond. This will prevent larger cumulative flows from causing erosion of the dump face.
- In areas of potential dump instability, reclaim dump surfaces and grade surfaces to promote runoff. Grading should be done to shed water back towards natural ground or into a diversion channel constructed around the margins of the waste dump. If the diversion channel is conveying clean water, it can extend to the environment. If it is conveying turbid water, it should be directed to the nearest settling pond.
- Site new dumps ideally leave a 100m buffer of naturally vegetated ground between the ultimate dump toe and the nearest body of water. If this is not possible, leave a 50m buffer and implement appropriate sediment source control measures.

Operational Monitoring

The mine site has monitoring programs that identify areas where sediment is entering the natural drainage system and an investigation of the sources of the sediment can be conducted. Measures to remove or control the source could then be identified and implemented. Measures could vary from construction of new diversion structures or the implementation of localized sediment source control practices.

WATER MONITORING PLAN

Water quality monitoring at IOC is governed by the requirements of the MDMER promulgated under the federal Fisheries Act and the Certificate of Approval (CofA) for the mines issued by the provincial Department of Environment and Conservation.

Additional testing may be required from other locations throughout construction and development of the general water chemistry analysis program through the CofA. More details and the requirements will be determined once discharge sites have been registered and approved by the government agencies.

DEWATERING PITS AND LAKES

To ensure that the environmental risks associated with pit and lake dewatering operations are properly managed, procedures are governed and adhered to through external permits those such as, Water Use License (WUL), Permit to Alter a Body of Water (PABW), Dewatering Wells, Ground Monitoring Wells etc., and Environment Assessment (EA) conditions listed upon Ministers Approval.

Dewatering Strategy Design

A Pit Dewatering Permit Request will be completed and submitted to the IOC Environment Department and de-watering strategies shall be designed to ensure that the impact to the environment is minimised.

The IOC Environment Department shall be initially consulted to identify the following issues that will influence the de-watering design:

- Compliance levels that must be achieved,
- Regulatory approvals that must be obtained, and
- Environmental protection plans that may be required.

De-watering design shall consider the placement of de-watering discharge sites to:

- Allow discharged water to follow natural surface drainage patterns to minimize erosion, and
- To discharge to vegetated work areas to reducing impact on turbidity levels in natural water bodies.

Note: This will not affect compliance levels, which are taken at “end of pipe”.

Further environmental protection measures shall be developed and implemented as defined by the IOC Environment Department.

De-Watering Operations

Once a de-watering design has been implemented, there shall be no changes to the de-watering discharge points without prior liaison with the IOC Environment Department.

Extraction at the de-watering sumps shall be managed so the placement of the de-watering pump intake shall be above the lake/sump bottom to reduce silt intake and minimize the discharge turbidity.

All operating de-watering sumps and discharge points shall be inspected to insure:

- The de-watering pump intake is above the lake/sump bottom,
- Excessive erosion or sedimentation is not occurring at discharge points.

The typical discharge design is pumping water to an area of undisturbed forest, which will act as a vegetative filter. Boulders or a small rock lined pool will be placed at the point of discharge to prevent localized erosion.. If compliance levels are considered difficult to meet at the compliance point, reductions may be achieved by using either one or a combination of the following methods:

- Filtration,
- Settling Ponds,
- Silt fences,
- Dykes.

Dewatering Monitoring

All de-watering discharge sites shall be sampled and tested in a manner as determined by the IOC Environment Department in consideration of legal requirements.

De-watering monitoring results shall be kept by the IOC Environment Department.

If monitoring results demonstrate that legal requirements are not being met, the de-watering design and operation shall be investigated to determine the root cause and action for improvements.

ENVIRONMENTAL MANAGEMENT SYSTEM

An environmental management plan is in effect at the mine site. When any construction and development begin, it will be incorporated into this plan. The management plan includes an Environmental Aspects Register, in which all activities in the mine are listed, and associated risks are identified and quantified. Procedures to manage the risks are identified along with the government regulations that are applicable to each of the activities.