

Memo

To:	John Roberts	Client:	TMAC Resources Inc.
From:	Mark Liskowich	Project No:	1CT022.001.410
Cc:	Maritz Rykaart, SRK	Date:	December 1, 2014
Subject:	Water Management Plan: Madrid Advanced Exploration Program, North and South Bulk Samples		

1 Introduction

This plan is intended primarily for TMAC Resources Inc. staff and their contractors with the objective to ensure that best practices are employed throughout all water management activities associated with the operation and closure of the Madrid Advanced Exploration Program, Madrid North and South bulk samples, thus ensuring minimal potential environmental impacts.

There are no camp facilities at Madrid North or South bulk sample locations; therefore, potable water is limited to daily usage by the work force which will be transported to site from the Doris Camp on an as needed basis. All remaining water use will be limited to that needed to support mining the bulk samples. Water is needed to prepare brine for drilling in the underground workings. The goal of the water management system is to use intercepted contact water in preference to lake water for make-up water, and to maximize the mine contact water reuse within the underground workings.

This plan has been written in a manner allowing it to be appended to the Hope Bay Water Management Plan, following regulatory approval to proceed with the Madrid North and South bulk samples. This plan involves the collection and transportation of all excess water from the bulk samples via truck to Tail Lake Tailings Impoundment Area (TIA).

This plan does not include management of any water used or consumed as part of the surface exploration drill program which is covered under the standard terms and conditions of exploration licences issued by the Nunavut Water Board (NWB).

2 Background

From beginning to end, the bulk samples will require approximately 590 days or 20 months for the Madrid North bulk sample and approximately 520 days or 18 months for the Madrid South bulk sample.

In the case of the Madrid North bulk sample all waste and ore mining will be completed outside of the talik zone resulting with the production of relatively low volumes of mine water.

The Madrid South bulk sample will initially require approximately 260 days of development mining (waste rock) in order to reach the area of interest. Once the ore zone is reached, a combination of ore and waste mining will be carried out for an additional 260 days to the completion of the bulk sample. This latter phase of the Madrid South bulk sample is assumed to be in the talik zone and therefore is expected to generate the highest volumes of mine water.

3 Responsibilities

The overall responsibility for the implementation of this Water Management Plan rests with TMAC's General Manager of Operations. The general manager will be responsible to ensure that all necessary resources and personnel are made available to ensure that components of the water management plan such as pipelines, diversion berms, lined ponds, holding tanks are ready for operation prior to initiating the bulk sample mining activities.

Day-to-day operational responsibilities will be in accordance with those outlined in the Doris North Water Management Plan; however, it is expected the following will also apply.

The Manager of Environmental Compliance and the Environmental Coordinator will be responsible for reporting requirements related to all monitoring associated with all components of this plan, such as pond water volumes, as well as coordination with the surface foreman responsible for transporting water from the bulk sample sites to the TIA.

4 Infrastructure

Both the Madrid North and Madrid South bulk samples will occur at undeveloped sites with no existing infrastructure. An all-weather road will be constructed in order to access both sites. The following infrastructure will be required and constructed at both the Madrid North and Madrid South bulk sample sites:

- 1 Pollution Control Pond (Madrid North bulk sample site), 2 Pollution Control Ponds (Madrid South bulk sample site);
- Waste rock pile;
- Bulk sample ore stockpile;
- Laydown area, infrastructure pads and vent raise;
- Fuel storage area; and
- Mine portal.

The locations of these facilities are shown on Figures 1 and 2 for the Madrid North and Madrid South bulk sample sites, respectively.

4.1 Pollution Control Ponds

All water interacting with the above infrastructure will be collected in the Pollution Control Pond or ponds in the case of the Madrid South bulk sample and managed as described in Section 5.

The ponds at both bulk sample locations will be lined with a geomembrane and will act as sedimentation basins facilitating the settling of suspended solids. The runoff water captured by these ponds will either be used within the Brine Mixing Facilities (BMF) or transferred to the TIA.

4.1.1 Madrid North Bulk Sample

The single pond at the Madrid North bulk sample site will be located downstream of the portal, ore and waste rock pile pads as shown in Figure 1. The pond will be contained by a 6 m wide berm. This berm has been designed to allow for light vehicle access around the pond for regular inspection; to assist in accommodating any required maintenance; and to allow for a vacuum truck to remove any retained water. The surface area of the Pollution Control Pond is 13,900 m² and its maximum depth is 2.8 m.

The Pollution Control Pond will have the capacity to contain flow from the overall drainage area plus 25% of the annual snow coverage combined with a 100-year, 24-hour storm event or an approximate 14,940 m³ in total. However, it is expected that this pond will always be operated in a manner allowing pumping to commence as soon as the containment volume is large enough for one continuous hour of pumping.

The run-off water captured by this pond will be used within the BMF or transferred to the TIA.

4.1.2 Madrid South Bulk Sample

The primary Pollution Control Pond will be constructed downstream of the waste rock and ore stockpiles and will be contained by an 8-m wide berm which will double as a roadway and allow for access around the pond and to the waste rock storage location as shown in Figure 2.

The surface area of the primary Pollution Control Pond will be 12,300 m² and will have the capacity to contain flow from the overall drainage area plus 25% of annual snow coverage combined with a 100-year, 24-hour storm event (approximately 15,000 m³ in total).

The secondary Pollution Control Pond will be contained by a 6-m wide berm located next to the Madrid South portal and the BMF. The berm was designed to allow for light vehicle access around the pond for regular inspection and to assist in accommodating any required maintenance. The secondary Pollution Control Pond will have the capacity to contain flow from the overall drainage area plus 25% of the annual snow coverage for an approximate total of 900 m³. However, it is expected that this pond will always be operated in a manner allowing pumping to commence as soon as the containment volume is large enough for one continuous hour of pumping.

Operation of both primary and secondary ponds will be done in a manner that both ponds are maintained in a 90% empty state.

The run-off water captured by these ponds will be used within the BMF or transferred to the TIA.

4.2 Waste Rock Piles

As shown in Figures 1 and 2, the waste rock piles at each bulk sample sites will be located adjacent to the Pollution Control Ponds.

The Madrid North bulk sample waste rock pile has a base area of 21,530 m² and is designed to hold 285,000 m³ of waste rock. The Madrid South bulk sample waste rock pile has a base area of 31,230 m² and is designed to hold a volume of 276,000 m³ of waste rock.

All water coming into contact with the waste rock piles will be collected in the Pollution Control Ponds and managed in accordance with Section 5.

4.3 Bulk Sample Ore Stockpiles

The bulk sample ore stockpiles will be constructed adjacent to the waste rock piles (Figures 1 and 2). The Madrid North bulk sample ore stockpile is designed with a base of 5,560 m² and the ability to hold 28,000 m³ (50,000 tonnes) of ore and the Madrid South bulk sample ore stockpile is designed with a base area of 12,200 m² and the capacity to hold 31,000 m³ (55,000 tonnes) of ore.

All water coming into contact with the bulk sample stockpiles will be collected in the Pollution Control Ponds and managed in accordance with Section 5.

4.4 Laydown Area and Infrastructure Pads

4.4.1 Madrid North Bulk Sample

The Madrid North laydown area is located on the Portal Upper Pad (Figure 1). The Portal Pad provides a base for the Shop, Laydown Area, office trailers, the BMF and the storage of calcium chloride. The Vent Raise Pad provides a base for the vent raise, air heating facility and fuel containment.

Each of these facilities will be constructed and graded at 0.5% to collect and route all contact water to the Pollution Control Pond for collection, reuse and/or management as discussed in Section 5.

4.4.2 Madrid South Bulk Sample

The laydown area and infrastructure pads consist of the infrastructure pad, the portal pad, the upper portal pad and the vent raise pad. The infrastructure pad provides a base for the shop, fuel transfer station, laydown area and office trailers. The vent raise pad provides a base for the vent raise, air heating facility and associated fuel storage tank. The Upper Portal Pad provides a base

for the water tank. The Madrid South Portal Pad provides a base for the BMF and the storage of calcium chloride (CaCl_2) (Figure 2).

Each of these facilities will be constructed to collect and route all contact water to either the Primary or Secondary Pollution Control Pond for collection, reuse and/or management as discussed in Section 5.

4.5 Fuel Storage Area

At both the Madrid North and South Bulk Sample sites, fuel will be stored in two separate locations. One 75,000 L double-walled tank will be located adjacent to the Portal Pad Haul Road (Figure 1) at the Madrid North bulk sample site and one 75,000 L double-walled tank will be located on the infrastructure pad at the Madrid South bulk sample site (Figure 2). A second storage tank with a capacity of 60,000 L will be located on the vent raise pads associated with both the Madrid North and Madrid South bulk sample sites. These tanks will be placed in lined containment designed to hold 100% of the tank volume plus 10% of the fuel transport truck as well as 25% of annual snow cover combined with a 1-in-100 year 24-hour storm event.

A sump will be installed in one corner of each tank's containment to allow for collection and removal of runoff and snow melt that accumulates inside the containment. If seasonal accumulation of water meets discharge criteria it may be discharged to the tundra in the area of the fuel storage and/or used in activities, such as dust suppression if said approval is pre-approved.

4.6 Mine Portal

The mine portals will provide access to the underground workings and be used to recover all mine water from both bulk sample sites. The portal is located on Figures 1 and 2. All brine needed for drilling will be transported via pipeline from the BMF to the underground drilling equipment. Following settlement of suspended solids in the underground sumps the clarified water will be directly recycled from the sumps to the underground equipment and/or pumped to the BMF water supply tank which supplies raw water to the BMF for re-use in the underground workings. All runoff entering the mine portal will report to the underground sumps.

5 Water Management

Runoff from the waste rock piles, ore stockpiles and the site infrastructure pads will be collected in Pollution Control ponds and transferred to the 50,000 L water supply tank located at each bulk sample site. Supply water for the BMF will be drawn from this tank to create a brine to be used in underground operations. Additional freshwater for the BMF should only be needed when water already being used for drilling can no longer be recycled. When make-up water cannot be drawn from the Pollution Control ponds it will be drawn from Windy Lake in the case of the Madrid North bulk sample, and from Patch Lake in the case of the Madrid South bulk sample. All excess water collected in the Pollution Control ponds will be transported to the TIA.

5.1 Water Management during Operations

The sources of water during operations are runoff from site infrastructure pads, waste rock piles and ore stockpiles (collected in the Pollution Control ponds) and fresh make-up water drawn from either Windy or Patch Lake.

Water will be stored in a 50,000 L water supply tank located near the BMF.

During operations, the underground mine water demand will be supplied from three sources, as shown in Figures 3 and 4 and listed by priority of use below:

1. Reuse mine water collected in underground settling sumps;
2. Contact water from waste rock and ore stockpiles, collected in the Pollution Control ponds and directed to the 50,000 L tank as needed; and
3. Freshwater as make-up water from Windy Lake or Patch Lake.

It is estimated that there will be four underground drilling rigs used for the bulk sampling at the Madrid North and Madrid South bulk sample sites resulting in the use of 34 m³ of water daily per site. Of this 34 m³/d an estimated 6.7 m³/d will be consumed and 27 m³/d will be recycled. Water will initially be drawn from Windy Lake (in the case of the Madrid North bulk sample) and from Patch Lake (in the case of the Madrid South bulk sample) to make brine for drilling. Brine used underground will be reused to the maximum extent possible by settling solids in sumps underground. Some of the drilling brine will be lost in waste rock and ore, and additional make-up water will be required.

Contact water runoff from the pads, waste rock piles and ore stockpiles will be collected in the Pollution Control ponds. Once the ponds have filled to a 10% capacity the water will be pumped from the Pollution Control ponds to the 50,000 L water supply tank for the BMF at each of the bulk sample sites.

Water will be pumped from the supply tank through the BMF, and will be stored in a secondary containment structure within the BMF. This additional brine will be pumped underground and used by the underground drilling as needed.

If the Pollution Control ponds and underground settling sumps cannot meet the demand for brine, additional make-up water will be drawn from Windy Lake for the Madrid North bulk sample or from Patch Lake for the Madrid South bulk sample. When necessary the freshwater pumped from either lake will be done so utilizing a water truck. All intakes will be screened in accordance with guidelines published by DFO (1995).

Potable water will be limited to that used for drinking water. This water will be provisioned to each site from the Doris North water treatment facility on an as-needed basis. Water for washroom facilities and the emergency shower located at each of the bulk sample sites will be sourced from Windy Lake for the Madrid North bulk sample or from Patch Lake for the Madrid South bulk sample and will be provisioned by truck.

All grey water and sewage will be transported via truck from the bulk sample locations to Doris North for disposal in the Doris North Sewage Treatment Facility.

5.2 Excess Water Management

Excess water from the underground workings or the Pollution Control ponds will be managed in the following manner and as shown schematically on Figures 3 and 4.

Excess water accumulating in the Pollution Control ponds above 10% of the pond holding capacity that is not required as supply water for the BMF, will be transferred to trucks and hauled to the TIA.

The volume of water that will need to be transported to the TIA will vary depending on the season and the climatic conditions of the season (i.e., dry, average or wet year) and what point in the mining schedule each bulk sample is at.

5.2.1 Madrid North Bulk Sample

In the case of the Madrid North bulk sample the entire bulk sample should be completed without intersecting the talik zone therefore the major fluctuations in mine contact water volumes should be climate dependent. Table 1 provides anticipated monthly volumes and estimated water truck trips on an annual basis while mining the bulk sample under different climatic conditions.

Table 1: Bulk Sample Water Management Contact Water Volumes for Dry, Average and Wet Hydrologic Conditions (SRK 2014).

Phase	Month	Year	Madrid North Bulk Sample			Madrid South Bulk Sample		
			5th	50th	95th	5th	50th	95th
Madrid North Mining	4	3	0	0	0	0	0	0
	5	3	0	0	0	0	0	0
	6	3	8,586	11,546	16,204	0	0	0
	7	3	4,047	5,442	7,638	0	0	0
	8	3	1,254	1,686	2,366	0	0	0
	9	3	1,571	2,113	2,965	0	0	0
	10	3	417	555	779	0	0	0
	11	3	0	0	0	0	0	0
	12	3	0	0	0	0	0	0
	1	4	0	0	0	0	0	0
	2	4	0	0	0	0	0	0
	3	4	0	0	0	0	0	0
	4	4	0	0	0	0	0	0
	5	4	0	0	0	0	0	0
	6	4	8,135	11,592	16,741	0	0	0
	7	4	3,834	5,464	7,891	0	0	0
	8	4	1,188	1,693	2,445	0	0	0

Phase	Month	Year	Madrid North Bulk Sample			Madrid South Bulk Sample		
			5th	50th	95th	5th	50th	95th
	9	4	1,489	2,121	3,064	0	0	0
	10	4	391	557	805	0	0	0
	11	4	0	0	0	0	0	0
Madrid South Mining	12	4	0	0	0	0	0	0
	1	5	0	0	0	0	0	0
	2	5	0	0	0	0	0	0
	3	5	0	0	0	0	0	0
	4	5	0	0	0	0	0	0
	5	5	0	0	0	0	0	0
	6	5	8,748	11,569	16,741	6,721	8,888	12,863
	7	5	4,123	5,453	7,891	3,168	4,190	6,063
Madrid South Mining in Tailk	8	5	1,277	1,689	2,445	16,200	16,517	17,097
	9	5	1,601	2,117	3,064	16,449	16,845	17,573
	10	5	420	556	805	15,542	15,646	15,837
	11	5	0	0	0	15,219	15,219	15,219
	12	5	0	0	0	15,219	15,219	15,219
	1	6	0	0	0	15,219	15,219	15,219
	2	6	0	0	0	15,219	15,219	15,219
	3	6	0	0	0	15,219	15,219	15,219
	4	6	0	0	0	15,219	15,219	15,219
	5	6	0	0	0	0	0	0
Closure	6	6	8,667	11,612	16,204	6,659	8,922	12,450
	7	6	4,085	5,473	7,638	3,139	4,205	5,868
	8	6	1,266	1,696	2,366	972.4	1,303	1,818
	9	6	1,586	2,125	2,965	1,219	1,633	2,278
	10	6	417	559	779	320	429	598
	11	6	0	0	0	0	0	0
	12	6	0	0	0	0	0	0
	1	7	0	0	0	0	0	0
	2	7	0	0	0	0	0	0
	3	7	0	0	0	0	0	0
	4	7	0	0	0	0	0	0
Peak Volume (m ³ /month)			8,748	11,612	16,741	16,449	16,845	17,573
Peak Daily Truck Traffic (trucks/day)			6	8	11	11	11	12

5.2.2 Madrid South Bulk Sample

It is anticipated that much of the waste and ore mining at the Madrid South bulk sample will occur in the talik zone. The initial ± 260 days of mining will be developed in waste rock which is anticipated to be outside of the talik zone and therefore be relatively dry. The final ± 260 days of mining is expected to be within the talik and therefore responsible for the production of the majority of the groundwater encountered during the Madrid South bulk sample program. Table 1 provides anticipated monthly volumes and estimated water truck trips on an annual basis while mining in the different zones (with or without groundwater) and under different climatic conditions.

5.3 Water Management at Closure and Temporary Closure

In the case of temporary mine shut down, or permanent closure, mine contact water will be managed as excess water described in Section 5.2. Any remaining waste rock or ore remaining on the stockpiles will either be transported to the Doris North Project or covered in place with a HDPE liner to eliminate contact, or some combination of both management approaches.

Runoff from the site infrastructure pads, waste rock piles and ore stockpiles will be collected in the Pollution Control ponds for settling. The water collected in the ponds will be tested and if it meets discharge criteria it will be discharged to the tundra. Water not meeting the discharge guidelines will be transported via truck to the TIA as described in Section 5.2 (Figure 5).

Subsequent to the water quality meeting all discharge limits, the site infrastructure will be decommissioned and reclaimed as described in the Madrid Advanced Exploration Program: Conceptual Closure and Reclamation Plan (SRK 2014).

6 Inspections

Daily visual inspections of all pads and dykes located throughout the bulk sample infrastructure areas will be completed by operations or environmental staff. These inspections will look for the following types of issues:

- Drainage channels have not been inadvertently blocked or re-routed in a manner that could alter the intended routing of the runoff to the Pollution Control ponds.
- Signs of erosion, occurring during high flow periods.
- Volumes of water in the Pollution Control ponds.
- Any irregularities identified during the visual inspections will be recorded in field books and immediately relayed to the General Manager of Operations and/or the Engineering, Procurement and Construction (EPC) Manager in order to ensure immediate corrective action can be implemented.

7 Monitoring

The Pollution Control ponds will be constructed with permanent staff gauges to allow for visual monitoring of incoming flows to each pond. Daily volumes will be recorded in a dedicated log book for each pond. These log books should be maintained by the operations or environmental staff. The volume of all water transferred from the Pollution Control ponds either to the BMF or to the TIA will be monitored with a flow meter or tracked by truckload as appropriate during the transfers.

Pond water quality in the Pollution Control ponds will be monitored in accordance with the Water Licence.

The Site General Manager and operations are responsible for monitoring.

All sampling procedures and QA/QC activities will follow those documented in the SNP requirements stipulated in the Water Licence.

8 Reporting

In accordance with the approval to proceed with the Madrid North and Madrid South bulk samples, a construction monitoring report will be prepared documenting the construction of all infrastructure at each site.

The report will include, but not necessarily be limited to the following:

- A summary of all inspections conducted during construction, and
- Updated “As-built” drawings of the constructed infrastructure.

All inspection and monitoring data will be compiled, documented and incorporated into the existing monthly and annual monitoring reports submitted to the Board. These reports will include, but not be limited to:

- An assessment of data to identify areas of non-compliance; and
- A site water balance incorporating water volumes transferred from the Pollution Control Ponds to the BMF and/or volumes trucked to the Doris North TIA.

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9 References

DFO 1995, Freshwater Intake End-Of-Pipe Fish Screen Guideline, DFO / 5080, March 1995.

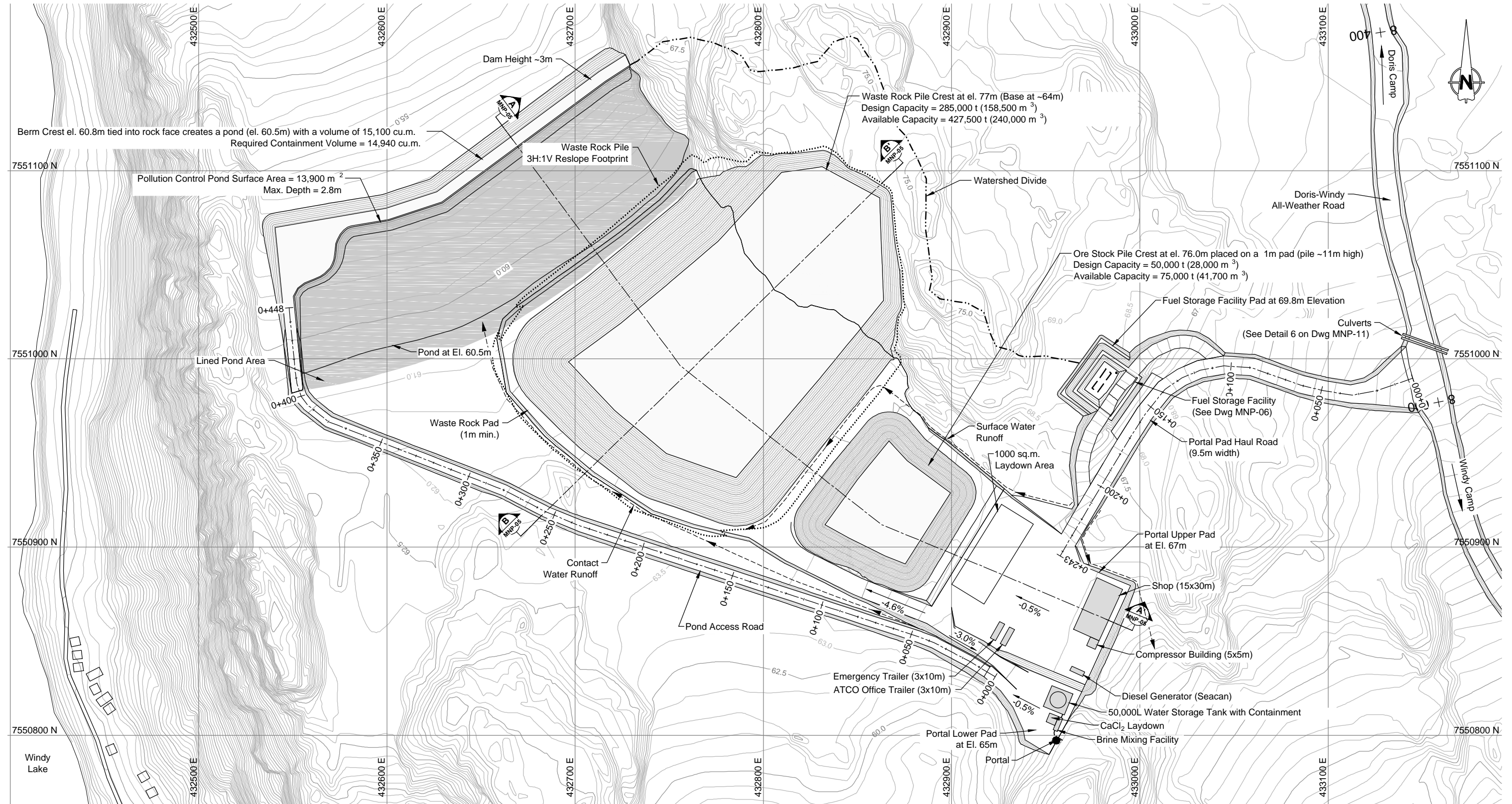
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SRK Consulting (Canada) Inc. 2014b. Hope Bay Project: Madrid Advanced Exploration Project Water Quality Prediction. Technical Memorandum prepared for TMAC Resources Inc., Project No.: 1CT022.001.410. November 5, 2014.

Figures

C:\01_SITES\Hope Bay\Madrid North Portal\CT022.001_MNP-Figure1.dwg



NOTES

1. All dimensions in metres unless noted otherwise.
2. Notes in this drawing apply to all other active drawings.

0 10 20 30 40 50
Scale in Metres

 **srk consulting**

SRK JOB NO.: 1CH022.001

FILE NAME: 1CT022.001_MNP-Figure1.dwg

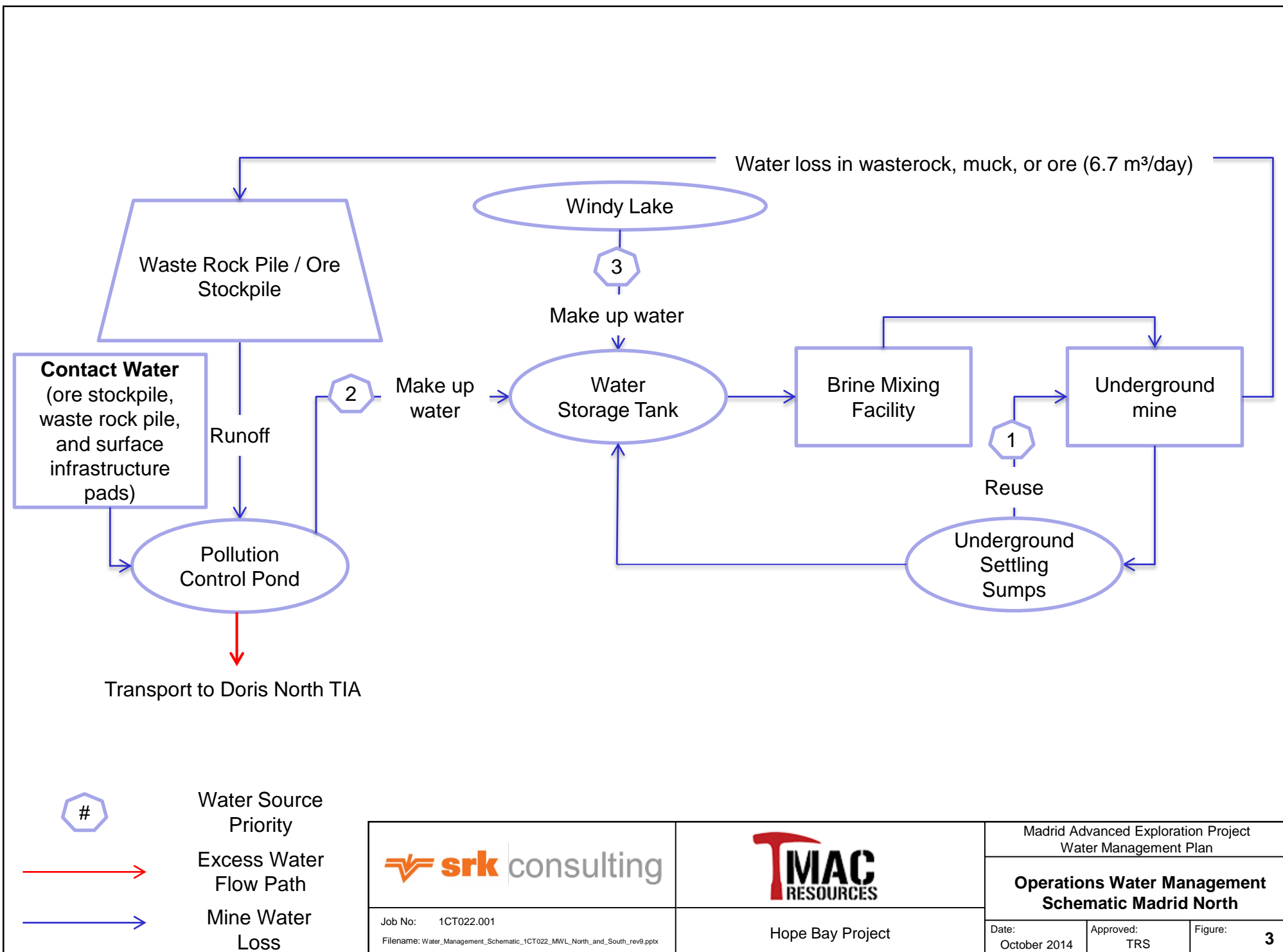
 **TMAC RESOURCES**

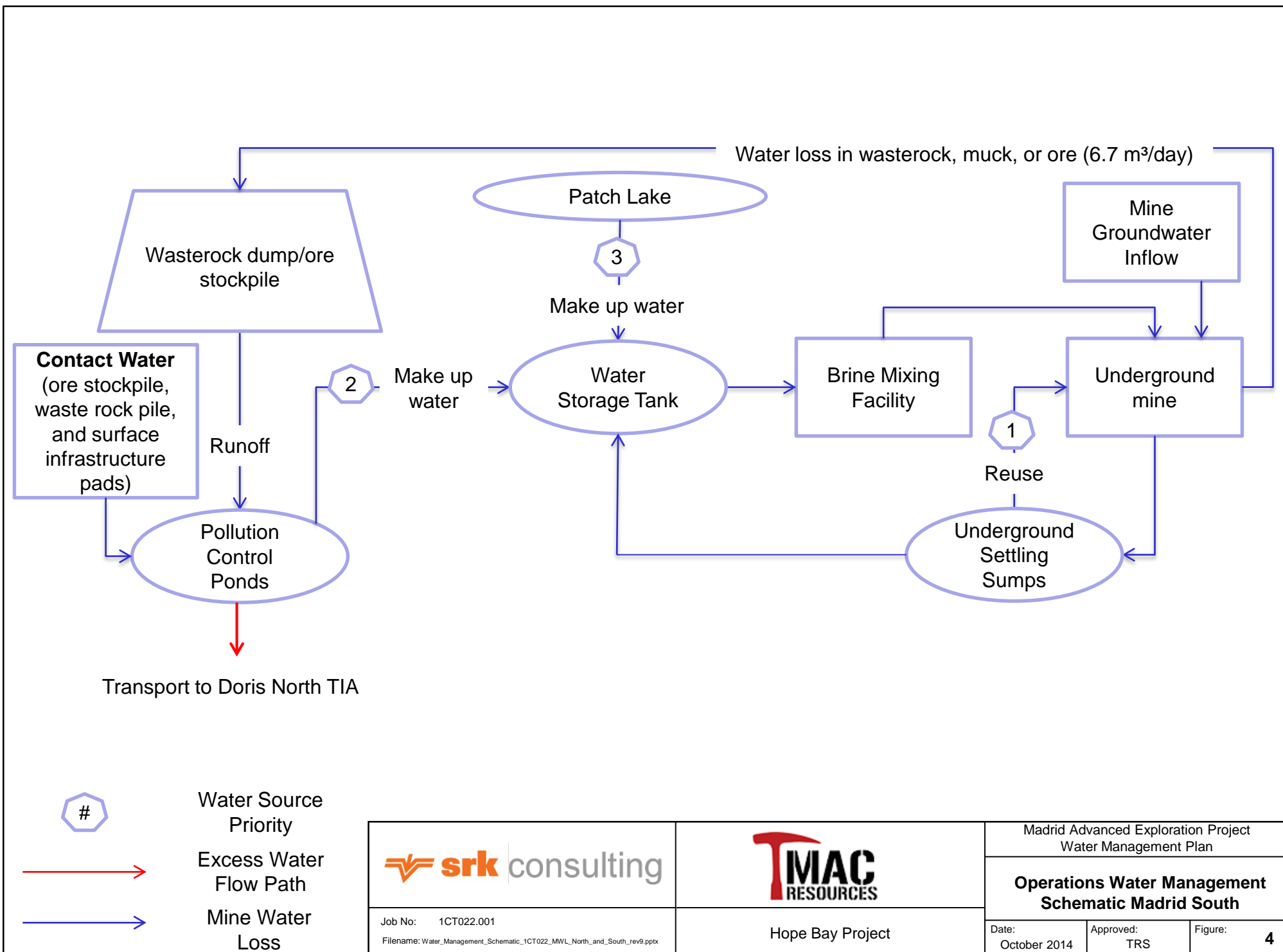
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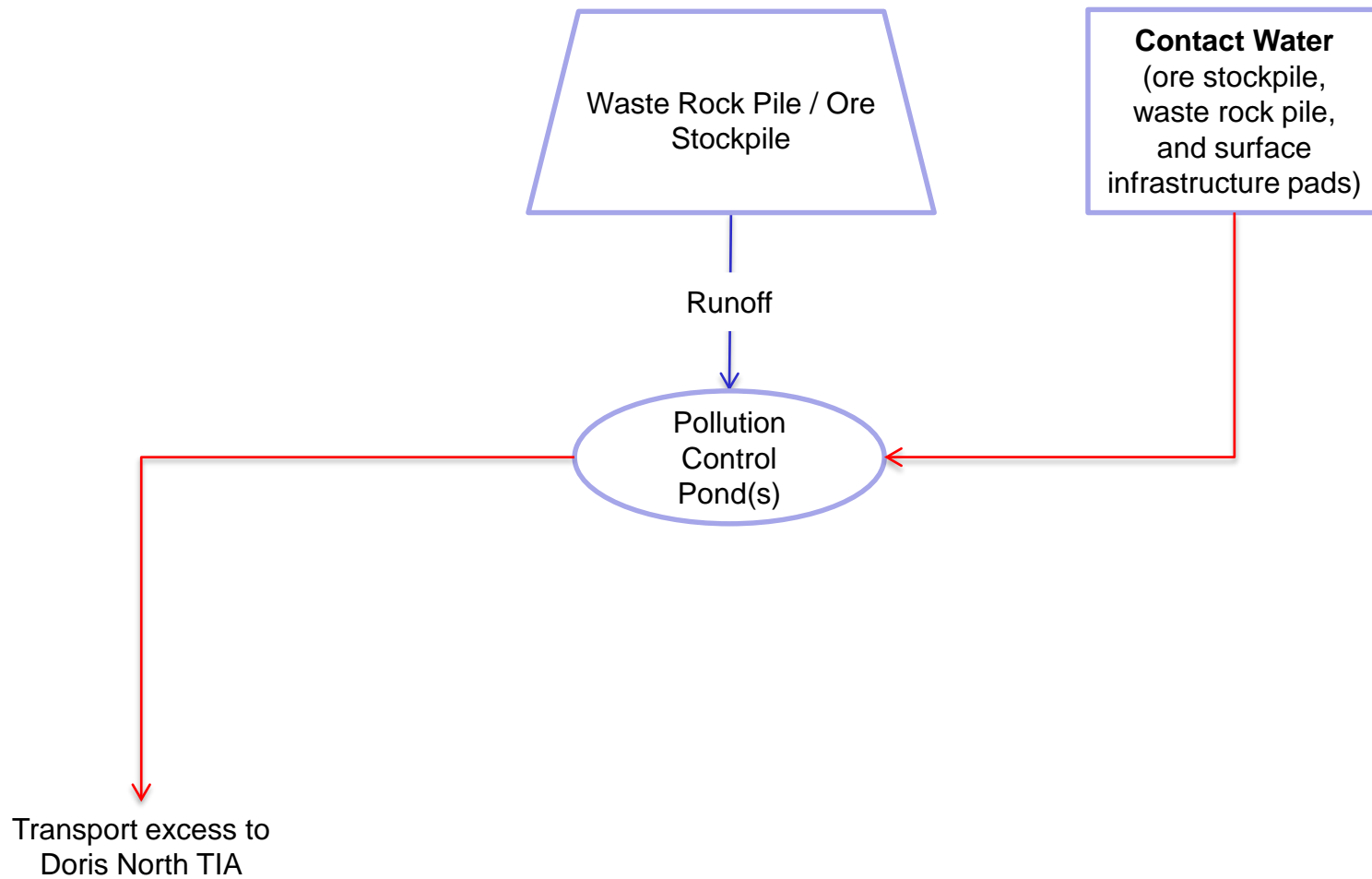
Surface Water Management

Madrid North Site Layout Portal

DATE: Oct. 2014 APPROVED: ML FIGURE: 1







 Job No: 1CT022.001 Filename: Water_Management_Schematic_1CT022_MWL_North_and_South_rev9.pptx	 Hope Bay Project	Madrid Advanced Exploration Project Water Management Plan		
		Closure or Temporary Closure Water Management Schematic Madrid North and South		
		Date: October 2014	Approved: TRS	Figure: 5