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October 5, 2018

Karén Kharatyan
Director of Technical Services
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0

Sent via Email: licensing@nwb-oen.ca; karen.kharatyan@nwb-oen.ca

Re: Supplemental Response to CIRNAC-8 on Final Written Submissions on Applications for 2AM-BOS---- and Amendment No. 2 of 2AM-DOH1323

Dear Mr. Kharatyan,

Please find attached a supplemental response by TMAC Resources Inc. (TMAC) to Crown-Indigenous Relations and Northern Affairs Canada Final Written Submissions #8 ('CIRNAC-8'), provided to the Nunavut Water Board for Water Licence applications for 2AM-BOS---- and Amendment No. 2 of 2AM-DOH1323.

Should you have any further questions please feel free to contact me at oliver.curran@tmacresources.com.

Sincerely,

Oliver Curran
Vice President, Environmental Affairs, TMAC

Cc:
Stephanie Autut (NWB)
Derek Donald (NWB)
Richard Dwyer (NWB)
Ida Porter (NWB)

Attachments:

Attachment A: Supplemental Response to Final Written Submissions on the 2AM-BOS and 2AM-DOS1323 Water Licence Applications, October 5, 2018.

Attachment A

Supplemental Response to Final Written Submissions on the 2AM-BOS and 2AM-DOH1323 Water Licence Applications

TMAC RESOURCES

TMAC Resources Inc.

HOPE BAY PROJECT

Supplemental Response to Final Written Submissions on 2AM-BOS and 2AM-DOS1323 Water Licence Applications

October 2018

Prepared by:

TMAC Resources Inc.
Toronto, Ontario

Citation:
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HOPE BAY PROJECT

Supplemental Response to Final Written Submissions on 2AM-BOS and 2AM-DOS1323 Water Licence Applications

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1.1 SUBJECT/TOPIC

Closure and Reclamation Planning

1.2 COMMENT

The Doris Interim Closure and Reclamation Plan has been updated to include proposed amendments, and a Conceptual Closure and Reclamation Plan has been provided for Boston. These describe how the sites will be cleaned up after the mining has finished, and they were used to develop reclamation cost estimates. Table 7 lists the comments on this topic and their status.

Table 7 Status of comment pertaining to closure and reclamation planning

Comment #	Issue	Status
R1, R2	Doris Tailings Impoundment Area	Resolved
R3, R4, R5, R6	Boston Tailings Management Area seepage	Resolved
R7, R8, R9, R10	Closure planning and requirements	Resolved
R13, R14	Long-term climate change effects	Resolved
R21	Reclamation cost estimate	Unresolved

Doris Tailings Impoundment Area: R1 and **R2** are about plans for closure of the Doris TIA. The first was about the site specific water quality objectives (SSWQO) TMAC was proposing to use after closure, and this issue has been deferred to the Aquatic Effects Monitoring Plan. The second recommendation was for field trials of the proposed cover design for closure to confirm that none of the potential issues identified would compromise its performance. TMAC has provided a discussion of potential performance issues and concluded deficiencies could be covered by the 20% contingency of the reclamation cost estimate.

Boston Tailings Management Area seepage: R3, R4, R5 and **R6** are all related to the Boston TMA closure plan which includes cover of a geomembrane under 1 m of aggregate. R3 is on the effect on arsenic loading from a 1% geomembrane failure, as will occur in the future, likely in between 100-500 years. TMAC provided a memo with modelling results of arsenic loading calculations demonstrating that even at 10% cover failure, concentrations would remain below criteria. The last three recommendations covered: the anticipated design life of the TMA components; post-closure mitigation actions that could be taken in event of non-compliant seeps; and field trials of the proposed cover design. These were addressed in TMAC's discussion of potential performance issues with mitigation measures.

Closure planning and requirements: Though adequate for the current level of project definition, the Boston Conceptual Closure and Reclamation Plan and the Doris-Madrid Interim Closure Plan do not follow many of the requirements in the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB & AANDC, 2013). The recommendations were about: following the applicable closure planning guidance (**R7**), establishing a stakeholder working group for closure planning (**R8**), defining long term post-closure maintenance and monitoring requirements (**R9**), and specifying post-closure land uses (**R10**). TMAC provided a closure design and performance uncertainties table detailing different failure modes and concluded there would be no post-closure maintenance requirements, addressing **R9**. They also committed to considering the other recommendations in future plan updates.

Long-term climate change effects: R13 sought confirmation that the geochemical source terms used to assess project impacts accounted for anticipated climate change effects, which TMAC provided. **R14** was for a sensitivity analysis projecting climate change effects 200 years post-closure using predicted climate data for 2100, because permafrost response to climate change can be delayed until cumulative thresholds are reached. TMAC stated the model response past 2100 would remain unchanged, which is due to simplifications in the thermal model used.

Reclamation cost estimate (R21): CIRNAC developed two estimates for the closure plans at Doris-Madrid and at Boston. Following discussions with TMAC and the Kitikmeot Inuit Association, we have revised the estimate. Our current reclamation costs are in Table 8 for Doris-Madrid and in Table 9 for Boston. The detailed RECLAIM spreadsheets will be submitted with this document.

Table 8 Reclamation cost estimate for Doris-Madrid

Cost Category	Total Cost ($)	Land		Water	
		%	Cost ($)	%	Cost ($)
Capital Costs					
Underground	312 868	98	306 351	2	6 517
Tailings Facility	18 850 158	50	9 425 079	50	9 425 079
Rock Pile	170 371	100	170 371	0	-
Buildings and equipment	13 641 928	91	12 346 309	9	1 295 619
Chemicals and Contaminated Soil Mgmt	2 873 934	50	1 436 967	50	1 436 967
Surface and Groundwater Mgmt	660 059	0	-	100	660 059
Interim Care and Maintenance	5 597 400	0		100	5 597 400
Subtotal: Capital Costs	***42 106 717***	*56*	***23 685 077***	*44*	***18 421 640***
Indirect Costs					
Mobilization/Demobilization	9 180 540	56	5 164 064	44	4 016 476
Post-Closure Monitoring and Maintenance	1 855 177	56	1 043 539	44	811 638
Engineering	2 105 336	56	1 184 254	44	921 082
Project Management	2 105 336	56	1 184 254	44	921 082
Contingency	8 421 343	56	4 737 015	44	3 684 328
Sub-Total: Indirect Costs	***23 667 732***	*56*	***13 313 126***	*44*	***10 354 605***
Total Costs	**65 771 118**		**36 998 203**		**28 776 246**

Table 9 Reclamation cost estimate for Boston

Cost Category	Total Cost ($)	Land		Water	
		%	Cost ($)	%	Cost ($)
Capital Costs					
Underground	60 847	100	60 847	0	-
Tailings Facility	15 195 574	50	7 597 787	50	7 597 787
Rock Pile	57 143	100	57 143	0	-
Buildings and equipment	5 313 366	95	5 070 137	5	243 229
Chemicals and Contaminated Soil Mgmt	636 123	50	318 061	50	318 061
Surface and Groundwater Mgmt	46 772	0	-	100	46 772
Interim Care and Maintenance	4 786 320	0		100	4 786 320
Subtotal: Capital Costs	***26 096 144***	*50*	***13 103 974***	*50*	***12 992 170***
Indirect Costs					
Mobilization/Demobilization	5 041 005	50	2 531 301	50	2 509 704
Post-Closure Monitoring and Maintenance	1 577 877	50	792 318	50	785 558
Engineering	1 304 807	50	655 199	50	649 609
Project Management	2 105 336	50	655 199	50	649 609
Contingency	5 219 229	50	2 620 795	50	2 598 434
Sub-Total: Indirect Costs	***14 447 725***	*50*	***7 254 812***	*50*	***7 192 913***
Total Costs	**40 543 869**		**20 358 786**		**20 185 083**

We are still in discussions on three aspects of the estimates.

1) Costs: The biggest differences between the CIRNAC and TMAC estimates are because of the duration of interim care & maintenance and post-closure monitoring. CIRNAC is looking to standardize the duration of interim care & maintenance to 5 years and post-closure monitoring to 25 years, as described in the guideline in Annex A. Since the current Doris water licence has a 1.5 year interim care & maintenance period, we are using 3 years as a transition. Our discussion with TMAC on costs is ongoing, and the difference between our estimates is approximately 10%.

2) Land-water split: The Kitikmeot Inuit Association is looking to hold security for what they consider predominantly land liabilities, which would leave CIRNAC to hold water related liabilities. There are significant differences between the Kitikmeot Inuit Association's and CIRNAC's land-water allocations, principally due to how the tailings reclamation costs are distributed. Rational for the landwater split used by CIRNAC is provided in Annex B.

   If the site were to be abandoned, CIRNAC's reclamation efforts would be in collaboration with the Kitikmeot Inuit Association. Security would be accessed following the Mine Site Reclamation Policy for Nunavut (INAC, 2002).

   Discussions are also ongoing with the Kitikmeot Inuit Association regarding the land-water split.

3) Phased bonding: TMAC has proposed posting security in phases for both projects. The current proposal has 6 phases for Boston and 15 for Doris-Madrid. Some concerns we are presently discussing with TMAC are:

   - There are too many phases. With the current project schedule 1-4 phases would be posted each year, with the possibility for more. This is an administrative burden and might lead to re-evaluations of security more frequently than necessary as different people handle the file. We would recommend limiting changes to posted security once per year by lumping together phases in that year's workplan, and believe this would not pose undue constraints given the advanced planning necessary for each phase.
   - Mobilization, interim care & maintenance, and post-closure monitoring costs need to be in the first phase for each licence. These costs will be necessary almost in their entirety once the project is started, so it is not logical to distribute them proportionally.
   - Dividing the tailings reclamation costs according to the tonnage deposited as proposed would require further work. For the Boston TMA, we have spoken about how the stacking of tailings could be done in cells or areas, so that only the proportion of the footprint for which security was held was being used. This would require modifying the Boston Tailings Management Area – Operations, Maintenance and Surveillance Manual and possibly the Conceptual Closure and Reclamation Plan, as well as clearly delineating the areas on the ground

so Inspectors could identify them. Similarly, at Doris, markers allowing Inspectors to assess what surface area extent of the TIA was secured were discussed.

CIRNAC agrees with the principle of phased bonding and continuing discussions should allow us to come to an agreement.

1.3 TMAC RESPONSE TO CIRNAC-8

TMAC appreciates the additional comment provided by CIRNAC and confirms that it intends to continue discussions with CIRNAC and KIA on reclamation and financial security matters. As part of this submission, TMAC wishes to address to some extent some of the specific outstanding matters referred to by CIRNAC in their submission.

Remaining Cost Differences

The remaining cost differences for the Doris- Madrid and Boston Projects are summarized in Table 1. These differences are expressed as the percentage to which the current CIRNAC closure and reclamation costs exceed those of TMAC.

Table 1. Remaining Cost Differences

Cost Category	Doris-Madrid Project	Boston Project
Direct Costs	8.6%	11.3%
Indirect Costs	6.7%	12.7%
Total Costs	7.9%	12.3%

Under the Direct Costs category for both projects the remaining outstanding differences is made up of four primary classes, i.e. rounding errors, unsupported unit rates/quantities, contaminated soil management and Interim Care and Maintenance (ICM). Rounding error differences are small (0.01%) and were determined to exist because CIRNAC rounded TMAC unit rates and quantities in their estimate. Unsupported unit rates/quantity differences amount to about 0.8%, and exist because there remains disagreement between TMAC and CIRNAC regarding certain closure activities and the approach to its costing. TMAC maintains that their first principles approach is well substantiated as it is based on project-specific costs, productivities and experiences. CIRNACs approach does not appear to be as rigorous as they chose to adopt standard RECLAIM rates and/or 'default' allocations.

CIRNAC maintains that the closure estimate should include costs for Phase 1 and Phase 2 site assessments, and this results in a cost differential for each project of about 0.3%. The objective of Phase 1 and Phase 2 site assessment is to determine potential areas of contamination. TMAC is of the opinion that such investigations are not required for a project such as Hope Bay that is regulated in Nunavut. This is because TMAC is legally obliged to document in detail (including locations), report to multiple regulatory bodies,

and immediately remediate as appropriate, all spills or potential contamination. CIRNAC and KIA Inspectors, in addition to various other agencies, formally inspect the site repeatedly every year, as well as after spills have been reported, to ensure this is being done and TMAC is in compliance with its obligations. Furthermore, TMAC operates an extremely robust environmental monitoring program with a main objective to determine, as soon as possible, if any contamination or unexpected findings occur during project operations. The design of the monitoring program is reviewed continually, including by the NWB, CIRNAC and KIA, and results are provided to all parties for scrutiny and comments. As a result, determining location and extent of contamination sources, which is the focus of Phase 1 and Phase 2 site investigations, is not necessary and as a result TMAC does not agree that such costs should be allowed for.

Interim Care and Maintenance (ICM) makes up the biggest part of the remaining Direct Cost differences for each project at 4.4% and 6.4% respectively for Doris-Madrid and Boston Projects. This differential is as a result of CIRNACs desire to 'standardize' the duration of ICM to 3 years vs. the 1.5 years proposed by TMAC. TMAC appreciates the rationale behind CIRNACs desire to standardize. TMAC is however concerned that standardization of the duration alone is not appropriate and this policy change has not been fully thought through. Standardization should also include the components and activities that fall within the ICM cost category. For example, about one third of TMACs ICM costs consist of mobilization costs for a dedicated, completely independent, ICM fleet based on a CIRNAC requests during Phase 1 estimate development. This cost, to mobilize a dedicated and completely independent ICM fleet and not use existing equipment on site, is not included in any of the other current Type A Water Licenced Projects in Nunavut. Furthermore, even excluding the mobilization costs, TMACs annual ICM costs far exceeds that of all other Type A Water Licenced Projects in Nunavut (approximately three times greater), yet TMAC is a small underground mine with no surface waste rock at closure, compared to other larger open pit operations with massive waste rock dumps and known liabilities at closure. Therefore TMAC maintains that the total quantum allowed for under ICM in TMAC's estimate is appropriate, especially when compared to other projects where CIRNAC has previously accepted much lower ICM allocations for projects with much larger potential liabilities.

The differences in the Indirect Cost category is primarily associated with Post-Closure Monitoring and Maintenance and Project Management. Post Closure Monitoring differences amount to approximately 1% and are associated with CIRNACs desire to standardize the post closure monitoring to 25 years, as well as not allowing for any discount rate to be applied. Once again, TMAC appreciates CIRNACs rationale for wanting to standardize. TMAC however believes that post-closure monitoring should be evaluated on a project specific basis and should not be standardized across all Type A Water Licences for any project in Nunavut. TMACs projects allows for walk-away conditions and the proposed 10 year monitoring program is designed to demonstrate that without the need to continue monitoring. CIRANC has not produced any evidence

to date that refutes this position in relation to TMAC's projects and rather, suggests only the rationale is that this is a 'policy' decision.

Project Management differences amounts to 0.3% for the Doris-Madrid Project and 1.3% for Boston Project. TMAC has calculated this cost based on first principles which includes a detailed time schedule for implementation of the closure plan. Therefore TMAC believes that the quantums proposed are justified. In contrast, CIRNAC has made no attempt to quantify this but rather applies an arbitrary percentage for this cost with the rationale it is the 'default' in the RECLAIM model. Considering the fact that CIRNAC has accepted TMACs implementation schedule in the cost estimate, TMAC does not believe that CIRNACs arbitrary percentage approach is appropriate and preferable to assumptions based on project-specific activities, productivities and experiences.

Land/Water Split

TMAC is committed to assisting CIRNAC and KIA in coming to an agreement on the Land/Water split of the closure and reclamation bond. TMAC considered the following general guiding principles in its recommendation with regard to the proposed Land/Water split of the closure and reclamation bond:

- For any closure component, an allocation towards Water was made considering the primary likelihood of ongoing direct impact to any water bodies of the closed facility. In this allocation it is recognized that indirectly, you can make the argument that any facility could potentially impact water bodies when one considers overland runoff, but in many cases the likelihood of any direct impact may be low and the allocation should be based on the greater perceived risk to Land or Water to help ensure a efficient and effective reclamation execution (explained further in the next bullet).

- Considering that the bonds for Land and Water components will be held by different parties, no individual closure component was split between Land and Water, as that would render it impossible for either bond holder to effectively or efficiently close that component. Judgement was used to allocate 100% of that closure component cost to either Land or Water. As an example:

    - The graded roads and pads are allocated to Land as there are no geochemical or water quality concerns associated with these features.

    - The Doris Tailing Impoundment Area (TIA) closure cover is an isolation cover as there are no geochemical or water quality concerns associated with these tailings. Although runoff from this cover will drain into Doris Lake, the primary purpose of this cover is to restore the Land and its use. As a result, 100% of this cover cost has been allocated to Land.

    - In contrast, the primary function of the Boston Tailings Management Area (TMA) is to reduce infiltration such that there would not be any poor-quality leachate

emanating from the facility post-closure. Therefore, the primary purpose of that cover system is to protect Water, and as a result 100% of that cover has been allocated to Water.

TMAC considers this approach practical, as it is clear to the parties involved as to which components of the closure they hold the security bond. This would allow for closure to be executed independently should there ever be a need to do that, but would also not preclude a collaborative effort between parties.

Phased Bonding

Considering the staged development of Phase 2, TMAC is proposing a phased bonding approach to financial security. This phased bonding will be based on predetermined "tranches" of the closure and reclamation cost estimates with specific triggers.

Based on the tranches and triggers described below, the expected tranche schedule based on the expected Hope Bay Phase 2 Project Execution Schedule is provided in Figure 1. It is important to note that the triggers for tranches are tied to execution milestones and not specific dates. This figure shows what the tranche schedule would be, should the Phase 2 Project be executed as per the expected schedule. Actual project development may differ from this expected schedule and as such the tranche schedule would move in parallel.

CIRNAC is concerned that the number of tranches proposed would result in an administrative burden; however TMAC contends that the bulk of the administrative burden rests with TMAC. Notwithstanding this, when evaluating the breakdown as illustrated in Figure 1, TMAC would logically consolidate the administrative management of tranches should it become apparent that some would be triggered within months of each other.

Boston Project Tranches

The proposed tranches and their associated triggers for the Boston Project are described in Table 2, and the allocation of the closure and reclamation costs in accordance with these tranches are provided in Table 3.

Table 2: Proposed Tranches and Triggers for Phasing of the Boston Project Closure and Reclamation Cost Estimate

Tranche	Trigger
Mining	60 days before starting any commercial mining of ore greater than extracted for the bulk sample.
Tailings	60 days before commissioning the processing plant and producing filtered tailings (including the pre-commissioning period), 35% of this tranche is triggered. The next installment of another 35% of this tranche is triggered 60 days before the total amount of tailings in the Boston TMA exceeds 1.7 million tonnes. The final 30% of this tranche is triggered 60 days before the total amount of tailings in the Boston TMA exceeds 3.4 million tonnes.
Earthworks	60 days before starting any earthworks related to the Boston Project such as quarries, roads, pads or the airstrip.
Buildings	60 days before erecting any of the major permanent infrastructure such as workshops, camp, tank farm, power plan, mill building, etc.

Direct costs will be assigned in accordance with the chosen tranches, but the Indirect costs will be fiscally prorated in accordance with the ratio of each tranche against the total Direct cost. In accordance with this recommended approach, the total Boston closure and reclamation bond would be submitted in four (4) installments in accordance with the recommended triggers.

Table 3: Proposed Phased Bonding Amounts for the Boston Project

Tranche	Percentage of Direct Costs
Mining	2.9%
Tailings	67.6%
Earthworks	3.0%
Buildings	26.5%
TOTAL	**100%**

The Boston Tailings Tranche is separated into three stages. The stage triggers allow for a subdivision of the total tranche amount based on the total amount of tailings being placed relative to the overall proposed Phase 2 tailings volumes proposed for the Phase 2 Hope Bay Project. The rationale for this subdivision is based on the fact that the closure and reclamation cost associated with the tailings tranche is proportional to the surface area of the Boston Tailings Management Area at any given period in the project life that is exposed and would require a closure cover. This surface area in turn is proportional to the total amount, i.e. tonnage of tailings deposited.

The proposed Boston Tailings Tranche Stages are described below and in Table 9.

- 60 days before commissioning the processing plant and producing filtered tailings (including the pre-commissioning period), Stage 1 of the Boston Tailings tranche is triggered (35% of the total Boston Tailings tranche).
- Stage 2 of the Boston Tailings Tranche is triggered (35% of the total Boston Tailings tranche) is triggered 60 days before the total amount of tailings in the Boston TMA exceeds 1.7 million tonnes (1/3rd of the total planned 5.1 million tonnes).
- The final Stage 3 of the Boston Tailings Tranche is triggered (30% of the total Boston Tailings tranche) is triggered 60 days before the total amount of tailings in the Boston TMA exceeds 3.4 million tonnes (2/3rd of the total planned 5.1 million tonnes).

Table 4: Breakdown of the Boston Tailings Tranche Rationale

Category	Stage 1	Stage 2	Stage 3
Cumulative Tailings Tonnage (million tonnes)	1.7	3.4	5.1
Fraction of Tailings Tonnage (%)	33%	33%	33%
Tailings Surface Area (square kilometers)	0.07	0.13	0.20
Fraction of Surface Area (%)	35%	70%	100%

Management of the Boston Tailings Management Area can be intentionally adjusted to meet specific surface area targets for a given tonnage. This will be done by setting the defined maximum surface footprint areas for the three trigger stages for the Boston TMA during detailed engineering that correspond to the proposed trigger levels.

Doris-Madrid Project Tranches

Table 5 summarizes the proposed tranches and their associated triggers for the Doris-Madrid project. The allocations associated with these tranches are provided in Table 6.

Direct costs will be assigned in accordance with the chosen tranches. Indirect costs, except for Mobilization/Demobilization, will be fiscally prorated in accordance with the ratio of each tranche against the Direct cost. Mobilization/Demobilization is split between the Phase 1 tranche and the Doris-Madrid Tailings tranche, with an overall weighting in favor of Phase 1. This is because the closure duration is predominantly defined by the time to cover the tailings, and once Madrid North is fully developed and tailings production increases the closure execution duration increases.

In accordance with this recommended approach, the total Doris-Madrid closure and reclamation bond would be submitted in seven (7) installments in accordance with the

recommended triggers. The first installment, which is Phase 1 has already been submitted as part of the current approved Phase 1 Doris North Project.

Table 5: Proposed Tranches and Triggers for Phasing of the Doris-Madrid Project Closure and Reclamation Cost Estimate

Tranche	Trigger
Phase 1	All infrastructure and activities associated with Doris Phase 1, including the Doris-Windy all-weather road, old windy camp and old Patch Lake.
Roberts Bay	60 days before starting any infrastructure associated with the Roberts Bay Cargo Dock including the Tank farm, access roads and laydown areas
Boston All-Weather Road	60 days before starting any infrastructure associated with the Boston all-weather road.
Wind Turbines	60 days before erecting any of the six (6) wind turbines, one sixth of this tranche is triggered.
Madrid North	60 days before starting any earthworks related to the Phase 2 Madrid North site such as quarries, roads or pads. OR, 60 days before starting any commercial mining more than ore extracted for the bulk sample.
Madrid South	60 days before starting any earthworks related to the Phase 2 Madrid South site such as quarries, roads or pads. OR, 60 days before starting any commercial mining more than ore extracted for the bulk sample.
Tailings	See below

Table 6: Proposed Phased Bonding Amounts for the Doris-Madrid Project

Tranche	Percentage of Direct Costs
Phase 1	49.5%
Roberts Bay	1.0%
Boston All-Weather Road	1.1%
Wind Turbines	9.3%
Madrid North	7.7%
Madrid South	2.3%
Tailings	29.1%
TOTAL	**100%**

The Doris-Madrid Tailings Tranche is separated into five phases. As described above for the Boston Tailings tranche staging, the phase triggers allow for a subdivision of the total tranche amount based on the total amount of tailings being placed relative to the

overall proposed Phase 2 tailings volumes proposed for the Phase 2 Hope Bay Project and the associated surface area of tailings.

The Doris-Madrid Tailings Tranche is separated into five (5) Phases, Phase 1 for the Phase 1 tailings and four equal Phases for the Phase 2 tailings; Phases 2a, 2b, 2c and 2d. Phase 1 tailings is based on 2.5 million tonnes of tailings deposition. The total minimum amount of Phase 2 tailings planned for deposition in the Doris TIA is 10.4 million tonnes, therefore each of Phases 2a-2d incorporate the addition of 2.6 million tonnes (25% of 10.4 million tonnes).

The proposed Doris-Madrid Tailings Tranche Stages are described below and in Table 7. Note, Table 7 shows the proportions of each phase relative to the total tailings tranche. The below descriptions break the Phase 2 phases into proportions of Phase 2 for clarity.

- The Phase 1 tailings security is already posted (40% of the total Doris-Madrid Tailings tranche).

- 60 days before the total amount of tailings in the Doris TIA exceeds 2.5 million tonnes (Phase 1 total tailings tonnage), Phase 2a of the Doris-Madrid Tailings tranche is triggered (25% of the total Doris-Madrid Phase 2 Tailings tranche).

- 60 days before the total amount of tailings in the Doris TIA exceeds 5.1 million tonnes (25% of the minimum Phase 2 total tailings tonnage, plus the Phase 1 tailings tonnage) Phase 2b of the Doris-Madrid Tailings tranche is triggered (25% of the total Doris-Madrid Phase 2 Tailings tranche).

- 60 days before the total amount of tailings in the Doris TIA exceeds 7.7 million tonnes (50% of the Phase 2 total tailings tonnage, plus the Phase 1 tailings tonnage) Phase 2c of the Doris-Madrid Tailings tranche is triggered (25% of the total Doris-Madrid Phase 2 Tailings tranche).

- 60 days before the total amount of tailings in the Doris TIA exceeds 10.3 million tonnes (75% of the Phase 2 total tailings tonnage, plus the Phase 1 tailings tonnage) Phase 2d of the Doris-Madrid Tailings tranche is triggered (25% of the total Doris-Madrid Phase 2 Tailings tranche).

Table 7: Breakdown of the Doris-Madrid Tailings Tranche Rationale

Category	Phase 1	Phase 2a	Phase 2b	Phase 2c	Phase 2d
Tailings Volume (million tonnes)	2.5	2.6	2.6	2.6	2.6
Cumulative Tailings Volume (million tonnes)	2.5	5.1	7.7	10.3	12.9
Fraction of Tailings Volume (%)	19%	40%	60%	80%	100%
Tailings Surface Area (square kilometers)	0.44	1.01	1.30	1.42	1.70
Fraction of Surface Area (%)	26%	59%	76%	84%	100%
Tranche Category	Phase 1	Phase 2 Tailings (25%)	Phase 2 Tailings (25%)	Phase 2 Tailings (25%)	Phase 2 Tailings (25%)

Overlapping of Class A and Class B Water Licence Bond Amounts

Figures 2, 3 and 4 provides and illustration of the footprint areas of the approved Madrid North, Madrid South and Boston Type B Water Licences compared against those of the Phase 2 Doris-Madrid and Boston Projects. These figures clearly illustrate that 100% of the Type B Water Licence footprints are consumed by the Phase 2 Project. Therefore the Phase 2 Closure and Reclamation cost estimates proposed by TMAC accounts for reclamation of 100% for the Type B licence infrastructure.

The only difference between the Type B and the Phase 2 closure and reclamation cost estimates involves the closure activity associated with waste rock at Madrid North and Madrid South, and the closure activity associated with ore stockpiles at Boston. For the Type B licences waste rock remains on surface at closure and therefore the cost estimate includes covering of the waste rock piles with a geomembrane cover. Likewise, the Boston Type B bond includes an allowance to consolidate and cover the existing ore at the project site. For the Phase 2 closure cost estimate none of these closure activities are required as all ore would be processed and all waste rock would be deposited underground.

Therefore TMAC believes that if the Type B activities at Madrid North or Madrid South is started before Phase 2, then the Type B bond should be triggered as normal. However, when Phase 2 development starts the posted bond amounts should be credited against the already posted Type B bond until the Phase 2 bond amount starts to exceed the already posted amount. This would avoid double bonding and is reasonable as the Phase 2 developments consume the Type B developments. The one exception is that

until Phase 2 commercial mining development is triggered, the Type B bond amount associated with covering the waste rock pile with a geomembrane should remain in place over and above the Phase 2 bond as until that time there may be room for underground disposal of waste rock.

Likewise, posting of the Phase 2 Boston bond should be discounted against the already posted Boston Type B bond, until that amount is exceeded. Furthermore, for as long as the existing 10,000 tonnes of ore at Boston remains on site, the bond amount associated with consolidation and covering of the ore should remain in place over and above the Phase 2 bond.

Figures

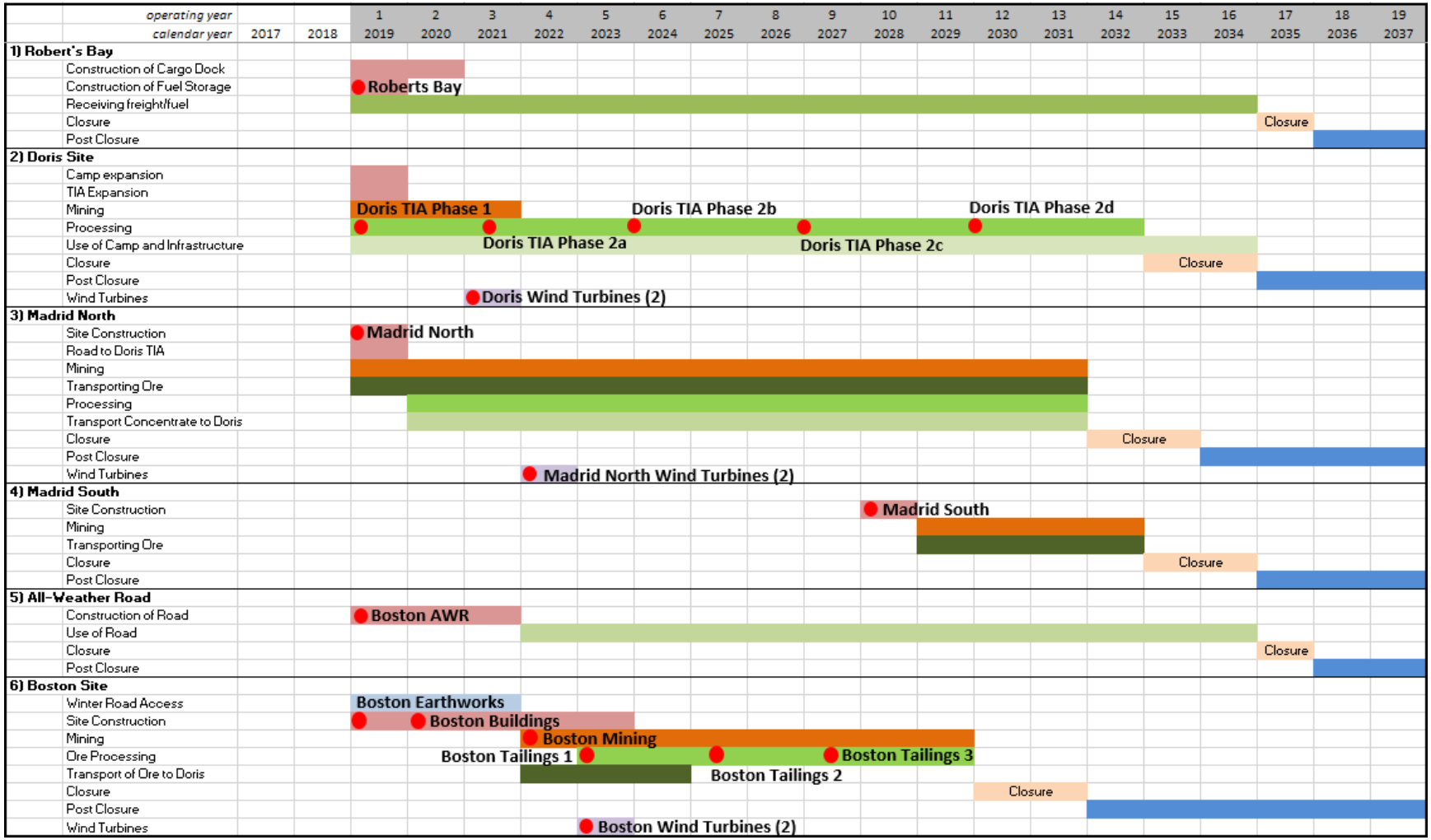
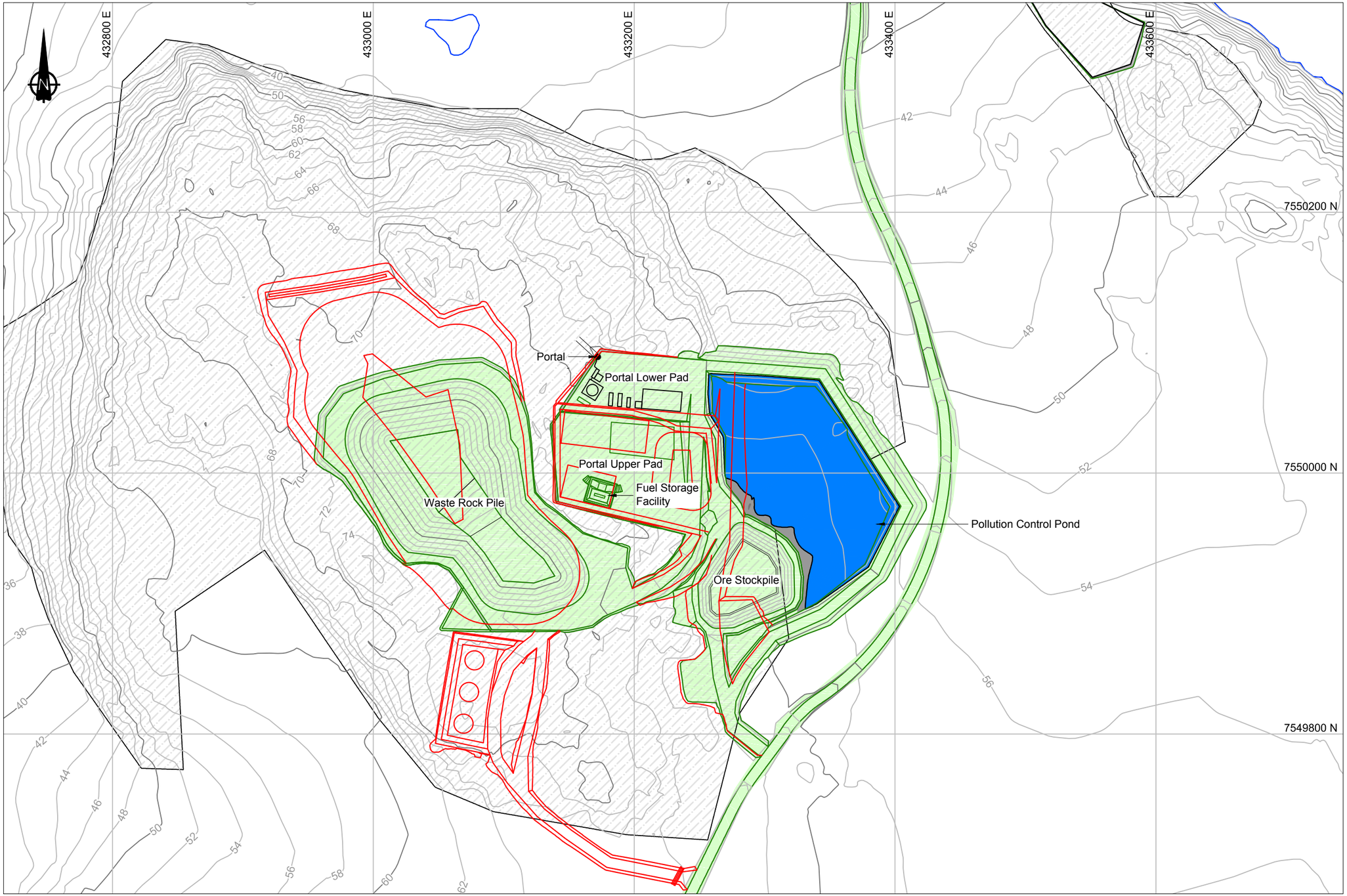


Figure 1: Expected Staged Bonding Schedule



LEGEND

- Type A Infrastructure
- Type B Infrastructure
- Quarry Location
- Shared Footprint

NOTES

1. Contours shown at 2.0m intervals.
2. All dimensions in meters unless otherwise stated.
3. Infrastructure on pads shown in black is the same for both Type A and Type B Infrastructure layouts.

REFERENCE

NAD83 UTM Zone 13.

Engineering drawings for the Madrid South All-Weather Road, Hope Bay Project, Nunavut, Canada. Issued for Discussion. Revision D. Project no. 1CT022.001. October 31, 2014.

Engineering drawings for the Madrid North Bulk Sample Surface Infrastructure, Hope Bay Project, Nunavut, Canada. Issued for Discussion. Revision B. Project no. 1CT022.001. November 1, 2016.

Engineering drawings for the Madrid North DEIS Surface Infrastructure, Hope Bay Project, Nunavut, Canada. Issued for Discussion. Revision B. Project No. 1CT022.013. November 16, 2017.

0m 30 60 90 120

srk consulting

SRK JOB NO.: 1CT022.030

FILE NAME: 1CT022.030 - Bulk Sample Infrastructure.dwg

TMAC RESOURCES

Hope Bay Project

Bulk Sample and Phase 2 Infrastructure

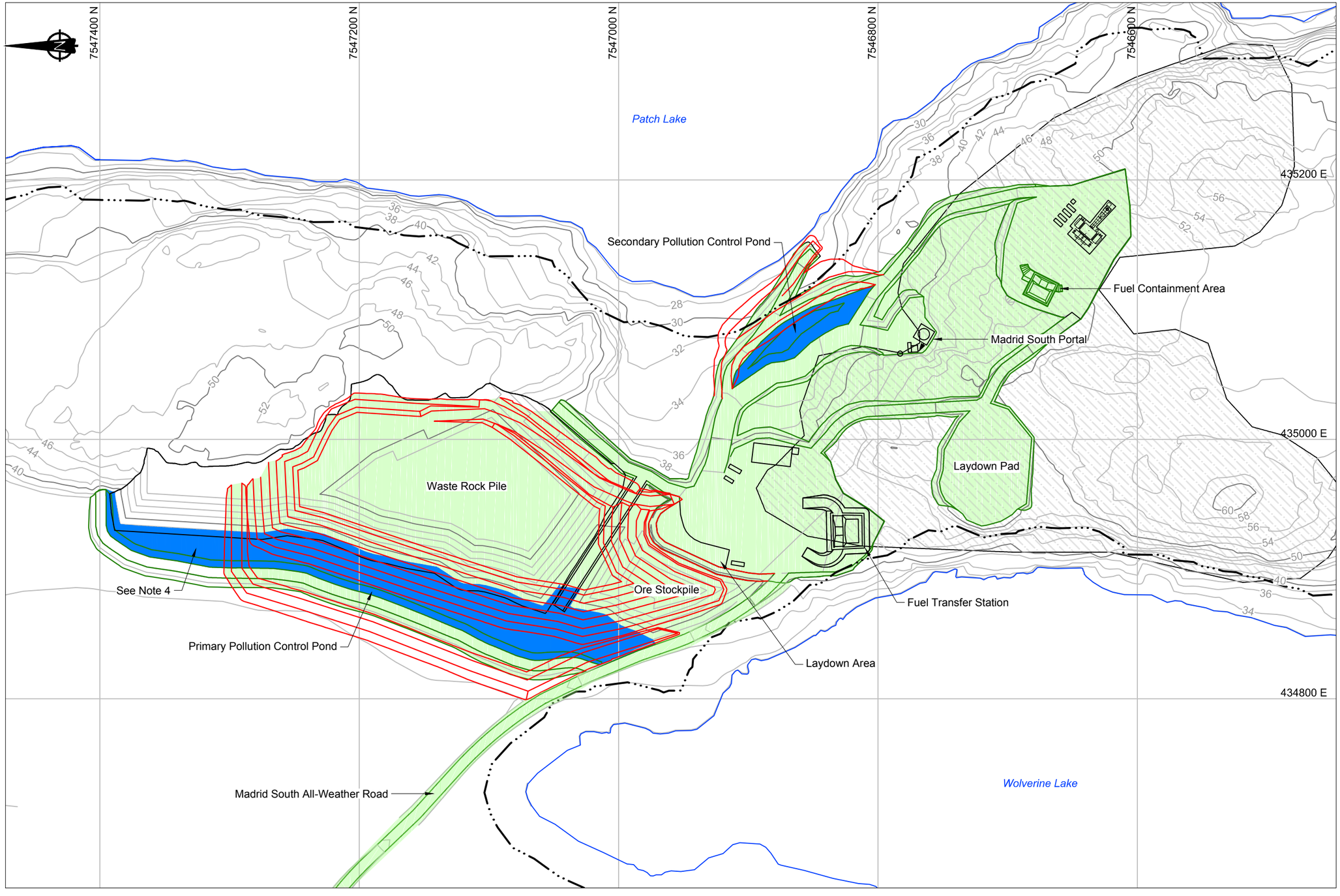
Madrid North Site Layout

DATE: October 2018

APPROVED: EMR

FIGURE: 2

P:\01_SITES\Hope Bay\ACAD\2018 Drawings\1CT022.030 - Bulk Sample Infrastructure.dwg



LEGEND

- 31m Lake Buffer
- Type A Infrastructure
- Type B Infrastructure
- Quarry Location
- Shared Footprint

NOTES

1. Contours shown at 2.0m intervals.
2. All dimensions in meters unless otherwise stated.
3. Infrastructure on pads shown in black is the same for both Type A and Type B infrastructure layouts.
4. Type B Contact Water Pond Design has been optimized during later design efforts for Phase 2. The optimized design meets the requirements for Type B and as such this portion would not be constructed.

REFERENCE

NAD83 UTM Zone 13.

Engineering drawings for the Madrid South All-Weather Road, Hope Bay Project, Nunavut, Canada. Issued for Discussion. Revision D. Project no. 1CT022.001. October 31, 2014.

Engineering drawings for the Madrid South Surface Infrastructure, Hope Bay Project, Nunavut, Canada. Issued for Minor Edits. Revision G. Project no. 1CT022.001. October 31, 2014.

Engineering drawings for the Madrid South Surface Infrastructure, Hope Bay Project, Nunavut, Canada. Issued for Discussion. Revision J. Project no. 1CT022.013. October 23, 2017.

0m 30 60 90 120

srk consulting

SRK JOB NO.: 1CT022.030

FILE NAME: 1CT022.030 - Bulk Sample Infrastructure.dwg

TMAC RESOURCES

Hope Bay Project

Bulk Sample and Phase 2 Infrastructure

Madrid South Site Layout

DATE: October 2018

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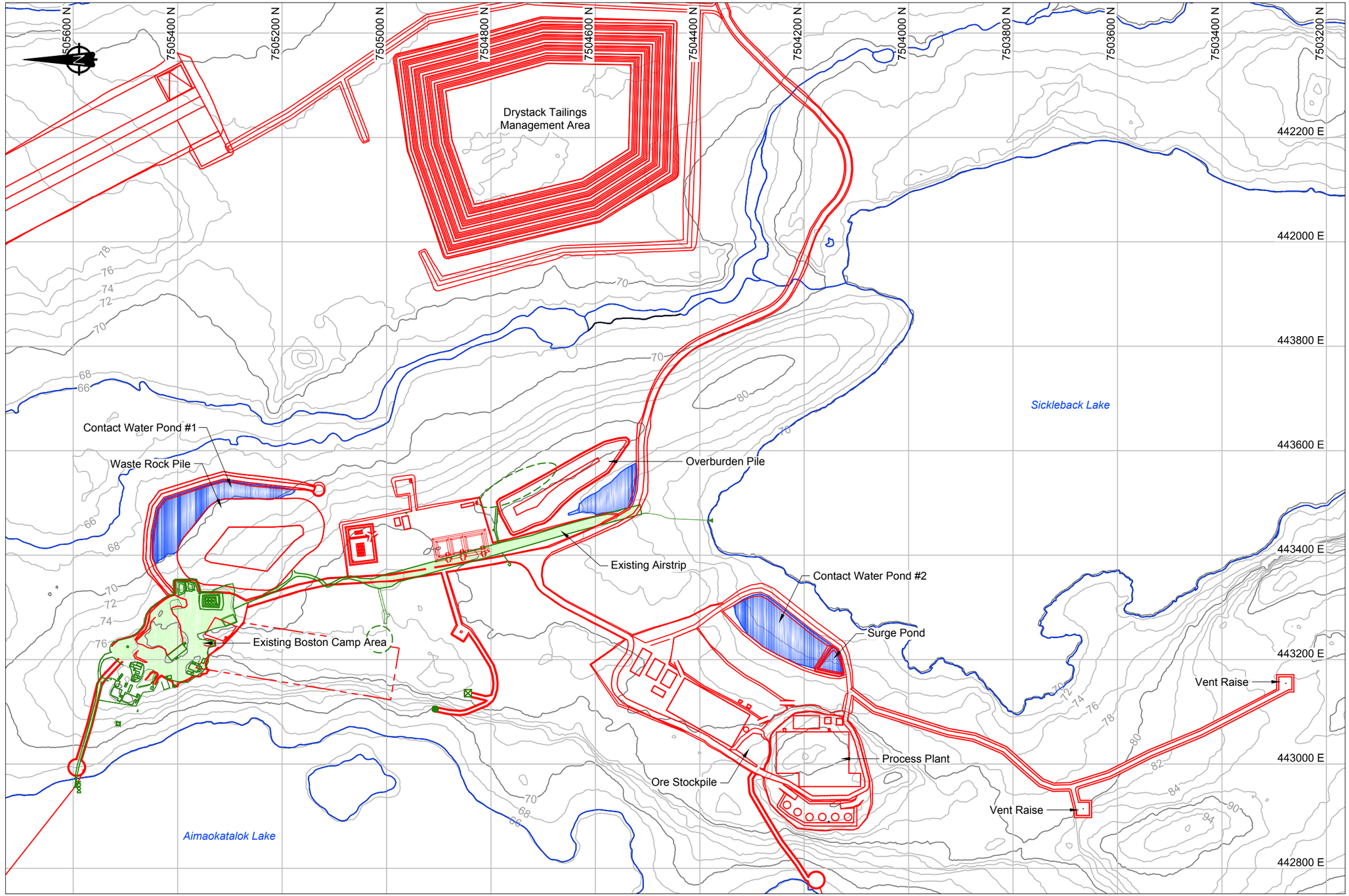
FIGURE: 3

P:\01_SITES\Hope Bay\ACAD\2018 Drawings\1CT022.030 - Bulk Sample Infrastructure.dwg



LEGEND

- Type A Infrastructure
- Type B Infrastructure
- Shared Footprint

NOTES

1. Contours shown at 2.0m intervals.
2. All dimensions in meters unless otherwise stated.

REFERENCE

NAD83 UTM Zone 13.

0m 50 100 150 200 250 300

srk consulting

TMAC RESOURCES

Hope Bay Project

Bulk Sample and Phase 2 Infrastructure

Boston Site Layout

SRK JOB NO.:	1CT022.030
FILE NAME:	1CT022.030 - Bulk Sample Infrastructure.dwg

DATE:	APPROVED:	FIGURE:
October 2018	EMR	4

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