To:	John Berry - TiGa Minerals
C.C.:	Robert Brand, Brian Rodrigues;
Date:	28 August 2023
From:	Tom Lawson
Subject:	Process water treatment
Job No.	2019 – TiGa BJV

Dear John,

From email exchanges, phone calls and meetings with you and your consultants Zeb, Graham and Luke, the issue of water mixing from Collins and Canoe Creeks is understood to be a problem. That is, when the water flows are low in the Collins creek, TiGa had planned to use water from Canoe Creek as additional water into the usual source path for the mine including the ingress water flow to the mine void.

TiGa has reviewed the situation and considered alternatives for the site. From this, the preference is to use water from the site process water ponds as make up water into the water supply to the site. This would effectively recirculate some of the water back to Collins Creek to supplement some of the water source into the mine site. The water to be used is from pond 2 (clean water) source near to the operating WCP. This water will need to maintain a low TSS/Turbidity, which has not been selected for certain, but likely to be 20mg/l maximum achieving an NTU of approximately 5 or visually clear. It is understood that a preferred level of <10mg/l may be required ultimately and is considered herein also.

IHC Mining have developed a high-level concept for improving the process water quality from pond 2 of the Barrytown project site by removing suspended solids.

Conceptual Process Design

The current MUP and WCP site operations receive water ingress at the mine void. There is also dirty water from the MUP desliming circuit and the WCP concentration processes. These dirty (slime containing) streams go to Pond 1 near the WCP where flocculant is added to settle out the solids and via various cells create a cleaner water which overflows into pond 2 also near the WCP. In pond 2, excess water to that required to supply the site process operations was to overflow into the drain along the western side of the site to flow down to the other ponds (3 and/or 4) in the North-West corner of the site.

As part of the existing MUP/WCP design, water is pumped from pond 2 back to process water tanks near the WCP when the MUP is not operating at approximately 100m3/h (28l/s) which is returned to the mine void with the tailings return line. During the same MUP off time, pond 2 overflows to the drain system at approximately 200m3/h (~55l/s). This excess of water is from ingress at the mine void.

When the MUP is on, the water from pond 2 to the WCP stops as it is routed via the MUP feed to the WCP. However, the pond 2 overflow to the drainage system is approximately the same 200m3/h (~55l/s).

If the ingress at the mine void is higher, the pond 2 overflow would also be higher and roughly in proportion to this ingress flowrate.

For this solution, concept, we would increase the pumping rate from pond 2 to the process water tanks to prevent pond 2 overflow in most cases. The Process Water tanks would overflow into a new to process water clarifier or filter which removes solids down to the desired TSS or Clarity requirements provided by the hydrologist. The clean water can be redirected back to the site drain or other location as agreed. The sludge

of solids formed in this system will be pumped to the tailings bin in the WCP for disposal back into the mine void with the plant tailings. Figure 1 outlines the steps suggested here with some clarity in the following text.

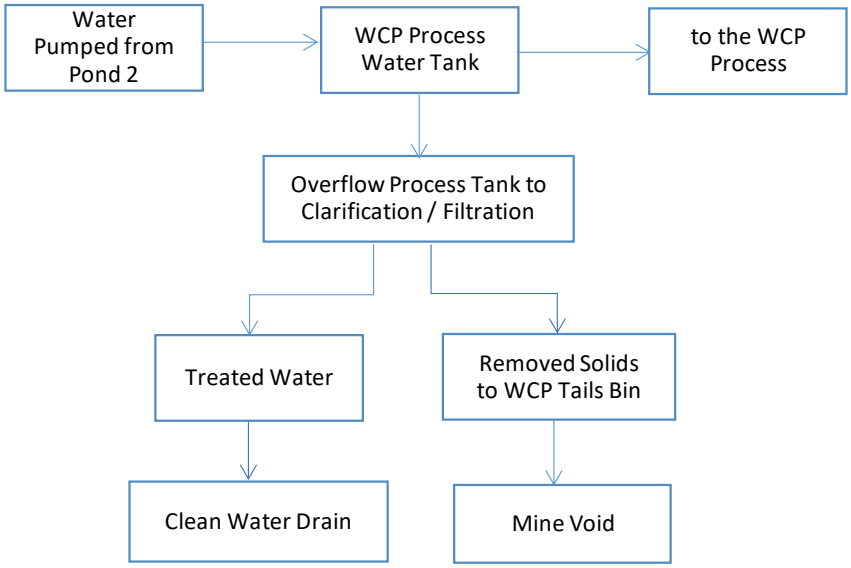


Figure 1: Process water treatment block flow diagram

Water from Pond 2

The current design has a pump sized to bring water from pond 2 for use in the process when the MUP is not operating. This pump will be increased in size or an additional pump added to prevent water overflow by returning excess to the process water tanks.

Process Water Tank

The process water tank will deliver water to the WCP and MUP as per the design. However, the overflow that used to go to pond 1 will have the option to go to the clarifier/filter when the water is dirty enough to require further treatment.

Clarification / Filtration

The water to be treated will be pumped or gravity fed to the clarifier or filtration plant. IHC envisions a packaged plant, where the main process equipment, piping and valves and other ancillaries are installed on skids.

One treatment option consists of several clarifiers which receive the process water and promote the settling of the suspended solids targeting a TSS of 20mg/l. The clear water is discharged from the clarifiers, and the solids are pumped to the WCP tails bin, for disposal back in the mine void.

An alternative option for lower TSS levels consists of sand filters or membrane filters (similar to pool filters). After collection, the process water is pumped to filters connected to a common manifold. The process water is pumped through the filters, and clean water is discharged to a common manifold. The suspended solids are captured inside the filters. Periodically, the filters are back flushed with process water to remove the captured solids and transport them to the WCP tails bin, for disposal back in the mine void.

Treated Water Discharge

Once treated, the clean water is laundered (by gravity) to the clean water drainage trenches, and drains to the site clean water discharge point. This could be an alternative location and pumped if necessary which can be further clarified in the FEED stage of the project.

Removed Solids Discharge

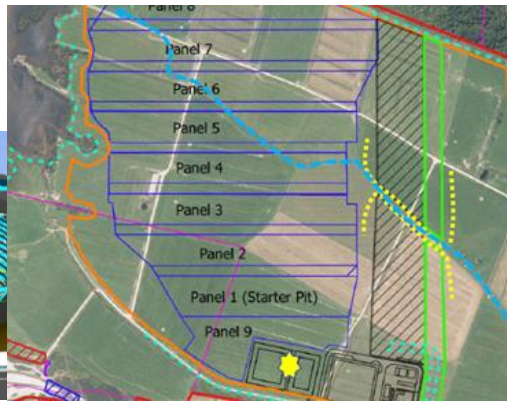
Once captured, the suspended solids are pumped back to the WCP tails bin and pumped to the mine void with the WCP tails.

Conceptual Equipment List

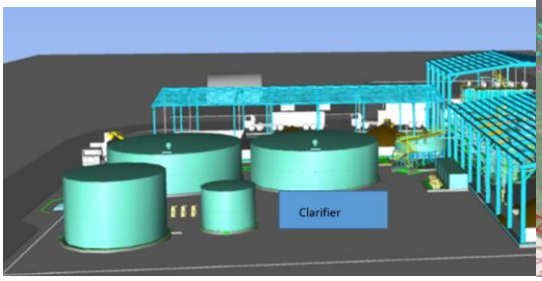
Equipment	Description	Function
Process water pump pond 2 to Process water tank	Vertical spindle pump or submersible pump	Transports process water from clean water pond to process water tank.
Clarifiers	Lamella clarifiers or similar	Used to separate the suspended solids from the process water.
Water filters	Sand or multimedia filters	Used to separate the suspended solids from the process water, as an alternative to clarifiers.
Underflow pump	Centrifugal pump	Transports captured solids to WCP Tails bin.
Clean Water Pump	Centrifugal pump	Transports clean water back to pond 2, site drainage or process water tank as required.

Site Layout Concept

The adjacent site picture shows the WCP and Pond 1 and 2 locations at the Site. The additional water pump will be located approximately where the yellow star is shown to return clean water back to the WCP Process Water.



The layout of the Process Water area of the WCP will have the clarifier added as shown to operate with the overall plant water system.



Estimated Price

Based on the likely equipment required and a factored estimate to achieve a ±30% accurate estimation of the costs to implement this water cleaning capability. It is assuming current equipment will be used or adapted where possible in the FEED stage of design.

For a flow rate of approximately 200m3/h (55l/s) of water to process, the Clarifier system will cost approximately AUD850k in additional cost. If a filter system was to be used instead of a Clarifier for lower TSS this is likely to rise to AUD1.3m.

If the water flow was to increase to 540m3/h (150l/s) the likely additional cost would be AUD1.6m for a clarifier solution and AUD2.1m for a filter solution.

The additional pumping Opex will be in the order of AUD15-35 per hour of operating the water system depending on the ultimate water flow rate that requires treatment. The annual maintenance cost additional to the plant would be AUD50k per annum.

It is not envisaged there would be a difference in the project lead time as this equipment is able to be sourced in parallel with the current plant build schedule.

Conclusion

The water cleaning is possible using conventional clarification or filtration means to achieve a nominal clean water level of TSS~20mg/l or a lower level if required. The system can effectively bolt on to the side of the WCP process plant and be bypassed to save Opex should the treatment not be required when the pond system is producing adequately clean water.

The inclusion of this system into the overall design can be captured in detail at the FEED stage by including it in the Basis of Design update for the FEED.

If you require any further information on this system, please contact us at any time.

Kind Regards,

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