

## Responses to Recommendations – First Quarter 2019 Update

Strategic Environmental Issues		Recommendations (Summary)	PTFI Response	PTFI Responsible Group	Status/Timing
Grasberg Mine Closure Program	Wanagon Overburden Stockpile	1. Finalize the Surface Mine Detailed Closure Implementation Plan as a priority. The importance of meeting the closure schedule embedded in this plan should not be understated due the adverse impacts the WOBS has on the ModADA.	The implementation plan is still under development with the Mine Closure Team and a 3 <sup>rd</sup> party contactor. The plan is scheduled to be finalized by the end of 2019.	LWOBS/WWSS Dept., Surface Mine	Q4 2019
		2. Add resources and management attention to accelerate and ensure the successful stabilization of the LWOBS to minimize sulphide and metal loads and facilitate geochemically secure conditions in the ModADA and estuary.	This is being addressed by WWSS Project.  Resources are continuing to be added to the project and a more formal organizational chart for the group will be completed in the 2 <sup>nd</sup> quarter of 2019.	LWOBS/WWSS Dept., Surface Mine	Q2 2019
		3. Address the need for increased resources required to manage the increase in geochemically unfavourable materials already depositing in the upper ModADA and passing to the estuary (i.e., mixing of deposited sediments to mitigate surface oxidizing zones, removal of	WWSS project is one of critical program that is intended to minimize pressure from Grasberg to ModADA. TRMP has implemented a geochemical management and monitoring	Regional Hydrology and ARD Group, TRMP	On-going - 2024

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		surface logs which act as localized collectors of heavy sulfide minerals, and enhanced retention of sediments currently passing to the estuary).	program to address this issue.		
		4. Effectively close the Koteka and Kaimana dumps. All dumps and piles of highly pyritic material (comprising HSZ and skarn), including any upper benches of the Kaimana dump which are outside the footprint of the Koteka dump, should be relocated to the Koteka dump and co-disposed with limestone, reshaped and covered with limestone to facilitate ARD control for closure.	Relocation plan of high pyrite content material from Kaimana to Koteka is included in the Grasberg mine closure program which is being completed.	Mine Surface, Regional Hydrology and ARD Group	Q4 2019
	Closure Water Management	1. It is recommended that settling, collection and long-term storage of neutralization sludge be further considered in the detailed facility design. The design of settling/polishing ponds for the facility should provide sufficient residence time for settling of the amorphous phases and thereby maximize containment of this material. It is important to minimize the introduction of these metal-hydroxides precipitates	This will be addressed in the next update of the Mine Closure Plan. Majority of the water coming from Surface Mine is currently diverted to the Mill for process.	Environmental	To be determined. Current Closure Plan includes contingency to construct and operate an ARD treatment plant if necessary.

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		to receiving surface waters at circum-neutral pH, as this could result in remobilization of metals to the dissolved phase with associated water quality impacts.			
		2. It is recommended that permitting issues associated with the management and storage of the neutralization sludge be considered.	This will be addressed during the next update of the Mine Closure Plan	Environmental Department	To be determined
		3. It is recommended to conduct water balance and geochemical work for surface facilities and incorporated into a site-wide post-closure water balance and water quality model. These studies will result in prediction of flow and chemistry that can better inform the need for post-closure water treatment, its duration and associated costs.	Regional hydrology is working with SRK Consultant to address this issue. Regional hydrology model has been completed and the result will be used as input for geochemistry model. A draft of this report is currently being reviewed.	Regional Hydrology and ARD Group.	Q2 2019
Underground Mining Operation	Underground ARD Waste Rock Management	1. Continue the regular updating of ARD waste rock model to confirm the actual rock geochemical characteristics, in order to improve ARD management.	A specific SOP to address potential ARD from UG waste is in place. UG Geology conducts a regular update of the ARD waste	UG Geology. ARD and Regional Geology group are working on the seepage monitoring and UG waste data	Closed

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			rock model, which is an SOP requirement.	compilation in waste dump and crushers.	
	Surface Subsidence	1. Continue the verification of subsidence model on EESS with the monitoring data. Better understanding on the subsidence process is beneficial in the subsidence prediction due to GBC operation.	<p>The verification of subsidence model on EESS is ongoing with aerial imagery, LiDAR, and InSAR data.</p> <p>PTFI is currently working in collaboration with the corporate office in Phoenix on forecasted subsidence due to GBC operation using the latest (2<sup>nd</sup> quarter 2018) GBC mining sequence.</p> <p>The regular update is provided on a quarterly basis for Subsidence on EESS.</p>	UG Geoengineering	On-going
		2. Environmental impacts of subsidence as stated in PTFI Mine Closure Plan should be continuously analyzed in detailed and action plan to support mine closure plan of the area	The Environmental Department is currently working on a detailed action plan to support the mine closure plan's stated environmental impacts. The monitoring will be included in the revision of RKL/RPL.	Environmental Department	On-going

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		3. GBC subsidence model needs to be updated and coordinated with the subsidence model developed in EESS.	PTFI is working with the corporate office in Phoenix on updating the forecasted COW-A Subsidence due to GBC and DOZ-DMLZ operation using the latest mining sequence.	UG Geoengineering	On-going
		4. Develop procedure and contingency plan to address crack lines extension to the Grasberg OBS as the failure of OBS dump will affect the environmental concern on slope failure and exposure of PAF materials.	UG GeoEngineering Division had communicated the potential subsidence zone/crack line (with providing the 2D & 3D Subsidence shapes) to Surface Mine Division.  Surface Mine Division is working on the detail action plan, procedure and contingency plan.	SM GeoEngineering, Regional Hydrology, Environmental	On-going
	Exhaust air from mine ventilation system	1. Regularly measure and document the temperature of ventilation air in exhaust tunnels and the surrounding ambient air temperature	PTFI will establish a vegetation monitoring plot near a ventilation air exhaust as part of our vegetation monitoring program in order to identify any potential impacts to the surrounding vegetation.	Environmental Department	To be determined

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	Underground mine water management	1. Ditch along AB Tunnel should be constructed properly and reduce risk due to collision by underground equipment.	The current structural design was evaluated. Improvements have already been implemented and regular inspections are conducted.	UG GeoEngineering and UG Operation	Closed
		2. The facilities such as ditch, settling pond, monitoring equipment, etc., should be prepared for the increase of quantity of underground mine water in the future when GBC and DMLZ start to operate. Total water from underground that will flow through AB Tunnel portals and MLA & DOZ pipe will increase from current water flow of 1.3 m <sup>3</sup> /s to 3.37 m <sup>3</sup> /s in the future (160% increase).	All underground discharges are monitored and the monitoring equipment is already in place.  The field study of AB Tunnel ditch actual capacity has been conducted and the results are being used to determine drainage improvements.  The MLA, DOZ, Amole and other ditches do not require any since its flow will decrease in the future.	UG GeoEngineering and UG Operation	Closed
		3. Improve the capacity of sediment and water quality control facility for underground mine water discharge (particularly from AB tunnel) with the target to meet the effluent standard for	Results of the study showed that there is inadequate space for the size of the facility needed. PTFI has agreed to implement the	Environmental, UG, CES	Closed

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		gold and copper mining operation as stated in the Decree of Minister of Environment No. 202 of 2014.	recommendations of the MoEF Road Map which addresses the mine water discharges.		
Tailing Management		1. Perform a stability analysis for the west levee from WMA-55 to WMA-117, additional geotechnical foundation condition testing (as required), and instrumentation and monitoring. Based on the results of this analysis, additional fill placement on the toe buttress or upstream construction to widen the crest of the embankment should be considered.	<p>A stability analysis for West Levee MA55-MA117 has been conducted at 5 locations with 4 locations were found with FOS of Static and Pseudo-static below criteria.</p> <p>Recommendations from the designer were downstream raising from WMA55-117 for 1m lift and Instrument installation to monitor the downstream slope of these locations. Crest widening is also considered to increase stability in this area in particular in the bulge area with ponding water directly at the upstream levee.</p> <p>Instrumentation installation plan (locations and type of instrument) is being</p>	TRMP	<p>WMA117-85 is still in need of raising. All other areas have been completed.</p> <p>Instrumentation installation to be determined.</p>

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			developed by the levee designer.		
		2. Continue the program of constructing and testing spur dikes along both the East and West levee system designed to keep the tailings river away from the levee embankment.	The 2018 Spur dike plan was completed (8 spur dikes) as planned.  Spur dike monitoring is regularly conducted to assess scouring and in planning repair works.	TRMP	Closed
		3. Develop equipment capabilities (i.e., swamp excavators) to actively re-position tailings within the ModADA to prevent uncontrollable pulses of tailings against the levee embankments which could adversely impact freeboard requirements. This effort is currently underway by PTFI.	A three-year sediment management project is currently being implemented. The swamp excavator project to mitigate ponding water per recommendation is ongoing.	TRMP	Closed
		4. Evaluate the impacts of the Wanagon OBS erosion in relationship to the increase of staining in the ModADA and coordinate the closure plan for the WOBS to reduce erosion impacts in the ModADA.	A number of evaluations have been performed to-date, including estimation of Wanagon geochemical characteristics, historic sediment deposition modeling, and	TRMP / PHX Water Resources	Closed



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			geomorphological . SOPs have been developed for geochemical sampling in the ModADA. Evaluation will continue with ongoing data collection activities part of ModADA management. Closure activities for Wanagon are being executed jointly with our design engineering contractor and Grasberg Operations performing the work.		
		5. Continue to refine tailings retention models to reflect additional flow and settlement data.	Tailings retention estimates have continued to be refined. Sediment transport modeling and topographic modeling have been performed to evaluate sediment retention in the ModADA, and occurs concurrently with the acquisition of LiDAR surveys of the ModADA.	TRMP / PHX Water Resources	Closed
		6. Seek approvals from GOI to continue levee extensions (including	Continue to communicate with GoI	Environmental Department	Q2 2019

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		river crossings) designed to further contain and retain tailings.			
		7. Evaluate reporting and management impact resulting from the designation of B3 waste for tailings in conjunction with operations and closure of the ModADA.	PTFI has submitted a letter to GoI for the exclusion of tailing as B3 wastes. PTFI believes that tailings are not B3 waste and will not be required to be managed as B3 waste. PTFI intends to manage the waste as identified and agreed upon by GoI in accordance with the AMDAL and Closure Plan.	Environmental Department	Closed
Water Quality and Quantity	Surface Water Quality	1. It is recommended to continue the stockpile/fresh ore blending strategy adopted to date and to avoid processing 100% stockpile material for the Bali stockpile.	The stockpile blending will be continued.	Surface Mine	Closed
		2. Given the potential negative effects of high sedimentation on the downstream area, including the ModADA, it is recommended that PTFI implement the closure and reclamation works for the Lower	Wanagon is undergoing construction in accordance with planning.	LWOBS/WWSS Dept., Regional Hydrology, Environmental	2024

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		Wanagon OBS with the greatest urgency.			
	Groundwater Quality	1. It is recommended that PTFI consider installation of an additional syphon at KL-28 to ensure water levels are maintained at the lower level for longer periods of time.	The first syphon was installed at KL-28 in 2016. A second syphon was installed in 2017 and is currently being modified with a lower intake.	Environmental Department	Closed
		2. Documentation of the monitoring data subsequent to installation of the trench at KL-27, and possibly addition of another syphon at KL-28, is recommended in order to facilitate a more robust assessment of the efficacy of this proposed management strategy as well as providing more representative model calibration/verification data	PTFI will continue to collect WQ data with operation of current and planned trench and syphons. A second siphon was added and will be upgraded in 2019. In 2018, the GW model for Kwamki Lakes was rerun using updated data	Environmental Department	Closed
	Stormwater Management	1. It is recommended for PTFI to conduct maintenance and/or reconstruct the constriction point adjacent to the mill to ensure the 100-year event can be accommodated in this section of the Makin Ditch. Without an upgrade to increase capacity in this section of the ditch,	PTFI conducts regular inspections of the ditch and conducts maintenance based on inspection results.  The curent ditch design can accommodate a 100-year rainfall event, which includes the use of a	UG Ground Control, Regional Hydrology	Closed

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		future flooding of the eastern area of mill is probable.	concrete road to collect overflow water if necessary.  Areas in need of improvement have already been identified and will be modified as practical.		
		2. Consideration should be given to determining the storm surge mitigation potential in the Ertsberg Pit in order to maintain the capacity (by dredging of sediments from the pit) at the required level.	Study to determine adequate sediment level within Erstberg pit has been completed	Regional Hydrology	Closed
		3. Recognizing the importance of sediment control from the DWP facility, good housekeeping practices and upset remediation practices are recommended to better manage the concentrate, restrict storage to designated containment areas, and thereby reducing the risk of loss of containment and discharge to the environment during large storm events.	Thickener, concrete floor and sump pump system are built to minimize risk of loss of containment discharging to environment.  Dedicated groups of manpower are allocated to immediate repair of slurry leak source and conveyor spillage, and clean up due to upset plant condition.	DWP  DWP	Closed  Closed

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			Reengineering of the floor sump pump piping system for improvement of handling large storm events is currently being finalized. Installation of the associated piping is expected to begin in Q4 2018	DWP	Q4 2019
Waste Management	General Issue	1. It is recommended to review and conduct analysis of hazardous waste generation vs. production trend and other waste management evaluation/review.	The analysis of hazardous waste generation vs production trend was conducted to determine their correlation. Results did not indicate any correlations.	Environmental Department	Closed
		2. Waste stream audit need to be done to update current waste stream data regarding the type, generated source and amount of hazardous waste at the PTFI operation.	A third-party consultant will conduct an updated waste stream audit to determine the types and amounts of wastes generated.	Environmental Department	Q4 2019
		3. Improve the color quality of hazardous waste symbol and conduct socialization for generated waste area to use the correct color coding of this symbol.	Environmental Department is working with SCM to purchase new labels.	Environmental Department & SCM	Q2 2019

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			Additional waste socializations addressing proper labeling were conducted and additional waste trainings will be developed as needed.		
		4. PTFI needs to conduct socialization on and implement to record the date of packaging when the hazardous waste is contained in the container at the generator waste area.	The record of hazardous waste will be improved with the revised Hazwaste Tracking System which was published on April 6 <sup>th</sup> . A socialization was provided to employees.	Environmental Department	Closed
		5. Improvement of existing COC system for waste management must be done to address some observations above. It is advised to hold a workshop session for key functions for this COC system improvement, such as Environmental Dept., SHE representative at relevant division, MIS (developer of COC software), FM representative, KPI representative and other relevant functions.	The Hazwaste Tracking System (hazwaste COC online) has been revised to ensure PTFI complies with the 90-day storage requirement in accordance with PP101/2014. Socialization of the new system to waste generators was completed.	Environmental Department	Closed

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		6. It is recommended to develop contingency plans on waste management in case of the damage of waste facilities by natural disasters (landslides or floods), permit expiration or withdrawal of authorized waste transporter, collector and processor as well as security issues for transporting waste from highland to lowland.	Contingency plans on waste management will be developed.	Environmental Department	Q2 2019
	Hazardous Waste Management (Mine Maintenance)	1. It was recommended to incorporate this waste reduction and recycling in the waste mass balance table or align with improved COC system that will include application for used oil.	Environmental Department in cooperation with MIS will develop the COC online for used oil from generation until utilization point with a function to determine total amounts of used oil generated and utilized. The COC online will incorporate waste reduction and recycling of used oil at each facility. A template was created in Q1 2019 however it has not been fully implemented.	PTFI Environmental and MIS	Q2 2019

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		2. It is necessary to ensure that the facility for waste management from underground has sufficient capacity. The capacity of temporary hazardous waste or waste transfer point in Kasuang should be evaluated to meet the future demand.	The current capacity of Kasuang Transfer Point area meets the current demand for staging hazardous waste. Upgrade of waste transfer facility is on-going by installing roofing system.	Environmental Operation Maintenance	Closed
	Hazardous Waste Management (Mill Concentrating)	1. In order to have PCB control, location of past PCB containment should be documented and equipped with monitoring wells on the upstream and downstream of possible impacted area.	PCB storage area and proper monitoring will be discussed with Geo-Hydrology. MoEF is addressing the need for PCB management nationwide which may be in operation in 2019.	Environmental Department & Geo-Hydrology	Q2 2019
		2. It is recommended to improve the consistency of utilization of COC system and to conduct random inspection by each area owner for confirmation.	The Hazwaste Tracking System (hazwaste COC online) has been revised to ensure PTFI complies with the 90-day storage requirement in accordance to PP101/2014.  Socialization of the hazardous waste storage requirements is on-going. Environmental Inspectors inspect the facilities and	Environmental Department	Closed



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			confirm hazardous wastes are being stored and disposed of in accordance with PP101/2014.		
		3. It is recommended to improve the current transfer point of hazardous waste in Mill in order to comply with Government Regulation No. 101 Year 2014 and MEMR regulation No. 18 Year 2015.	PTFI is currently improving the current transfer point of hazardous waste in order to comply with GoI regulation No. 10/2014 and MEMR No. 18.2015. AFE has been approved and project has been started.	Concentrating	Q2 2019
	Hazardous Waste Management (PJP)	1. It is recommended to have a formal handing over from the Environmental Department to PJP team to ensure that monitoring activity will be continued by the PJP team.	Currently, the monitoring is performed by PJP.	Environmental Department & PJP	Closed
		2. It is suggested to compare the hazardous waste (B3) generation with generated power, such analysis could be used for prediction of B3 generation.	Analysis to compare hazardous waste generation with generated power was conducted. We will continue to review coal consumption vs. B3 generation to see if trends continue.	Environmental Department & PJP	Closed
	Hazardous Waste	1. Report on the decommissioning of MP 38/KPI workshops and	SOP for decommissioning of facility will be developed.	Environmental Department	Q2 2019

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Management (KPI)		establishment of SOP for decommissioning are necessary.			
		2. It was recommended to refer to SOP from environment and IMO standard for spill emergency and consider the classification with the maximum amount (12,000 m3) of diesel.	SOP for Environmental Emergency System will be revised to include a section accounting for the classification with the maximum amount (12,000 m3) of diesel at sea.	Environmental Department	Q2 2019
		3. KPI Marine team should verify whether the ship's crew has adhered to these requirements either via audit or inspection or obtaining inspection record done by ship crew regarding this requirement.	KPI Marine will ensure to ship's crew of MV. Meratus Semarang (Third Party) as a carrier of PTFI hazardous waste to meet with "Surat Persetujuan Pengangkutan Limbah B3" from SeaCom and meet with Rekomendasi Pengangkutan Laut Limbah B3 from KLHH "	KPI Marine	Q2 2019
Hazardous Waste Management (Facility Management)	1. To ensure that the two containers are moved to THWS 32 and review the capacity of THWS 32 in order to be able to contain all possible generated waste or to transfer more frequently waste to authorized third party.	The two containers outside fence were shipped on December 2017. PTFI ships wastes on a monthly basis. Currently, PTFI is trying to ship via Surabaya in hopes of more frequent shipments. New THWS with larger	Environmental Department	Closed	

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			capacity near MP-32 KPI will be constructed and a contractor has been assigned for the construction process.		
		2. PTFI needs to build a specific temporary waste for PCB waste due to having to wait for authorization of a third party in Indonesia by the MoEF.	New THWS would store 60 containers including PCB wastes. As directed by MOEF, our PCB waste will be shipped to PPLI for trial project by the government.	Facilities Management Lowland	Q2 2019
		3. To record the monitoring of waste container that is temporarily stored in THWS 32 to have a better control of waste mass balance.	The Hazwaste Tracking System (hazwaste COC online) has been revised to ensure PTFI can comply for 90-day storage requirements in accordance to PP101/2014 which also includes recording the waste container at THWS 32.	Environmental Department	Closed
		4. To include this used oil generation and collection within COC system for ease and better tracking of mass balance data. During the COC development it is recommended to use waste tracking system to manage recording of used oil management.	Environmental Department in cooperation with MIS will develop the COC online for used oil from generation until utilization point with a function to determine total amounts of used oil generated and utilized. The	Environmental Department & MIS	Q2 2019

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			COC online will incorporate waste reduction and recycling of used oil at each facility. A template was created in Q1 2019 however it has not been fully implemented.		
	Hazardous Waste Management (LIP)	1. Inventory of PCB containing transformer should be continued with planning of PCB containing transformer replacement and how to handle it properly following PP 101/2014, SOP-E 09-31 (dated 20 July 2016) and its implementation should be evaluated and improved because it could not prevent this situation from happening.	PTFI continues to inventory transformers and will document which transformers contains PCBs. We will work with area owners for implementation of SOP regarding transformers containing PCB.	Environmental Department	Closed
		2. More frequent collection should be performed to reduce hauling waiting time.	The hazardous wastes at LIP Central Shop are transported to THWS 32 every week. This practice is a follow-up action from MOEF Administrative Sanction to comply with 90-day storage requirements.	LIP Central Shop and Environmental Department	Q2 2019

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		3. Provide drainage structure to contain the water from this dried slurry in the second drying area.	The secondary drying area is no longer in use. The solids from the settling pond are pumped into containers and shipped offsite for disposal.	LIP Central Shop	Closed
	Hazardous Waste Management (DWP)	1. PTFI should establish waste stream analysis not only for waste included in COC hazardous waste tracking but also for used oil.	Environmental Department in cooperation with MIS will develop the COC online for used oil from generation until utilization point with a function to determine total amounts of used oil generated and utilized. The COC online will incorporate waste reduction and recycling of used oil at each facility. A template was created in Q1 2019 however it has not been fully implemented.	Environmental Department & MIS	Q2 2019
		2. It is recommended that waste be collected from the Portsite more frequently.	Environmental Department worked with DWP, KPI Marine and PJP Coal Plant to set up a Waste Transfer Point to move B3 wastes from Portsite. WTP at Portsite has been completed.	Environmental Department, KPI Marine, DWP and PJP Coal Plant	Closed

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	Hazardous Waste Management (Hospital)	1. SOP E.8.1-05 needs to be improved to direct waste generator to confirm handed over waste.	The waste tracking system has been integrated into the SOP and data is reviewed.	Environmental Department	Closed
		2. Improvement on medical waste may be done to ensure that relevant procedure on this activity is being implemented and review the presently available data to improve the current process.	The revision of the SOP related to this is complete. The Environmental Department performed a socialization and completes inspections to ensure implementation of the SOP to reduce no labeling, lack of yellow plastic bag, transportation and others issues covered by the SOP.	Environmental Department	Closed
	Non-Hazardous Waste (Solid Waste Handling)	1. To provide figure of generations factor for evaluating higher waste generation in order to focus on the most probable reduction opportunity.	PTFI has contracted a third party to perform a waste evaluation of higher generating areas and larger waste streams for waste minimization.	Facilities Management, Environmental Department	Q4 2019
		2. To determine waste bin color as per regulation of Minister of Public Works No.13/2013.	PTFI is continuing to work on confirming this citation with the audit team.	Environmental Department	Q4 2019
		3. Master plan of Solid Waste Management should be renewed and updated to address development of	PTFI will contract a third party to renew the Waste Management Plan.	Facilities Management,	To be determined

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		PTFI and to identify opportunity for improving resource recovery and 3 R program (composting, plastic recycling, metal recycling, and biodiesel from used cooking oil) to reduce waste being sent to landfill		Environmental Department	
	Non-Hazardous Waste (Landfills)	1. Improve separation before final disposal in landfill	A socialization to several areas in Grasberg have been conducted. Environmental Department will check via inspection to determine if the socialized areas have properly segregated the wastes at Koteka landfill.	Environmental Department	Closed
		2. Avoid ARD entering domestic waste cells	PTFI has engaged a contractor to develop a plan for this finding. The plan is currently scheduled to be completed at the end of 2019.	Surface Mine Engineering	Q4 2019
		3. It is recommended to review the MP 73 landfill design based on this circumstance and specification of landfill as per Ministry of Public Works regulation No. 03 year 2013.	A review of the plan has been completed and determined that an updated Master Plan is needed.	Facilities Management, Environmental Department	Closed

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		4. Drainage channel to prevent run off water infiltrating to landfill body is not installed as mentioned in landfill engineering design.	Facilities Management has contracted with PT. Syntegra to generate new Masterplan Landfill 73 & to do re-design engineering which includes channel designs to prevent runoff water infiltrating to Landfill 73. Drafts of the Masterplan and designs are expected in Q2 2019.	Facilities Management	Q2 2019
		5. Seek MP 73 landfill permit and complete its infrastructure.	This will be considered based on a completed updated master plan & new design engineering	Environmental Department	To be determined
		6. Reduce the volume of rainwater falling into active landfill areas, by placing a temporary cover such as an impermeable media like HDPE.	This will be considered based on a completed updated master plan & new design engineering	FMHL	Q2 2019
	Wastewater Treatment (Wastewater – Sewage Plant)	1. Regulation of MoEF No. 68/2016 must be used as a benchmark for process target.	A verification audit of the STP permit was conducted in Q1 2019 and debit is no longer a compliance parameter. FMHL continues to conserve water by	Facilities Management, Environmental Department	Closed



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			installing automatic water taps at barracks.		
		2. PTFI should improve the TEL laboratory or Malaria Control laboratory to have accreditation for this E. Coli measurement. It is important for regular WWTP/STP monitoring.	The accreditation for E. Coli measurement will be conducted in the next assessment.	Environmental Department	Q3 2019
		3. Water consumption should be evaluated thoroughly. Monitoring for discharge of water user clusters by installing major wastewater meters may help in evaluating discharge level of water users and will give real domestic wastewater generation rates.	Debit is no longer a compliance parameter and flowmeter is only required to be installed at the STP. PTFI STPs are equipped with outlet flowmeters	Facilities Management, Environmental Department	Closed
	Wastewater Treatment (LTP)	1. It is recommended for PTFI to reevaluate the water balance of the landfill. Since the LTP has treatment capacity up to 340 m <sup>3</sup> /day, it is recommended to operate LTP as high as leachate generation. Other option is to recirculate the water to cell 1 and cell 2 during dry days.	The LTP was run on a batch system and beginning in early 2018, the daily treatment capacity of leachate has increased. We anticipate our treatment capacity to equal the leachate generation. Flow rate is controlled to not exceed flow rate capacity (340 m <sup>3</sup> /day)	FMLL	Closed

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		2. It is recommended to evaluate performance of processing unit in the LTP and find optimum operational performance.	We operate the LTP as normal and all parameters meet the GoI regulation. An external consultant has been contracted to evaluate and improve the LTP performance.	FMLL	Closed
	Wastewater Treatment (OWS)	1. PTFI should construct a small ditch and water chamber roof to prevent external water runoff flowing into OWS collection chamber.	PTFI will communicate with OWS owners to continue to improve the segregation of stormwater from their OWS. EQMS is currently verifying all OWS have this roof system.	Environmental Department	Q2 2019
Air Quality and Climate Change Issues	Air Quality	1. PTFI need to improve the action plan to solve NOx emission issues from diesel power plant in highland. Replacement planning to maintain emission control performance is needed.	We will complete the installation to measure the emissions in 2018 Emission standards and how to meet them are being discussed with MoEF.	Environmental Department	On-going
		2. In order to increase capacity for monitoring, PTFI needs to improve certification of air quality monitoring personnel in TEL laboratory.	All emissions testing will be done by the certified third party, Sucofindo.	Environmental Department	Closed
		3. It is reported that some monitoring measurements were not conducted.	Environmental Department is continuing to identify	Environmental Department	Q3 2019

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		CEMS installment can become an alternative to maintain continued monitoring.	which air quality monitorings have not been conducted.		
		4. It is recommended to install CEMS in the stack of Mahaka.	CEMS installed and operational in Q2 2018.	Concentrating	Closed
		5. Since underground is strategic issues, Radon monitoring need to be continued for all expansion of underground operation. In the development of underground activities PTFI should ensure Radon level below the standard that meet occupational health. More consideration of waste rock management should be given when radon level is found increasing.	PTFI will continue to monitor the Radon level.	Underground Operation and Safety	On-going
		6. Lowland workshop should measure emission of repaired/maintained vehicles to ensure lower emission of vehicles. Improvement of SOP is needed to ensure the monitoring are well implemented.	Environmental Department will review the regulations and SOP regarding measuring vehicle emissions.	Environmental Department	Q2 2019
		7. Energy management should systematically managed according to related regulation. Level of energy efficiency and conservation plan should be increased.	Energy Team was developed in Q1 2018. This team is now working on the energy efficiency programs.	Energy Team	Closed

Strategic Environmental Issues		Recommendations (Summary)	PTFI Response	PTFI Responsible Group	Status/Timing
		8. Regarding underground activity, PTFI should monitor and calculate CO2 emission from the activity especially from underground exhaust.	Program under review	Underground operation and safety	To be determined
		9. Improvement of GHGs reliability and calculation covers	PTFI will conduct a workshop on GHG data and calculations. The objective will be to improve the reliability, ensure comprehensiveness, improve the data collection, and educate involved parties in proper methodologies.	Environmental Department	Q2 2019
		10. IPCC's emission factor is being used for GHGs inventory and purchased fuel is being used for data of fuel consumption. Use of emission factor from fossil fuel gas analysis data and use of fuel consumption instead of purchased fuel will increase accuracy and potentially reduce CO2 emission.	Potential implementation of this recommendation will be a part of the above identified workshop.	Environmental Department	Q2 2019
		11. PTFI should improve the tier of used emission factors in GHGs calculations.	Potential implementation of this recommendation will be a part of the above identified workshop.	Environmental Department	Q2 2019

Strategic Environmental Issues		Recommendations (Summary)	PTFI Response	PTFI Responsible Group	Status/Timing
Reclamation and Biodiversity	Revegetation Activities	1. Continued experiments are required to improve plant/soil/growing media preparation and planting techniques.	PTFI intends to continue conducting experiments to improve reclamation technics, including bioremediation, large scale composting to generate organic materials and various vegetation propogation strategies.	Environmental Department, Reclamation	Closed
		2. A comprehensive analysis and synthesis of existing reclamation monitoring data should be conducted in order to better understand the biological and physical phenomena of reclamation, and conduct continuous improvement of techniques.	A comprehensive analysis of the existing HL reclamation data was completed in 2016. A comprehensive analysis of the existing LL reclamation data will be completed in 2019.	Environmental Department, Reclamation	Q4 2019
		3. Monitoring of post-mining reclamation success in terms of ecological function should include measurement of a parameter to demonstrate nutrient cycling/energy flow, e.g. through monitoring of soil fauna/arthropod community. As stated in the AMDAL 300K RPL, one of the objectives of reclaiming mined areas is to rebuild/restore ecosystem function to its original state.	PTFI will investigate and develop techniques for monitoring of post-mining reclamation success in terms of ecological function.	Environmental Department, Reclamation	Q4 2019

Strategic Environmental Issues		Recommendations (Summary)	PTFI Response	PTFI Responsible Group	Status/Timing
	Biodiversity and Natural Ecosystems	1. In view of technical difficulties in the field and the vast area to be covered, PTFI should consider novel approaches to monitoring of biodiversity (e.g., use of drones to record observations on steep slopes, use of camera traps, radio tracking of animals).	PTFI does use and will continue to investigate novel or emerging approaches to biodiversity monitoring. We intend to continue our use of drones and satellite imagery for reclamation and biodiversity. Camera traps have been used for some biodiversity survey programs.	Environmental Department, Biodiversity	Closed
		2. Unique natural ecosystems along the altitudinal zonation within the CoW area (between lowland and highland) have not been adequately studied and monitored. Permanent plots should be established in representative ecosystem types, in view of the very unique and vulnerable natural environment. Although some monitoring data are available, there is a need for temporal (time series) data from routine monitoring of representative groups of terrestrial biota, including related spatial aspects. These data should then be analysed,	PTFI will reestablish a permanent flora and fauna monitoring plot in the ecosystem between the lowland and highland. The current constraint is security in some areas.	Environmental Department, Biodiversity	Q2 2019

Strategic Environmental Issues		Recommendations (Summary)	PTFI Response	PTFI Responsible Group	Status/Timing
		synthesized and interpreted accordingly.			
		3. Although a workshop for Biodiversity Strategic Action Plan has been conducted, the action plan has not been formalized and fully executed. Flagship species have not been determined. The issue of maintenance and curation of PTFI's biodiversity sample collection should be included in the action plan.	Flagship species have been identified. An area within MP21 is being established to house PTFI's plant species collection. PTFI is in the process of working with Papua University, LIPI and other institution for implementation of BSAP.	Environmental Department, Biodiversity	Q4 2019
		4. PTFI activities in raising public awareness and education (e.g., through NSDP, Diorama, sanctuaries) could be developed further by presenting more diverse and interesting scientific information while ensuring its scientific accuracy.	PTFI will identify additional opportunities to raise public awareness and education.	Environmental Department, Biodiversity	On-going
		5. PTFI can play a greater role in demonstrating its commitment to biodiversity conservation, i.e., by supporting more scientific research into the unique biodiversity within the CoW area.	In 2018 PTFI, will support scientific research in a number of areas within the CoW area, including: Singing Dog, Herpetofauna, Dragon Flies. PTFI also supporting Multi Stakeholder Forum (consist of local government	Environmental Department, Biodiversity	On-going

Strategic Environmental Issues		Recommendations (Summary)	PTFI Response	PTFI Responsible Group	Status/Timing
			agencies, conservation agencies and LESTARI) for Biodiversity and Conservation program.		