

Appendix 15

Meadowbank and Whale Tail 2022 Geotechnical Recommendation Implementation Plan

MEADOWBANK - 2022 - Annual Geotechnical Recommendation Implementation Plan

Priority Level ⁽¹⁾	Location	Recommendation	Action Plan/Follow-up	Status	Target Completion Date
2	Baker Lake Fuel Farm	A hole in the exposed geomembrane (300 mm diameter hole) was observed at Baker Lake on the south southwestern corner of Tank 3 at the top of the slope. The hole in the geomembrane should be repaired to ensure a good performance of the retention basin. It is also recommended to cover the exposed area with geotextile and fill material to re-establish the liner protection. Update (2022): Still the case in 2022: the geomembrane was damaged again at the same location. It should be repaired and covered with geotextile and granular material.	Update (2020): the hole has been repaired, the liner must be covered. Update (2021): the geomembrane was damaged again at the same location. Will be repaired and covered with geotextile and granular material. Update (Summer 2022): Recommendation has been passed on to E&I.	Not started	Summer 2023
3	Baker Lake Tank Farm	Cover the exposed liner on northern side of Tank 5. 2022 Update (2022): Still exposed geomembrane on the north and south side of Tanks 1 to 4, in the northeastern corner of Tank 4, and newly exposed geomembrane on the south side of Tanks 5 and 6.	Update (2020): only northeastern corner of Tank 4 still has exposed liner to be covered. Update (2021): Still exposed geomembrane on the south side of Tanks 1 to 4, and in the northeastern corner of Tank 4. Will be covered. Update (Summer 2022): Recommendation has been passed on to E&I.	Not started	Summer 2023
4	Stormwater Dike	Asses whether the design criteria will still be met with different final tailings elevations on both sides of the dike (possible impact on seepage low and freezeback). Can be done by EoR but must be reviewed by designer.	Will be addressed in the update of the Engineering of the landform of the South Cell Update (2022): The TSF Closure Landform study is ongoing and is looking at this aspect.	Ongoing	Summer 2023
3	Baker Lake Fuel Farm	Expose one small area of liner where animal burrows are present to verify that the animals don't damage the liner. Once this verification is done, no more investigation will be required even though new burrows appear.	Use hand shovel to avoid damaging liner during uncovering. To be done in summer of 2021. Update (2021): Outstanding recommendation from 2020. Will be done in 2022. Update (2022): Completed in July 2022 - burrow did not reach liner.	Completed	Summer 2022
2	Baker Lake Fuel Farm	Repair hole in liner at the southwestern corner of the containment cell of the Jet A fuel tanks. Update (2022): Still the case in 2022: the repairs done on two holes in this area did not hold and the geomembrane is open. A third rip was observed on top of the slope in the same sector.	Update (2021). Outstanding recommendation from 2020. Will be done in 2022. Update (Summer 2022): Recommendation has been passed on to E&I.	Not started	Summer 2023
3	Saddle Dam 4	A section of pipe with a metal connector and a metal rod are present on the liner and should be removed to avoid damaging the liner.	The situation with the piping with a metal connector and a metal rod on the liner will be investigated in the spring and a remediation plan will be made.	Not started	Summer 2023
2	Baker Lake Tank Farm	A fuel leak was reported by AEM in 2020 from one of the old fuel tanks. The geomembrane could be damaged by fuel contact under the granular cover. The geomembrane should be exposed for visual inspection in the leak area, repaired if needed, and covered again. Update (2022): Still the case in 2022.	An investigation of the geomembrane condition in the leak area will be completed to assess its condition. When the liner team is onsite they will assist in a visual inspection of the liner. Update (Summer 2022): Recommendation has been passed on to E&I.	Not started	Summer 2023

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4	Bay Goose Dike	The dike crest deformation observed immediately after placement of the thermal cap several year ago do not ease the visual inspection as it is hard to visually observed movement on an unequal surface. It is recommended to fill up the past deformation in a way to produce a flat surface. A flat surface would ease the visual observation. The filling work should be completed in summertime to avoid inclusion of snow in the backfill material that will thaw at summertime and generate additional deformation.	Historical deformation will be filled up at freshet to ease visual inspection. Update (2022): Some work was performed in summer 2022 to fill the deformations; further grading work to be performed in summer 2023.	Ongoing	Summer 2023
2	East Dike	Two cracks accompanied by a small hole were observed in the crest around Sta. 60+500 and had been painted. If the cracks progress or if new cracks appear, it is recommended to install crackmeters and/or extensometers and survey the crest to quantify the movement. The designer must be notified if movement is noted.	East Dike will continue to be closely monitored to observe if the cracks progress or if new cracks appear. If this does happen the movement will be quantified, verified, and the designer notified.	Ongoing	Summer 2023
3	Stormwater Dike	Remove the pipe with a metallic connector from the liner at approximately Sta. 10+900 or install a protective layer underneath to avoid puncture.	The situation with the piping with a metal connector on the liner at Stormwater Dike will be investigated in the spring and a remediation plan will be made.	Not started	Summer 2023
4	Stormwater Dike	Repair the holes in the liner (6 in total) located on top of the slope, at the junction with the crest at Sta. 11+050 and 10+550, to avoid infiltrations in the liner bedding material.	The holes will be repaired in the spring at Stormwater Dike; a plan will be made to ensure this is completed.	Not started	Summer 2023
3	Stormwater Dike	Monitor the development of sandboils and/or sinkholes in the North Cell tailings between the dike and the capping to follow their progression and confirm origin and mechanism.	During the Stormwater Dike inspections the tailings between Stormwater Dike and the capping will be closely examined to identify if the sandboils/sinkholes are progressing.	Ongoing	Summer 2023
3	North Cell Internal Structure	Tension cracks (10-20 mm wide) in the fine filter slope in all the east sector of the dike. It is recommended to monitor the evolution of the cracks and repair the fine filter if the coarse filter starts to be exposed to ensure good performance of the filter system.	The tension cracks in the fine filter slope at the NCIS will be closely monitored and repaired if judged necessary.	Ongoing	Summer 2023
3	Central Dike	Gravel is present on the geomembrane around Sta. 0+950. If tailings deposition resumes in the South Cell, it is recommended to clean the liner beforehand to avoid puncture.	Noted. If tailings deposition returns to the South Cell the liner will be cleaned in advance in that area.	Closed	-

1 : Priority Level Descriptions

P-1: A high priority or actual structure safety issues considered immediately dangerous to life, health, or the environment, or a significant risk of regulatory enforcement.

P-2: If not corrected could likely result in structure safety issues leading to injury, environmental impact, or significant regulatory enforcement; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.

P-3: Single occurrences of deficiencies or non-conformance that alone would not be expected to result in structure safety issues.

P-4: Best Management Practice – further improvements are necessary to meet industry best practices or reduce potential risks.

2 : Previous year recommendations are kept only if they are outstanding

WHALE TAIL - 2022 - Annual Geotechnical Recommendation Implementation Plan

Priority Level ⁽¹⁾	Location	Recommendation	Action Plan/Follow-up	Status	Completion Date
3	Whale Tail Dike	Updated (2022): Several piezometers show unexplained trends, which mechanisms need to be investigated to rule out the development of adverse conditions: - PZ 0+260 P3A and B exhibit a yearly pressure rise in the fall. - PZ 0+360 P1C exhibits a unique high-pressure trend that seems to be seasonal. - PZ 0+550 P1C and 0+701 P1C are newly installed and showed large fluctuations in the winter of 2022. - PZ 0+701 P2D is newly installed and had high pressure fluctuations between August 2021 and March 2022.	The unexplained trends PZ 0+260 P3A and B, PZ 0+360 P1C, PZ 0+550 P1C, PZ 0+701 P1C, and PZ 0+701 P2D exhibit will be investigated to determine the mechanism responsible.	Not Started	Summer 2023
3	Saline Ditch	Blocks and debris are present in the ditch close to the south culvert (ditch outlet) and should be cleared to avoid water flowing out of the ditch. Update (2022): Partially resolved in 2021: most of the debris have been cleaned up but some are still present around Sta. 0+550, where they block the outlet of the newly installed culvert.	Update (Summer 2021): The blocks and debris was cleared out from the ditch. Update (December 2022): The debris around Sta. 0+550 will be cleaned up in Summer 2023.	Not Started	Summer 2023
2	Saline Ditch	The ditch is being backfilled all along the road by mud and gravel from the road, pushed into the ditch by snow removal operation and surface grading. The ditch depth has been significantly reduced. The ditch should be cleared every year of this extra material to maintain its hydraulic capacity. Update (2022): Partially resolved in 2021: some mud and gravel were still present in the ditch from road maintenance and spring surface erosion, but boulders have been placed between the road and the ditch to reduce pushing of road material into the ditch.	Update (Summer 2021): The extra material in the ditch was cleared out. Update (December 2022): The mud and gravel in the ditch will be cleaned up in Summer 2023.	Not Started	Summer 2023
2	Whale Tail Dike	The settlement at the East abutment associated to foundation thawing has progressed and lateral movement towards the downstream side is observed, although less tension cracks are observed compared to 2021. It is recommended to repair the crest to design elevation and keep monitoring the deformation.	In September 2022 the first phase of a thermal berm was constructed at the Whale Tail Dike East abutment along with repairing the damaged crest area. This work will be continued in 2023. Close monitoring of the deformation will be continued.	Ongoing	Summer 2023
3	Whale Tail Dike	A small amount of water is observed flowing out of the rockfill at the downstream toe of the dike, around Sta. 0 170. The origin of this water must be investigated to rule out possible seepage.	The origin of the water flowing out of the rockfill at the downstream toe of Whale Tail Dike was investigated and seepage was ruled out.	Completed	-
2	Whale Tail Dike	The V-notch weir usually installed in the seepage collection trench is out of service. It is recommended to replace it shortly to keep monitoring the relative seepage rate.	A new V-notch weir was installed at a different location further downstream during summer 2022. The V-notch is an improvement over the previous one and captures more of the seepage.	Completed	-

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3	IVR Dike	A large area of the dike between Sta. 0+100 and 0+300 show settlement (up to about 300 mm), likely due to shallow foundation settlement in the footprint of the former water channel. It is recommended to survey the area and to follow-up on the settlement over time to better understand the mechanism.	The settlement at IVR Dike was surveyed and very closely monitored during the summer and fall. It was concluded the settlement mechanism seems to be related to the thawing of the esker material placed above the liner. Deformation of this esker zone will not impact the liner or the keytrench. This mechanism is supported by the thermistor data indicating that the keytrench and bedrock remained frozen in 2022 while only the esker material within the active layer thawed. As of November 2022, the esker material is completely frozen. Close monitoring of this area will continue. Visual inspection has not detected any changing condition in the area since September and the settlement zone has not progressed from September to October as indicated by the end of October drone scan data.	Closed	-
3	Whale Tail Tank Farm	Some granular material is missing on the liner anchor on the eastern corner. It is recommended to repair this area.	Granular material will be added on the liner anchor on the eastern corner of the Whale Tail tank farm where some is missing.	Not Started	Summer 2023
3	Saline Ditch	The outlet of the ditch towards the AP5 quarry, from a culvert beneath the road, was obstructed at its outlet by a wooden plank placed by AEM in the winter to avoid snow accumulation inside the culvert. It is recommended to clear this culvert.	The wooden plank obstructing the outlet of the saline ditch towards the AP5 quarry was removed.	Completed	-
2	Ore Stockpile Saline Ditch	Numerous debris from the stockpile and the crusher pad are present in the ditch. They must be removed to ensure the ditch capacity.	The debris in the ditch will be cleaned up in Summer 2023.	Not Started	Summer 2023
3	Ore Stockpile Saline Ditch	Minor tension cracks are present in the West slope of the ditch in its northern section. The cracks are due to the fine granular material moving in the slope and should be repaired if the movement causes material to accumulate in the ditch.	The cracks in the ditch will be monitored and will be repaired if movement causes material to accumulate in the ditch.	Ongoing	Summer 2023

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