5.2.2.3 Changes from the FEIS Addendum

The following changes are relevant to the GSP-2 water balance:

- The previous model did not have a defined location or footprint for GSP-2. GSP-2 has since been defined, with the storage curve presented in Appendix D. The local drainage area is also now defined. As a result, the local drainage area reporting to GSP-2 has increased by over 80%, from 0.034 km^2 to 0.062 km^2.
- The reduction of overflow from the underground due to the updated hydrogeological inputs. The impact of these inputs on the underground flows is discussed further in Section 5.3.3.

The impact of these changes results in a decrease (approximately 15%) in cumulative inflows to GSP-2 in operations (496,200 m^3 vs. 587,450 m^3). This changes in closure, when there is no longer overflow from the underground. By the time Whale Tail Lake (North Basin) reaches its final elevation in 2042, the cumulative inflows are only 1.5% lower than for the FEIS case (676,050 m^3 vs 686,600 m^3) (Figure 26).

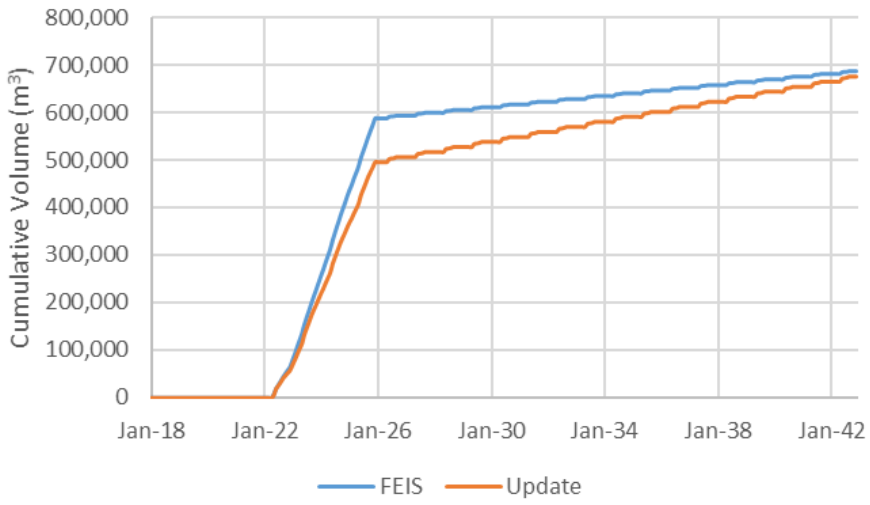

Figure 26: Comparison of Cumulative Inflows to GSP-2 under the FEIS Addendum and the Current Water Balances

5.2.3 Groundwater Storage Pond 3 (GSP-3)

Although currently not included in the water balance, GSP-3 is planned as a contingency for operational flexibility and adaptive management opportunities. The pond may provide additional storage capacity on surface if in the event of an increase in groundwater flows, or if underground storage is permanently or temporarily unavailable. This would allow for increased flexibility for treatment and discharge of site water.

If required, it would be constructed west of the IVR WRSF and north of GSP-2. Its potential location is shown in Figure 27. The potential catchment of GSP-3 is within the IVR Pit (see Section 5.8.3) watershed.

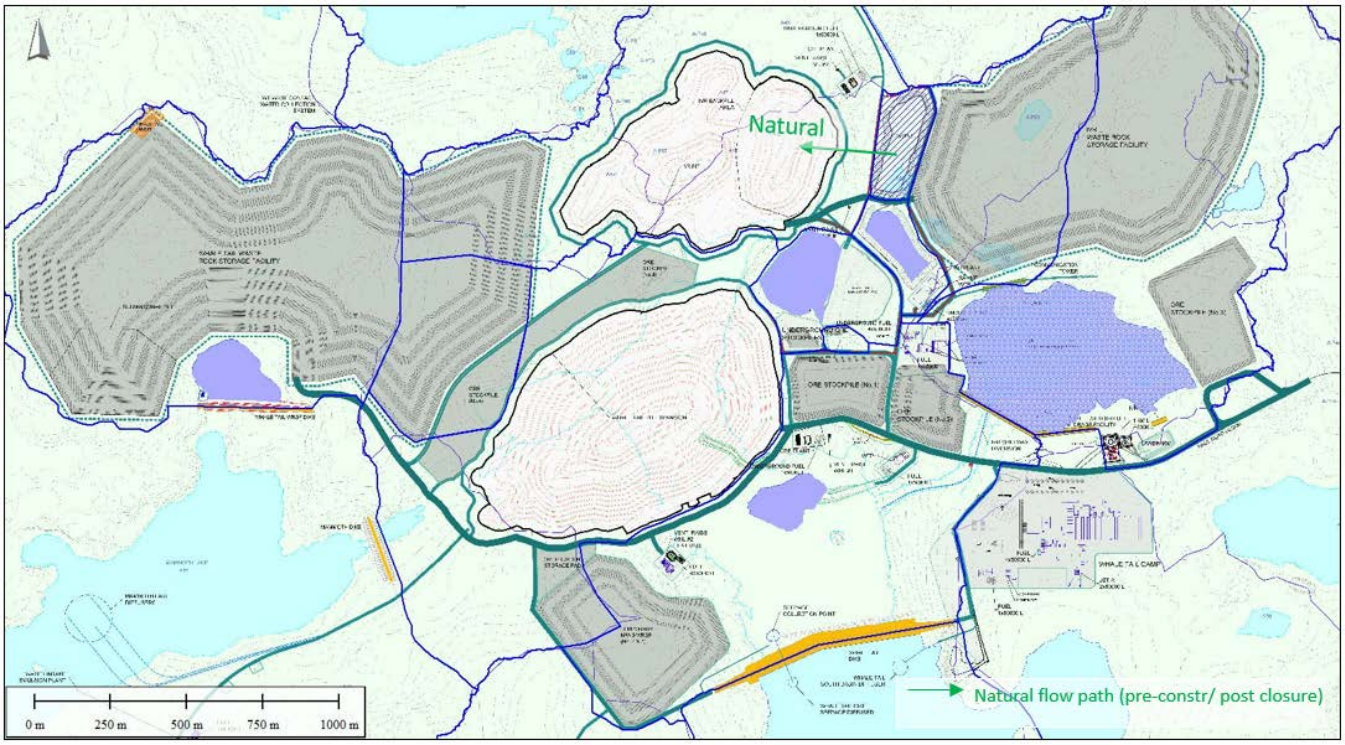

Figure 27: GSP-3 Catchment Overview

5.3 Underground Mine

5.3.1 Catchment Characteristics and Water Management

The catchment of the Underground Mine is located just northeast of, and drains naturally to, Whale Tail Lake. It includes the area south of GSP-1. Make-up water for the mine is supplied by GSP-1 (i.e., primary source), or by Lake C38 (Nemo Lake) (i.e., secondary source). Excess water volumes in the mine are managed through the Underground Mine Stope and GSP-1 (Section 5.2.1) for high salinity water, and through GSP-2 (Section 5.2.1.3) for low salinity water. If necessary, excess water volumes may also be managed in GSP-3 (Section 31).

At closure, the mine is partially backfilled by cemented rock fill and the remaining volume is flooded by water drawn down from the GSPs, the IVR Attenuation Pond, and Whale Tail Lake (South Basin). Once refilled, its water surface elevation is expected to remain below ground elevation at a maximum elevation of 152.5 masl (i.e., the baseline elevation of Whale Tail Lake) or less, depending on the groundwater regimes.

An overview of the catchment, along with its flow pathways, is provided in Figure 28.

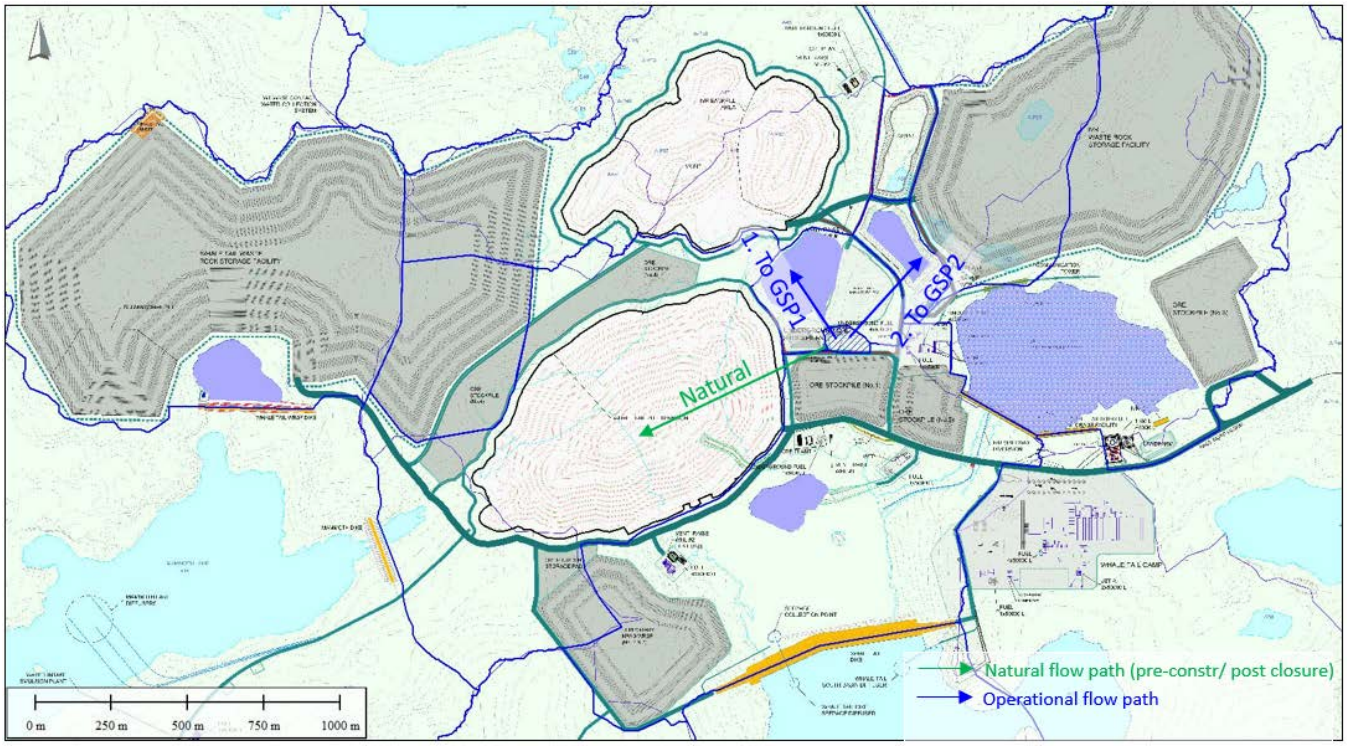

Figure 28: Underground Mine Catchment Overview

Storage characteristics are summarized in Table 13, and elevation-storage-area relationships are provided in Appendix C. Drainage areas of the underground are summarized in Figure 29.

The drainage area of Underground Mine remains constant at 0.011 km^2.

Table 13: Storage Characteristics (Underground Mine)

Snapshot	Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Baseline to Post-Closure	0.011	-501.10 to 149.00	10,000	149.00	1,268,546*

Note: * Accounts for backfilled volume and is representative of free water volume.

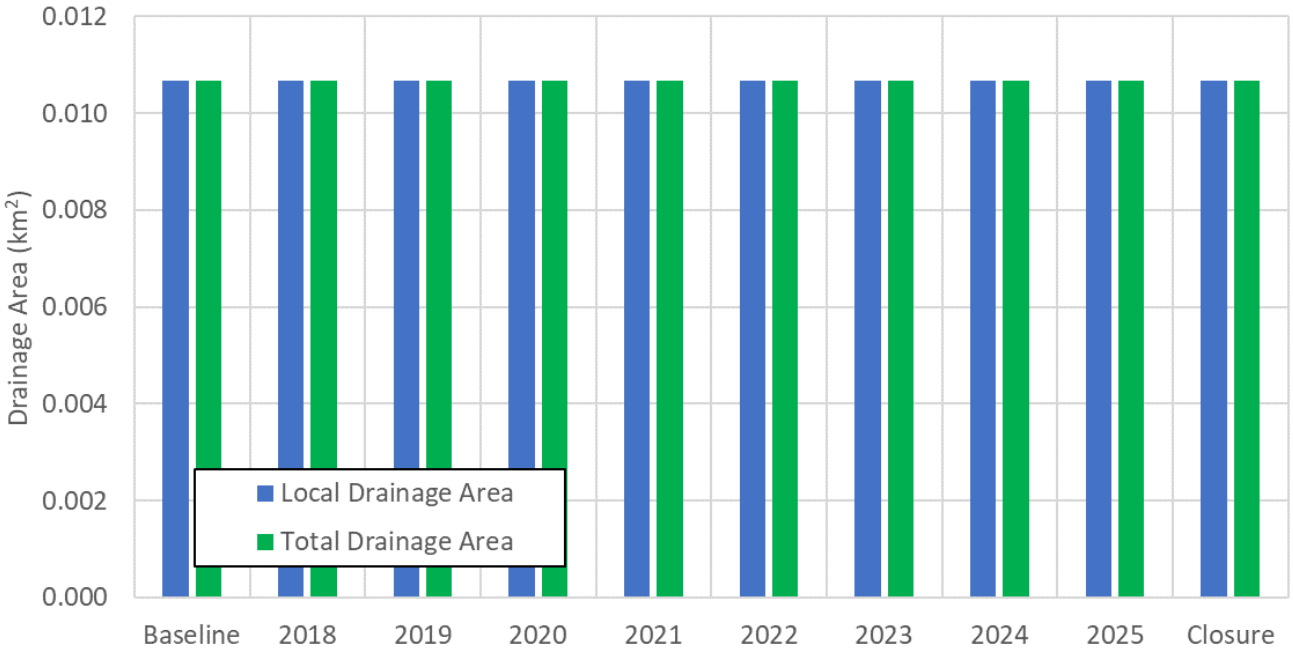

Figure 29: Drainage Area Progression through the Project (Underground Mine)

5.3.2 Water Balance

Inflows and outflows are summarized in Table 14, and presented in tabular form in Appendix F.

Table 14: Water Balance Flow Components (Underground Mine)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 30 (Construction / Operations) ■ Figure 31 (Closure)	■ Watershed runoff	■ Natural drainage	■ 2018	■ Post-Closure	■ Annual runoff volumes are expected to be constant.
	■ Make-up water from Nemo Lake	■ Pump / pipeline	■ 2018	■ 2018	■ Make-up water when the elevation of the Underground Mine is shallower than -275 masl. ■ Above this elevation, drilling fluid will be brined to facilitate operations within the permafrost. ■ Source of make-up water until GSP-1 is available to supply make-up water.
	■ Make-up water from GSP-1	■ Pump / pipeline	■ 2018	■ 2021 Level > -275 masl	■ Make-up water when the elevation of the Underground Mine is shallower than -275 masl. ■ Above this elevation, drilling fluid will be brined to facilitate operations within the permafrost.
	■ Recirculation of consumptive flows	■ Pump / pipeline	■ 2018	■ Closure	■ Recirculation is assumed to be 100%. ■ Consumption is expected to be consistent with the extraction rate of waste rock.
	■ Groundwater	■ Natural drainage	■ 2020	■ Post-Closure	■ Groundwater inflows are expected by January 2020. ■ Groundwater volumes are expected to increase in 2022, and in 2023, as the mine progresses below the permafrost. ■ Groundwater volumes are expected to decrease slightly in 2025, and further decrease as the mine is refilled.
	■ Drawdown of Whale Tail Lake (South Basin)	■ Pump / pipeline	■ Closure	■ Closure	■ Drawdown of Whale Tail Lake (South Basin) from 156.0 masl to 152.5 masl to expedite refilling of the Underground Mine, initiated in May 2026. ■ The Underground Mine is expected to be refilled by May 2026.
	■ Drawdown of the IVR Attenuation Pond, GSP-1 and GSP-2	■ Pump / pipeline	■ Closure	■ Closure	■ Drawdown of the IVR Attenuation Pond, GSP-1 and GSP-2 to expedite refilling of the Underground Mine, initiated in January 2026. ■ The Underground Mine is expected to be refilled by May 2026.
OUTFLOWS					
■ Figure 32 (Construction / Operations) ■ Figure 33 (Closure)	■ Recirculation of consumptive flows	■ Pump / pipeline	■ 2018	■ Post-Closure	■ Recirculation is assumed to be 100%. ■ Consumption is expected to be consistent with the extraction rate of waste rock.
	■ Discharge to the Underground Mine Stope	■ Pump / pipeline	■ 2018	■ 2020	■ Volumes exceeding the capacity of the Underground Mine sump are managed through the Underground Mine Stope. ■ The Underground Mine Stope is expected to be full by April 2020.
	■ Water content in waste rock	■ n/a	■ 2018	■ 2025	■ Volumes are expected to be consistent with the extraction rate of waste rock. ■ Water content of waste rock to surface was assumed to be 3% by weight.
	■ Discharge to GSP-1	■ Pump / pipeline	■ 2018	■ Closure	■ Overflow from the Underground Mine sump discharged to GSP-1 is expected by April 2020 (once the Stope is full). Ongoing until May 2022 when salinity is appropriate to be managed through GSP-2.
	■ Discharge to GSP-2	■ Pump / pipeline	■ 2022	■ Closure	■ Overflow of low salinity water from the Underground Mine Sump when the elevation of development is deeper than -275 masl (May 2022). ■ Water volumes are expected to be consistent with groundwater inflows to the Underground Mine.
	■ Groundwater	■ Natural drainage	■ Closure	■ Post-Closure	■ Annual losses to groundwater are expected to be constant (approximately 2,200 m^3/year) once the Underground Mine is refilled.

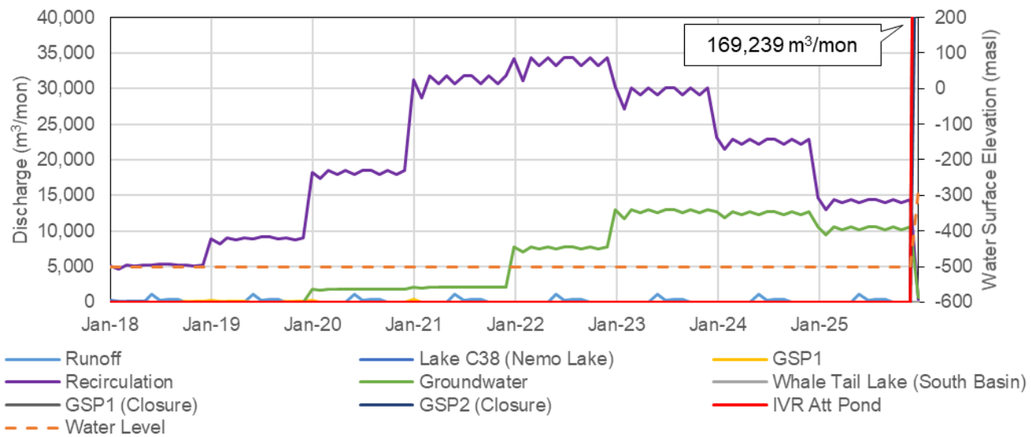

Figure 30: Inflows to Underground Mine (Construction and Operations)

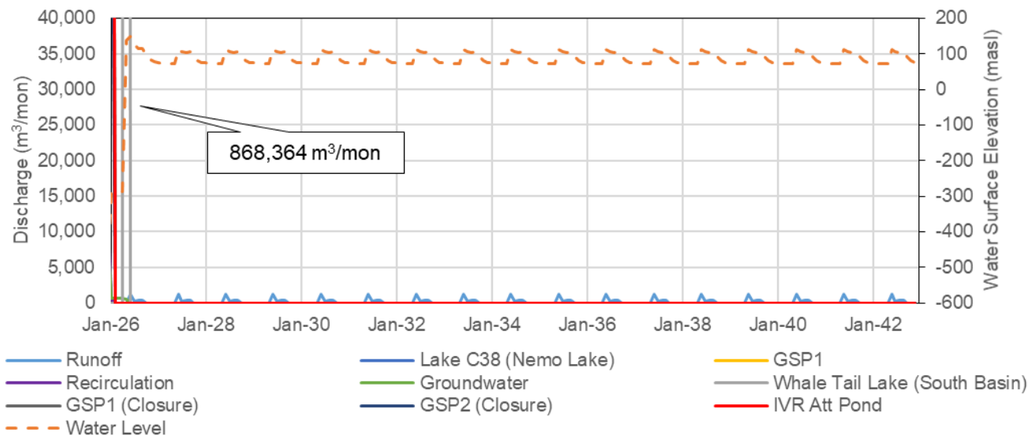

Figure 31: Inflows to Underground Mine (Closure)

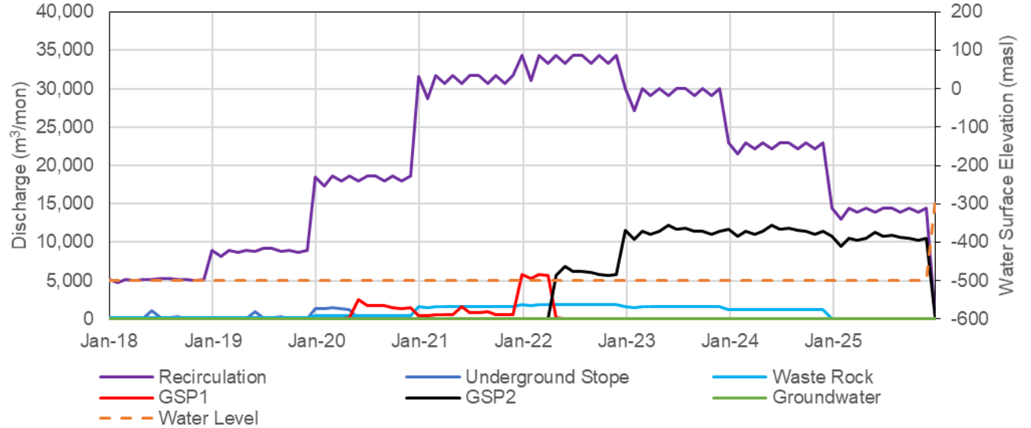

Figure 32: Outflows from Underground Mine (Construction and Operations)

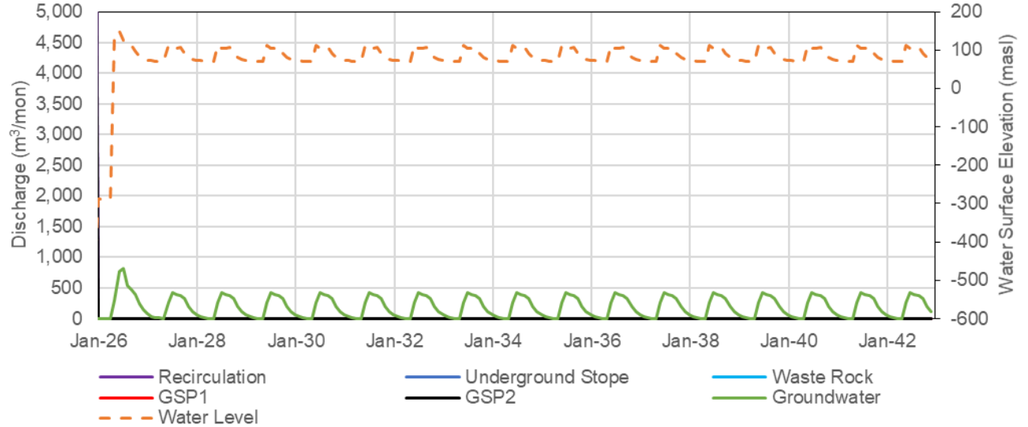

Figure 33: Outflows from Underground Mine (Closure)

5.3.3 Changes from the FEIS Addendum

The change in Underground Mine flows is due to the changes in groundwater as described in Section 4.0. The impact of these changes results in a slight decrease (approximately 5%) in cumulative inflows to the Underground Mine in operations (2,546,700 m^3 vs. 2,675,400 m^3). This trend continues through closure. The cumulative inflows to the Underground Mine by the end of 2042 are approximately 3% lower than for the FEIS case (3,852,800 m^3 vs 3,983,250 m^3) (Figure 34).

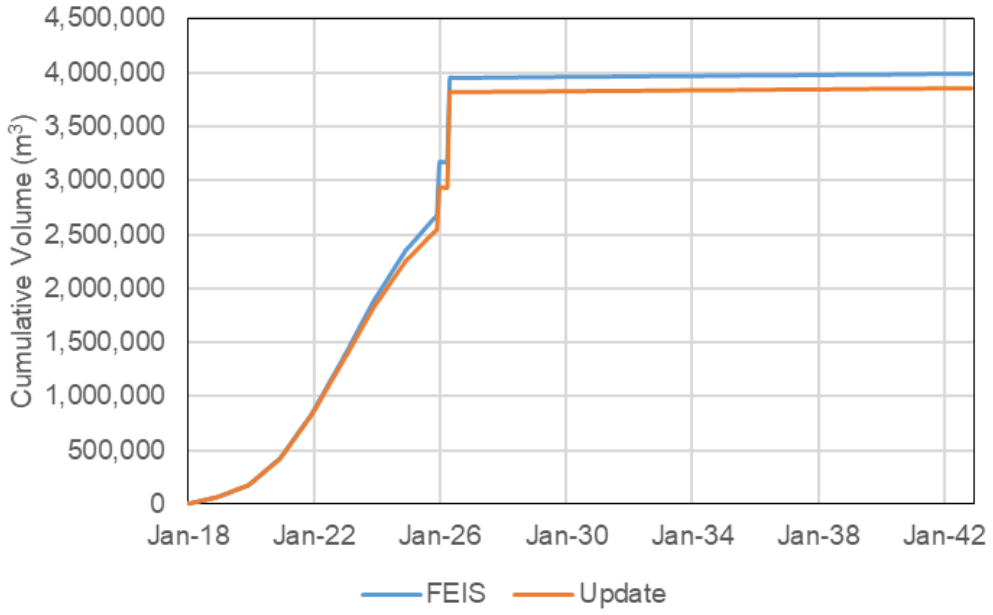

Figure 34: Comparison of Cumulative Inflows to the Underground under the FEIS Addendum and the Current Water Balances

5.4 Northeast Sector

5.4.1 Catchment Characteristics and Water Management

The Northeast Sector consists of the catchment upstream of the Northeast Dike, initiated in January 2019, just north of Whale Tail Lake. Prior to January 2019, runoff from the Northeast Sector drains naturally into Whale Tail Lake (North Basin). Runoff from the Northeast Sector is diverted to Lake A16 (Mammoth Lake) via the O-WTP from June 2019 to July 2020, prior to the initiation of the IVR Pit. Although dewatering of the lakes in the Northeast Sector (A46, A47, A49) was not included in the water balance, the dewatering volume required (138,000 m^3) is less than 40% of the annual runoff from the Northeast sector watershed. This additional volume is within the capacity of the O-WTP. Once the IVR Pit is initiated, the Northeast Sector is reduced to the catchment upstream of the IVR Diversion and diverted to Lake C38 (Nemo Lake) until closure. At closure, the IVR Diversion is decommissioned thereby re-establishing drainage patterns towards Whale Tail Lake (North Basin) via the IVR Pit during refilling.

Overviews of the catchment prior to and following the initiation of the IVR Pit, along with their drainage pathways, are provided in Figure 35 and Figure 36.

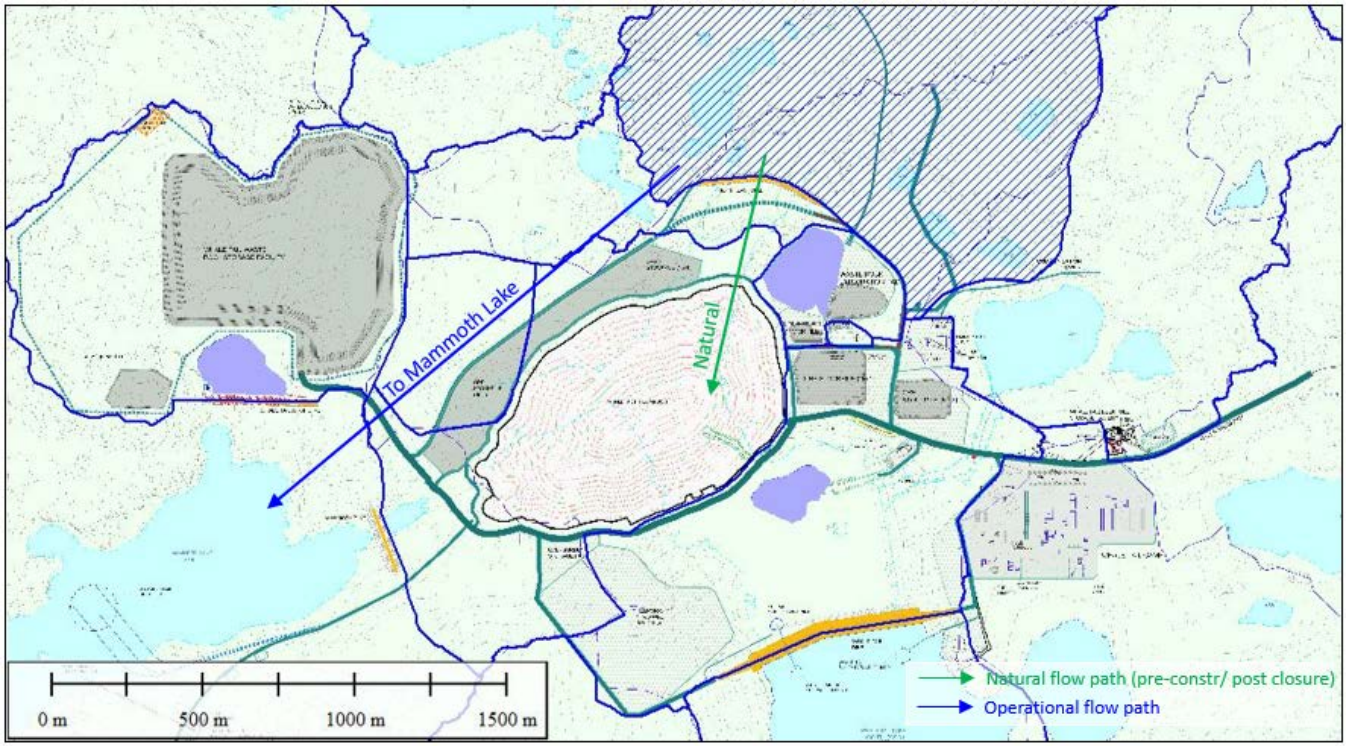

Figure 35: Northeast Sector Catchment Overview Prior to IVR Pit Initiation

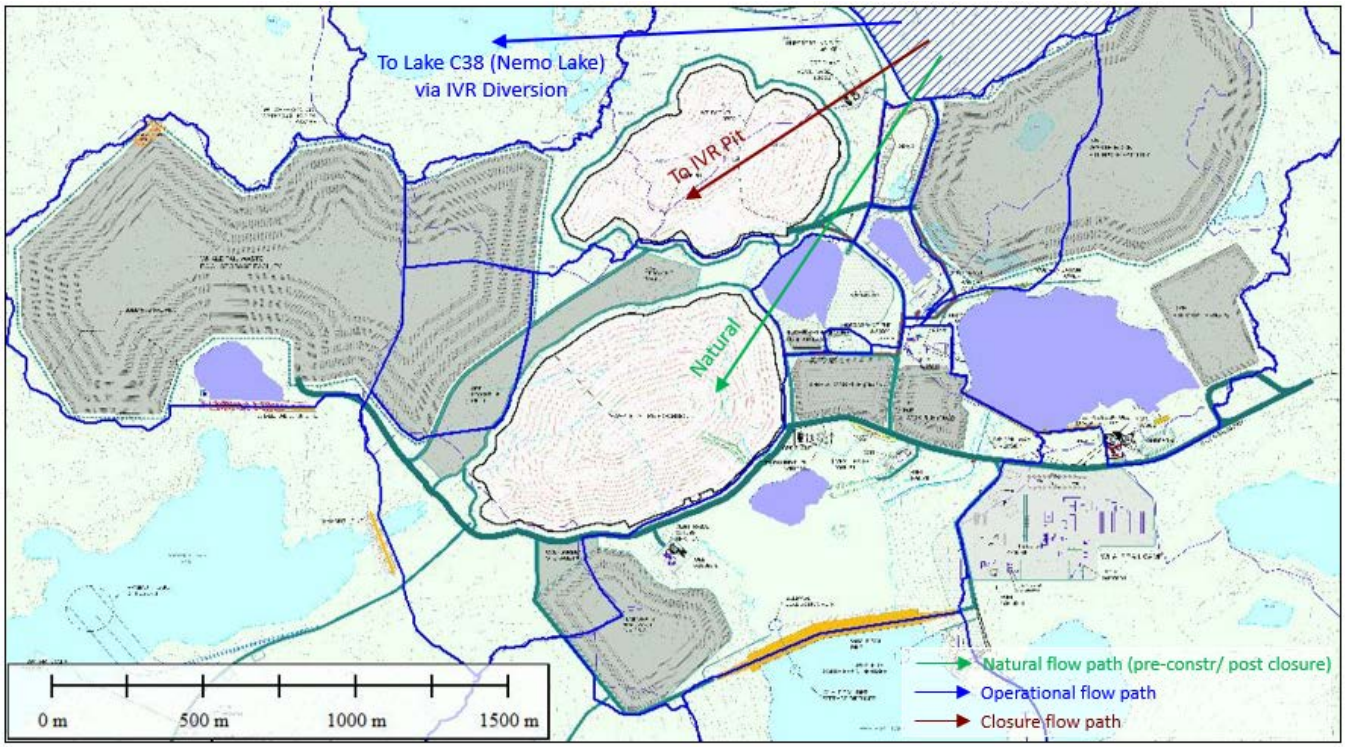

Figure 36: Northeast Sector Catchment Overview Following IVR Pit Initiation

Storage characteristics are summarized in Table 15. Drainage areas of the Northeast Sector are summarized in Figure 37.

The Northeast Sector has a drainage area of 1.91 km^2 until the IVR Pit is initiated in July 2020. It is then reduced to the drainage area of the IVR Diversion, to 0.684 km^2.

Table 15: Storage Characteristics (Northeast Sector)

Snapshot	Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Baseline to July 2020	1.91	n/a	0	n/a	0
July 2020 to Post-Closure	0.684	n/a	0	n/a	0

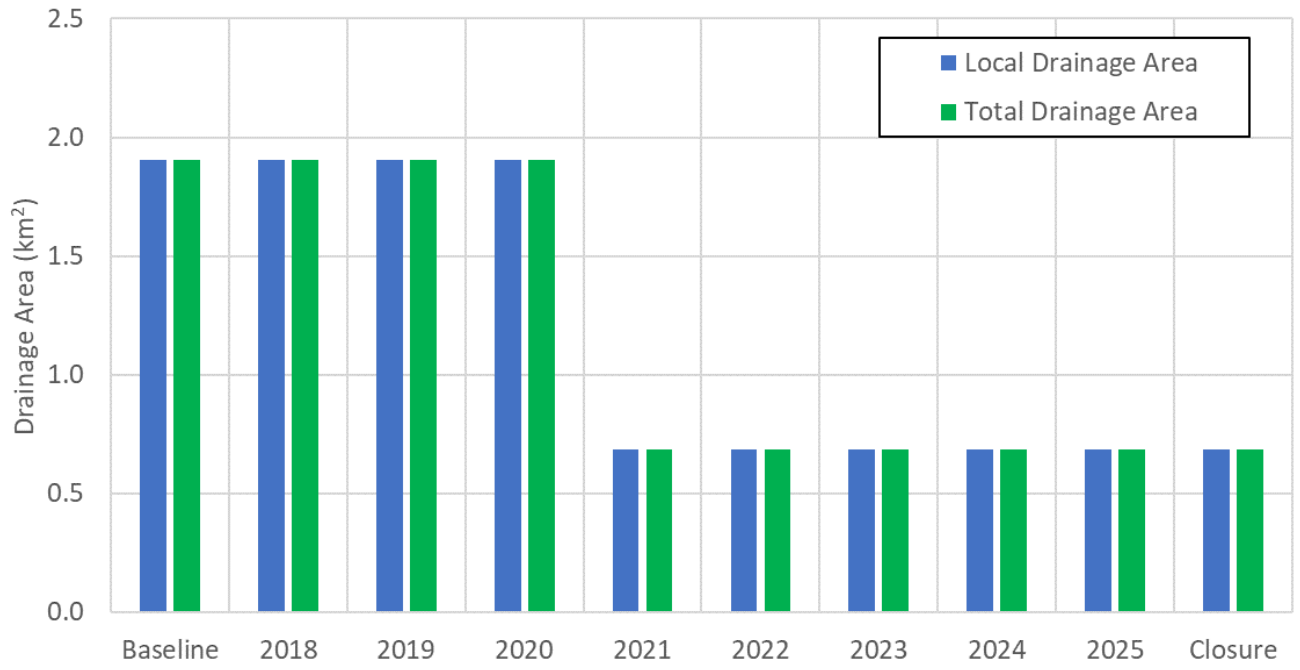

Figure 37: Drainage Area Progression through the Project (Northeast Sector)

5.4.2 Water Balance

Inflows and outflows are summarized in Table 16, and presented in tabular form in Appendix F.

Table 16: Water Balance Flow Components (Northeast Sector)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 38 (Construction / Operations) ■ Figure 39 (Closure)	■ Runoff from Lake A49	■ Natural drainage	■ 2018	■ July 2020	■ The Lake A49 sub-watershed becomes part of the IVR Pit watershed once the IVR Pit is initiated in July 2020 and is no longer part of the Northeast Sector.
	■ Runoff from natural areas	■ Natural drainage	■ 2018	■ Post-Closure	■ Runoff volumes are expected to be proportional to the catchment area of the Northeast Sector. The catchment area of the Northeast Sector decreases once the IVR Pit is initiated in July 2020.
OUTFLOWS					
■ Figure 40 (Construction / Operations) ■ Figure 41 (Closure)	■ Evaporation	■ n/a	■ 2018	■ July 2020	■ Evaporative losses are expected to be proportional to the collective waterbody areas of the Northeast Sector. There are no waterbodies in the Northeast Sector once the IVR Pit is initiated in July 2020.
	■ Runoff to Whale Tail Lake (North Basin)	■ Natural drainage	■ 2018	■ 2019	■ Natural runoff to Whale Tail Lake (North Basin) until the Whale Tail Dike is operational.
	■ Runoff diversion to Lake A16 (Mammoth Lake)	■ Pump / Pipeline	■ 2019	■ July 2020	■ Runoff diversion to Lake A16 (Mammoth Lake) via the O-WTP once the Whale Tail Dike is operational until the IVR Pit is initiated.
	■ Runoff diversion to Lake C38 (Nemo Lake)	■ Channel	■ July 2020	■ Closure	■ Runoff diversion to Lake C38 (Nemo Lake) following the initiation of the IVR Pit once the IVR Diversion is operational and prior to Closure.
	■ Runoff to Whale Tail Lake (North Basin) via the IVR Pit	■ Natural drainage	■ Closure	■ Post-Closure	■ The IVR Diversion is decommissioned at Closure, and natural drainage patterns towards Whale Tail Lake (North Basin) are re-established.

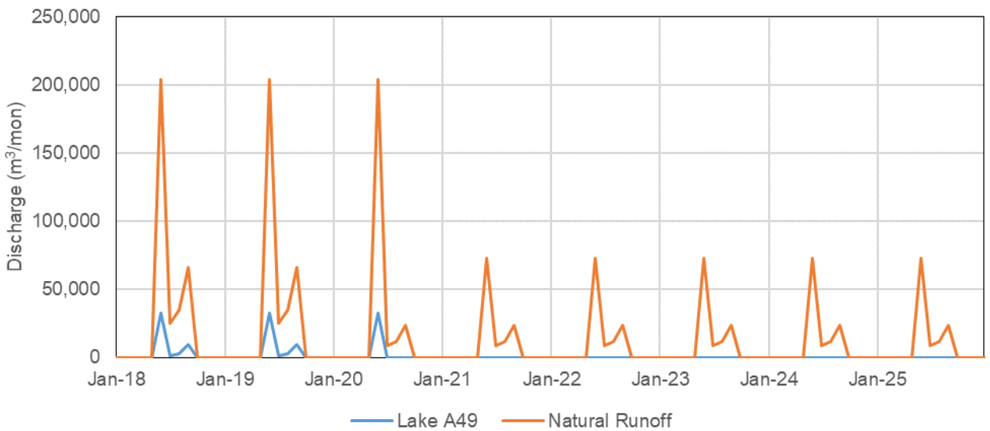

Figure 38: Inflows to the Northeast Sector (Construction and Operations)

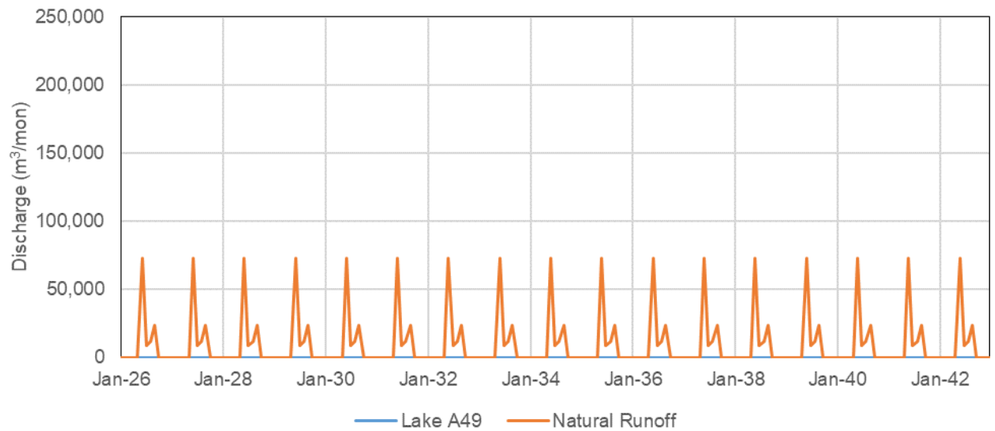

Figure 39: Inflows to the Northeast Sector (Closure)

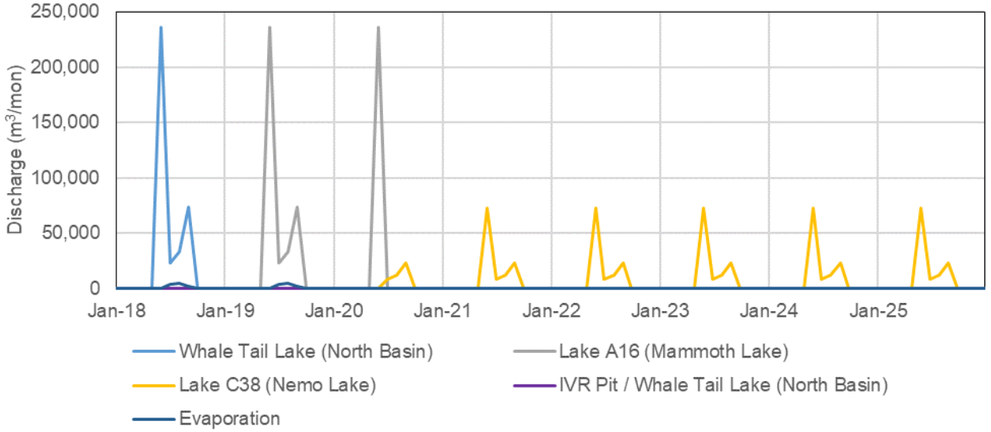

Figure 40: Outflows from the Northeast Sector (Construction and Operations)

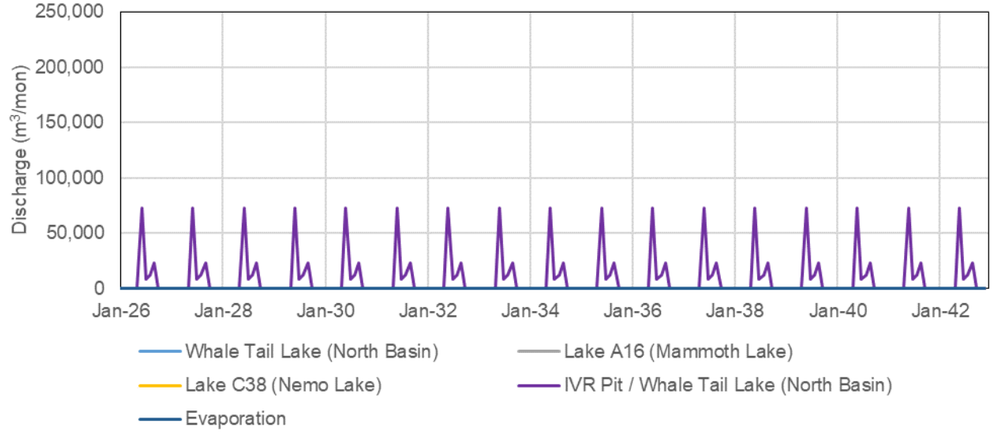

Figure 41: Outflows from the Northeast Sector (Closure)

5.4.3 Changes from the FEIS Addendum

The updated drainage area delineation results in a slightly larger drainage area prior to the initiation of the IVR Pit (1.91 km^2 vs 1.88 km^2 previously). Once the IVR diversion is in place, the drainage area increases slightly from 0.643 km^2 to 0.684 km^2. As a result, there is a cumulative increase of a 37,800 m^3 (996,950 m^3 vs. 959,150 m^3 previously) by the time the IVR Pit is initiated (a 4% increase). By the end of operations, the cumulative increase is 75,150 m^3 (1,646,700 m^3 vs. 1,541,550 m^3 previously) - approximately 5% higher (Figure 42).

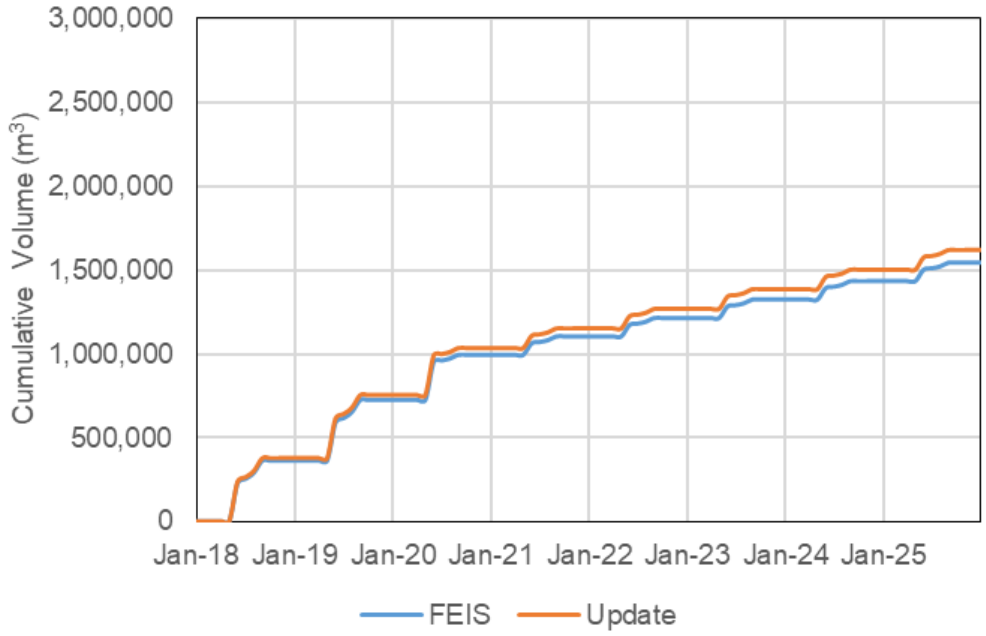

Figure 42: Comparison of Cumulative Inflows to the Northeast Sector under the FEIS Addendum and the Current Water Balances

5.5 Whale Tail Waste Rock Storage Facility Contact Water Collection System

5.5.1 Catchment Characteristics and Water Management

The catchment of the Whale Tail WRSF Contact Water Collection System is located in the northern headwaters of the Lake A16 (Mammoth Lake) catchment. Its runoff drained naturally to Lake A16 (Mammoth Lake) until Licence A was received (approved in July 2018). At this point, runoff is collected in a temporary sump and diverted to Quarry 1 until the Whale Tail Attenuation Pond becomes operational in 2019 (once the Whale Tail WRSF Dike is completed at the end of 2018). Runoff from the Whale Tail WRSF and catchment area is then collected in the Whale Tail WRSF Contact Water Collection System and discharged to the Whale Tail Attenuation Pond in 2019. Once the IVR Attenuation Pond becomes operational in 2022, flows are discharged to the IVR Attenuation Pond until closure. At closure, runoff is then pumped to the IVR Pit to expedite refilling of the pit and Whale Tail Lake (North Basin). Natural drainage patterns are re-established at Post-Closure if water quality criteria are met (i.e., the assumed scenario in this water balance). Alternatively, collected runoff could be conveyed to Whale Tail Lake (North Basin).

An overview of the Whale Tail WRSF catchment, along with its drainage pathways, is provided in Figure 43.

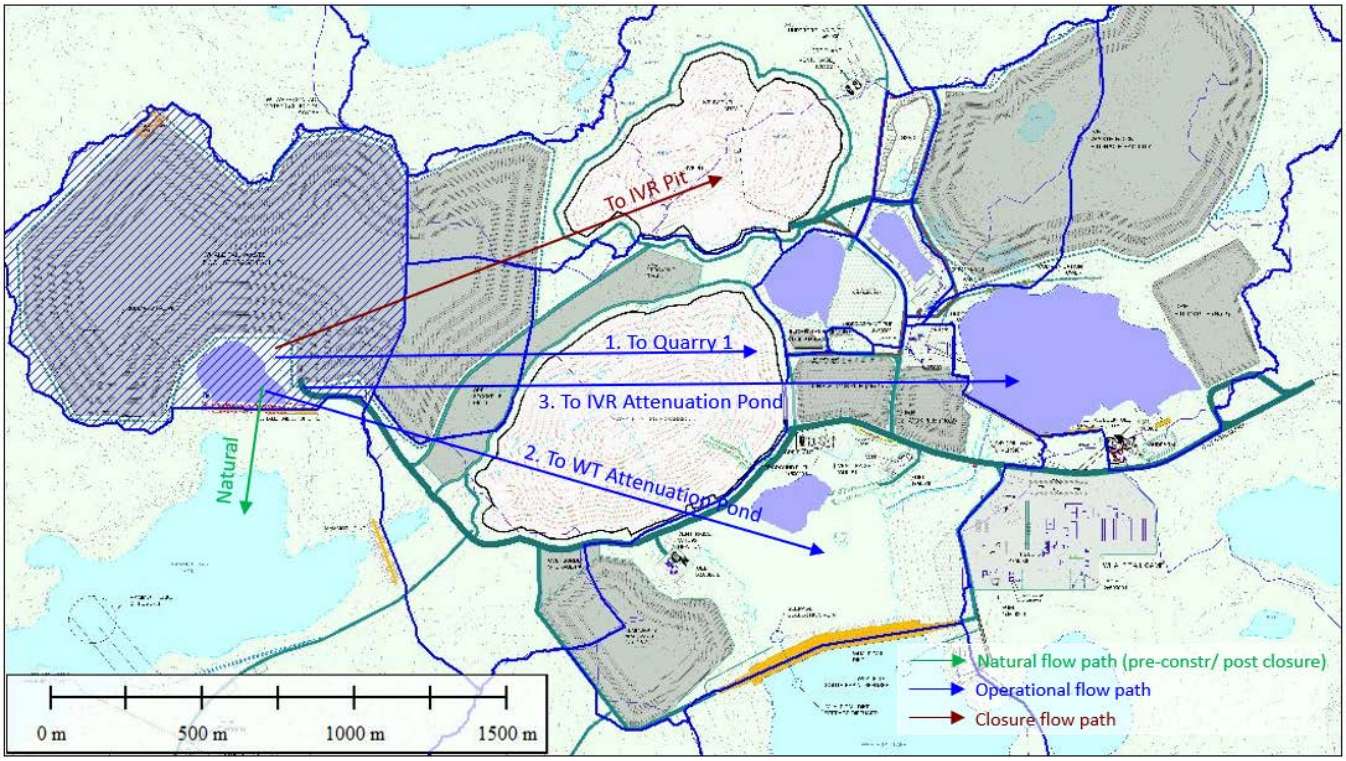

Figure 43: Whale Tail Waste Rock Storage Facility Contact Water Collection System Catchment Overview

Storage characteristics are summarized in Table 17 and elevation-storage-area relationships are presented in Appendix D. Drainage areas of the Northeast Sector are summarized in Figure 44.

The Whale Tail WRSF has a drainage area of 1.09 km^2. The storage capacity of the Whale Tail WRSF Contact Water Collection System once the WRSF Dike is constructed is shown in Table 17.

Table 17: Storage Characteristics (Whale Tail WRSF Contact Water Collection System)

Snapshot	Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Baseline to October 2018	1.09	n/a	n/a	n/a	n/a
October 2018 to Post-Closure	1.09	154.0 to 157.8	0 to 195,500	158.4	240,900

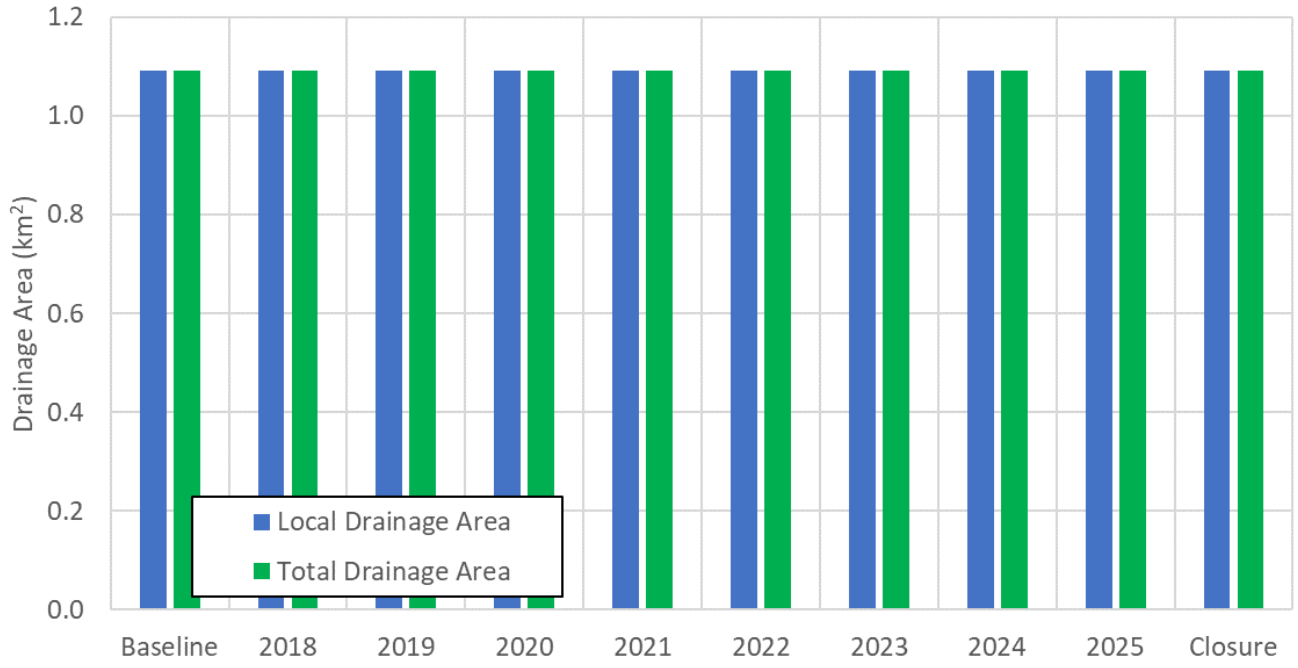

Figure 44: Drainage Area Progression through the Project (Whale Tail WRSF Contact Water Collection System)

5.5.2 Water Balance

Inflows and outflows are summarized in Table 18, and presented in tabular form in Appendix F.

Table 18: Water Balance Flow Components (Whale Tail WRSF Contact Water Collection System)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 45 (Construction / Operations) ■ Figure 46 (Closure)	■ Runoff from natural areas	■ Natural drainage	■ 2018	■ Post-Closure	■ Runoff volumes are expected to be inversely proportional to the footprint of the Whale Tail WRSF located in the Whale Tail WRSF Contact Water Collection System catchment, which reaches its maximum footprint in 2021.
	■ Runoff from the Whale Tail WRSF (including submarginal waste rock)	■ Natural drainage	■ Q3 2018	■ Post-Closure	■ Runoff volumes are expected to be proportional to the footprint of the Whale Tail WRSF located in the Whale Tail WRSF Contact Water Collection System catchment, which reaches its maximum footprint in 2021.
	■ Seepage from the Whale Tail WRSF (including submarginal waste rock)	■ Natural drainage	■ Q3 2018	■ Post-Closure	■ Based on OKC modelling results, seepage from the WRSF is negligible (See Section 4.0).
OUTFLOWS					
■ Figure 47 (Construction / Operations) ■ Figure 48 (Closure)	■ Evaporation	■ n/a	■ Q3 2018	■ Post-Closure	■ Evaporative losses, proportional to the water surface area of the Whale Tail WRSF Water Collection System, once the pond becomes operational.
	■ Runoff to Lake A16 (Mammoth Lake)	■ Natural drainage	■ 2018 ■ Post-Closure	■ Q3 2018 ■ Post-Closure	■ Natural drainage to Lake A16 (Mammoth Lake) until Licence A is received. ■ Natural drainage to Lake A16 (Mammoth Lake) at Post-Closure.
	■ Runoff discharged to Quarry 1	■ Pump / Pipeline	■ Q3 2018	■ 2019	■ Runoff discharged to Quarry 1 once Licence A is received until the Whale Tail Attenuation Pond becomes operational.
	■ Runoff discharged to Whale Tail Attenuation Pond	■ Pump / Pipeline	■ 2019	■ 2022	■ Runoff discharged to the Whale Tail Attenuation Pond once operational until the IVR Attenuation Pond becomes operational. ■ Runoff volumes are expected to be inversely proportional to the footprint of the Whale Tail WRSF which reaches its maximum footprint in 2021.
	■ Runoff discharged to IVR Attenuation Pond	■ Pump / Pipeline	■ 2022	■ Closure	■ Runoff discharged to the IVR Attenuation Pond once operational, until closure. ■ Annual runoff volumes are expected to be constant.
	■ Runoff discharged to Whale Tail Lake (North Basin) via IVR Pit	■ Pump / Pipeline	■ Closure	■ Post-Closure	■ Runoff discharged to Whale Tail Lake (North Basin) via IVR Pit to expedite refilling of the pit. ■ Runoff volumes are expected to increase from operations once freezing of the outer layer of the Whale Tail WRSF become more frequent at closure.

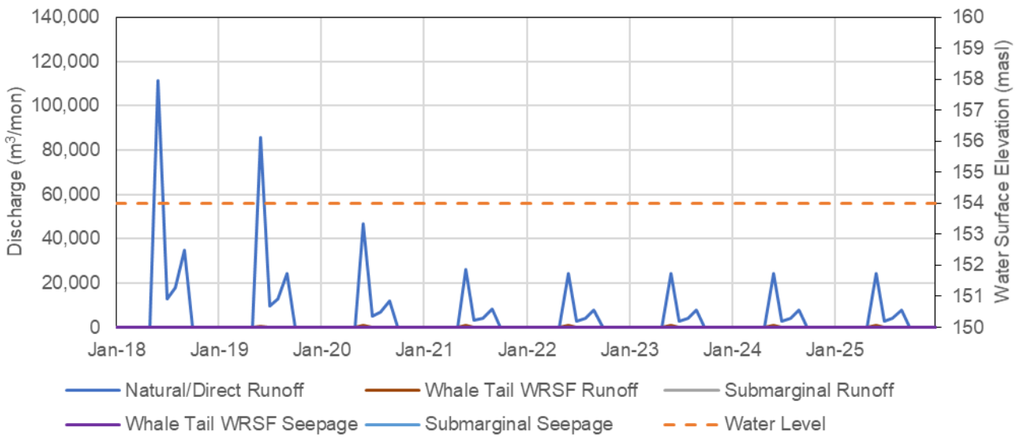

Figure 45: Inflows to the Whale Tail WRSF Contact Water Collection System (Construction and Operations)

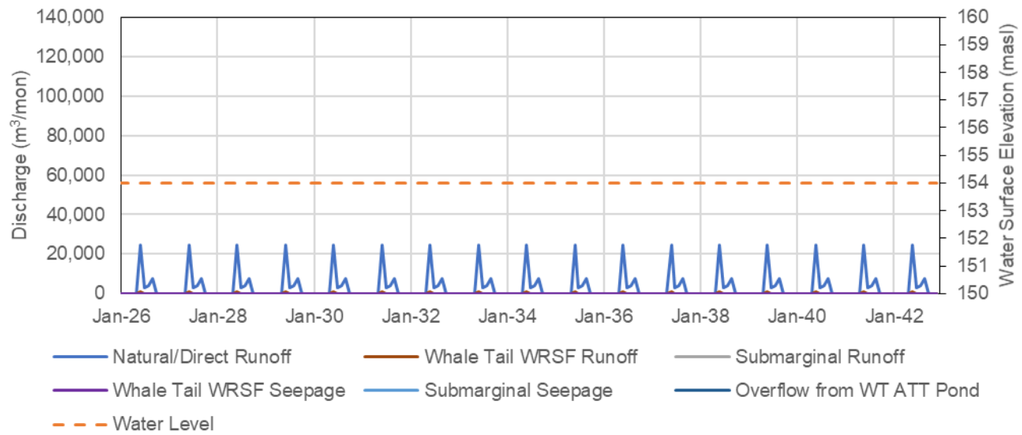

Figure 46: Inflows to the Whale Tail WRSF Contact Water Collection System (Closure)

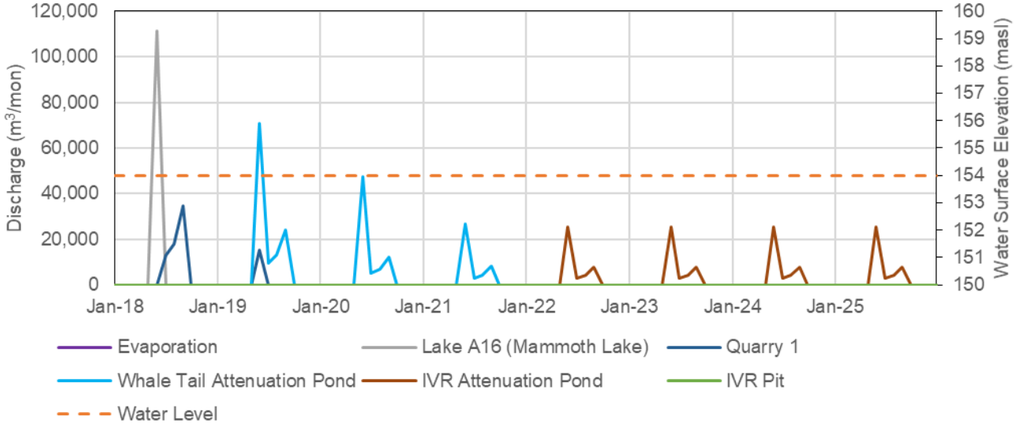

Figure 47: Outflows from the Whale Tail WRSF Contact Water Collection System (Construction and Operations)

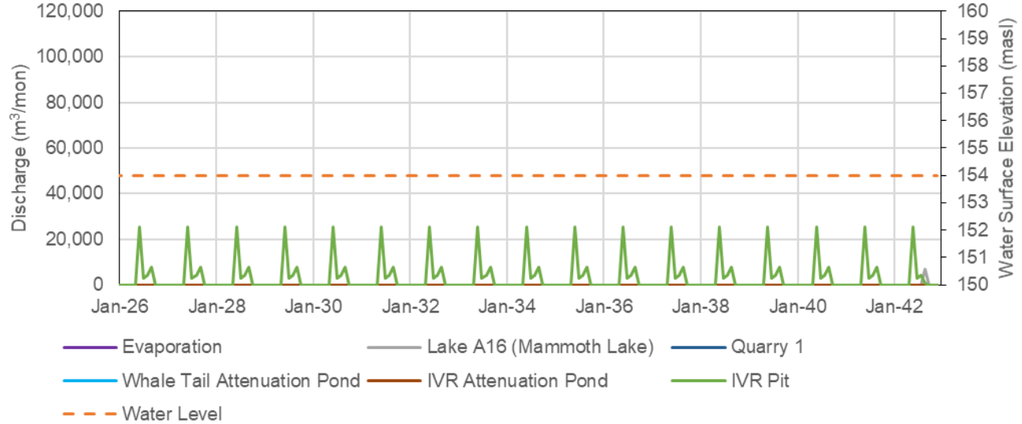

Figure 48: Outflows from the Whale Tail WRSF Contact Water Collection System (Closure)

5.5.3 Changes from the FEIS Addendum

The following changes are relevant to the Whale Tail WRSF water balance:

- The updated drainage area delineation results in a slightly smaller drainage area for the Whale Tail WRSF Contact Water Collection System (1.09 km^2 vs 1.10 km^2 previously).
- The primary difference in this update is the calculation of runoff and seepage from the WRSF. As explained in Section 4.0, the updated calculation method significantly reduces the generated runoff from the stockpile and sets the seepage to zero.

The impact of these changes results in a substantial decrease (approximately 45%) in cumulative inflows to the Whale Tail WRSF Contact Water Collection System during operations (583,800 m^3 vs. 1,061,800 m^3). By the time Whale Tail Lake (North Basin) reaches its ultimate water level elevation in 2042, the cumulative inflows are 67% lower than for the FEIS case (1,265,750 m^3 vs 3,827,700 m^3) (Figure 49).

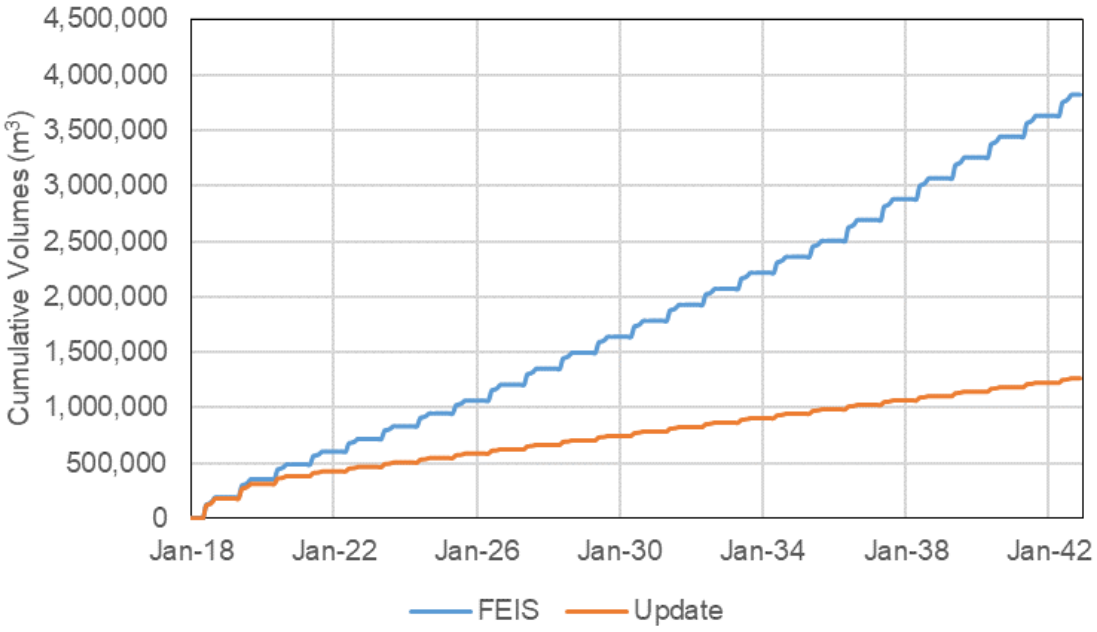

Figure 49: Comparison of Cumulative Inflows to the Whale Tail WRSF Contact Water Collection System under the FEIS Addendum and the Current Water Balances

5.6 North Sector

5.6.1 Catchment Characteristics and Water Management

The North Sector consists of the northwest catchment area of Whale Tail Lake, just north of its natural lake outlet. The North Sector collection area becomes operational once Whale Tail Lake (North Basin) is dewatered in 2019, and is intended to collect and convey contact water draining from the portion of the Whale Tail WRSF encroaching on the Whale Tail Lake (North Basin) watershed starting in 2021, to the active attenuation pond (i.e., either the Whale Tail Attenuation Pond or the IVR Attenuation Pond). The North Sector collection area remains operational

until closure when it is decommissioned and its natural drainage patterns towards Whale Tail Lake (North Basin) are re-established.

An overview of the sector, along with its drainage pathways, is provided in Figure 50.

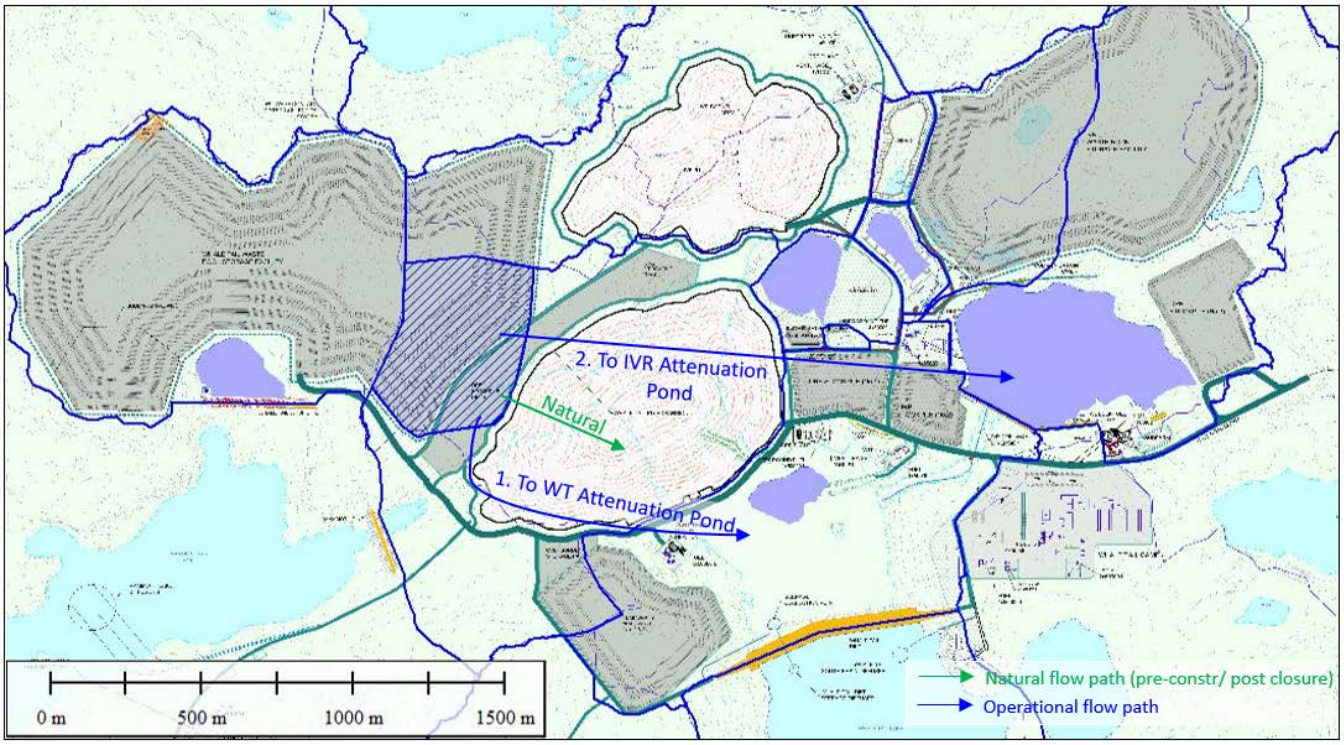

Figure 50: North Sector Catchment Overview

Storage characteristics are summarized in Table 19. Drainage areas of the North Sector are summarized in Figure 51.

The North Sector collection area has a drainage area of 0.243 km^2 and was assumed to have no storage in the water balance.

Table 19: Storage Characteristics (North Sector)

Snapshot	Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Baseline to Closure	0.243	n/a	0	n/a	0

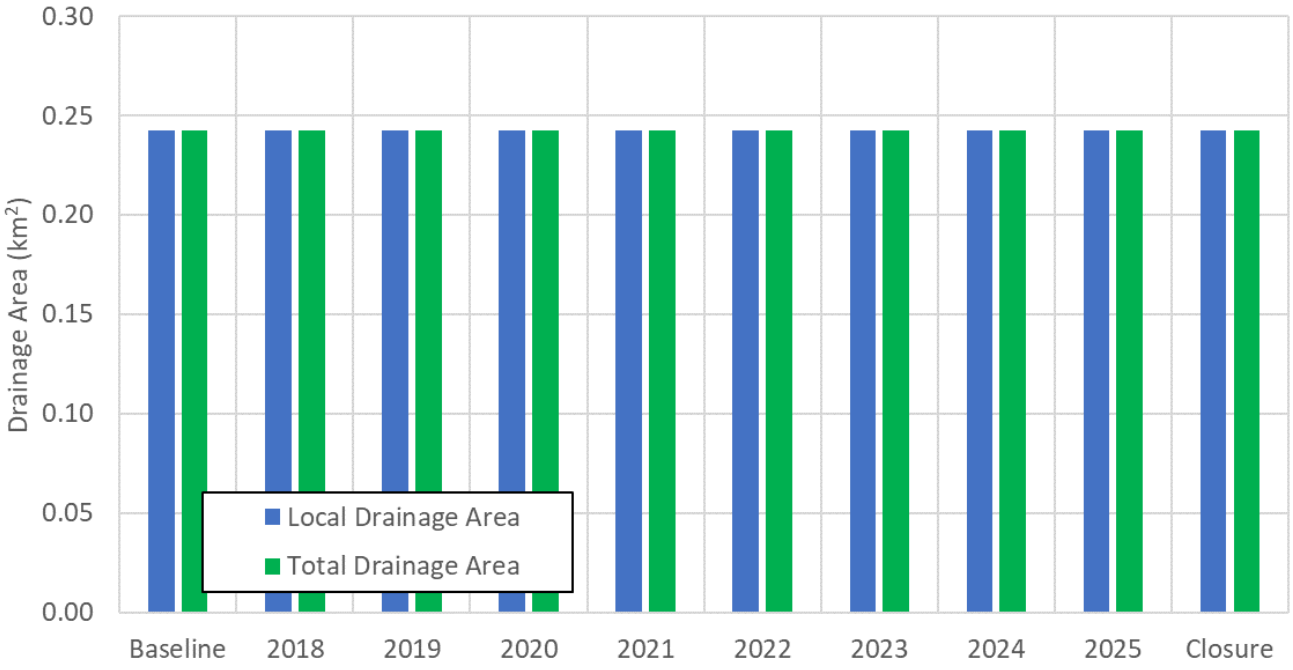

Figure 51: Drainage Area Progression through the Project (North Sector)

5.6.2 Water Balance

Inflows and outflows are summarized in Table 20, and presented in tabular form in Appendix F.

Table 20: Water Balance Flow Components (North Sector)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 52 (Construction / Operations) ■ Figure 53 (Closure)	■ Runoff from natural areas	■ Natural drainage	■ 2018	■ Post-Closure	■ Runoff volumes are expected to be inversely proportional to the footprint of the Whale Tail WRSF encroaching on the North Sector / Sump watershed from 2021 until the end of operations.
	■ Runoff from the Whale Tail WRSF	■ Natural drainage	■ 2021	■ Post-Closure	■ Runoff volumes are expected to be proportional to the footprint of the Whale Tail WRSF encroaching on the North Sector / Sump watershed from 2021 until the end of operations.
	■ Seepage from the Whale Tail WRSF	■ Natural drainage	■ 2021	■ Post-Closure	■ Based on OKC modelling results, seepage from the WRSF is negligible (See Section 4.0).
OUTFLOWS					
■ Figure 54 (Construction / Operations) ■ Figure 55 (Closure)	■ Runoff to Whale Tail Lake (North Basin)	■ Natural drainage	■ 2018	■ 2019	■ Natural drainage to Whale Tail Lake (North Basin) until the Whale Tail Attenuation Pond becomes available.
	■ Runoff to the Whale Tail Attenuation Pond	■ Pump / Pipeline	■ 2019	■ 2022	■ Runoff pumped to the Whale Tail Attenuation Pond until the IVR Attenuation Pond becomes available. ■ Runoff volumes are expected to decrease as the footprint of the Whale Tail WRSF in the North Sector catchment increases.
	■ Runoff diversion to the IVR Attenuation Pond	■ Pump / Pipeline	■ 2022	■ Closure	■ Runoff volumes are expected to be constant due to the constant footprint of the Whale Tail WRSF.
	■ Runoff to Whale Tail Pit / Lake (North Basin)	■ Natural drainage	■ Closure	■ Post-Closure	■ Runoff volumes remain the same as in closure based on the runoff assumptions described in Section 4.0

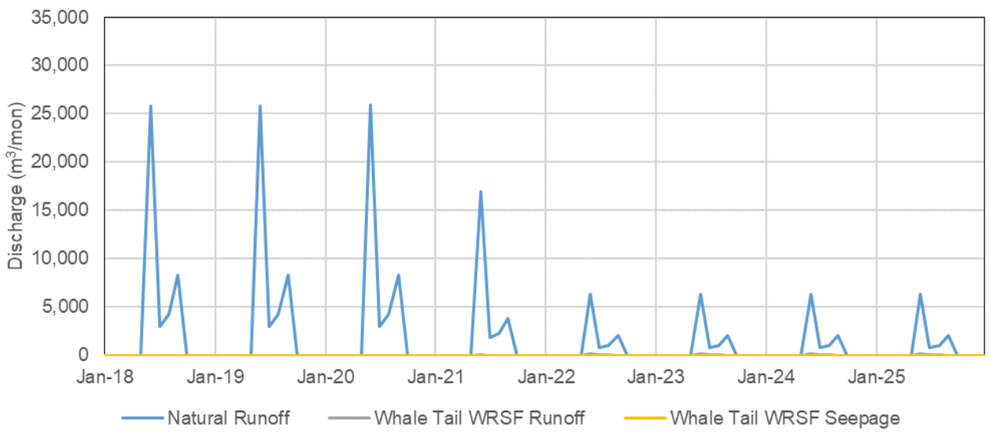

Figure 52: Inflows to the North Sector (Construction and Operations)

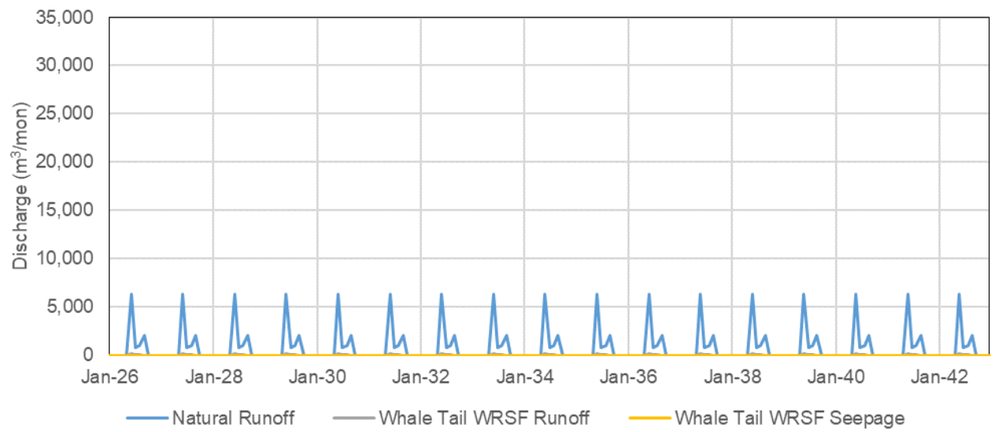

Figure 53: Inflows to the North Sector (Closure)

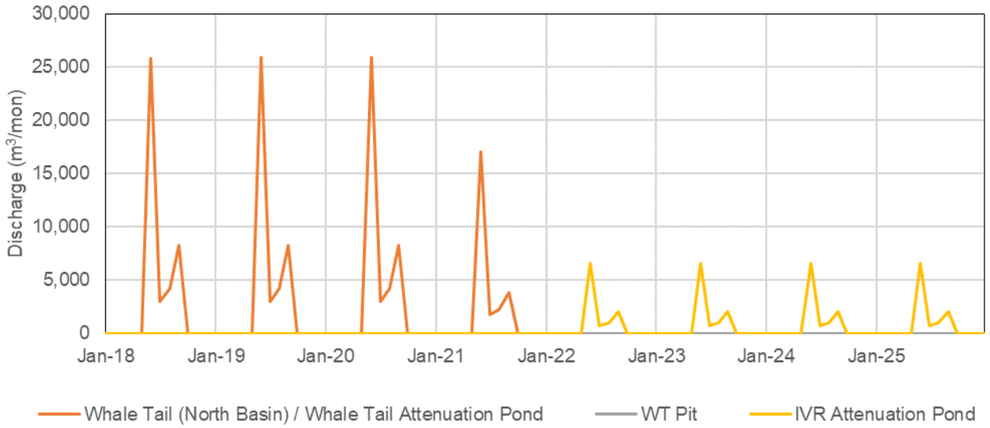

Figure 54: Outflows from the North Sector (Construction and Operations)

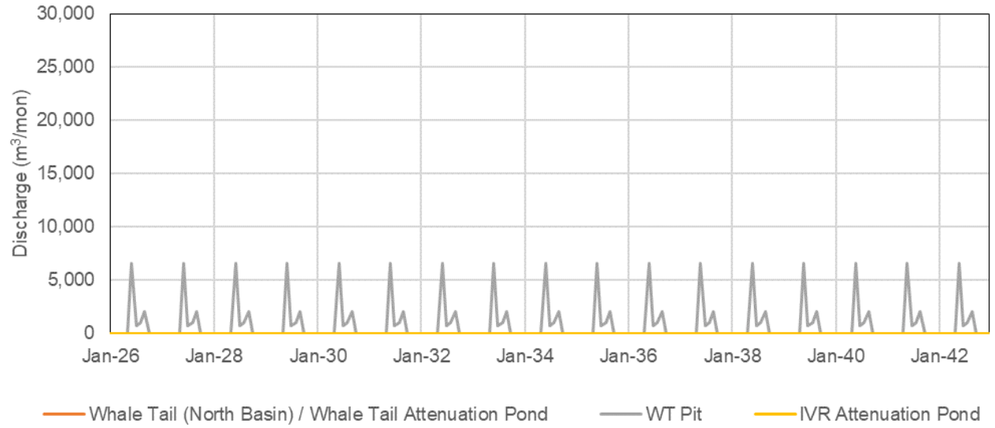

Figure 55: Outflows from the North Sector (Closure)

5.6.3 Changes from the FEIS Addendum

The following changes are relevant to the North Sector water balance:

- The updated drainage area delineation results in a smaller drainage area for the Whale Tail WRSF Contact Water Collection System (0.243 km^2 vs 0.289 km^2 previously).
- The primary difference in this update is the calculation of runoff and seepage from the WRSF. As explained in Section 4.0, the updated calculation method significantly reduces the generated runoff from the stockpile and sets the seepage to zero.

The impact of these changes results in a substantial decrease (approximately 38%) in cumulative inflows to the North Sump (191,050 m^3 vs. 308,000 m^3 previously). By 2042, the cumulative inflows are 67% lower than for the FEIS case (368,300 m^3 vs 1,111,650 m^3 previously) (Figure 56).

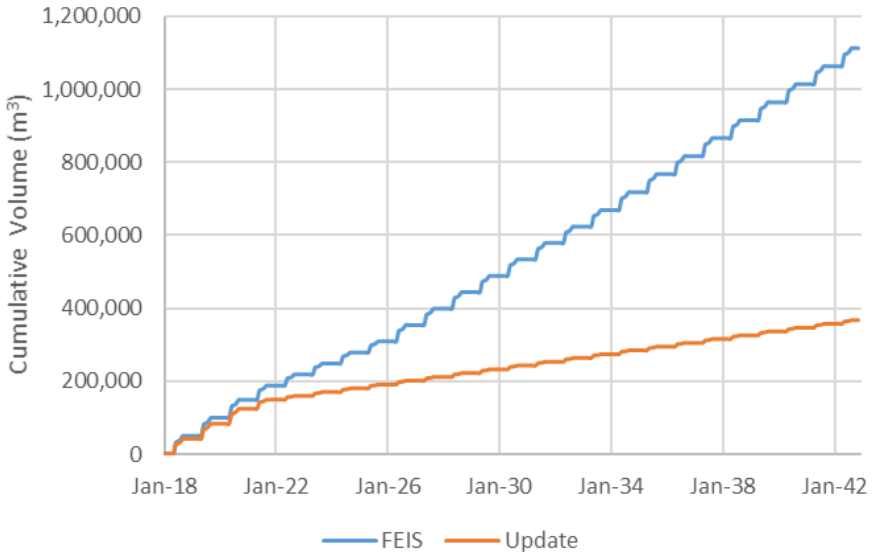

Figure 56: Comparison of Cumulative Inflows to the North Sector under the FEIS Addendum and the Current Water Balances

5.7 Whale Tail Pit

5.7.1 Catchment Characteristics and Water Management

The proposed Whale Tail Pit is located within the northern portion of Whale Tail Lake, just north of the Whale Tail Attenuation Pond. The Whale Tail Pit is initiated following the dewatering of Whale Tail Lake (North Basin) in 2019. Its operational runoff is conveyed to the active attenuation pond (i.e., either the Whale Tail Attenuation Pond or the IVR Attenuation Pond).

An overview of the catchment, along with its drainage pathways, is provided in Figure 57.

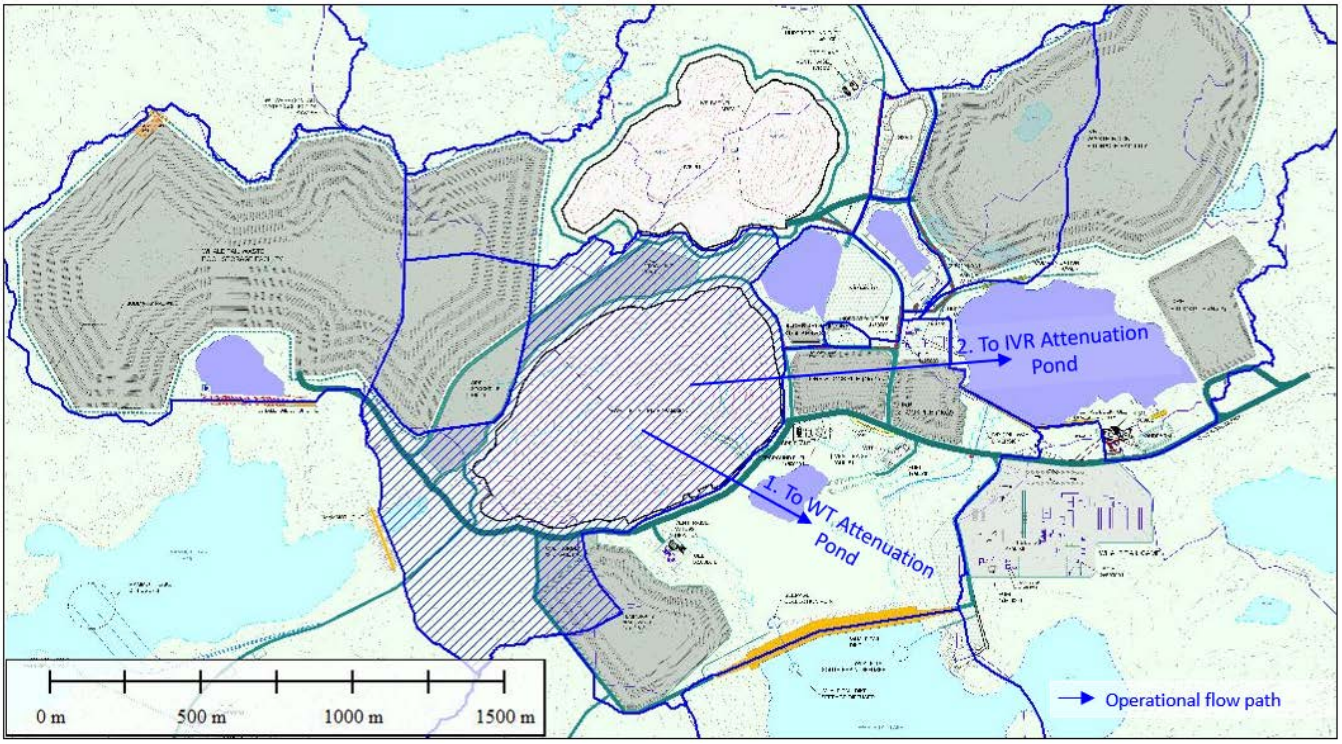

Figure 57: Whale Tail Pit Catchment Overview

Storage characteristics are summarized in Table 21. Drainage areas of the Whale Tail Pit are summarized in Figure 58.

The Whale Tail Pit catchment remains local with a drainage area of 1.17 km^2 until closure. At closure and following the refilling of IVR Pit (see Section 5.8.3), natural drainage patterns surrounding the Whale Tail Pit are re-established to expedite its refilling. The drainage area of the Whale Tail Pit increases to 29.6 km^2 which includes the sum of the natural drainage area of Whale Tail Lake and of the Whale Tail WRSF.

Table 21: Storage Characteristics (Whale Tail Pit)

Snapshot	Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Baseline to Closure	1.17	-129 (2025) to 79 (2019)	0	146.3	54,907,880
Closure (> IVR Pit full) to Post-Closure	29.6	n/a	n/a	146.3	54,907,880

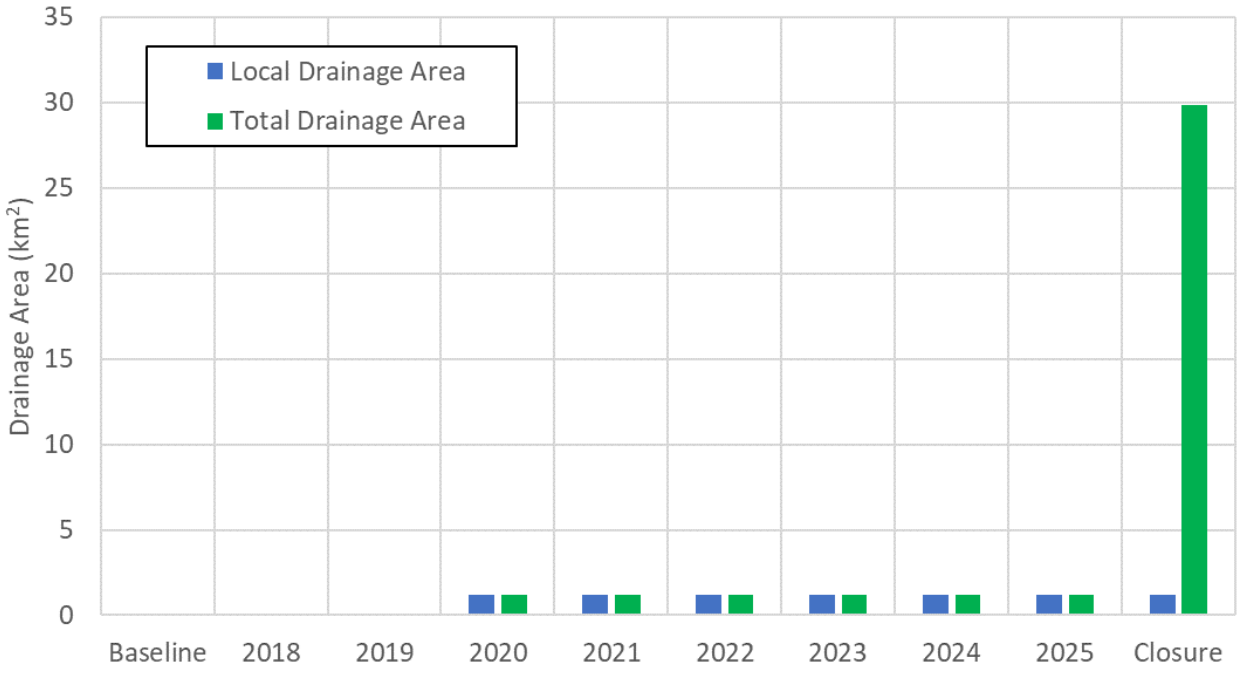

Figure 58: Drainage Area Progression through the Project (Whale Tail Pit)

5.7.2 Water Balance

Inflows and outflows are summarized in Table 22, and presented in tabular form in Appendix F. Whale Tail Pit is expected to be refilled to 146.3 masl by 2040.

Table 22: Water Balance Flow Components (Whale Tail Pit)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 59 (Construction / Operations) ■ Figure 60 (Closure)	■ Catchment Runoff	■ Natural drainage	■ 2019	■ Post-Closure	■ Annual runoff volumes are expected to decrease slightly in 2022 with the encroachment of the NPAG WRSF into the Whale Tail Pit drainage area.
	■ Groundwater	■ Natural drainage	■ 2019	■ Post-Closure	■ Groundwater inflows are expected throughout operations of the pit. ■ Freeze back of the pit wall is expected by closure, preventing inflows into the pit until thawing during pit refilling (Golder, 2019b).
	■ Drilling Water	■ Pump / Pipeline	■ 2019	■ Closure	■ Drilling water from Lake C38 (Nemo Lake) during operations of the pit.
	■ Runoff from overburden storage	■ Natural drainage	■ 2019	■ Post-Closure	■ Annual runoff volumes are expected to be constant.
	■ Runoff from NPAG WRSF	■ Natural drainage	■ 2022	■ Post-Closure	■ Annual runoff volumes are expected to be constant.
	■ Runoff from GSP-1	■ Natural drainage	■ Closure	■ Post-Closure	■ Runoff from GSP-1 following its backfill at closure, re-establishing its natural drainage patterns. ■ Annual runoff volumes are expected to be constant.
	■ Runoff from the North Sector	■ Natural drainage	■ Closure	■ Post-Closure	■ Runoff from the North Sector at closure once its natural drainage patterns are re-established.
	■ Runoff from the IVR WRSF	■ Diverted or Pumped	■ Closure	■ Post-Closure	■ Although the IVR WRSF drains naturally to the IVR Pit, its runoff is diverted to the Whale Tail Pit for water quality purposes (Golder 2019a).
	■ Overflow from IVR Pit	■ Natural drainage	■ IVR Pit full	■ Post-Closure	■ Overflow from the IVR Pit (water surface elevation of 149.3 masl) into Whale Tail Pit during closure. ■ Annual runoff volumes are expected to be constant.
	■ Overflow from the Whale Tail Attenuation Pond	■ Natural drainage	■ WT Att. Pd. full	■ Post-Closure	■ Overflow from the Whale Tail Attenuation Pond (water surface elevation of 146.3 masl) into Whale Tail Pit during closure. ■ Annual runoff volumes are expected to be constant until these are influenced by net groundwater losses in 2035.
OUTFLOWS					
■ Figure 61 (Construction / Operations) ■ Figure 62 (Closure)	■ Drill water losses	■ n/a	■ 2019	■ Closure	■ Water locked within the ore
	■ Discharge to Whale Tail Attenuation Pond	■ Pump / Pipeline	■ 2019	■ 2022	■ Runoff is managed through the Whale Tail Attenuation Pond until the IVR Attenuation pond becomes operational. ■ Annual runoff volumes are expected to be approximately constant, with minor fluctuations from groundwater inflows.
	■ Evaporation	■ n/a	■ 2019	■ Post-Closure	■ Evaporative losses proportional to the water surface area of Whale Tail Pit.
	■ Discharge to IVR Attenuation Pond	■ Pump / Pipeline	■ 2022	■ Closure	■ Runoff is managed through the IVR Attenuation Pond once operational, until closure. ■ Annual runoff volumes are expected to be constant.

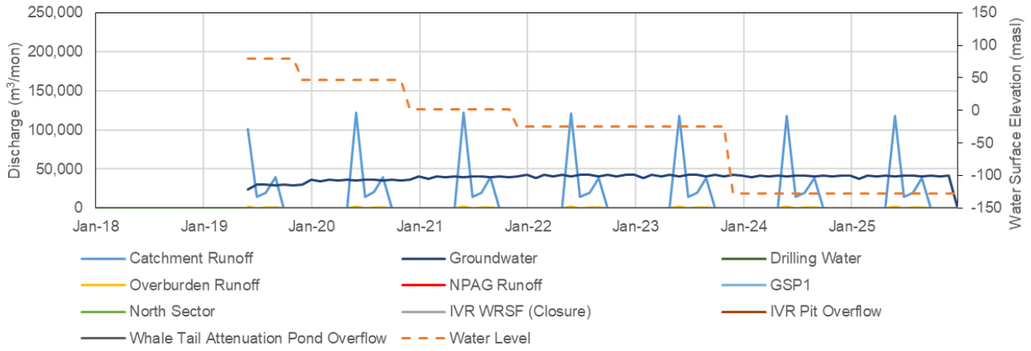

Figure 59: Inflows to the Whale Tail Pit (Construction and Operations)

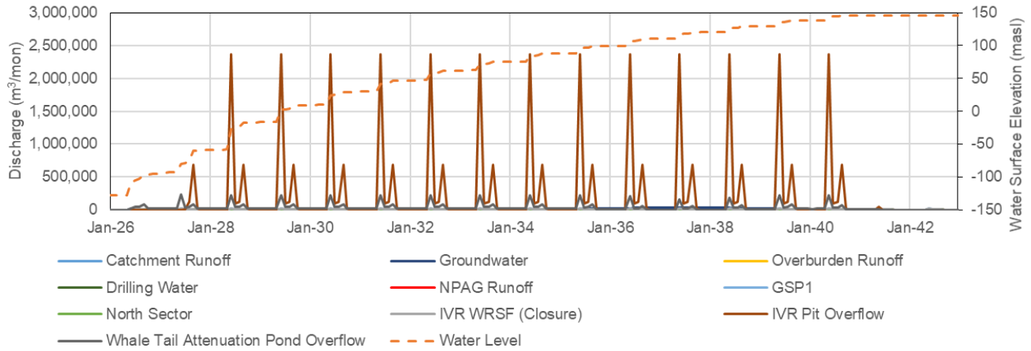

Figure 60: Inflows to the Whale Tail Pit (Closure)

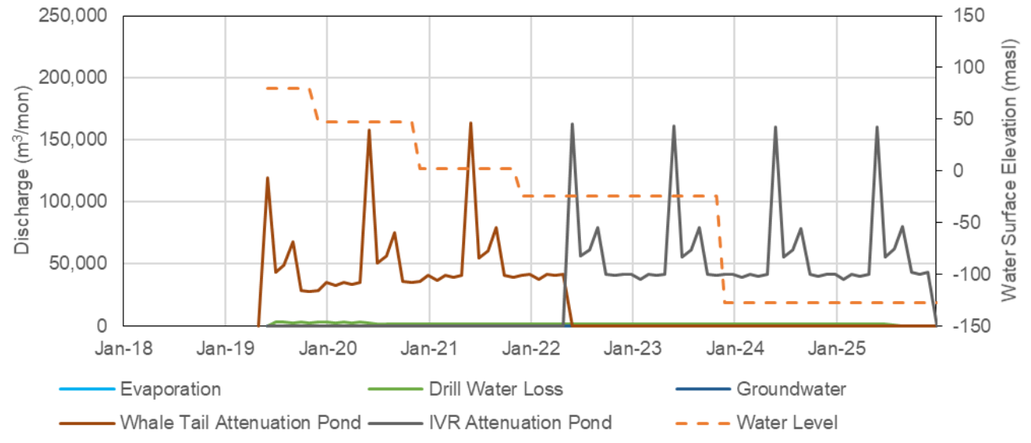

Figure 61: Outflows from the Whale Tail Pit (Construction and Operations)

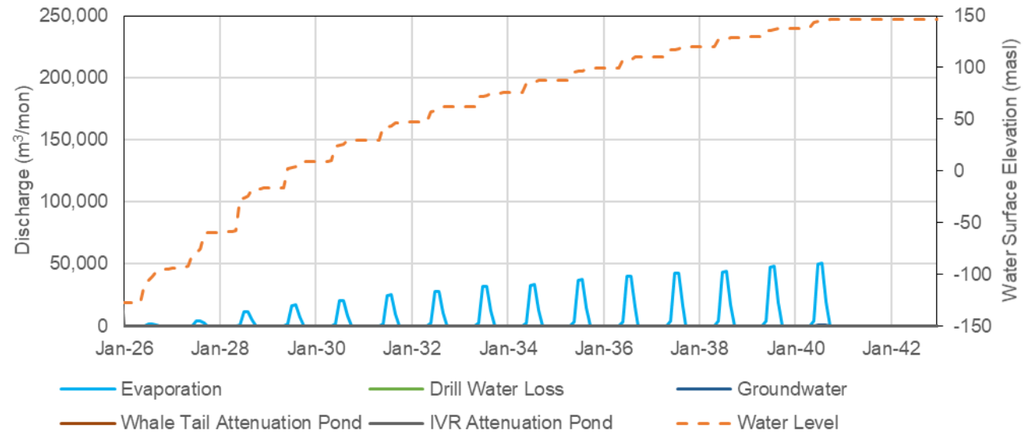

Figure 62: Outflows from the Whale Tail Pit (Closure)

5.7.3 Changes from the FEIS Addendum

The most significant changes to inflows to the Whale Tail Pit are caused by the following:

- The updated drainage area delineation results in a slightly larger drainage area for the Whale Tail Pit (1.17 km^2 vs 1.16 km^2 previously).
- North Sector and IVR WRSF Inflows. Runoff from the North Sector and the IVR WRSF are significantly reduced due to the updated calculation of runoff and seepage from the WRSFs.
- The reduction of predicted groundwater flows to and from the pit (see Section 4.0).

By the end of operations, there is 121,600 m^3 (3%) less inflow to the pit than previously predicted (4,559,850 m^3 vs. 4,681,450 m^3) (Figure 63). For closure, the result of these updates is that the filling of Whale Tail pit is delayed by a year (2040 instead of 2039) (Figure 64).

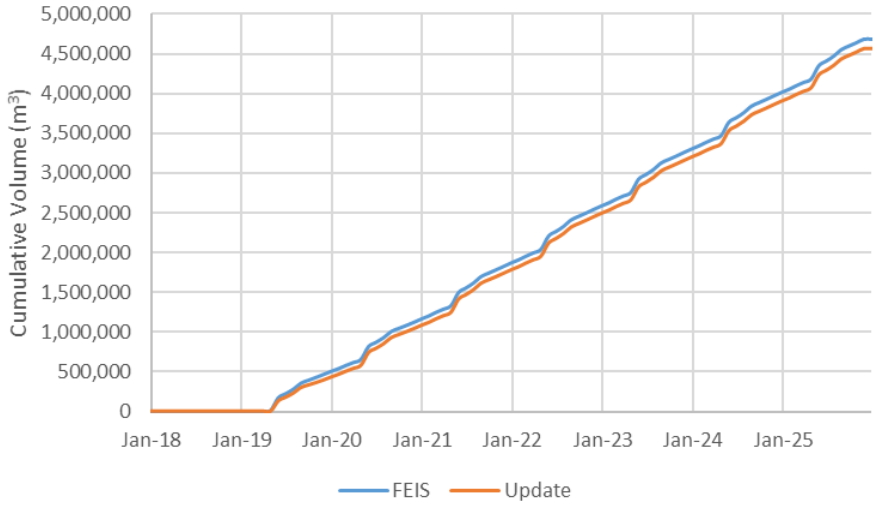

Figure 63: Comparison of Cumulative Inflows to the Whale Tail Pit during Operations under the FEIS Addendum and the Current Water Balances

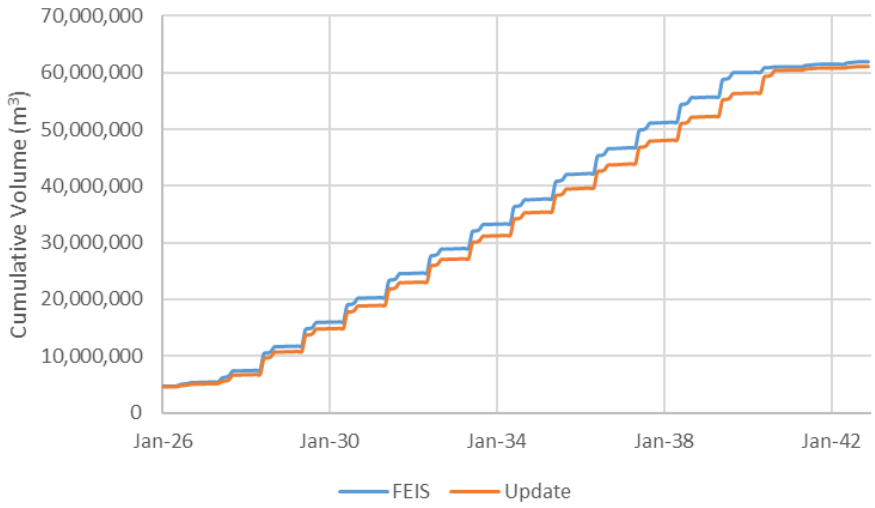

Figure 64: Comparison of Cumulative Inflows to the Whale Tail Pit during the filling period under the FEIS Addendum and the Current Water Balances

5.8 Whale Tail Lake (North Basin) / Whale Tail Attenuation Pond

5.8.1 Catchment Characteristics and Water Management

The Whale Tail Attenuation Pond is located just south of the Whale Tail Pit. It becomes operational once Whale Tail Lake (North Basin) is dewatered. Dewatering of Whale Tail Lake (North Basin) is planned in two phases - Phase 1, when approximately 2 million m^3 is dewatered in March and April 2019 for a period of approximately 45 days; and Phase 2, when approximately 1.1 million m^3 is dewatered in June 2019.

Aside from contact water managed within Quarry 1 and GSP-1, the Whale Tail Attenuation Pond is intended to manage all contact water until the IVR Attenuation Pond becomes operational in 2022. During this period, contributing catchments include those from the Whale Tail WRSF Contact Water Collection System, the North Sump, Whale Tail Pit, the IVR Pit, the IVR WRSF, the camp site and a portion of the NPAG Stockpile. Collected water is discharged to Lake A16 (Mammoth Lake) via the O-WTP during open water conditions. Prior to the availability of the S-WTP (brackish) in October 2020, contact water is pumped to GSP-1 during winter conditions to prevent overflow of the Whale Tail Attenuation Pond. After October 2020, this collected water is discharged to Lake A16 (Mammoth Lake) via the S-WTP (brackish) during winter (i.e., October 2020 to April 2022).

Once the IVR Attenuation Pond becomes operational, the Whale Tail Attenuation Pond only manages contact water from its local contributing area until closure. Winter discharge to the IVR Attenuation Pond is not required during this period due to a net groundwater loss from the Whale Tail Attenuation Pond.

At closure, the Whale Tail Attenuation Pond becomes part of Whale Tail Lake (North Basin) once more upon the filling of the Whale Tail and IVR Pits. The final elevation of the pit lake is 153.5 masl. This level is maintained by the Mammoth Lake sill constructed at closure. The Mammoth Dike and Whale Tail Dike remain in place until pit lake water meets quality objectives, predicted to occur by the end of 2042 (Golder 2019a).

Post-closure is initiated in 2042. It is defined as when the pit lake is fully flooded, and water quality is acceptable. At that time, drainage patterns are then re-established towards Lake A16 (Mammoth Lake) (i.e., water overflows

the Mammoth Lake sill) and Mammoth Dike and Whale Tail Dike are decommissioned reconnecting the North and South basins of Whale Tail Lake.

An overview of the catchment, along with its drainage pathways, is provided in Figure 65.

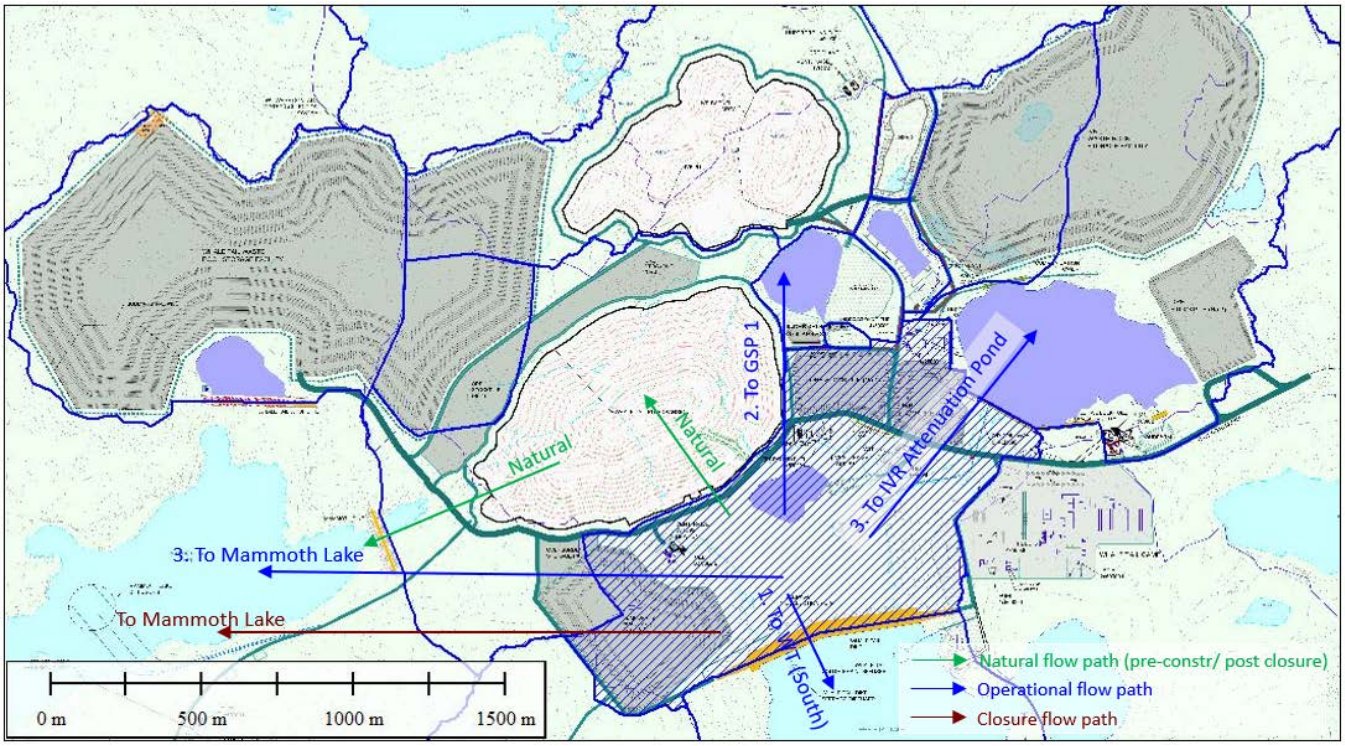

Figure 65: Whale Tail Lake (North Basin) / Whale Tail Attenuation Pond Catchment Overview

Storage characteristics are summarized in Table 23. Drainage areas of the Whale Tail Pit are summarized in Figure 66.

Whale Tail Lake (North Basin) has a baseline catchment area of 28.6 km^2. This catchment area is reduced to 28.4 km^2 in 2017 from the isolation of the Underground Mine and related water management systems. It is further reduced to 6.12 km^2 with the construction of Whale Tail Dike in 2018. In 2019, the construction of the North East Diversion and the dewatering of Whale Tail Lake (North Basin) further reduce the catchment area to 3.05 km^2. The final reduction in catchment area (to 1.03 km^2) occurs at the end of 2019 when the East Channel comes online, diverting the A53/IVR Attenuation Pond catchment towards Whale Tail Lake (South Basin). The Whale Tail Lake Attenuation Pond, once operational, has a catchment area ranging from 1.03 km^2 (i.e., the local catchment to 5.16 km^2 (i.e., the total contributing drainage area prior to the operations of the IVR Attenuation Pond). At closure, the natural drainage is restored, returning to baseline conditions.

Table 23: Storage Characteristics (Whale Tail Lake [North Basin] / Whale Tail Attenuation Pond)

Snapshot	Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Baseline	28.4 to 28.6	152.5	3,029,705	152.5	3,029,705
2018	6.12	152.5	3,029,705	152.5	3,029,705
2019	3.05	134.6 to 152.5	0 to 3,029,705	152.5	3,029,705
Whale Tail Lake (North Basin) Dewatered to Closure	1.03 to 5.16	134.6 to 143.5	0 to 133,232	143.5	133,232
Closure (> Whale Tail Pit full) to Post-Closure	28.6	134.6 to 153.5	0 to 7,171,781	153.5	7,171,781

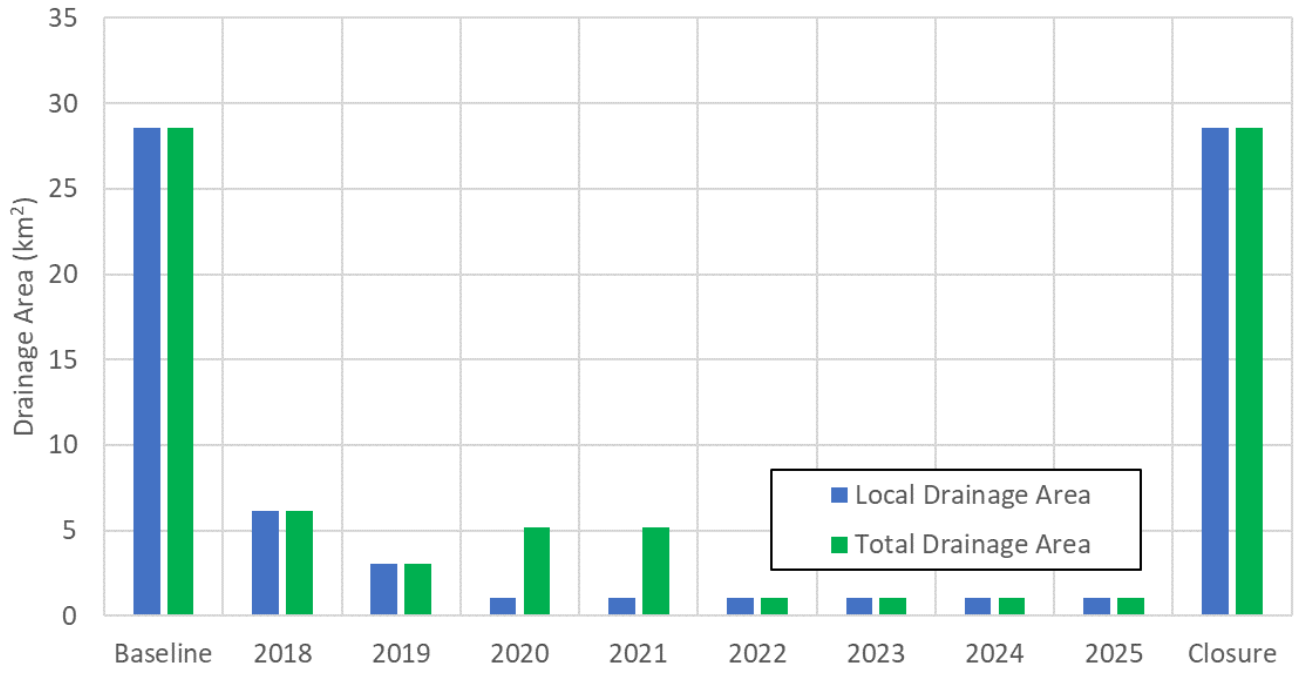

Figure 66: Drainage Area Progression through the Project (Whale Tail Lake [North Basin] / Whale Tail Attenuation Pond)

5.8.2 Water Balance

Inflows and outflows are summarized in Table 24, and presented in tabular form in Appendix F. Whale Tail Lake (North Basin) is expected to reach the elevation of 153.5 masl by 2042.

Table 24: Water Balance Flow Components (Whale Tail Lake [North Basin] / Whale Tail Attenuation Pond)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 67 (Construction / Operations) ■ Figure 68 (Closure)	■ Catchment runoff and direct precipitation	■ Natural drainage	■ 2018	■ Post-Closure	■ Runoff from the local catchment. ■ Annual runoff volumes are expected to be constant following the installation of the Whale Tail Dike and Mammoth Dike.
	■ Runoff from the Whale Tail Pit, IVR Pit, Northeast Sector, and Lake A53	■ Natural drainage	■ 2018	■ 2018	■ Runoff from the catchments of Whale Tail Pit, IVR Pit, the Northeast Sector, and Lake A53 naturally draining to Whale Tail Lake (North Basin) prior to dewatering activities.
	■ Whale Tail Lake (South Basin)	■ Natural drainage	■ 2018	■ 2019	■ Natural runoff from Whale Tail Lake (South Basin) to Whale Tail Lake (North Basin) until the installation of the Whale Tail Dike.
	■ Runoff from the North Sector	■ Natural drainage	■ 2018	■ 2021	■ Runoff from the North Sector / Sump prior to the operations of the IVR Attenuation Pond in 2022. ■ Annual runoff volumes are expected to be constant.
	■ Flows from the Camp Biodisk	■ Pump / pipeline	■ 2018 ■ 2026	■ 2022 ■ Post-Closure	■ Flows from the camp biodisk prior to the initiation of the Whale Tail Attenuation Pond until the IVR Attenuation Pond becomes operational in 2022. ■ Flows from the camp biodisk during closure.
	■ Intercepted runoff from the Industrial Sector, Camp Sector and Ore Stockpile	■ Pump / Pipeline	■ June 2018 ■ 2019	■ July 2018 ■ Post-Closure	■ Runoff diversion from the Camp Sector in June and July 2018 prior to the completion of mining in Quarry 1 by end of July 2018. ■ Runoff collected once the Whale Tail Attenuation Pond becomes operational in June 2019 until post-closure.
	■ Runoff collected in the Whale Tail WRSF Contact Water Collection System	■ Pump / pipeline	■ 2019	■ 2022	■ Runoff collected once the Whale Tail Attenuation Pond becomes operational in June 2019 until the IVR Attenuation Pond becomes operational in 2022.
	■ Groundwater	■ Natural drainage	■ 2019	■ Post-Closure	■ Groundwater inflows during dewatering from March to June 2019. ■ Groundwater inflows following the dewatering of Whale Tail Lake (North Basin) from June 2019 to Post-Closure.
	■ Seepage through the Whale Tail Dike	■ Natural drainage	■ 2019	■ Post-Closure	■ Seepage from Whale Tail Lake (South Basin) thru the Whale Tail Dike once the Whale Tail Attenuation Pond becomes operational in June 2019, until Whale Tail Lake (North Basin) is refilled before post-closure. ■ 50% of the seepage is collected by the Whale Tail Dike Seepage Pumping Station when operational by January 2020 and recirculated to Whale Tail Lake (South Basin).
	■ Flows from the Truck Shop	■ Pump / pipeline	■ 2019	■ 2022	■ Flows from the truck shop once the Whale Tail Attenuation Pond becomes operational in June 2019 until the IVR Attenuation Pond becomes operational in 2022.
	■ Discharge from the Whale Tail Pit, IVR Pit, and IVR WRSF	■ Pump / pipeline	■ 2019	■ 2022	■ Discharges until the IVR Attenuation Pond becomes operational in 2022.
	■ Runoff from NPAG stockpile	■ Natural drainage	■ 2020	■ Post-Closure	■ Runoff during operation is based on OKC runoff calculations. At closure, when the stockpile is removed, the Golder-calculated land runoff calculations are used

Figure	Flow Component	Flow Type	Start	End	Note / Comment
OUTFLOWS					
■	■ Evaporation	■ n/a	■ 2018	■ Post-Closure	■ Evaporative losses are expected to be proportional to the water surface area of Whale Tail Lake (North Basin) / Attenuation Pond.
■ Figure 69 (Construction / Operations) ■ Figure 70 (Closure)	■ Runoff to Lake A16 (Mammoth Lake)	■ Natural drainage	■ 2018 ■ Post-Closure	■ 2019 ■ Post-Closure	■ Natural runoff to Lake A16 (Mammoth Lake) until the Mammoth Dike is operational and following the refilling of Whale Tail Lake (North Basin).
	■ Drawdown to Whale Tail Lake (South Basin)	■ Pump / pipeline	■ 2019	■ 2019	■ Dewatering of 66% of the Whale Tail Lake (North Basin) to Whale Tail Lake (South Basin) starting in March for 45 days9, without treatment (assumed not be required).
	■ Drawdown to C-WTP	■ Pump / pipeline	■ 2019	■ 2019	■ Dewatering of the remaining 34% of the Whale Tail Lake (North Basin) to Whale Tail Lake (South Basin) via the C-WTP.
	■ Discharge via the O-WTP	■ Pump / pipeline	■ 2019	■ 2022	■ Discharge of collected water to Lake A16 (Mammoth Lake) until May 2021 and to Whale Tail Lake (South Basin) from June 2021 until May 2022 via the O-WTP during open water conditions.
	■ Discharge to GSP-1	■ Pump / pipeline	■ 2019	■ 2020	■ Discharge of collected water to GSP-1 during winter conditions from October 2019 to May 2020 before the S-WTP (brackish) becomes available to treat winter discharges.
	■ Groundwater	■ Natural drainage	■ 2019	■ Post-Closure	■ Infiltration once the Whale Tail Attenuation Pond becomes operational until post-closure.
	■ Discharge to the S-WTP (brackish)	■ Pump / pipeline	■ 2020	■ 2022	■ Discharge of collected water to Lake A16 (Mammoth Lake) via the S-WTP (brackish) during winter conditions from October (i.e., when the treatment unit becomes operational) to April in 2020-2021 and 2021-2022, after which the S-WTP (brackish) is required to treat low TDS salinity water from the Underground Mine.
	■ Discharge to the IVR Attenuation Pond	■ Pump / pipeline	■ 2022	■ Closure	■ Discharge of collected water during open water conditions to the IVR Attenuation Pond when it becomes available in 2022 to the end of operations.
	■ Overflow to Whale Tail Pit	■ Natural drainage	■ Closure	■ WT Pit full	■ Overflow of the Whale Tail Attenuation Pond into Whale Tail Pit during refilling at 146.3 masl. ■ Overflow of the Whale Tail Attenuation Pond is expected to start in June 2026.

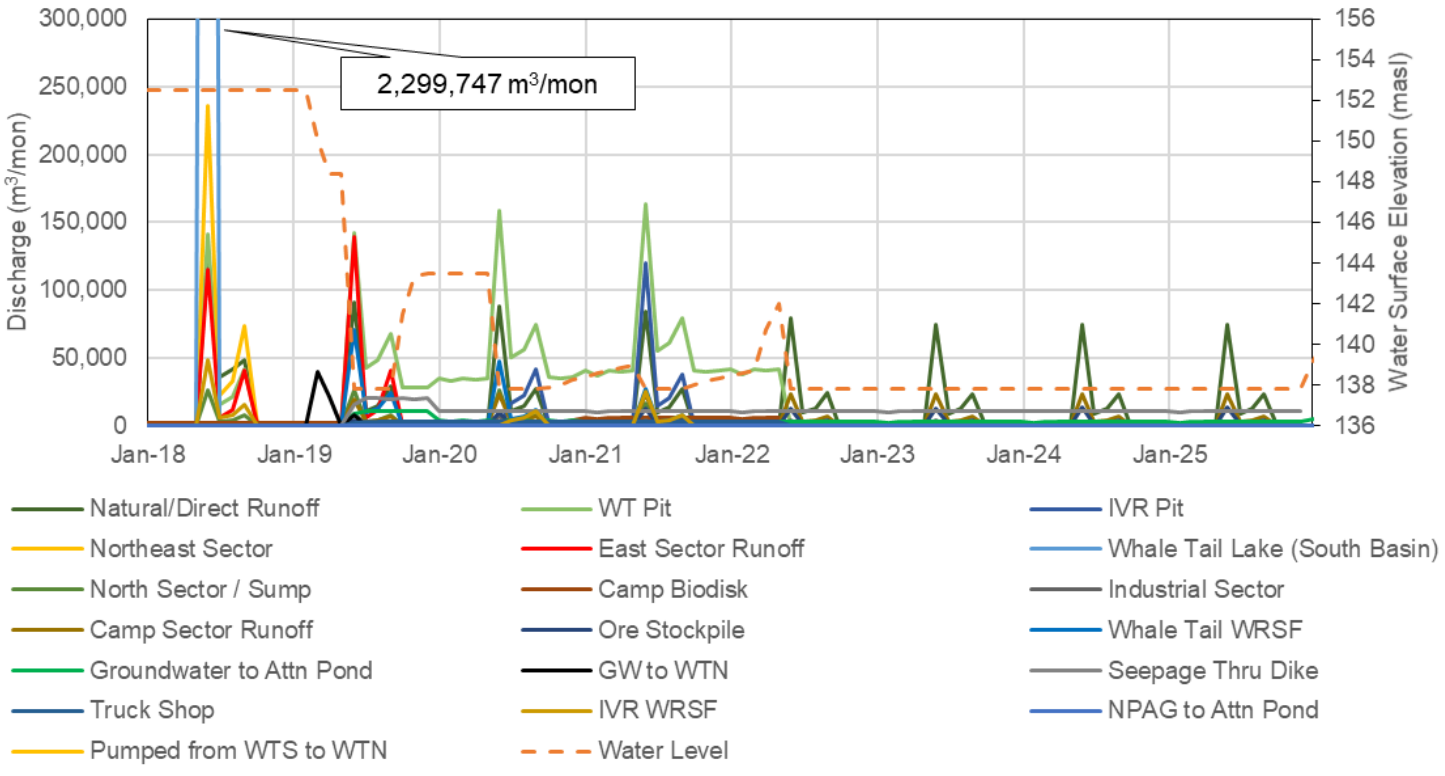

Figure 67: Inflows to the Whale Tail Lake [North Basin] / Whale Tail Attenuation Pond (Construction and Operations)

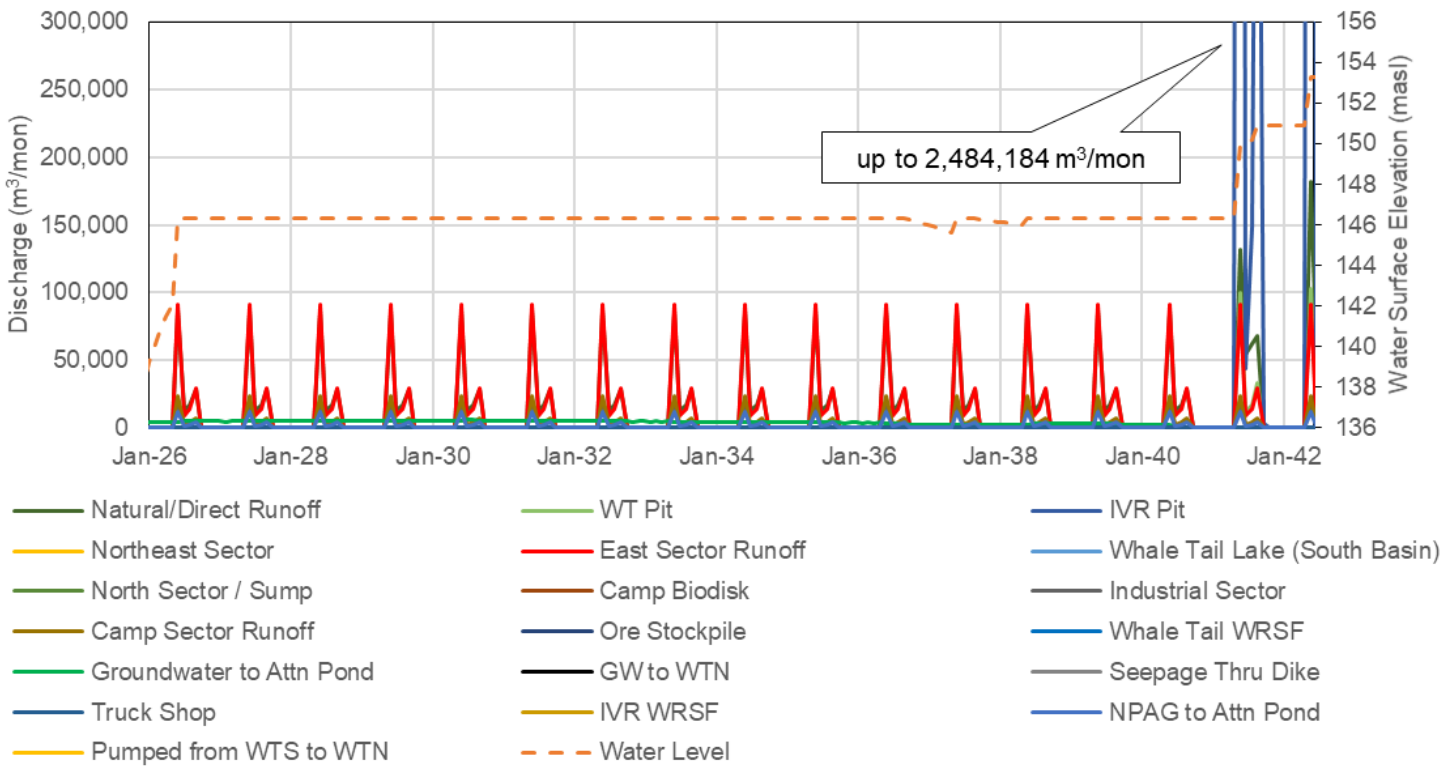

Figure 68: Inflows to the Whale Tail Lake [North Basin] / Whale Tail Attenuation Pond (Closure)

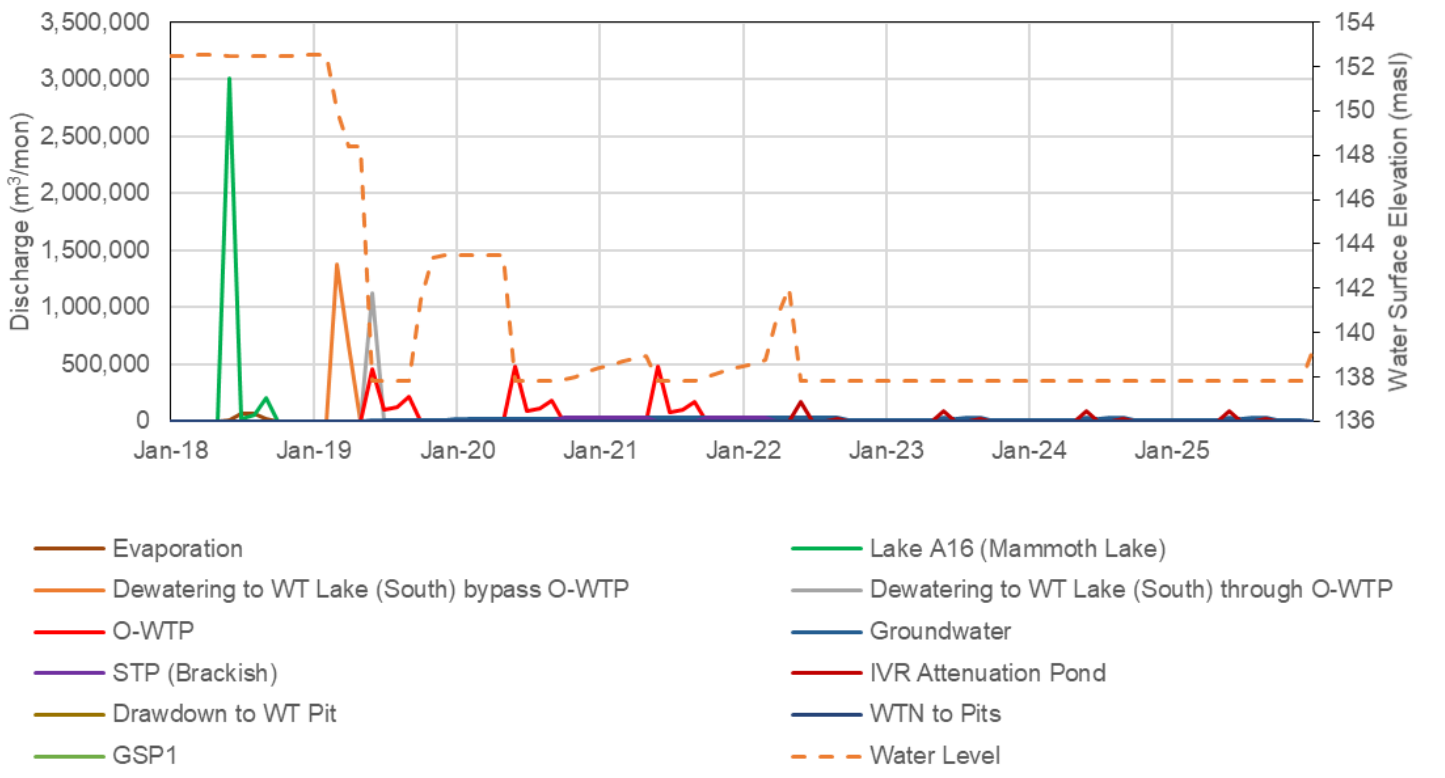

Figure 69: Outflows from the Whale Tail Lake [North Basin] / Whale Tail Attenuation Pond (Construction and Operations)

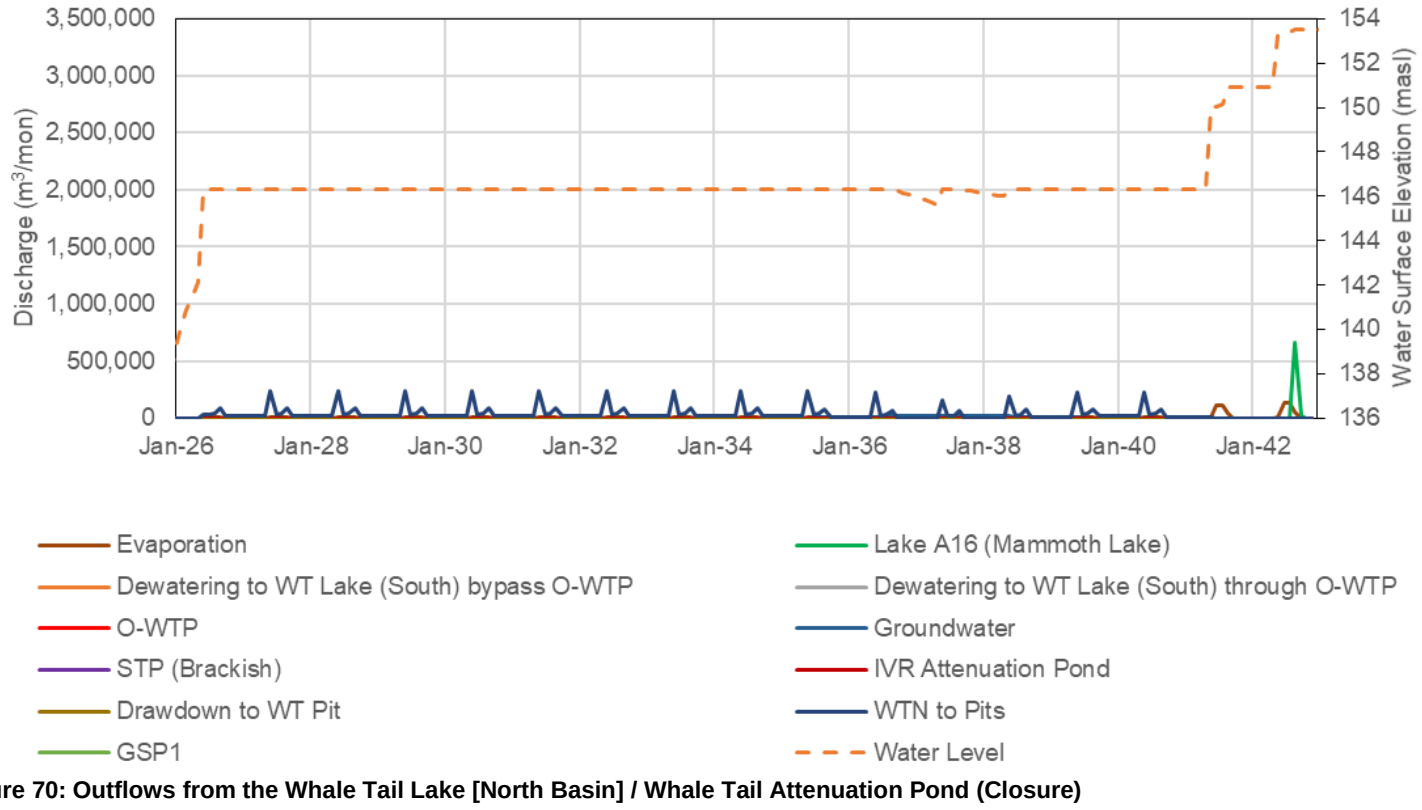

Figure 70: Outflows from the Whale Tail Lake [North Basin] / Whale Tail Attenuation Pond (Closure)

5.8.3 Changes from the FEIS Addendum

The most significant changes to inflows to the Whale Tail Attenuation Pond are caused by the following:

- The updated drainage area delineation results in a 21% smaller local drainage area in 2019 (3.05 km^2 vs 3.86 km^2 previously). However once Whale Tail Lake (North Basin) is dewatered, the difference drops to only 2% (5.16 km^2 vs 5.07 km^2 previously).
- WRSF Inflows. Runoff from the watersheds containing WRSFs are significantly reduced due to the updated calculation of runoff and seepage from the WRSFs.
- Consumptive flows. The operational camp flows starting in 2021 are approximately 1.5 times higher (192 m^3/day vs 77.8 m^3/day previously).

There is no change in the predicted groundwater flows to and from the pond (see Section 4.0).

By the end of operations, there is 1,695,350 m^3 (16%) less inflow to the pond than previously predicted (9,139,900 m^3 vs. 10,835,250 m^3). For closure, the result of these updates is that the filling of Whale Tail Lake (North Basin) is delayed by a year (2042 instead of 2041) (Figure 71).

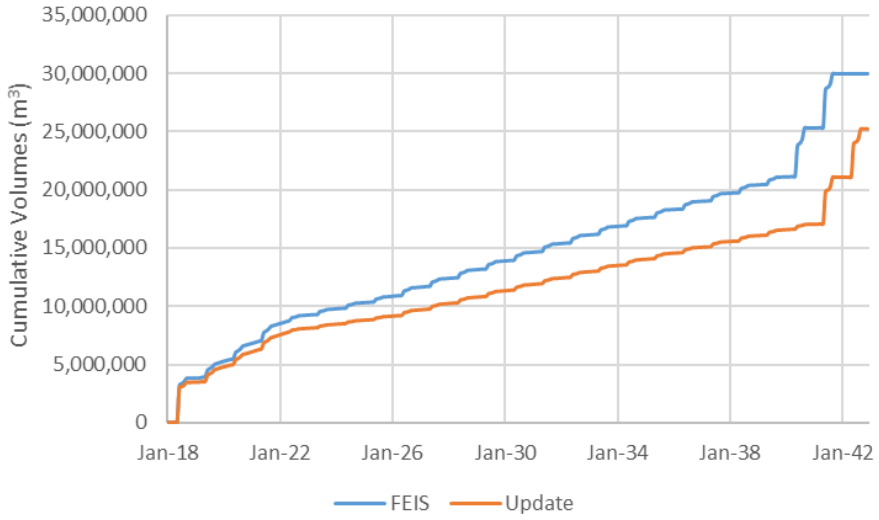

Figure 71: Comparison of Cumulative Inflows to the Whale Tail Attenuation Pond under the FEIS Addendum and the Current Water Balances

5.9 IVR Pit

5.9.1 Catchment Characteristics and Water Management

The proposed IVR Pit is located just north of Whale Tail Lake, within the Northeast Sector (see Section 5.2.1.3). The IVR Pit is initiated in Q3 2020. Its operational runoff is conveyed to the active attenuation pond (i.e., either the Whale Tail Attenuation Pond or the IVR Attenuation Pond).

An overview of the catchment, along with its drainage pathways, is provided in Figure 72.

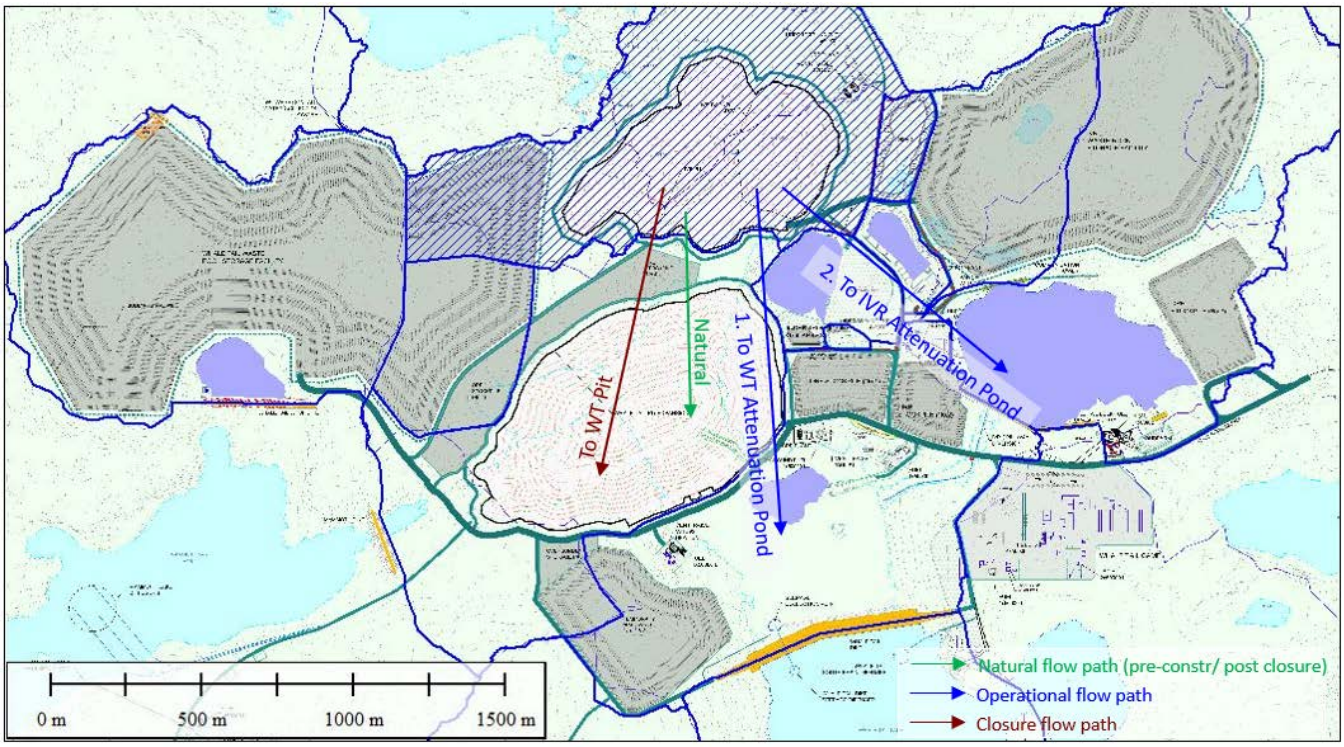

Figure 72: IVR Pit Catchment Overview

Storage characteristics are summarized in Table 25. Drainage areas of the Whale Tail Pit are summarized in Figure 73.

The IVR Pit catchment remains local with a drainage area of 1.18 km^2 until closure. At closure, natural drainage patterns surrounding the IVR Pit are mostly re-established, including the IVR Diversion and the Northeast Sector watersheds. The IVR WRSF watershed is diverted to Whale Pit. Runoff from the Whale Tail Lake (South Basin), the GSP-1 watershed area, the Underground Mine watershed area and the Whale Tail WRSF Contact Water Collection System are pumped to the IVR Pit to expedite its refilling. The drainage area of the IVR Pit Tail Pit increases to 25.4 km^2 which includes the sum of the natural drainage area of Whale Tail Lake (South Basin) and of the Whale Tail WRSF.

Table 25: Storage Characteristics (IVR Pit)

Snapshot	Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Q3 2020 to Closure	1.18	46 (2025) to 130 (2020)	0	149.3	10,107,510
Closure to Post-Closure	25.4	n/a	0	149.3	10,107,510

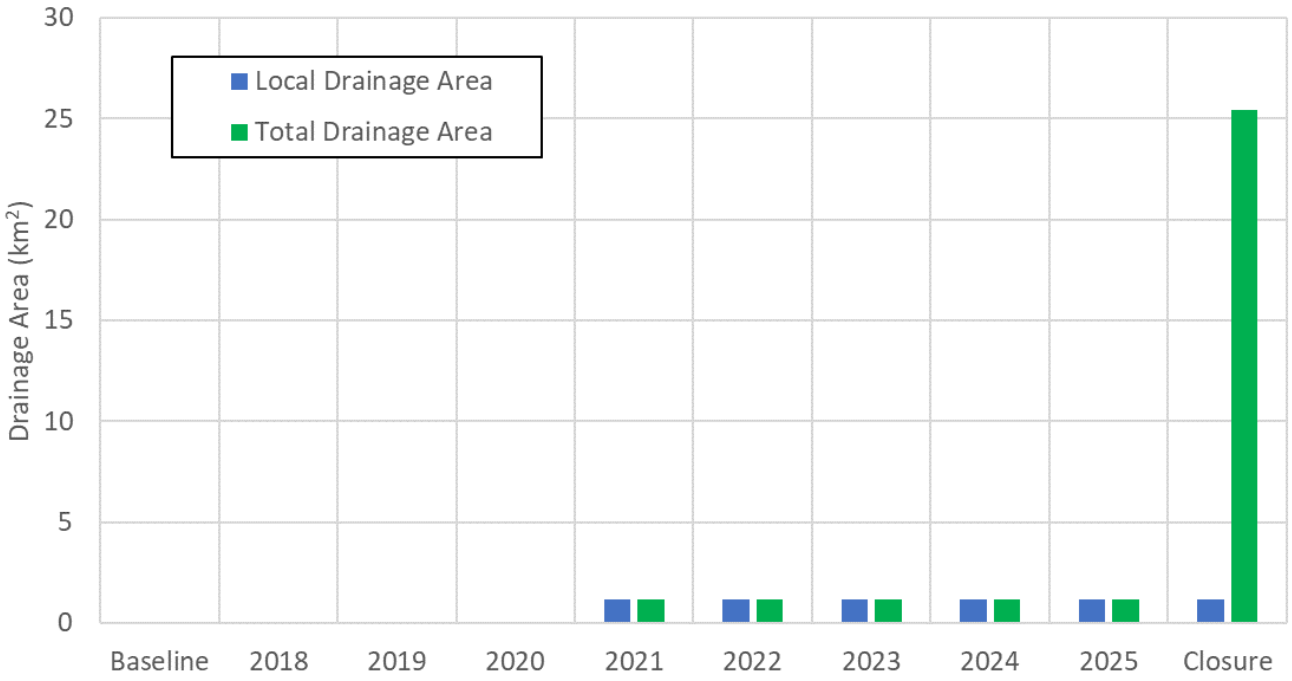

Figure 73: Drainage Area Progression through the Project (IVR Pit)

5.9.2 Water Balance

Inflows and outflows are summarized in Table 26, and presented in tabular form in Appendix F. IVR Pit is expected to be refilled to 149.3 masl by 2027.

Table 26: Water Balance Flow Components (IVR Pit)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 74 (Construction / Operations) ■ Figure 75 (Closure)	■ Direct and indirect runoff from natural areas	■ Natural drainage	■ Q3 2020	■ Post-Closure	■ Runoff volumes are expected to be constant on an annual basis, with minor fluctuations from direct runoff at various pit surface areas.
	■ Drilling Water	■ Pump / Pipeline	■ Q3 2020	■ Closure	■ Drilling water from Lake C38 (Nemo Lake) during operations of the pit.
	■ Runoff from the IVR Diversion sub-watershed	■ Natural drainage	■ Closure	■ Post-Closure	■ Runoff from the IVR Diversion sub-watershed following its decommissioning at closure, re-establishing its natural drainage patterns. ■ Runoff volumes are expected to be constant on an annual basis.
	■ Drawdown of Whale Tail Lake (South Basin)	■ Pump / Pipeline	■ Closure	■ WTS drawn down	■ Runoff from Whale Tail Lake (South Basin) during its drawdown from 156.0 masl to 153.5 masl in 2026.
	■ Discharge of overflow from the Whale Tail Lake (South Basin)	■ Pump / Pipeline	■ WTS drawn down	■ Post-Closure	■ Discharge of water from Whale Tail Lake (South Basin) following its drawdown in 2026 to maintain its water surface elevation at 153.5 masl during closure. ■ Annual runoff volumes are expected to be constant.
	■ Runoff from the northeast portion of the Whale Tail WRSF	■ Pump / Pipeline	■ Closure	■ Post-Closure	■ Annual runoff volumes are expected to be constant.
OUTFLOWS					
■ Figure 76 (Construction / Operations) ■ Figure 77 (Closure)	■ Evaporation	■ n/a	■ Q3 2020	■ Post-Closure	■ Evaporative losses proportional to the water surface area of IVR Pit.
	■ Discharge to Whale Tail Attenuation Pond	■ Pump / Pipeline	■ Q3 2020	■ 2022	■ Runoff is managed through the Whale Tail Attenuation Pond until the IVR Attenuation pond becomes operational. ■ Runoff volumes are expected to be approximately constant on an annual basis, with minor fluctuations from direct runoff at various pit surface areas.
	■ Drilling Water Losses	■ n/a	■ Q3 2020	■ 2025	■ Water locked within the ore
	■ Discharge to IVR Attenuation Pond	■ Pump / Pipeline	■ 2022	■ Closure	■ Runoff is managed through the IVR Attenuation Pond once operational, until closure. ■ Annual runoff volumes are expected to be constant.
	■ Overflow to Whale Tail Pit	■ Natural drainage	■ IVR Pit full	■ WT Pit full	■ Runoff overflows from IVR Pit when full (water surface elevation of 149.3 masl) to Whale Tail Pit by natural drainage patterns until Whale Tail Pit is full (water surface elevation of 146.3 masl). ■ Annual runoff volumes are expected to be constant.
	■ Overflow to Whale Tail Lake (North Basin)	■ Natural drainage	■ WT Pit full	■ Post-Closure	■ Runoff overflows from IVR Pit when full (elevation of 149.3 masl) to Whale Tail Lake (North Basin) by natural drainage patterns once Whale Tail Pit is full. ■ Annual runoff volumes are expected to be constant.

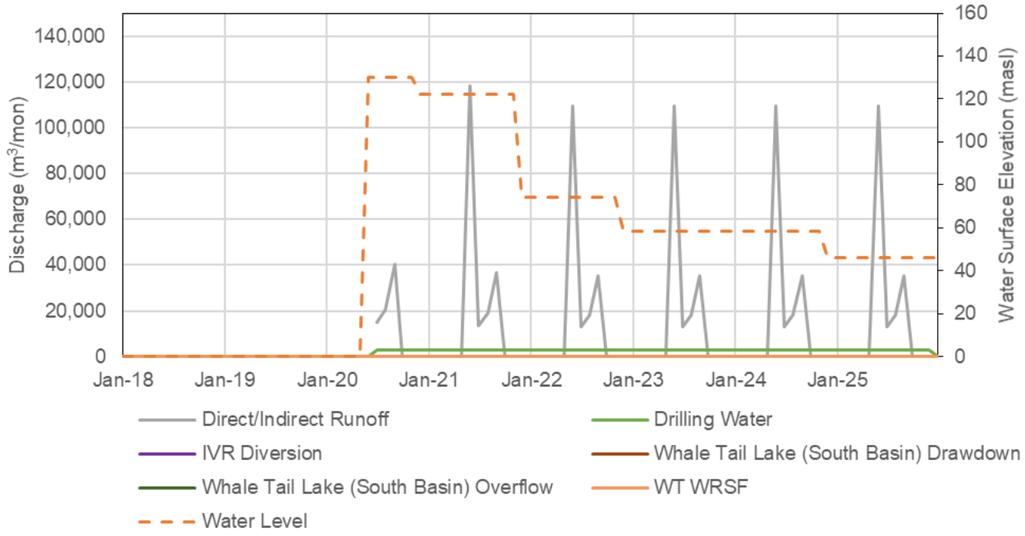

Figure 74: Inflows to the IVR Pit (Construction and Operations)

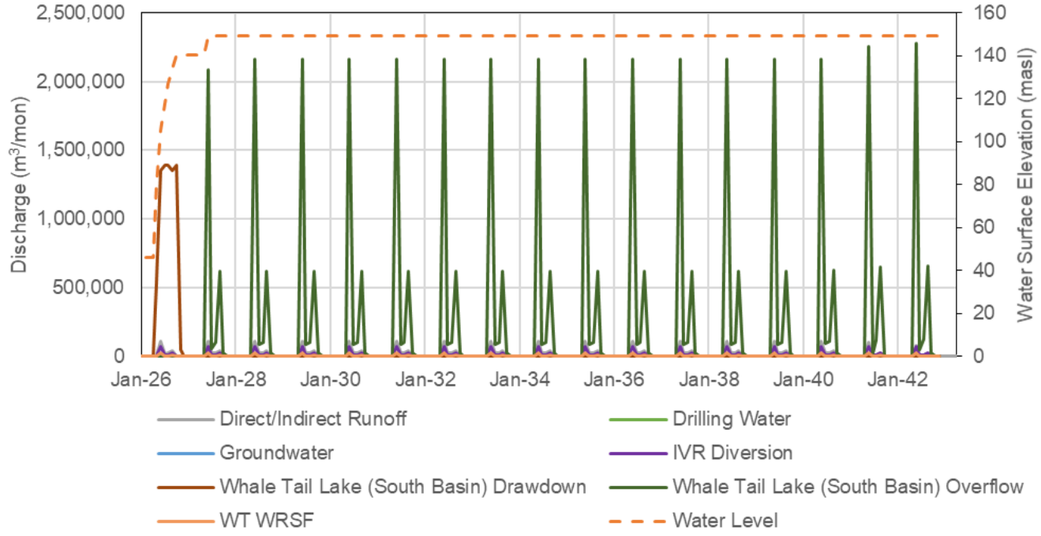

Figure 75: Inflows to the IVR Pit (Closure)

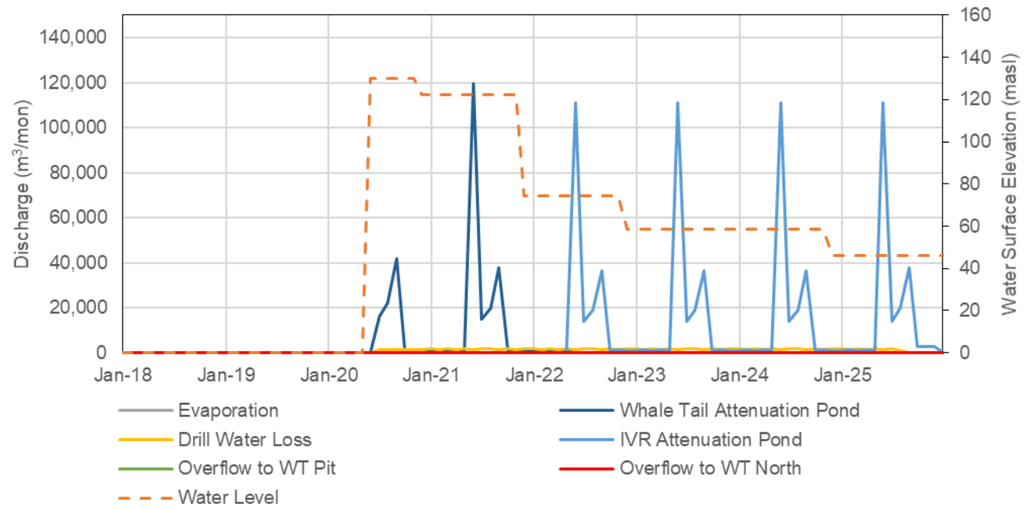

Figure 76: Outflows from the IVR Pit (Construction and Operations)

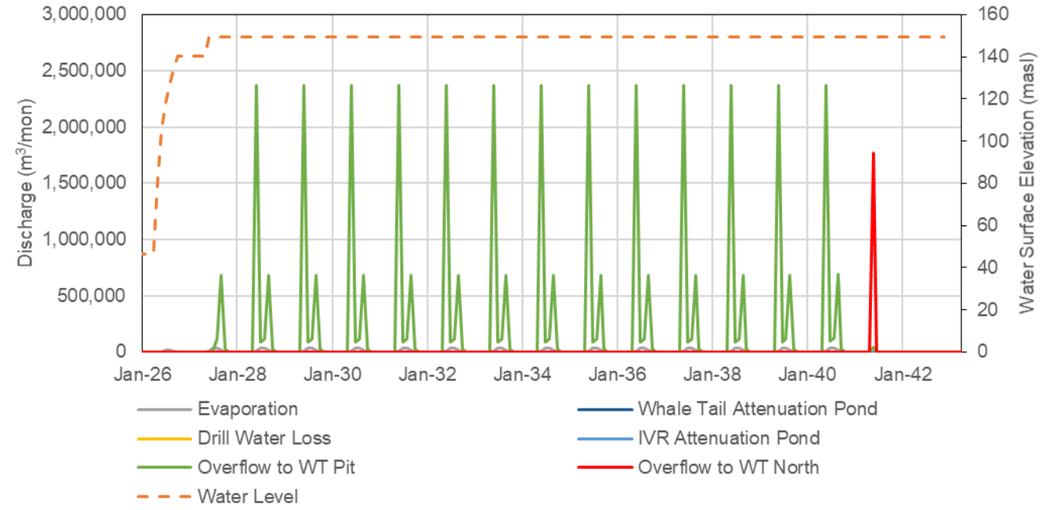

Figure 77: Outflows from the IVR Pit (Closure)

5.9.3 Changes from the FEIS Addendum

The most significant changes to inflows to the IVR Pit are caused by the following:

- The updated drainage area delineation results in a 12% higher local drainage area during operations (1.18 km^2 vs 1.05 km^2 previously). At closure, the contributing drainage area is 7% smaller (25.4 km^2 vs 27.3 km^2 previously).

By the end of operations, there is 38, 950 m^3 (3.5%) more inflow to the pit than previously predicted (1,159,650 m^3 vs. 1,120,700 m^3). For closure, there is no change to the pit filling schedule (2027) (Figure 78).

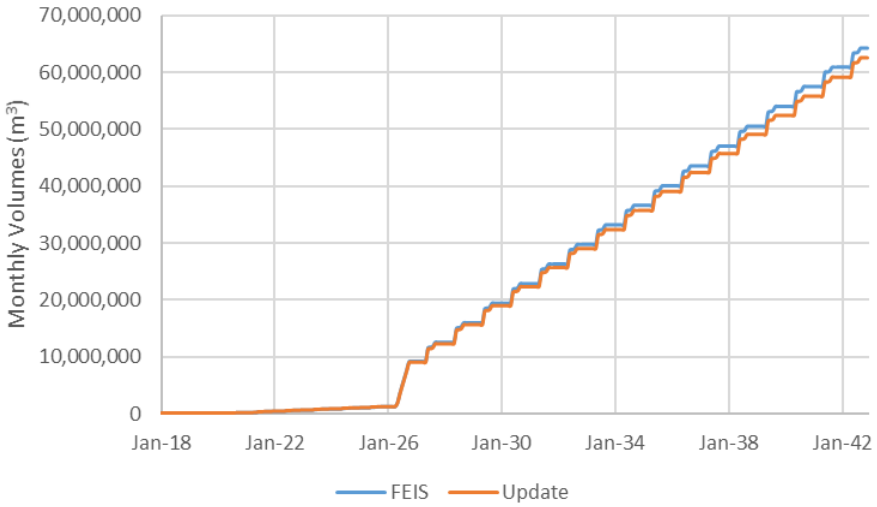

Figure 78: Comparison of Cumulative Inflows to the IVR Pit under the FEIS Addendum and the Current Water Balances

5.10 IVR Waste Rock Storage Facility Contact Water Collection System

5.11 Catchment Characteristics and Water Management

The IVR WSRF Contact Water Collection System becomes operational once the IVR Pit is initiated. Prior to its operation, the natural catchment forms a portion of the Northeast Sector (see Section 5.2.1.3). Runoff from the IVR WRSF is captured by perimeter ditches and conveyed to the IVR WRSF Contact Water Collection System prior to being pumped to the active attenuation pond (i.e., either the Whale Tail Attenuation Pond or the IVR Attenuation Pond). At closure, the runoff from this area is diverted to Whale Tail Pit.

An overview of the catchment, along with its drainage pathways, is provided in Figure 79.

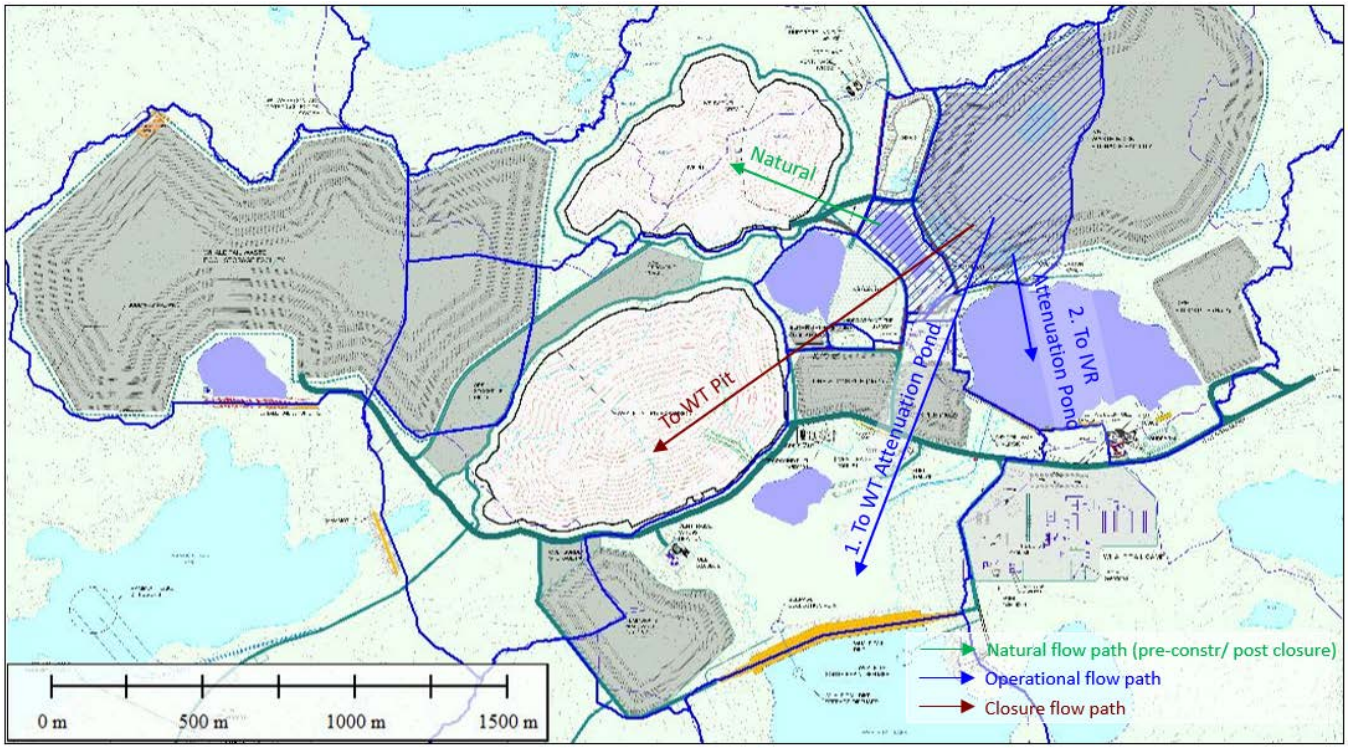

Figure 79: IVR Waste Rock Storage Facility Contact Water Collection System Catchment Overview

Storage characteristics are summarized in Table 27. Drainage areas of the IVR Waste Rock Storage Facility Contact Water Collection System are summarized in Figure 80.

The total catchment of the IVR WRSF Contact Water Collection System increases proportionally with the increase in waste rock footprint which encroaches on the natural catchment of the IVR Attenuation Pond over time. At closure, GSP-2 drains to the IVR WRSF thereby increasing its total catchment area. Thus, its total catchment area ranges from 0.459 km^2 during baseline conditions, to 0.915 km^2 in 2023, to 0.977 km^2 at closure. The water balance assumes that the IVR WRSF Contact Water Collection System has no capacity.

Table 27: Storage Characteristics (IVR WRSF Contact Water Collection System)

Snapshot	Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Baseline to Closure	0.441 to 0.915	n/a	0	n/a	0
Closure to Post-Closure	0.977	n/a	0	n/a	0

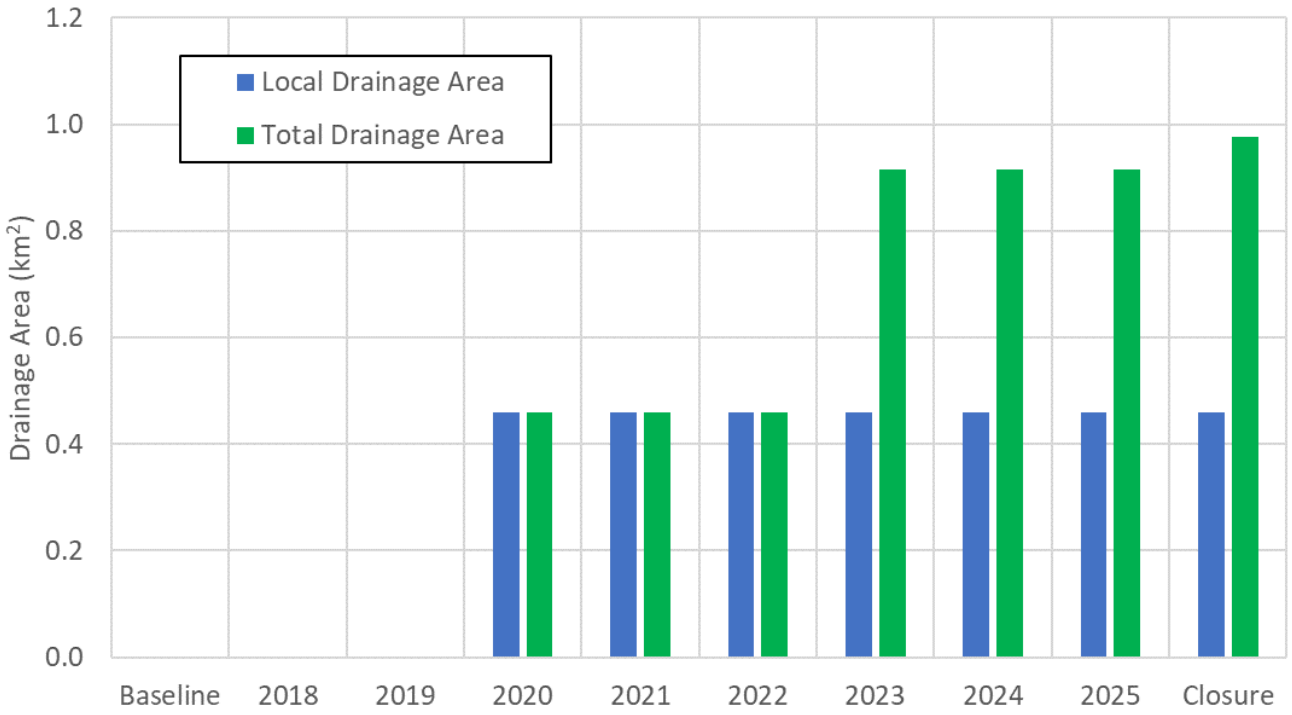

Figure 80: Drainage Area Progression through the Project (IVR WRSF Contact Water Collection System)

5.11.1 Water Balance

Inflows and outflows are summarized in Table 28, and presented in tabular form in Appendix F.

Table 28: Water Balance Flow Components (IVR WRSF Contact Water Collection System)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 81 (Construction / Operations) ■ Figure 82 (Closure)	■ Runoff from natural areas	■ Natural drainage	■ 2018	■ Post-Closure	■ Runoff volumes are expected to be inversely proportional to the footprint of the IVR WRSF which increases until 2025.
	■ Runoff from the IVR WRSF	■ Natural drainage	■ Q3 2020	■ Post-Closure	■ Runoff volumes are expected to be proportional to the footprint of the IVR WRSF which increases until 2025.
	■ Seepage from the IVR WRSF	■ Natural drainage	■ 2034	■ Post-Closure	■ Based on OKC modelling results, seepage from the WRSF is negligible (See Section 4.0)
	■ Runoff from GSP-2	■ Natural drainage	■ Closure	■ Post-Closure	■ GSP-2 is backfilled at the start of closure and its runoff will follow natural drainage patterns towards the IVR WRSF
OUTFLOWS					
■ Figure 83 (Construction / Operations) ■ Figure 84 (Closure)	■ Runoff to Whale Tail Lake (North Basin)	■ Natural drainage	■ 2018	■ 2019	■ Runoff to Whale Tail Lake (North Basin) until the Northeast Dike is constructed in October 2018
	■ Runoff discharge to the Northeast Sector	■ Pump / Pipeline	■ 2019	■ Q3 2020	■ Runoff discharge to Lake A16 (Mammoth Lake) via the Northeast Sector diversion (see Section 5.2.1.3) once the Northeast Dike is constructed in October 2018, until the IVR Pit is initiated in Q3 2020.
	■ Runoff discharge to the Whale Tail Attenuation Pond	■ Pump / Pipeline	■ Q3 2020	■ 2022	■ Runoff discharge to Whale Tail Attenuation Pond once the IVR Pit is initiated in Q3 2020, until the IVR Attenuation Pond is operational in 2022. ■ Runoff volumes decrease slightly from baseline conditions resulting from temporary storage in the IVR WRSF (i.e., released as seepage in 2034).
	■ Runoff discharge to the IVR Attenuation Pond	■ Pump / Pipeline	■ 2022	■ Closure	■ Runoff discharge to IVR Attenuation Pond once operational 2022 until closure.
	■ Runoff to Whale Tail Lake (North Basin) via the Whale Tail Pit	■ Natural drainage	■ Closure	■ Post-Closure	■ Runoff to Whale Tail Lake (North Basin) via the IVR Pit at closure, following natural drainage pattern. ■ Runoff volumes are expected to increase from baseline conditions from freezing of the Whale Tail WRSF and runoff from GSP-2.

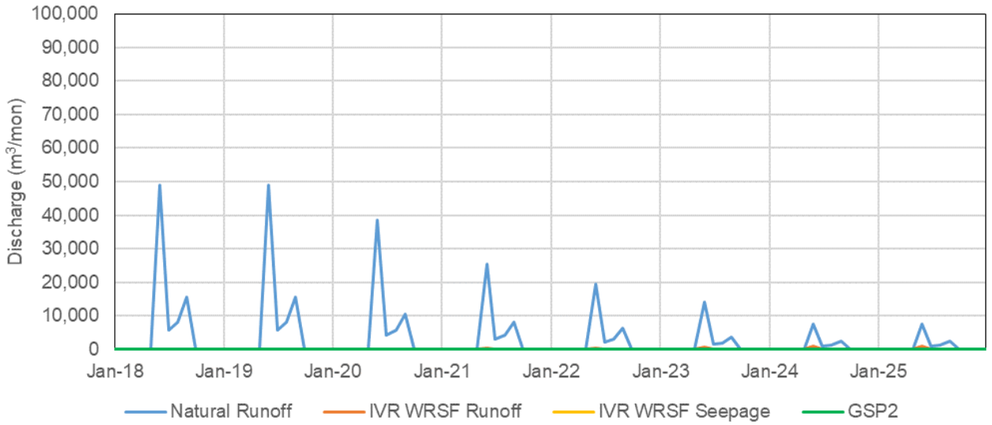

Figure 81: Inflows to the IVR WRSF Contact Water Collection System (Construction and Operations)

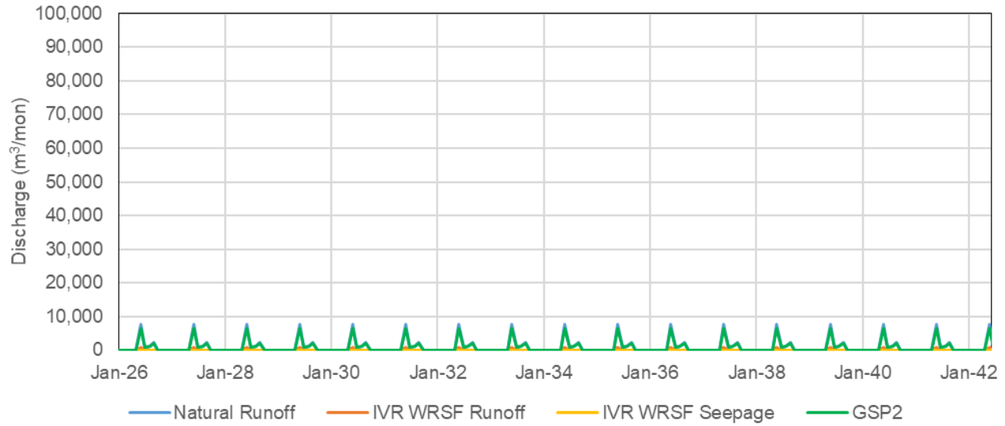

Figure 82: Inflows to the IVR WRSF Contact Water Collection System (Closure)

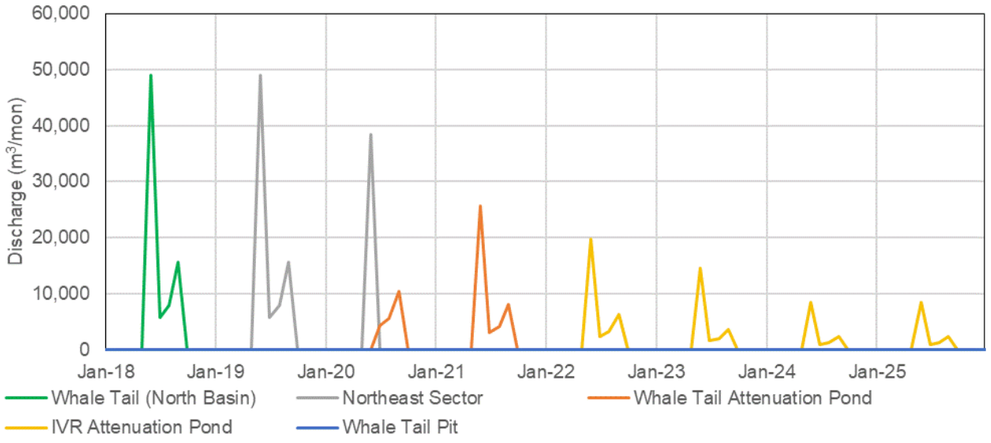

Figure 83: Outflows from the IVR WRSF Contact Water Collection System (Construction and Operations)

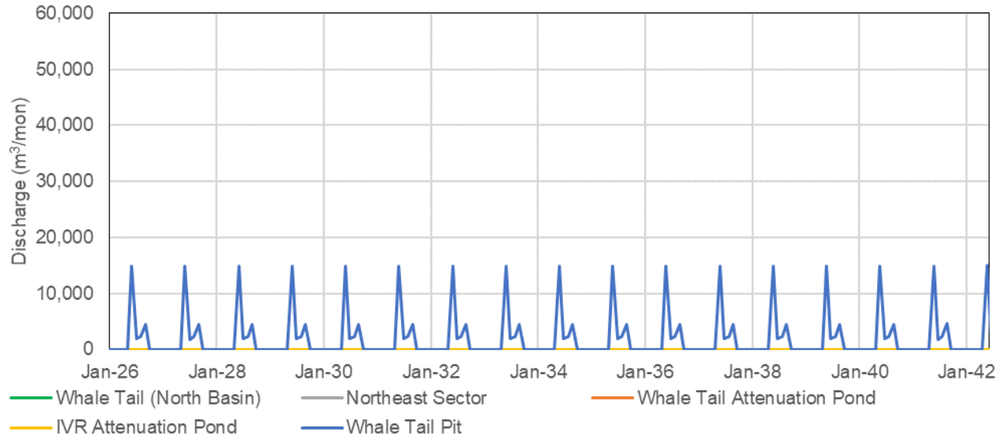

Figure 84: Outflows from the IVR WRSF Contact Water Collection System (Closure)

5.11.2 Changes from the FEIS Addendum

The most significant changes to inflows to the IVR WRSF are caused by the following:

- The primary difference in this update is the calculation of runoff and seepage from the WRSF. As explained in Section 4.0, the updated calculation method significantly reduces the generated runoff from the stockpile and sets the seepage to zero.
- The updated drainage area delineation results in a 16% higher local drainage area during operations (0.92 km^2 vs 0.788 km^2 previously). At closure, the contributing drainage area is 19% higher (0.977 km^2 vs 0.822 km^2 previously).

By the end of operations, there is 225,700 m^3 (40%) less runoff from the IVR WRSF than previously predicted (336,200 m^3 vs. 560,850 m^3). For closure, the cumulative runoff is 72% less (739,700 m^3 vs. 2,623,900 m^3). (Figure 85).

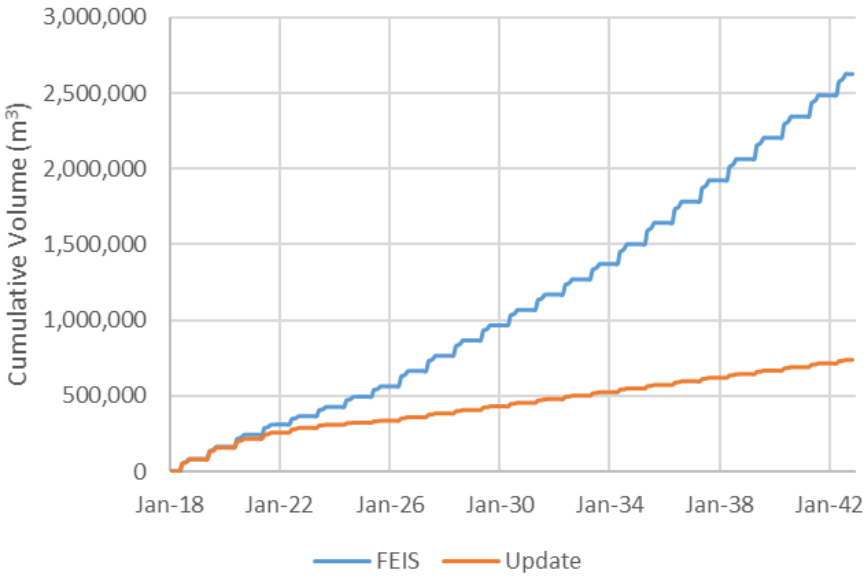

Figure 85: Comparison of Cumulative Inflows to the IVR WRSF under the FEIS Addendum and the Current Water Balances

5.12 East Sector / IVR Attenuation Pond

5.12.1 Catchment Characteristics and Water Management

The East Sector, inclusive of the Lake A53 catchment, is located east of Whale Tail Lake. The catchment remains at baseline conditions until 2022, when it becomes the IVR Attenuation Pond following fishout, construction of the IVR Attenuation Pond Dike, and dewatering of Lake A53. Its outlet drains naturally to Whale Tail Lake (North Basin) in 2018, after which its flow is diverted to Whale Tail Lake (South Basin) from 2019 to 2022. The IVR Attenuation Pond is operational by freshet 2022. The IVR Attenuation Pond is intended to manage all contact water from 2022 to closure while discharging through the O-WTP during open water conditions. At closure, it is drawn down by pumping to the Underground Mine, is backfilled with NML/NPAG waste rock to decrease its storage to zero and its

natural drainage patterns are re-established towards Whale Tail Lake (North Basin) via the Whale Tail Attenuation Pond.

An overview of the catchment, along with drainage pathways, is provided in Figure 86.

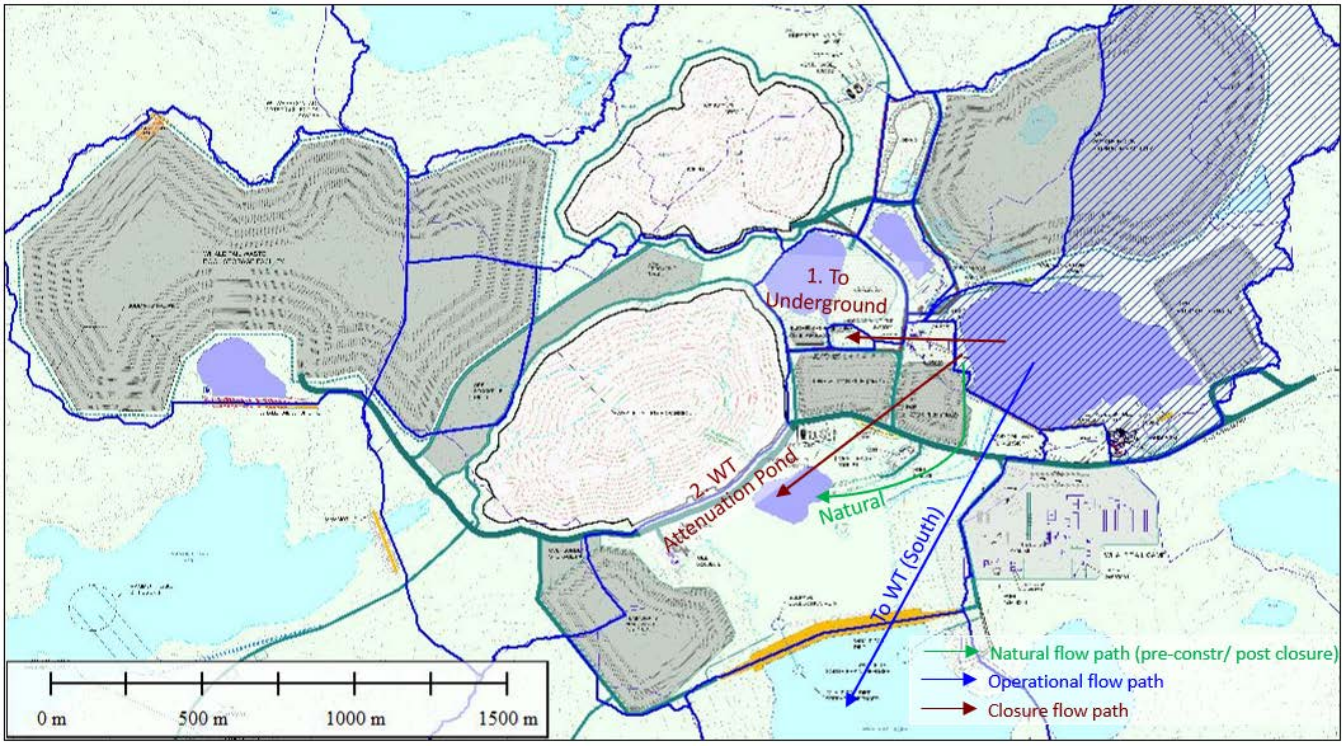

Figure 86: East Sector / IVR Attenuation Pond Catchment Overview

Storage characteristics are summarized in Table 29. Drainage areas of the IVR Attenuation Pond are summarized in Figure 87.

The East Sector / IVR Attenuation Pond has a drainage area of 1.32 km^2 at baseline. Its local drainage area diminishes with the increasing IVR WRSF footprint. Contributing catchments include those from the Whale Tail WRSF Contact Water Collection System, the North Sump, the Whale Tail Attenuation Pond, the Whale Tail Pit, the IVR Pit and the IVR WRSF Contact Water Collection System resulting in a total drainage area of 6.48 km^2 during operations. At closure, its drainage area consists of its local drainage area of 0.86 km^2.

Table 29: Storage Characteristics (East Sector / IVR Attenuation Pond)

Snapshot	Contributing Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Baseline to 2022	1.32	161.73	154,735	161.73	154,735
2022 to Closure	6.48	157.75 to 163.9	534,819	163.9	534,819
Closure to Post-Closure	0.86	161.73	0	161.73	0

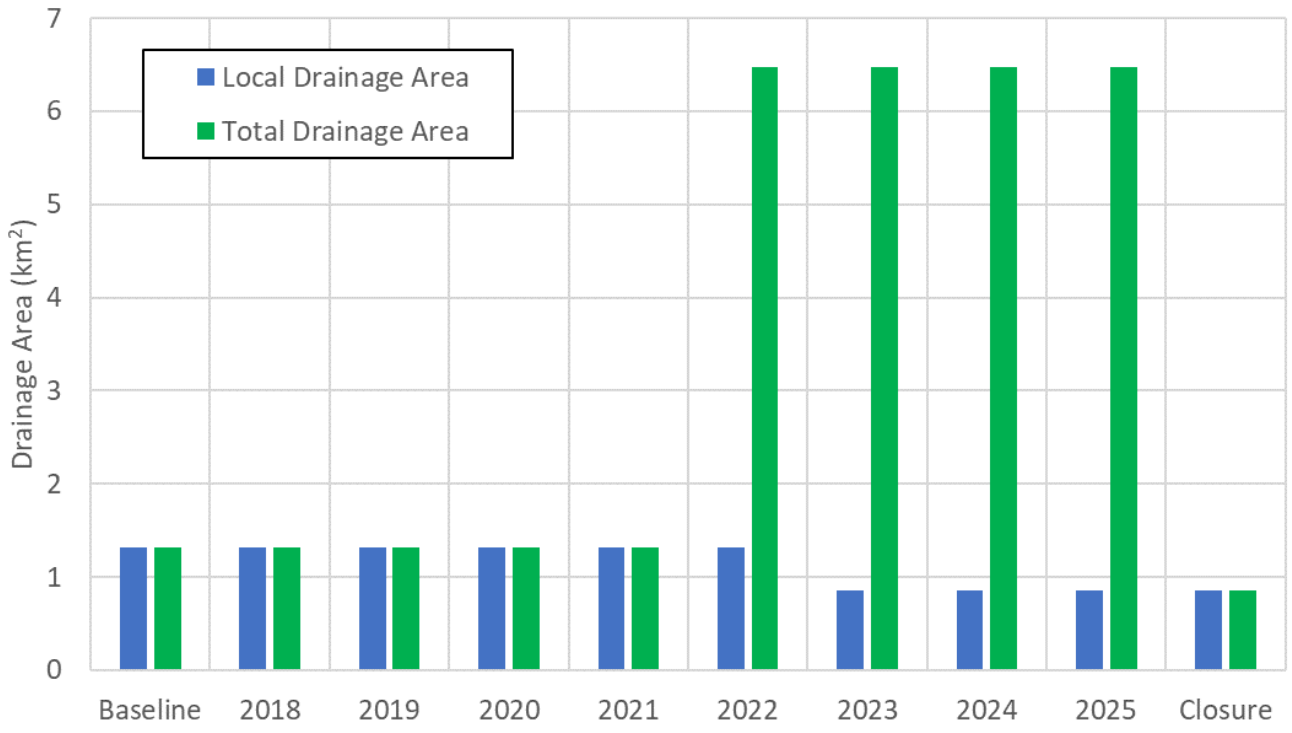

Figure 87: Drainage Area Progression through the Project (East Sector / IVR Attenuation Pond)

5.12.2 Water Balance

Inflows and outflows are summarized in Table 30, and presented in tabular form in Appendix F.

Table 30: Water Balance Flow Components (East Sector / IVR Attenuation Pond)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 88 (Construction / Operations) ■ Figure 89 (Closure)	■ Natural direct and indirect runoff	■ Natural drainage	■ 2018	■ Post-Closure	■ Runoff volumes are expected to be inversely proportional to the footprint of the IVR WRSF encroaching on the East Sector / IVR Attenuation catchment until 2025.
	■ Runoff from the landfarm located in the watershed	■ Natural drainage	■ 2018	■ Post-Closure	■ Runoff volumes are expected to be constant.
	■ Runoff from Whale Tail Ore Stockpile No. 3 located in the watershed	■ Natural drainage	■ 2022	■ Post-Closure	■ Runoff volumes are expected to be constant.
	■ Camp biodisk and truck shop inflows	■ Pump / Pipeline	■ 2022	■ Closure	■ Runoff volumes are expected to be constant.
	■ Discharge from the Whale Tail Attenuation Pond	■ Pump / Pipeline	■ 2022	■ Closure	■ Runoff volumes are expected to be greater in 2022 to reduce the water level in the Whale Tail Attenuation and constant on annual basis thereafter.
	■ Discharge from the IVR Pit	■ Pump / Pipeline	■ 2022	■ Closure	■ Annual volumes expected to be constant.
	■ Runoff from the IVR WRSF	■ Pump / Pipeline	■ 2022	■ Closure	■ Runoff volumes are expected to be proportional to the footprint of the IVR WRSF increasingly encroaching on the East Sector / IVR Attenuation catchment until 2025.
	■ Runoff from the North Sump	■ Pump / Pipeline	■ 2022	■ Closure	■ Annual runoff volumes expected to be constant.
	■ Runoff from the Whale Tail Pit	■ Pump / Pipeline	■ 2022	■ Closure	■ Annual runoff volumes expected to be constant.
	■ Runoff from Whale Tail WRSF	■ Pump / Pipeline	■ 2022	■ Closure	■ Annual runoff volumes expected to be constant.
OUTFLOWS					
■ Figure 90 (Construction / Operations) ■ Figure 91 (Closure)	■ Evaporation	■ n/a	■ 2018	■ Post-Closure	■ Evaporative losses are expected to be proportional to the water surface elevation in Lake A53 / IVR Attenuation Pond
	■ Runoff to Whale Tail Lake (North Basin)	■ Natural drainage	■ 2018 ■ Closure	■ 2019 ■ Post-Closure	■ Runoff following natural drainage patterns prior to the diversion to Whale Tail Lake (South Basin), and during closure.
	■ Runoff to Whale Tail Lake (South Basin)	■ Channel	■ 2019	■ 2022	■ Runoff diversion to Whale Tail Lake (South Basin) starting during the dewatering of Whale Tail Lake (North Basin) and ending once the IVR Attenuation Pond becomes operational.
	■ Drawdown and runoff diversion bypassing the O-WTP	■ Pump / Pipeline	■ 2022	■ 2022	■ Drawdown of 66% of Lake A53 to Whale Tail Lake (South Basin) assumed not to require treatment, following fishout and prior to operations of the IVR Attenuation Pond in April 2022.
	■ Runoff diversion to the O-WTP	■ Pump / Pipeline	■ 2022	■ Closure	■ Drawdown of 34% of the Lake A53 to Whale Tail Lake (South Basin) prior to operations of the IVR Attenuation Pond in May 2022. ■ Diversion to the O- WTP during open water conditions.
	■ Drawdown to the Underground Mine	■ Pump / Pipeline	■ Start of closure	■ Start of closure	■ Pumping of the IVR Attenuation Pond to the underground mine prior to backfilling with NML/NPAG waste rock at the start of closure.

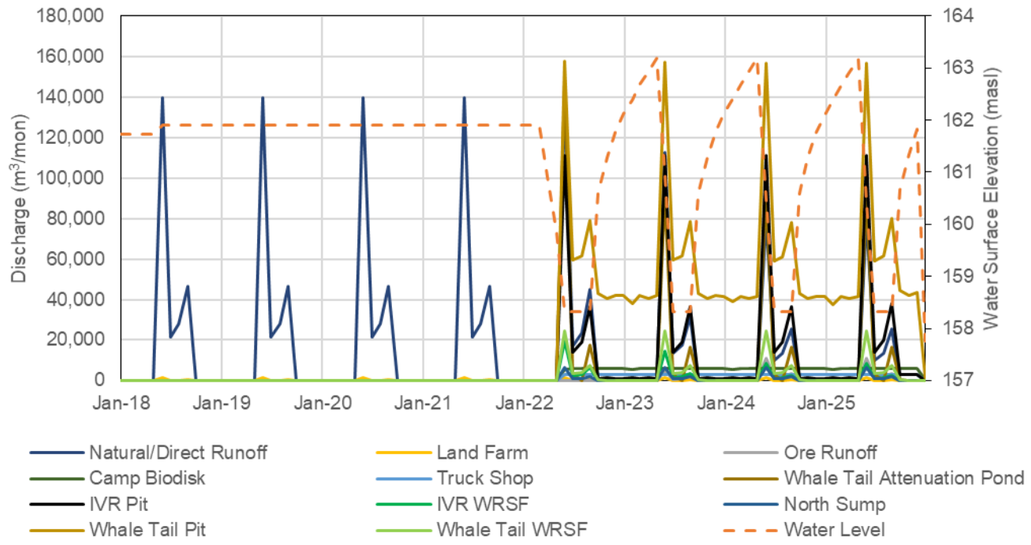

Figure 88: Inflows to the East Sector / IVR Attenuation Pond (Construction and Operations)

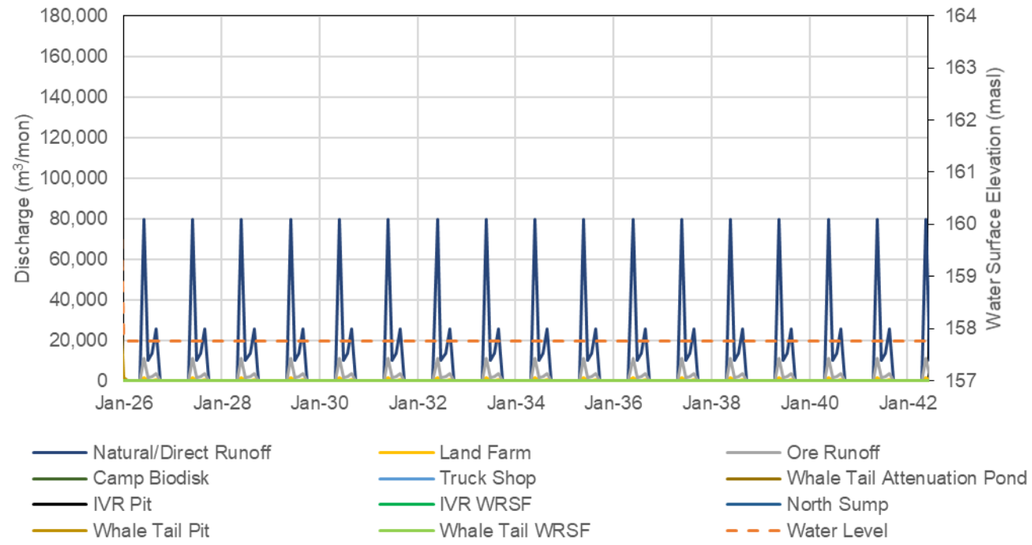

Figure 89: Inflows to the East Sector / IVR Attenuation Pond Area (Closure)

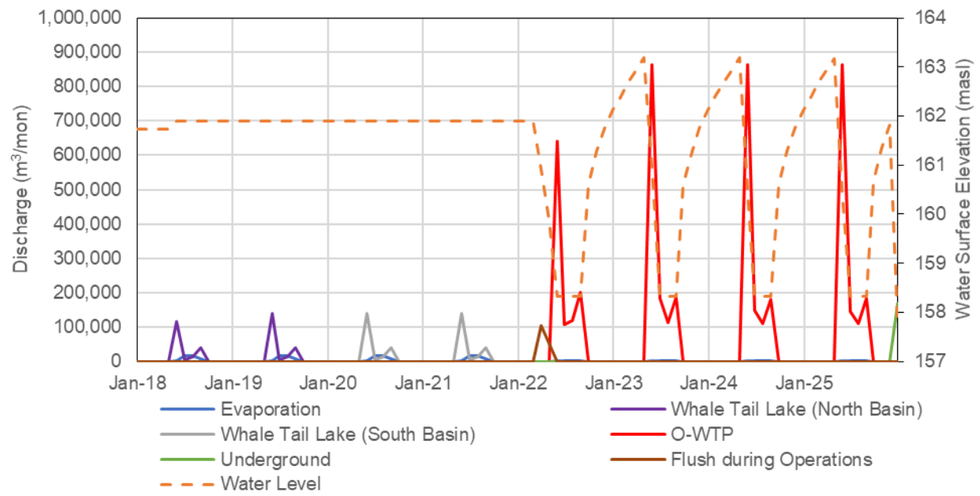

Figure 90: Outflows from the East Sector / IVR Attenuation Pond (Construction and Operations)

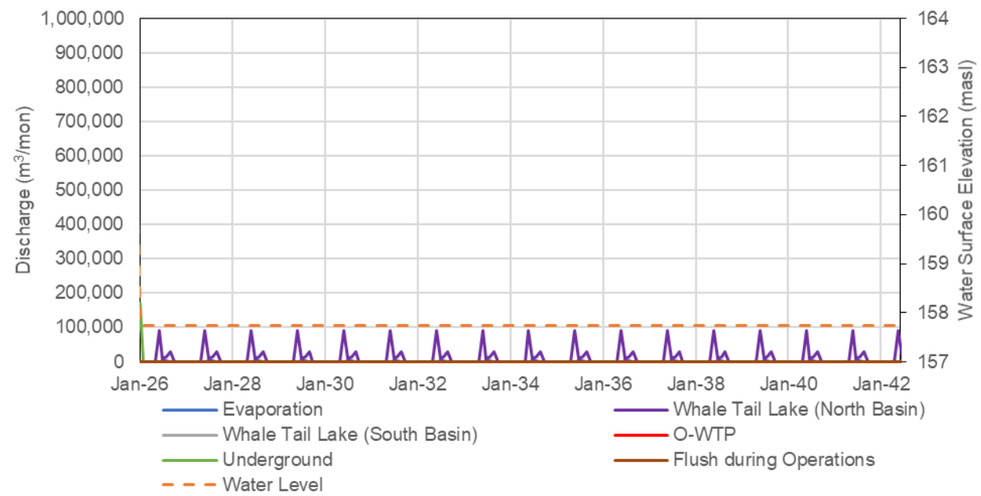

Figure 91: Outflows from the East Sector / IVR Attenuation Pond Area (Closure)

5.12.3 Changes from the FEIS Addendum

The most significant changes to inflows to the IVR Attenuation Pond are caused by the following:

- The updated drainage area delineation results in a 2.5% smaller local drainage area before 2022 (1.32 km^2 vs 1.35 km^2 previously). From 2022 to closure, the total contributing drainage is 0.9% larger (6.48 km^2 vs 6.42 km2 previously). At closure, the local drainage area is approximately 14% smaller (0.86 km^2 vs 1.00 km^2 previously).
- WRSF Inflows. Runoff from the watersheds containing WRSFs are significantly reduced due to the updated calculation of runoff and seepage from the WRSFs.
- Consumptive flows. The camp flows are substantially higher (192 m^3/day vs 77.8 m^3/day previously).

The change in runoff prior to 2022 is due solely to the updated area delineation and is less than 1% (950,900 m^3 vs. 966,750 m^3 previously). By the end of operations, however, the reduction of inflow due to the runoff from the WRSFs is slightly offset by the increase in consumptive flows. The resulting cumulative inflow is 8% lower (6,143,800 m^3 vs. 6,670,250 m^3). During closure, the consumptive flows are no longer required. By 2042, there is a 10% decrease in the cumulative inflows (8,666,450 m^3 vs. 9,599,300 m^3) (Figure 92).

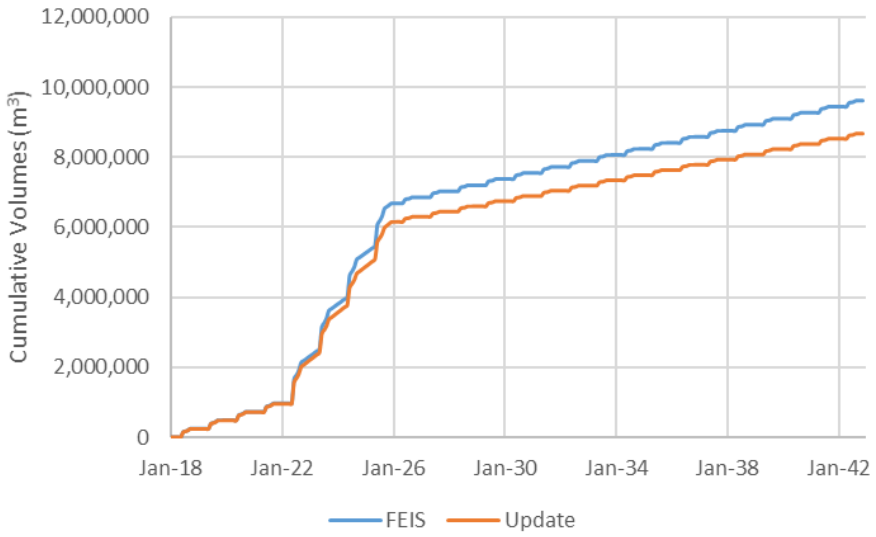

Figure 92: Comparison of Cumulative Inflows to the IVR Attenuation Pond under the FEIS Addendum and the Current Water Balances

5.13 Whale Tail Lake (South Basin)

5.13.1 Catchment Characteristics and Water Management

Whale Tail Lake (South Basin) is located south of and adjacent to the proposed Whale Tail Dike. Whale Tail Lake (South Basin) is connected to Whale Tail Lake (North Basin) until the construction of the Whale Tail Dike in June 2018. Dewatering of Whale Tail Lake (North Basin) results in the flooding of Whale Tail Lake (South Basin) (to an elevation of 156 masl) and overflow into the Lake A16 (Mammoth Lake) watershed via an engineered channel during operations. From June 2021 to closure, Whale Tail Lake (South Basin) receives effluent from the O-WTP.

At the end of operations and into closure, the water level in the South Basin is lowered permanently to 153.5 masl (i.e., one metre above baseline level) by pumping the flooded volume into the Underground Mine and the IVR Pit. This water level is permanently maintained. During closure, water level is maintained by pumping from Whale Tail Lake (South Basin) into Whale Tail Lake (North Basin). Post-closure, the Mammoth Dike and the Whale Tail Dike are decommissioned to re-establish natural drainage patterns in Whale Tail Lake. Whale Tail Lake then flows to Lake A16 (Mammoth Lake) via the Mammoth sill.

An overview of the sector, along with its natural drainage pattern and operational pathways, is provided in Figure 93.

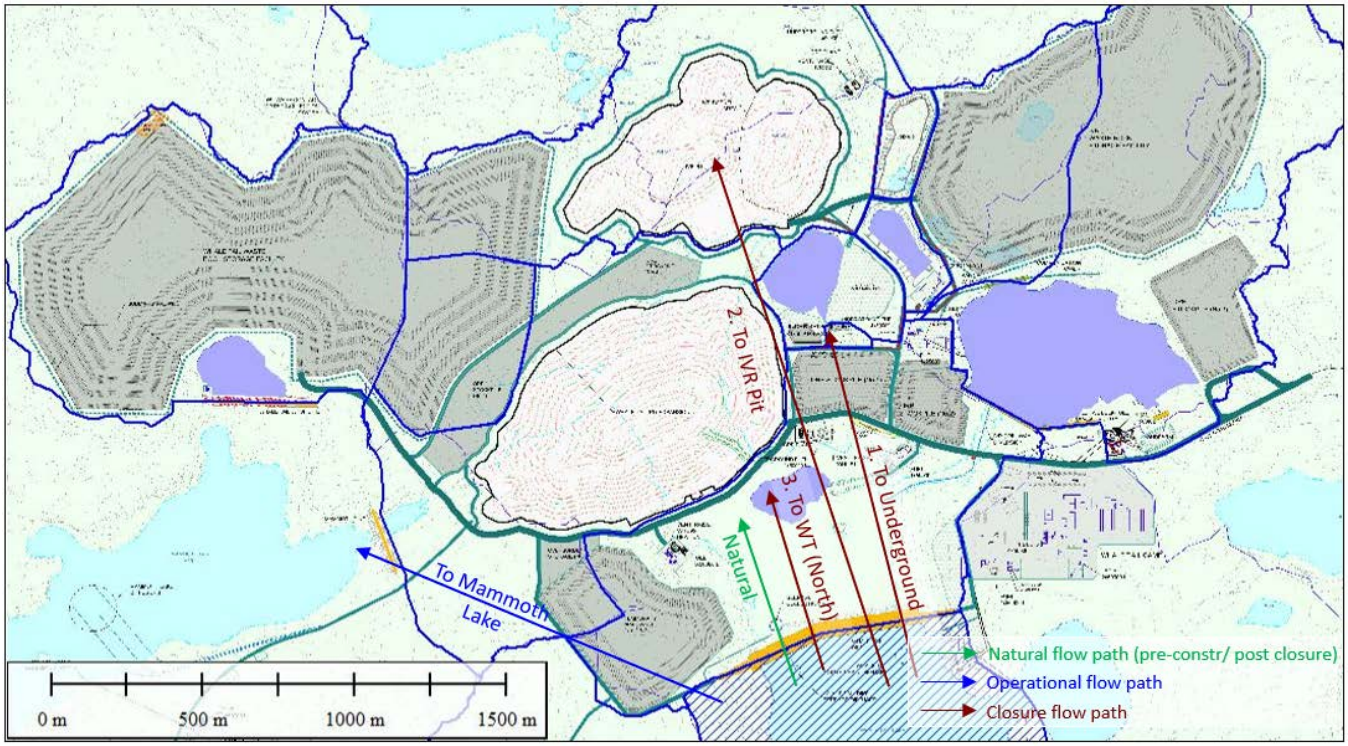

Figure 93: Whale Tail Lake (South Basin) Catchment Overview

Storage characteristics are summarized in Table 31. Drainage areas of Whale Tail Lake (South Basin) are summarized in Figure 94. The baseline drainage area of Whale Tail Lake (South Basin), 22.3 km^2, is augmented during the dewatering of Whale Tail Lake (North Basin) in 2019 and by the diversion of the East Sector to Whale Tail Lake (South Basin) from2019 to 2021). From 2021 to closure, the drainage area is augmented by treated flows from first the Whale Tail Attenuation Pond (2021 only) and then the IVR Attenuation Pond (via the O-WTP).

Table 31: Storage Characteristics (Whale Tail Lake [South Basin])

Snapshot	Drainage Area (km^2)	Operating Level		Capacity	
		Water Surface Elevation (masl)	Storage (m^3)	Water Surface Elevation (masl)	Storage (m^3)
Baseline	22.3	152.50	4,597,768	152.50	4,597,768
Construction to Closure	22.3 to 28.8	156.00	11,832,960	156.00	11,832,960
Closure to Post-Closure	22.3	153.50	5,547,803	153.50	5,547,803

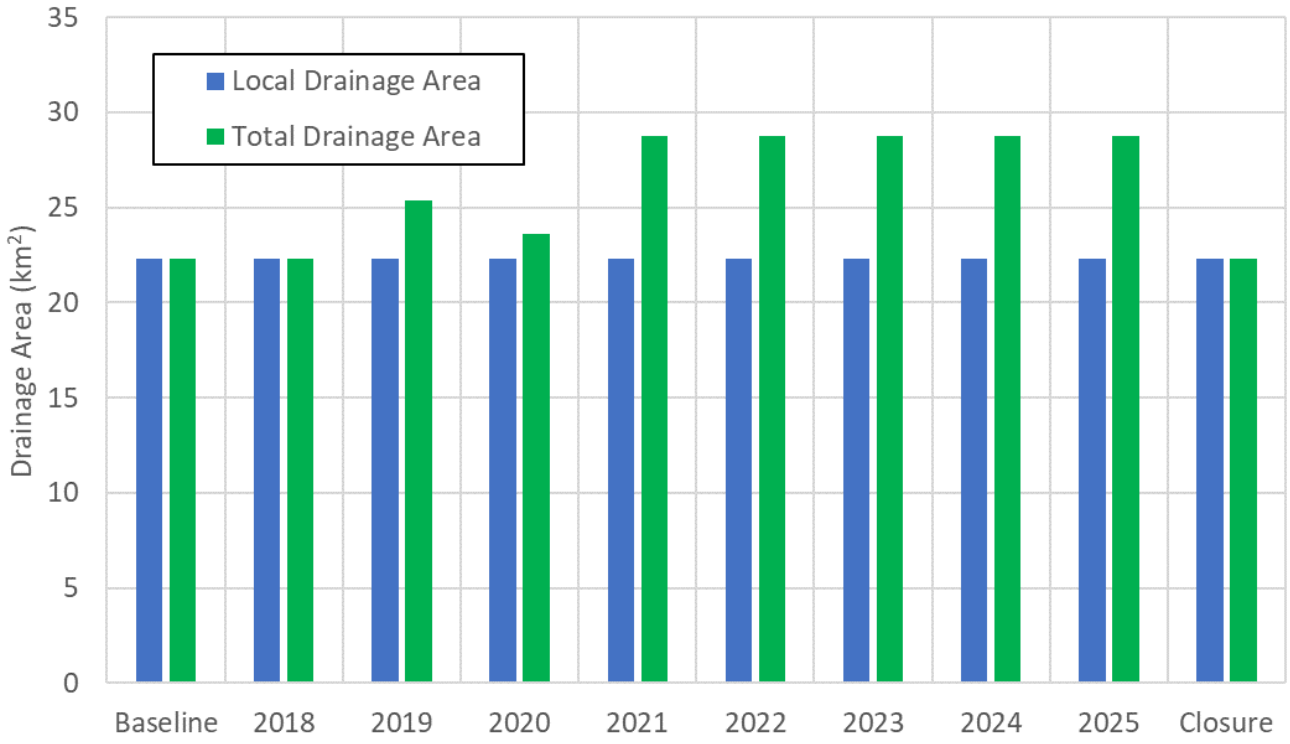

Figure 94: Drainage Area Progression through the Project (Whale Tail Lake [South Basin])

5.13.2 Water Balance

Inflows and outflows are summarized in Table 32, and presented in tabular form in Appendix F.

Table 32: Water Balance Flow Components (Whale Tail Lake [South Basin])

Figure	Flow Component	Flow Type	Start	End	Note / Comment
INFLOWS					
■ Figure 95 (Construction / Operations) ■ Figure 96 (Closure)	■ Runoff from natural areas	■ Natural drainage	■ 2018	■ Post-Closure	■ Runoff volumes are proportional to the lake surface area of Whale Tail Lake (South Basin). ■ Runoff volumes include those from tributary lakes when they become part of the flooded area of Whale Tail Lake (South Basin).
	■ Runoff from tributary Lakes A18, A55, A60, A62, and A65	■ Natural drainage	■ 2018	■ Post-Closure	■ Runoff volumes of tributary lakes are included in runoff volumes of Whale Tail Lake (South Basin) when they become part of the flooded area of Whale Tail Lake (South Basin), as noted above.
	■ Runoff diversion from the East Sector	■ Channel	■ 2019	■ 2022	■ Runoff diversion from the Lake A53 watershed until the IVR Attenuation Pond becomes operational. ■ Runoff volumes are expected to be constant on an annual basis.
	■ Drawdown of Whale Tail Lake (North Basin)	■ Pump / Pipeline	■ 2019	■ 2019	■ Drawdown of Whale Tail Lake (North Basin) through Whale Tail Lake (South Basin) from March to May 2019.
	■ Discharge from Whale Tail Attenuation Seepage Well	■ Pump / Pipeline	■ 2020	■ Closure	■ Discharge from the Whale Tail Attenuation Pond Seepage Pumping Station operational by 2020 and decommissioned by closure.
	■ Effluent discharge from the O-WTP	■ Pump / Pipeline	■ June 2021	■ Closure	■ The O-WTP discharges to Whale Tail Lake (South Basin) from June 2021 to closure.
OUTFLOWS					
■ Figure 97 (Construction / Operations) ■ Figure 98 (Closure)	■ Natural connection to Whale Tail Lake (North Basin)	■ Natural drainage	■ 2018	■ July 2018	■ Runoff to Whale Tail Lake (North Basin) following natural drainage patterns until construction of the Whale Tail Dike assumed to prevent runoff by July 2018.
	■ Evaporation	■ n/a	■ 2018	■ Post-Closure	■ Evaporative losses proportional to the lake surface area of Whale Tail Lake (South Basin).
	■ Drilling Water	■ Pump / Pipeline	■ 2018	■ Sep 2018	■ Drilling water until the water intake at Lake C38 (Nemo Lake) becomes operational.
	■ Camp Use	■ Pump / Pipeline	■ 2018 ■ 2026	■ Sep 2018 ■ Post-Closure	■ Camp use until the water intake at Lake C38 (Nemo Lake) becomes operational. ■ Camp use during closure.
	■ Truck Use	■ Pump / Pipeline	■ 2018	■ Sep 2018	■ Truck use until the water intake at Lake C38 (Nemo Lake) becomes operational.
	■ Groundwater	■ Natural drainage	■ 2019	■ Post-Closure	■ Groundwater infiltration through Whale Tail Dike is expected from the dewatering of Whale Tail Lake (North Basin) until it is refilled.
	■ Runoff diversion to Lake A16 (Mammoth Lake)	■ Channel	■ 2020	■ Closure	■ Whale Tail Lake (South Basin) is expected to reach an elevation of 156.0 masl and overflow during open water conditions to Lake A16 (Mammoth Lake) by June 2020 until closure.
	■ Drawdown to the Underground Mine and IVR Pit	■ Pump / Pipeline	■ 2026	■ WTS drawn down	■ Drawdown of Whale Tail Lake (South Basin) from 156.0 masl at the start of closure to 153.5 masl by October 2026. ■ Drawdown through the Underground Mine until it is refilled and through IVR Pit thereafter.
	■ Runoff diversion to IVR Pit	■ Pump / Pipeline	■ 2027	■ Post-Closure	■ Runoff diversion from Whale Tail Lake (South Basin) to maintain water surface elevations at 153.5 masl, to the IVR Pit. ■ Annual runoff volumes are expected to be constant.

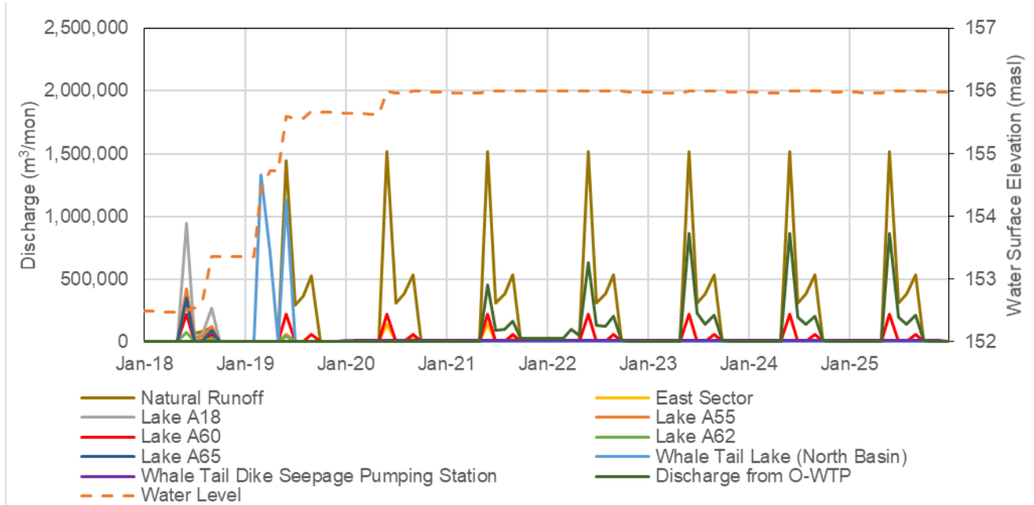

Figure 95: Inflows to Whale Tail Lake (South Basin) (Construction and Operations)

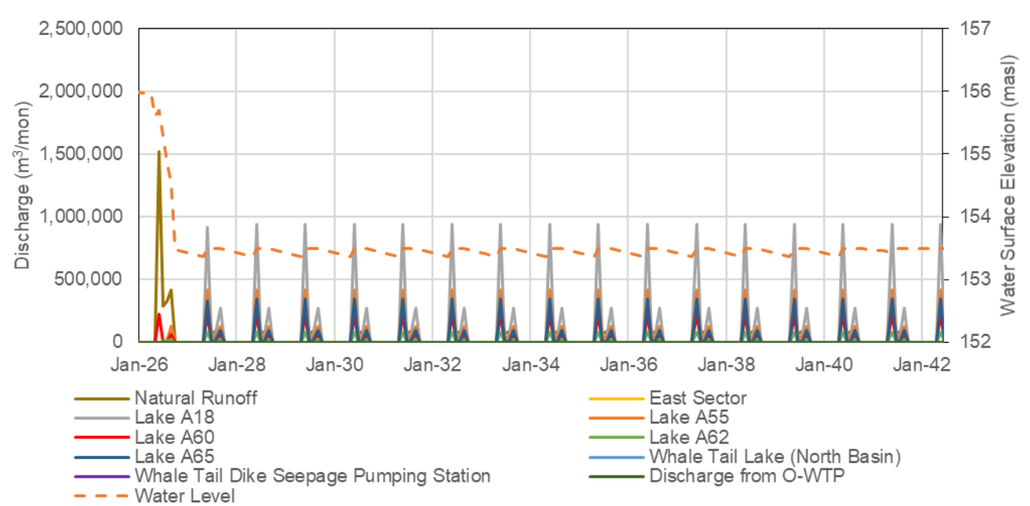

Figure 96: Inflows to Whale Tail Lake (South Basin) (Closure)

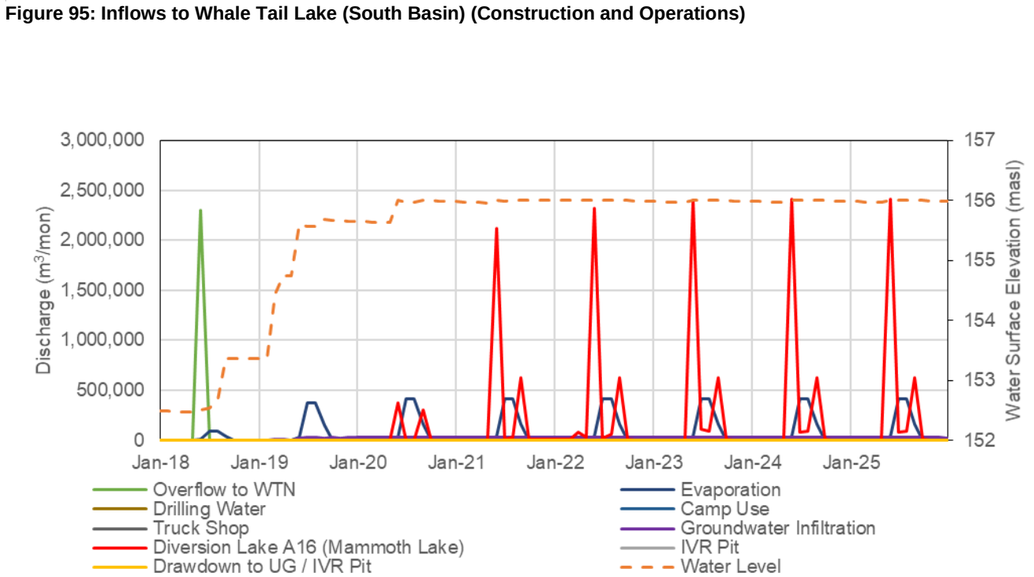

Figure 97: Outflows from Whale Tail Lake (South Basin) (Construction and Operations)

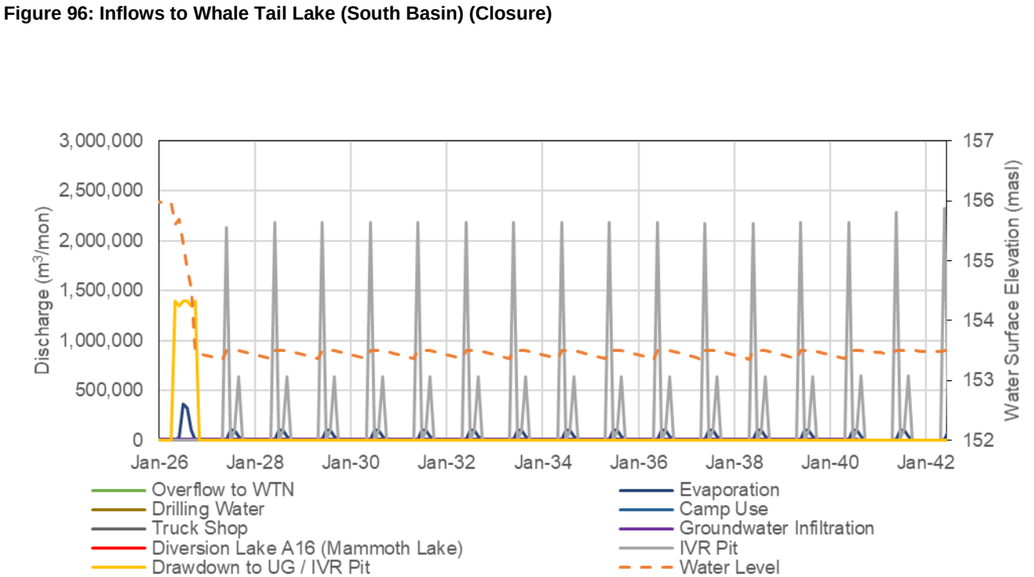

Figure 98: Outflows from Whale Tail Lake (South Basin) (Closure)

5.13.3 Changes from the FEIS Addendum

The most significant changes to inflows to Whale Tail Lake (South Basin) are caused by the following:

- The updated drainage area delineation results in a 0.3% larger local drainage area during operations (28.8 km^2 vs 28.7 km^2 previously).
- Impact of all changes in the previously described drainage areas that eventually report to Whale Tail Lake (South Basin) via the treatment plants.

The change in inflow during operations prior to 2025 is approximately 2% smaller than previously reported (35,335,650 m^3 vs. 36,207,500 m^3 previously). During closure, the impact of site drainage areas is no longer a consideration. By 2042, the difference reduces to under 1% (92,849,350 m^3 vs. 93,452,650 m^3) (Figure 99).

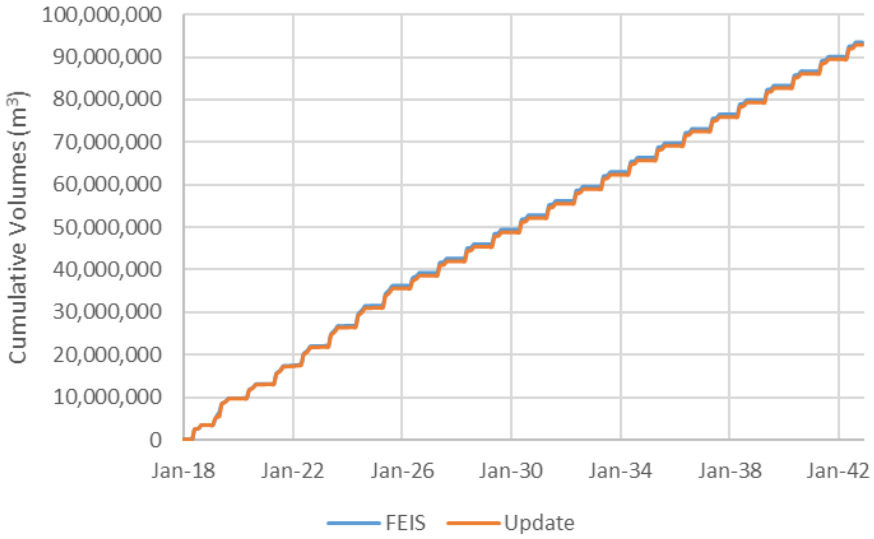

Figure 99: Comparison of Cumulative Inflows to Whale Tail Lake (South Basin) under the FEIS Addendum and the Current Water Balances

5.14 Water Treatment Plants: Treatment Requirement Summary

This section summarizes water treatment requirements identified in previous sections. All water treatment plant designs (type of treatment units, water treatment capacity and flow rate, treated water quality and sludge/brine characteristics) are provided by Agnico Eagle (2018b).

Inflows and outflows are summarized in Table 33, and presented in tabular form in Appendix F.

Table 33: Water Balance Flow Components (Water Treatment Plants)

Figure	Flow Component	Flow Type	Start	End	Note / Comment
O-WTP for TSS removal (non-contact water)					
■ Figure 100 (Inflows) ■ Figure 104 (Outflows)	■ Drawdown from Whale Tail Lake (North Basin)	■ Pump / pipeline	■ April 2019	■ May 2019	■ Drawdown of last third of the volume (34% or approximately 1,100,000 m^3) of Whale Tail Lake (North Basin) via the O-WTP. The first two-thirds of the volume is presumed free of suspended solids and is discharged directly to Whale Tail Lake South Basin.
O-WTP for TSS and arsenic removal					
■ Figure 101 (Inflows) ■ Figure 104 (Outflows)	■ Discharge from Quarry 1	■ Pump / pipeline	■ June 2019	■ June 2019	■ Drawdown of Quarry 1 to Lake A16 (Mammoth Lake) via the O- WTP once available in March 2019. ■ Drawdown volume is expected to be approximately 237,250 m^3.
	■ Discharge from the Whale Tail Attenuation Pond	■ Pump / pipeline	■ 2019	■ 2022	■ Discharge of collected water to Lake A16 (Mammoth Lake) until May 2021 and to Whale Tail Lake (South Basin) from June 2021 until May 2022 via the O-WTP during open water conditions. ■ Total treated volume is expected to be approximately 2,573,500 m^3.
	■ Discharge from GSP-1	■ Pump / pipeline	■ Jun 2020	■ Jun 2020	■ Drawdown of GSP-1 to Lake A16 (Mammoth Lake) via the O- WTP in June 2020. ■ Drawdown volume is expected to be approximately 237,700 m^3 ■ Intended to prevent untreated overflow of GSP-1 to the receiving environment and dilution of high salinity waters.
	■ Drawdown from Lake A53	■ Pump / pipeline	■ May 2022	■ May 2022	■ Drawdown of last third of the volume (34% or approximately 51,600 m^3) of Lake A53 to Whale Tail Lake (South Basin) prior to operations of the IVR Attenuation Pond in May 2022. This water is expected to require TSS control only but is run through the O-WTP as well. The first two-thirds of the volume is presumed free of suspended solids and is discharged directly to Lake A16 (Mammoth Lake).
	■ Runoff diversion from the Northeast Sector	■ Pump / pipeline	■ 2019	■ July 2020	■ Runoff diversion to Lake A16 (Mammoth Lake) once the Whale Tail Dike is operational and until the IVR Pit is initiated. This water is expected to require TSS control only but is run through the O-WTP as well.
	■ Diversion from the IVR Attenuation Pond	■ Pump / pipeline	■ 2022	■ Closure	■ Diversion to Whale Tail Lake (South Basin) during open water seasons via the O-WTP.
S-WTP (brine) Unit					
■ Figure 102 (Inflows) ■ Figure 104 (Outflows)	■ Discharge from GSP-1	■ Pump / pipeline	■ 2022	■ Closure	■ Treatment at a rate of 60 m^3/day in 2022. ■ Treatment at a rate of 90 m^3/day from 2023 to closure. ■ Treated water (permeate) is discharged to Whale Tail Lake (South Basin).
S-WTP (brackish) Unit					
■ Figure 103 ■ (Inflows) ■ Figure 104 (Outflows)	■ Discharge from the Whale Tail Attenuation Pond	■ Pump / pipeline	■ Winter 2020 - 2021	■ Winter 2021 - 2022	■ Diversion of collected water to Lake A16 (Mammoth Lake) via the S-WTP (brackish) during winter only from October 2020 (i.e., when the treatment unit becomes operational) to April 2022 (i.e., when treatment is required for low salinity water from the Underground Mine). ■ Treatment at a maximum rate of 1,000 m^3 per day. ■ Resulting brine concentrate reject (assumed to be 15% of the treated volume) is conveyed to GSP-1. ■ Resulting permeate (assumed to be 85% of the treated volume) is conveyed to Lake A16 (Mammoth Lake) from October 2020 to May 2021 and to Whale Tail Lake (South Basin) from October 2021 to April 2022.
	■ Diversion from GSP-2	■ Pump / pipeline	■ 2022	■ Closure	■ Treatment at a maximum rate of 1,000 m^3 per day. ■ Resulting brine (assumed to be 15% of the treated volume) is conveyed to GSP-1. ■ Resulting permeate (assumed to be 85% of the treated volume) is discharged to Whale Tail Lake (South Basin).

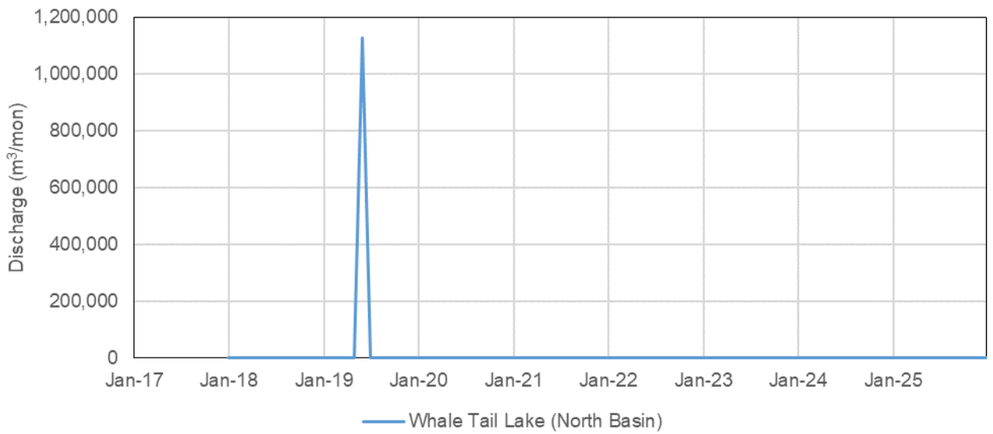

Figure 100: Non-Contact Water flows to the O-WTP (Construction and Operations)

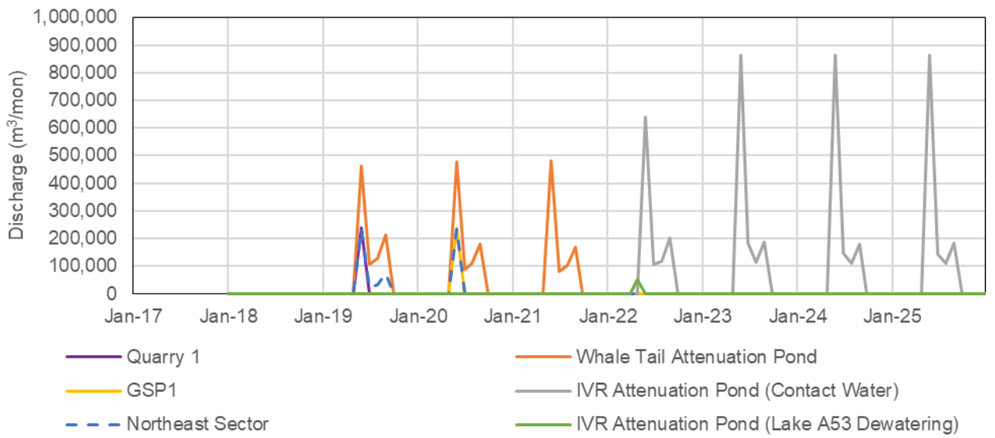

Figure 101: Contact Water Inflows to the O-WTP (Construction and Operations)

Figure 102: Inflows to the S-WTP (brine) Unit (Construction and Operations)

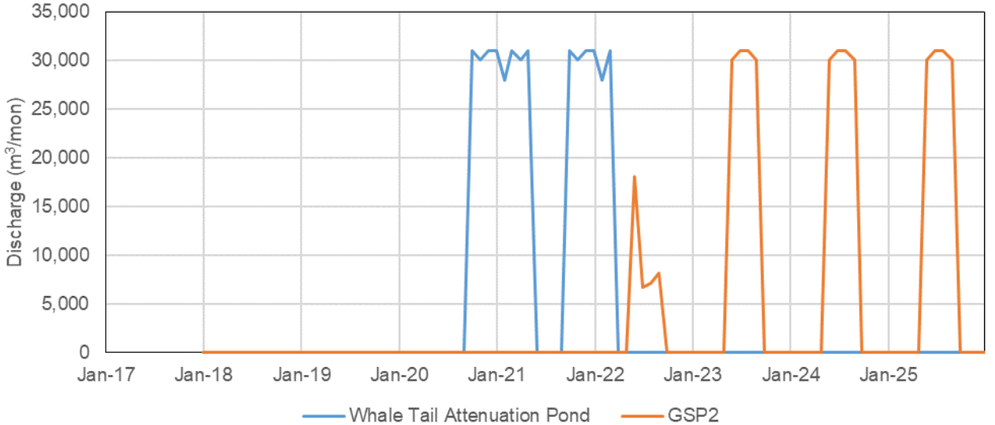

Figure 103: Inflows to the S-WTP (brackish) Unit (Construction and Operations)

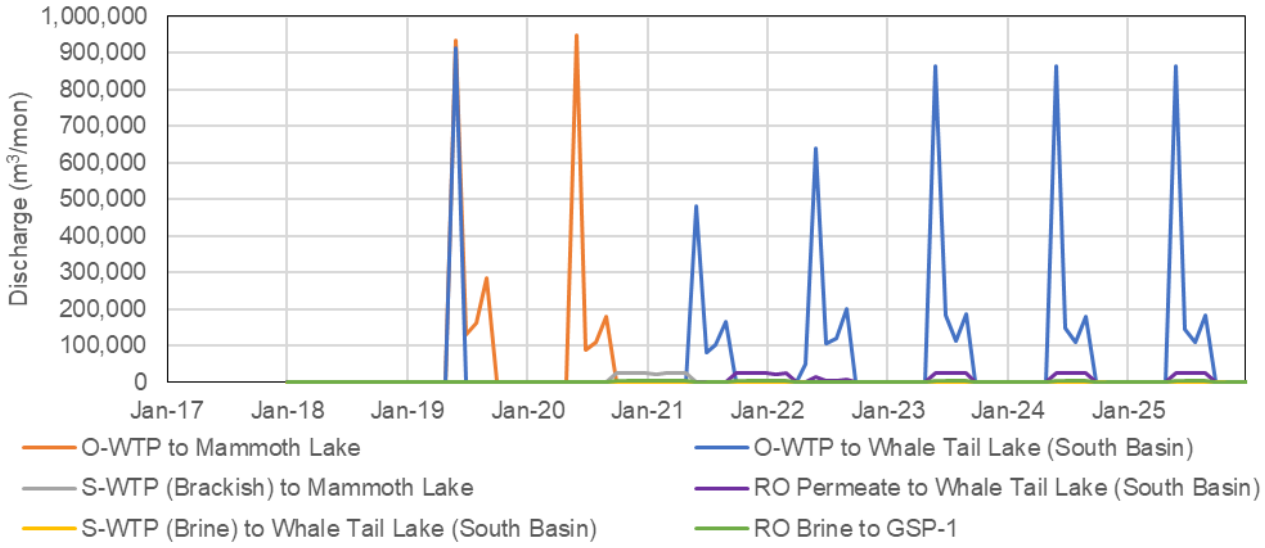

Figure 104: Outflows from the Water Treatment Plants

5.14.1 Changes from the FEIS Addendum

Changes to the treatment are an accumulation of all the upstream updates described above. The flows through the Project's treatment streams are summarized below, relative to the flows considered in the FEIS Addendum:

- O-WTP for TSS removal (non-contact water): Due to the change in the dewatering schedule (Section 4.0), there is a slight change in the fraction of the dewatering from the Whale Tail Lake (North Basin) that is sent to the O-WTP for TSS removal. The updated treated volume is 2% lower (1,128,350 m^3 vs. 1,150,300 m^3 previously).
- O-WTP for TSS and arsenic removal: Overall, there is less contact water pumped to the attenuation ponds that collect the surface water requiring treatment (primarily due to the reduction in runoff from the WRSFs – see Sections 5.5.3 and 5.12.3 for further details). As a result, there is a 5% reduction in contact water pumped to the O-WTP during operations (8,750,300 m^3 vs. 9,241,350 m^3 previously).
- S-WTP (brine) Unit: Flows to the S-WTP (brine) unit are pumped at a constant rate, which was not changed in this update. There is therefore no change in the flows from this unit.
- S-WTP (brackish) Unit: In addition to water from the underground, the S-WTP (brackish) treats runoff from the Whale Tail Attenuation Pond during the winters of 2021 and 2022. During this time, there is a 6% increase in the runoff pumped from the pond due to the increased camp flows described in Section 4.0. Flows from the Underground Mine are treated at a constant rate, which has not changed in this update. The overall inflow to the S-WTP (brackish) over operations is 831,000 m^3 (compared to 824,300 m^3 previously).

Overall, these updates result in a net 4% decrease in treatment (10,927,850 m^3 vs. 11,434,250 m^3 previously) over the operations period (Figure 105).

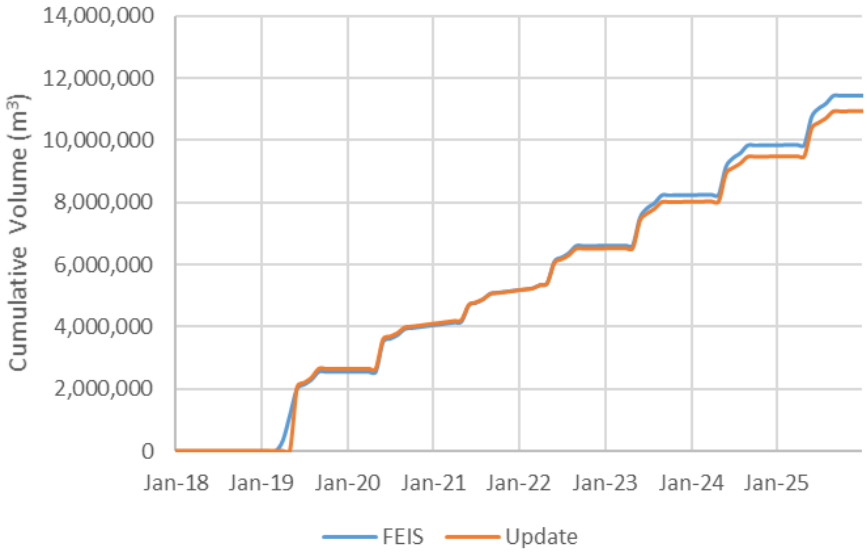

Figure 105: Comparison of Cumulative Inflows to Treatment under the FEIS Addendum and the Current Water Balances

5.15 Closure: Flooding of Open Pits, Underground Mine and Refilling of Whale Tail Lake (North Basin)

Mine closure is initiated after cessation of mining activities, in January 2026 until Whale Tail Lake (North Basin) reaches a water surface elevation of 153.5 masl (i.e., 1 metre over the baseline elevation). The water management plan for the closure period is presented conceptually in Figure 106.

The refilling duration of Whale Tail Lake (North Basin) was estimated using the mean annual water balance based on the following assumptions:

- The Whale Tail Pit, IVR Pit, and Underground Mine are not hydraulically connected below the surface during the refilling period.
- Refilling of mining development is prioritized as follows:
  - Underground Mine;
  - IVR Pit; and,
  - Whale Tail Pit.
- The Underground Mine is refilled by local catchment runoff, drawdown of GSPs 1 and 2, IVR Attenuation Pond and partial drawdown of Whale Tail Lake (South Basin) to complete its flooding.
- The IVR Pit is refilled by local catchment runoff, runoff collected in the Whale Tail WRSF Contact Water Collection System, partial drawdown of Whale Tail Lake (South Basin), and diversion of runoff from Whale Tail Lake (South Basin) to maintain its closure water surface elevation (i.e., 153.5 masl).
- The Whale Tail Pit is refilled by local catchment runoff, runoff from the IVR WRSF Contact Water Management System, and overflow of the Whale Tail Attenuation Pond and of the IVR Pit. Once Whale Tail Pit is refilled, the water surface elevation increases until Whale Tail Lake (North Basin) reaches the water surface elevation of 153.5 masl.

Using this approach, refilling of Whale Tail Lake (North Basin) to 153.5 masl was estimated to occur from 2026 to 2042 (Figure 107) as follows:

- refilling of the Underground Mine expected to be completed in early 2026;
- refilling of the IVR Pit to 149.3 masl (i.e., the spill elevation of the IVR Pit onto the bed of Whale Tail Lake [North Basin]) expected in 2027;
- refilling of the Whale Tail Attenuation Pond and pit areas to the water surface elevation of 153.5 masl expected in 2042.
- Reconnection of the South Basin and North Basin will occur once water quality objectives are met within the flooded pit lake, currently predicted to occur in 2042 (Golder 2019a). However, this timeline will be updated via water quality modelling and operations management with the aim of matching the timing of end of flooding with meeting of water quality goals.

During this period, the total catchment area of Lake A16 (Mammoth Lake) will be reduced by 77% from 38.7 km^2 to 9.0 km^2, resulting in a proportional decrease in flows.

Elevation-storage-area relationships used for this estimate are provided in Appendices C and D.

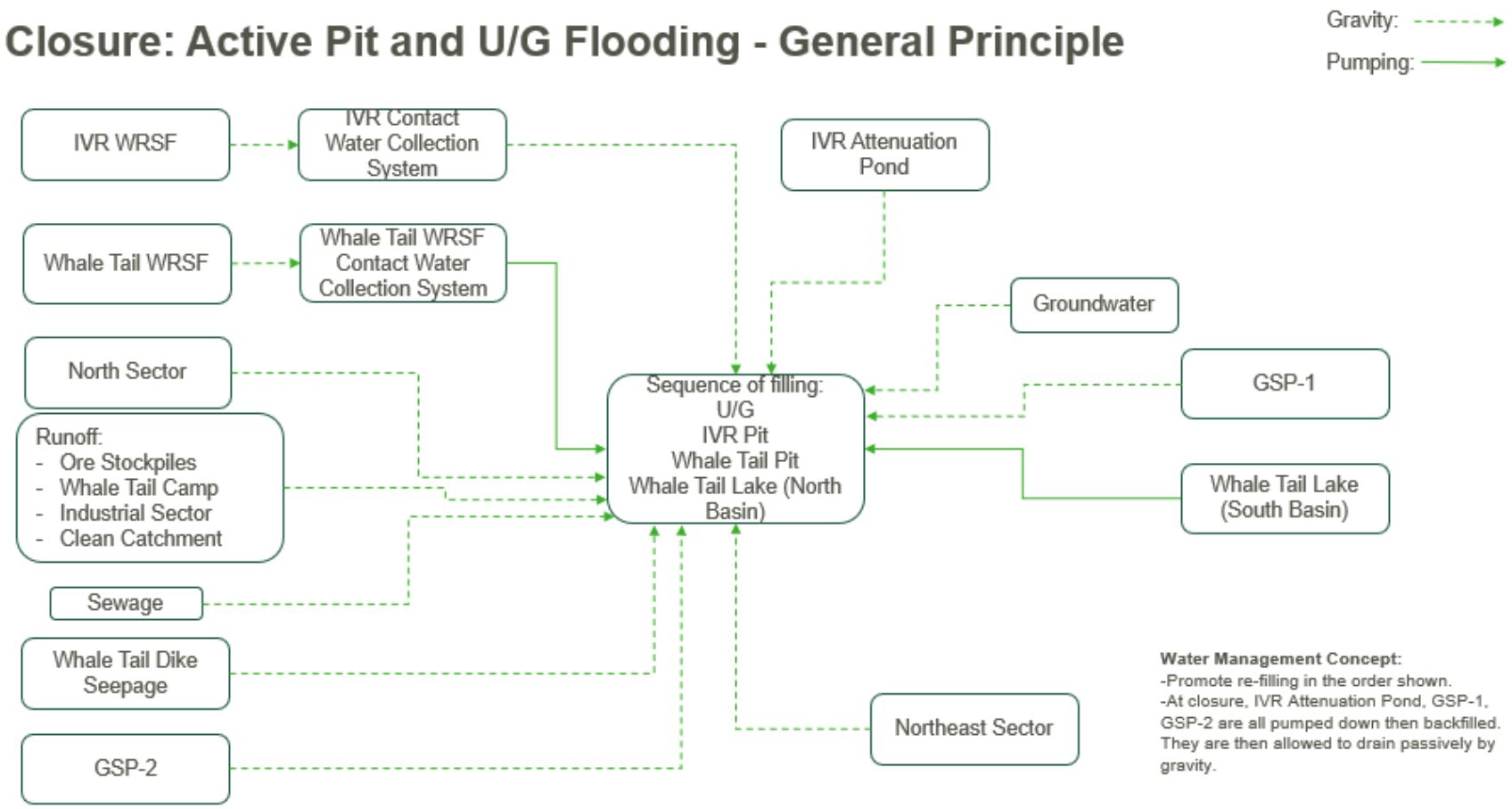

Figure 106: Mine Closure Period Flow Diagram – General Principle

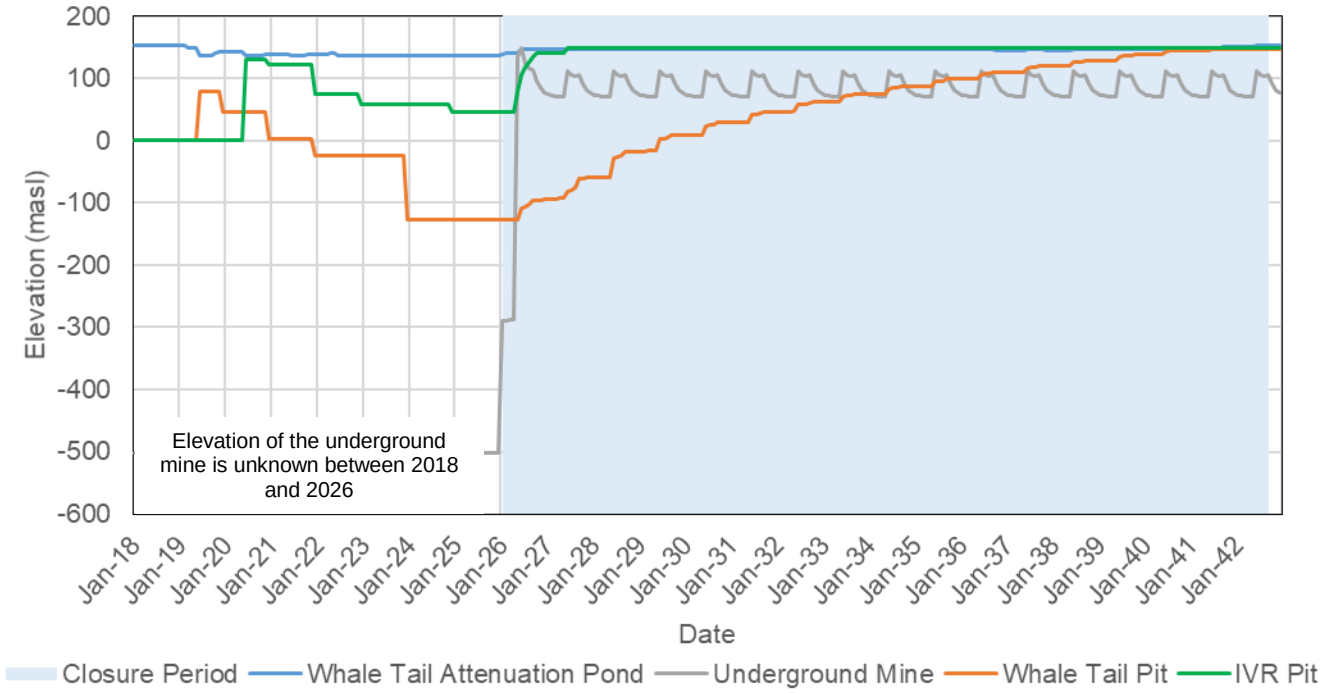

Figure 107: Refilling of Whale Tail Lake (North Basin) and Underground Mine

5.16 Post-Closure: Re-Establishment of Natural Drainage Patterns

Following refilling of Whale Tail Lake (North Basin) to 153.5 masl (i.e., to overtop the Mammoth Lake sill), and once the pit lake water quality is acceptable (full flooding predicted to occur in 2042; adequate water quality in 2042; Golder 2019a), the Whale Tail Dike, Mammoth Dike, and the Whale Tail WRSF Dike are decommissioned. Whale Tail Lake (North Basin) and Whale Tail Lake (South Basin) form Whale Tail Lake with a water surface area of 2.34 km^2, or a 41% increase from baseline, which flows to Lake A16 (Mammoth Lake) over the Mammoth Lake Dike via spillway. Runoff from the Whale Tail WRSF Contact Water Collection System area flows to Lake A16 (Mammoth Lake).

The reflooding strategy will be adapted during closure based on future water quality predictions validated with site monitoring data. The objective will be for pit lake water to meet quality objectives concurrently with completed reflooding such that lake reconnection can happen as soon as possible after thereafter.

The configuration of Whale Tail Lake at Post-Closure, along with permanent drainage pathways, is shown in Figure 108. Water balance components are presented in Section 5.8 (Whale Tail Lake) and in Section 5.5 (Whale Tail WRSF Contact Water Collection System area).

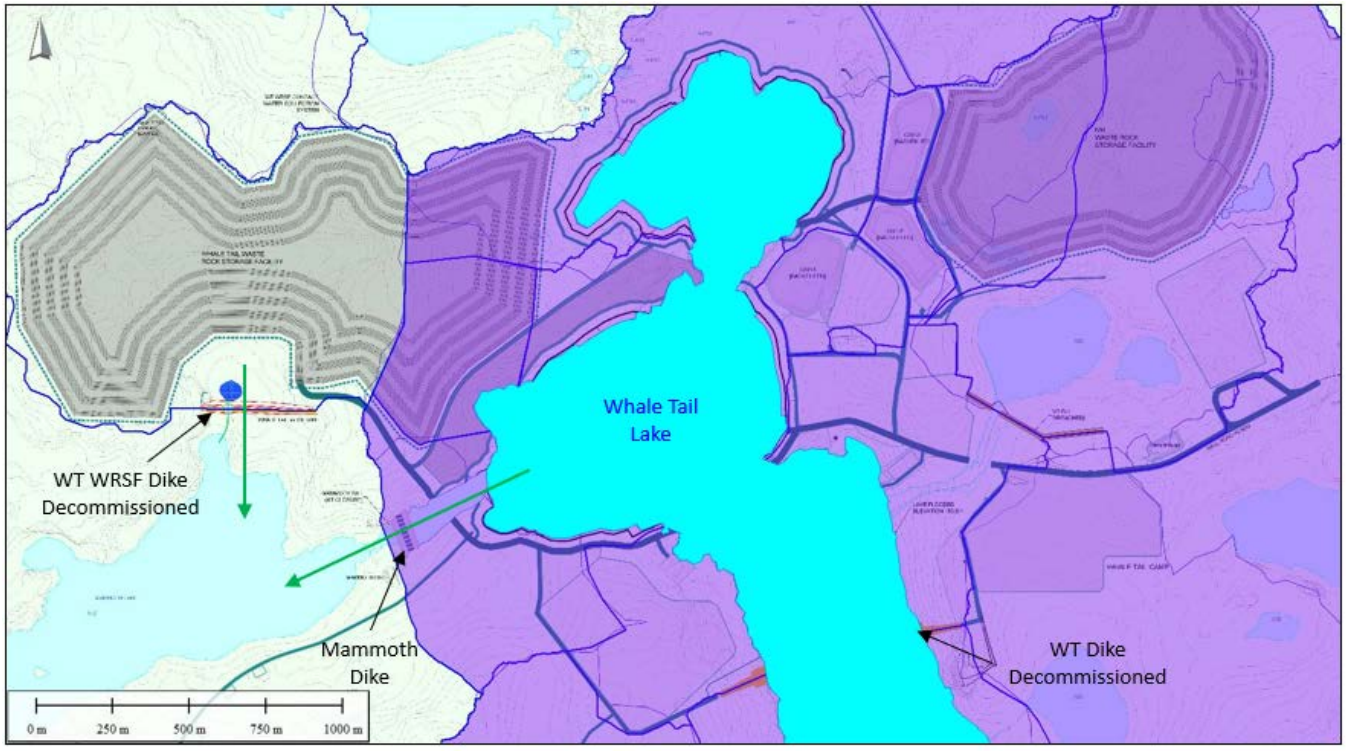

Figure 108: Post-Closure

6.0 RISKS AND OPPORTUNITIES

Based on the results of the water balance presented herein, risks and opportunities are listed as follows:

- Dry/Wet Precipitation Years: This water balance was based on mean annual precipitation. Runoff is therefore expected to vary from mean annual conditions under dry or wet annual conditions. These variations can affect filling and drawdown durations, as well as monthly runoff volumes managed on site. While short-term extreme events were not considered as part of the scope of the water balance, the site water management infrastructure will be designed based on guidelines provided in the Canadian Dam Association (CDA) Dam Safety Guidelines.
- Adaptive Water Management. Although this report presented potential adaptive water management in the form of GSP-3 (Section 5.2.3), the potential for contingencies may take several forms. Relevant examples for the Project include:
  - GSP-2. The water balance presented here assumes GSP-2 is online by 2022 in order to manage brackish water from the Underground Mine. However, this pond can potentially be constructed sooner if needed.
  - GSP-3. As previously described, based on the results of the water balance presented in this report, GSP-3 is not required. However, it can still be considered for contingency purposes. GSP-3 is a potential source of flexibility in site water management and treatment and is an adaptive management opportunity. As site water management optimization progresses, the use of this pond may be further considered. This pond could be used as either a surface or underground water storage pond depending on the water management needs of the project.
  - IVR Attenuation Pond. Another potential source for increased water storage capacity on site is the IVR Attenuation Pond. There is the potential to increase the design dike elevation to increase water storage capacity.
  - Underground Mine Storage. If surface storage of underground water is not available or insufficient, temporary use of the Underground Mine is a possibility. Partial flooding of the Underground Mine could provide time to review surface water containment and/or water treatment options.
- Conservative Groundwater Inflows: Groundwater inflows considered herein comprise a substantial proportion of total inflows. These inflows were based on the “EA Case” and are conservative by design (Golder 2019b). Thus, actual groundwater inflows may be less than those considered herein. The Base Case, described in Section 3.5, represents the best estimate of groundwater inflows based on measured data to date. Using the Base Case values would result in approximately 15% inflow reduction to the Underground Mine during operations than compared with the EA Case results presented in this report.
- Water Content in Waste Rock from the Pits: Losses from the pits due to the water content in waste rock were not considered. This results in a conservative water balance as it increases the volume of water in the pit that must ultimately be treated and discharged.

7.0 STUDY LIMITATIONS

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8.0 CLOSURE

This report presents methods and results of the Project's updated mean annual water balance with a focus on the construction, operation, and closure phases of the Expansion Project to provide input to the Project's design, water management plan, and environmental impact assessments. It is limited to catchments of the Project footprint and does not address the receiving environment within and downstream of the effluent discharge point. Where relevant, the report demonstrates the impacts of revisions since the FEIS Addendum.

Please do not hesitate to contact the undersigned should you have any questions or comments.

Golder Associates Ltd.

REGISTERED PROFESSIONAL ENGINEER
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NT/NU
10 MAY 2019

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AC/JL/VJBNS/sg
https://golderassociates.sharepoint.com/sites/102627/technical work/04_waterbalance-waterquality/04_reporting/water balance/rev1/18108905-294-rpt_2019waterbalance-rev1.docx

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Signature
Date 10 May 2019
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

9.0 REFERENCES

Agnico Eagle (Agnico Eagle Mines Limited). 2016a. Meadowbank Mine – Amendment/Reconsideration of the Project Certificate (No. 004/ File No. 03MN107) and Amendment to the Type A Water Licence (No. 2AM-MEA1525).

Agnico Eagle. 2016b. Meadowbank Mine – Amendment/Reconsideration of the Project Certificate (No. 004/ File No. 03MN107) and Amendment to the Type A Water Licence (No. 2AM-MEA1525). Volume 8, Appendix 8-B.2. Submitted to the Nunavut Impact Review Board, June 30, 2016.

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Agnico Eagle. 2018a. Meadowbank Mine – Addendum to Project Certificate (No. 008/ File No. 16MN056) and Addendum to the Type A Water Licence (No. 2AM-WTP1826) – Phase 2. Reference to be updated when available. Golder (Golder Associates Ltd.). 2016. Hydrogeology Baseline Report – Whale Tail Project. Submitted as Volume 6, Appendix 6-A to Final Environmental Impact Statement. June 2016.

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Golder. 2019b. Updated Hydrogeological Assessment, Whale Tail Pit, Expansion Project. 18108905-291-TM-Rev0. 6 May 2019.

SNC Lavalin. 2019. Mine Layout Watersheds During Operations – Phase II. Figure 1-2. January 16, 2019.

APPENDIX A

Conceptual Flow Diagrams

Whale Tail Pit – Expansion Project
Water Management Flow Charts – March, 2019

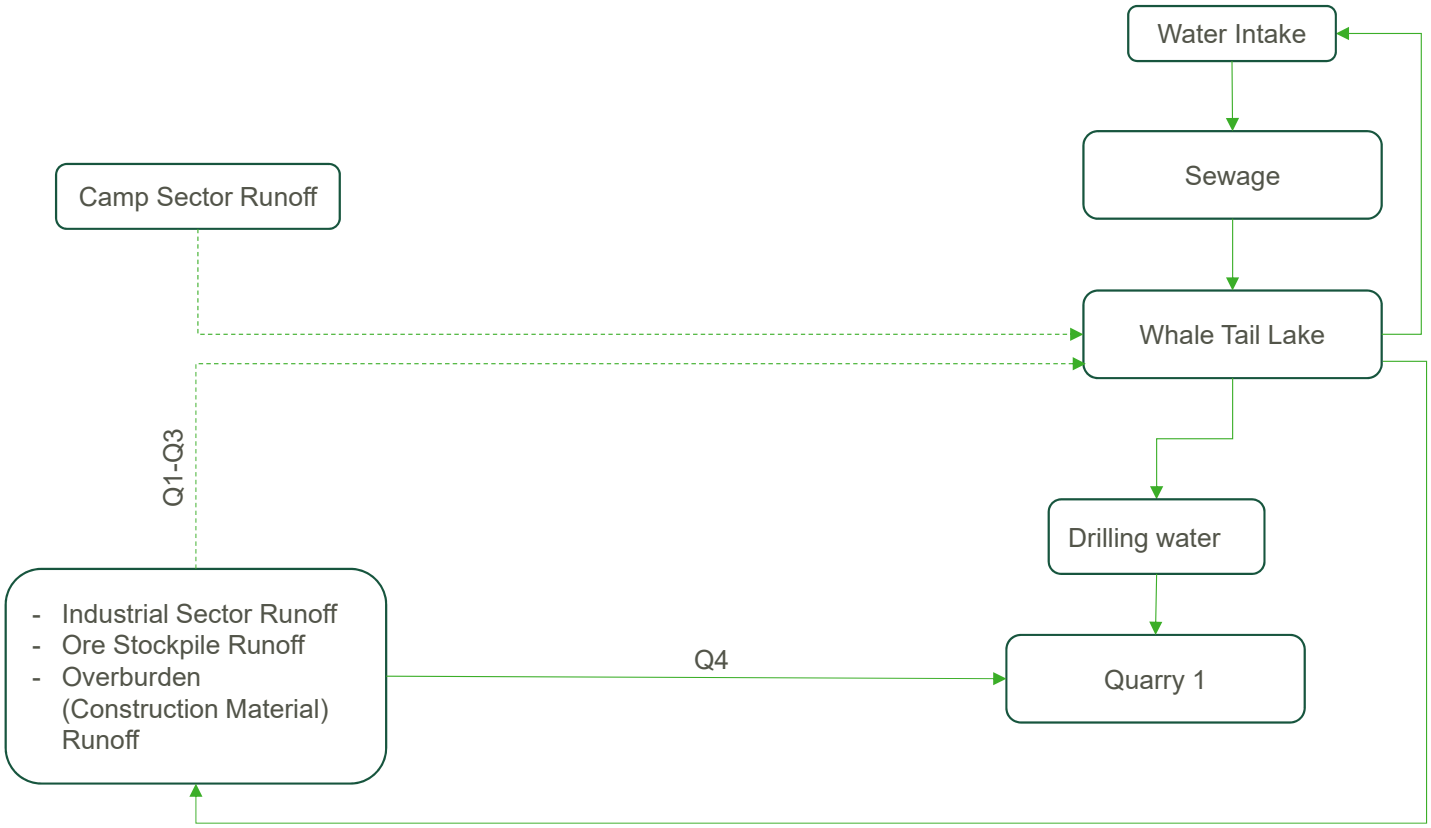
GOLDER

Surface Water Flow Charts

2017 (Pre-Construction)

Gravity: ----------→

Pumping: ——————→



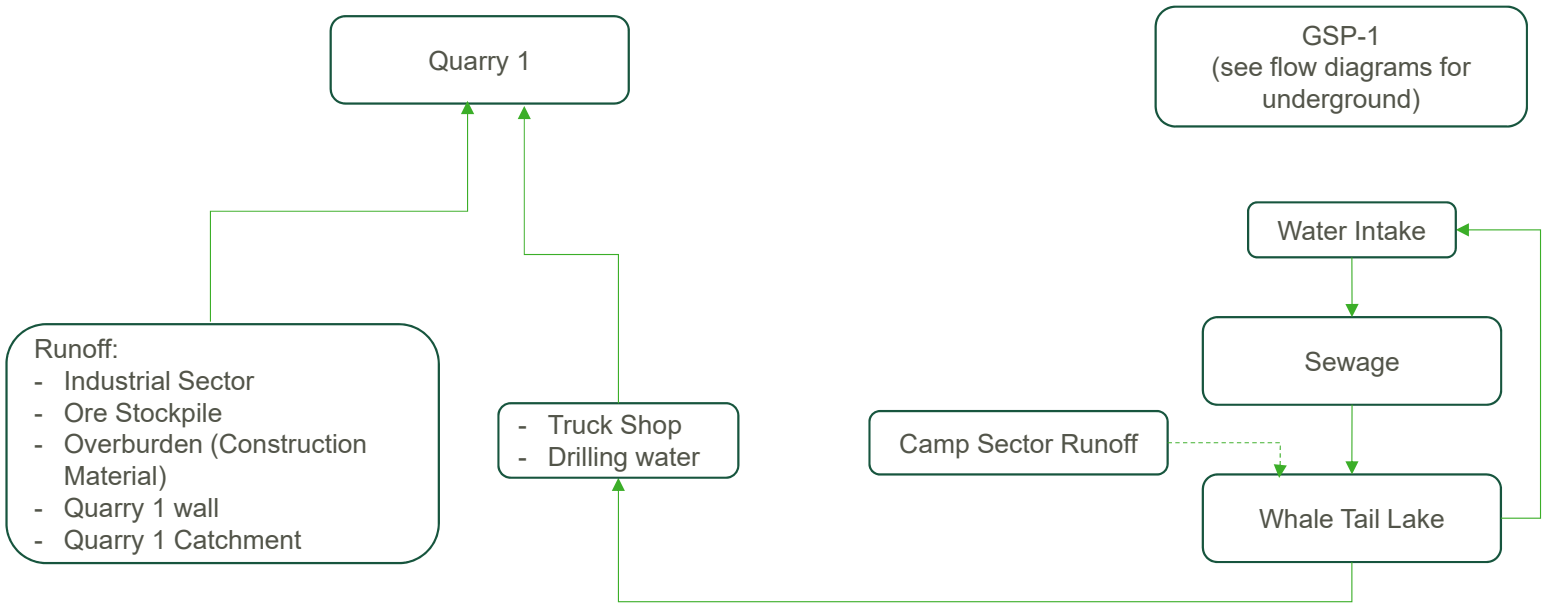
Water Management Concept:
-Contact water is managed through Quarry 1 once initiated.
-Whale Tail Lake is the source of fresh water.

Q1-Q2 2018 (Until Quarry 1 is mined out and Licence A is received)

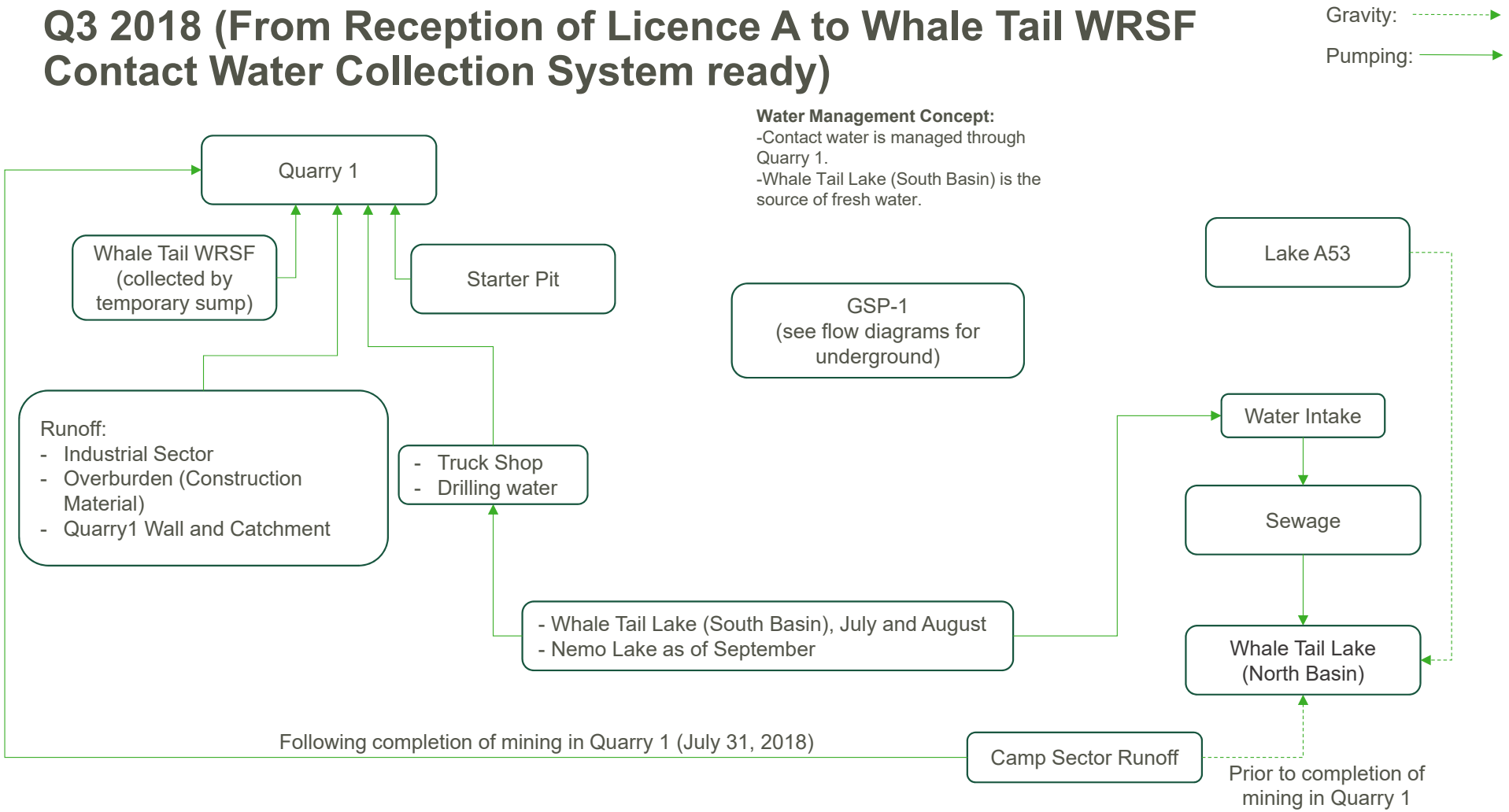
Gravity: ⇢

Pumping: →

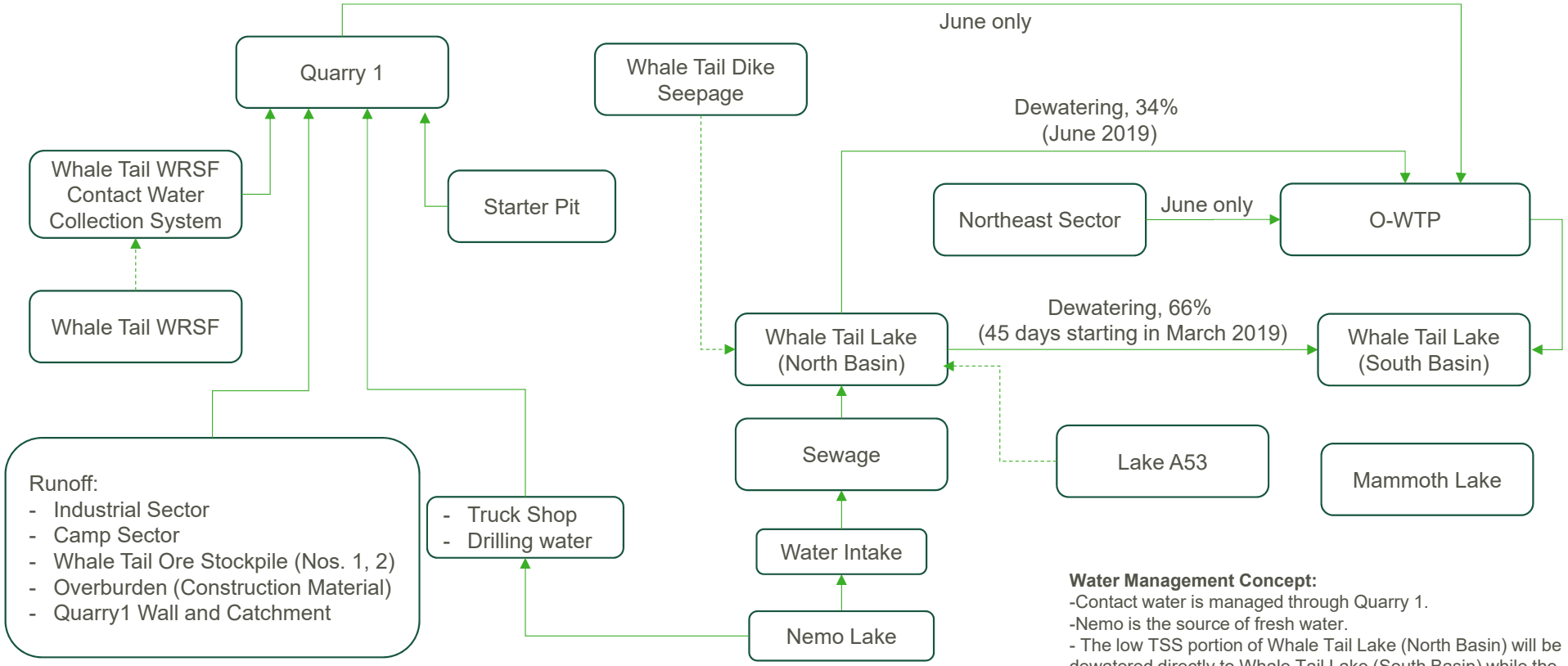
Water Management Concept:
-Contact water is managed through Quarry 1.
-Whale Tail Lake is the source of fresh water.



Q3 2018 (From Reception of Licence A to Whale Tail WRSF Contact Water Collection System ready)

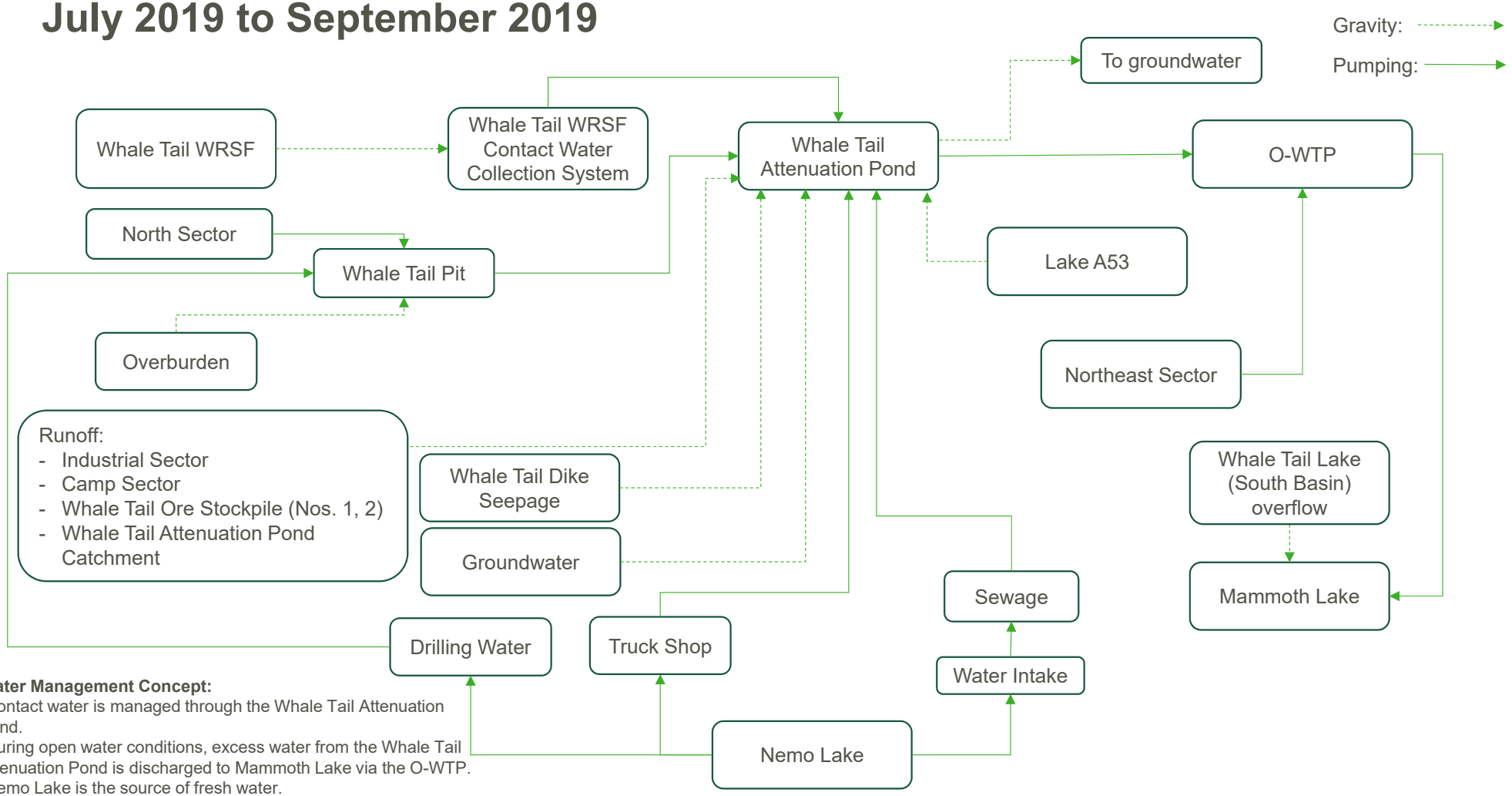


Q4 2018 (Whale Tail WRSF Contact Water Collection System ready) to June 2019 (Whale Tail North Dewatered)



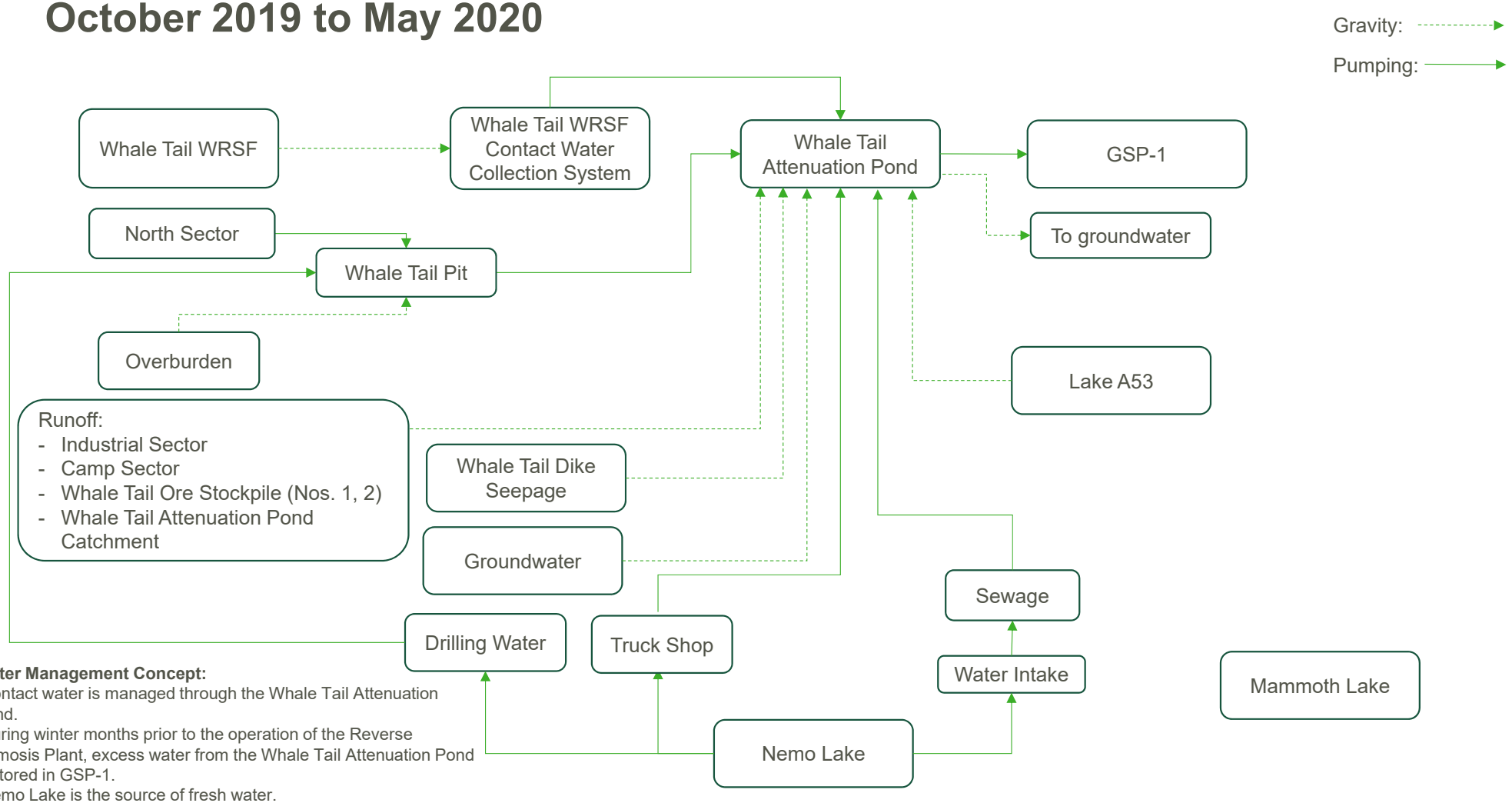
Water Management Concept:
-Contact water is managed through Quarry 1.
-Nemo is the source of fresh water.
- The low TSS portion of Whale Tail Lake (North Basin) will be dewatered directly to Whale Tail Lake (South Basin) while the remainder will be discharged through the O-WTP.

July 2019 to September 2019



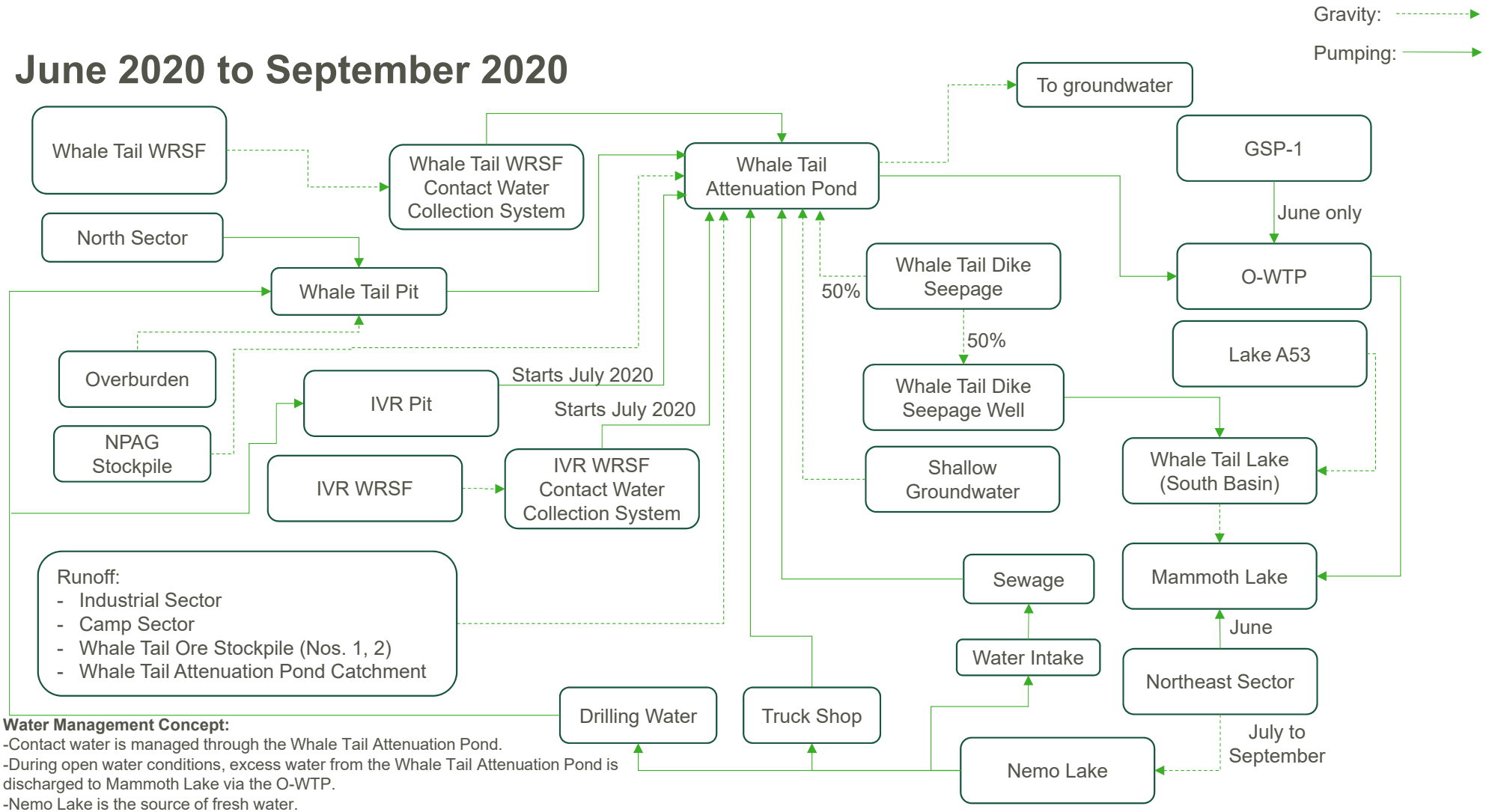
Water Management Concept:
-Contact water is managed through the Whale Tail Attenuation Pond.
-During open water conditions, excess water from the Whale Tail Attenuation Pond is discharged to Mammoth Lake via the O-WTP.
-Nemo Lake is the source of fresh water.

October 2019 to May 2020



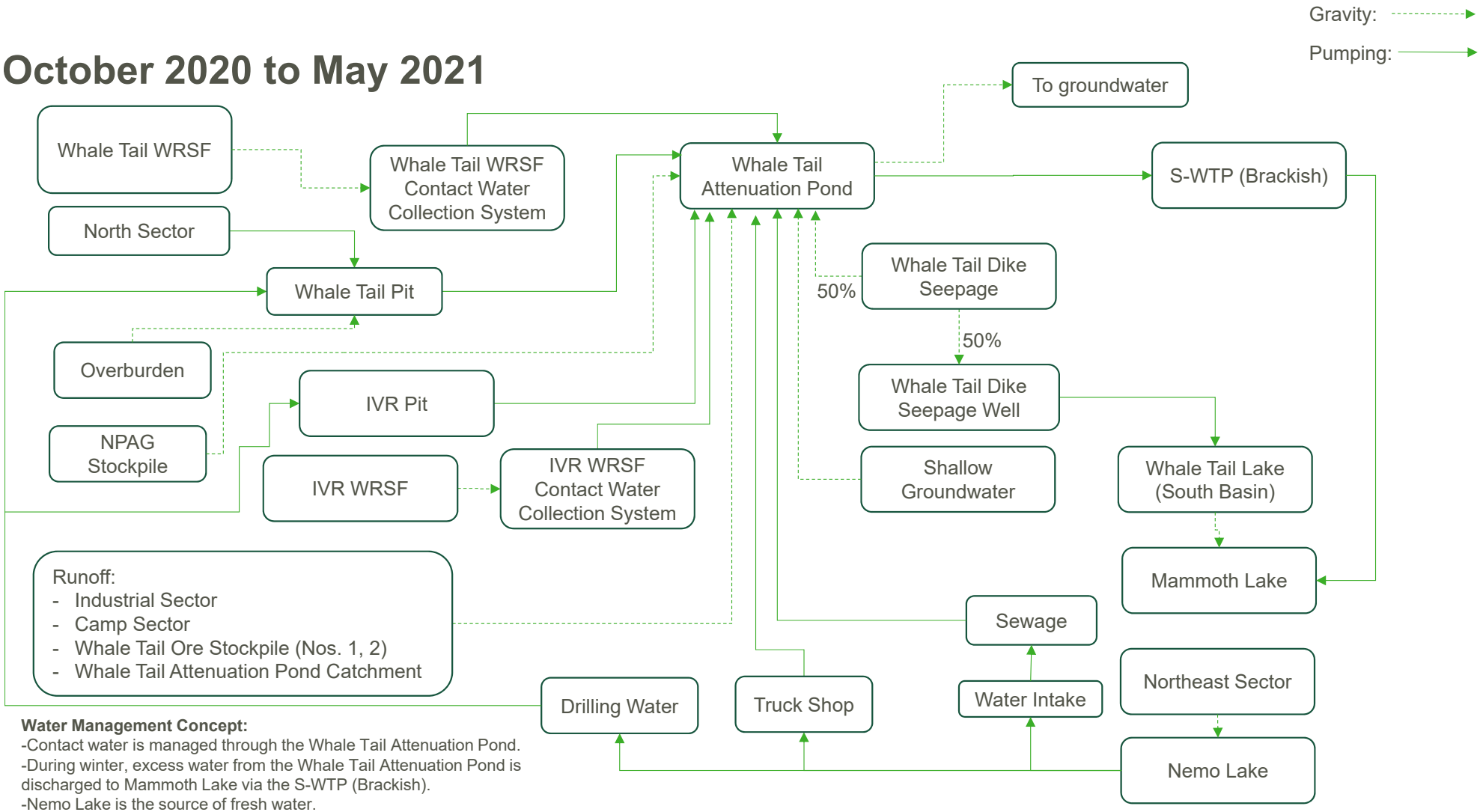
Water Management Concept:
-Contact water is managed through the Whale Tail Attenuation Pond.
-During winter months prior to the operation of the Reverse Osmosis Plant, excess water from the Whale Tail Attenuation Pond is stored in GSP-1.
-Nemo Lake is the source of fresh water.

June 2020 to September 2020



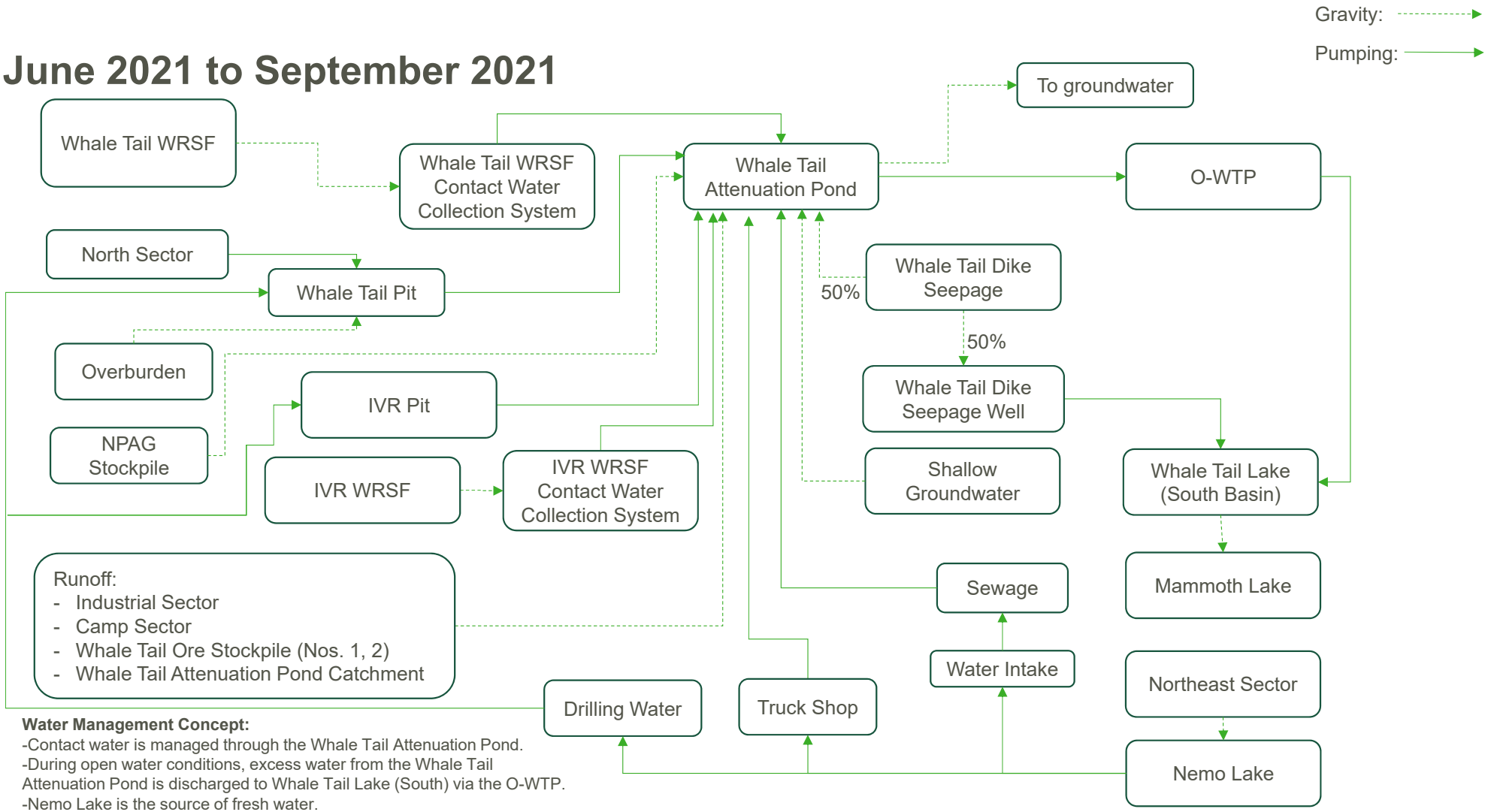
Water Management Concept:
-Contact water is managed through the Whale Tail Attenuation Pond.
-During open water conditions, excess water from the Whale Tail Attenuation Pond is discharged to Mammoth Lake via the O-WTP.
-Nemo Lake is the source of fresh water.

October 2020 to May 2021



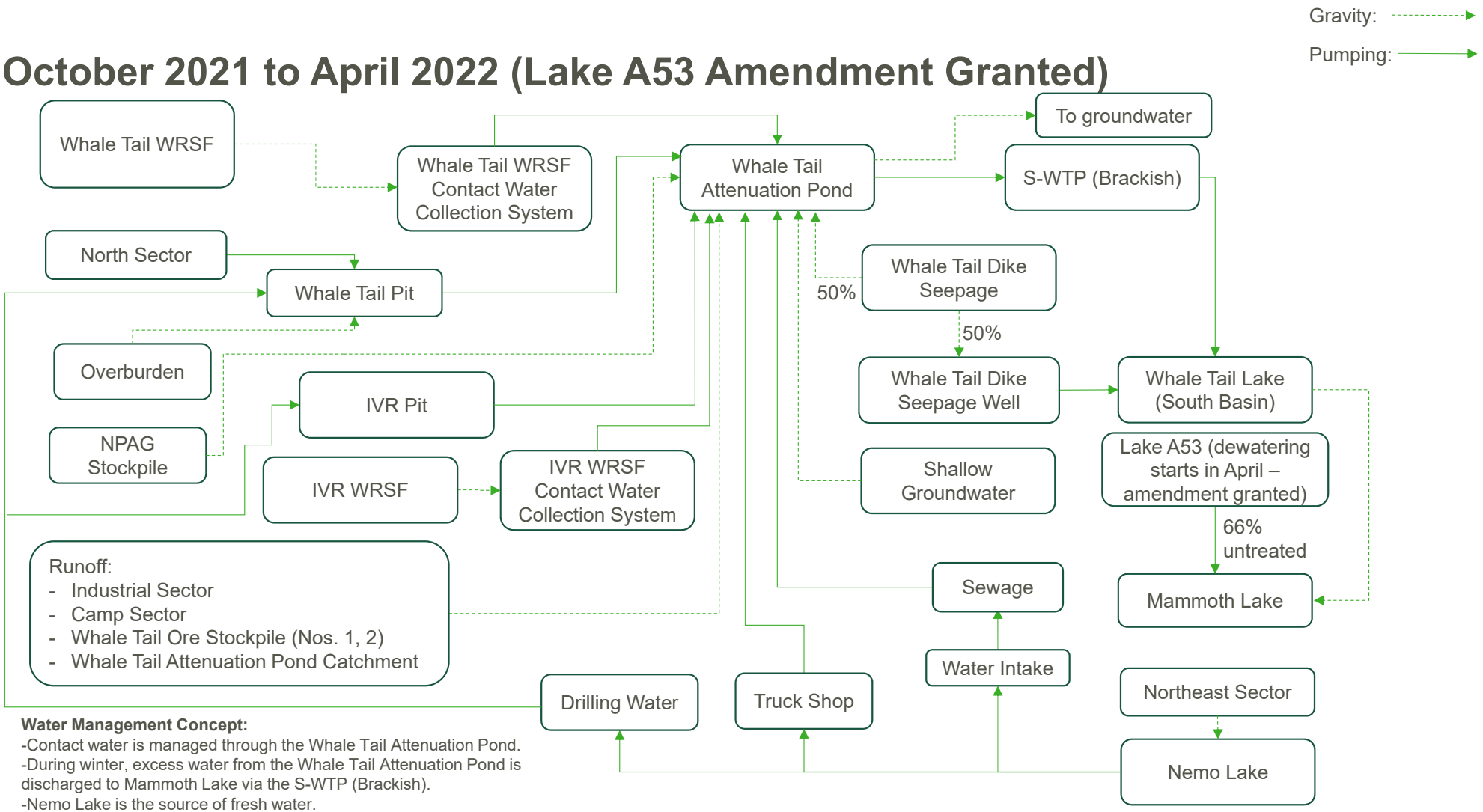
Water Management Concept:
-Contact water is managed through the Whale Tail Attenuation Pond.
-During winter, excess water from the Whale Tail Attenuation Pond is discharged to Mammoth Lake via the S-WTP (Brackish).
-Nemo Lake is the source of fresh water.

June 2021 to September 2021



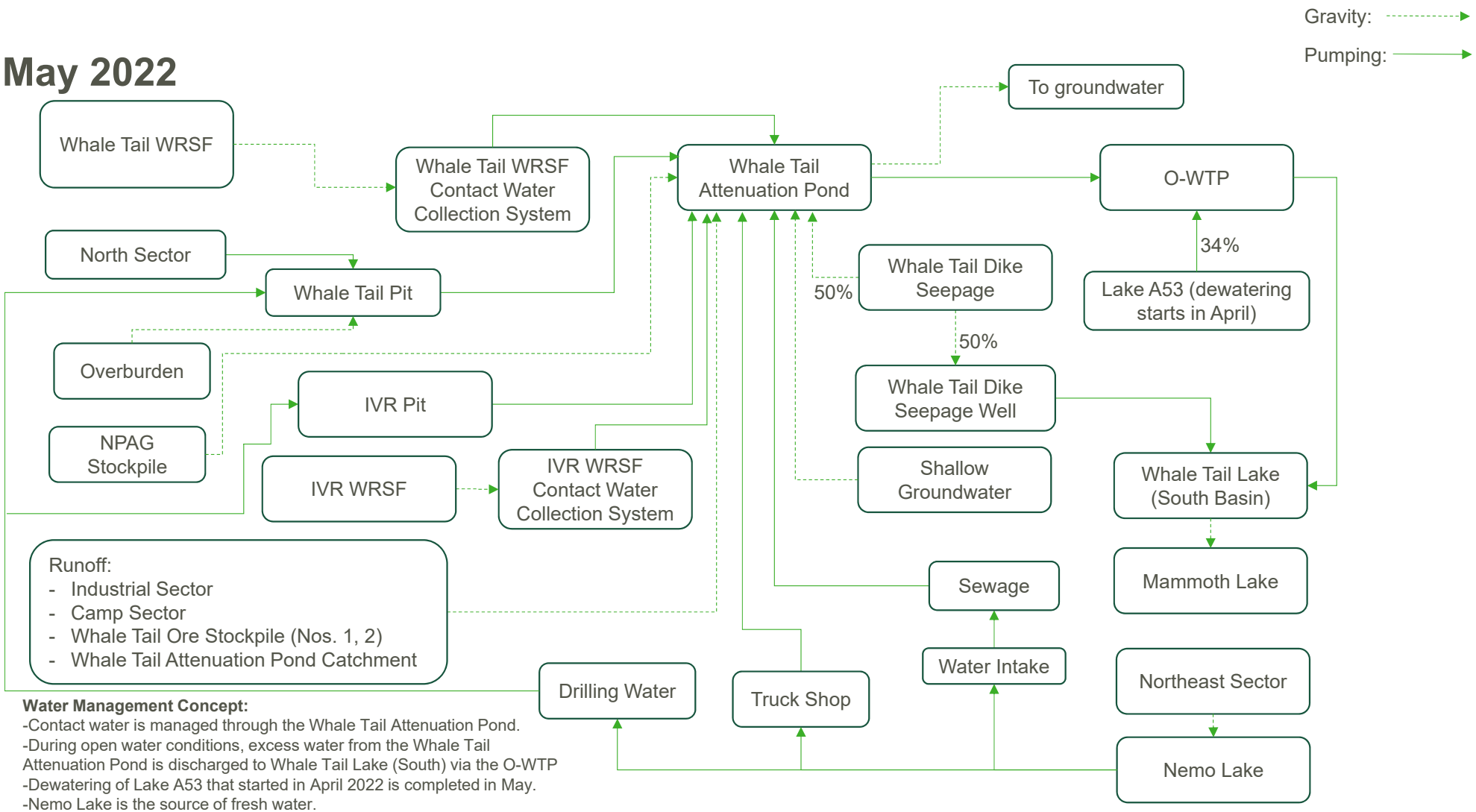
Water Management Concept:
-Contact water is managed through the Whale Tail Attenuation Pond.
-During open water conditions, excess water from the Whale Tail Attenuation Pond is discharged to Whale Tail Lake (South) via the O-WTP.
-Nemo Lake is the source of fresh water.

October 2021 to April 2022 (Lake A53 Amendment Granted)



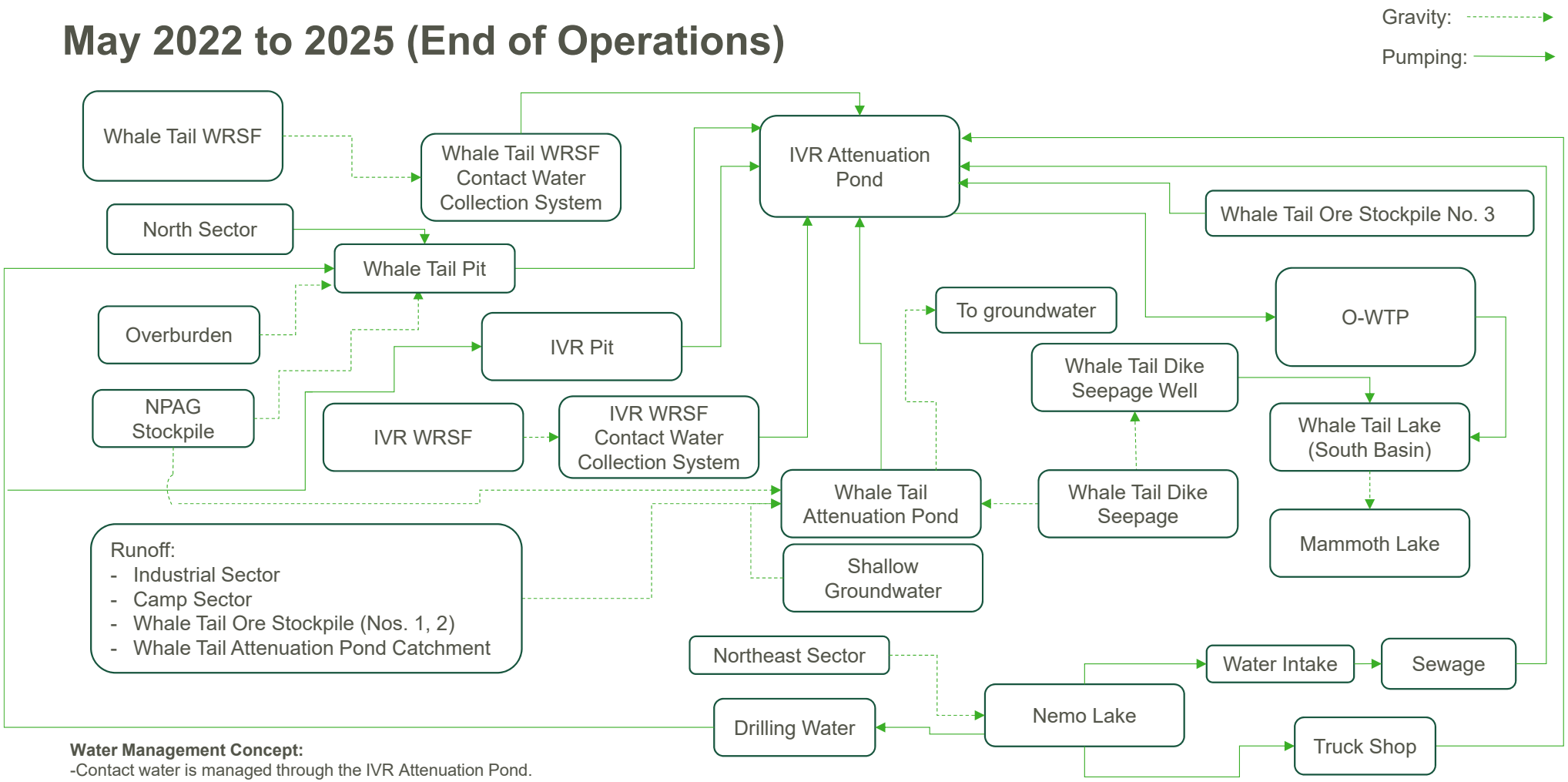
Water Management Concept:
-Contact water is managed through the Whale Tail Attenuation Pond.
-During winter, excess water from the Whale Tail Attenuation Pond is discharged to Mammoth Lake via the S-WTP (Brackish).
-Nemo Lake is the source of fresh water.

May 2022



Water Management Concept:
-Contact water is managed through the Whale Tail Attenuation Pond.
-During open water conditions, excess water from the Whale Tail Attenuation Pond is discharged to Whale Tail Lake (South) via the O-WTP
-Dewatering of Lake A53 that started in April 2022 is completed in May.
-Nemo Lake is the source of fresh water.

May 2022 to 2025 (End of Operations)

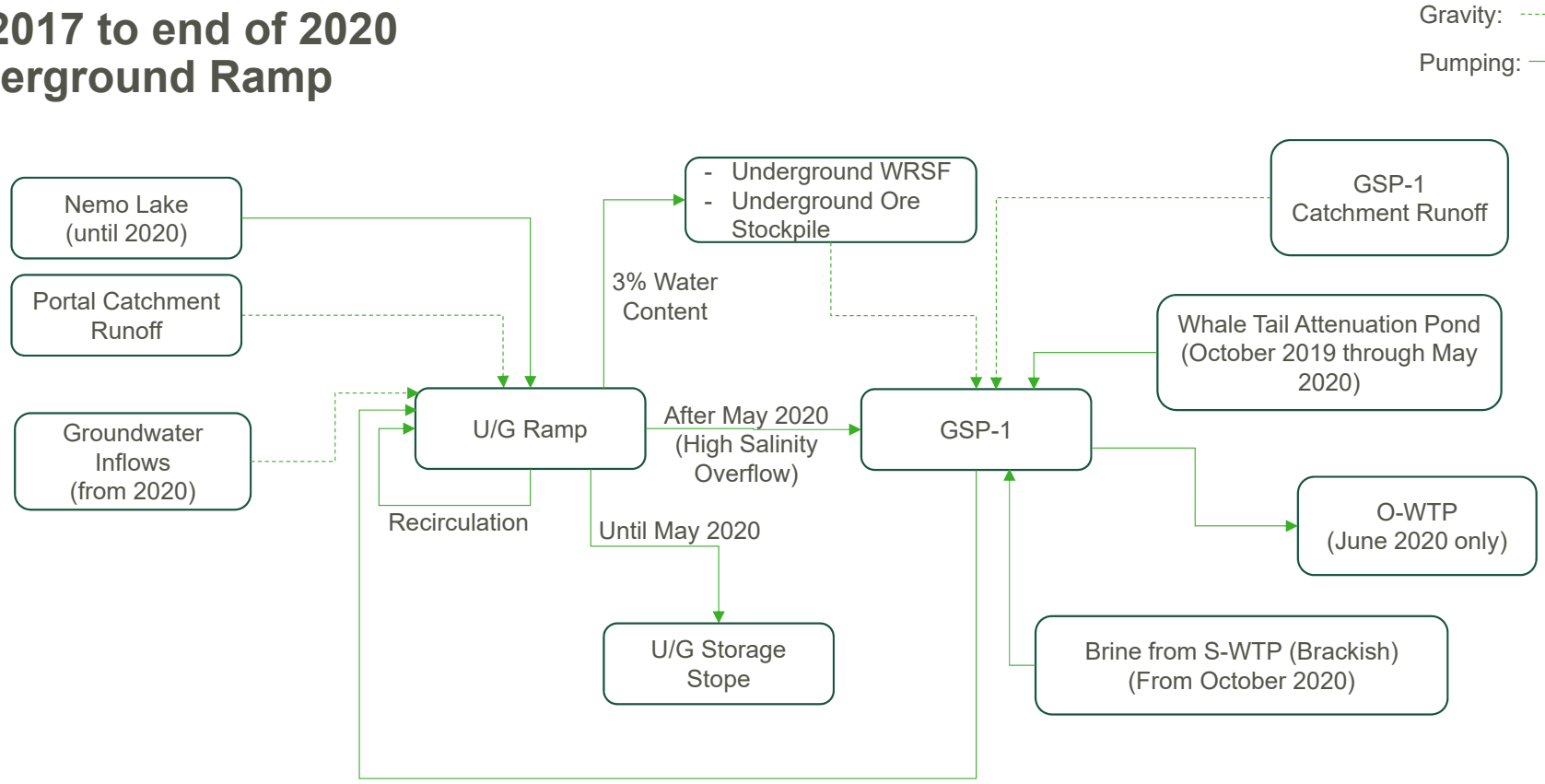


Water Management Concept:
-Contact water is managed through the IVR Attenuation Pond.
-Nemo Lake is the source of fresh water.

GOLDER

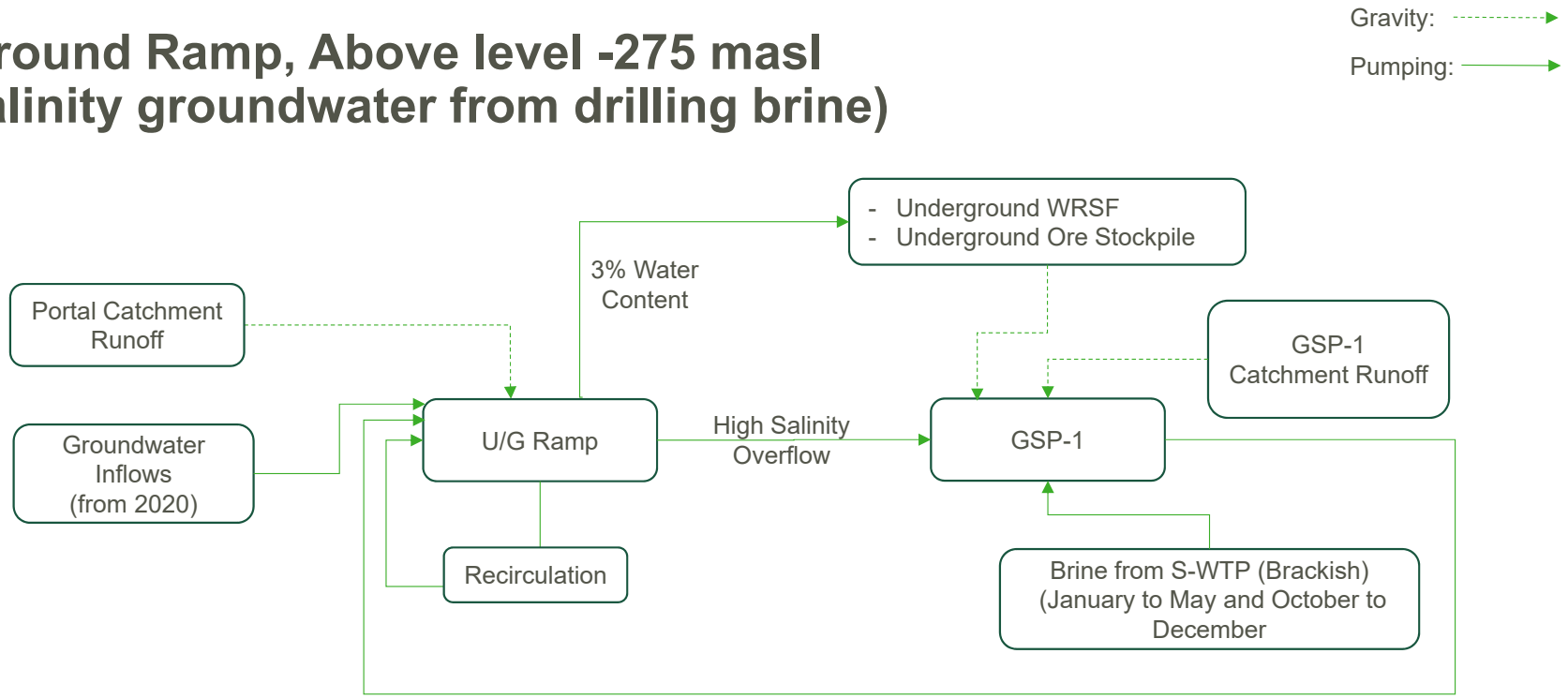
Underground Mine Water Flow Charts

Q4 2017 to end of 2020
Underground Ramp



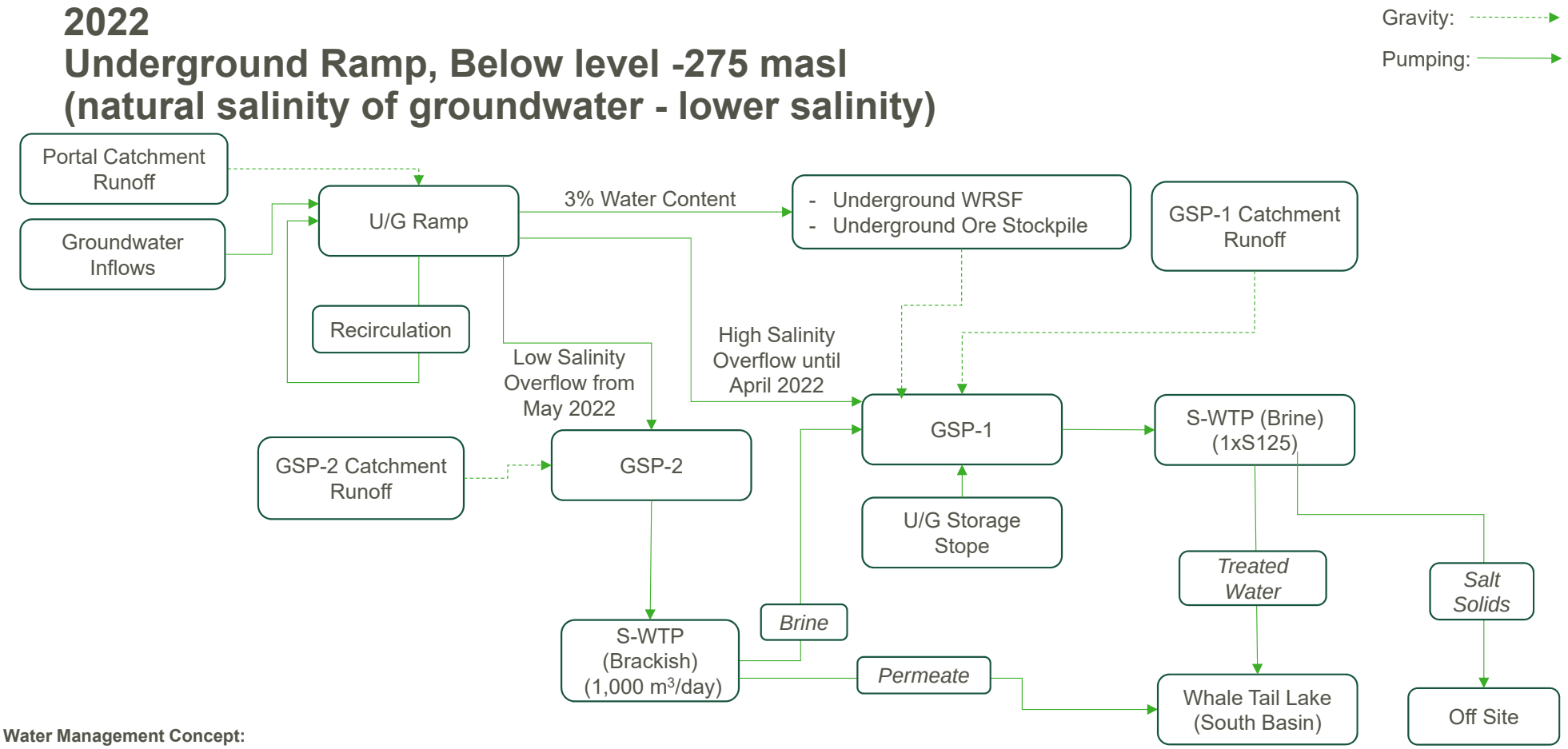
Water Management Concept:
-GSP-1 is the primary source of make-up water to feed the U/G Ramp. Nemo Lake is the secondary source.
-Overflow from the Underground Ramp is discharged to the Underground Stope until it is full. Once the stope is full, overflow reports to GSP-1 (High Salinity Pond) until mining breaks through the cryopeg (estimated in April 2022)

2021
Underground Ramp, Above level -275 masl (high salinity groundwater from drilling brine)



Water Management Concept:
-GSP-1 is the source of make-up water to feed the U/G Ramp.
-Overflow from the Underground Ramp is discharged to the Underground Stope until it is full. Once the stope is full (May 2020), overflow reports to GSP-1 (High Salinity Pond) until mining breaks through the cryopeg (estimated in April 2022)

2022
Underground Ramp, Below level -275 masl (natural salinity of groundwater - lower salinity)



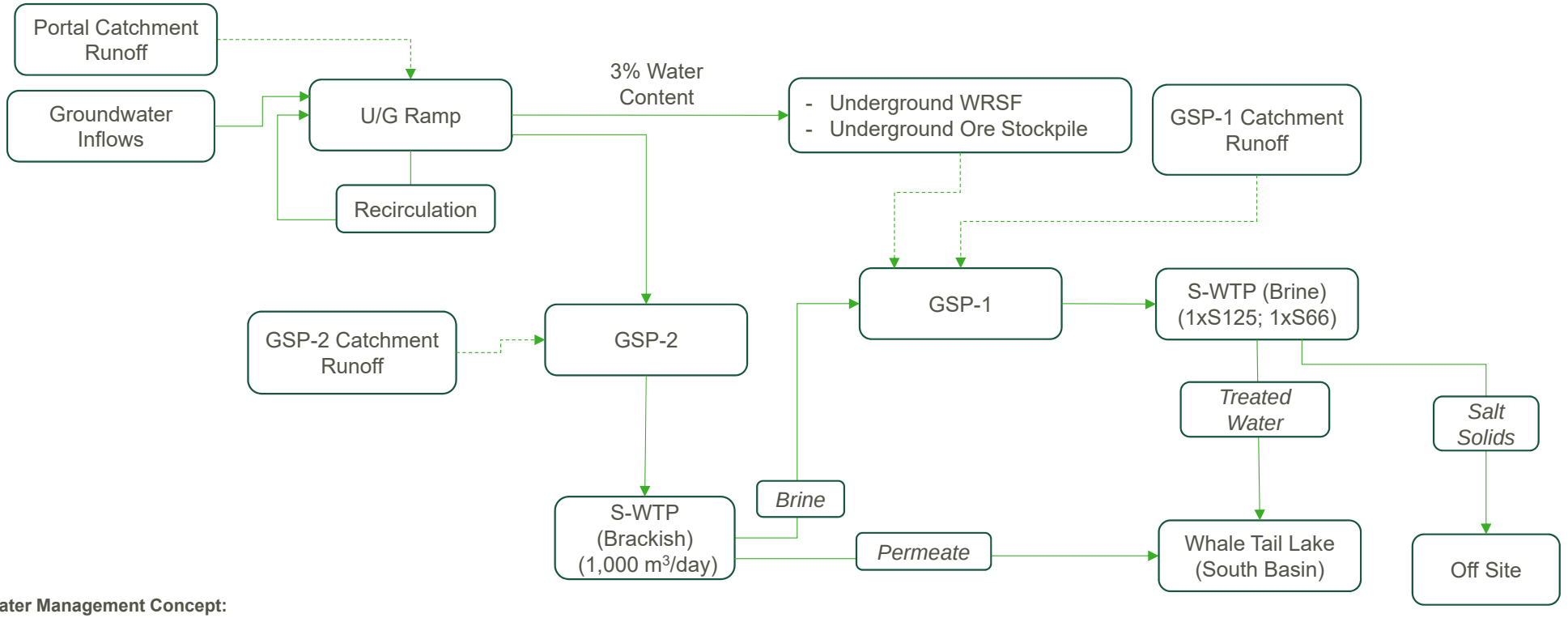
Water Management Concept:

-Overflow from the Underground Ramp is discharged to the Underground Stope until it is full. Once the stope is full (May 2020), overflow reports to GSP-1 (High Salinity Pond) until mining breaks through the cryopeg (estimated in April 2022). The low salinity overflow then reports to GSP-2 (Low Salinity Pond).

-Treated high salinity flows (from GSP-1) are discharged to Whale Tail Lake (South Basin) via S-WTP (Brine)

-Treated low salinity flows (from GSP-2) are discharged to Whale Tail Lake (South Basin) via S-WTP (Brackish)

2023, 2024
Underground Ramp, Below level -275 masl
(natural salinity of groundwater - lower salinity)



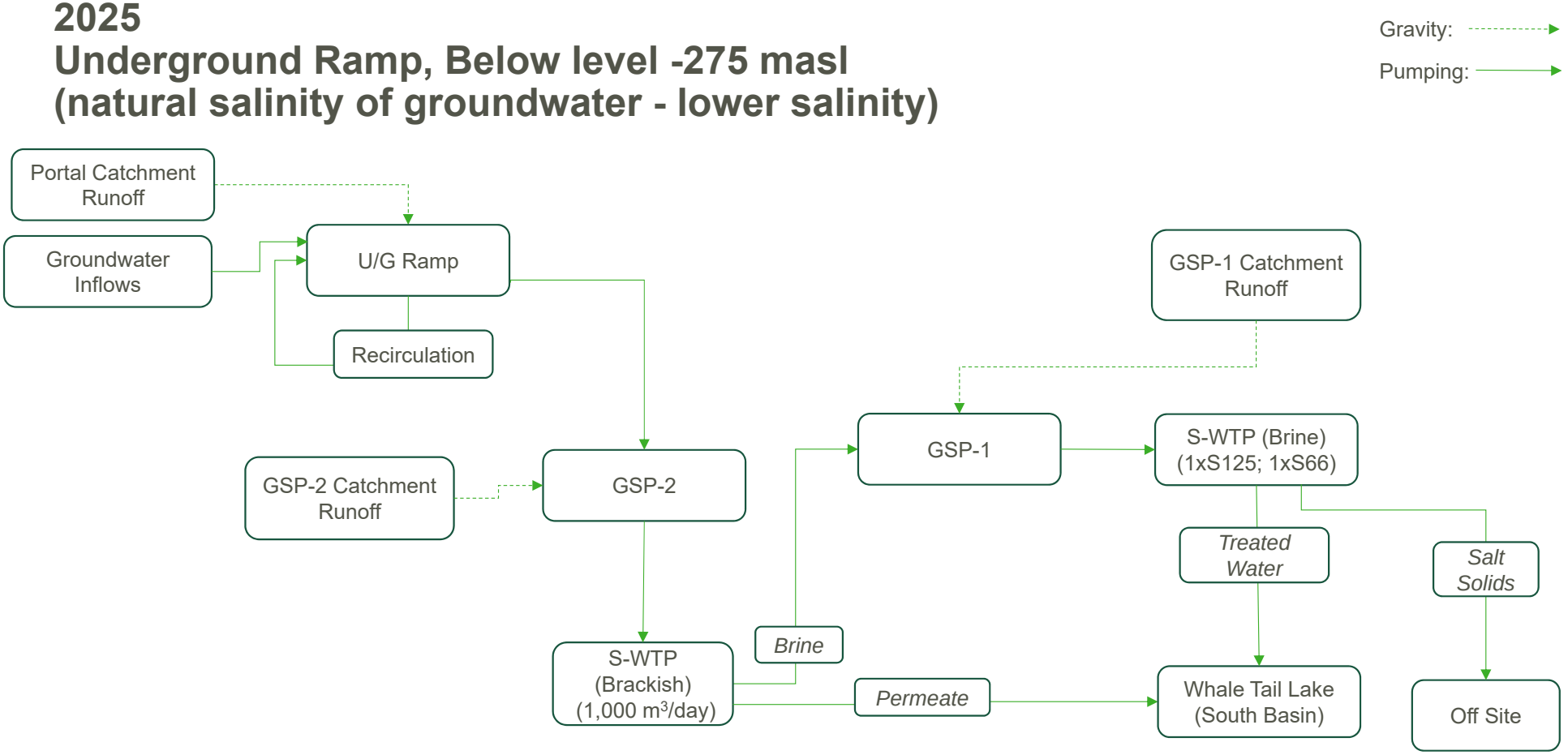
Water Management Concept:

-Overflow from the Underground Ramp is discharged to the Underground Stope until it is full. Once the stope is full (May 2020), overflow reports to GSP-1 (High Salinity Pond) until mining breaks through the cryopeg (estimated in April 2022). The low salinity overflow then reports to GSP-2 (Low Salinity Pond).

-Treated high salinity flows (from GSP-1) are discharged to Whale Tail Lake (South Basin) via S-WTP (Brine). The capacity is increased in January 2023

-Treated low salinity flows (from GSP-2) are discharged to Whale Tail Lake (South Basin) via S-WTP (Brackish)

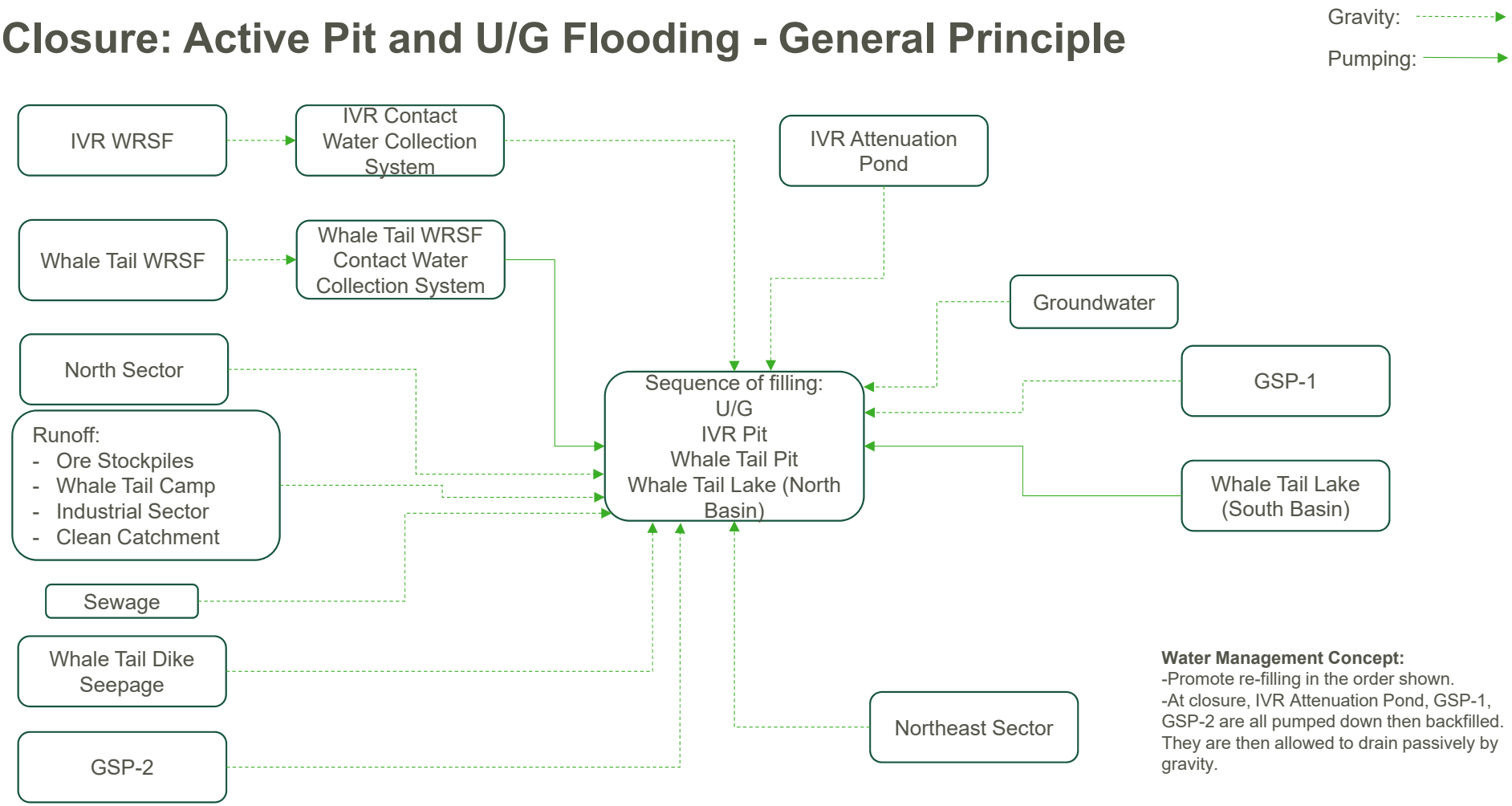
2025
Underground Ramp, Below level -275 masl (natural salinity of groundwater - lower salinity)



Water Management Concept:
-Mining from underground completed at end of 2024.
-Treated high salinity flows (from GSP-1) are discharged to Whale Tail Lake (South Basin) via S-WTP (Brine). The capacity is increased in January 2023
-Treated low salinity flows (from GSP-2) are discharged to Whale Tail Lake (South Basin) via S-WTP (Brackish)

Closure and Post-Closure Flow Charts

Closure: Active Pit and U/G Flooding - General Principle



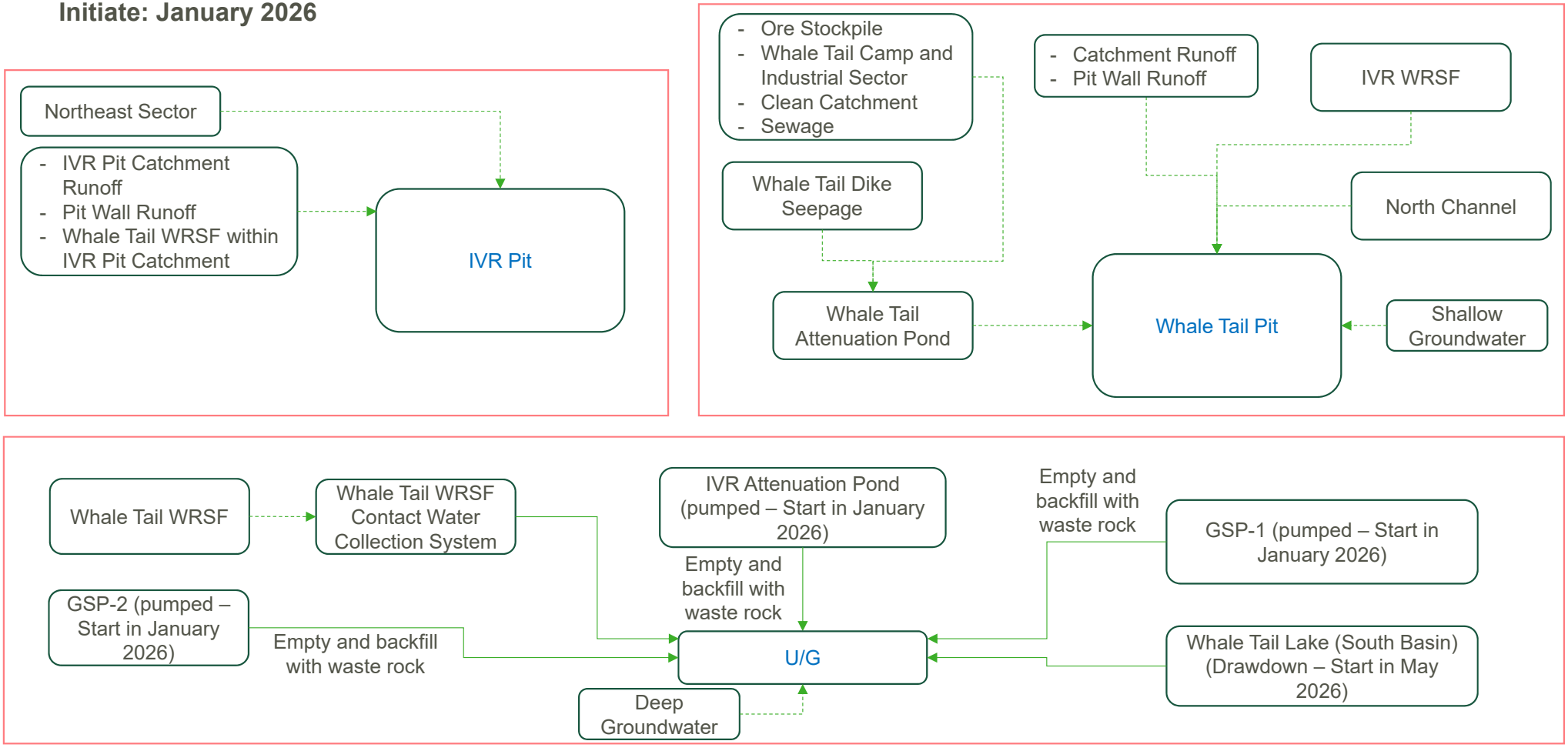
Water Management Concept:
-Promote re-filling in the order shown.
-At closure, IVR Attenuation Pond, GSP-1, GSP-2 are all pumped down then backfilled. They are then allowed to drain passively by gravity.

Closure (Active Flooding) Sequence: Underground Mine

Gravity: ⇢

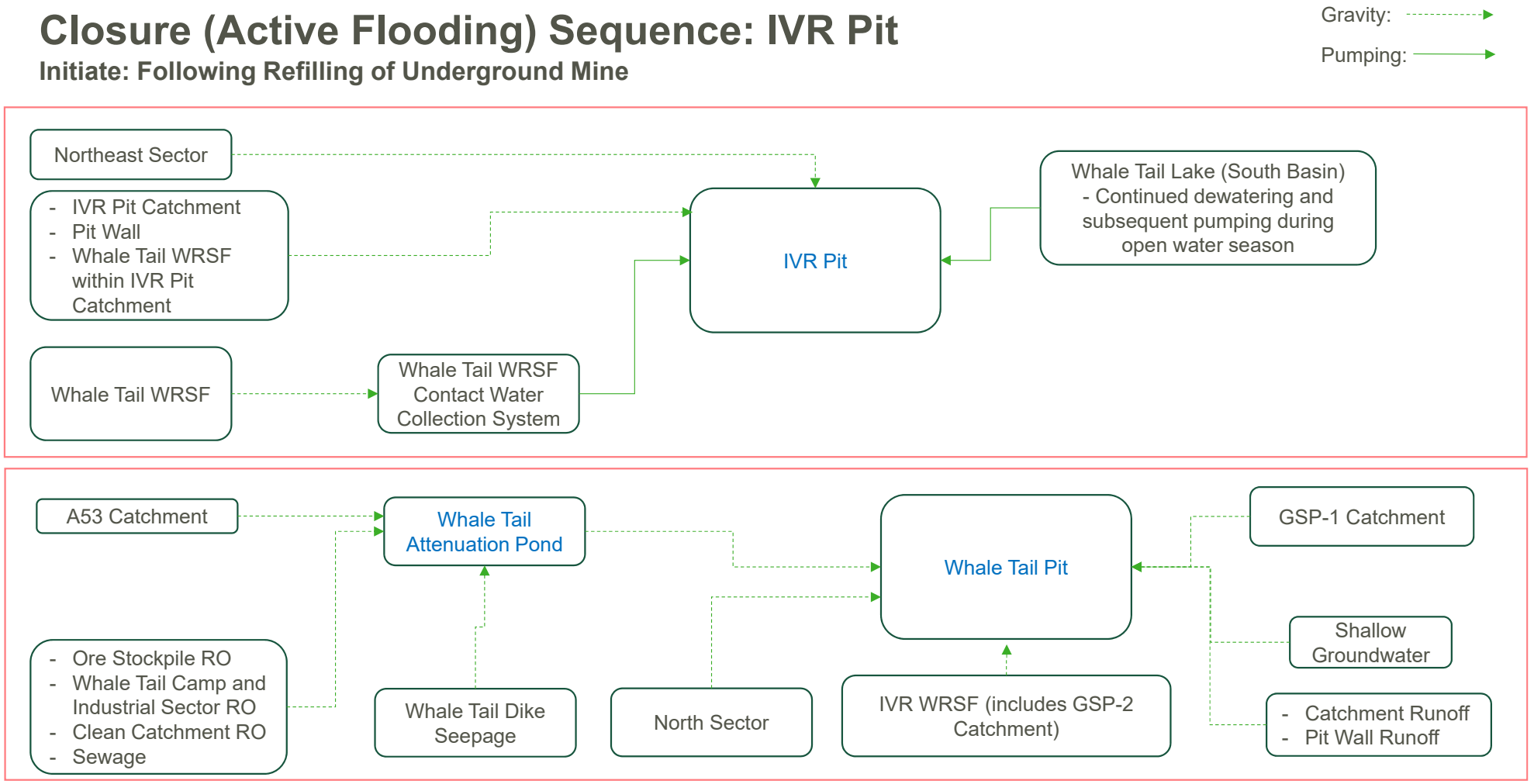
Pumping: →

Initiate: January 2026



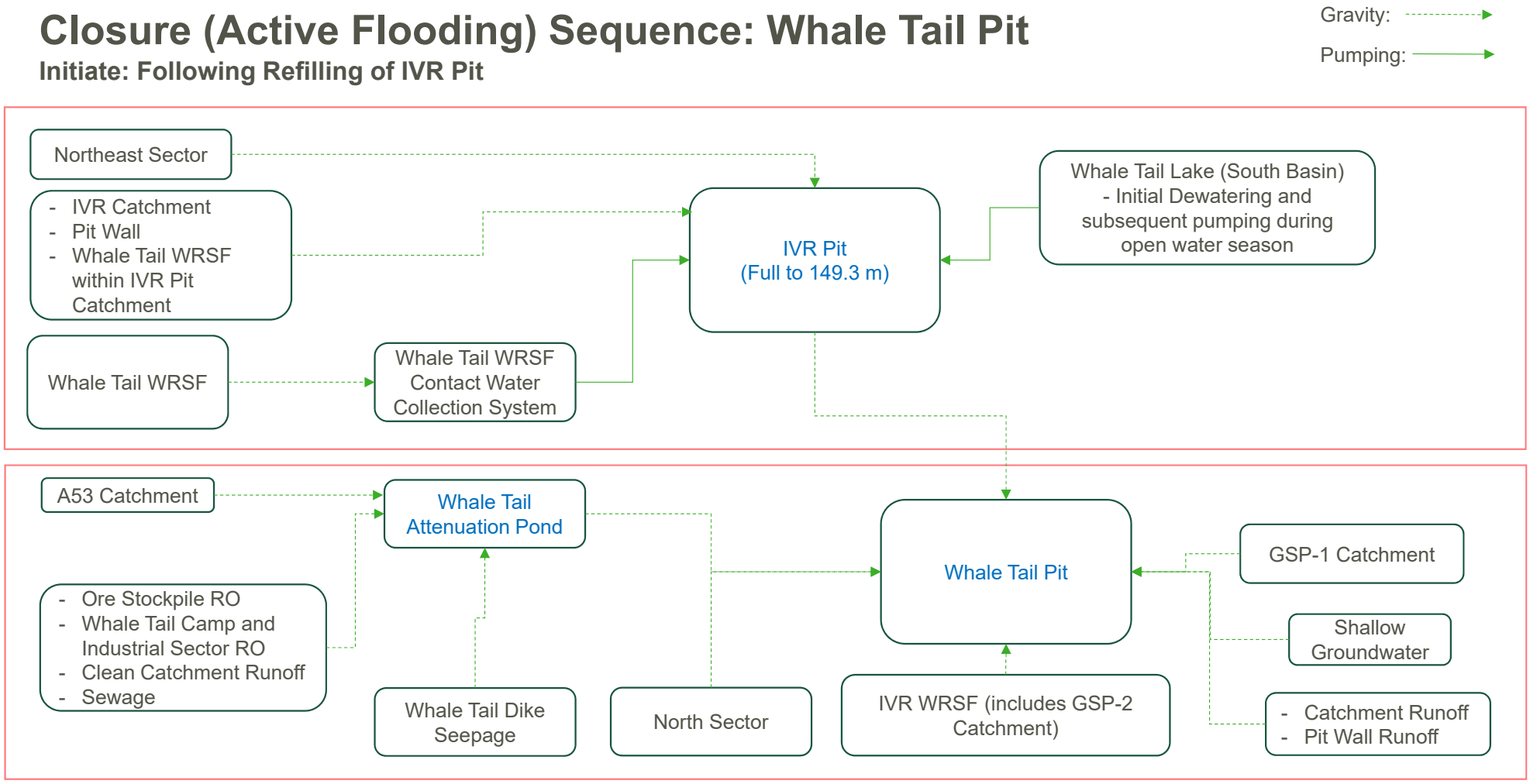
Closure (Active Flooding) Sequence: IVR Pit

Initiate: Following Refilling of Underground Mine



Closure (Active Flooding) Sequence: Whale Tail Pit

Initiate: Following Refilling of IVR Pit

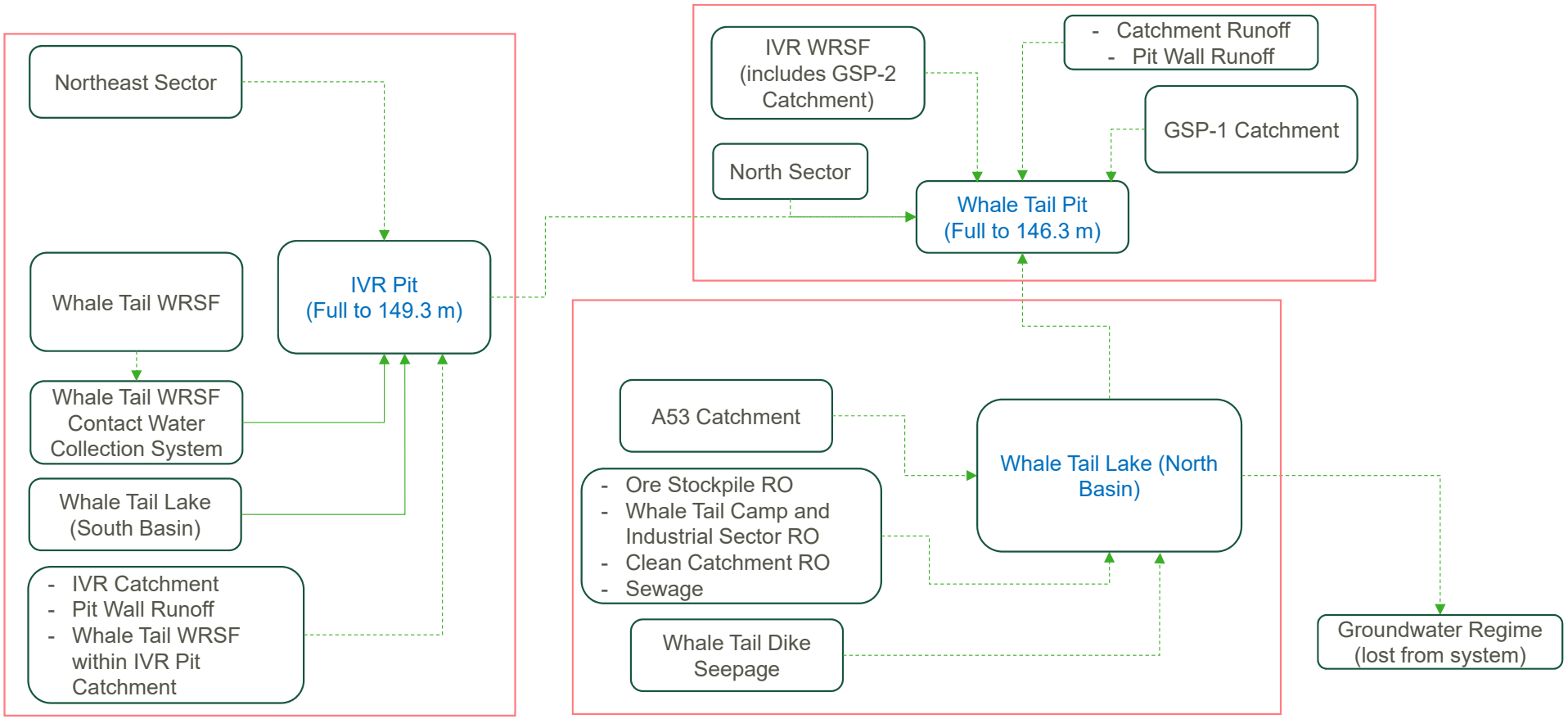


Closure (Active Flooding) Sequence: Whale Tail Lake (North Basin)

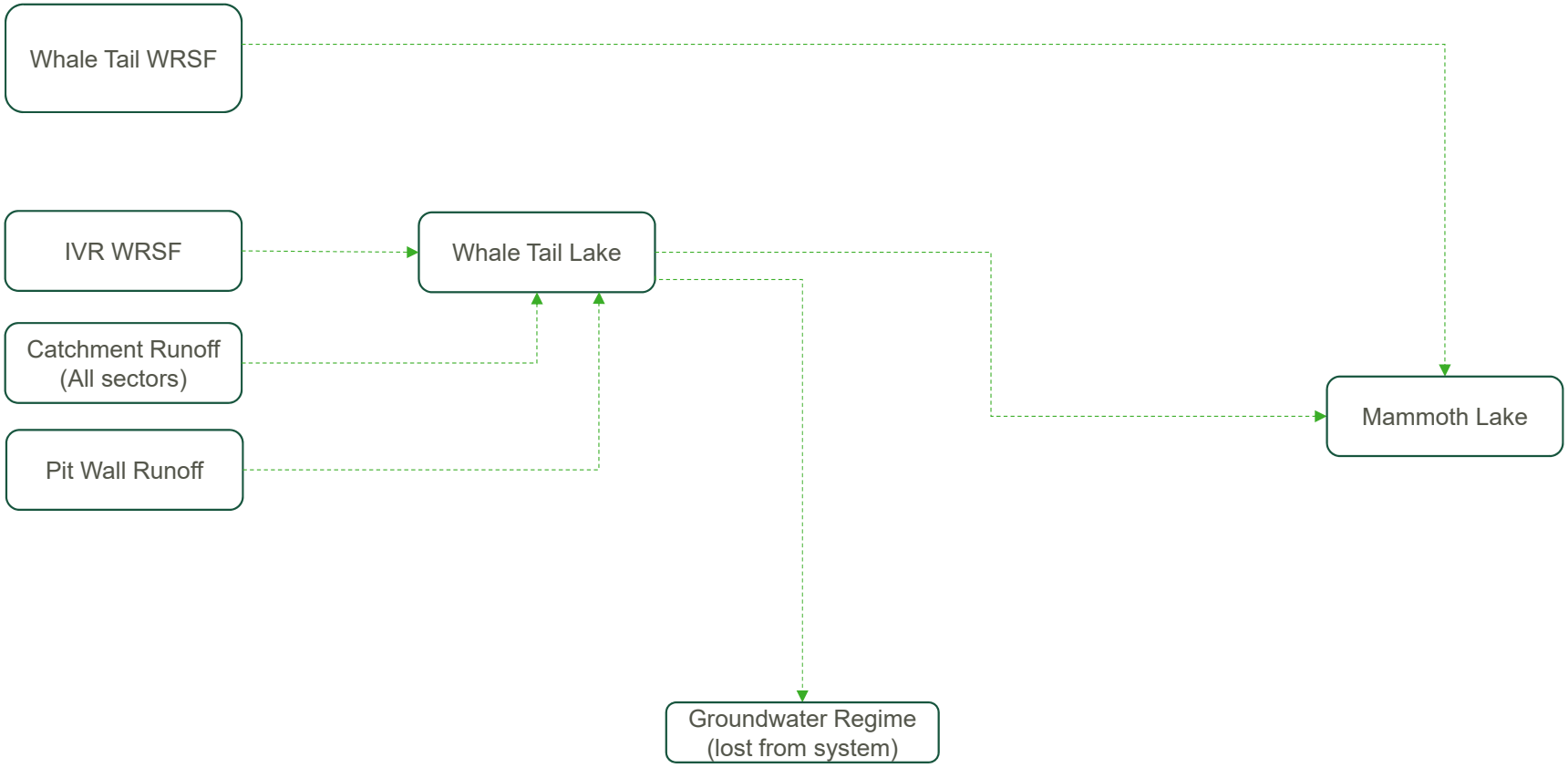
Gravity: ⇢

Pumping: →

Initiate: Following Refilling of Whale Tail Pit



Post-closure General, Whale Tail Lake

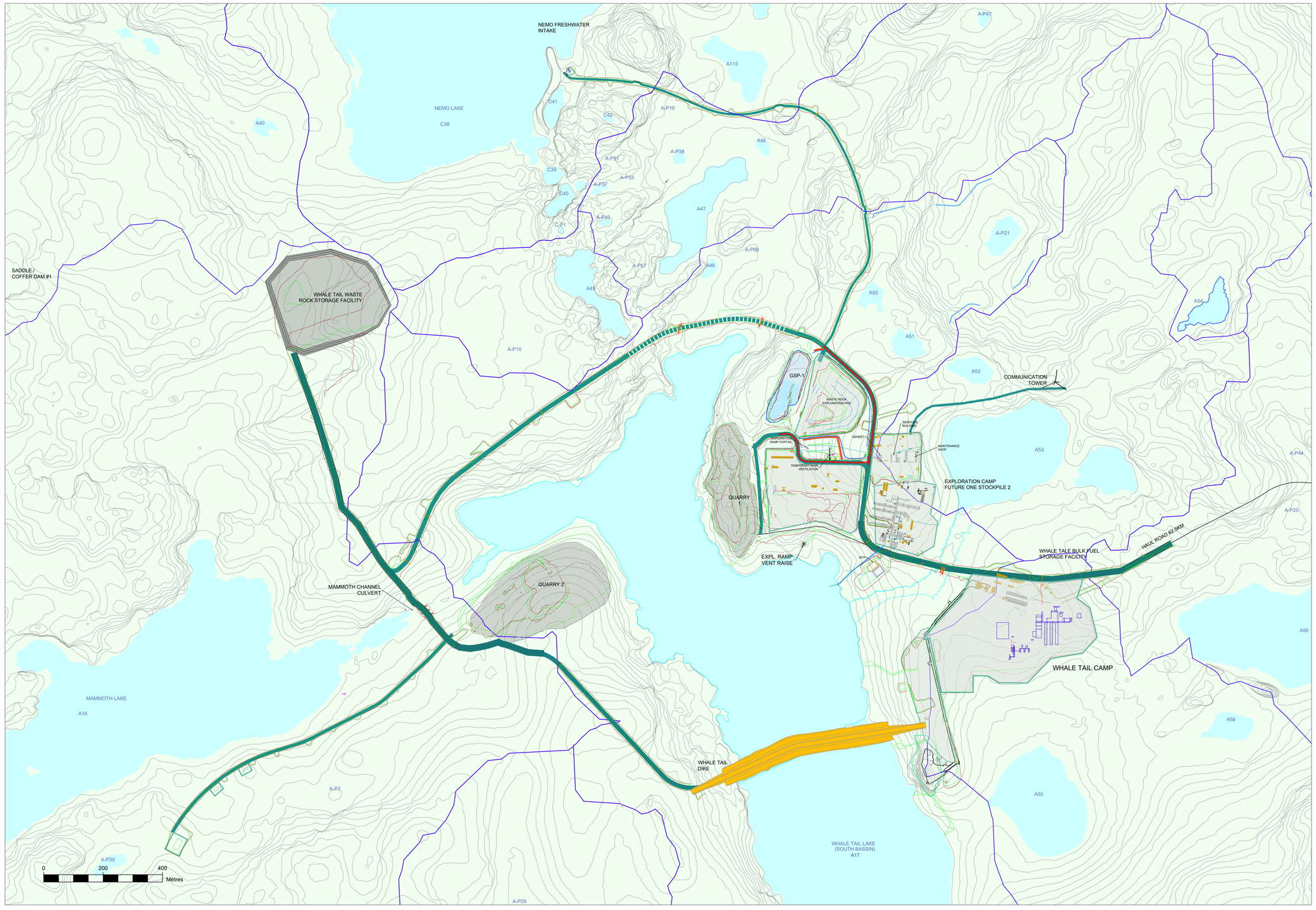


APPENDIX B

Mine Plan Drawings

NO. DESSIN
DRAWING NO. AMQ 2018Q4V8

FORMAT ARCHD



PLAN CLÉ
KEY PLAN

ISSUED FOR PERMITTING
AGNICO EAGLE DATE : 2019-05-03

NOTES GÉNÉRALES / GENERAL NOTES

LEGEND

- WATERSHED
- WATER PIPE
- LAKE WATER
- HAUL ROAD, LARGE WIDE
- HAUL ROAD, SINGLE LANE
- SERVICE ROAD
- ROAD, SALT PROTECTION
- ROCK PILE
- WATER POND
- PAD
- BUILDING

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TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT

REVISIONS

AMARUQ PROJECT

TITRE / TITLE
AGNICO EAGLE – MEADOWBANK DIVISION
AMARUQ MINE PROJECT
005 – SITE PREPARATION
210 GENERAL ARRANGEMENT
AMARUQ MINE SITE ARRANGEMENT
–

DESSINÉ PAR / DRAWN BY	J. CRETE	DATE 2018-05-01
VERIFIÉ PAR / CHECKED BY		
APPROUVÉ PAR / APPROVED BY		
ÉCHELLE / SCALE 1:6000	DATE 2018-05-01	
NO. DESSIN / DRAWING NO. 2018 Q4		
NO. PROJET / PROJECT NO. 6117	REVISION v8	FEUILLE / SHT 3 / 6

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