Memorandum

Subject	Winu H3 Hydrogeological Assessment – Recovery Model Update		
Date	27 July 2025		
To	Emma McGivern	From	Jordan Forster & Gerhard Jacobs
Project No	311012-01475	Doc No	TM_HG-45_Rev0
Project	Winu H3 Hydrogeological Assessment		

Introduction

The Winu Project is proposed to have a 32-year mine life with a 26-year period of open pit mining operations. The open pit design is planned to be 485 metres deep and disturb approximately 170 ha at end of mining (Rio Tinto, 2024).

The open pit is proposed to transition into a pit lake at closure. Initial GoldSim modelling of the post-closure lake recovery was conducted by Golder Associates in 2021 with subsequent model updates by Advisian in 2023 and HydroGeoLogica (HGL) in 2024.

The Winu H3 numerical groundwater model (Worley, 2025) formed the basis for estimating groundwater inflow at specified elevation for the GoldSim pit lake recovery model. The pit lake recovery curve developed by HydroGeoLogica was incorporated back into the the groundwater model to assess the long-term recovery of the regional groundwater system post closure. Post closure modelling was extended to 300 years beyond mine closure.

This memorandum describes the methodology utilised for updating the numerical groundwater model and summarises the results of the recovery modelling.

Methodology

Pit lake stage modelling

HGL provided the pit lake recovery curve for the 'no TSF seepage' scenario, covering the pit lake recovery for 300 years after closure (Figure 1). The 'no TSF seepage' scenario (worst case) was selected to assess groundwater impacts.

Under the 'no TSF seepage' scenario the pit lake stage is predicted to recover to 6 m Australian Height Datum (AHD) after 50 years and stabilises at approximately 50 m AHD as inflow to the lake is balanced by evaporation at 300 years post closure. The pit lake is predicted to remain a terminal groundwater sink indefinitely.

For a comprehensive description of the inputs, methodology and results of the Goldsim modelling, refer to the pit lake modelling report (HydroGeoLogica, 2024).

Figure 1 Pit lake recovery curve, HGL base case – no TSF seepage (HGL, 2024)

Groundwater level recovery modelling

The setup and parameterisation of the numerical groundwater model utilised for recovery modelling are described in detail in the H3 Hydrogeological Assessment report (Worley, 2025).

The pit lake recovery curve was introduced to the numerical model through the Constant Head Designation (CHD) package. A constant hydraulic head equal to the lake stage was applied to cells within the pit void area, with the assigned head varying for each time-step over the recovery period, consistent with the lake stage recovery curve.

To assess the long-term recovery of the regional aquifer system, the numerical model was extended to simulated 300 years post-closure. The pit lake reaches a stable recovery state by the end of this period, with only minor fluctuations thereafter driven by seasonal variation.

Two recovery scenarios were modelled, aligned with the two proposed conceptualisations of the Thorny Devil Fault and pre-mineralisation sill. The scenarios differed based on the assigned hydraulic conductivity of these structural features:

1. Low permeable flow barriers (No-flow barriers (Kh=1x10-8 m/d)
2. Higher permeable flow barriers (Partial flow barriers (Kh=1x10-5 m/d

Results

Groundwater levels of the pit lake recovery modelling, integrated with the regional groundwater model, were assessed at 50, 100 and 300 years post-closure under both structural permeability scenarios, assuming no recharge to the regional aquifer.

Residual drawdown groundwater levels are presented in Figure 2 and Figure 3. The results show incomplete groundwater recovery in the metasediments aquifer 300-years post mining, owing to low recharge rates and the presence of the pit lake groundwater sink.

1. Under the low-permeability scenario, the 2 m residual drawdown extents up to approximately 15 km at Year 50, 20 km at Year 100 and 25 km at Year 300. Reaching the model boundary at year 100.

2. The higher-permeability scenario, the 2 m residual drawdown extents up to approximately 14 km at Year 50, 20 km at Year 100 and 22 km at Year 300. Reaching the model boundary at year 100.

In the low-permeability scenario, compartmentalisation due to the structural features results in similar overall extents of drawdown; however, the propagation of drawdown is slower toward the north and east.

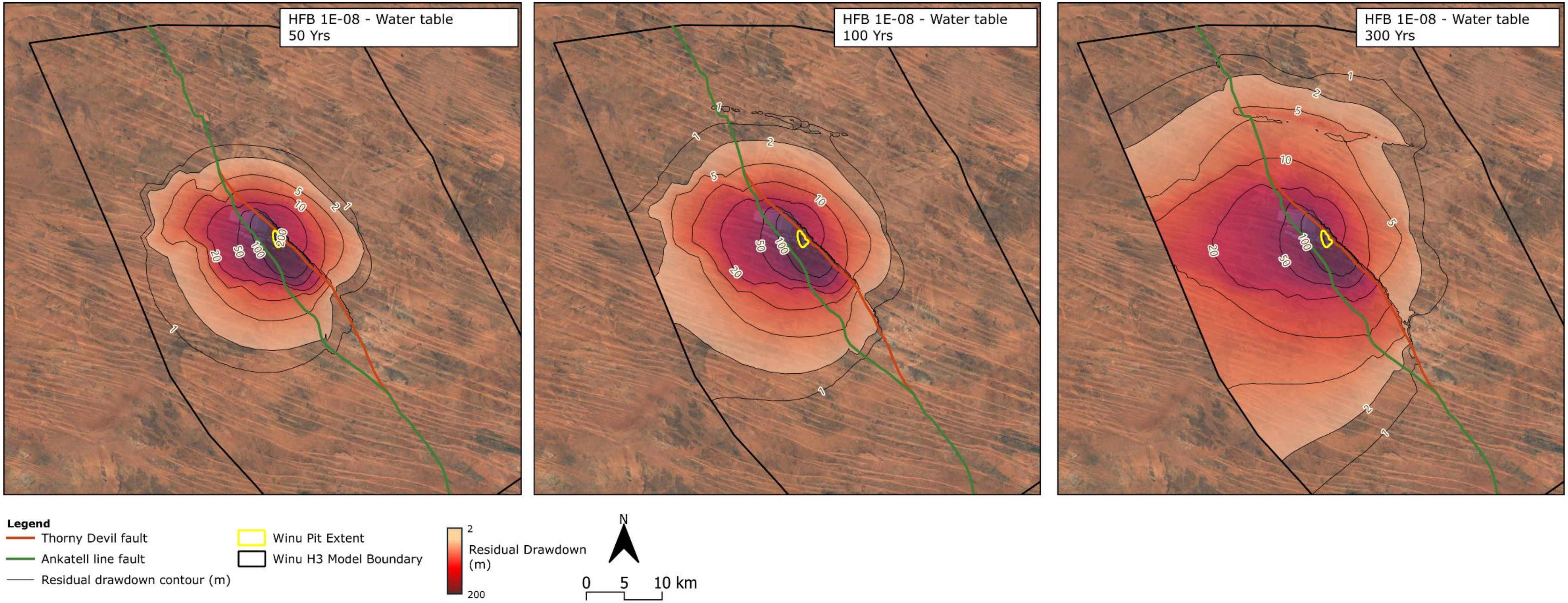

Figure 2 Low permeability flow barriers (Kh = 1E-08 m/d), residual drawdown at 50 years, 100 years, and 300 years post closure

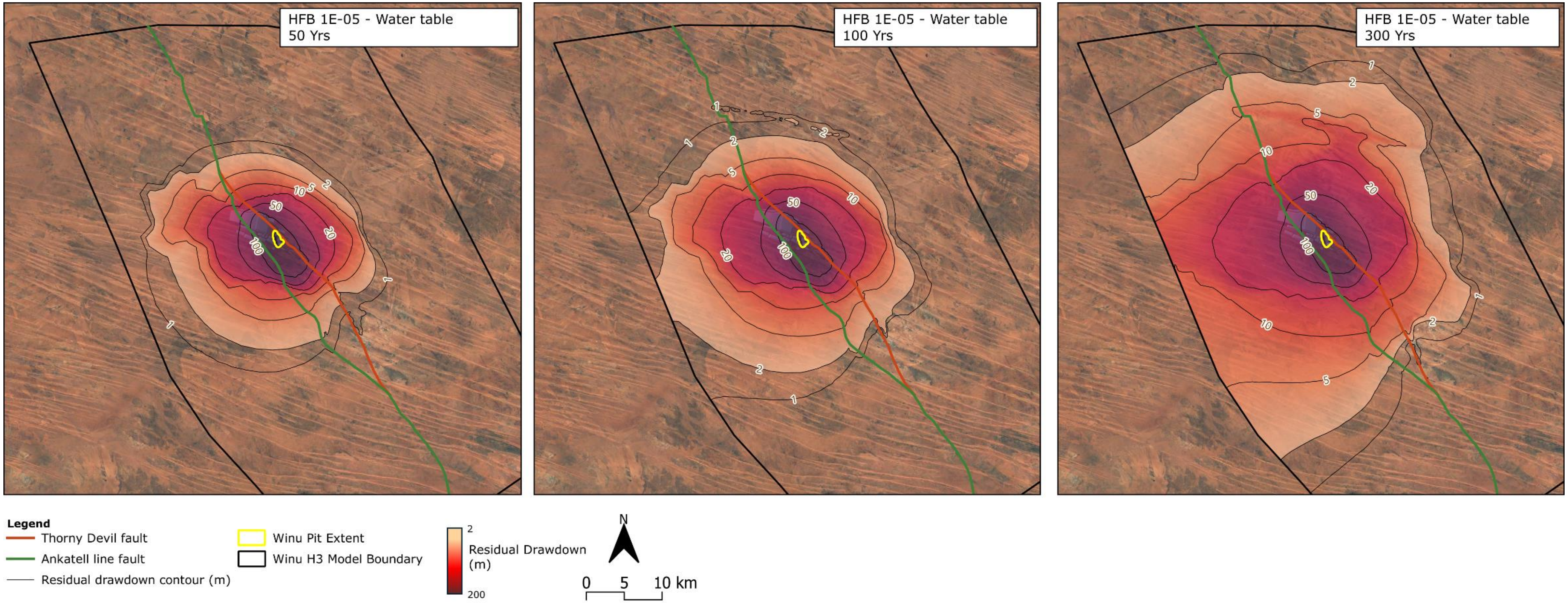

Figure 3 2. Higher permeable flow barriers (Kh = 1E-05 m/d), residual drawdown at 50 years, 100 years, and 300 years post closure

Conclusion

The updated recovery modelling for the Winu H3 hydrogeological assessment includes simulation of system responses over a 300-year post-closure period under two structural permeability scenarios.

Results indicate that the pit lake will act as a long-term terminal groundwater sink, with lake levels stabilising around 50 m AHD after 300 years. Groundwater recovery in the surrounding metasediments aquifer remains incomplete over this period due to limited recharge and the influence of the pit lake. Both permeability scenarios show similar drawdown extents at 300 years, though propagation occurs more slowly to the north and east in the low-permeability case due to structural compartmentalisation.

References

HydroGeoLogica. (2024). *Winu Pit Lake Model, Draft 2 (May 2024).* Report Prepared for Rio Tinto Winu Pty Ltd.

Rio Tinto. (2024). *Winu Operations Closure Plan: Draft version for Consultation.*

Worley. (2025). *H3 Hydrogeological Assessment.* Report prepared for Rio Tinto Winu Pty Ltd.