ENGENY

# REVOLVER RESOURCES

## Dianne Copper Mine Recommencement Project

### Water Management RFI Response

BNTL01500_0002-REP-001-0

26 SEPTEMBER 2025

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# 1. INTRODUCTION

The Dianne Copper Mine (DCM) is an historic copper mine which is currently in care and maintenance. The mine is located in the Cape York Peninsular, Queensland, approximately 160 km northwest of Cairns and 100 km southwest of Cooktown. Mining operations were undertaken at the DCM primarily between 1979 and 1983, with both open cut and open stope underground mining techniques adopted during this time. The DCM has remained in care and maintenance since 1983 when a global decrease in copper prices led to the cessation of mining operations.

Revolver Resources is seeking to recommence mining operation at the DCM (the Project). To support the Environmental Authority (EA) amendment application (EPML00881213), Engeny prepared Water Management Plan (WMP) in accordance with the EA and for compliance with the Department of Environment and Heritage Protection *Preparation of Water Management Plans for Mining Activities* guideline (2012). Following submission of the EA amendment application, the Department of Environment, Tourism, Science and Innovation (the Department) issued a Request for Information (RFI) seeking further detail on certain aspects of the Project.

A summary of the additional requested information relating to water management is provided in Table 1.1.

**TABLE 1.1: WATER MANAGEMNET RFI ITEMS**

| Reference | Related Document | Department Response | Requested Information | Where Addressed |
|---|---|---|---|---|
| EA19. | Appendix 3 Dianne Copper Mine Groundwater and Surface Water Impact Assessment Report | Without an understanding of the hydrological intersections with the site features, particularly the pit expansion, it is impossible to estimate whether there is a potential drawdown or change in inflow and outflows of the groundwater system. This limits the identification of potential zone of influence from the pit. The information on outflows will also assist with assessment of risk from WRD and heap leach pads.<br><br>The application is unclear as to the derivation of the groundwater inflow. It is noted that Section 7.2.3. estimates this value at 32ML/year. However, it is unclear how this value has been estimated. | Provide a water balance model for the site with an estimation of potential inflows and outflows to and from groundwater with consideration of all new expansion features, including the pit, WRD, heap leach pads and processing plant. The estimations must also include post closure scenario. | Updated WMP (provided as a separate document) |
| EA11. | Appendix 2 Dianne Copper Mine Water Management Plan | Figure 4.1 in the Water Management Plan shows a catchment boundary line for the contributing catchment upstream of the Settling Dam (to be renamed the Release Dam). However, the area (in $km^2$) of the catchment area was not provided. | Provide the area (in $km^2$) for the contributing catchment area upstream of the Settling Dam (to be renamed the Release Dam). | Updated WMP (provided as a separate document)<br><br>Section 2 |
| | | The emphasis in Section 5.3.2.2 is on the annual volumes of water released; not on the potential instantaneous rate of discharge from the Release Dam, which is what determines the required spillway capacity. The total catchment area upstream of the Release Dam would have had to be known, for insertion into the water balance modelling which is discussed in Section 5 of the Water Management Plan. | Provide data on the potential instantaneous rate of discharge from the Release Dam, and how this was calculated to determine the required spillway capacity. | Section 3.3.1 |

| Reference | Related Document | Department Response | Requested Information | Where Addressed |
|---|---|---|---|---|
| | | Water management model parameters are discussed in Section 5; but without mention of actual catchment areas contributing. | | |
| | | The Water Management Plan contains information on the total annual volumes of water discharging through and around Release Dam. However, it lacks information on the maximum flood discharge and instantaneous rate of discharge. | Under a 0.1% AEP, provide estimate of the maximum flood discharge which could occur in the Release Dam, including the instantaneous rate of discharge. | Section 3.3.1 |
| EA24. | Appendix 12 Dianne Recommencement Project Preliminary Consequence Category Assessment | The Spillway Capacity for the Release Dam, and the design of the Release Dam Spillway has not been discussed. The Environmental Assessment Report, February 2025, does not include any assessment of the required spillway capacity for the Release Dam. | Provide assessment of the required spillway capacity for the Release Dam during various flood scenarios including the 0.1% AEP. Provide 0.1% AEP modelling for catchment above the Release Dam and Spillway and design storage allowance for the release dam and spillway, as per 1st November guideline. | Spillway: Section 3.3.1.23.3.1.2<br><br>DSA / Freeboard Allowance: Section 4 |
| PRCP4. | Appendix 2 Dianne Copper Mine Water Management Plan | The PRCP guideline section 3.1 requires the EA holder to provide baseline information with respect to site hydrology and fluvial networks.<br><br>Section 3.6.1 of the PRCP Guideline requires information regarding the effect of flood flow through the site for the post mining land use.<br><br>The Rehabilitation Planning Part does not provide information on the long-term sustainability of the final landform.<br><br>Flood modelling is required to determine the influence of flood depth and velocity on the final landform. | Provide flood depth and velocity for a variety of flood flow events including 0.1% AEP, for the final landform and justify how this will form a stable condition.<br><br>Provide information on the future conditions of watercourses, including the geotechnical assessment against flood modelling velocities, the post mining flood model, and justify how this will form a stable condition. | Section 3.3.2 |

# 2. CATCHMENT REVIEW

## *EA11. Provide the area (in km2) for the contributing catchment area upstream of the Settling Dam (to be renamed the Release Dam).*

The proposed Release Dam will receive direct runoff from disturbed areas across the site, including the ROM area. It is also the final point of containment for overflows from all mine affected and sediment storages on site, as well as two clean water dams.

A review of the worst-case contributing catchment area upstream of the Release Dam was undertaken, assuming no pumping or attenuation in upstream storages. The following information, in order of priority, was used to determine the catchment areas:

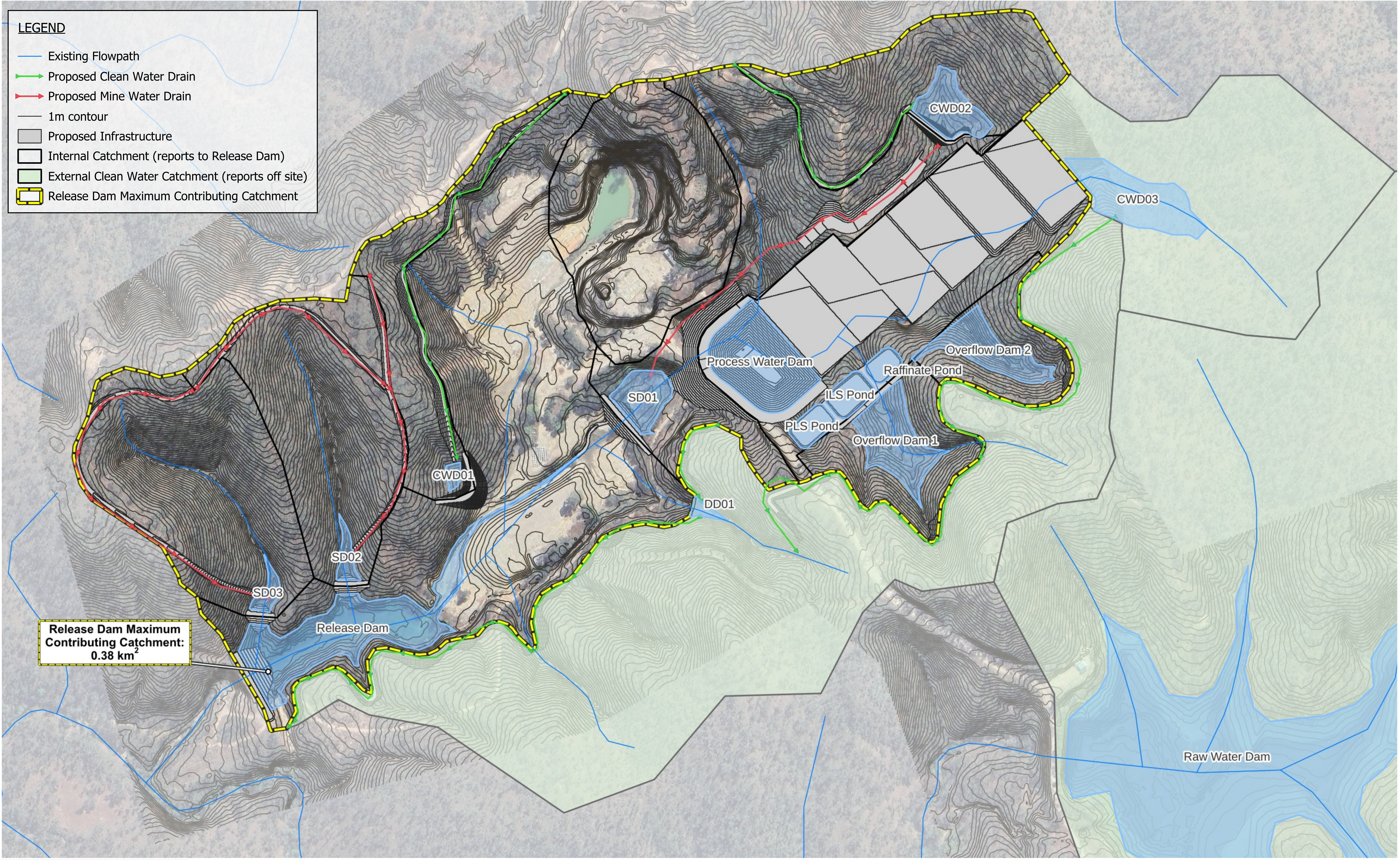
(1) Design strings for the proposed water management system (drain designs from *XR-012-STR DRAINAGE.dwg,* and storage / heap leach pad infrastructure from *XR-400-STR-RELEASE DAM.dwg*).

(2) Existing surface DEM, captured in 2024 (provided by Projectick to Engeny on 17/7/24 to inform the DCM Water Management Plan).

The individual and overall catchment areas contributing to the worst-case Release Dam catchment are summarised in Table 2.1 and shown on Figure 2.1.

**TABLE 2.1: RELEASE DAM CATCHMENT SUMMARY**

| Contributing Storage | Catchment Area (ha) | Overflow Location |
|---|---|---|
| Overflow Dam 02 | 1.18 | Overflow Dam 01 |
| Overflow Dam 01 | 1.59 | Process Water Dam (via Heap Leach Ponds) |
| Process Water Dam (includes Heap Leach Ponds - Raffinate, ILS and PLS) | 5.62 | Sediment Dam 01 |
| Sediment Dam 01 | 4.11 | Release Dam |
| Sediment Dam 02 | 3.60 | Release Dam |
| Sediment Dam 03 | 3.99 | Release Dam |
| Clean Water Dam 01 | 1.71 | Release Dam |
| Clean Water Dam 02 | 2.96 | Sediment Dam 01 |
| Pit | 3.88 | Release Dam |
| Release Dam | 9.85 | Off-site |
| **Total Release Dam Catchment Area (ha)** | **38.49** | |
| **Total Release Dam Catchment Area (km2)** | **0.38** | |

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Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

**Figure 2.1: Release Dam Contributing Catchment Area**

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# 3. RELEASE DAM FLOOD ASSESSMENT

A flood assessment of the Release Dam catchment was undertaken to address the Department RFI items relating to the maximum flood discharge and instantaneous rate of discharge expected from the Release Dam and final landform stability.

This section provides an overview of the methodology used to develop the hydrologic and hydraulic models and the outcomes from the flood assessment.

## 3.1 Hydrologic Modelling Methodology

Hydrologic modelling was undertaken using the RORB runoff routing software package to estimate the critical storm durations and temporal patterns for the hydraulic assessment. The RORB model was used to assess the following scenarios:

- Existing Scenario – represents the existing DCM site, prior to commencement of the DCM Recommencement Project.
- Proposed Scenario - represents the proposed DCM Recommencement Project design surface, provided by DCM to identify the critical duration events upstream and downstream of the Release Dam to be adopted in the hydraulic modelling.
- Final Landform Scenario – represents the proposed final landform surface provided by Revolver ResourcesDCM to assess potential impacts to the downstream natural Gum Creek.

### 3.1.1 Model Setup

The 1% AEP and 0.1% AEP design rainfall depths were sourced using the Australian Rainfall and Runoff 2019 Intensity-Frequency-Duration (IFD) generation tool available on the Bureau of Meteorology (BoM) website (www.bom.gov.au), at Latitude 16.099 (S), Longitude 144.517 (E).

Different hydrological parameters were applied for the Proposed Scenario and Final Landform Scenario to account for differences in catchment size. Both scenarios were simulated for the 1% AEP and 0.1% AEP events to address the EA11 and PRCP RFI requirements. The 1% AEP is consistent with the proposed Release Dam spillway design criteria (Capital Consulting Engineers, 2025), while the 0.1% AEP event was used to estimate the instantaneous rate of discharge from the Release Dam, and to assess stability of the final landform and downstream watercourses. Catchments for both scenarios are shown in Figure 3.1.

The key hydrologic modelling parameters are summarised in Table 3.1.

**TABLE 3.1: HYDROLOGIC MODEL PARAMETER SUMMARY**

| Parameter | Proposed Scenario | Existing / Final Landform Scenario |
|---|---|---|
| Assessed Catchment (ha) | 38.49 (local site catchment only) | 436 (including the upstream of Gum Creek) |
| Initial Loss (mm) | 20 | 20 |
| Continuing Loss (mm/hr) | 3.4 | 3.4 |
| Routing Parameter $k_c$ | 0.67 | 2.7 |
| Exponent m | 0.8 | 0.8 |
| Design Event Simulation | 1% AEP and 0.1% AEP | 1% AEP and 0.1% AEP |
| Lidar Data | Design strings for the proposed water management system, supplemented with Existing surface DEM (2024) | Publicly available SRTM Lidar adopted for the upstream Gum Creek catchment. |

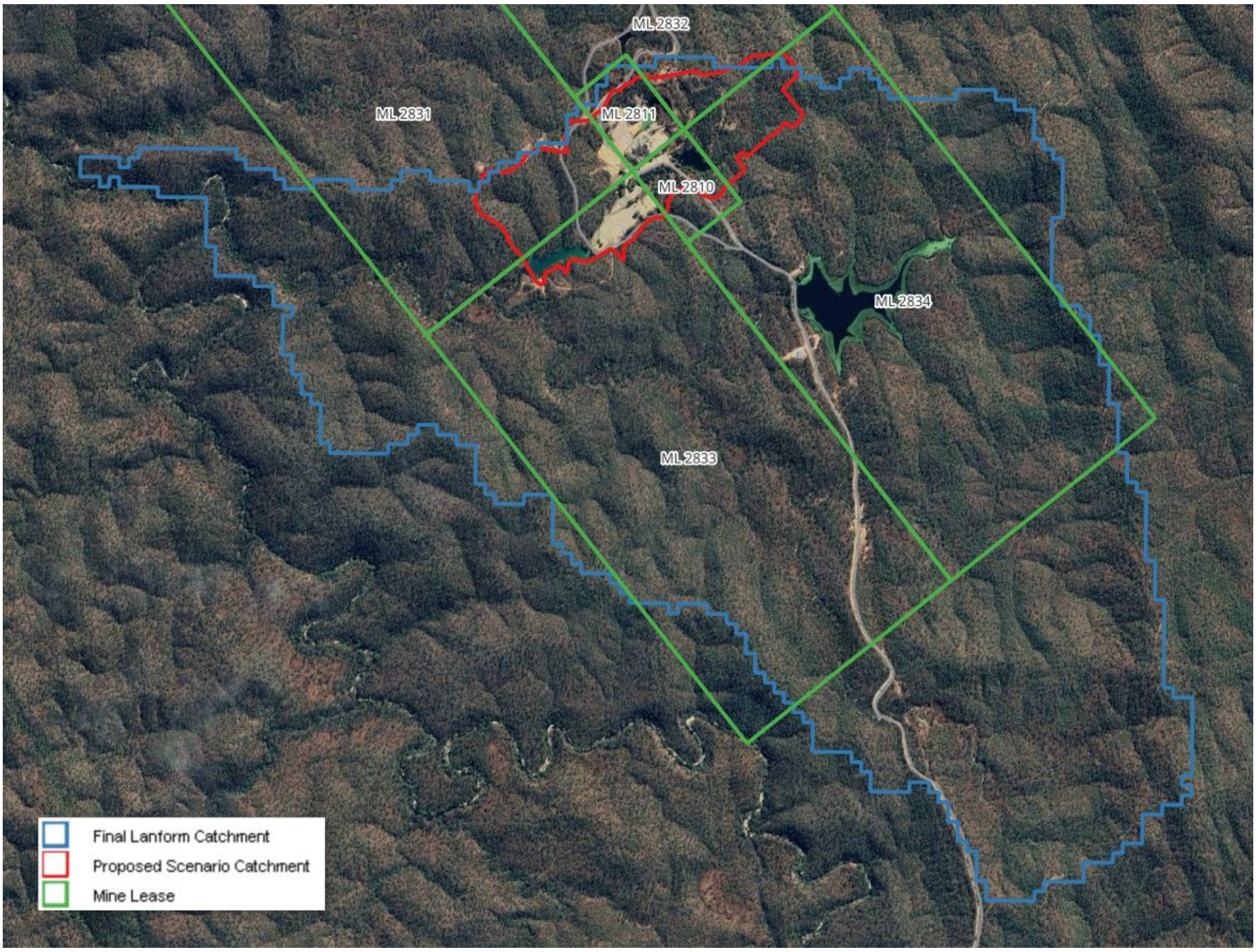


**Figure 3.1: Catchments for Proposed and Final Scenarios**

### 3.1.2 Critical Duration Assessment

The hydrologic model was used to identify critical durations at the proposed Release Dam for input into the hydraulic model. Critical durations upstream and downstream of the Release Dam were assessed and the resulting peak flow, critical duration, and temporal pattern for each simulated event are provided in Table 3.2.

**TABLE 3.2: Critical Design Events for Proposed Scenario**

| AEP | Locations | Peak Flow ($m^3/s$) | Duration (min) | Temporal Pattern |
|---|---|---|---|---|
| 1% | Upstream of the Release Dam | 15.0 | 25 | 9 |
| 0.1% | Upstream of the Release Dam | 25.1 | 15 | 8 |

### 3.1.3 Flood Hydrology Validation

The 1% AEP flood simulation for the RORB model has been validated using two available methods: the Regional Flood Frequency Estimation (RFFE) Method (ARR, 2021), and Rational Method. The comparison of modelled peak flows to each validation method is presented in Figure 3.2 and Table 3.3 respectively. The results indicate the model is likely overestimating peak flows, compared to the expected RFFE and Rational Method results, however, is within the 5$^{th}$/95$^{th}$ Percentile RFFE validation range. The model is therefore slightly conservative, however, considered to provide an appropriate representation of flows at DCM.

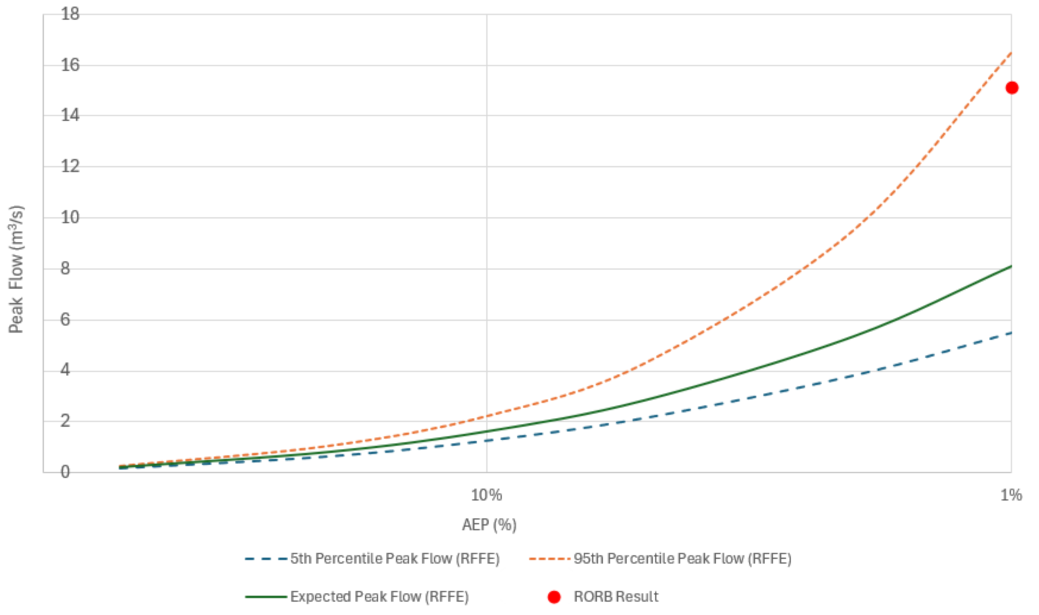


**Figure 3.2: Regional Flood Frequency Estimate Validation Results**

**TABLE 3.3: PEAK DISCHARGE VALIDATION (RATIONAL METHOD)**

| Design Event AEP | Rational Method Peak Flow (m3/s) | RORB Peak Flow (m3/s) | Peak Flow Difference (m3/s) | Percent Difference |
|---|---|---|---|---|
| 1% | 13.3 | 15.0 | 1.7 | 12.7% |

## 3.2 Hydraulic Modelling Methodology

The TUFLOW software package was used to develop two-dimensional hydraulic models for the Proposed, Existing and Final Landform Scenarios.

- Proposed Scenarios has developed to understand the peak flow discharge at the spillway of the release dam.
- Existing Scenario has developed to provide the hydraulic results to utilise for the Afflux assessment.
- Final Landform Scenario has developed to understand the flow capacity and the characteristics across the DCM site under the current scenario, and to utilise for the Afflux assessment.

The following sections detail the key model inputs and present hydraulic model results.

### 3.2.1 Topography and Model Extent

The model topography used in the TUFLOW hydraulic model include:

- Existing Scenario: Existing surface DEM, captured in 2024 (provided by Projectick to Engeny on 17/7/24 to inform the DCM Water Management Plan).

- Proposed Scenario: Design strings for the proposed water management system (drain designs from *XR-012-STR DRAINAGE.dwg,* and storage / heap leach pad infrastructure from *XR-400-STR-RELEASE DAM.dwg*), supplemented with the existing surface DEM, captured in 2024 (provided by Projectick to Engeny on 17/7/24 to inform the DCM Water Management Plan).
- Final Landform Scenario: Final Landform design contours (*Final_Landform_Design_Shapefile.shp* provided by DCM on 1/8/25), supplemented with the existing surface DEM, captured in 2024 (provided by Projectick to Engeny on 17/7/24 to inform the DCM Water Management Plan).

Additional terrain modifiers were incorporated into the Proposed and Final Landform models to better represent the proposed water management system design, including:

- Proposed Scenario:
  - Filling of the potential ponding area between the Heap Leach and Overflow Dams and Raffinate Ponds to ensure overflows into the Process Water Dam as proposed.
  - Filling the existing pit area to ground level to resolve incomplete survey.
  - Spillway modification for the Overflow Dams, Raffinate Pond, ILS and PLS Ponds, and the Clean Water Dam upstream of the Heap Leach to allow water to drain and divert downstream, as proposed.
- Final Landform Scenario:
  - Filling of the potential ponding area between the Heap Leach and Overflow Dams and Raffinate Ponds to ensure overflows into the Process Water Dam as proposed.

The model extent for the assessment is shown on Figure 3.3, with the model domain covering the DCM site and upstream areas that contribute flow to the site. The downstream model boundary extends to include a portion of Gum Creek, in order to simulate downstream conditions. Due to the available DEM extent, this is limited to 250 m downstream of its confluence with the Release Dam spillway.

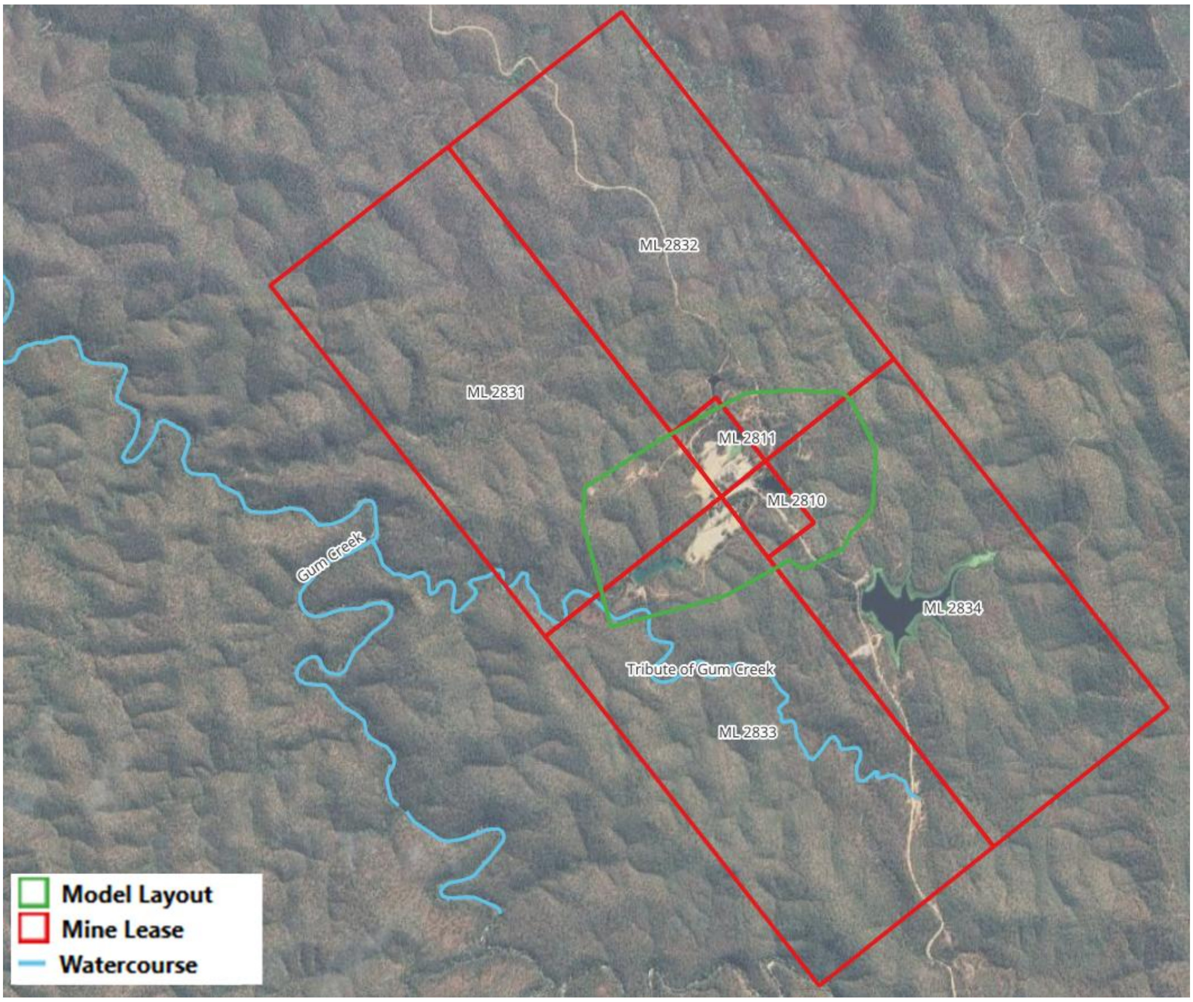


**Figure 3.3: Hydraulic Model Extent for DCM**

### 3.2.2 Model Parameters

An overview of the adopted hydraulic model parameters is provided in Table 3.4.

**TABLE 3.4: HYDRAULIC MODEL PARAMETERS**

| Parameter | Specification |
|---|---|
| Roughness Values | The hydraulic roughness (Manning's 'n') values applied in the TUFLOW model were adopted based on aerial imagery and land cover characteristics, which are assumed to be:<br>• 0.025 for Watercourse and open water area.<br>• 0.03 for clean water diversions and channels.<br>• 0.0025 for hardstand (heap leach).<br>• 0.035 for less vegetated open pervious area.<br>• 0.06 for rest of the site with vegetation. |
| Boundary Conditions | The hydraulic model uses three different boundary conditions to control inflow and outflow from the model domain:<br>• **Inflow: Rain on Grid (RoG**) – directly applies IFD rainfall depths to each cell within the model domain, based on the input rainfall hyetograph, to appropriately assess stability across the site.<br>• **Outflow: Normal depth outflow** – assigns a water level along the water boundary based on a water level versus flow curve around the site, which is applied at an average value of 1% to represent the slope of the flow path downstream of the boundary. |
| TUFLOW Build Version | The latest TUFLOW Build version (2023-03-AF) was adopted. |
| TUFLOW Solution Scheme | Heavily Parallelised Compute (HPC). |
| Cell Size | 1 m |
| Initial and Continuing Losses | IL = 20 mm, CL = 3.4 mm |
| Initial Water Level | All identified storages were conservatively assumed to be full at the commencement of the modelled design events. Depressions not considered to function as storages were excluded from this assumption, and no initial water level was applied to them. |
| Areal Reduction Factors | The areal reduction factor (ARF) is a multiplier applied to the design rainfall to account for increased spatial variability that occurs over large catchments. The ARF is calculated using region specific parameters and the total local catchment area upstream of the areas being assessed. Due to the local focus of the study, and the relatively TUFLOW model domain (<1 km$^2$), ARF will not be applied. |

## 3.3 Flood Assessment Results

Each of the three proposed scenarios (Proposed, Existing and Final Landform) have been assessed for the 1% and 0.1% AEP events. Flood mapping results are provided as follows:

- Appendix A provides the flood depth and velocity for the 1% and 0.1% AEP events for the Proposed Scenario.
- Appendix B provides the flood depth and velocity for the 1% and 0.1% AEP events for the Existing Scenario.
- Appendix C provides the flood depth and velocity for the 1% and 0.1% AEP events for the Final Landform Scenario.
- Appendix D provides the flood depth afflux for the 1% and 0.1% AEP events for the Final Landform Scenario compared to the Existing Scenario.

## 3.3.1 Release Dam Inflow and Outflow Assessment

*EA11. Provide data on the potential instantaneous rate of discharge from the Release Dam, and how this was calculated to determine the required spillway capacity.*

*Under a 0.1% AEP, provide estimate of the maximum flood discharge which could occur in the Release Dam, including the instantaneous rate of discharge.*

### 3.3.1.1 Release Dam Maximum Discharge

A preliminary Consequence Category Assessment (CCA) was undertaken for the Release Dam (Capital Consulting Engineers, 2025), which determined a 'low' risk associated with all failure scenarios, including *Failure to Contain – Overtopping* and *Dam Break* scenarios. The *Manual for accessing consequence categories and hydraulic performance of structures (ESR/2016/1933 Version 5.04)* (The Manual) specifies a spillway design criteria ranging from the 1% AEP to 0.1% AEP for containment dams classified as 'significant' consequence. Based on the 'low' consequence category rating of the Release Dam, the proposed 1% AEP spillway capacity is considered appropriate.

In addition to the 1% AEP, the Proposed Scenario flood model was simulated for the 0.1% AEP to provide an estimate of the maximum flood discharge which could occur in the Release Dam, including the instantaneous rate of discharge.

Peak inflows and outflows for the proposed Release Dam for each event are presented in Table 3.5, for the locations shown on Figure 3.4. Under the 0.1% AEP event up to 720 ML would be discharged from the Release Dam under the maximum contributing catchment scenario (i.e. all storages are full at the start of the event).

**TABLE 3.5: MAXIMUM INSTANTANEOUS RATE OF INFLOW AND OUTFLOW FOR THE PROPOSED RELEASE DAM**

| Location | 1% AEP Peak Flow ($m^3/s$) | 0.1% AEP Peak Flow ($m^3/s$) |
|---|---|---|
| Release Dam Inflow (US_DAM) | 13.7 | 20.3 |
| Release Dam Outflow (DS_DAM) | 15.2 | 21.2 |


**FIGURE 3.4: RELEASE DAM INFLOW AND OUTFLOW RESULT LOCATIONS**

#### 3.3.1.2 Spillway Capacity

The potential instantaneous rate of discharge from the Release Dam, and hence spillway capacity, was estimated using a combination of the hydraulic modelling undertaken by Engeny, and catchment analysis and Rational Method undertaken by DCM. The outcomes of the assessment include:

- The 1% AEP peak outflow from the Release Dam was estimated to be 15.2 m3/s, using the hydraulic model, based on the worst-case contributing catchment area upstream of the Release Dam (38.5 ha).
- The preliminary spillway design flow reported in the Engineering Design Report (R2247-PRO-CI-RP-1100) (Capital Consulting Engineers, 2025), was 7.34 m3/s, based on a Rational Method calculation that did not account for contributing inflows from the upstream Pit or Process Water Dam catchments.
- Water balance modelling undertaken for the Dianne Copper Mine Water Management Plan (WMP) (Engeny, 2025) indicates the Process Water Dam will not spill during any of the 123 modelled climate scenario realisations. Additionally, the Pit is proposed to be empty at the start of operations and will rapidly increase in capacity during operations, making overflows to the Release Dam unlikely.
- To validate the local catchment flow (7.34 $m^3/s$), DCM applied the Rational Method to the maximum catchment scenario, which produced a 1% AEP flow of 13.6 $m^3/s$, compared to the hydraulic modelling result of 15.2 $m^3/s$. This indicates that the hydraulic modelling provides a more conservative basis for spillway design.

Based on this assessment, the preliminary spillway design for the Release Dam is suitable to convey the local catchment flow of 7.34 $m^3/s$ under the 1% AEP event. Although contributions from the Process Water Dam and Pit are unlikely to significantly affect the spillway during normal operations, provision could be made for an additional emergency spillway on the northern embankment could be incorporated into the design to accommodate higher flows.

### 3.3.2 Final Landform Stability Assessment

*PRCP4. Provide flood depth and velocity for a variety of flood flow events including 0.1% AEP, for the final landform and justify how this will form a stable condition.*

*Provide information on the future conditions of watercourses, including the geotechnical assessment against flood modelling velocities, the post mining flood model, and justify how this will form a stable condition.*

The hydrologic and hydraulic models were updated for the Final Landform Scenario to understand the potential hydrological effect the final landform has on the downstream natural watercourse, as well as to assess the overall stability of the proposed final landform.

#### 3.3.2.1 Final Landform Stability

The modelling results have been used to identify locations where the 1% AEP and 0.1% AEP flood events interact with the final landform design. Key locations of interest include locations where ponding occurs against final structures (e.g. the heap leach pad) and where elevated flow velocities are predicted.

Peak velocity results are presented in Figure 3.5 and Figure 3.6. The highest velocities were observed at the following locations:

- The connecting landform between the Overflow Dams and the capped ILS and Raffinate Pond (2.6m/s-2.8m/s).
- The south-eastern slope within the former Process Water Dam location, which is modified as a drainage line in the final landform, (3.4m/s-4.1m/s).
- Downstream channels in the vicinity of the former Release Dam (2.4m/s – 3.3m/s); and
- The former dirty water drains north of the former Release Dam (2.2m/s - 2.5m/s).

At isolated locations where peak velocities approach 4.0 m/s, a moderate risk of erosion is anticipated. However, given that the majority of the final landform is subject to very low velocities, the overall erosion risk is considered to be low under both the 1% AEP and 0.1% AEP events.

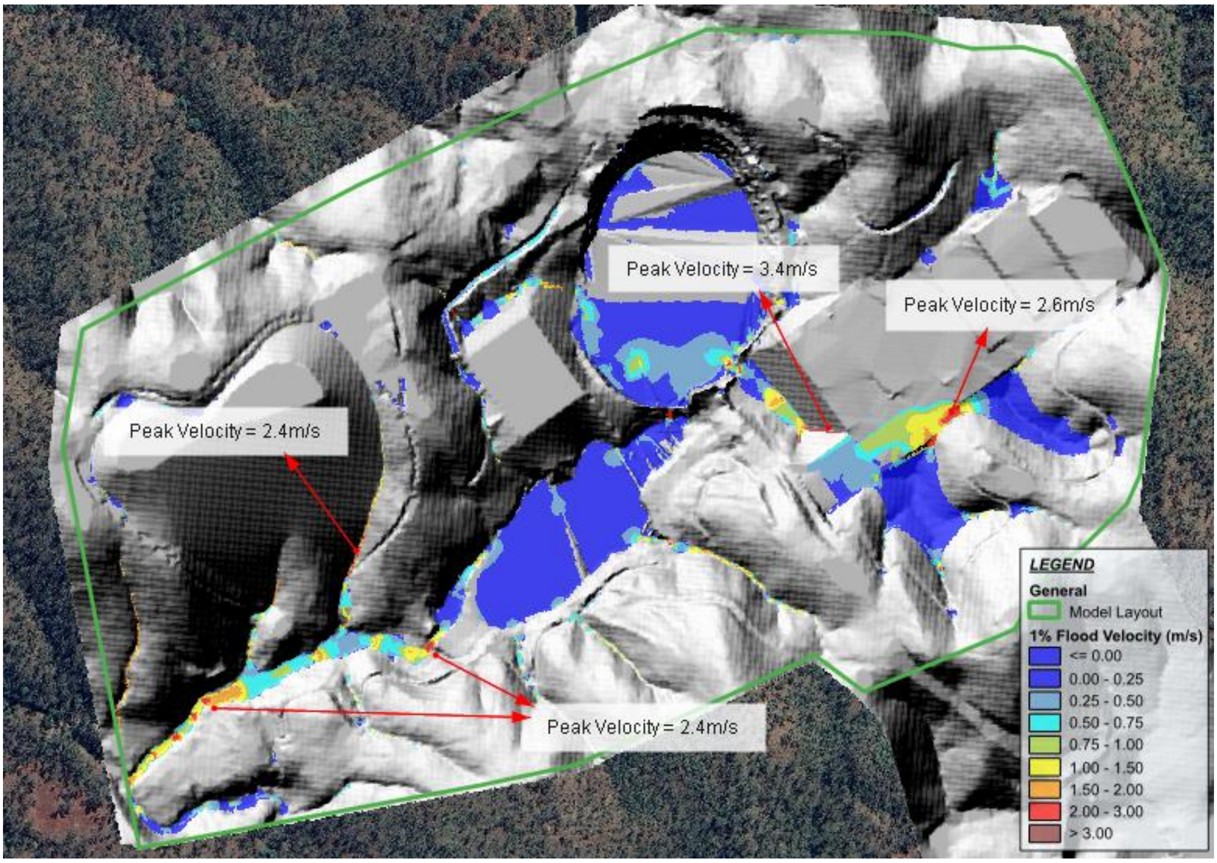


**FIGURE 3.5 PEAK VELOCITY FOR 1% AEP FLOOD**

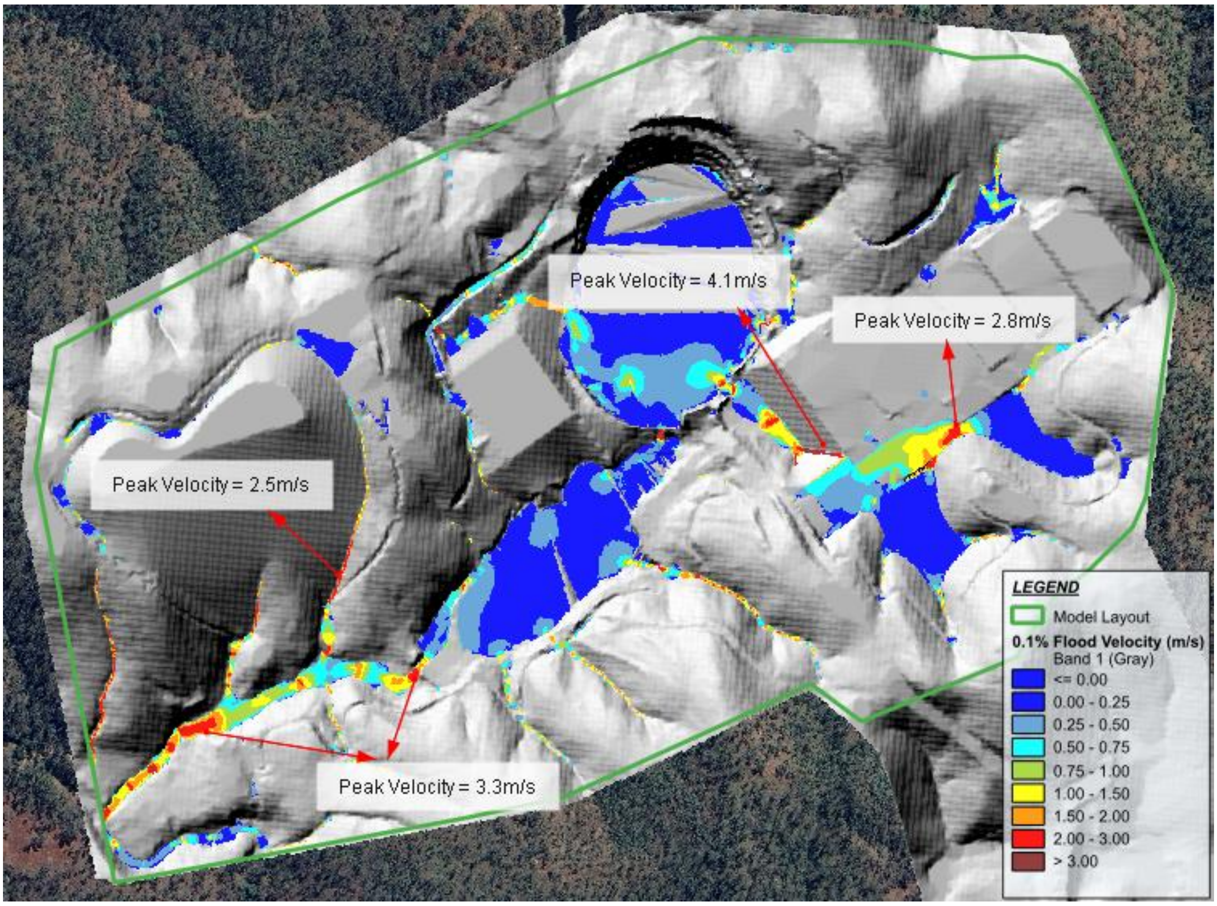


**FIGURE 3.6 PEAK VELOCITY FOR 0.1% AEP FLOOD**

### 3.3.2.2 Watercourse Stability

The hydrological models have also simulated for the 1% and 0.1% AEP design events for the Final Scenario, to assess potential changes in flood regimes between scenarios. Critical events downstream of Gum Creek were assessed to determine the resulting peak flow, critical duration, and temporal pattern for each simulated event. Results for the peak flow rate at three different focus locations are shown in Table 3.6.

**TABLE 3.6: PEAK FLOW RATE RESULTS FOR FINAL LANDFORM SCENARIO**

| AEP | Locations | Final Landform Peak Flow ($m^3/s$) | Existing Peak Flow ($m^3/s$) | Change in Peak Flow ($m^3/s$) |
|---|---|---|---|---|
| 1% | Flow from Upstream of Gum Creek | 37.5 | 37.5 | - |
| | Downstream of the site feeding into Gum Creek | 12.8 | 11.7 | 1.1 |
| | Downstream of Gum Creek | 44.2 | 44.2 | - |
| | Critical Event | Critical duration = 2hours<br>Temporal Pattern = 10 | | |
| 0.1% | Flow from Upstream of Gum Creek | 66.0 | 66.0 | - |
| | Downstream of the site feeding into Gum Creek | 21.3 | 21.5 | 0.2 |
| | Downstream of Gum Creek | 78.3 | 78.3 | - |
| | Critical Event | Critical duration = 1.5hours<br>Temporal Pattern = 3 | | |

Results indicate that the Final Landform Scenario will result in increased peak flows from the site by approximately 1 $m^3/s$ in the 1% AEP and 0.2 $m^3/s$ in the 0.1% AEP, compared to the Existing Scenario. These increases are relatively minor, compared to the natural flow rate in Gum Creek, and it is considered that the flow capacity in the Gum creek is sufficient to carry the outflow from the site under the final landform condition.

# 4. DSA AND ESS ASSESSMENT

*EA24.* *Provide assessment of the required spillway capacity for the Release Dam during various flood scenarios including the 0.1% AEP.* – [completed by DCM]

*Provide 0.1% AEP modelling for catchment above the Release Dam and Spillway* [addressed in Section 3.3] *and design storage allowance for the release dam and spillway, as per 1st November guideline* [addressed in this Section].

## 4.1 DSA Requirement

In accordance with the *Manual for accessing consequence categories and hydraulic performance of structures (ESR/2016/1933 Version 5.04)* (The Manual), the Design Storage Allowance (DSA) is an available volume provided in a dam as at 1 November each year in order to prevent a discharge from that dam up to a specified annual exceedance probability (AEP). The Manual also states that the DSA, Extreme Storm Storage allowance (ESS) and Mandatory Report Level (MRL) assessments are only requirements for those dams as assessed as having a 'significant' or 'high' consequence for the 'failure to contain – overtopping' scenario.

The CCA completed for the Release Dam (Capital Consulting Engineers, 2025) found that there is a 'low' risk associated with overtopping. The Release Dam and therefore the determinations for a DSA, Extreme Storm Storage allowance (ESS) or Mandatory Report Level (MRL) are not required, even if the dam is otherwise classified as a regulated structure.

## 4.2 Freeboard Assessment

### 4.2.1 Method of Deciles DSA Assessment (Indicative)

In order to address the Department RFI item *EA24*, Engeny completed an indicative DSA assessment, based on the method of deciles for volumetric containment as per Appendix A.1 of The Manual (ESR/2016/1933 Version 5.04).

As DSA is not a requirement for 'low' consequence category dams, there is no defined design criteria, however the following are defined for 'significant' and 'high' consequence dams (Table 5 from the Manual). Conservatively, a 1:20 AEP wet season containment (DSA) was adopted in accordance with the 'significant' consequence design criteria.

Based on the location of the Project, the Manual requires sufficient capacity to contain two months of critical wet season volume. The 1:20 AEP two-month duration rainfall total for the Project has been estimated based on a frequency of analysis of annual maxima two month rainfall totals for the period 1965 to 2025 at the Maitland Downs rainfall gauge (BoM Gauge 28013), located approximately 24.5 km south east of the Release Dam. The Maitland Downs rainfall gauge was considered the most suitable rainfall station for the calculation of DSA due to its proximity to the mine site, is within the same river basin as the site and has a useable record of approximately 60 years (the Manual requires a minimum of 50 years).

For the 1:20 AEP, the indicative DSA volume required on November 1 of every year is equivalent to 75.7 ML based on:

- 769 mm of rainfall depth.
- 9.85 ha catchment area (individual storage catchment only).
- 100% catchment runoff and no evaporation, in accordance with the Manual.

It is noted that the calculated DSA of approximately 76 ML exceeds the Release Dam capacity of 47 ML. Due to the 'low' consequence category of the Release Dam, it is not a requirement to adopt this DSA. Engeny have completed a review of the actual recommended freeboard within the Release Dam, prior to a wet season event (refer to Section 4.2.2 below).

A water balance model has been developed as part of the DCM WMP (Engeny, 2025), which provides an overview of predicted overflows associated with the Release Dam.

### 4.2.2 Proposed Freeboard

Although there is no requirement to define a DSA, it is recommended that DCM lower the water level in the Release Dam to at least 500 mm below the spillway level prior the start of wet season (1st November). This allows for containment of a 50%AEP 3 hr rainfall event, as detailed in Table 4.1.

It is understood that DCM propose to adopt a 600 mm freeboard depth, which allows for a contingency (e.g. for additional wave runup).

**TABLE 4.1: FREEBOARD ASSESSMENT SUMMARY**

| Parameter | Value | Basis |
|---|---|---|
| Reporting Area (ha) | 9.85 | Catchment review undertaken in Section 2 |
| 50% AEP 3-hour Rainfall Depth (mm) | 56.9 | Intensity-Frequency-Duration (IFD) data for DCM (Nearest Gauge: Latitude, 16.1125 (S) Longitude, 144.5125 (E)), obtained from the Bureau of Meteorology. |
| Storm Volume (ML) | 5.6 | Assumes 100% catchment runoff |
| Freeboard Level (mAHD) | 385.5 | |
| Freeboard Depth (mm) | 475 | From spillway level (386 mAHD) |
| Adopted Freeboard Depth (mm) | 600 | Allowance for additional contingency freeboard |

# 5. QUALIFICATIONS

(a) In preparing this document, including all relevant calculation and modelling, Engeny Australia Pty Ltd (Engeny) has exercised the degree of skill, care and diligence normally exercised by members of the engineering profession and has acted in accordance with accepted practices of engineering principles.

(b) Engeny has used reasonable endeavours to inform itself of the parameters and requirements of the project and has taken reasonable steps to ensure that the works and document is as accurate and comprehensive as possible given the information upon which it has been based including information that may have been provided or obtained by any third party or external sources which has not been independently verified.

(c) Engeny reserves the right to review and amend any aspect of the works performed including any opinions and recommendations from the works included or referred to in the works if:

    (i) Additional sources of information not presently available (for whatever reason) are provided or become known to Engeny; or

    (ii) Engeny considers it prudent to revise any aspect of the works in light of any information which becomes known to it after the date of submission.

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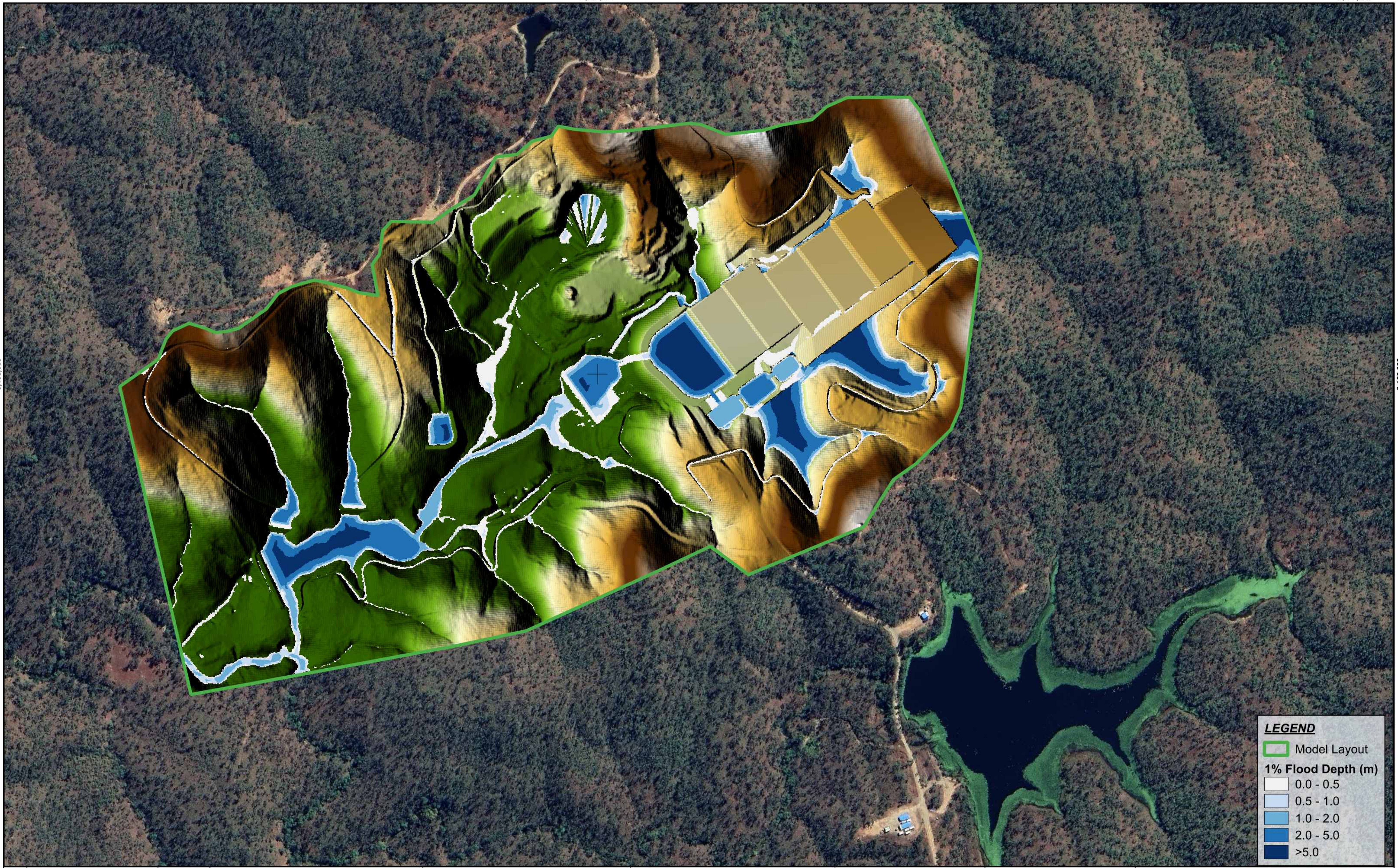
(f) If any claim or demand is made by any person against Engeny on the basis of detriment sustained or alleged to have been sustained as a result of reliance upon the Report or information therein, Engeny will rely upon this provision as a defence to any such claim or demand.

(g) This Report does not provide legal advice.

# APPENDIX A: PROPOSED SCENARIO FLOOD RESULTS

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| 1 | Final Issue | 25-09-2025 |



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| APPROVED | LV | DATE | 25-09-2025 |

NOTES:

N

0 0.1 0.2 km

SCALE - 1:4,500
GDA2020 / MGA zone 52

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**Figure 1**

## DCM 1% AEP Flood Depth - Proposed Scenario

Drg Ref:
BNTL01500_0002-SKE-1-0

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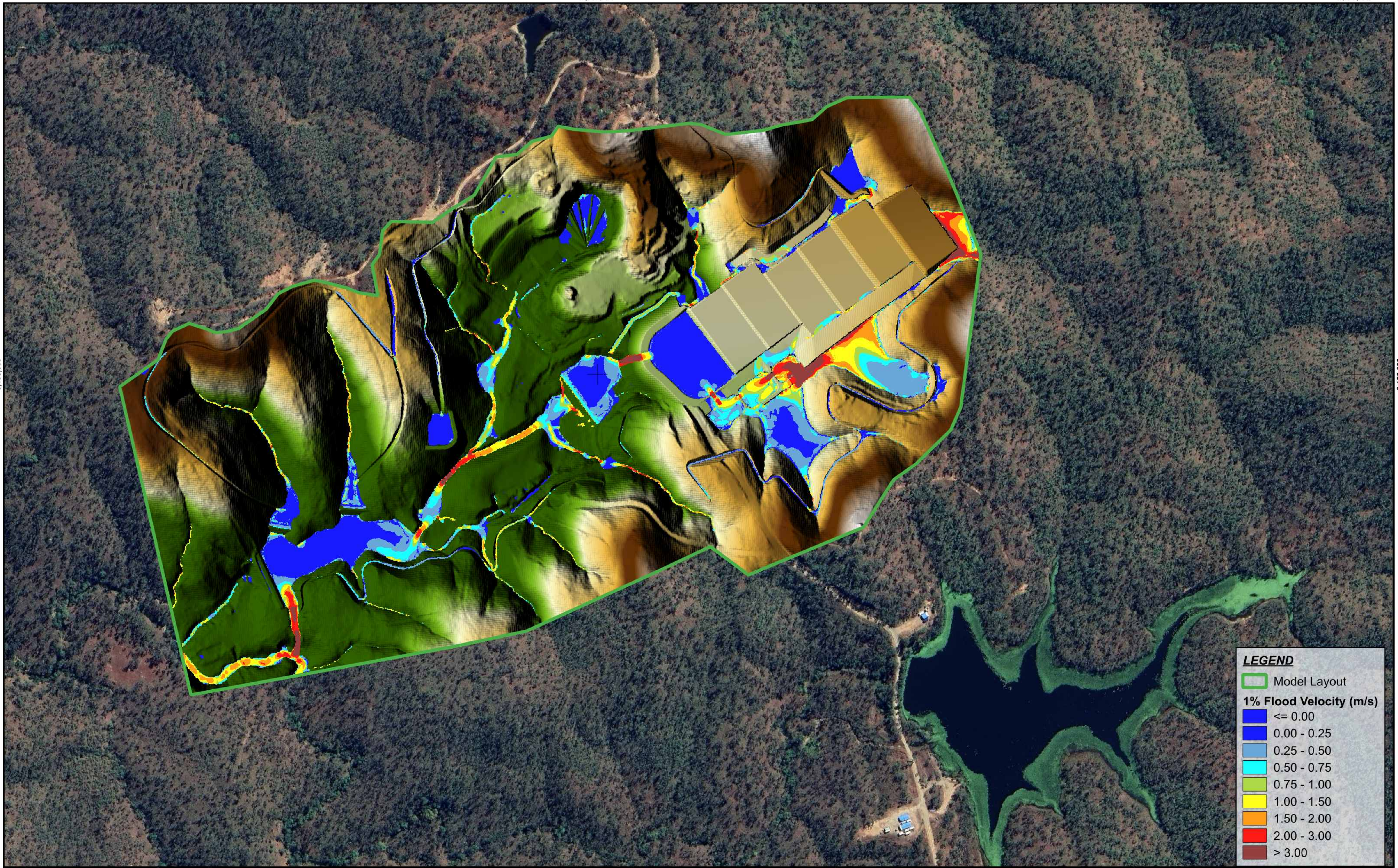


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NOTES:

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SCALE - 1:4,500
GDA2020 / MGA zone 52



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## Figure 2

## DCM 1% AEP Flood Velocity - Proposed Scenario

Drg Ref
BNTL01500_0002-SKE-2-0

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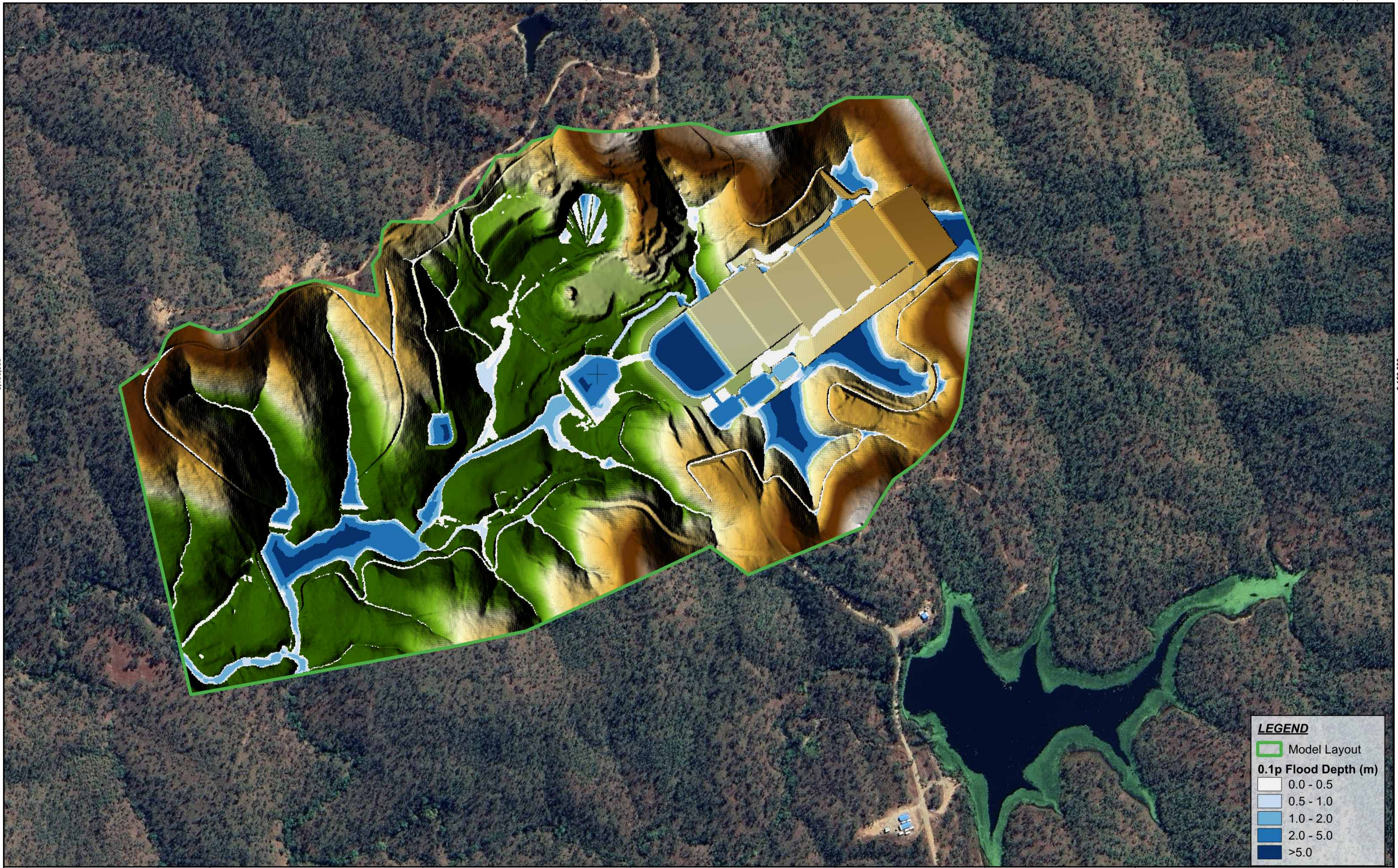


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NOTES:

N

0 0.1 0.2 km

SCALE - 1:4,500
GDA2020 / MGA zone 52

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**Figure 3**

DCM 0.1% AEP Flood Depth - Proposed Scenario

Drg Ref.
BNTL01500_0002-SKE-3-0

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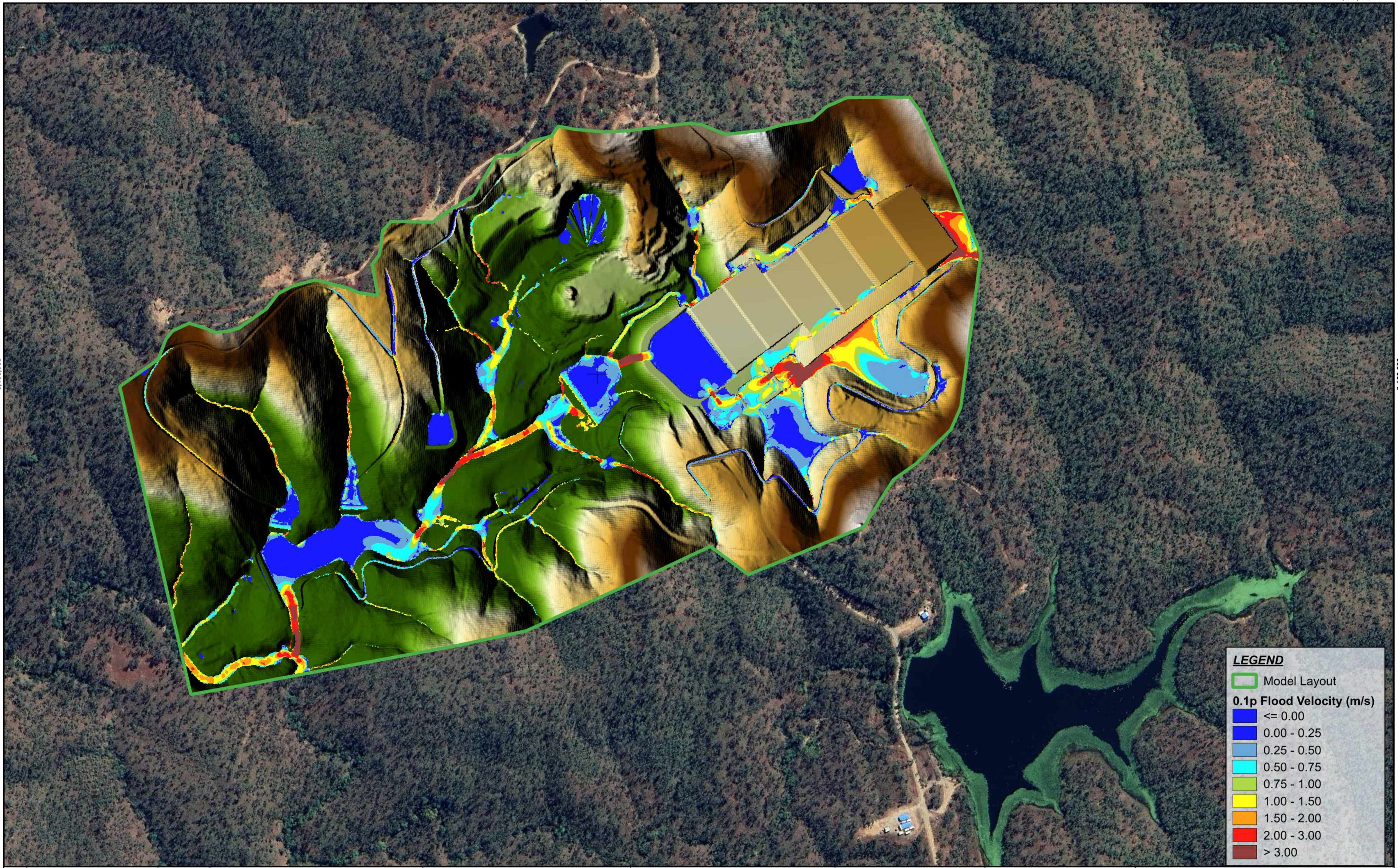


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SCALE - 1:4,500
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**Figure 4**

DCM 0.1% AEP Flood Velocity - Proposed Scenario

Drg Ref:
BNTL01500_0002-SKE-4-0

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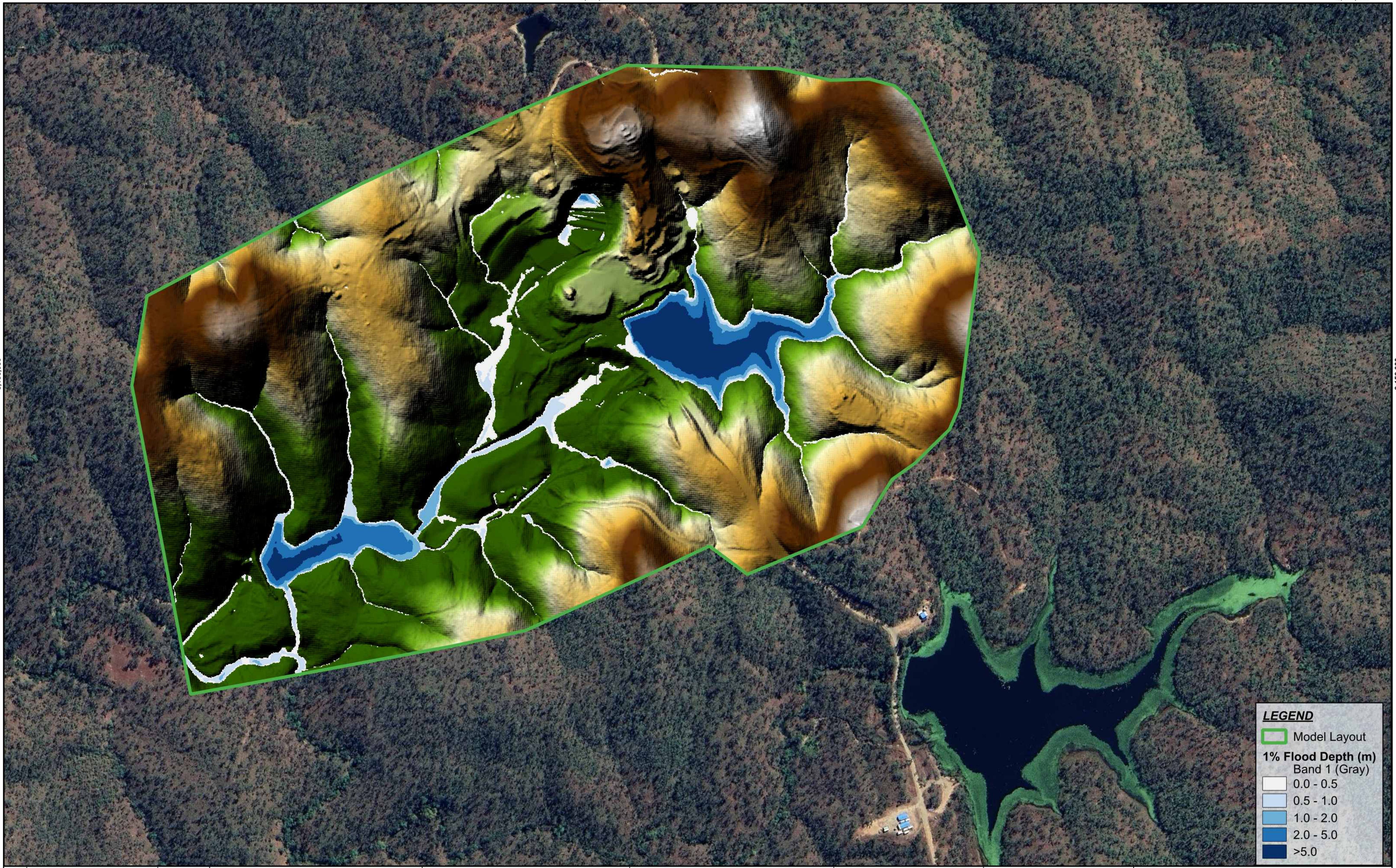
# APPENDIX B: EXISTING SCENARIO FLOOD RESULTS

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| APPROVED | LV | DATE | 25-09-2025 |

NOTES:

N

0 0.1 0.2 km

SCALE - 1:4,500
GDA2020 / MGA zone 52



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**Figure 5**

## DCM 1% AEP Flood Depth - Existing Scenario

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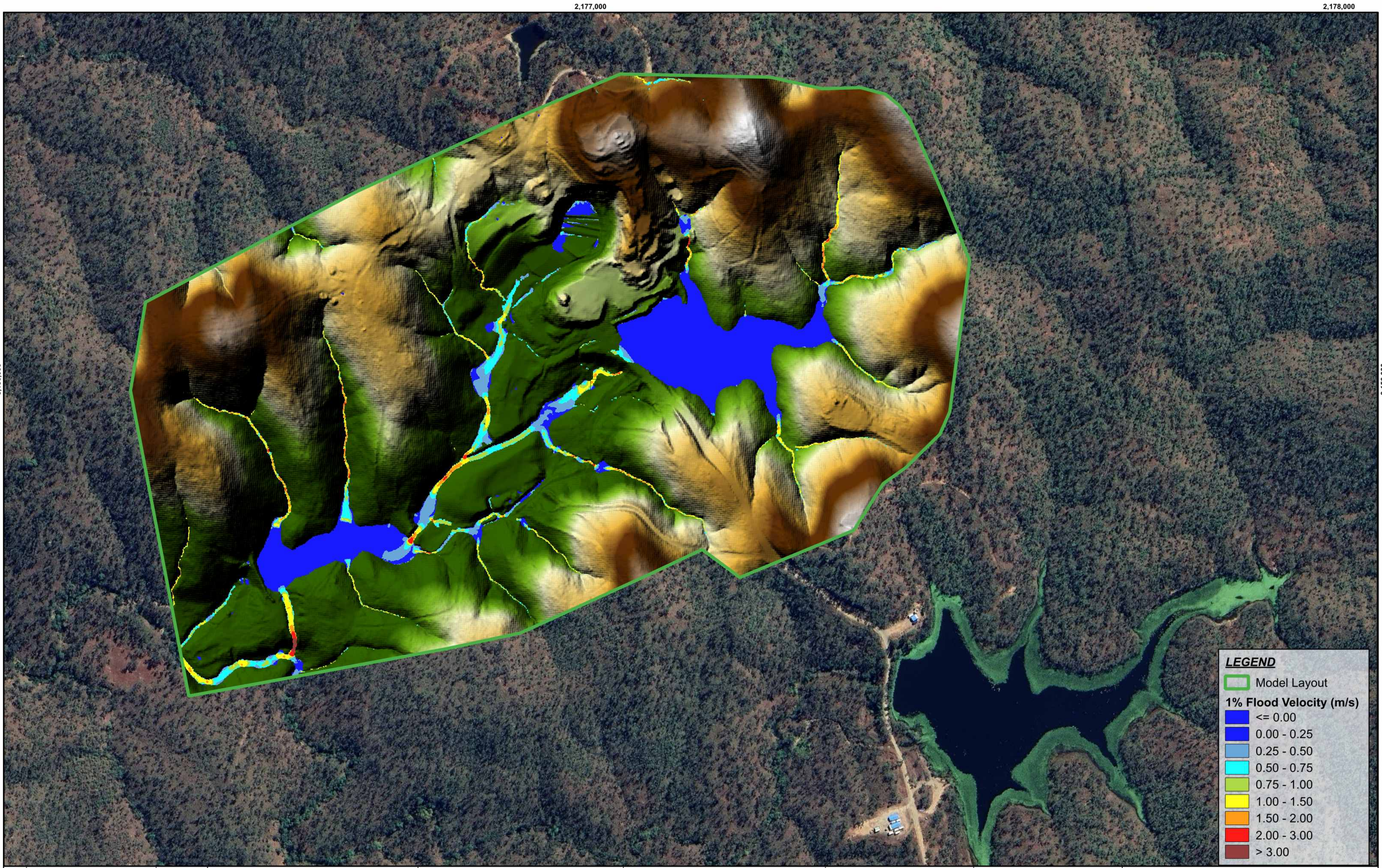


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| APPROVED | LV | DATE | 25-09-2025 |

NOTES:

N

0 0.1 0.2 km

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**Figure 6**

DCM 1% AEP Flood Velocity - Existing Scenario

Drg Ref.
BNTL01500_0002-SKE-6-0

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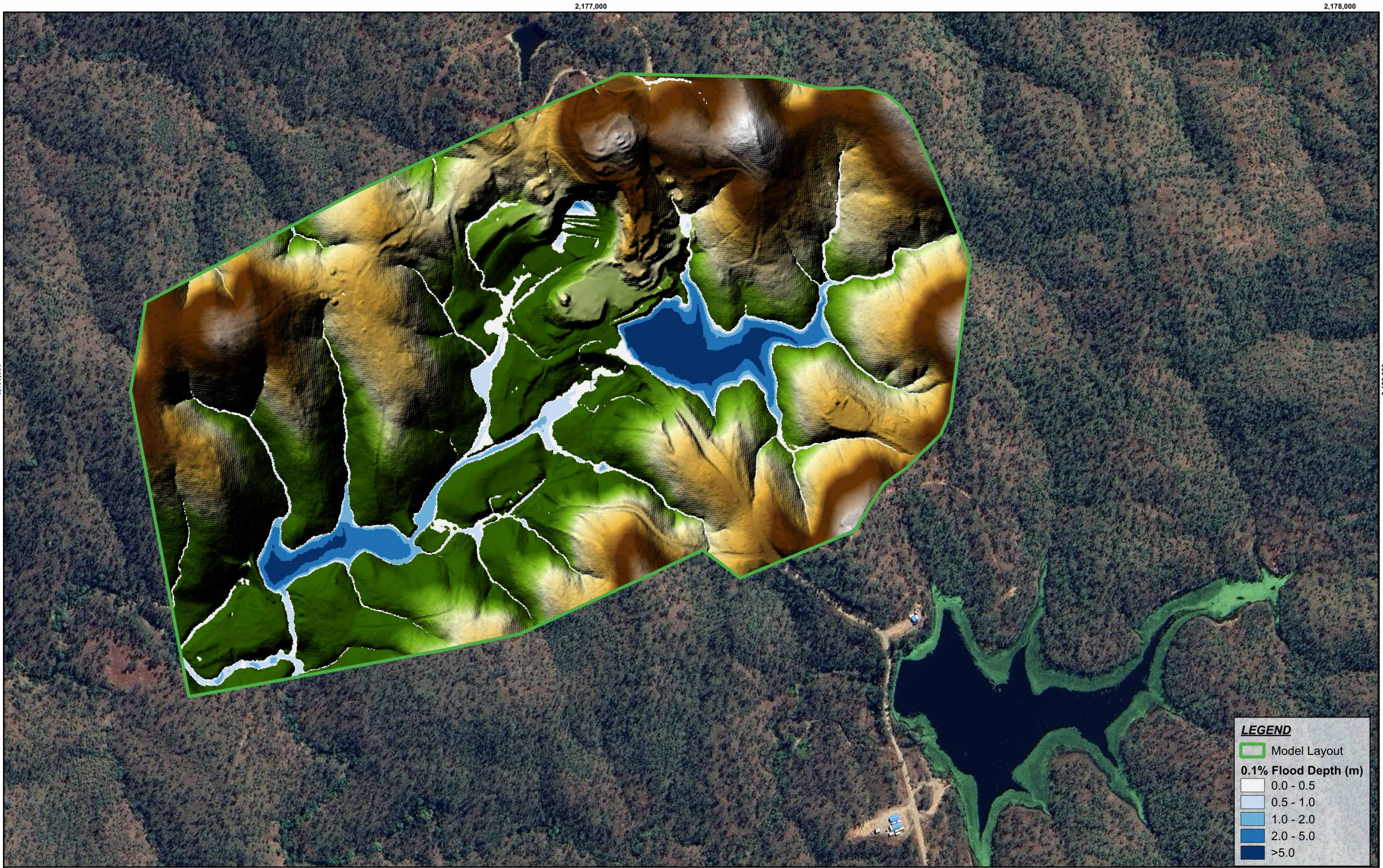


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NOTES:

N

0 0.1 0.2 km

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**Figure 7**

## DCM 0.1% AEP Flood Depth - Existing Scenario

Drg Ref.
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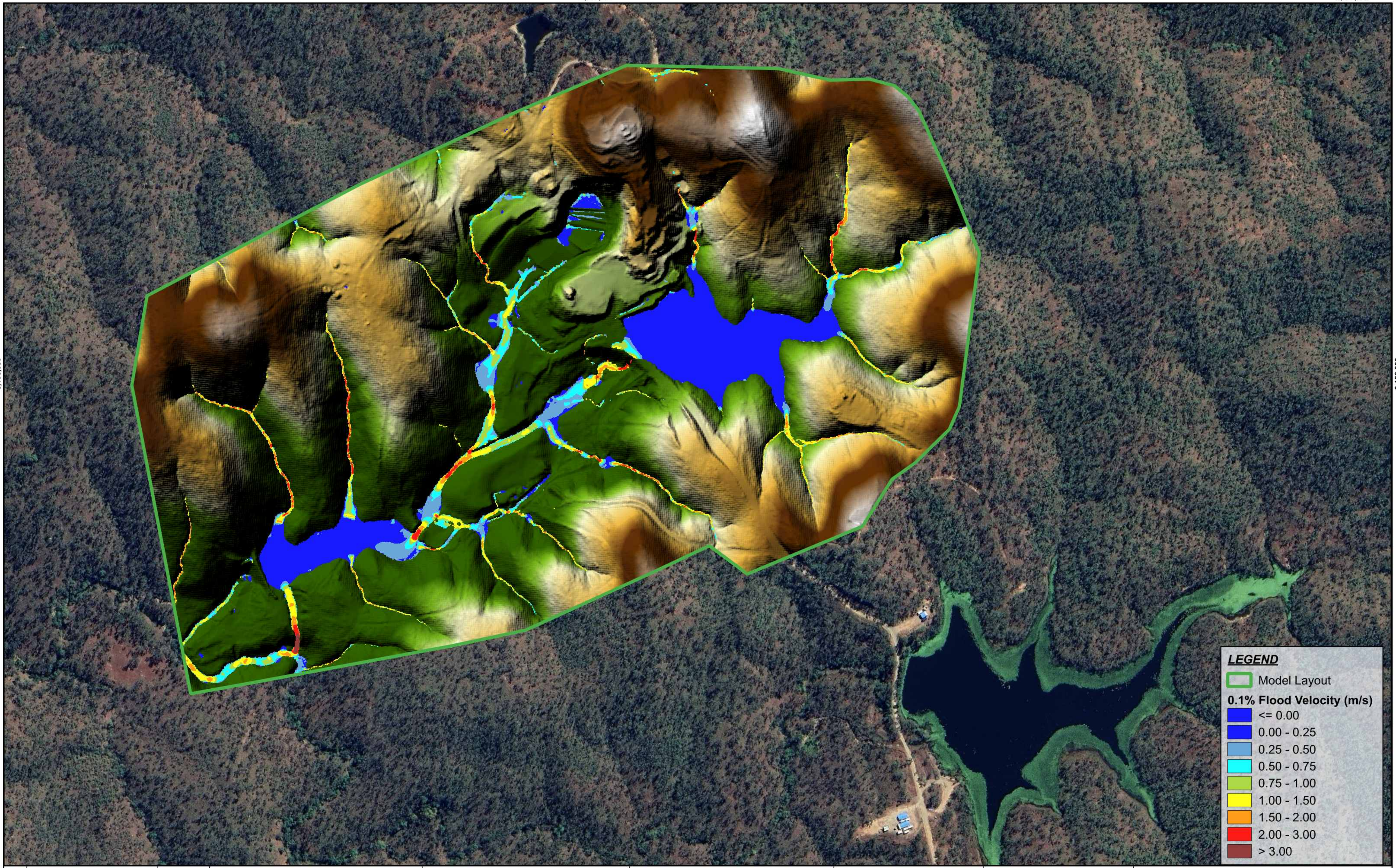


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NOTES:

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0 0.1 0.2 km

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Figure 8

# DCM 0.1% AEP Flood Velocity - Existing Scenario

Drg Ref:
BNTL01500_0002-SKE-8-0

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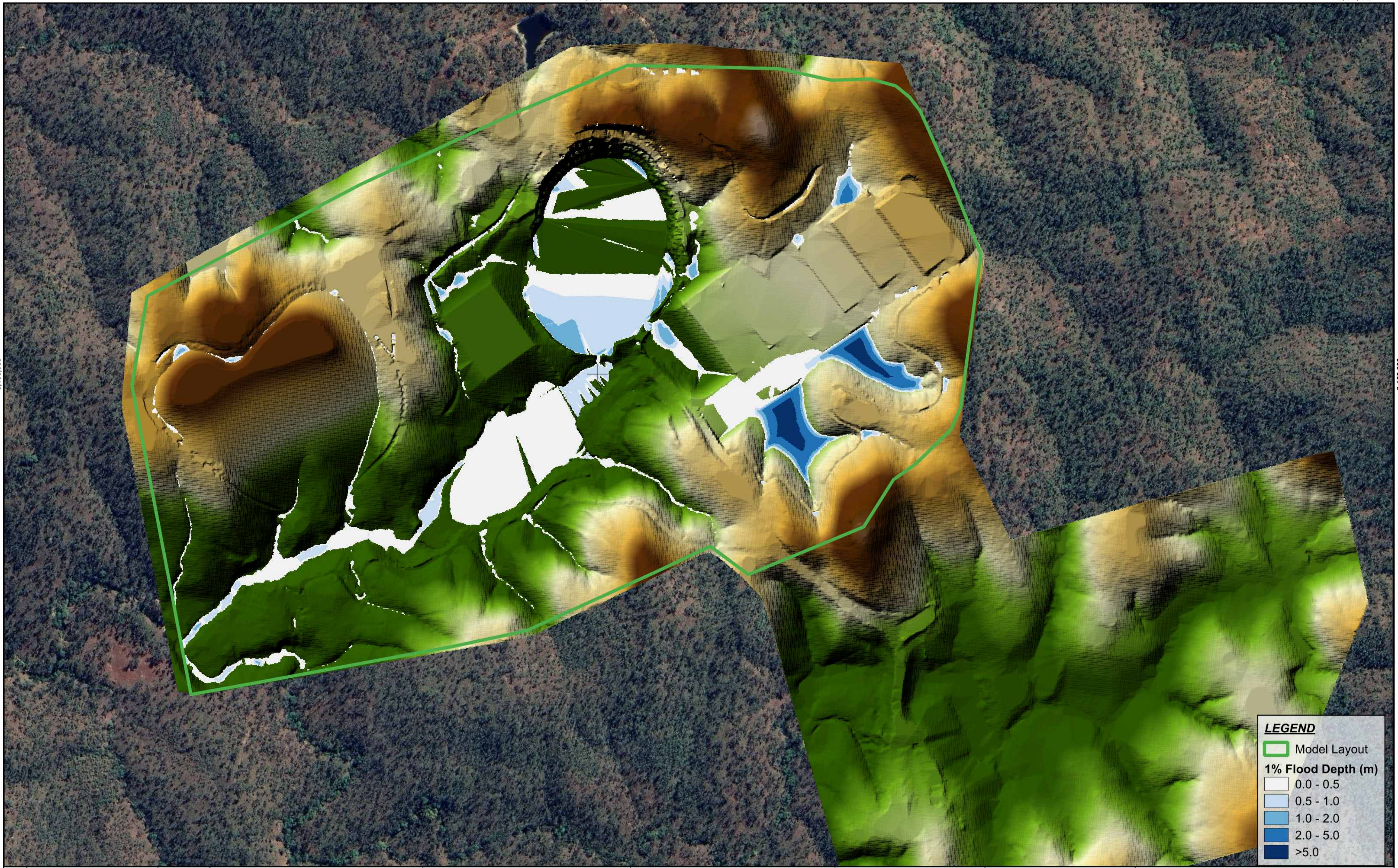
# APPENDIX C: FINAL LANDFORM SCENARIO FLOOD RESULTS

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NOTES:

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**Figure 9**

DCM 1% AEP Flood Depth - Final Landform Scenario

Drg Ref:
BNTL01500_0002-SKE-9-0

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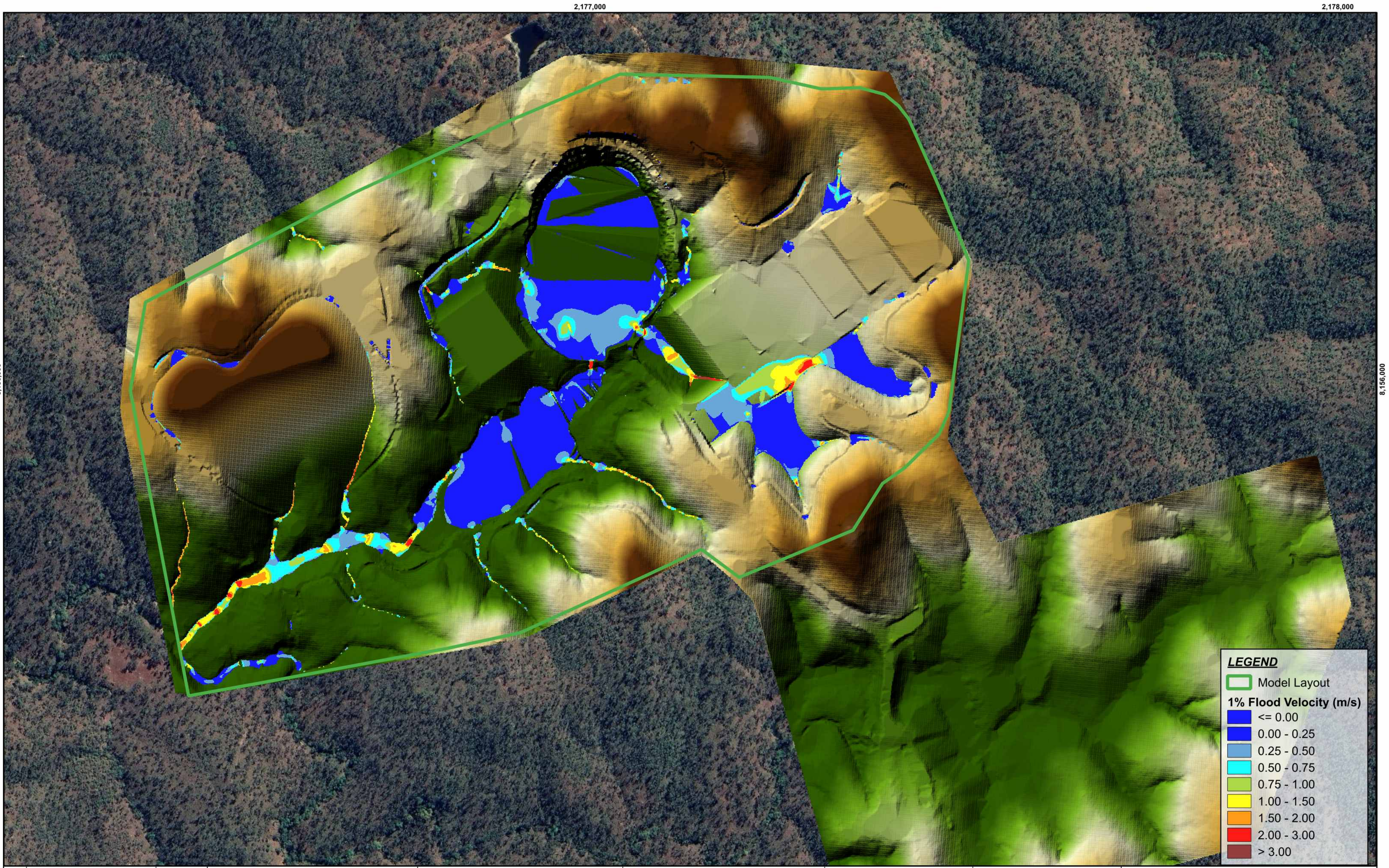


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NOTES:

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SCALE - 1:4,500
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**Figure 10**

DCM 1% AEP Flood Velocity - Final Landform Scenario

Drg Ref:
BNTL01500_0002-SKE-10-0

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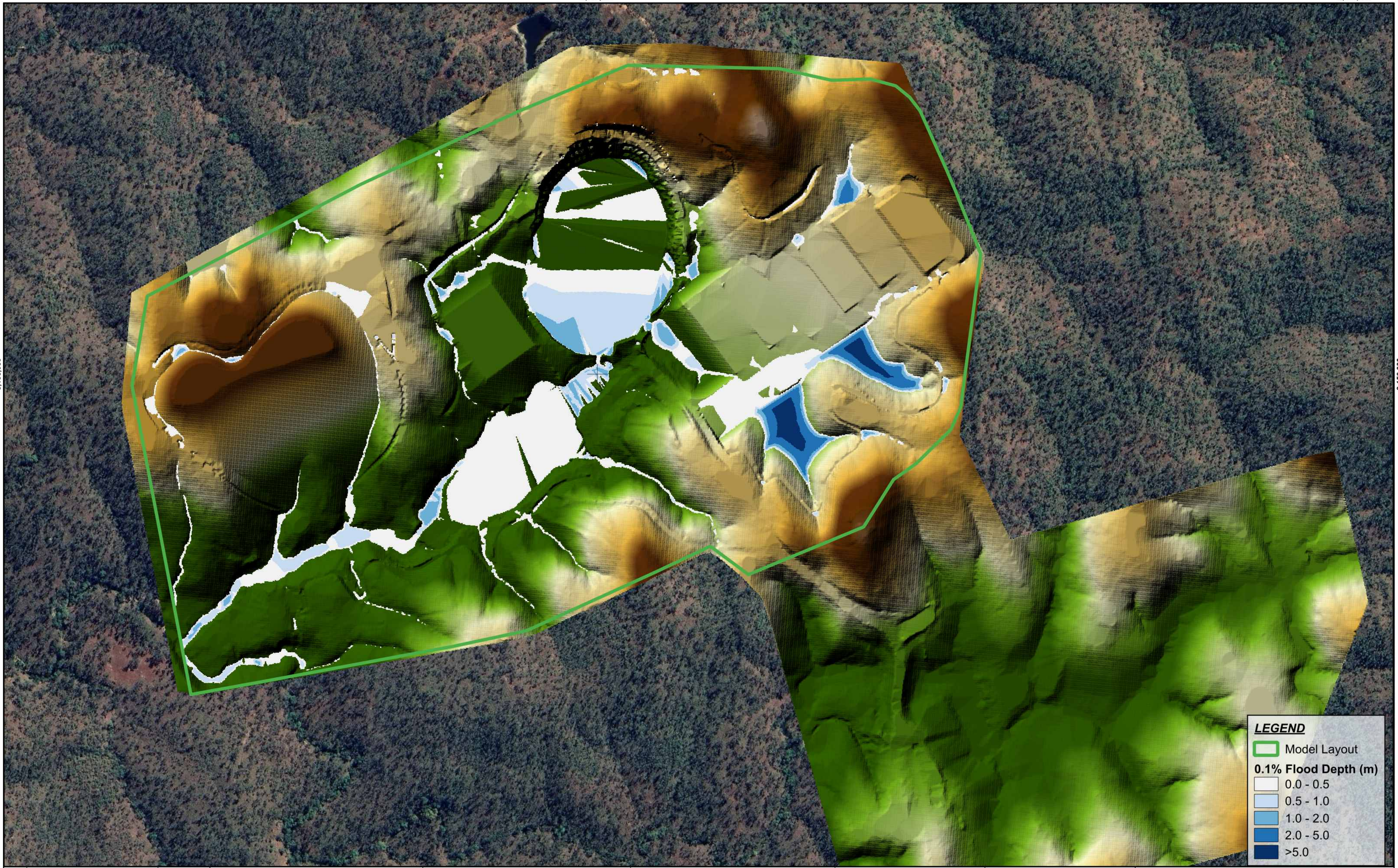


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NOTES:

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0 0.1 0.2 km

SCALE - 1:4,500
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# Figure 11

DCM 0.1% AEP Flood Depth - Final Landform Scenario

Drg Ref
BNTL01500_0002-SKE-11-0

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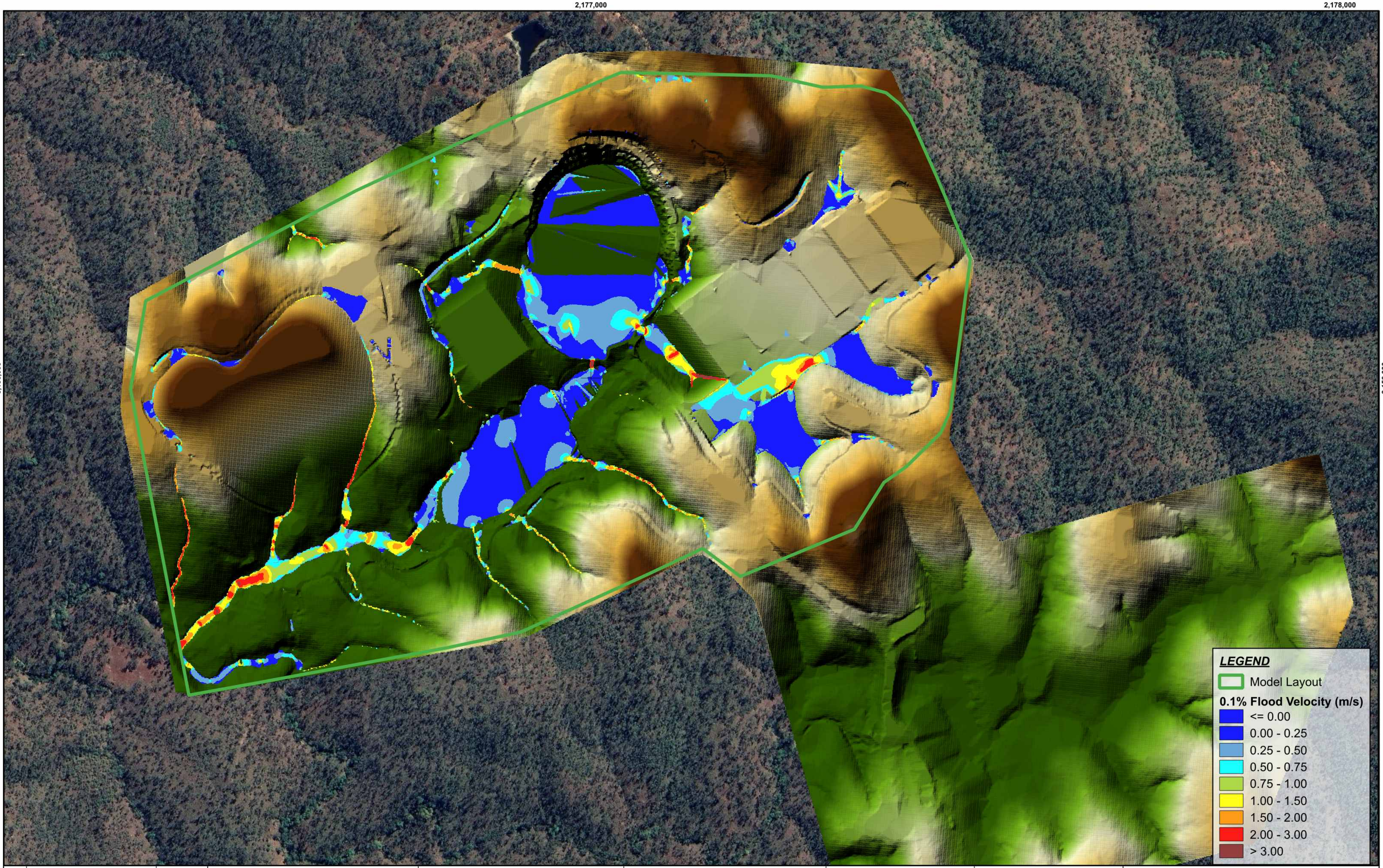


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NOTES:

N

0 0.1 0.2 km

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**Figure 12**

DCM 0.1% AEP Flood Velocity - Final Landform Scenario

Drg Ref
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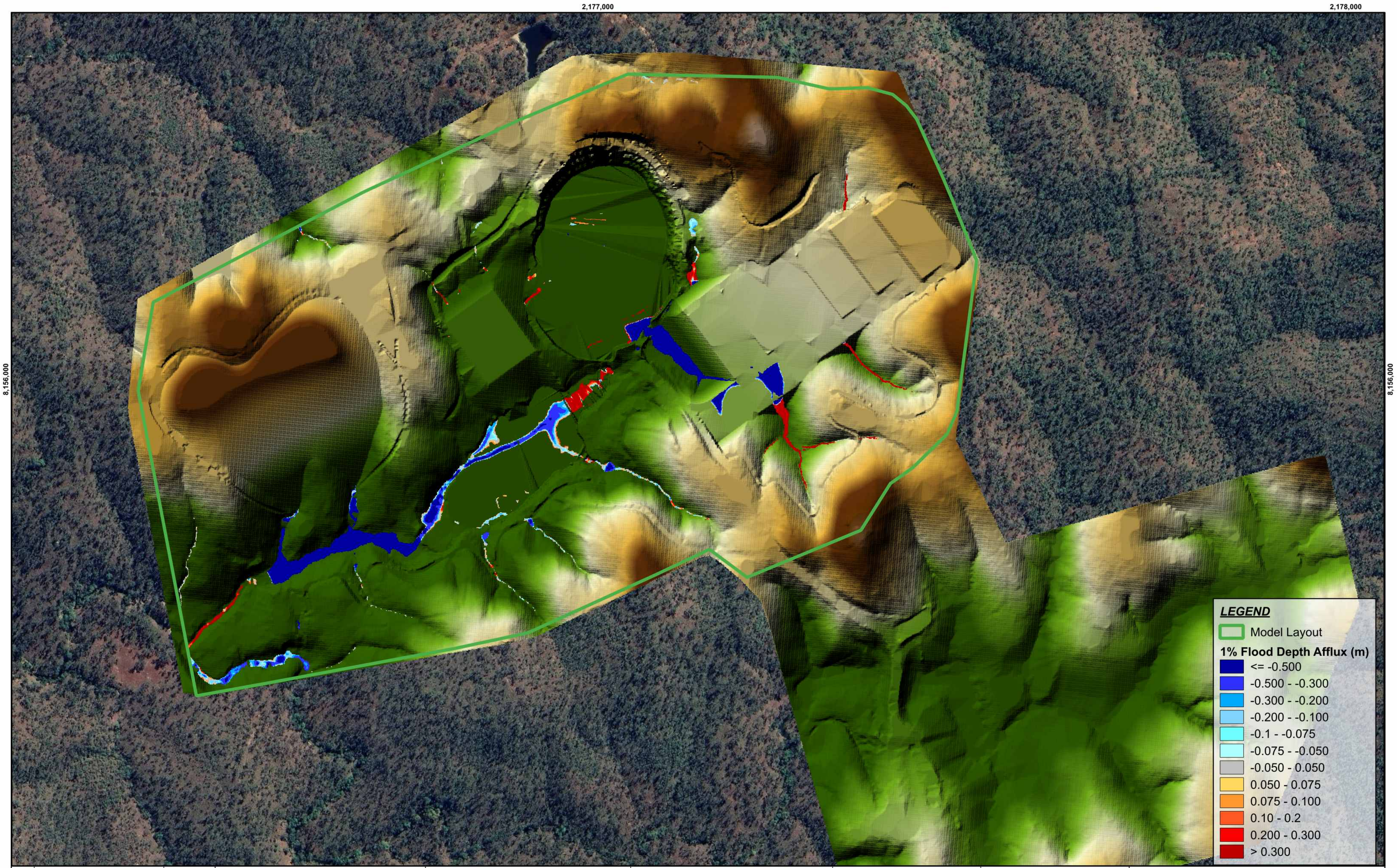
# APPENDIX D: FLOOD RESULTS AFFLUX: FINAL LANDFORM – EXISTING

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NOTES:

N

0 0.1 0.2 km

SCALE - 1:4,500
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**Figure 13**

## DCM 1% AEP Flood Depth Afflux

Dwg Ref:
BNTL01500_0002-SKE-13-0

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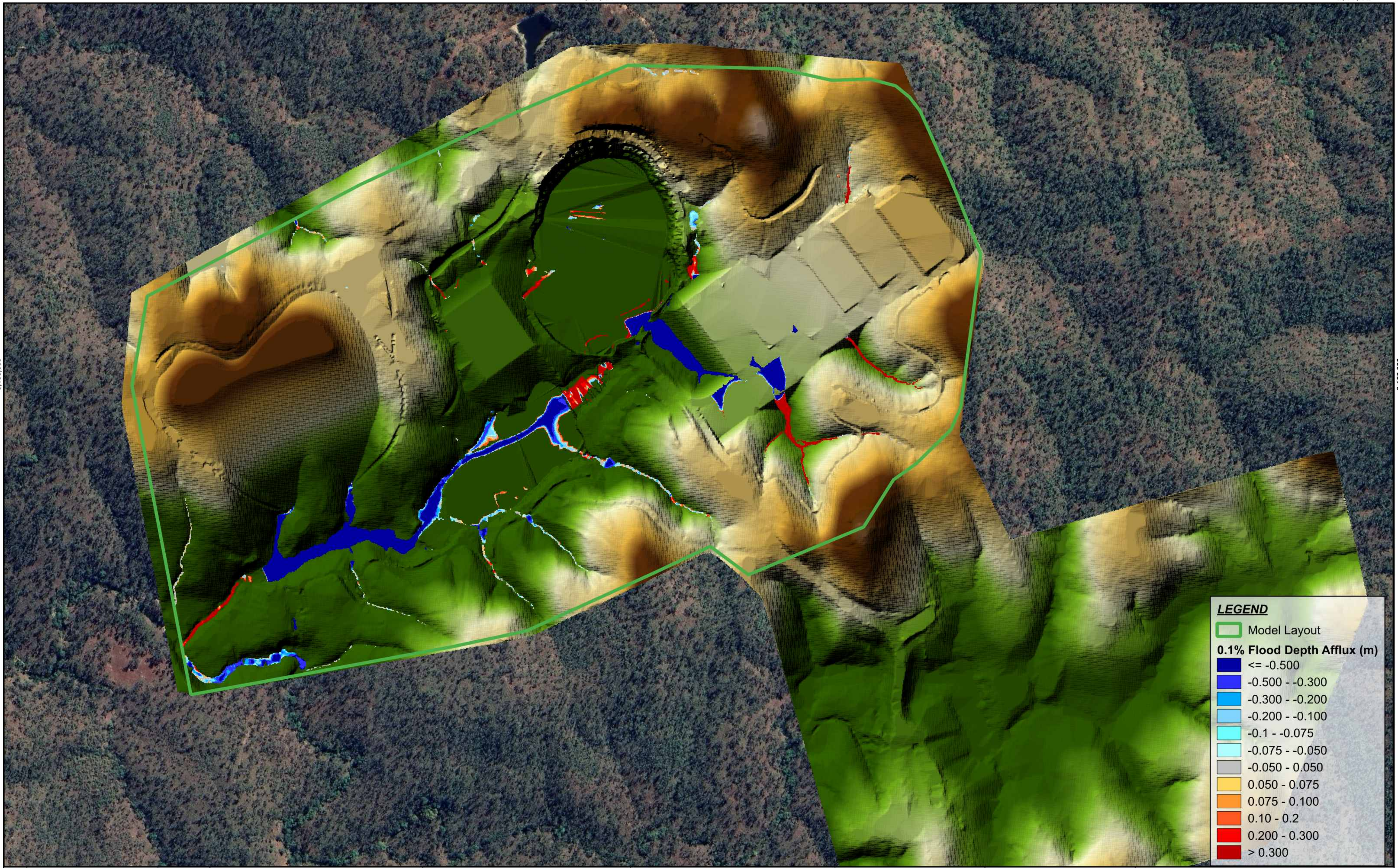


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NOTES:

N

0 0.1 0.2 km

SCALE - 1:4,500
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## Figure 14

DCM 0.1% AEP Flood Depth Afflux

Drg Ref:
BNTL01500_0002-SKE-14-0

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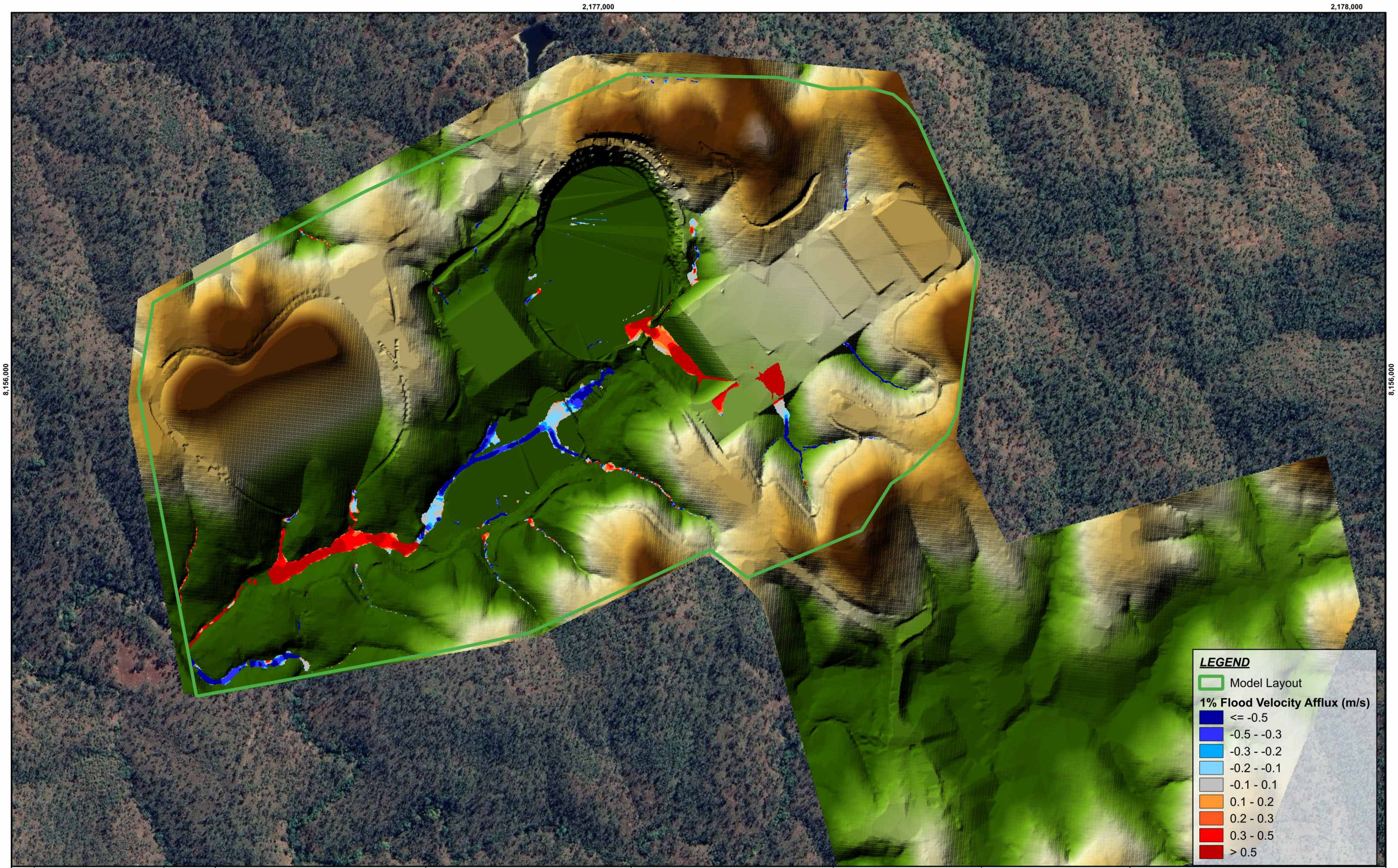


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NOTES:

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0 0.1 0.2 km

SCALE - 1:4,500
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## Figure 15

## DCM 1% AEP Flood Velocity Afflux

Drg Ref:
BNTL01500_0002-SKE-15-0

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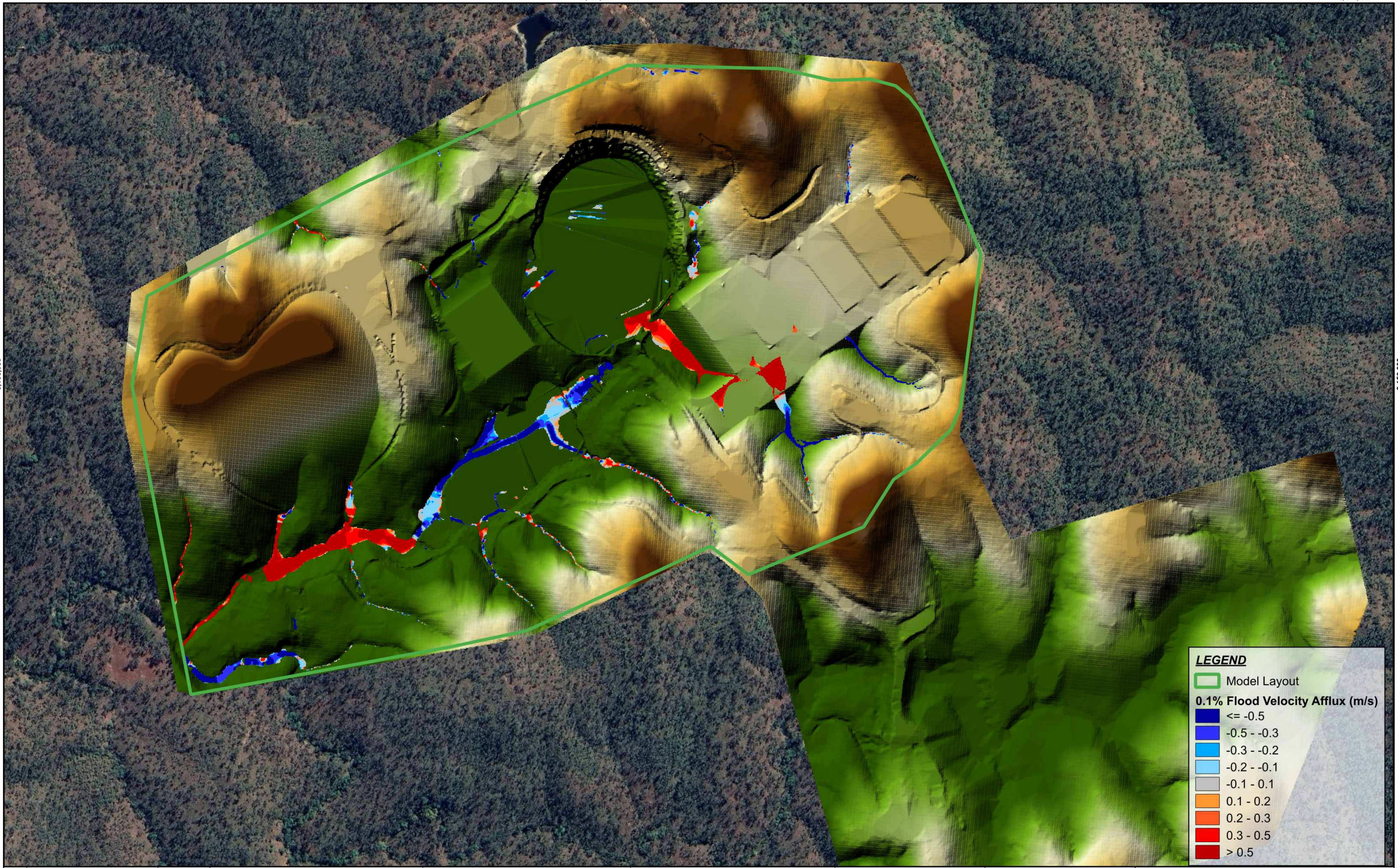
8,156,000 8,156,000

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NOTES:

N

0 0.1 0.2 km

SCALE - 1:4,500
GDA2020 / MGA zone 52

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**Figure 16**

## DCM 0.1% AEP Flood Velocity Afflux

Drg Ref
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