CATABY POWER STATION – SURFACE WATER ASSESSMENT

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PREPARED FOR

Preston Consulting Pty Ltd

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LIST OF ABBREVIATIONS

AEP	Annual Exceedance Probability
ARF	Areal Reduction Factor
ARI	Average Recurrence Interval
BoM	Bureau of Meteorology
DEM	Digital Elevation Model
DPIRD	Department of Primary Industries and Regional Development
EPA	Environmental Protection Authority
HMS	Hydrologic Modelling System (HEC-HMS software)
LiDAR	Light Detection and Ranging
PDWSA	Public Drinking Water Source Areas
RAS	River Analysis System (HEC-RAS software)
RFFE	Regional Flood Frequency Estimation
SRTM	Shuttle Radar Topography Mission
SWIS	South West Interconnected System

1 INTRODUCTION

1.1 BACKGROUND

Alinta Energy Development Pty Ltd (Alinta) is investigating the option to develop approximately 400 megawatts (MW) of fast-start, open-cycle gas turbines to be connected to the South West Interconnected System (SWIS), known as the Cataby Power Station (the Project). The proposed location is on cleared agricultural land approximately 200 kilometres (km) north of Perth, near the small town of Cataby (refer Figure 1-1).

The project will be situated on an estimated 20-hectare (ha) lot currently owned by Iluka. The Project will include a maximum of 10 ha of ground disturbance, including 0.5 ha for an access road to Mimegarra Road. (refer Figure 1-2). The larger 20-ha lot provides the flexibility to position the project in the most suitable location within the property.

Alinta plans to seek approval under Part IV of the *Environmental Protection Act* 1986 to enable the development of the project.

1.2 OBJECTIVES

The primary objective of this assessment is to evaluate the flood risk, stormwater management needs, and overland runoff flows for the site, along with the associated risks, in advance of the engineering design phase. This assessment will guide the optimal placement of infrastructure within the 20-ha lot.

The assessment will consider pre-existing conditions upstream of the site, as the power station is expected to outlast the mine. It is assumed that, after mine closure, natural water flows will need to be restored. The assessment scope excludes the potential effects of infrastructure located outside the designated 20-ha lot.

The stormwater assessment for the project will include a catchment analysis of overland flow within and around the site. This will address flood risk, evaluate stormwater conveyance, and ensure the protection of project infrastructure. The assessment will also consider water quality management to comply with *Environmental Protection Authority* (EPA) guidelines for Inland Waters (EPA, 2018), thereby safeguarding the environmental values of local waterbodies and surrounding ecosystems.

The key objectives of our assessment include:

Literature Review and Desktop Study:

Conduct a literature review and desktop study of the site's local and regional hydrological conditions;

Stormwater Assessment:

Develop a Concept Stormwater Management Plan encompassing:

- Catchment analysis
- Flood impact assessment
- Water quality assessment

Flood Study:

Undertake a Flood Study on the proposed site for pre- and post-development conditions to determine any potential areas of flood risk and inform the location of critical infrastructure.

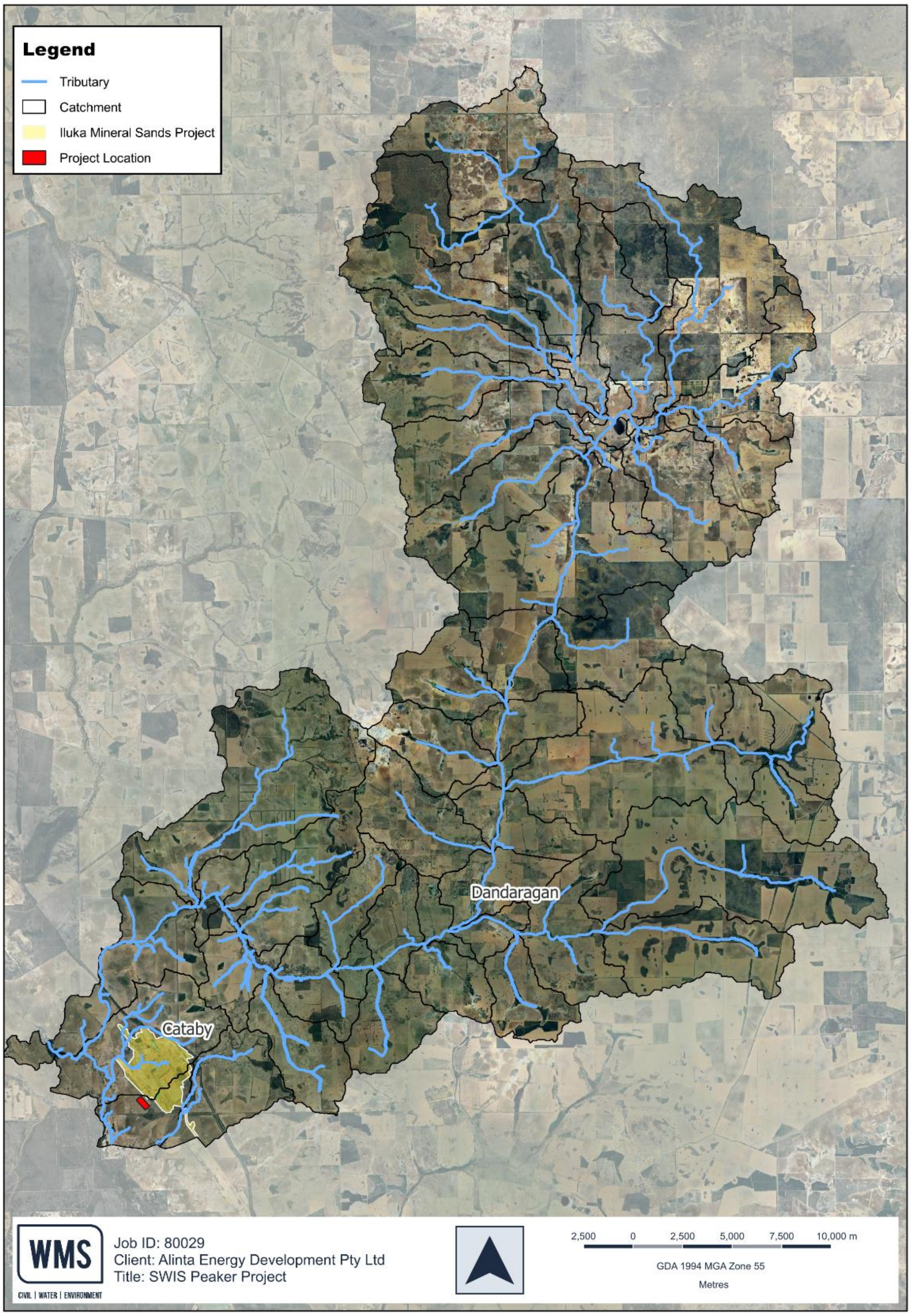


Figure 1-1 Project Location and Regional Hydrology

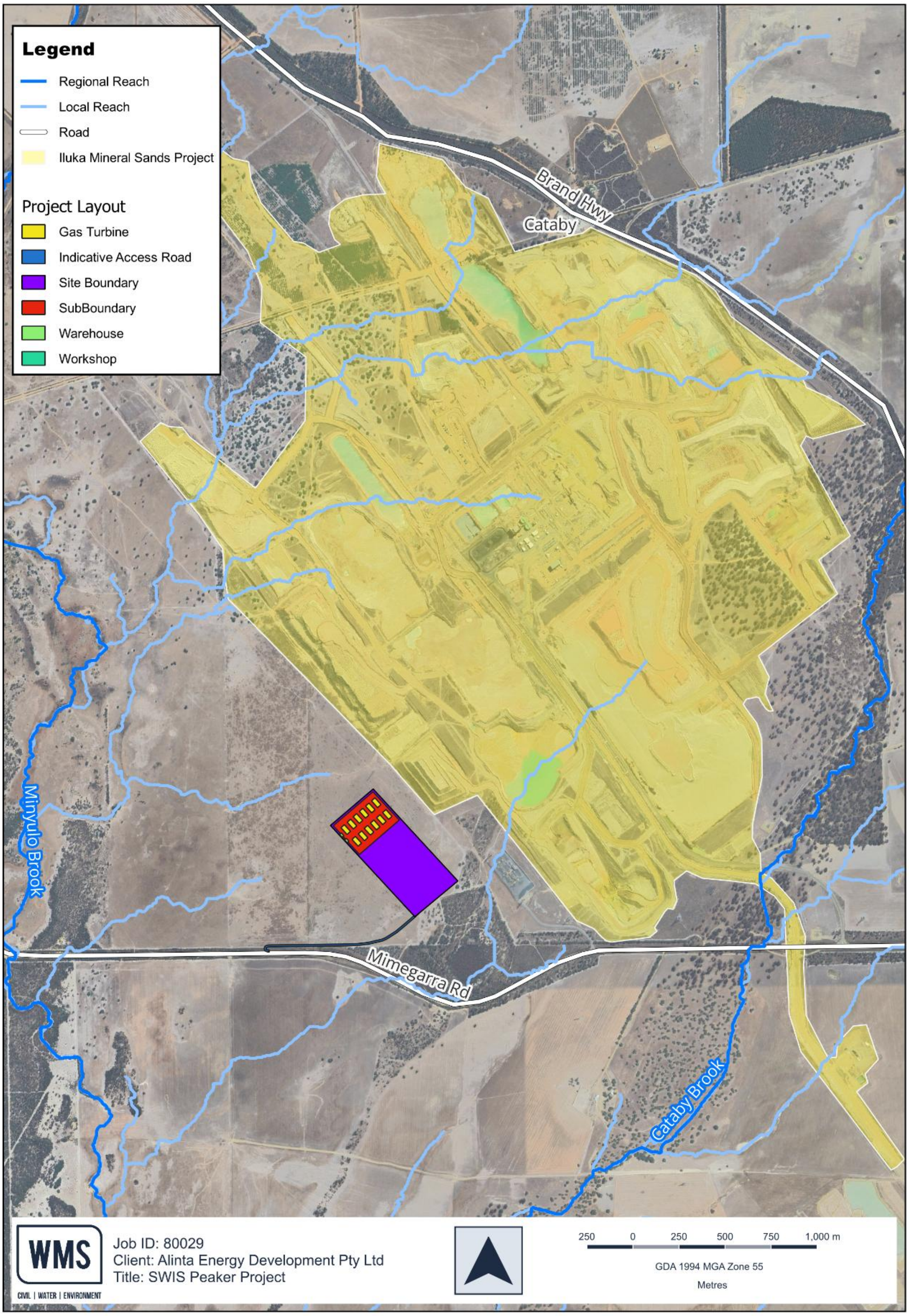


Figure 1-2 Project Layout and Sub-Regional Hydrology

1.3 TERMINOLOGY

In the 1987 edition of *Australian Rainfall and Runoff* (ARR, 1987), the term *Average Recurrence Interval* (ARI) was used to express the probability of design flood events. The 2019 revision, *Australian Rainfall and Runoff* (ARR, 2019) introduced *Annual Exceedance Probability* (AEP) as the preferred terminology for defining rainfall intensity probabilities. This updated terminology aligns with guidance from Engineers Australia's National Committee on Water Engineering, enhancing clarity, technical accuracy, and ease of application across both professional and public contexts.

Table 1-1 displays the equivalency of event likelihood across various terminology formats. For events exceeding a 10% AEP, converting ARI to AEP can be approximated by taking the inverse of the ARI. The Australian Rainfall and Runoff (ARR 2021), offers an in-depth overview of the updated ARR probability terminology, including a detailed comparison of ARI and AEP equivalencies.

The % AEP terminology has been adopted throughout this report.

Table 1-1 Summary of AEP and ARI equivalence

Annual Exceedance Probability (AEP)		Average Recurrence Interval
% AEP	1 in X AEP	ARI (in years)
63.2%	~1	1
50%	2	~2
20%	5	~5
10%	10	~10
5%	20	20
2%	50	50
1%	100	100
0.05%	2000	2000

2 PROJECT SETTING

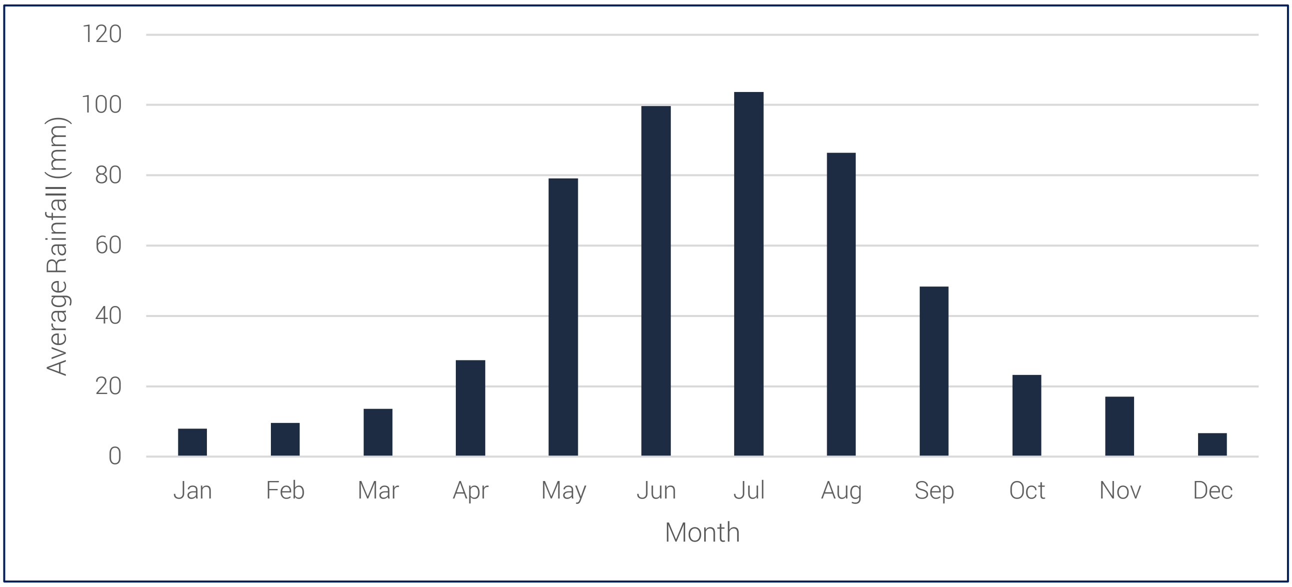
The project is located in Yued Noongar Country, approximately 200 kilometres north of Perth, near the small town of Cataby. The project site, owned by Iluka Resources Ltd, is positioned within the SWIS on a 20-ha parcel of cleared agricultural land. This site lies immediately southwest of Iluka's Cataby Mineral Sands Project.

2.1 CLIMATE

2.1.1 Rainfall and Evaporation

The Bureau of Meteorology (BoM) rainfall station at Eneminga (Station Number 9179) is situated 0.05 km southeast of the project site and is deemed representative of the study area. The annual average rainfall for the Cataby area over the last 43 years is approximately 540mm (refer to Figure 2-1), with an average pan evaporation of approximately 2000mm. Over an average year, both average monthly rainfall and evaporation rates are highly seasonal. Evaporation exceeds rainfall in all, but in the wettest months, annual evaporation is three times higher than annual rainfall.

Figure 2-1 **Average monthly rainfall Eneminga Rainfall Station (9179)**



2.1.2 IFD Data

The BoM (2021) 2016 IFD data for the project site is presented in Figure 2-2

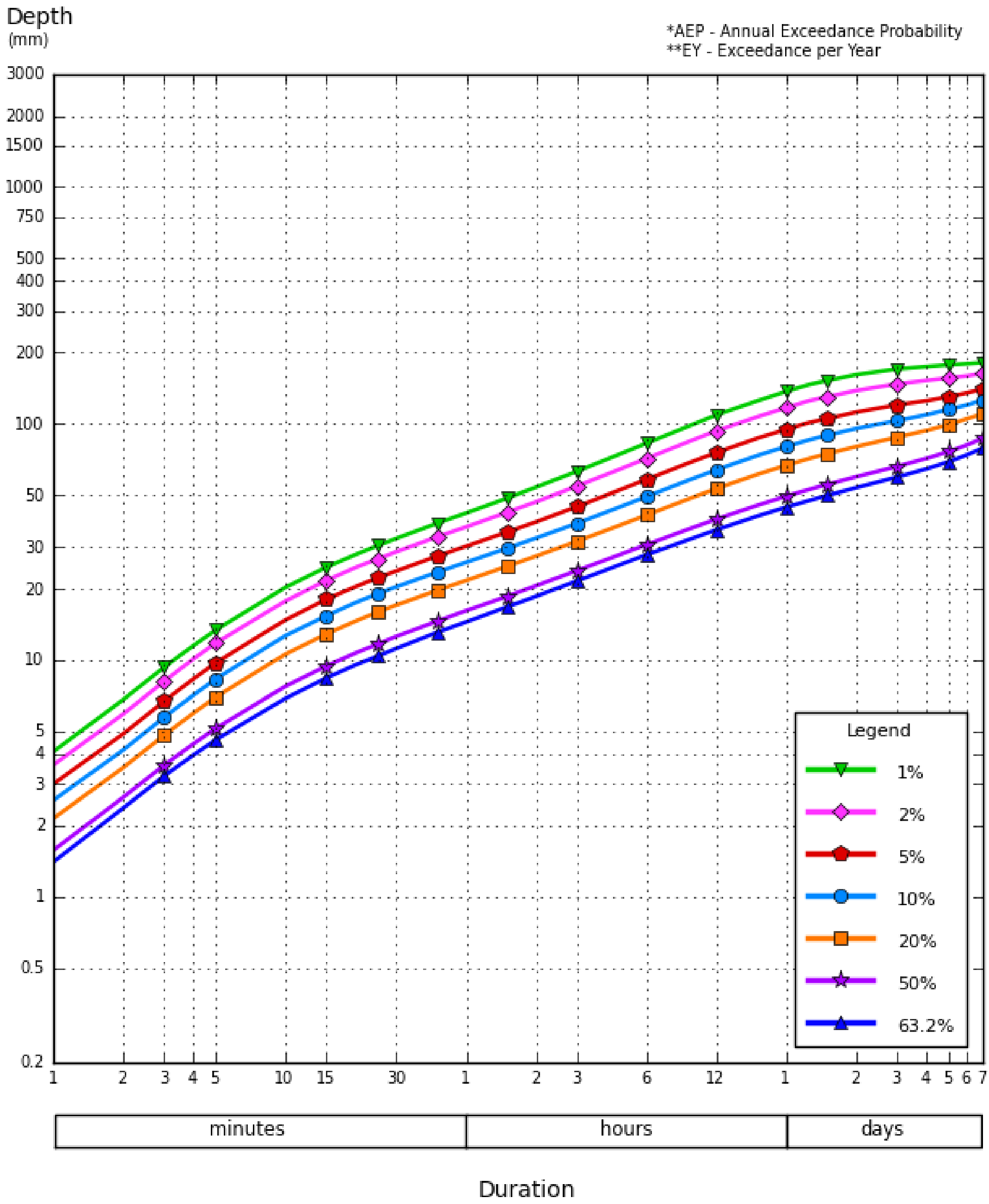


Figure 2-2 2016 IFD data for the Cataby Power Station (BoM, 2021)

2.2 HYDROLOGY

2.2.1 Catchment Analysis

The project area falls within the hydrological unit of the South West Coastal Drainage Basin, with surface hydrology dominated by seasonal overland flow patterns. The region typically experiences flood events during higher rainfall months, influenced by seasonal storm fronts.

Agricultural activities have significantly modified the surface water systems in this area. Riparian systems have been highly impacted by agriculture and grazing (Iluka, 2015). Given the flat topography and reduced natural drainage capacity, there is a potential for localised flooding and pooling, especially in the vicinity of modified watercourses and drainage lines during substantial rainfall events.

Two ephemeral watercourses, Minyulo Brook and Cataby Brook, contribute to the regional hydrology of the project area, primarily flowing during periods of high rainfall. As Minyulo Brook approaches Caro, it bifurcates, with the northern branch flowing towards Caro Swamp, while the southern drains into a non-perennial lake located 1.5km west and downstream of the project area.

Cataby Brook flows southward past the project site, crossing Iluka's Mine access roads and Mimegarra Road before dissipating across agricultural paddocks upstream of Eneminga Pool. During extreme rainfall events, there is potential for flows from the Cataby Brook to divert into the Unnamed Nature Reserve (WA27993), which is immediately southeast of the project.

The study area and its catchment analysis are presented in Figure 2-3.

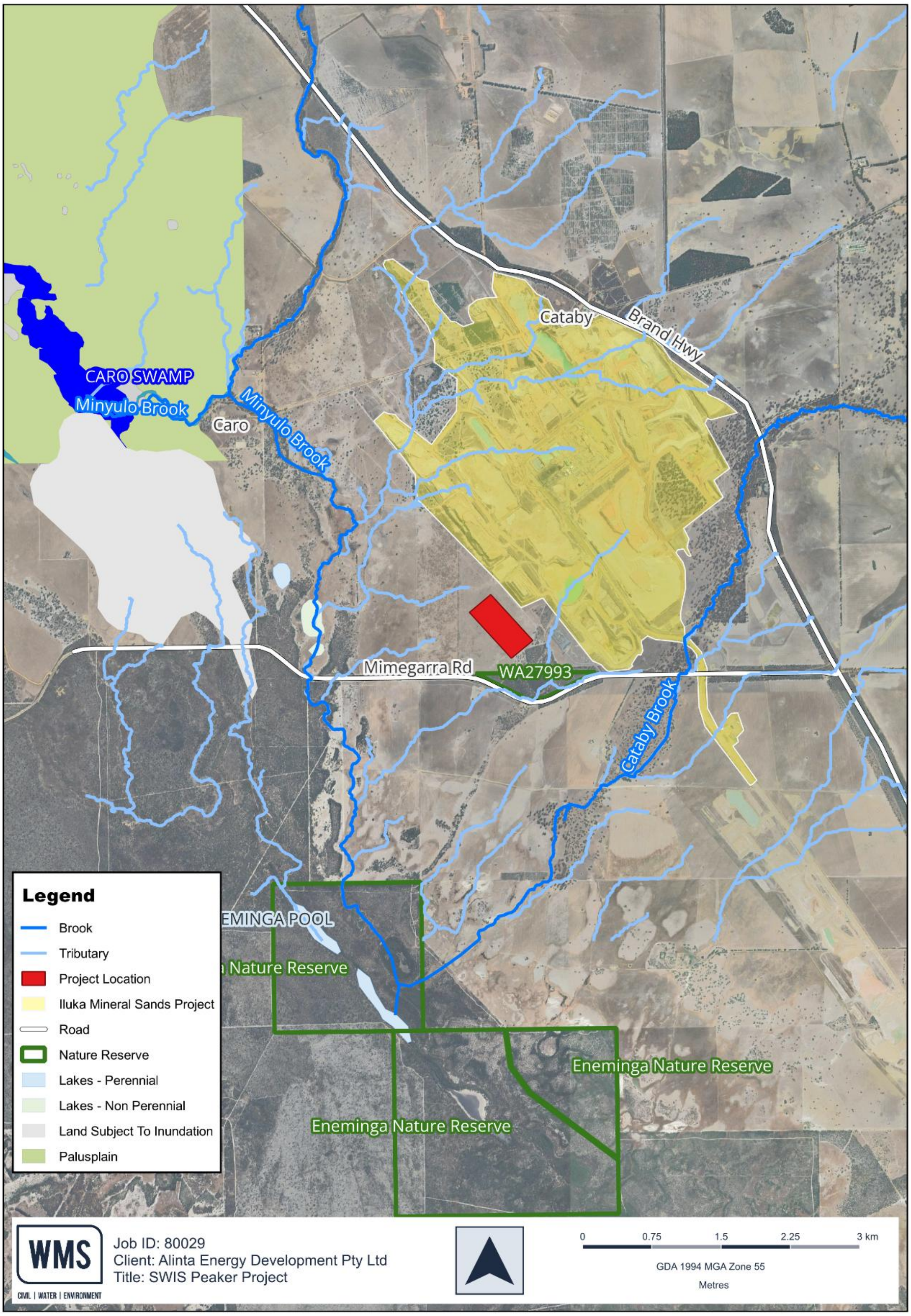


Figure 2-3 Project Location and Catchment Analysis

3 DATA AND LITERATURE REVIEW

WMS collated and reviewed all publicly available data during the assessment, including:

- Cataby Project Mining Proposal (Iluka, 2015)
- Temporal patterns and catchment data from the Australian Rainfall & Runoff Data Hub
- Design rainfall and rainfall intensities from the Bureau of Meteorology (BoM)
- Topographic data from a LiDAR-derived Digital Elevation Model (DEM) with a 5 m grid resolution was captured in 2012, and 30-meter resolution data was derived from SRTM LiDAR.

The LiDAR data, surveyed prior to the construction of Iluka's mine site located north-east of the project area, accurately represented the pre-existing terrain. To assist with the investigation, Preston Consulting provided WMS with:

- The limit of disturbance for the 20-ha lot and investigation area.
- Preliminary Infrastructure Layout (as per the project layout in Figure 1-2.).

WMS intended to utilise hydrological data, flow estimates, and findings from Iluka's previous studies, but these were not available at the time of this assessment, including:

- Surface Water Management Plan (Iluka, 2017)
- Surface Water Model (Jacobs, 2015)
- 1m LiDAR of the adjacent Cataby Sands Project.

WMS's approach followed best practices outlined in ARR 2019, and the comprehensive use of publicly available data and validated hydrological modelling techniques ensures that the study's conclusions are both robust and reliable.

4 GENERAL METHODOLOGY

Due to the large study area and variations in catchment sizes, three modelling domains were developed to conduct the assessment; Regional, Sub-Regional and Local.

- Regional, sub-regional and local hydrologic modelling was employed to determine critical durations and flows for the respective domains, including primary watercourses and major tributaries. A detailed explanation of the hydrologic modelling approach is provided in Section 5.1.
- Sub-regional rain-on-grid hydraulic modelling with regional hydrologic inflows from Minyulo Brook were modelled to inform the effect of flood waters on the project.
- Local hydraulic modelling of smaller catchments to assess stormwater flows. This domain was used to evaluate the effects of pre-existing and post-development conditions. Further details on the hydraulic modelling approach are discussed in Section 5.2.

5 SURFACE WATER MODELLING

5.1 HYDROLOGIC MODELLING

No hydrologic models of the study area were available for this assessment. New hydrologic HEC-HMS models were therefore developed to generate regional and local catchment flows for the project. HEC-HMS is an industry standard modelling package that is widely used in hydrological studies across Australia.

The following sections present key details and parameters for the hydrologic modelling.

5.1.1 Hydrologic Modelling Approach

The three domains; Regional, Sub-Regional and Local were modelled in three separate HEC-HMS domains (see Figure 5-1 and Figure 5-2) to allow for the application of catchment-specific parameters.

The regional HMS model is designed to simulate flows within the Minyulo Brook catchment contributing into the sub-regional domain. The sub-regional model is focused on the upstream contributing catchment and complex downstream inundation, which includes flows from Cataby Brook. The local model assesses localised flooding and stormwater runoff within and contributing to the immediate project area.

The ensemble modelling approach described in ARR2019 (ARR, 2019) was adopted when modelling the 1% and 10% AEP events in HEC-HMS. This approach involves running an ensemble of temporal patterns and selecting the pattern closest to average flow at the project site. ARR datahub (ARR, 2019) provides a range of 10 temporal patterns across different storm durations for use in design.

The temporal patterns were simulated in HEC-HMS for a range of storm durations to ensure the critical durations for each of the regional, sub-regional and local catchments were captured. The storm duration resulting in the maximum flow at the locations of interest was then selected for hydraulic analysis in HEC-RAS.

Watercourse reach lags were incorporated between sub-catchments, with lag times determined using the Muskingum method. Catchment routing was performed using the Bransby-Williams method to model the flow of water through the catchments.

5.1.2 Catchment Delineation

Publicly available topographic survey data was used to generate a DEM of the study area. The resulting DEM (see Figure 5-1 and Figure 5-2) illustrates ground elevations ranging from approximately 110 m AHD in the southeastern portion of the project area to around 98 m AHD in the northwestern extent.

The DEM excludes disturbances from the Iluka mine site located north of the project area. Consequently, the survey reflects the pre-existing terrain, which is assumed to represent the landscape post-closure of the mine site. Given that the project's operational life is expected to exceed that of the adjacent mine, the pre-existing terrain has been adopted as a conservative approach in this study to model hydraulics of the surface water flow.

Regional catchments were delineated using 30-meter resolution topographic data derived from SRTM LiDAR. For sub-regional and local catchments, a higher-resolution 5-meter LiDAR dataset was available and utilised.

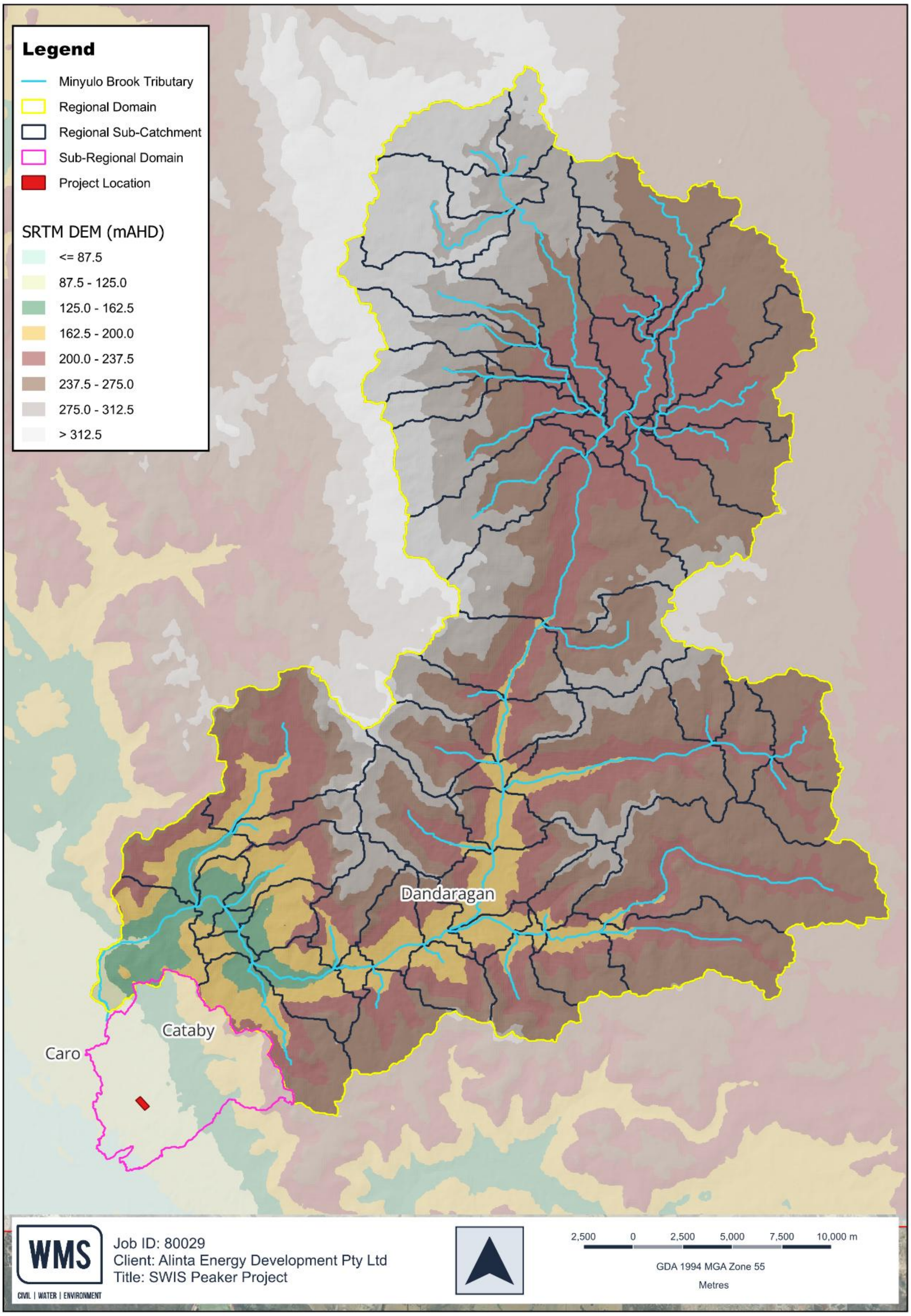


Figure 5-1 Regional Hydrological Model Extent

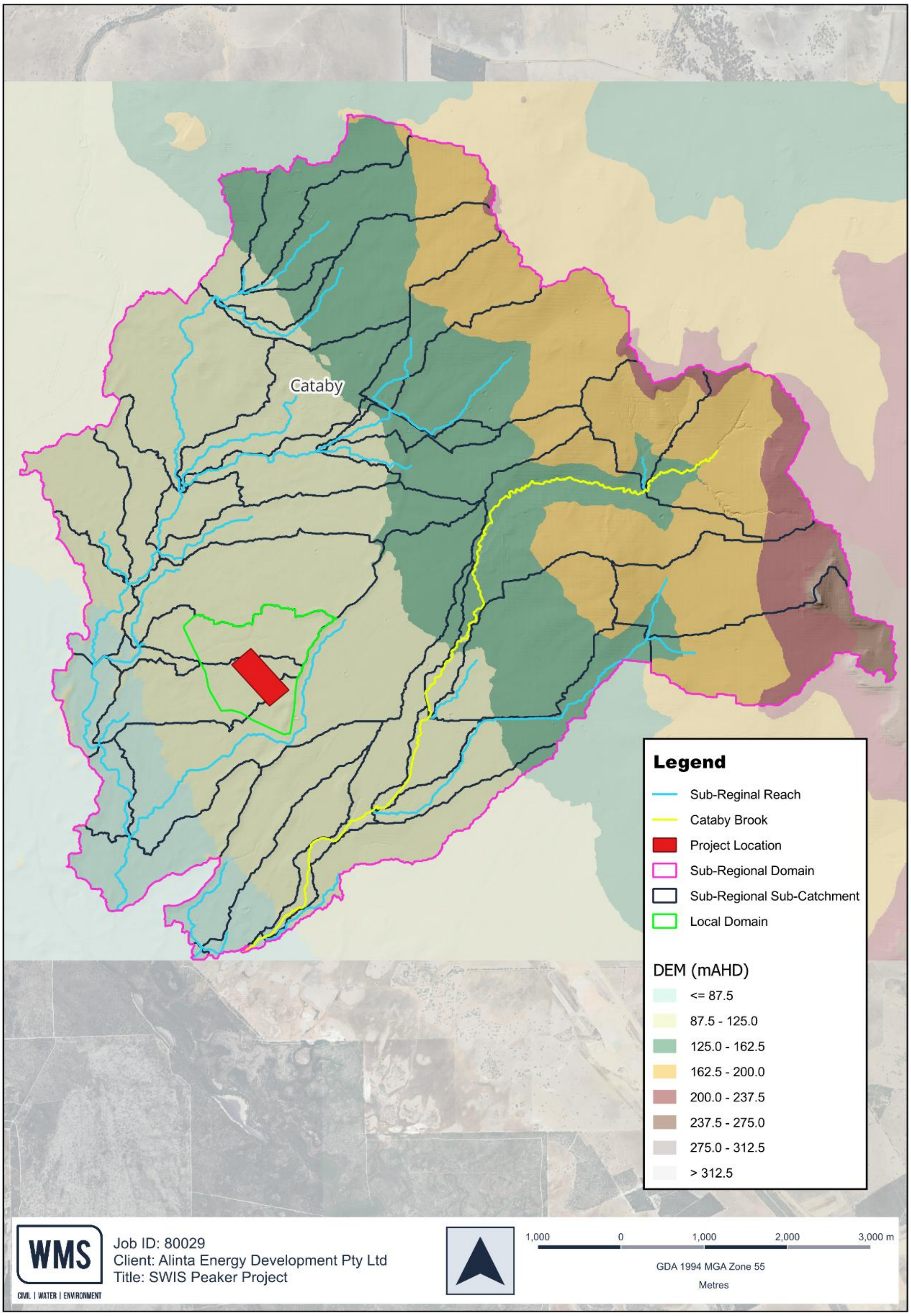


Figure 5-2 Sub-Regional and Local Hydrological Model Extent

5.1.3 Design Rainfall

The design rainfall for the Cataby study area was defined in HEC-HMS using the sub-catchment centroids within each HEC-HMS model. Rainfall data from the 2019 Australian Rainfall and Runoff (ARR) guidelines were sourced from the Bureau of Meteorology (BoM) via the ARR Data Hub and applied to all sub-catchments within the respective catchments. The temporal patterns used were based on the Southern and South Western Flatlands (West) region. Design rainfall for both the 10% and 1% AEP events was extracted. The catchment centroids from which the rainfall data was obtained are listed in Table 5-1.

Table 5-1 Catchment Centroids for Rainfall Extraction

HEC-HMS Model	Centroid Location	
	Latitude	Longitude
Regional	- 30.569	115.718
Sub-Regional	- 30.751	115.547
Local	-30.765	115.525

5.1.4 Rainfall Losses and Pre-Burst

ARR Datahub rainfall losses used across all segmented HEC-HMS models are summarised in Table 5-2. Pre-burst rainfall accounts for catchment wetted conditions at the beginning of a design rainfall event. ARR median pre-burst rainfall values were subtracted from the initial losses for the ensemble events.

Table 5-2 Adopted Rainfall Losses

RAFTS Model	Initial Loss (mm)	Continuing Loss (mm/hr)
Regional	65	8.7
Sub-Regional	67.9	5.5
Local	66	5.5

5.1.5 Areal Reduction Factors

The Areal Reduction Factor (ARF) is a multiplier applied to the design rainfall to account for increased spatial variability that occurs across larger catchments. The ARF is calculated using region specific parameters and the total catchment area upstream of the study site. Refer to Table 5-3 for the contributing areas to each model's ARF.

For the regional, sub-regional, and local catchments, ARF values have been calculated based on the upstream catchment areas and are illustrated in Figure 5-1 and Figure 5-2. Predicted flows from the hydrological model are optimised for the upstream reach of the catchment, whilst being conservative for the downstream reach of the catchment.

Table 5-3 ARF Areas

HEC-HMS Model	ARF Area (km^2)
Regional	1080
Sub-Regional	37
Local	1.85

5.1.6 Critical Duration Assessment

A critical duration assessment was carried out in the hydrologic models for the events of interest in accordance with ARR2019 guidelines. A range of durations were simulated for each event and were generally between 0.5 and 72 hours depending on the model.

For each duration, an ensemble of ten temporal patterns was simulated. The 10% AEP storm events were modelled using intermediate temporal patterns, while the 1% AEP storm events were assigned rare temporal patterns.

The critical durations were determined based on the highest median peak flow. The assessments were carried out at the hydrological node corresponding to the critical location at the Project.

The critical durations identified by the hydrological assessment are listed in Table 5-4.

Table 5-4 Critical Duration Summary for Catchments (Hydrological Models)

Event (% AEP)	HEC-HMS Model (Hydrological Models)					
	Regional		Sub-Regional		Local	
	Critical Duration (hrs)	Temporal Pattern	Critical Duration (hrs)	Temporal Pattern	Critical Duration (hrs)	Temporal Pattern
1%	24	TP8	9	TP2	9	TP2
10%	24	TP2	24	TP5	24	TP5

5.1.7 Streamflow Data

There is no public streamflow data available for the Cataby Brook or Minyulo Brook catchments. Streamflow gauging stations are not present in the catchments of interest or located near the site. Therefore, it was not possible to complete flood frequency analysis of streamflow data to estimate the 1% and 10% AEP peak flow.

5.1.8 Peak Flow Validation

To assess the appropriateness of hydrologic model flows, peak flows at critical locations were compared to flow estimates using the Regional Flood Frequency Estimation (RFFE) model and the Rational Method.

The RFFE is an online tool that requires the catchment centroid and outfall coordinates, and the catchment area. The RFFE transfers flood frequency characteristics from a group of stream gauged catchments to the location of interest. The Rational Method is an empirical equation used to approximate the peak flows for an ungauged catchment.

It is acknowledged that the RFFE is the preferred method to determine peak flows for ungauged catchments, when compared against the Rational Method, as per ARR.

A summary of the peak flow validation is provided in

Table 5-5. For the 1% and 10% AEP storm event, the modelled peak flows were within range of the RFFE and Rational Method estimates. The modelled peak flows are considered fit for purpose to adopt in the hydraulic modes.

Table 5-5 Peak Flow Validation Summary

Segmented HEC-HMS Model (Hydrological Basin)	Event	Peak Flow (m^3/s)		
		HEC-HMS	RFFE	Rational Method
Regional	1% AEP	128	115	125
Sub-Regional		40	10.5	34
Local		3.5	2	1
Regional	10% AEP	44	47	72
Sub-Regional		5	4	20
Local		1	1	0.5

5.2 HYDRAULIC MODELLING

Two 2D HEC-RAS hydraulic models were developed to assess flood behaviour of the sub-regional and local catchments. The latest HEC-RAS version 6.6 was adopted for this study, which includes support for Heavily Parallelised Computing (HPC). This allows for significant improvements in computational performance by utilising modern multi-core processors, graphical processing units (GPUs), and HPC environments.

HEC-RAS employs explicit solvers for 2D Shallow Water Equations, with parallelisation handled through OpenMP in the Intel Fortran compiler. The performance gains from HPC are particularly effective with larger datasets, which benefit more from parallel processing.

5.2.1 Hydraulic Modelling Approach

Two HEC-RAS 2D hydraulic models were developed to assess stormwater and flood impacts within the sub-regional and local catchments. The study area was divided into two modelling domains to capture all relevant catchments without the need for a single, large domain, which would result in excessive run times and file sizes.

Hydrological inflows from the regional catchment were applied as inputs to the sub-regional model. This sub-regional model simulated downstream flooding extents and regional flows to assess potential impacts on the site. The local catchment model focused on stormwater runoff directly affecting the site.

5.2.2 Model Resolution, Extent and Topography

The hydraulic model layouts are presented in Figure 5-3. A 10-meter cell size was selected for the sub-regional model, with 5-meter refinement regions around the project area to capture more detail. The local model used a 5-meter cell size throughout. Both configurations provide sufficient resolution to accurately represent the study watercourses.

5.2.3 Boundary Conditions

5.2.3.1 Inflow Boundaries and Initial Conditions

Design rainfall data was extracted from the ARR Data Hub through direct integration within Storm Injector. The tool interfaces seamlessly with the ARR Data Hub to acquire critical rainfall information, including temporal patterns, spatial distribution, and ARFs based on user-defined locations and scenarios.

The hyetographs extracted from the ARR Data Hub were applied to the HEC-RAS model as 2D boundary applied to the model domain, delineated to the catchment.

In the sub-regional HEC-RAS model, inflow boundary conditions were defined using a hydrograph generated by the regional HEC-HMS model, capturing runoff from the external regional catchment. This hydrograph was then applied along the model boundary. The flow rates were derived from an assessment of critical storm events within the hydrological model, ensuring that the peak flows from both the regional and sub-regional catchments were synchronised to accurately model coincident downstream flooding.

5.2.4 Outflow Boundaries

5.2.4.1 Downstream Boundaries

The downstream boundary adopted in the hydraulic model is consistent with the modelling, refer to Section 5.1. Within the hydraulic models, terrain-only bed slopes existed as perimeter boundaries and are assumed to have a value of 0.05 m/m.

5.2.5 Hydraulic Structures

There is no significant stormwater infrastructure or bridges within the study area to be considered, with crossings in the study area observed as floodways.

5.2.6 Hydraulic Roughness

The hydraulic roughness (Manning's 'n') values used in the models are outlined in Table 5-6. Values are within the ranges recommended by ARR 2019 Guidelines. The delineation of land use was based on inspection of existing satellite imagery from Bing Aerial.

Table 5-6 Adopted Hydraulic Roughness Values per Land Use

Land Use	Adopted Manning's 'n'
Dense Vegetation	0.1
Wetland	0.06
Shrubland	0.06
Cropland	0.04
Grassland	0.03
Water	0.025

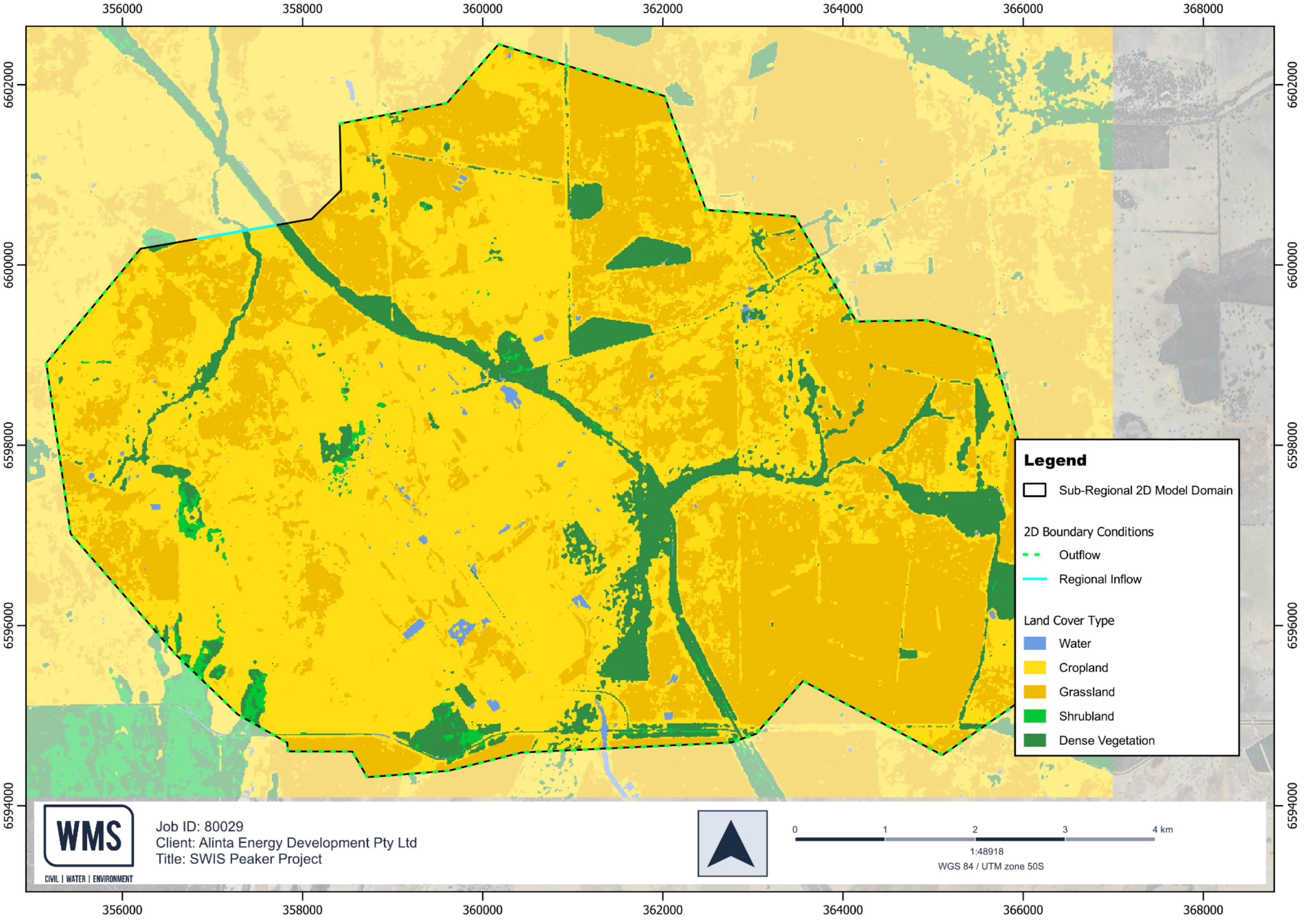


Figure 5-3 Pre-Existing Sub-Regional Hydraulic Model Layout

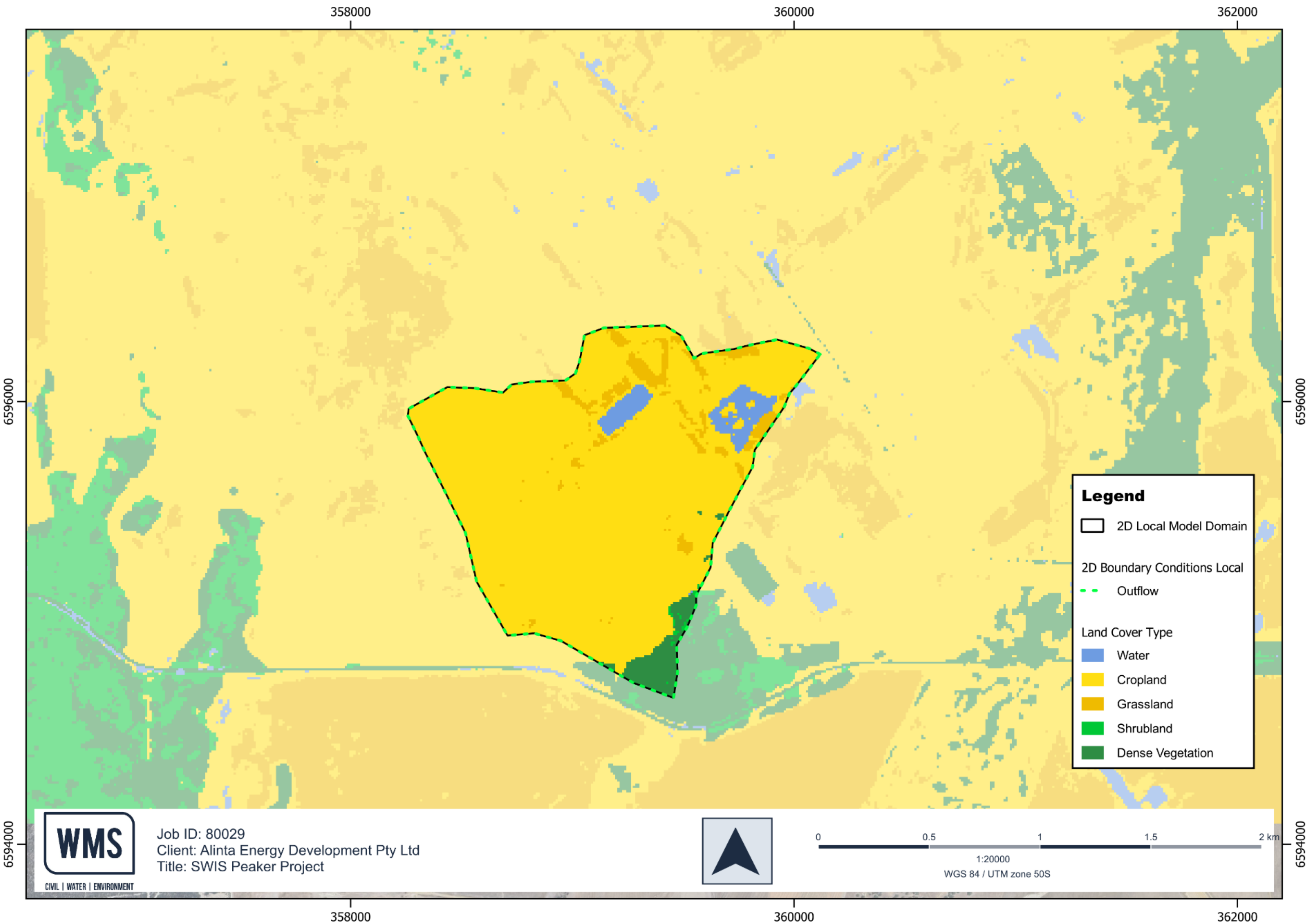


Figure 5-4 Pre-Existing Local Hydraulic Model Layout

5.2.7 Post-Development

The 20-ha lot provides flexibility in selecting the optimal location for the project within its boundaries. The selected location presented in Figure 5-5 is deemed the most appropriate as it has the least disturbance to overland flow and impact to the surface water regime. The location is expected to minimise impacts on planned infrastructure and reduce potential effects on downstream environments.

In the Post-Development condition, the hydraulic model is executed for the same range of design events as in the Pre-Existing condition. The results are post-processed to determine key metrics, including peak water levels, depths, flow velocities and water surface elevation afflux, which provide critical insights to inform stormwater management at the project. WMS has assumed that mannings' n roughness values of the Project will remain consistent post-development and that access roads will not be at a higher elevation than the current terrain.

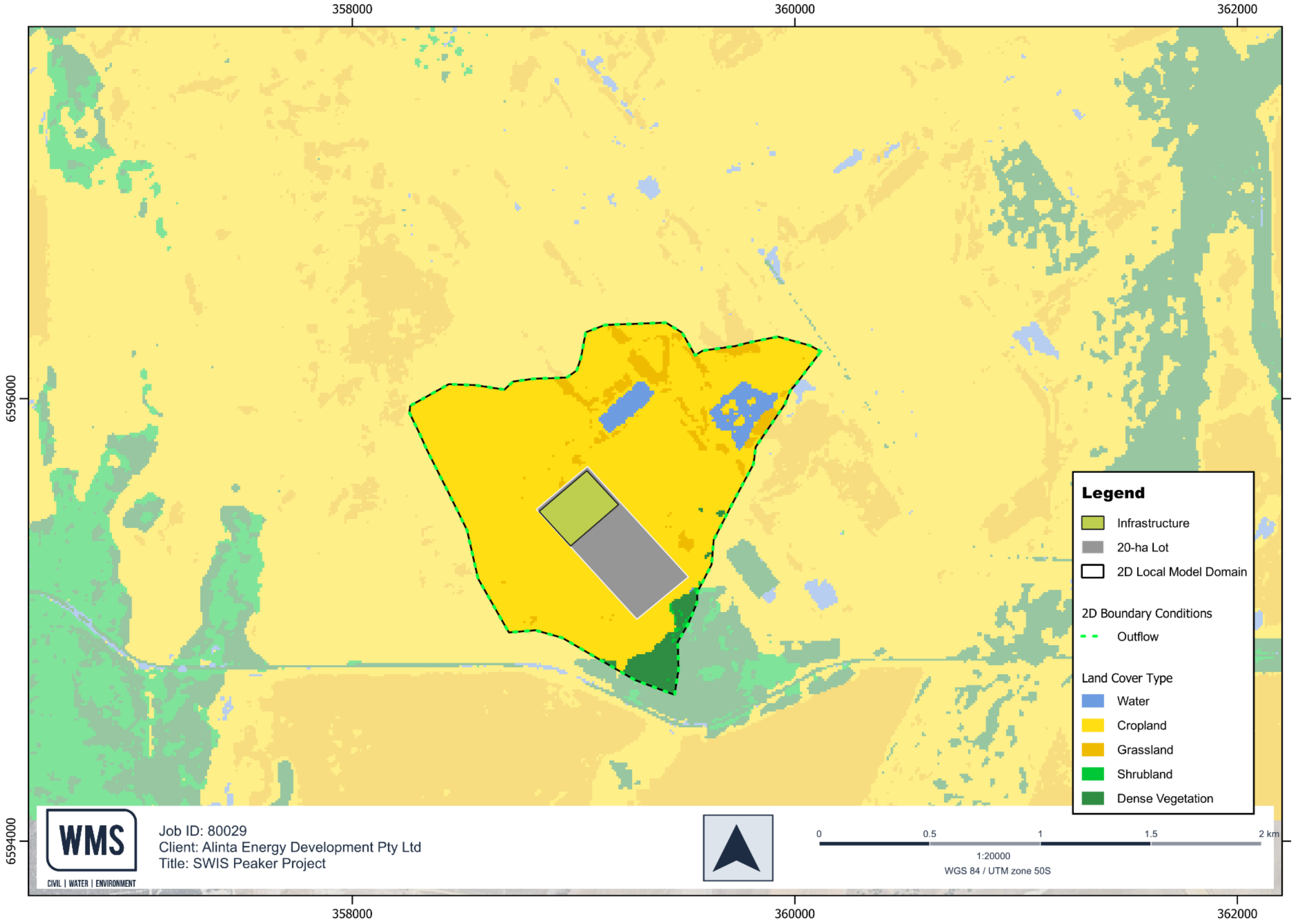


Figure 5-5 Post-Development Local Hydraulic Model Layout

6 STORMWATER MANAGEMENT

WMS conducted a high-level conceptual assessment to evaluate the potential sediment loss and water quality impacts of the project. Preston Consulting provided WMS with a preliminary layout of the project's infrastructure. Consequently, a conservative approach was adopted, representing the entire disturbance area as encompassing the proposed infrastructure (refer to Figure 5-5).

WMS has provided a high-level assessment of potential scour and sedimentation risks to downstream areas if control measures were absent.

6.1.1 Erosion and Sediment

Austroads (2019) provides guidance on the hydraulic design of waterway structures, which includes methods for the selection and design of rock protection for earth embankments. The peak velocity maps produced for each of the mine areas were used to identify areas that may require rock protection. The rock protection acts to safeguard operational flood control measures and final landform designs from scour/erosion. Rock classes recommended by Austroads (2019) are presented in Table 6-1 which suggests that rock protection is not required when peak velocities are less than 2 m/sec.

Table 6-1 Desirable maximum flow velocities in culverts or unprotected stream beds (Austroads, 2019)

Velocity Range (m/sec)	Class of Rock Protection, Wc (tonne)	Section Thickness, T (m)
<2	None	---
2.0-2.6	Facing	0.50
2.6-2.9	Light	0.75
2.9-3.9	0.25	1.00
3.9-4.5	0.5	1.25
4.5-5.1	1.0	1.60
5.1-5.7	2.0	2.00
5.7-6.4	4.0	2.50
>6.4	Special	---

6.1.2 Water Quality Assessment

The Project area is neither within nor adjacent to any significant wetlands or water bodies (EPA, 2018). The Unnamed Nature Reserve (WA27993) immediately southeast of the project site is not affected by site runoff and the closest water body is a non-perennial lake located 1.5 km west of the project area. Additionally, the 20-ha lot does not intersect any Public Drinking Water Source Areas (PDWSA).

Given the absence of permanent surface water bodies, the project is expected to have no significant or irreversible impact on inland waters-related environmental values and the EPA objective for inland waters 'To maintain the quality of surface water so that environmental values are protected' would be met should the proposal be implemented.

The direct rainfall runoff within the site is minor and can be managed by internal drainage systems when developed.

7 KEY LIMITATIONS

Table 7-1 outlines the limitations applicable to the data used for the investigation, modelling results and mapping deliverables. The modelling results should therefore be viewed considering these limitations.

Table 7-1 Key Limitations

Limitations	
1	No stream gauge data was available for the catchments. Model calibration is therefore not possible. ARR2019 flow estimation methods have been used and validation has been undertaken in place of calibration.
2	Only publicly available data could be used for this assessment, as key proprietary datasets—including Iluka's Surface Water Management Plan (2017), Surface Water Model (Jacobs, 2015), and 1m LiDAR data from the Cataby Sands Project—were not accessible.
3	Potential infrastructure locations have been informed from inspection of the flood maps and preliminary layout supplied by Preston Consulting. Changes to the development layout will require re-assessment of the nominated predicted peak flows. Infrastructure outside the 20-ha lot was not considered in this assessment.
4	Flood events assessed include the 10%, and 1% AEP events. Analysis of these events is appropriate for the study needs, but results from this assessment should not be used to infer the flood results of other events.
5	The catchment area nominated for calculating the ARF for each the HEC-HMS models has been informed from the location of the catchment centroid. Hydrological nodes downstream of the ARF catchment are susceptible to overestimation of peak flows, whilst hydrological nodes upstream are susceptible to underestimation. The ARF catchment has been delineated with to ensure an accurate representation of hydrological processes near the proposed infrastructure.

8 RESULTS AND DISCUSSION

Peak water depth and flood velocity maps were generated for the 1% and 10% AEP event are presented in Appendix A to E. The results suggest the following:

- Direct rainfall on the site produces runoff which flows generally southwest at depths ranging between 0.1 m and 0.2 m. The results show a south-west oriented catchment divide located east of the project site.
- External floodwater from Minyulo Brook is directed towards the site although does not reach a sufficient level to impact the site. External floodwater from the Cataby Brook is directed towards the Unnamed Nature Reserve (WA27993) immediately southeast of the project although the catchment divide safeguards the project from flows.
- 1% and 10% AEP floodwater backs up behind (on the southern side of) the divide and in the Unnamed Nature Reserve (WA27993), but does not impact the site boundary. Runoff from the site does not impact WA27993.

A comprehensive analysis of local catchment water flows identified the most suitable site locations for the infrastructure disturbance area within the larger 20-ha lot.

8.1 FLOOD MAPPING

Mapped model results for the project are presented in Appendix A to Appendix E. The following results have been provided:

- Appendix A – Flood Mapping – Peak Depth and Water Surface Level Contours of Sub-Regional Model
- Appendix B – Flood Mapping – Peak Velocity of Sub-Regional Model
- Appendix C – Flood Mapping – Peak Depth and Water Surface Level Contours of Local Model and
- Appendix D – Flood Mapping – Peak Velocity of Local Model
- Appendix E – Flood Mapping – WSE Afflux (Local Model)

9 CONCLUSIONS

WMS has conducted a Surface Water Assessment of the Cataby Power Station, evaluating pre-existing and post-development hydrologic and hydraulic conditions. The assessment involved developing and simulating HEC-HMS models at regional, sub-regional, and local scales, as well as applying two HEC-RAS hydraulic rain-on-grid models to analyse detailed flood behaviour across the 1% and 10% AEP events.

This approach facilitated a thorough understanding of peak flow dynamics and flood characteristics, with model outputs presented as A3 maps of peak water depths and velocities throughout the study area (Appendices A–E). Additionally, peak flow estimates at various critical points within the catchments were cross-validated against Regional Flood Frequency Estimation and Rational Method calculations, confirming the models' suitability for informing the strategic placement of infrastructure.

The results demonstrated that natural catchment divide adjacent to the site safeguard the project area from potential external floodwaters from the Cataby Brook. Flood waters from the Minyulo Brook are approximately 1km away from the site and therefore, regional flooding is not anticipated to affect the site in the 1% or 10% AEP event.

The high-level stormwater analysis confirms that overland runoff within the site can be managed through internal drainage systems. The risk of downstream scour and sedimentation is minimal, as flow velocities are projected to remain below critical thresholds. However, if significant alterations occur to runoff coefficients, landcover or the terrain of the Iluka mine site post-closure, diverging substantially from the pre-existing conditions, the Project may require re-evaluation. Nonetheless, it is anticipated that stormwater flows will remain below critical velocities for the 1% AEP.

The project area, located in a 20-ha lot approximately 200 km north of Perth, is not adjacent to significant wetlands or water bodies (EPA, 2018). The study revealed no significant or irreversible impact on inland water environmental values, indicating that the project aligns with the Environmental Protection Authority objectives to maintain surface water quality.

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APPENDIX A

FLOOD MAPPING – PEAK DEPTH (SUB-REGIONAL)

APPENDIX B

FLOOD MAPPING – PEAK VELOCITY (SUB-REGIONAL)

APPENDIX C

FLOOD MAPPING – PEAK DEPTH (LOCAL MODEL)

APPENDIX D

FLOOD MAPPING – PEAK VELOCITY (LOCAL MODEL)

APPENDIX E

FLOOD MAPPING – WSE AFFLUX (LOCAL MODEL)