AECOM

Prepared for
Tarong West Project Co Pty Ltd
ABN: 55 106 637 754

AECOM

Tarong West Wind Farm

Flood Assessment

23-May-2025
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Tarong West Wind Farm

Flood Assessment

Client: Tarong West Project Co Pty Ltd

ABN: 55 106 637 754

Prepared by

AECOM Australia Pty Ltd

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Job No.: 60704414

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1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by Tarong West Project Co Pty Ltd (TWPC) to estimate the 0.5%, 1%, 20% Annual Exceedance Probability (AEP) flood extent and levels for the Tarong West Wind Farm site in 2023.

The purpose of the study was to assess the potential inundation extents associated with design rainfall events at the site location, and to comment on the potential impacts that the Tarong West Wind Farm development may have on local flood conditions.

A revised flood assessment was undertaken in 2025 (this study) incorporating an updated access track layout and design crossing information for the same AEP events. Additional runs with climate change and blockage sensitivity considerations have also been undertaken as part of the 2025 study.

1.1 Site Location and Setting

The Project site is located within the South Burnett Regional Council local government area approximately 30 kilometres (km) west of Kingaroy and 85 km east of Chinchilla, as shown in Figure 1.

The Project will involve the construction and operation of a wind farm consisting of 97 Wind Turbine Generators (WTGs) with an overall rated capacity of up to 436.5 megawatts (MW) of clean and renewable electricity to supply to the National Electricity Market (NEM). The Project comprises the planning corridor, a 1,609 ha subset which contains a clearing footprint (872 ha) for the proposed wind turbines, access tracks, underground cables, overhead lines and other associated infrastructure. Except where permanent infrastructure is proposed, the existing land will continue to be used for rural purposes such as grazing livestock and cropping.

Following approval of the wind farm, further detailed site investigations will be undertaken to determine the exact location of the WTGs and all other infrastructure within the approved planning corridor (i.e. micro-siting). To accommodate on-site constraints, the WTGs and ancillary infrastructure may move up to 100 metres (m) from the original proposed locations.

The Project will be constructed as a single stage and be completed within approximately 30 months (subject to detailed design and weather).

Figure 2 outlines the proposed locations of the WTGs and required infrastructure along with the defined water courses and water shed lines. The layout has been extensively developed to avoid, where possible, impacts on known environmental constraints.

Due to the nature of the proposed development, the infrastructure is generally located in areas of topographic rise (hills). As such, the interactions between waterways and flooding are limited for WTGs and infrastructure areas. Proposed access tracks, allowing access to the infrastructure, and primarily co-located underground electrical reticulation, necessarily interacts with waterways and drainage paths.

The Boyne catchment is located just south of the Tropic of Capricorn in Queensland. The Boyne River joins the Burnett River (near Mundubbera), before flowing to Paradise Dam and eventually discharging to the Pacific Ocean (north of Hervey Bay) at Bundaberg. The total catchment area of the Burnett River is approximately 33,000 km^2. The Boyne River and its tributaries i.e. Ironpot Creek, Boughyard Creek, Jumma Creek and Middle Creek traverse through the Project site.

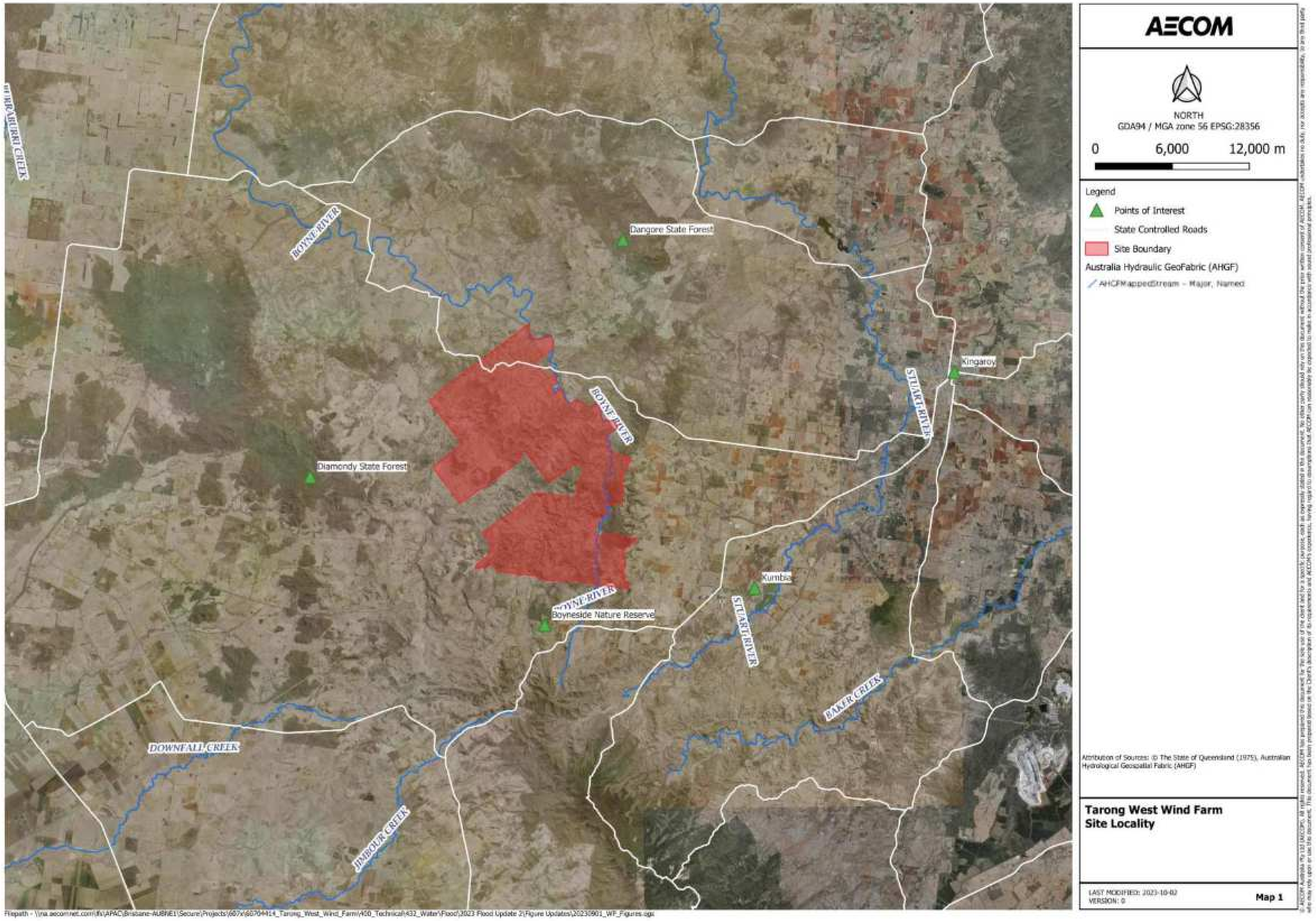

Figure 1 Site Locality

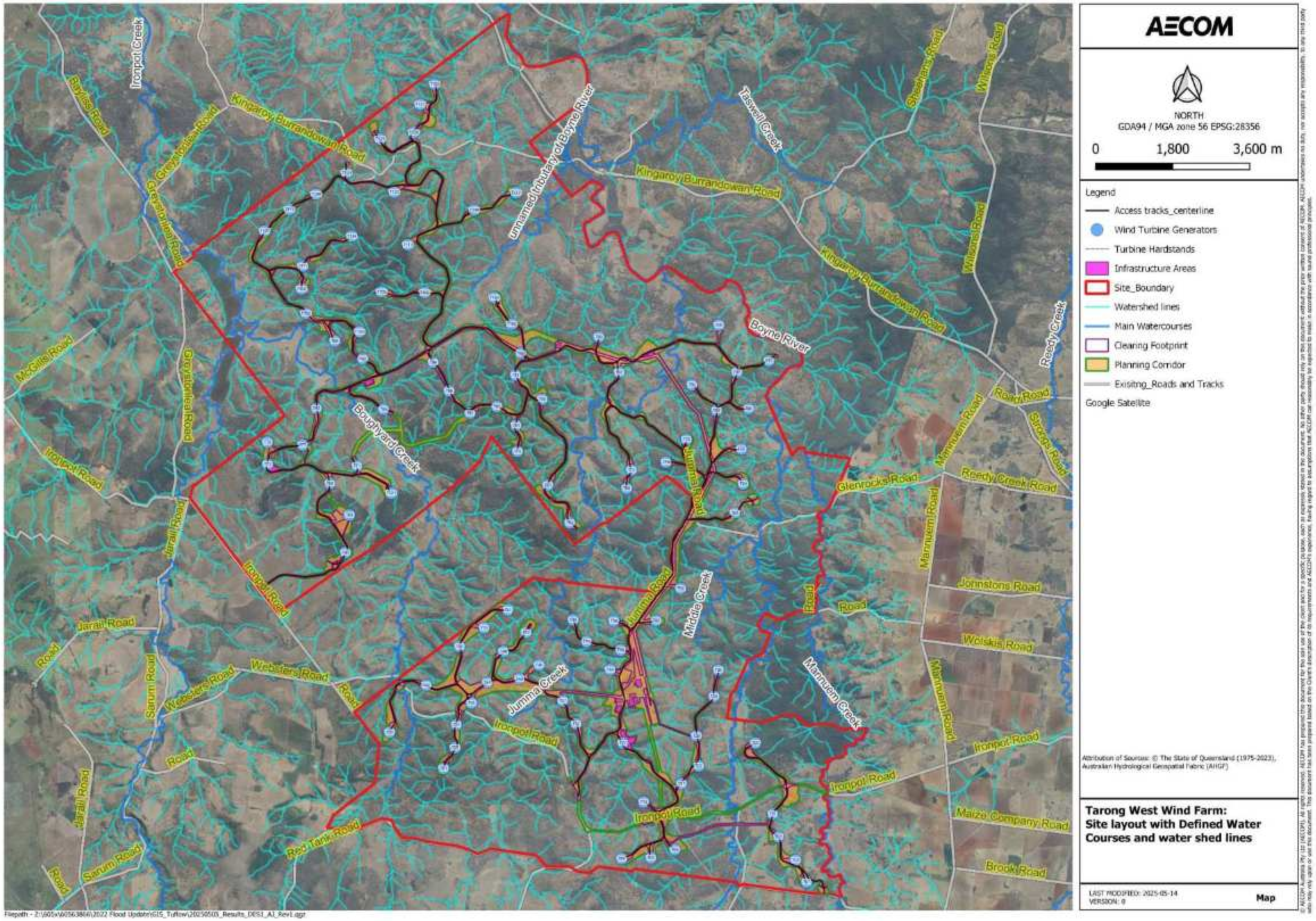

Figure 2 Proposed Site Layout along with main water course and water shed lines

1.2 Objectives

The objective of the 2023 flood assessment was to estimate the 0.5%, 1%, and 20% AEP flood extents and water levels. Additionally, the flood impacts on the proposed development and the impacts of the proposed development on local flooding were assessed.

In the updated 2025 flood assessment, in addition to the above-mentioned objectives, a climate change scenario for 1% AEP event for the 2090 horizon was also assessed. The Australian Rainfall and Runoff (ARR) v4.1 guidelines were used for this assessment for the Representative Concentration Pathway (RCP) 8.5 scenario.

A blockage sensitivity assessment was also undertaken for the designed culvert crossings.

1.3 Scope of works

The scope of work for the 2023 assessment is summarised below:

- Source and review of data:
  - Topographic - LiDAR data of the Project site from TWPC.
  - Rainfall - design event rainfall (Bureau of Meteorology) for 20%, 1% and 0.5% AEP storm events.
  - Observed flow records and flood levels within the Project area.
  - Dimensions of relevant hydraulic infrastructure such as bridge / culvert crossings for Ironpot Road, Kingaroy Burrandowan Road and McLaughlin's crossing.
- Identify and delineate catchments relevant to the Project.
- Develop a hydrologic model of the Project Area using RORB software.
- Develop a 2-D hydraulic model of the Project using TUFLOW software.
- Estimate flood levels and inundation extents for the 20%, 1% and 0.5% AEP storm events.
- Prepare flood inundation maps of the Project to identify flood for the 20%, 1% and 0.5% AEP storm events.
- Prepare a hydraulic assessment report summarising the findings of the flood assessment.

The scope of work for the 2025 assessment included the following:

- Incorporation of the updated access track details received in October 2024 within the hydraulic model.
- Addition of details for proposed hydraulic structures (five road crossings) within the study area as provided by TWPC in March 2025.
- Inclusion of climate change scenario (RCP 8.5 2090) for the 1% AEP flood event. It is noted that no other updates to the previous hydrologic assessment were undertaken.
- Sensitivity analysis for blockage

2.0 Data availability

A range of background data was provided by TWPC for use in the previous study (December 2023). This included:

- Topographic data, provided as a Digital Elevation Model (DEM) used in the hydraulic modelling (refer to Section 2.1).
- Shuttle Radar Topography Mission (SRTM) data with a 30 m cell size obtained from Geosciences Australia used for hydrology and catchment delineation (refer to Figure 3).

- Images of hydraulic structures (bridges, culverts, etc) provided by TWPC for 2D hydraulic modelling.
- General layout of general Project items such as Project boundary and location of WTGs. This data was supplied by TWPC to be incorporated in spatial mapping of the results.
- Queensland Floodplain Assessment Overlay (QFAO) mapping has been utilised as a comparative estimate against the findings of this assessment.
- Relevant background studies, including reports, models and drawings where relevant and available.

For the 2025 assessment (this study), new information was incorporated into the hydraulic model including data received from the client and publicly sourced databases and publications including:

- Sas of 15th October 2024 received as GIS shapefile which was inclusive of:
  - Access track alignment and centreline for the site
  - Proposed locations of turbine hardstands, infrastructure areas, permanent and temporary mast locations.
  - Location of overhead and underground reticulation
  - Extent of clearing footprint and planning corridor for the new proposed infrastructure
- Details for nine waterway crossings were received in the form of a GIS .kmz file, with design drawings in PDF format provided for some of them. It was noted that four of these crossings were either outside the study area for the flood study or lacked associated design drawings. As such, they were omitted from the hydraulic modelling. Therefore, details of only five (5) crossings were included in the hydraulic model.
- Climate change scenario (RCP 8.5 – 2090) for the 1% AEP flood event were set up in accordance with the Datahub download of corresponding climate change factors for the site with the following coordinates: Latitude: -26.71 S, Longitude: 151.49 E (data obtained in the previous stage of the project on14/03/2022)

2.1 Topographic data

An important component of this study was the use of accurate topographic data. TWPC provided two LiDAR surveys dated 2018 and 2019, which are 1m by 1m Digital Elevation Model (DEMs). The DEMs were derived from aerial laser survey (LiDAR) captured in 2018 and 2019.

LiDAR data is widely used for flood study applications as it provides a highly detailed set of topographical data suitable for use in two-dimensional hydraulic models. However, LiDAR also suffers from some drawbacks that must be addressed before the data can be adopted. These include the presence of banding, which presents as systematic shifts in the data associated with parallel flights during the capture process. LiDAR is also unable to penetrate structures such bridges, culverts, and cannot penetrate water surfaces.

The available LiDAR data is summarised in Table 1:

Table 1 LiDAR Data

Data	Description
2018 LiDAR	1m DEM with partial site coverage. Inspection of the data suggests a high-quality dataset.
2019 LiDAR	1m DEM with full site coverage. Inspection of the data shows that the data-set features terracing, whereby data elevation data is generally rounded to the nearest contour increment. The data is of reasonable quality.

The LiDAR data provided for this study was reviewed and found to be of reasonable quality and generally suitable for use. Due to the terracing data within the 2019 LiDAR dataset, the 2018 LiDAR dataset was used where coverage was available, with the 2019 LiDAR dataset utilised where coverage was not available in the 2018 dataset.

The coverage of the datasets, relative to the proposed layout of the Tarong West Wind Farm, is shown in Figure 3. For this study (the 2025 update), the same data and methodology were used.

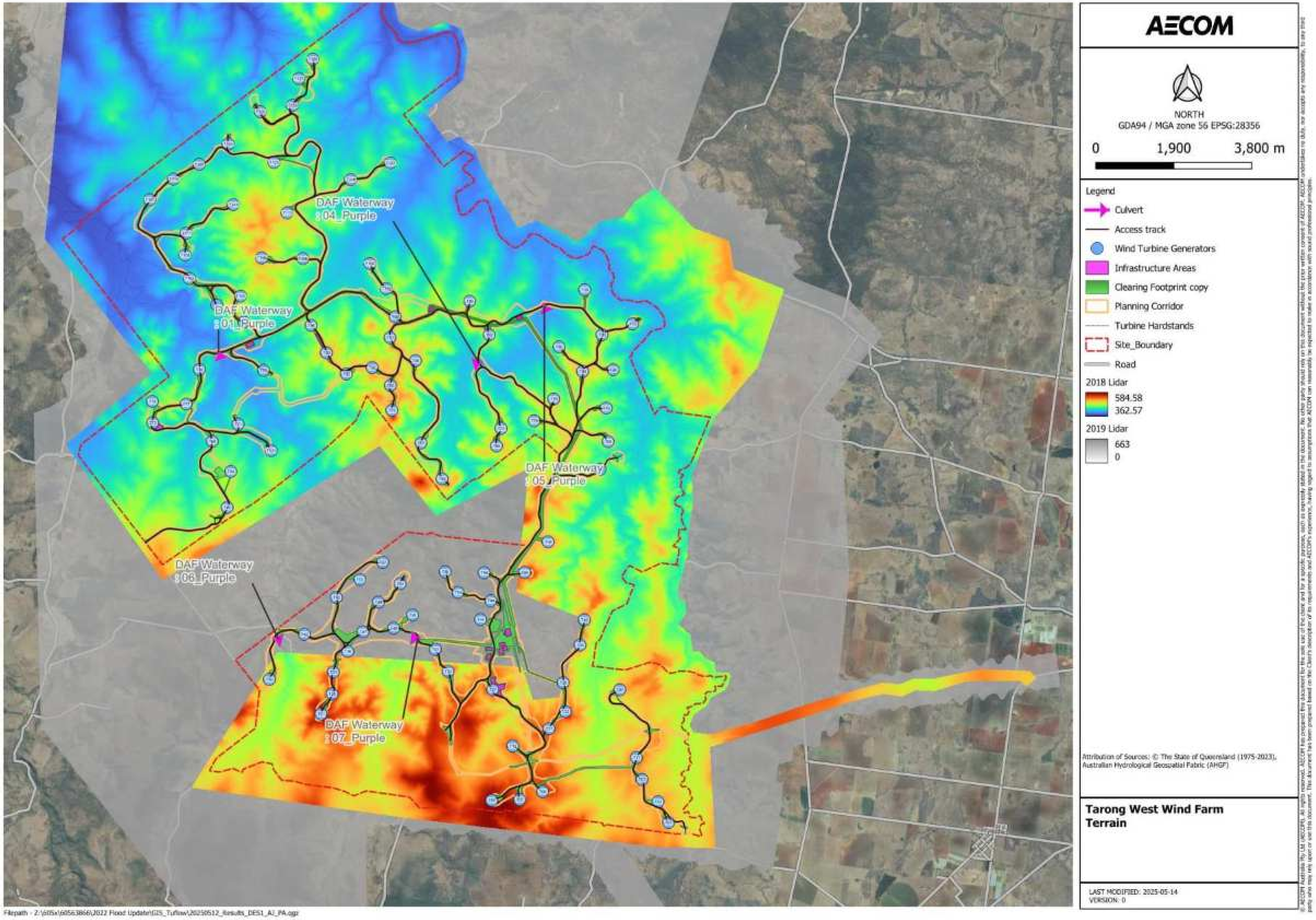

Figure 3 **LiDAR Data**

2.2 2025 Update

Since the previous study (December 2023), the Project layout has been further refined as a result of both ongoing turbine loading assessments and overall environmental impact reduction. Key changes to the Project layout include the following:

- Overall clearing footprint reduction of 190 ha avoiding impacts to habitat for MNES.
- Reconfiguration of the main site entrance to provide safe ingress and egress throughout both construction and operation phases.
- Relocation of four WTGs and associated infrastructure (e.g. access track, underground cable, clearing footprint and planning corridor). WTGs 23, 26, 109 and 112 have been replaced with WTGs 52, 79, 104 and 121 to assist with turbine structural loading constraints and MNES habitat disturbance reduction.
- Relocation of northern substation to mitigate reticulation losses that caused generator performance issues which were identified during detailed grid connection studies.
- Relocation of proposed borrow pits to three (3) revised locations (adjacent to T27, T73 and T89).
- Removal of battery energy storage system from Project to reduce the overall size of the main facilities area, and as a result of detailed studies.
- Inclusion of a proposed helipad to comply with Powerlink requirements (adjacent to the Powerlink switching station.
- Reduced number of construction laydown areas from seven (7) to four (4)
- Revised general arrangement at the main facilities area on land parcel 29BO243 (this includes updated design details to facilitate the cut-in of the existing Powerlink transmission line to the new Powerlink switching station, as a result of further design consultation with Powerlink).
- Reduction of the planning corridor extent following on from the above changes which result in confirmed avoidance areas.
- The design details of five waterway crossings also informed this study and were incorporated into the hydraulic model as detailed in section 4.5.

2.3 Streamflow Gauging data

Recorded streamflow obtained from the Department of Resources (DoR) has been used in this study, in order to validate the hydrologic parameters adopted (see section 3.5). No streamflow gauges were available within the Project areas catchment. A single streamflow gauging station was observed downstream (Refer Table 2), approximately 35 km north-west of the Project area catchment. There were no other gauges identified within close proximity of the Project site for this study.

The station available for hydrologic validation is active and is identified as Boyne River at Carters (136315A) with details for the station summarised in Table 2.

For this study (the 2025 update), the same data and methodology were used.

Table 2 DoR Gauge Station 136315A Details

Gauge	Name	Stream	Catchment Area (km^2)	Period of Record
136315A	Carters	Boyne River	1,617	1979 – current

2.4 Rainfall data and Intensity Frequency Duration

To inform hydrological modelling, design rainfall depths for the Project area catchment were acquired from the Bureau of Meteorology (BoM) website in the form of Intensity-Frequency-Duration (IFD) data as summarised in Table 3 for the Project area catchment (Latitude: -26.71 S, Longitude: 151.49 E).

For this study (the 2025 update), the IFDs were obtained from BOM and compared with the IFDs obtained in 2023. The difference was very minor; therefore, the hydrology model was not updated since it was out of the scope of the 2025 study.

Table 3 IFD Rainfall Depths (mm) (BoM, 2022)

Design Burst Duration	Annual Exceedance Probability (AEP)		
	20%	1%	0.5%
15 min	28.0	49.7	54.2
20 min	32.4	57.7	63.1
25 min	35.8	64.1	70.1
30 min	38.6	69.4	75.9
45 min	44.7	80.8	88.6
1 hour	48.7	88.5	97.1
1.5 hour	54.2	98.5	108
2 hour	57.9	105	115
3 hour	62.9	114	124
4.5 hour	68.0	122	133
6 hour	71.9	128	139
9 hour	77.8	138	149
12 hour	82.5	146	158
18 hour	89.9	159	173
24 hour	95.8	171	187
30 hour	101	181	201
36 hour	105	190	214
48 hour	112	205	232
72 hour	122	228	256
96 hour	130	242	269
120 hour	135	250	276
144 hour	140	254	279
168 hour	143	255	279

2.5 Existing Hydraulic Structures

There are various hydraulic structures found to be within the model extent. The geometric details around these structures were determined through combination of supplied details, obtained details, supplied photographs and aerial imagery. Structure information including reference to imagery can be seen in Table 4 with hydraulic structure imagery in Appendix A. Further details regarding their inclusion in the model have been described in section 4.1.5.

Table 4 Hydraulic Structures

Location	Structure	Model ID	Figure
Ironpot Road	0.6m Diameter Culvert	FW_0.6mpipe	Figure 16
	10 m span wooden bridge	10m_wooden_span	Figure 17
	20 m (approximate) span bridge	Bridge 1	Figure 18
	30 m (approximate) span bridge	Bridge 2	Figure 19
	3 span (20 m approximate) wooden bridge	Bridge 3	Figure 20

Location	Structure	Model ID	Figure
Kingaroy Burrandowan Road	40m span bridge	Bridge 4	Figure 21
McLaughlin's Crossing	3 span (15 m approximate) (assumed) bridge	Bridge 5	Figure 22

2.6 Design Hydraulic structures

For the 2025 assessment, details of nine design waterway crossings were received, the geometric details of which have been outlined below in Table 5. There were four crossings out of which did not have associated design drawings and one was no longer needed because of the updated civil design showing the waterway crossing is made redundant. Therefore, details of only five (5) crossings were included in the hydraulic model. Further details regarding their inclusion in the model have been described in section 4.1.5.

Table 5 Design waterway crossing details (March 2025)

Structure Name/Location	Type	Width (m)	Height (m)	No of barrels	US invert (mAHD)	DS invert (mAHD)	Drawing No.
DAF Waterway 01_Purple	RCBC	2.1	2.1	10	397.8	397.7	WGA221123-DR-CV-0611
DAF Waterway 03_Purple	Drawing received, but the crossing does not cross any built infrastructure or access tracks that were received from client in the latest civil design						
DAF Waterway 04_Purple	RCBC	3	2.7	7	414	413.9	WGA221123-DR-CV-0641
DAF Waterway 05_Purple	RCBC	2.1	2.1	11	403.7	403.65	WGA221123-DR-CV-0651
DAF Waterway 06_Purple	RCBC	2.1	2.1	10	446.2	445.7	WGA221123-DR-CV-0660
DAF Waterway 07_Purple	RCBC	2.1	2.1	10	456.1	455.7	WGA221123-DR-CV-0670
DAF Waterway 02_Red	Within model extent, geometric details not available. Opening in road embankment made for allowing free flow						
DAF Waterway 08_Red	Within model extent, geometric details not available. Opening in road embankment made for allowing free flow						
DAF Waterway 09_Red	Within model extent, geometric details not available. Opening in road embankment made for allowing free flow						

3.0 Hydrological Modelling

3.1 Catchment Delineation and RORB catchment file

Catchment delineation was completed for the hydrological features which report flows through the site location (Refer to Figure 4)including:

- Minor drainage paths and unnamed tributaries
- Ironpot Creek
- Boughyard Creek

- Jumma Creek
- Middle Creek
- Boyne River
- Mannuem Creek

The delineation was developed by:

- The software CatchmentSim was utilised to determine sub-catchments utilising SRTM data. The sub-catchments were delineated into 60 sub-catchments with areas ranging from 2.5 to 28.4 km² with a combined total area of 693 km² for the catchment in its entirety.
- Subsequently, channel reaches were defined with reference to the Australian Hydraulic GeoFabric overlay (BOM, 2022).

The resulting hydrological delineation is shown in Figure 4, which was parameterised into a RORB catchment file.

For this study (the 2025 update), the same data and methodology were used.

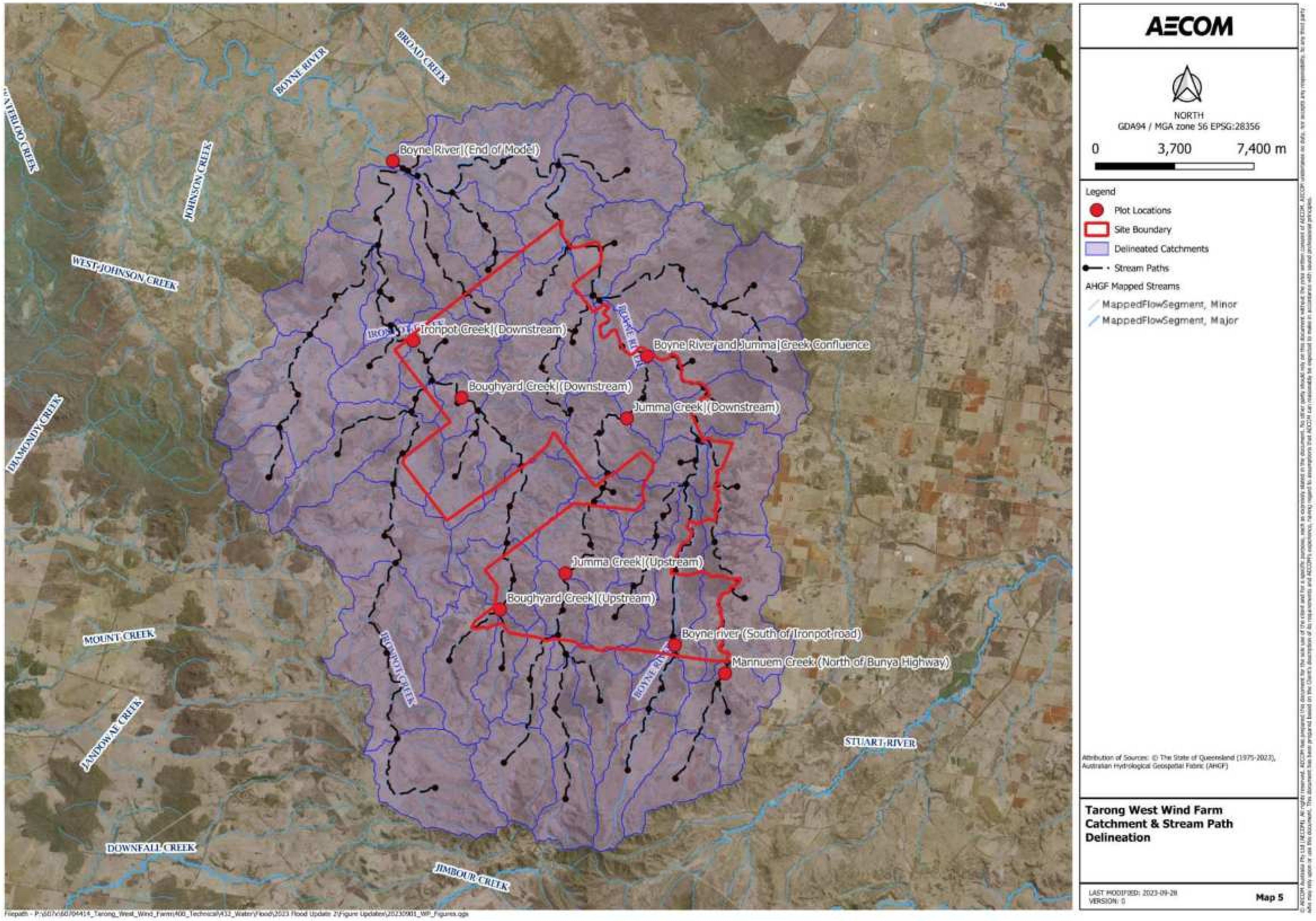

Figure 4 Catchment and Stream-path Delineation

3.2 Runoff routing model

The runoff-routing model RORB was used to estimate the design floods for the Project. RORB is a general runoff and streamflow routing program that is used to calculate flood hydrographs from rainfall and other catchment and channel inputs. The model subtracts losses from rainfall to determine rainfall excess and routes this through catchment storages to produce streamflow hydrographs at points of interest. RORB is a spatially distributed, non-linear model that is applicable to both urban and rural catchments. The model can account for both temporal and spatial distribution of rainfall and losses.

The design rainfall depths were estimated from an IFD analysis using AR&R 2019. Design rainfall depths were estimated for burst durations between 0.5 hrs to 24 hours. Aerial reduction factors were sourced through the AR&R 2019 hub data and this factor accounts for the fact that larger catchments are less likely to experience high intensity storms over the whole of the catchment.

The IFD data (Table 3) was input into the RORB hydrological model, with the adopted initial loss (IL), continuous loss (CL) and kc parameter to produce hydrographs representative of the catchment. The parameters adopted for the Project area catchment are detailed as follows:

- IL = 10 mm
- CL = 2.5mm/hr
- Kc = 28.18 based on the value for Queensland (Weeks) in Equation 3.23 in Australian Rainfall & Runoff Guidelines (AR&R, 2019)

The peak flow values obtained for the adopted parameters above are summarised in Table 6 with their respective critical durations.

3.3 Design flood estimation

The RORB model developed for the Boyne catchment was used to estimate peak flows at a number of locations of interest (Refer Figure 4) for the 0.5%, 1% and 20% AEP events. The RORB model was run using the method outlined in AR&R 2019 (ensemble method) and the catchment parameters derived from the validation process (Section 3.1).

Peak flood discharge for the modelled design rainfall event durations is shown in Table 6.

Table 6 **Peak Discharge [m³/s] at Plot Locations***

AEP	Design Rainfall Event Duration [Hours]	Plot Location								
		Jumma Creek (Upstream)	Jumma Creek (Downstream)	Boughyard Creek (Upstream)	Boughyard Creek (Downstream)	Ironpot Creek (Downstream)	Boyne River and Jumma Creek Confluence	Boyne river (South of Ironpot Road)	Mannuem Creek (North of Bunya Highway)	Boyne River (End of Model)
20%	3	64	51	57	78	152	126	67	115	268
	4.5	80	64	64	97	192	162	63	101	346
	6	87	72	60	103	215	188	56	81	402
	9	93	87	63	111	240	222	52	78	478
	12	92	93	57	113	246	240	47	66	522
	18	80	88	48	102	227	231	33	48	535
	24	77	87	44	97	221	228	30	42	546
1%	3	185	148	139	228	452	382	130	183	813
	4.5	209	176	133	246	521	459	123	165	979
	6	219	203	134	265	563	528	121	171	1,130
	9	184	222	103	238	530	560	92	139	1,239
	12	187	216	101	237	535	558	92	136	1,288
	18	159	198	79	198	461	513	65	83	1,277
	24	146	188	75	184	430	485	58	76	1,244
0.5%	3	206	166	152	253	505	427	141	197	909
	4.5	232	198	146	274	583	516	134	180	1,102
	6	243	228	147	295	628	594	133	187	1,273
	9	201	247	114	260	582	623	101	152	1,382
	12	205	239	111	260	589	619	101	148	1,435
	18	175	218	87	219	510	568	73	92	1,423
	24	162	208	82	204	479	540	65	85	1,391

*Red Shading indicates critical peak discharge outcomes with respect to design rainfall event durations.

The hydrological model results suggest the following key aspects of drainage at the site location:

- The critical duration rainfall event varies depending on the location within the site areas.
  - For upstream areas, critical design rainfall event durations are generally on the order of 3-9 hours.
  - For downstream areas, critical design rainfall event durations are generally on the order of 6-12 hours.

The largest magnitude hydrological flows were estimated for Boyne River (north of model extent in proximity to Jumma creek confluence) and Ironpot Creek. Overall, the model results suggest a significant degree of accumulation of water in downstream creeks and waterways, compared to upstream locations.

3.4 Climate Change

Climate change scenario modelling was undertaken in line with the ARR v4.1 guidelines for the Representative Concentration Pathway (RCP) 8.5 scenario.

The climate change scaling factors (obtained from the Data Hub in the previous stage of the project on 14/3/2022) were applied to the 1% AEP historical rainfall data to adjust for future climate conditions. This process involves multiplying the observed rainfall depths by the scaling factors corresponding to the RCP 8.5 scenario. The climate change factors used have been summarised in Table 7 below.

It should be noted that the proposed infrastructure immunities and hydraulic structures were not designed for the climate change scenario. This scenario was run to better understand the impacts on receiving environments, with the assessment being done by other consultants.

Table 7 Climate change factors applied for 2090- RCP 8.5

Duration (h)	Multiplier*
0.5	1.197
1	1.197
2	1.197
3	1.197
6	1.197
9	1.197
12	1.197

*In accordance with ARR v4.1. same multiplier is applied to all durations and AEPs

3.5 Hydrologic Model Validation

3.5.1 Flood Frequency Analysis

A hydrologic validation was conducted through a flood frequency analysis (FFA) using a Log Pearson III distribution which was undertaken on the gauging station Boyne River at Carters (136315A), for the available data record of 40 years. The FFA returns the frequency at which a flood is likely to occur and returns it as a particular AEP event. The results of the flood frequency analysis were based on the flow data obtained from the DNRME and is represented in Figure 5 and summarised in Table 8.

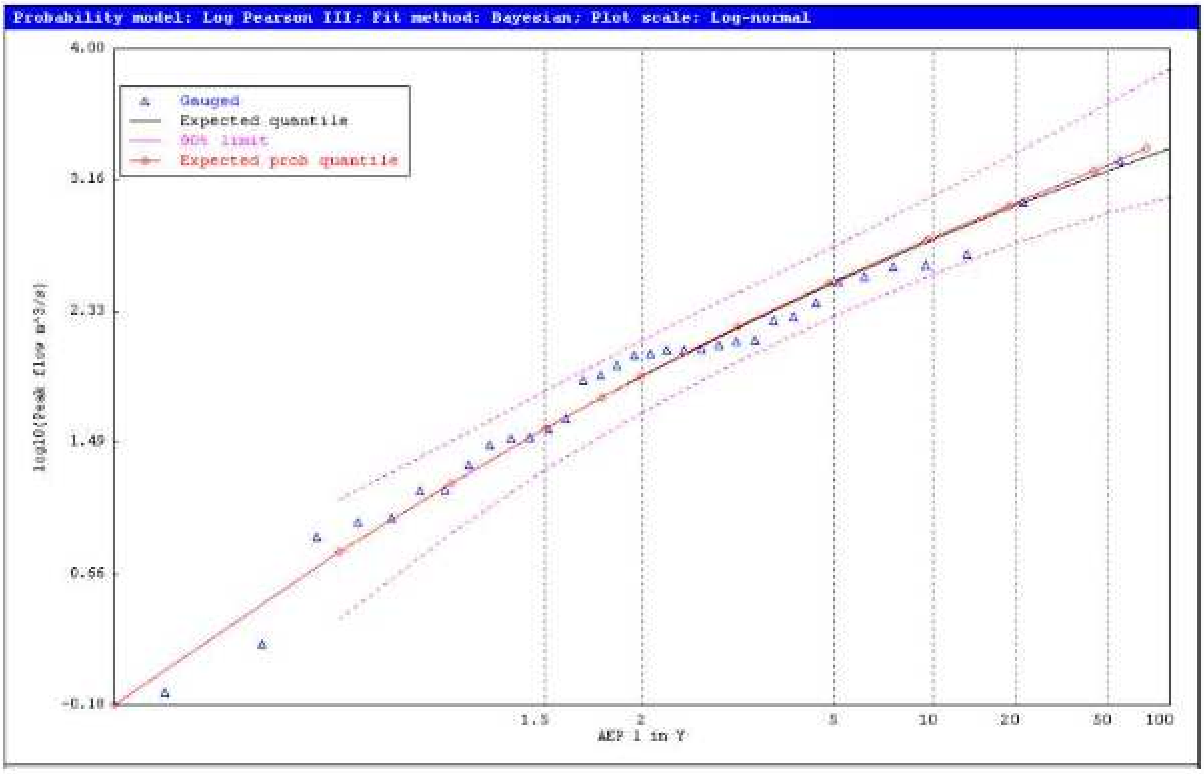

Figure 5 Flood Frequency Analysis Results for Boyne River at Carters (136315A)

Table 8 FFA AEP Event Results

AEP (%)	Peak Design Flow (m^3/s), Boyne River at Carters (136315A)		
	Expected Flow	Upper Limit (90%)	Lower Limit (10%)
50	82	138	48
20	322	553	198
10	612	1,157	366
5	1,002	2,142	574
2	1,681	4,459	889
1	2,322	7,495	1,143

3.5.2 Catchment Ratio Scaling

As the gauge is located in the vicinity of the Project area catchment, the catchment ratio scaling method (Palmen and Weeks, 2011) was adopted to estimate flows based on catchment area ratio and then compared to the outputs from RORB model.

The Catchment Ratio relationship is described as:

$$\frac{Q1}{Q2} = \left(\frac{A1}{A2}\right)^n$$

Where:

Q = the AEP flow rate for the catchment

A = area of the catchment

A1 = catchment of the Project area (693 km^2)

A2 = catchment area of the gauging station (1,617 km^2)

n = ratio parameter of 0.7

Through adopting the Catchment Ratio Method and comparing the end of catchment peak flow for the 1% AEP event it can be seen the scaled value from the FFA is similar to the hydrological model output (RORB) for the Projects catchment are as seen in Table 9.

Table 9 Catchment Ratio Validation Data and Results

AEP	Gauge 136315A	Project Area	
		Scaled from gauge 136315A	RORB model
20%	322 m^3/s	178 m^3/s	546 m^3/s
1%	2,322 m^3/s	1,283 m^3/s	1,228 m^3/s

At the 1% AEP level, the difference between the RORB hydrological model peak flow and the scaled peak flow is approximately 5% which suggests that the hydrological model peak flow outputs are reasonable and appropriate for this assessment.

At the 20% level, the difference between the RORB hydrological model peak flow and the scaled estimate is significantly different. However, it was considered that:

- The hydrological model is influenced by significantly shorter critical storm durations in the Boyne River (compared to the gauge location), potentially explaining the difference.
- The difference can be adopted as a conservative assumption within the assessment.

For this study (the 2025 update), the same data and methodology were used.

4.0 Hydraulic Modelling

The TUFLOW 2D HPC hydraulic routing software was utilised for this assessment (Version 2020-10-AB). The reason this software was chosen was due to:

- Strong capability for 2D modelling.
- Fast model development process without compromising accuracy.
- Widely adopted in the Australian hydraulic industry.

4.1 Model Setup

The hydraulic model setup was not changed in the 2025 update, except for changes described in Sections 4.4, 4.5 and 4.6.2

Model development was completed in the 2D HPC version of TUFLOW. Two hydraulic model configurations (Rain-on-grid and Inflow based) were developed, the former covering select localised sections of the design layout where there would be flooding potential and the latter to assess flooding impacts where the design roads interact with major crossings such as Jumma and Boughyard creeks.

Model scenarios were developed to analyse the proposed Project area as follows:

- A pre-development (baseline) scenario was established, without consideration of proposed site elements.
- A post-development (design) scenario was established, primarily considering the instatement of topographic features affecting hydraulic responses, namely the proposed access tracks across the site location. Details of the proposed hydraulic structures, where drawings were available, were also included.

It is noted that the hydraulic model domains developed for both models do not encompass all proposed infrastructure. The reasoning for this approach was that a large proportion of the proposed development is located at topographic rises and ridgelines (hilltops), with negligible likelihood of flood responses at these locations. Rather, the model development was focused on locations were proposed development crosses drainage paths and waterways of significance. Model domains were established as listed in Table 10:

Table 10 Model Domains and Approaches

Aspect	Linear Model	Rainfall on Grid (ROG) Model**
Focus	Boughyard Creek Ironpot Creek Jumma Creek Boyne River Mannueum Creek	Selected upstream areas of proposed access tracks.
Model Grid Size	10 m fixed cell size with 1m SGS*	10 m fixed cell size with 1m SGS*
Outflow Boundary Conditions	Normal boundary condition.	Free outfall condition. (Water is removed from the model boundary)
Model Extent Figure	Figure 6	Figure 7

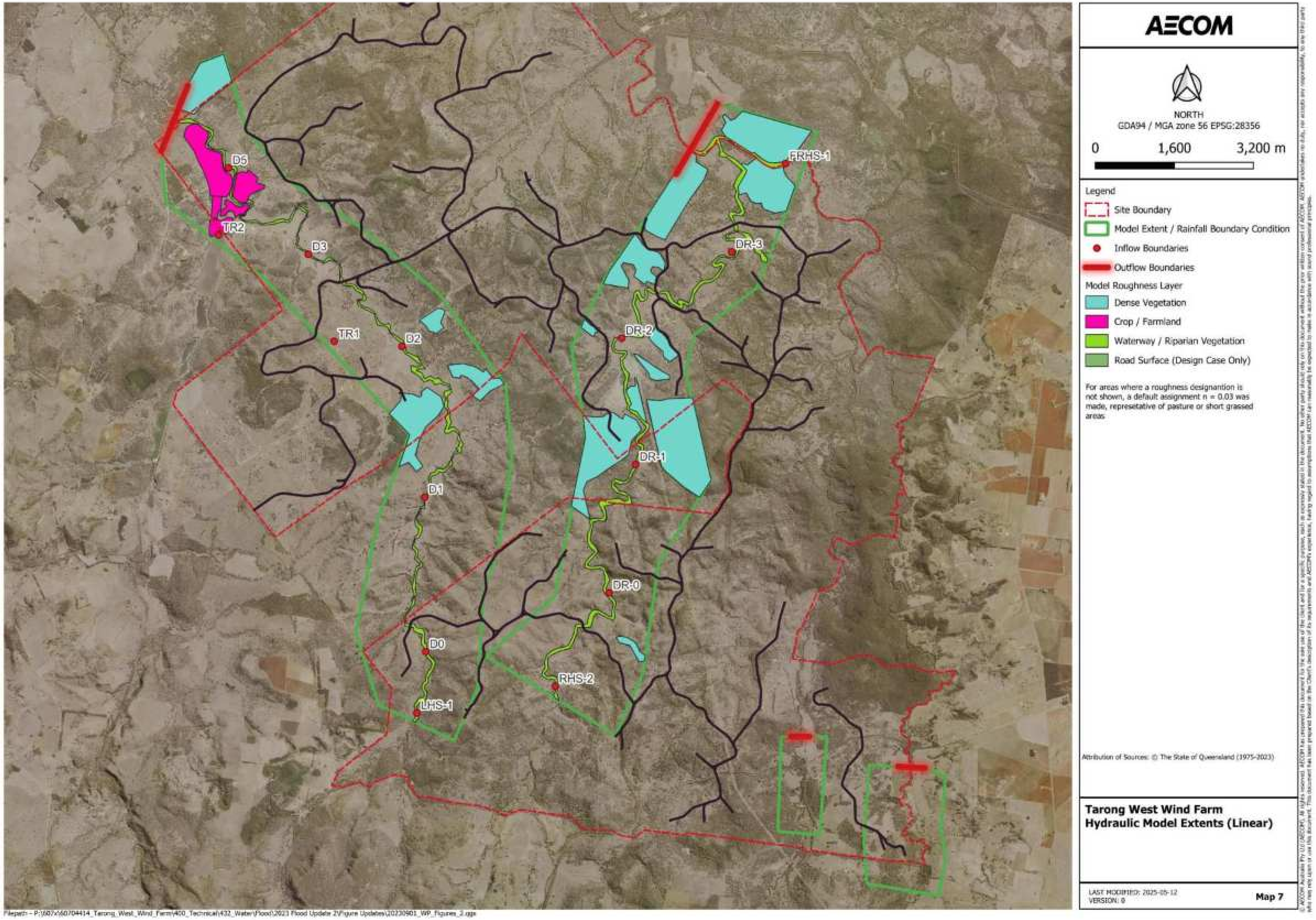

Figure 6 Model Setup – Linear Model

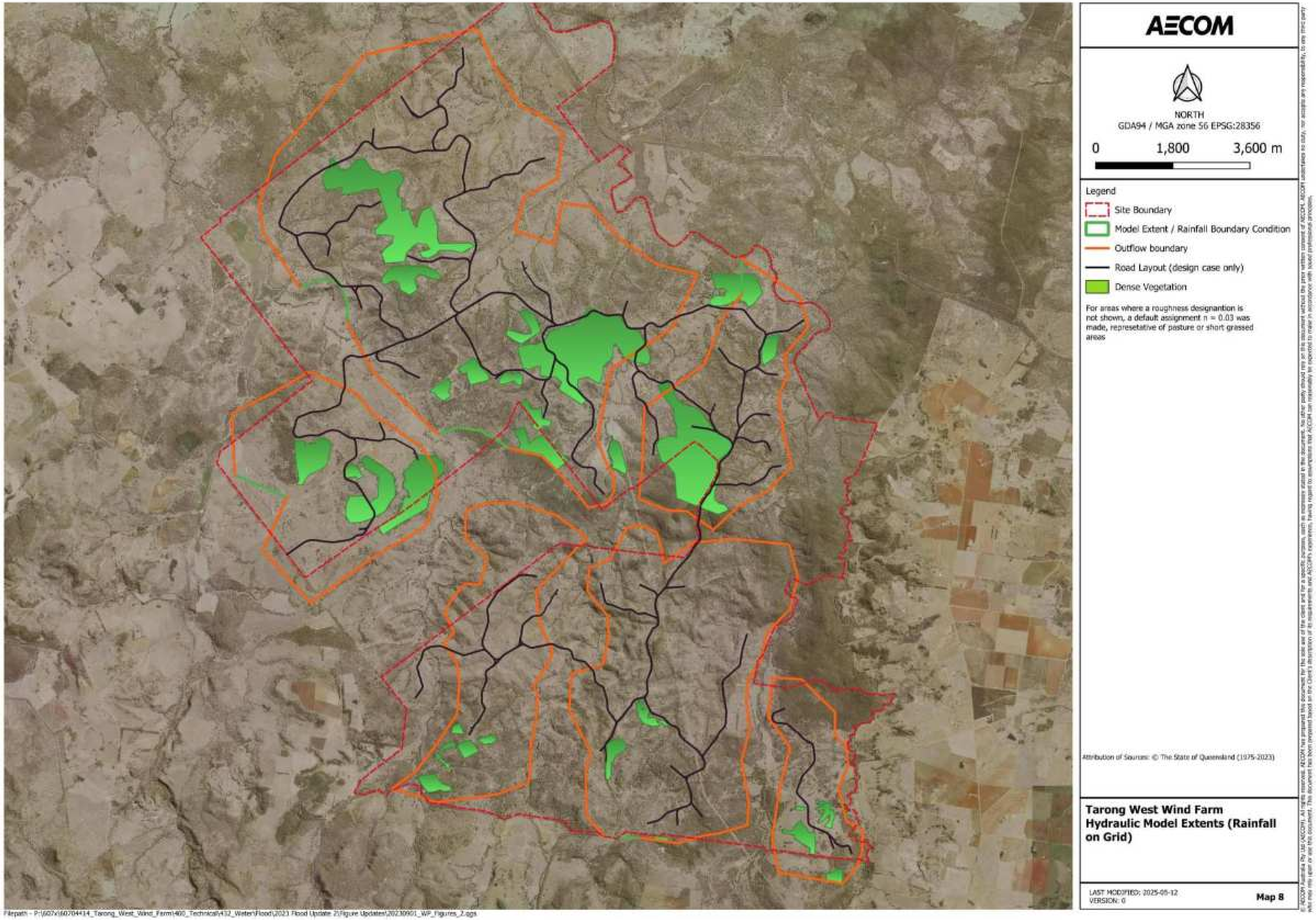

Figure 7 Model Setup – Rainfall on Grid (ROG) Model

4.2 Boundary Conditions

Inflow boundary conditions were applied as listed in Table 11. For this study (the 2025 update), the same data and methodology were used.

Table 11 Applied Boundary Conditions

Aspect	Linear Model	Rainfall on Grid (ROG) Model
Boundary Conditions	Discrete inflows, applied at regular intervals at the locations shown on Figure 6, using hydrograph outputs from the RORB model.	Direct rainfall was applied to all model cells concurrently, based on the hyetographs output from the RORB model.

4.3 Materials Roughness (Manning's Value)

Hydraulic roughness values (Manning's n) were used to describe the differing surfaces in the hydraulic model. Principal references utilised for selection of Manning's 'n' Parameters were as follows:

- (BCC, n.d.) *Manning's Roughness Guideline*, Brisbane City Council
- (Chow, 1959), , University of Illinois

Adopted parameters are listed in Table 12. For this study (the 2025 update), the same data and methodology were used.

Table 12 Manning's Values

Land Use	Value
Default Parameter for Pasture, and Sparsely Vegetated Surfaces	0.03
Waterways and Ponded Areas	0.04
Dense Vegetation	0.09
Road Surfaces	0.025

The extent of surfaces was determined by inspection of aerial imagery available through the Queensland Government Basemap (Queensland Government, 2022) and is shown on Figure 6 and Figure 7. It is to be noted that land use delineation was based on Aerial (Google Maps and Nearmaps). Recent changes within land use may not be captured within the current hydraulic model. Whilst the extent of the design road was added in the model, the extent of the clearing or planning footprints as changes to Manning's roughness were omitted. This may present slight changes to modelled hydraulic conditions.

4.4 Design Event Durations and Temporal Patterns

Analysed event durations were selected on their capacity to result in critical flood outcomes, depending on the model type. The durations modelled were enveloped, with critical flood outcomes selected from all durations. The analysed durations and temporal patterns are listed in Table 13. For this study (the 2025 update), the same data and methodology were used.

Table 13 Analysed Events

	Linear Model	ROG Model
Durations	3, 6, 9 and 12 hours.	30, 60 and 120 minutes.
Temporal Patterns	A single temporal pattern resulting in median peak flow discharge from the hydrological model was selected.	

4.5 Proposed Access Track Representation

The primary proposed infrastructure with the potential to generate flood impacts are the proposed access tracks where the proposed road interferes with flow paths. Detailed road layouts and access track design elevations were not available at the time of this assessment (refer to section 2.2).

In the absence of this information, the design access tracks were incorporated in the hydraulic model as follows:

- Access track alignments were artificially raised by 1.5 meters from the existing terrain within the model. A 20-meter width was assumed for the proposed roads. To represent the road embankment, the roads were merged with the existing terrain.
- Where concentrated flows were modelled under the baseline (pre-development) condition, the roads were removed over a representative small number of cells to allow flow to propagate downstream.
- At culvert crossing locations where concept design drawings were available for the 2025 update, the vertical road levels in the hydraulic model were adjusted to match the specified elevations. A road width of 20 m was assumed, which remains consistent with other areas in the model. It should be noted that at these locations, the road terrain level is in cut, meaning the design road level is lower than the existing terrain.

An estimate of changes to flood conditions has been made using conservative assumptions for global vertical elevation, global road width, and representative flow width opening, due to the current absence of more detailed design information.

4.6 Hydraulic Structures

4.6.1 Existing Structures

The approach for inclusion of hydraulic structures was dictated by their influence on hydraulic conditions within the study area. Structure details for some existing hydraulic structures around the site were received. After detailed assessment, it was decided to exclude them from the hydraulic assessment, the reasoning of which has been described below in Table 14.

Table 14 Existing Hydraulic Structure details and reason for exclusion in the hydraulic model

Location	Structure	Figure	Reason for exclusion
Ironpot Road	0.6m Diameter Culvert	Figure 17	Figure 17 shows culvert has lot of dry vegetation at its entrance and exit which can make the culvert almost fully blocked during a major storm event.
	10 m span wooden bridge	Figure 18	The terrain at the bridge location was modified to reflect the existing elevation of the creek surface, rather than the elevation of the bridge deck.
	20 m (approximate) span bridge	Figure 19	The terrain at the bridge location was modified to reflect the existing elevation of the creek surface, rather than the elevation of the bridge deck.
	30 m (approximate) span bridge	Figure 20	The terrain at the bridge location was modified to reflect the existing elevation of the creek surface, rather than the elevation of the bridge deck.
Kingaroy Burrandowan Road	3 span (20 m approximate) wooden bridge	Figure 21	The bridge is situated approximately 3 km upstream of the model outflow boundary.
	40 m span bridge	Figure 22	The bridge is situated approximately 3.2 km upstream of the model outflow boundary.

Location	Structure	Figure	Reason for exclusion
McLaughlin's Crossing	3 span (15 m approximate) (assumed) bridge	Figure 23	The bridge is situated approximately 4.7 km upstream of the model outflow boundary.

4.6.2 Proposed Hydraulic Structures

Details of nine design waterway crossings were received in 2025. There were four crossings that either did not have associated design drawings or were outside the model extent (Refer to section 2.6 for details).

Table 15 describes the design structures and details of their inclusion in the model. Five proposed hydraulic structures were included in the hydraulic model (refer to Figure 10). These were added as 1d_nwk structures within the hydraulic model, with geometric sizes and invert levels as per the design drawings.

Proposed earthworks (cut and fill) for the access track approaching these structures were obtained from the drawings and included in the model. Terrain adjustments were made in the hydraulic model upstream and downstream of these structures to smooth the creek elevation between the design levels near the structure and the existing creek levels. In the absence of proposed earthworks, this was done artificially to stabilise the culvert flows.

Table 15 Proposed Hydraulic Structure details and reason for exclusion/inclusion in the hydraulic model Figure 10

Structure Name/Location	Included ?	Reasoning
DAF Waterway 01 - Purple	Yes	Within model extent, geometric details available
DAF Waterway 03 - Purple	No	Crossing not interacting with design access track
DAF Waterway 02 – Red	No	Within model extent, geometric details not available
DAF Waterway 04 - Purple	Yes	Within model extent, geometric details available
DAF Waterway 05 - Purple	Yes	Within model extent, geometric details available
DAF Waterway 06 - Purple	Yes	Within model extent, geometric details available
DAF Waterway 07 - Purple	Yes	Within model extent, geometric details available
DAF Waterway 08 – Red	No	Within model extent, geometric details not available
DAF Waterway 09 - Red	No	Within model extent, geometric details not available

4.7 Blockage Assessment

A culvert blockage assessment was undertaken as a sensitivity test to infer the potential blockage percentage that the structures would likely have due to the presence of accumulated sediments and debris. This assessment was done in accordance with Book 6 of ARR v4.2 guidelines.

For the sensitivity run, a blockage factor of 10% was adopted. As the roads at these crossings overtop during frequent events, the hydraulic head available to drive flow through the culverts is often limited. In such cases, the flow bypasses the culverts via surface overtopping, and the culverts operate under submerged or low-head conditions. Thus, results from the blockage assessment show limited to no changes in comparison to the non-blockage scenario.

4.8 Limitations

The key limitations of hydraulic modelling for this study are outlined below:

- Due to the lack of observed or measured water levels or flows, the hydraulic model was not calibrated. Validation was conducted through scaling methods which was deemed suitable for this high-level assessment.
- The accuracy of the flood water levels, and areal extent simulated by the model is limited by the DEM, grid size, and the accuracy of the topographic contour dataset from which the 1 m DEM was generated. This is further constrained by the model grid size, which was adopted at a 10 m resolution. While this is considered sufficient for a flood impact assessment, it is noted that some local variations in topography may not be captured by the model.
- A key limitation of the model is the absence of detailed geometric information for the proposed infrastructure. As a result, conservative assumptions were applied for global vertical elevation, road width, and representative flow width openings. These assumptions introduce a level of uncertainty in the modelling outcomes, particularly in relation to flood impacts and road immunity. The estimates may be refined in future stages as more accurate design data becomes available.

5.0 Results and Discussion

The 20% AEP, 1% AEP, 0.5% AEP, and 1% AEP + Climate Change flood events were simulated to assess flood behaviour under pre- and post-development conditions. Appendices C to H present the detailed results as follows:

- Pre-development peak water depths: refer to Appendix C
- Post-development peak water depths: refer to Appendix D
- Pre-development peak velocities: refer to Appendix E
- Post-development peak velocities: refer to Appendix F
- Afflux mapping (change in flood levels): refer to Appendix G
- Change in velocity mapping: refer to Appendix H

Flood depth maps for both pre-developed and post-developed scenarios display only depths greater than 0.1 m.

As outlined in Section 4.1, two hydraulic model setups were used—one incorporating lumped inflows representing the broader catchment, and the other using rain-on-grid inflows for local catchment runoff. Each setup produced a distinct set of results based on catchment-specific critical durations. The maps referenced in Table 16 display outputs from both models for a specific AEP event on a single map to facilitate comparison and review. It should be noted that there are some visual inconsistencies in the mapped results, particularly near the boundaries of the two models. These differences are primarily due to variations in model extents and critical durations. However, resolution of these inconsistencies is not expected to alter the overall flood assessment outcomes. Presenting all results on a single map supports a more streamlined and accessible review process.

Regarding Maps 21 and 26, please note that these maps show the difference between pre-development (2025) and post-development (2090), including the effects of climate change. The high afflux observed is a result of both climate change and the proposed development. We have presented this map as the ultimate scenario for environmental assessment. Model results in digital format will be provided for other assessment purposes.

Table 16 summarise the provided flood maps

Table 16 Map List

Appendix	Map Number	Case	AEP	Hydraulic conditions
C	1	Pre Development	20% AEP	Flood depth (m)
	2		1% AEP	
	3		0.5% AEP	
D	4	Post Development	20% AEP	
	5		1% AEP	
	6		1%AEP + 10pcBLK	
	7		0.5% AEP	
	8		1% AEP+ CC (RCP 8.5- 2090)	
E	9	Pre Development	20% AEP	Flood velocity (m/s)
	10		1% AEP	
	11		0.5% AEP	
F	12	Post Development	20% AEP	
	13		1% AEP	
	14		1%AEP + 10pcBLK	
	15		0.5% AEP	

Appendix	Map Number	Case	AEP	Hydraulic conditions
	16		1% AEP+ CC (RCP 8.5- 2090)	
G	17	Post Development vs Pre Development	20% AEP Post Dev minus 20% AEP Pre Dev	Change in Flood Level (afflux) (m)
	18		1% AEP Post Dev minus 1% AEP Pre Dev	
	19		1% AEP + 10pcBL Post Dev minus 1% AEP Pre Dev	
	20		0.5% AEP Post Dev minus 0.5% AEP Pre Dev	
	21		1% AEP+CC_2090_RCP_8.5 Post Dev minus 1% AEP Pre Dev	
H	22	Post Development vs Pre Development	20% AEP Post Dev minus 20% AEP Pre Dev	Change in Velocity (m/s)
	23		1% AEP Post Dev minus 1% AEP Pre Dev	
	24		1% AEP + 10pcBL Post Dev minus 1% AEP Pre Dev	
	25		0.5% AEP Post Dev minus 0.5% AEP Pre Dev	
	26		1% AEP+CC_2090_RCP_8.5 Post Dev minus 1% AEP Pre Dev	

*CC – climate change

5.1 Comparison of Results to Other Flood Studies

Comparison of the modelled flood extents, under the 1% AEP event, was made relative to:

- **The Queensland Floodplain Assessment Overlay (DNRME, 2013)**

  The Queensland Floodplain Assessment Overlay (QFAO) represents a floodplain area within drainage sub-basins in Queensland. It has been developed for use by local governments as a potential flood hazard area. It represents an estimate of areas potentially at threat of inundation by flooding. The data has been developed through a process of drainage sub-basin analysis utilising data sources including 10 metre contours, historical flood records, vegetation and soils mapping and satellite imagery. This data represents an initial assessment and will be subject to refinement by respective Local Government Authorities. The QFAO does not utilise any calculations, modelling or any particular flood event and therefore is used as a first pass or comparison assessment only.

- **Queensland flood mapping program flood investigation Burnett Basin (DNRME, 2015)**

  This dataset was created through the Queensland Flood Mapping Program and is relevant for the 1% AEP event for the Burnett Basin. This dataset was created by the Department of Natural Resources, Mines and Energy (DNRME) and is specific for the Burnett Basin.

The comparison is shown on Figure 8 and Figure 9.

The general following conclusions were made:

- The alignment of the flood inundation extents of waterways and creeks are generally similar, however the modelled flood extents under the 1% AEP event are significantly reduced in extents, compared to the QFAO and Burnett Basin flood investigation.
- The inundation of minor drainage paths is modelled as being significantly less in extent, compared to the QFAO and Burnett Basin flood investigation.

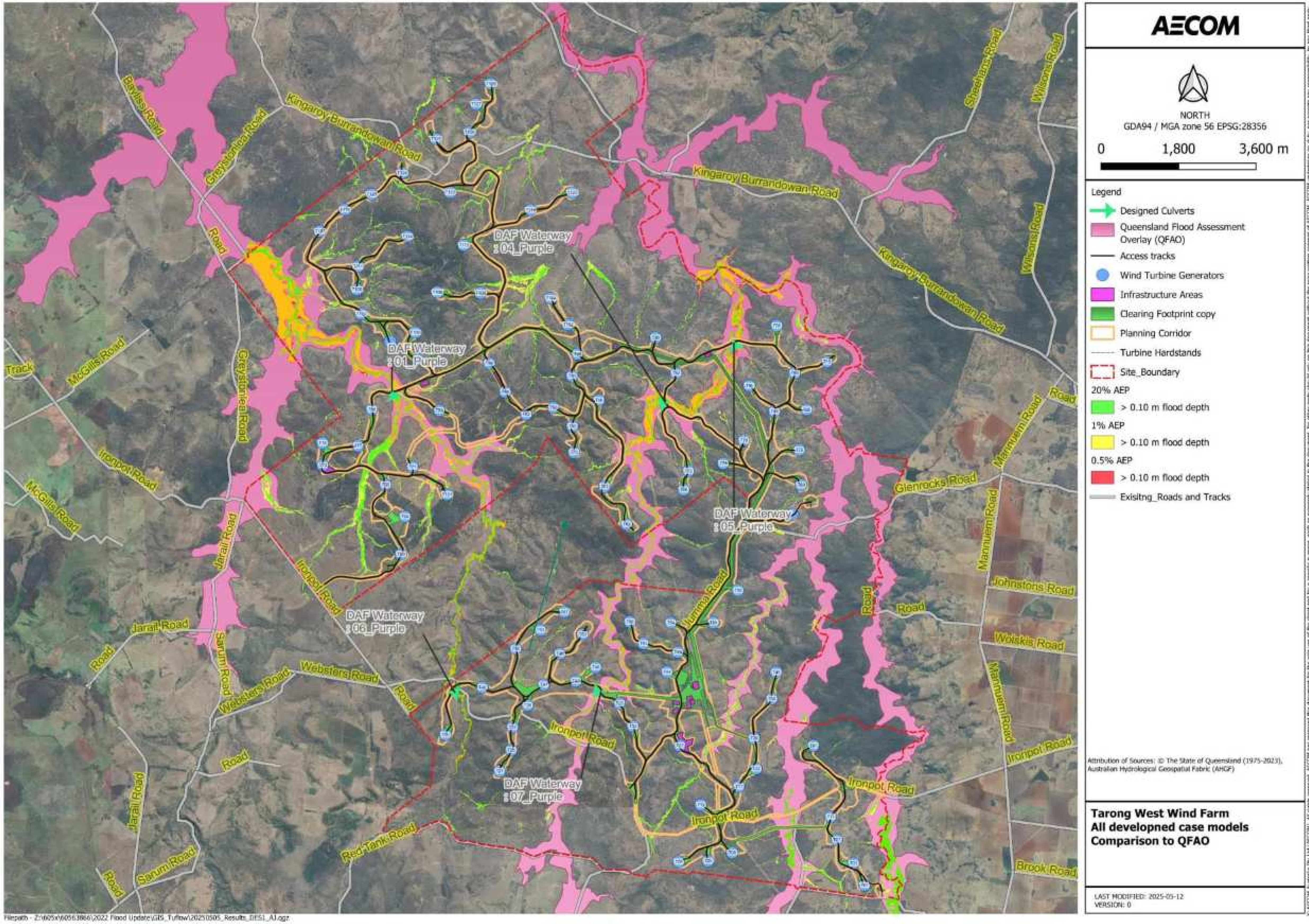

Figure 8 **Comparison of Flood Extents to QFAO (DNRME, 2013) (the site layout is from 2023 in this map)**

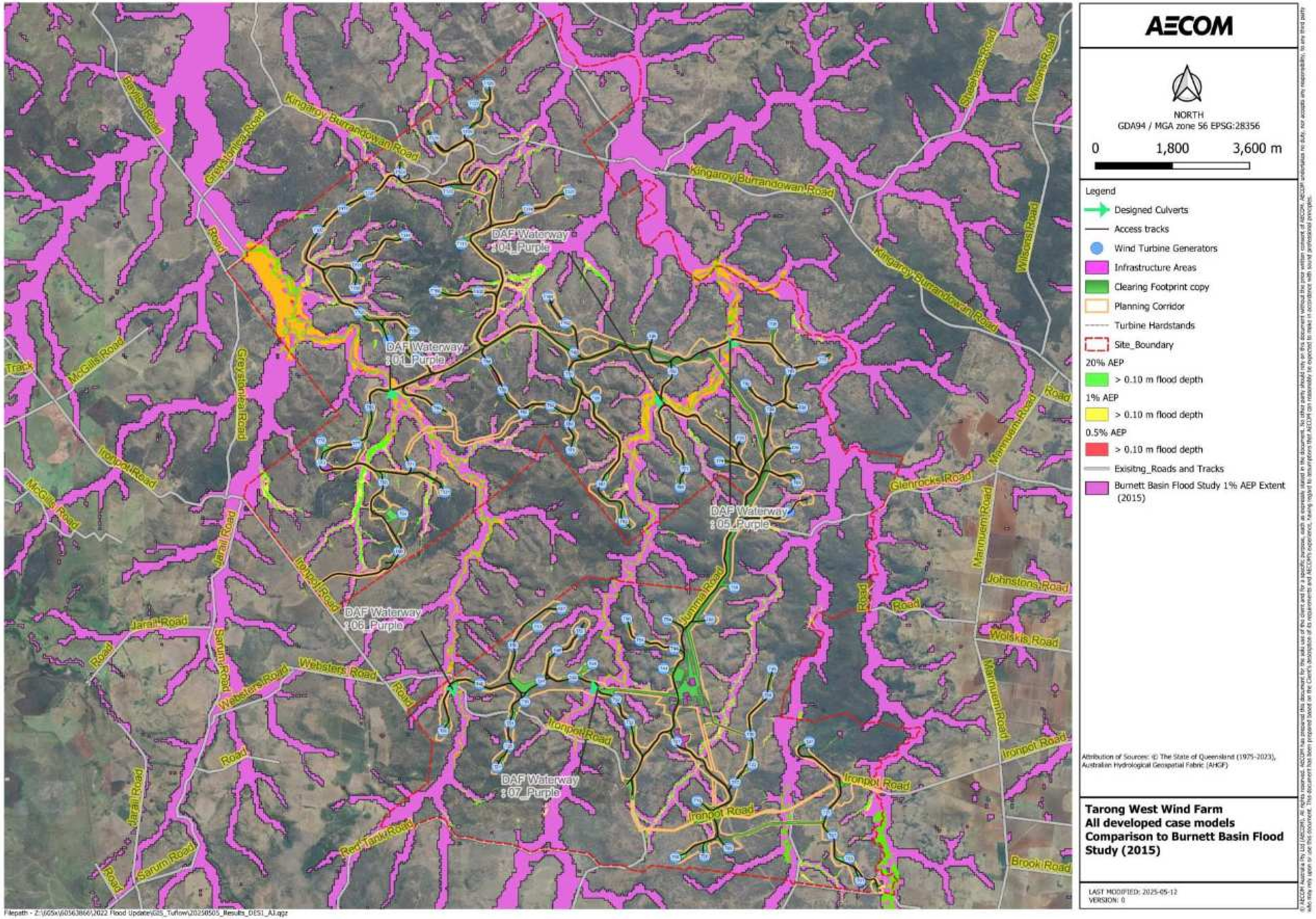

Figure 9 Comparison of Flood Extents to Burnett Basin Flood Study (DNRME, 2015) (the site layout is from 2023 in this map)

5.2 Change in Flood Condition

5.2.1 Change in Flood Levels

This section presents an assessment of flood level changes resulting from proposed design modifications, including the superelevation of access tracks, proposed earthworks, and five hydraulic structures provided by the client. These are evaluated against the pre-development condition. The assessment is based on hydraulic modelling outputs, with spatial changes in flood levels illustrated in Appendix G.

The design scenario includes adding proposed hydraulic structures, raised road levels to reflect the proposed access tracks, along with adjusted terrain and watercourse geometries at the five major creek crossings (where concept design information was provided). These modifications result in localised changes to flood behaviour, particularly near creek crossings and terrain modifications.

Figure 10 presents major creek crossings intersected by the proposed access roads where localised afflux (increased flood levels) is observed due to design interventions.

Across all modelled flood events, including multiple AEPs, the proposed infrastructure and turbine locations remain largely are outside areas with significant changes in flood levels. No material flood risk to these assets has been identified.

Under the 1 % AEP climate change scenario, afflux increases at most creek crossings. However, no sensitive receptors (e.g. residential, ecological, or cultural assets) are identified within the affected areas.

The model results indicate that the observed change in flood levels (afflux) is localised, typically occurring near creek crossings and access tracks. The magnitude of these impacts varies across different flood events and climate change scenarios. The model results show that any potential afflux remains within the development footprint or along existing infrastructure corridors, with no material impact at the edges of adjacent private properties. At each location, afflux is influenced by factors such as total flow, elevation changes, and flow constraints. These results reflect the current level of model detail, which does not yet include finalised vertical road designs or hydraulic structure specifications. Consequently, the impacts shown are indicative of the current design and will be refined as more detailed information becomes available. The current assessment suggests that, any potential afflux increases triggered by future design refinements can be mitigated through simple measures such as adjusting earthwork levels or installing hydraulic structures like culverts to bring it back within acceptable limits.

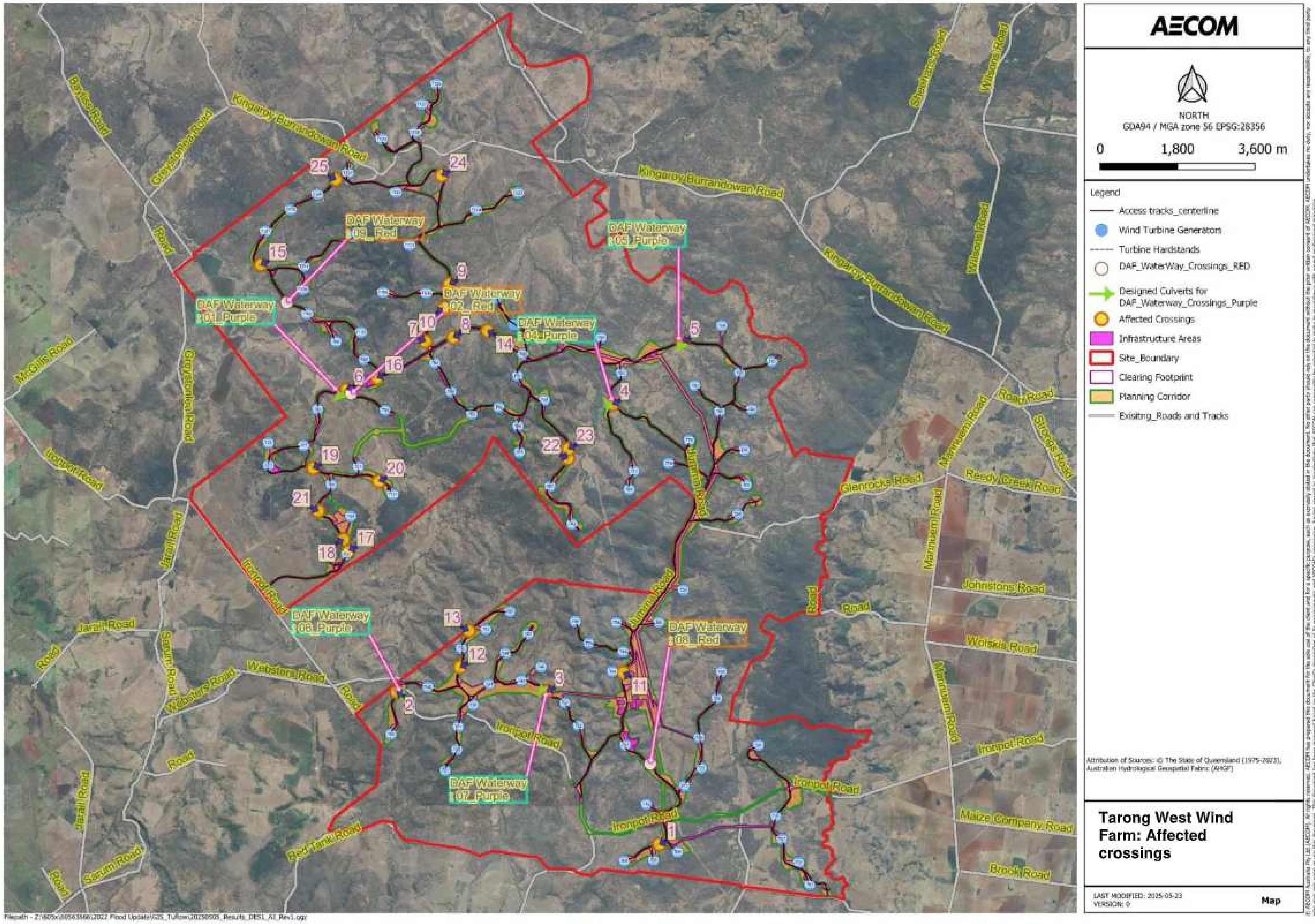

Figure 10 Affected crossings

Design drawings (concept design) for nine waterway crossings were received in 2025, with five crossings included in the hydraulic model (refer to 2.6 and Figure 10).

Localised change in flood levels were observed at these five modelled crossings, with a consistent trend across all design rainfall events. The afflux typically manifests as a small increase in water levels downstream of the crossings and a small decrease upstream. This phenomenon is attributed to the design of the access roads approaching the crossings, which are designed in cut. As a result, the roads overtop during frequent events, facilitating increased flow conveyance downstream of the crossings. It is important to note that the roads may not be trafficable for flood events larger than the 20% AEP. It is recommended that the crossings be designed to withstand larger flood events without substantial damage to ensure continued site access during such events.

A sensitivity test for blockage for designed culverts show minimum to no change in the water levels or velocities at those crossings. This is because most of the flow is conveyed by road overtopping. Therefore, blockage has minimum to no impact on these designed crossings.

Table 17 summarise indicative afflux upstream and downstream of the road embankment at the location of five modelled crossings.

Table 17 Indicative afflux levels upstream and downstream of crossings

Crossing	20% AEP		1% AEP		0.5% AEP	
	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
01_PURPLE (number 6 on Figure 10)	20mm-50mm	0	29mm-54mm	60mm-200mm	5mm-10mm	180mm-230mm
04_PURPLE (number 4 on Figure 10)	0mm-2mm	0	Reduction up to 12 mm	Increase up to 270mm	Reduction of 9 mm	27mm-200mm
05_PURPLE (number 5 on Figure 10)	Reduction of up to 26 mm	0	Reduction of up to 67 mm	-28mm to 180mm	Reduction of up to 91 mm	60mm-115mm
06_PURPLE (number 2 on Figure 10))	55mm-65mm	0-100mm	0-25mm	-17mm to 65mm	25mm-35mm	50mm-60mm
07_PURPLE (number 3 on Figure 10	Reduction of up to 101mm	10mm-40mm	Reduction of up to 119mm	24mm to 65mm	Reduction of up to 105 mm	15mm-55mm

Figure 11 shows the afflux at crossing DAF_Waterway_01_purple, where the road is overtopped during the 20% AEP event. Key downstream infrastructure, such as Greystonlea Jumma Road, is not affected by this event. There is also an interaction between the road embankment and a tributary to the east.

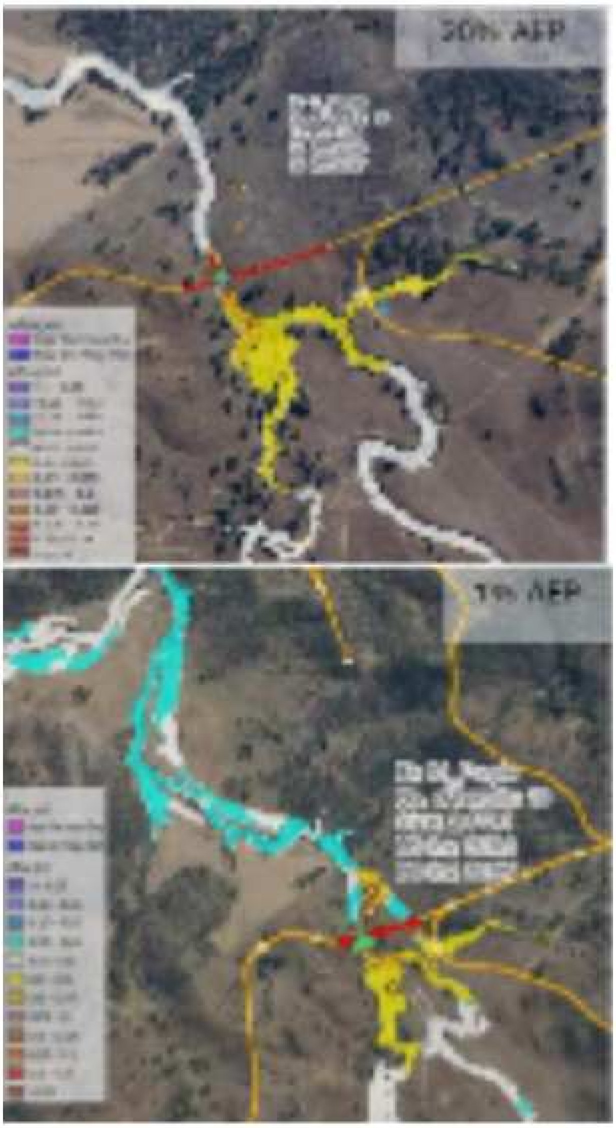

Figure 11 DAF Waterway 01-purple

Figure 12 shows the afflux at DAF_Waterway_04_purple. For the 1% AEP event, afflux is widespread downstream, resulting from the interaction of the main flow path with both longitudinal and lateral sections of the road embankment. However, there are no sensitive receptors in areas of positive afflux, and the road is overtopped during the 20% AEP event. The impacts shown are indicative of the level of maturity of the current design and will be refined as more detailed information becomes available.

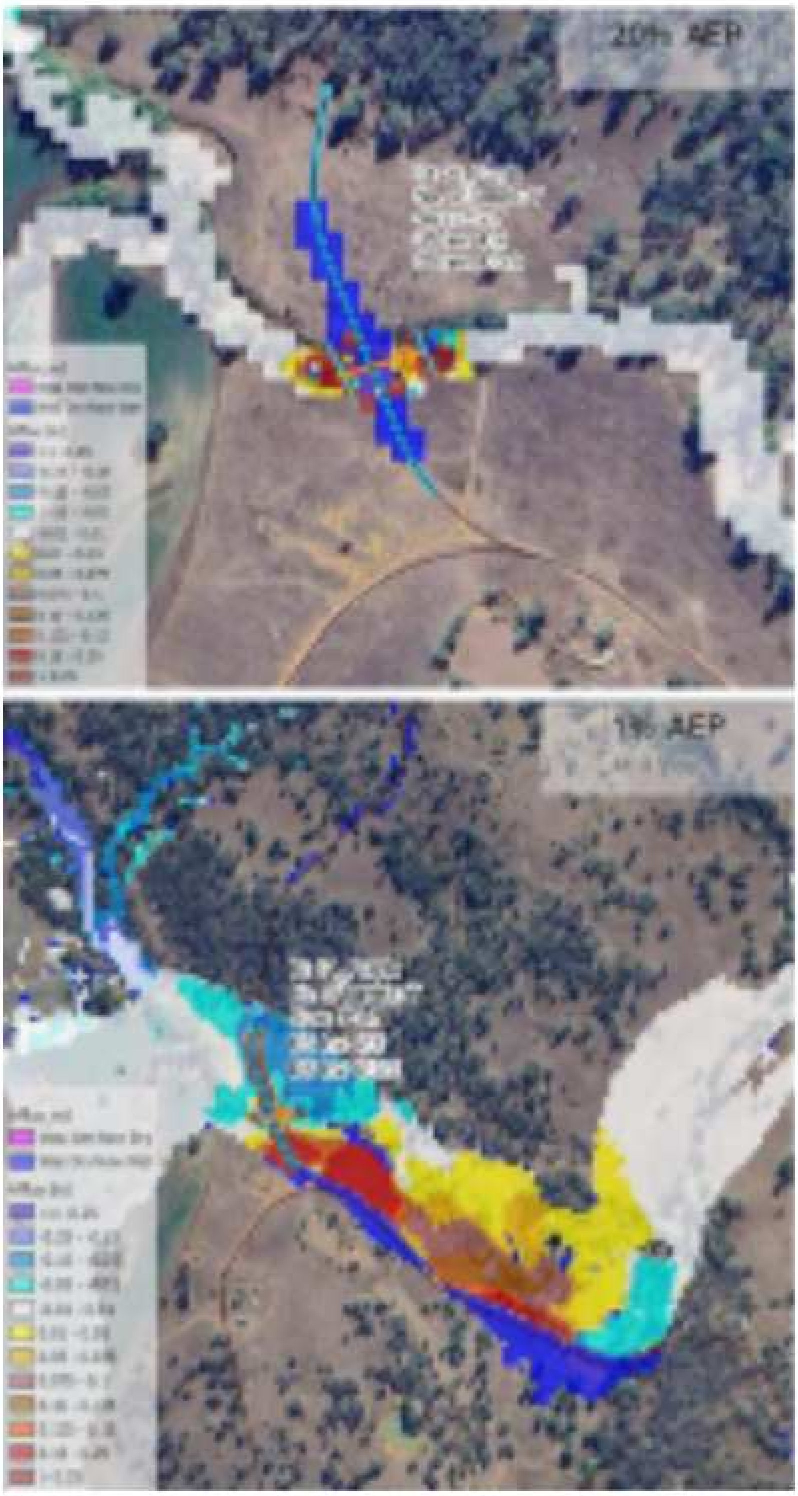

Figure 12 DAF Waterway 04-purple

At crossings DAF_Waterway_05_purple (Figure 13) and DAF_Waterway_07_purple (Figure 14), overtopping occurs, and downstream afflux ranges from -28 to 180mm for the 1% AEP event for crossing DAF_Waterway_05_purple and 24 to 65 mm for DAF_Waterway_07_purple for the same event. There are no sensitive receptors near these crossings. Flood immunity at both crossings is less than the 20% AEP.

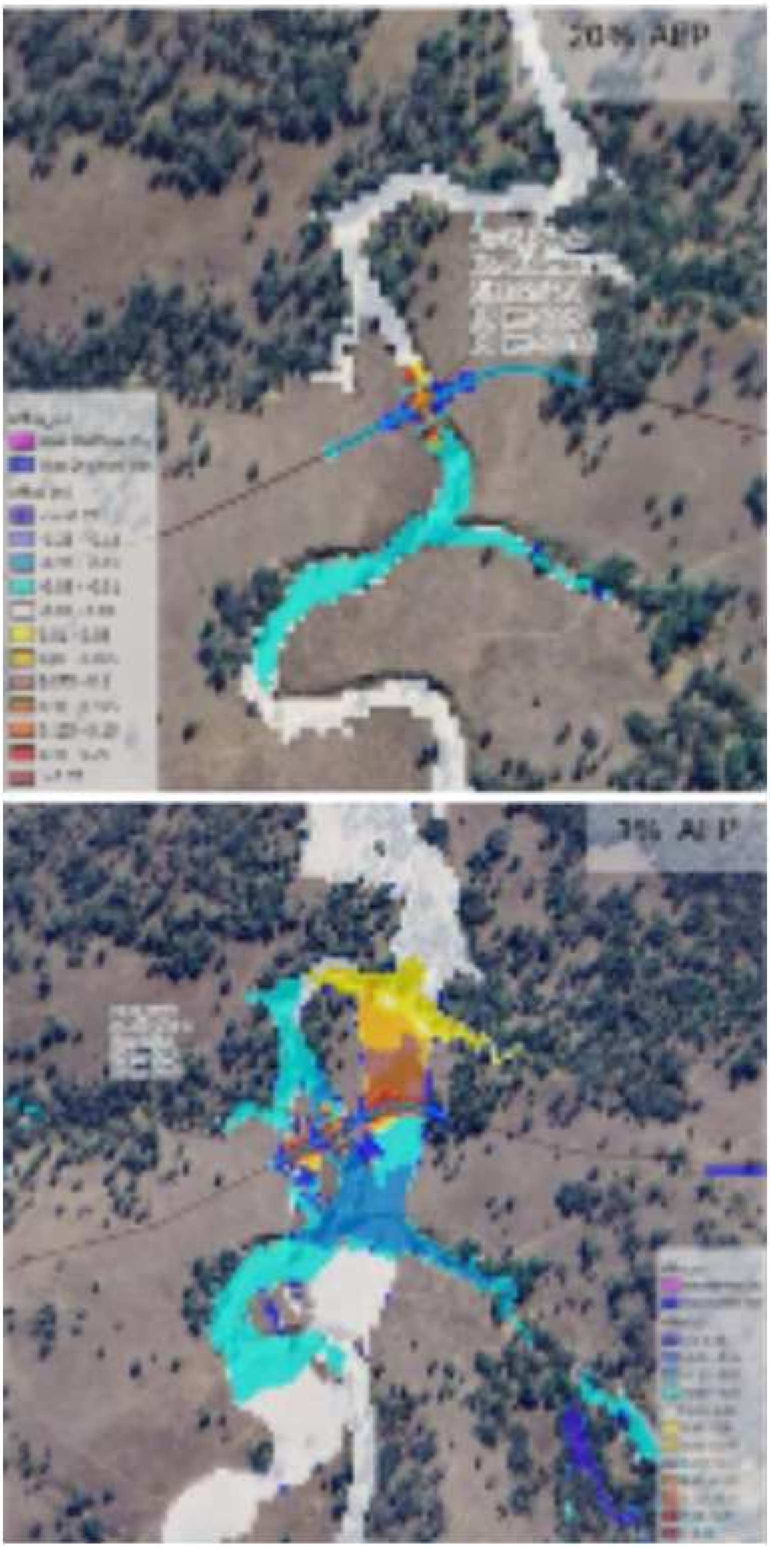

Figure 13 DAF Waterway 05-purple

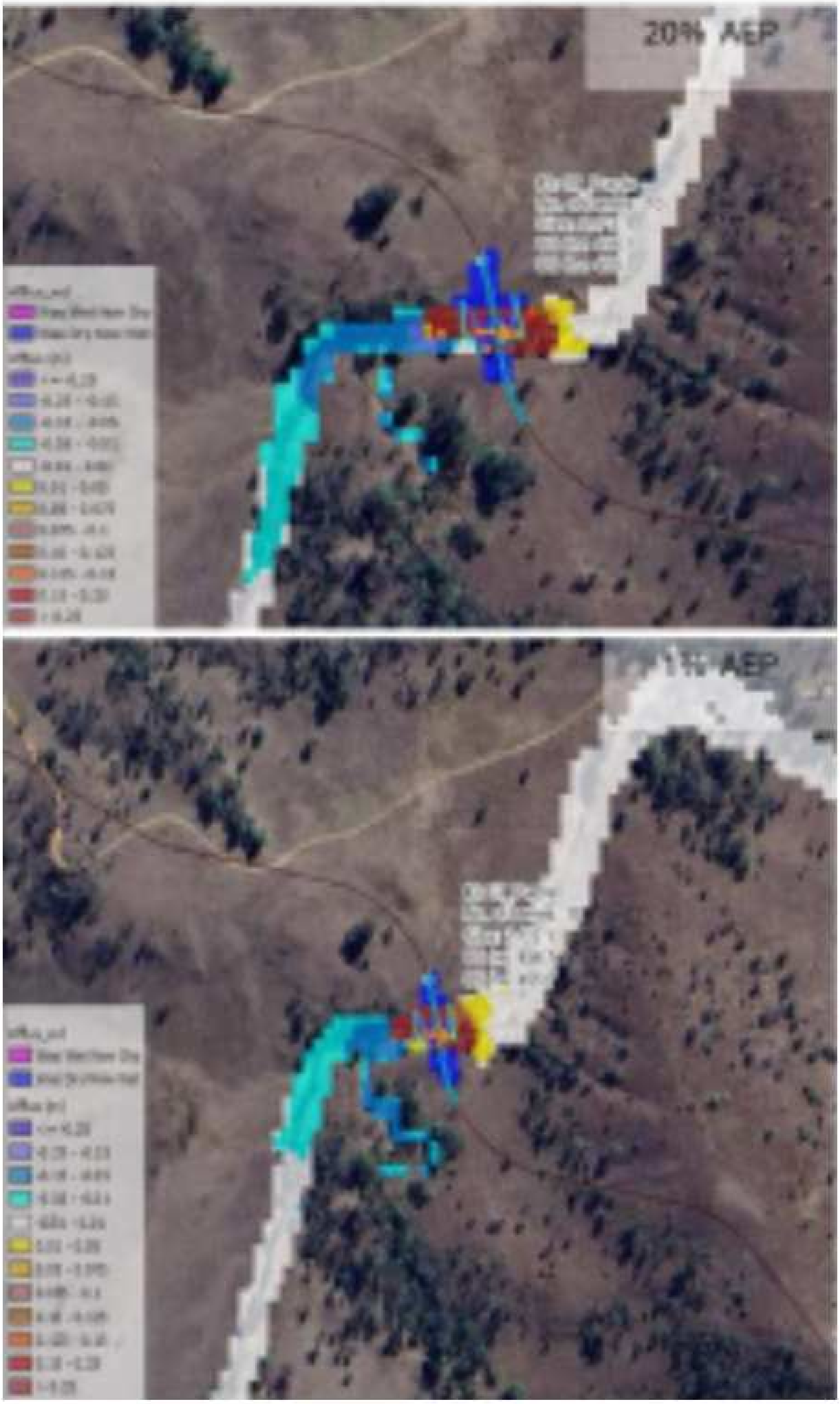

Figure 14 DAF Waterway 07-purple

Figure 15 shows the afflux at DAF_Waterway_06_purple. Both upstream and downstream afflux are observed, measuring approximately 25 mm and 65 mm, respectively, for the 1% AEP event. It is important to note that this afflux is localised and occurs away from critical infrastructure. The crossing is overtopped during the 20% AEP event.

Figure 15 DAF Waterway 06-purple

5.2.2 Changes to Flood velocity

Changes to velocity maps were generated as part of the assessment. Reviewing the fish passage requirements, as outlined in the Accepted Development Requirements for Operational Work that is Constructing or Raising Waterway Barrier Works (Department of Agriculture and Fisheries, 2018), was not part of the current scope. However, it is recommended that suitable hydraulic conditions are maintained in the downstream channel to minimise adverse changes in flow velocities, enabling fish passage upstream during low to medium flow conditions. It is recommended that these requirements are reviewed in future design stages, particularly in relation to design flood velocities.

Table 18 summarises changes to flow velocities at the upstream and downstream of the culvert crossings.

Table 18 Indicative changes in velocity (m/s) at upstream and downstream the crossings

Crossing	20% AEP		1% AEP		0.5% AEP	
	Upstream (m/s)	Downstream (m/s)	Upstream (m/s)	Downstream (m/s)	Upstream (m/s)	Downstream (m/s)
01_PURPLE	-0.11 to 0.03	-0.73 - -0.02	Up to -0.2	Up to 0.6	-0.07 to 0.13	-0.31 to 0
04_PURPLE	-0.14 to 0.01	No change	No change	0.2 m/s to 0.4	-0.07 to 0.13	-0.29 to 0.03
05_PURPLE	-0.2 to 0.48	-0.2 to 0.48	Up to -0.15	-0.1 m/s to 0.6	-0.09 to 0.46	-0.09 to 0.46
06_PURPLE	-0.99 to 0.52	-0.07 to 0.19	Up to -0.2	-0.1 m/s to 0.2	-0.42 to 0.57	-0.27 to 0.31
07_PURPLE	-0.02 to 0.81	-0.71 to 1.24	Up to 0.16	Up to 0.45	-0.03 to 0.23	-0.71 to 0.77

5.3 Flood Immunity for Infrastructure Areas

Table 19 summarises the sampled flood levels across infrastructure areas for the modelled AEP events. While no specific Flood Planning Level (FPL) criteria currently exist for those areas, the results can help inform appropriate building flood immunity requirements in future project stages to ensure design requirements are met.

The proposed five crossings are understood to be designed to convey smaller, more frequent flood events. As such, temporary flood impacts on road trafficability during larger events are not considered a critical issue at this stage.

The proposed infrastructure and turbine locations remain largely flood-free across all modelled flood events, including various AEPs and climate change scenarios. However, these conditions may change, once detailed designs for the access tracks, turbine hardstands, and infrastructure areas become available.

Table 19 Sampled flood levels (m AHD) for proposed infrastructure areas

	20% AEP	1% AEP	1% AEP with blockage	1% AEP + 2090 CC	0.5% AEP
Borrow Pit - 1.8 ha	481.45	481.50	481.50	481.51	481.5
Borrow Pit - 3.0 ha	460.16	460.19	460.19	460.20	460.19
Borrow Pit - 7.2 ha	538.42	538.46	538.46	538.46	538.46
Laydown - 0.2 ha	547.18	547.20	547.20	547.21	547.21
Laydown - 1.2 ha	523.28	523.30	523.30	523.30	523.3
Laydown - 1.5 ha	527.18	527.22	527.22	527.22	527.22
Laydown - 1.8 ha	414.4	414.44	414.44	414.46	414.45
O&M Building - 1.0 ha	532.02	532.03	532.03	532.04	532.04

6.0 Conclusions

The purpose of the study was to assess the potential inundation extents associated with design rainfall events at the site location, and to comment on the potential impacts that the Tarong West Wind Farm development may have on local flood conditions. A revised flood assessment was undertaken in 2025 (this study) incorporating an updated access track layout and design crossing information. Additional runs with climate change and blockage sensitivity considerations have also been undertaken as part of this study.

The model results indicate that the observed change in flood levels (afflux) is localised, typically occurring near creek crossings and access tracks. In the areas where civil design details were not available, the estimate of changes to flood conditions has been made using conservative assumptions for global vertical elevation, global road width, and representative flow width opening, due to the current absence of more detailed design information.

The current assessment suggests that any potential afflux increases triggered by future design refinements can be mitigated through simple measures such as adjusting earthwork levels or installing hydraulic structures like culverts to bring it back within acceptable limits.

Culvert designs and corresponding road levels within ±70 m chainage from the culvert centre were provided for the DAF waterway crossings classified as purple. These crossings were incorporated into a hydrological routing-based model, rather than a rain-on-grid approach, enabling a more accurate representation of flow paths and a more reliable assessment of afflux at these locations.

As the roads at these crossings overtop during frequent events, the hydraulic head available to drive flow through the culverts is often limited. In such cases, the flow bypasses the culverts via surface overtopping, and the culverts may operate under submerged or low-head conditions. Therefore, while blockage has been considered, its influence on overall flow conveyance under these conditions is expected to be limited.

The only exception was near DAF Waterway Crossing 01 (purple), where flow interaction occurred with an adjacent waterway classified as red. In the absence of detailed design drawings for the red waterway crossing, the road embankment was artificially lowered in the model to permit flow conveyance.

Some modelling assumptions regarding geometry were made at those crossings where design details were unavailable at this time. These assumptions in some cases may lead to unrealistic afflux impacts, albeit localised. It is expected that these numerical issues will be resolved when a more refined design surface is incorporated into the model.

As discussed above, even if these afflux levels obtained afterwards are out of acceptable limits they can be mitigated.

The proposed infrastructure and turbine locations remain predominantly flood-free across all modelled AEP events. Although no specific Flood Planning Levels (FPLs) have been established for the infrastructure areas, the modelled flood levels provide a basis for informing building flood immunity required in future stages. The results can guide design decisions to ensure infrastructure remains resilient to flood events.

These results support the continuation of the project, with flood risks considered manageable at the current stage. Outputs from this flood study can inform an assessment of potential impacts to sensitive environmental receptors triggered by change in flood behaviour, flood levels, and velocities.

The current assessment is based on the best information available to date. However, it is recommended that the representation of the following elements in the model is refined in future design stages.

- Vertical and horizontal road designs and finalised access track profiles.
- Hydraulic structures (e.g. culverts and bridges).
- Proposed earthworks.
- Final alignment and grading information across the development area.

6.1 Assessment Gaps and Future Works

Model limitations include lack of detailed design inputs and structure specifications. Further modelling and refinement are required during detailed design to ensure flood resilience and compliance.

The principal gaps in the assessment related to the following:

- Final landform details and elevations for the following infrastructure were not available:
  - Proposed access tracks
  - Proposed hardstand and infrastructure areas
- Further stormwater assessment is to be undertaken at locations where a flow path was present and either a road opening was instated to allow for conveyance or flow ponded against the road embankment.

The precise detailed design and instatement of these features will be required as the Project progresses to future phases, to:

- Mitigate the potential for access track inundation, and damage from overtopping flows.
- Mitigate the potential impact on existing flow conditions across the Project area and downstream receptors.
- Define the hydraulic requirements for significant drainage path and creek crossings.

For major impact areas identified, which typically comprise creek crossings, detailed design is expected to include:

- Detailed ground survey of drainage path / creek invert proximate to the crossing
- Consideration of fish passage requirements.
- Consideration of hydraulic capacity, overtopping potential and serviceability requirements.

For transverse and longitudinal drainage associated with proposed access tracks, the design of features could be completed in a software package such as the 12D Drainage Editor (ILSAX Module).

7.0 Limitations

AECOM has prepared this report in accordance with the usual diligence and thoroughness of the consulting profession with reference to current standards, procedures, and practices. The hydrological component of this study used SRTM data sourced from Geosciences Australia and available LiDAR data was used for the hydraulic assessment.

The hydraulic model used for this Study is based on a 10 m grid size with SGS functionality, which is deemed appropriate for this level of assessment to inform a concept design. However, it presents some inherent uncertainties in deriving site specific flood levels, and as such an appropriate freeboard level should be included in setting any design flood levels.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by AECOM for use of any part of this report in any other context. This report was prepared for the exclusive use of the Study. AECOM accepts no liability or responsibility whatsoever for, any use of, or reliance upon, this report by any third party.

Australian Rainfall and Runoff (AR&R, 2016) outlines several fundamental themes which are also particularly relevant to this Study:

- All models are coarse simplifications of very complex processes. No model can therefore be perfect, and no model can represent all of the important processes accurately.
- Model accuracy and reliability will always be limited by the accuracy of the terrain and other input data.
- Model accuracy and reliability will always be limited by the reliability / uncertainty of the inflow data.
- No model is 'correct' therefore the results require interpretation.
- A model developed for a specific purpose is probably unsuitable for another purpose without modification, adjustment, and recalibration. The responsibility must always remain with the modeller to determine whether the model is suitable for a given problem.
- Recognition that no two flood events behave in exactly the same manner.
- Design floods are a best estimate of an "average" flood for their probability of occurrence.

The interpretation of results and other presentations in this report should be done with an appreciation of any limitations in their accuracy, as noted above. Unless otherwise stated, presentations in this report are based on peak values of water surface level, flow, depth and velocity. Therefore, using flood levels as an example, the peak level does not occur everywhere at the same time and, therefore, the values presented are based on taking the maximum value which occurred at each computational point in the model during the entire flood. Hence, a presentation of peak levels does not represent an instantaneous point in time, but rather an envelope of the maximum values that occurred at each computational point over the duration of the flood event.

8.0 References

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Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) Australian Rainfall and Runoff: A Guide to Flood Estimation, © Commonwealth of Australia (Geoscience Australia), Version 4.1, 2019.

The accepted development requirements for operational work that is constructing or raising a waterway barrier works Guidelines. Department of Agriculture and Fisheries. October 2018.

Appendix A

Hydraulic Structures

Appendix A Hydraulic Structures

Figure 16 Structure ID FW_0.6mpipe

Figure 17 Structure ID 10m_wooden_span

Figure 18 Structure ID Bridge 1

Figure 19 Structure ID Bridge 2

Figure 20 Structure ID Bridge 3

Figure 21 Structure ID Bridge 4

Figure 22 Structure ID Bridge 5

Appendix B

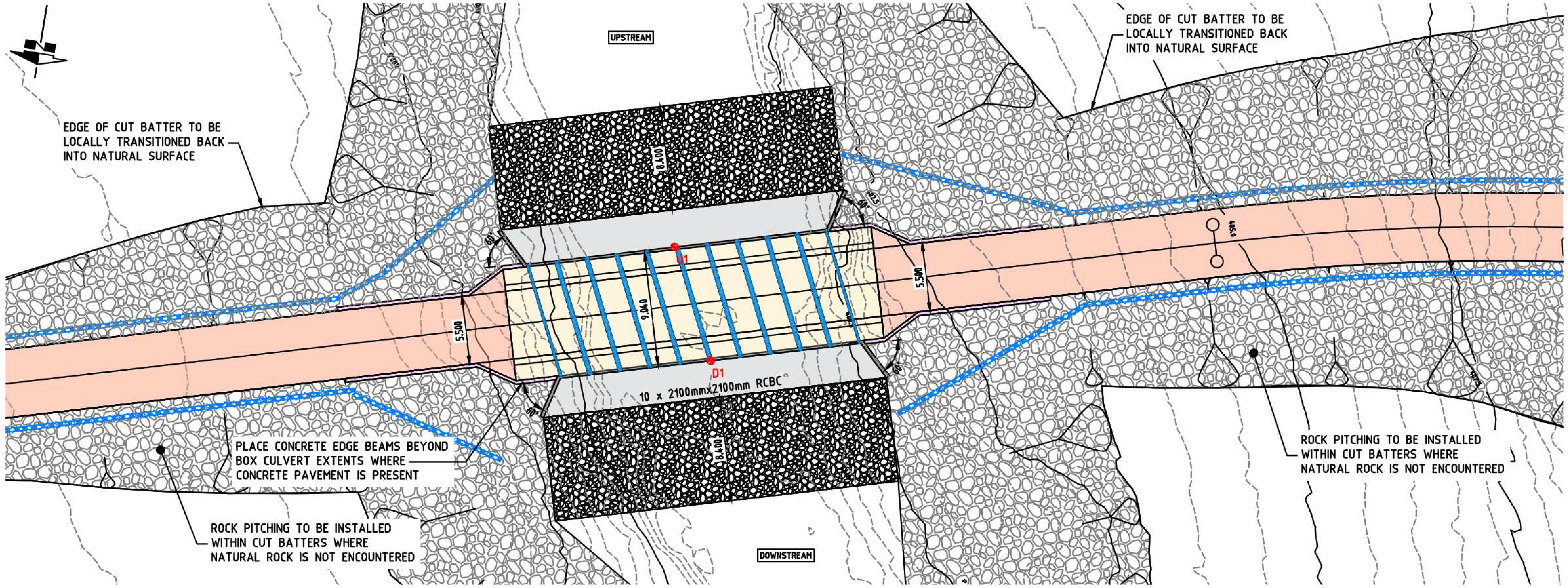
Drawings used for design details of DAF waterway crossings

LEGEND:

- EXISTING LEVELS
- EXISTING CONTOURS
- P.19.600 — DESIGN LEVELS
- TABLE DRAIN
- DISTURBANCE FOOTPRINT
- CTQR PAVEMENT (300mm THICK 3% CEMENT STABILISED QUARRY RUBBLE - REFER DRG 0612 FOR DETAILS)
- ROCK PITCHING. MINIMUM 800mm THICK SITE WON ROCK (D50=400mm) ON BIDIM A34 GEOFABRIC
- CONCRETE HEADWALL AND APRON CAST INSITU (REFER DRG 0612 FOR DETAILS)
- EXTENT OF CONCRETE PAVEMENT (250mm THICK N40 SLAB - REFER TO DRG 0613 FOR DETAILS)
- CONCRETE EDGE BEAM (REFER DRG 0613 FOR DETAILS)
- ROCK PITCHING. MINIMUM 600mm THICK SITE WON ROCK (D50 = 300mm) ON BIDIM A34 GEOFABRIC

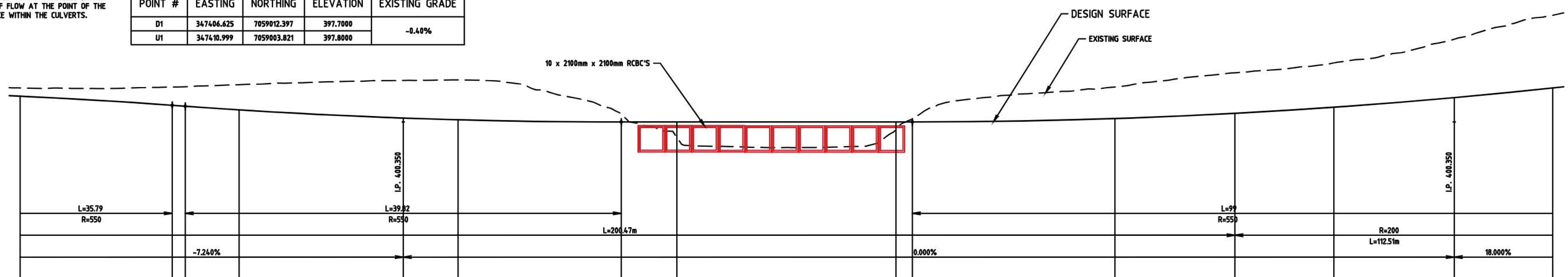
NOTES:

1. EMBANKMENT SLOPES SHALL BE AS PER THE FOLLOWING:
   - CONCRETE HEADWALL AT MAXIMUM 1:1 SLOPE.
   - ROCK PITCHING AT MAXIMUM 1:2 SLOPE.
   - ALL OTHER FILL/CUT BATTERS, AS PER STANDARD WINDFARM DESIGN CRITERIA.
2. CROSSING HAS BEEN DESIGNED TO PROTECT AGAINST SCOUR AND OVERTOPPING EROSION UP TO THE 20% AEP STORM EVENT
3. CULVERT SET OUT TO BE VERIFIED ONSITE BY THE CONTRACTOR. CULVERT SET OUT PROVIDED IN THE ENCLOSED SCHEDULES MAY NEED LOCAL ADJUSTMENTS TAKING INTO ACCOUNT:
   - DAF WATERWAY REQUIREMENTS AS DETAILED.
   - VERTICAL SET OUT DISCREPANCIES THAT MAY OCCUR IN USING THE PROVIDED SURVEY INFORMATION
4. CULVERT CELLS HAVE BEEN ALIGNED TO RUN PARALLEL (WITHIN 10 DEGREES) TO THE DIRECTION OF FLOW AT THE POINT OF THE CROSSING TO MINIMISE TURBULENCE WITHIN THE CULVERTS.



GENERAL ARRANGEMENT - DAF WATERWAY 01 - PURPLE
SCALE 1:200

CULVERT SETOUT				
POINT #	EASTING	NORTHING	ELEVATION	EXISTING GRADE
D1	347406.625	7059012.397	397.7000	-0.40%
U1	347410.999	7059003.821	397.8000	



CUT/FILL	-0.745	-1.673	-1.779	-2.300	-3.443	-3.646	-0.714	1.406	0.690	-0.292	-2.895	-3.713	-4.048	-5.343	-6.634
EXISTING SURFACE	403.454	403.551	403.571	403.758	404.153	404.199	401.064	398.944	399.660	400.642	403.556	404.853	405.745	407.921	410.095
DESIGN CENTRELINE	402.709	401.878	401.792	401.458	400.710	400.552	400.350	400.350	400.350	400.350	400.461	401.139	401.697	402.577	403.461
CHAINAGE	1080.000	1093.896	1095.089	1100.000	1115.000	1120.000	1134.911	1140.000	1160.000	1161.500	1180.000	1190.967	1200.000	1211.000	1220.000

LONGITUDINAL SECTION MC152
Horizontal scale 1:200
Vertical scale 1:200

DESIGN BASIS/NOTES:

AS PER DEPARMENT OF AGRICULTURE AND FISHERIES (DAF) ACCEPTED DEVELOPMENT REQUIRMENTS FOR OPERATIONAL WORK THAT IS CONSTRUCTING OR RAISING WATERWAY BARRIER WORKS DATE EFFECTIVE 1ST OCTOBER 2018, THE CONSTRUCTION OF NEW CULVERT CROSSINGS ON MAJOR IMPACT (PURPLE) WATERWAYS IS NOT ACCEPTED DEVELOPMENT. IT IS ASSESSABLE DEVELOPMENT AND REQUIRES A DEVELOPMENT APPROVAL UNDER THE PLANNING ACT.

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When sheet printed full size, the scale bar is 100mm.
0 50 100mm

SCALE BAR (m) 1:200

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C	14.08.2024	ISSUED FOR DAF APPROVAL	KK	RA	RA
D	18.09.2024	ISSUED FOR DAF APPROVAL	KK	RA	RA

Vestas WGA

TARONG WIND FARM
CIVIL WORKS
DAF WATERWAY 01 - PURPLE
GENERAL ARRANGEMENT

A1 DOCUMENT NUMBER
Project Number Sheet No. Rev.
Design Drawn
WGA221123-DR-CV-0611 D

LEGEND:

414.96	EXISTING LEVELS
	EXISTING CONTOURS
P.19.600	DESIGN LEVELS
	TABLE DRAIN
	DISTURBANCE FOOTPRINT
	CTQR PAVEMENT (300mm THICK 3% CEMENT STABILISED QUARRY RUBBLE - REFER DRG 0642 FOR DETAILS)
	ROCK PITCHING. MINIMUM 800mm THICK SITE WON ROCK (D50=400mm) ON BIDIM A34 GEOFABRIC
	CONCRETE HEADWALL AND APRON CAST INSITU (REFER DRG 0642 FOR DETAILS)
	EXTENT OF CONCRETE PAVEMENT (250mm THICK N40 SLAB - REFER TO DRG 0643 FOR DETAILS)
	CONCRETE EDGE BEAM (REFER DRG 0643 FOR DETAILS)
	ROCK PITCHING. MINIMUM 600mm THICK SITE WON ROCK (D50 = 300mm) ON BIDIM A34 GEOFABRIC

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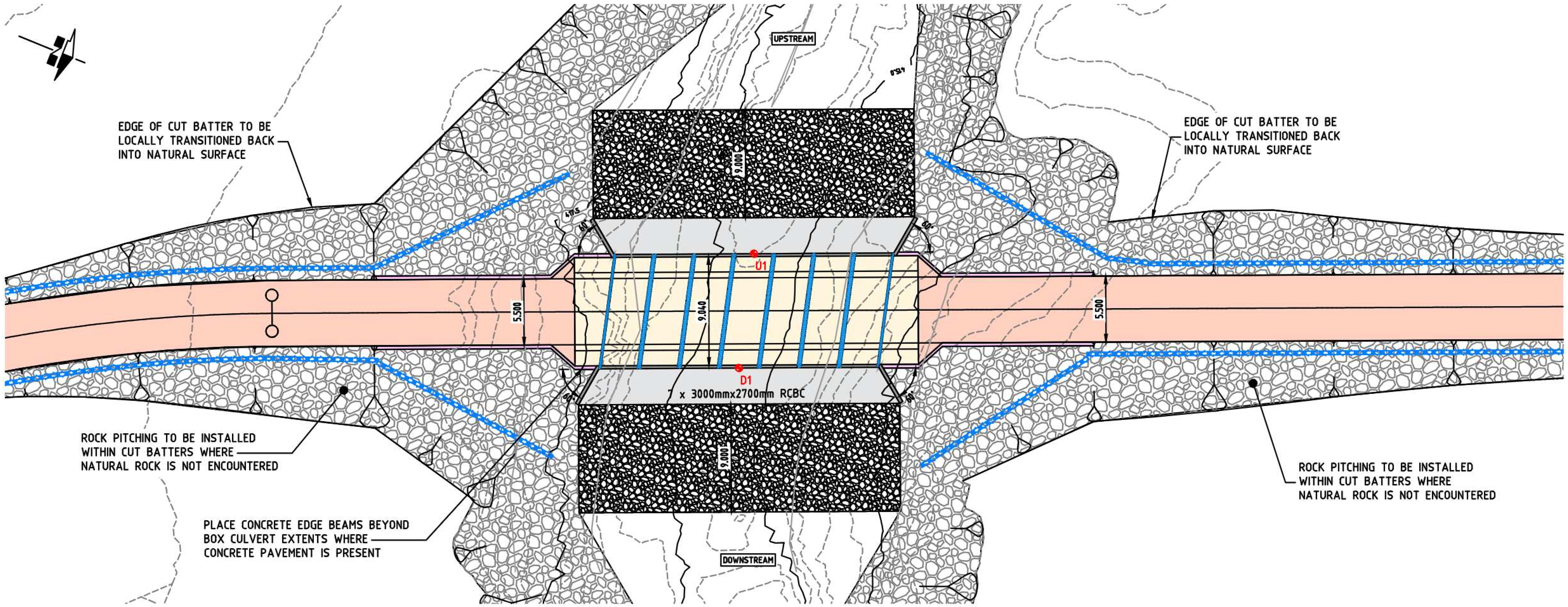
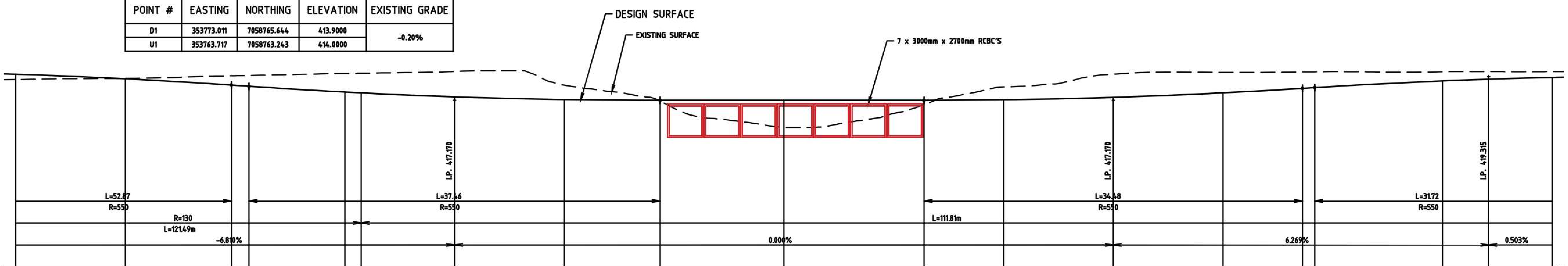
4. CULVERT CELLS HAVE BEEN ALIGNED TO RUN PARALLEL (WITHIN 10 DEGREES) TO THE DIRECTION OF FLOW AT THE POINT OF THE CROSSING TO MINIMISE TURBULENCE WITHIN THE CULVERTS.



GENERAL ARRANGEMENT - DAF WATERWAY 04 - PURPLE
SCALE 1:200

CULVERT SETOUT

POINT #	EASTING	NORTHING	ELEVATION	EXISTING GRADE
D1	353773.011	7058765.644	413.9000	-0.20%
U1	353763.717	7058763.243	414.0000	



CHAINAGE	CUT/FILL	EXISTING SURFACE	DESIGN CENTRELINE
90.000	0.484	419.059	419.542
100.000	-0.031	419.159	419.128
109.670	-0.847	419.401	418.554
111.272	-0.984	419.429	418.445
120.000	-1.699	419.619	417.920
121.491	-1.798	419.643	417.844
130.000	-2.300	419.789	417.489
140.000	-1.302	418.542	417.239
148.728	0.076	417.094	417.170
160.000	2.458	414.712	417.170
172.760	0.397	416.773	417.170
180.000	-1.169	418.387	417.218
190.000	-2.105	419.545	417.440
200.000	-1.867	419.711	417.845
207.240	-1.505	419.756	418.251
208.355	-1.445	419.766	418.321
220.000	-0.841	419.768	418.927
224.212	-0.694	419.780	419.086
230.000	-0.530	419.782	419.252

LONGITUDINAL SECTION MC141
Horizontal scale 1:200
Vertical scale 1:200

DESIGN BASIS/NOTES:

AS PER DEPARMENT OF AGRICULTURE AND FISHERIES (DAF) ACCEPTED DEVELOPMENT REQUIRMENTS FOR OPERATIONAL WORK THAT IS CONSTRUCTING OR RAISING WATERWAY BARRIER WORKS DATE EFFECTIVE 1ST OCTOBER 2018, THE CONSTRUCTION OF NEW CULVERT CROSSINGS ON MAJOR IMPACT (PURPLE) WATERWAYS IS NOT ACCEPTED DEVELOPMENT. IT IS ASSESSABLE DEVELOPMENT AND REQUIRES A DEVELOPMENT APPROVAL UNDER THE PLANNING ACT.

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When sheet printed full size, the scale bar is 100mm.
0 50 100mm

SCALE BAR (m) 1:200

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C	07.02.2024	RE-ISSUED FOR PRELIMINARY DAF SUBMISSION	PM	RA	EN
D	14.08.2024	ISSUED FOR DAF APPROVAL	KK	RA	RA
E	18.09.2024	ISSUED FOR DAF APPROVAL	KK	RA	RA

Vestas WGA

TARONG WIND FARM
CIVIL WORKS
DAF WATERWAY 04 - PURPLE
GENERAL ARRANGEMENT

A1 DOCUMENT NUMBER
WGA221123-DR-CV-0641 E

LEGEND:

- EXISTING LEVELS
- EXISTING CONTOURS
- P.19.600 DESIGN LEVELS
- TABLE DRAIN
- DISTURBANCE FOOTPRINT
- CTQR PAVEMENT (300mm THICK 3% CEMENT STABILISED QUARRY RUBBLE - REFER DRG 0652 FOR DETAILS)
- ROCK PITCHING. MINIMUM 800mm THICK SITE WON ROCK (D50=400mm) ON BIDIM A34 GEOFABRIC
- CONCRETE HEADWALL AND APRON CAST INSITU (REFER DRG 0652 FOR DETAILS)
- EXTENT OF CONCRETE PAVEMENT (250mm THICK N40 SLAB - REFER TO DRG 0653 FOR DETAILS)
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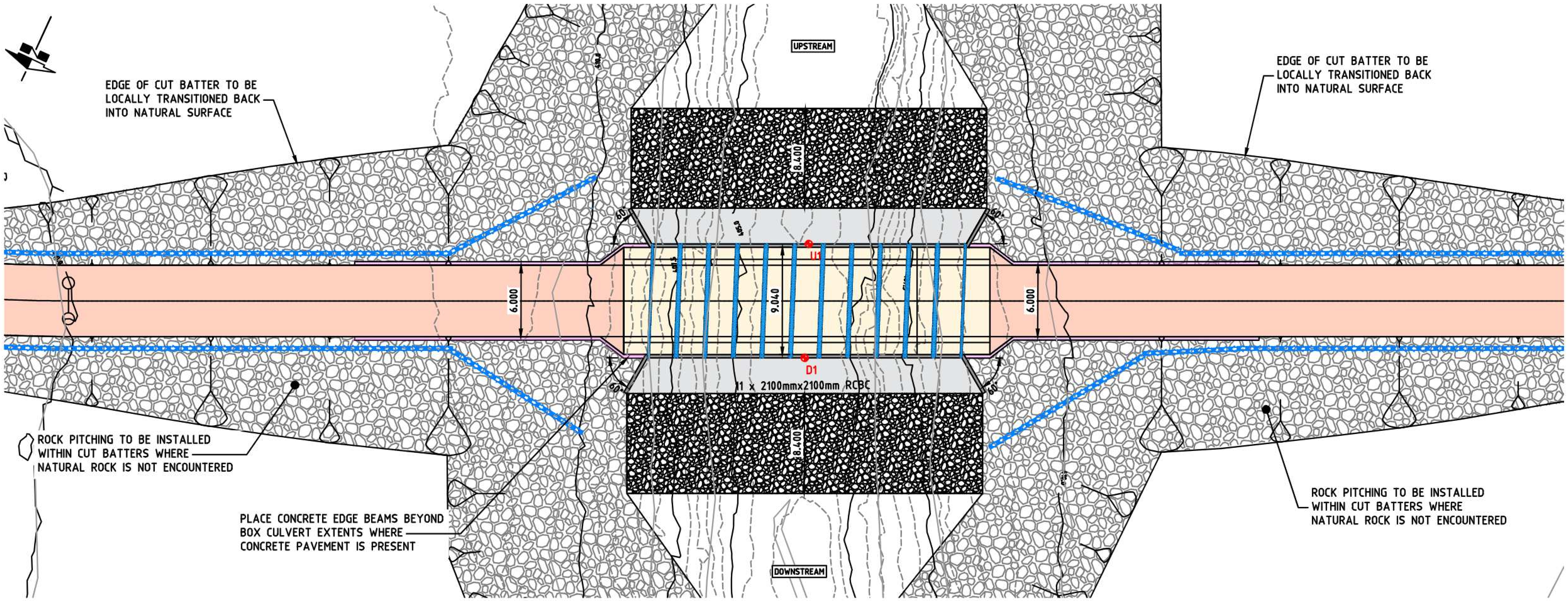
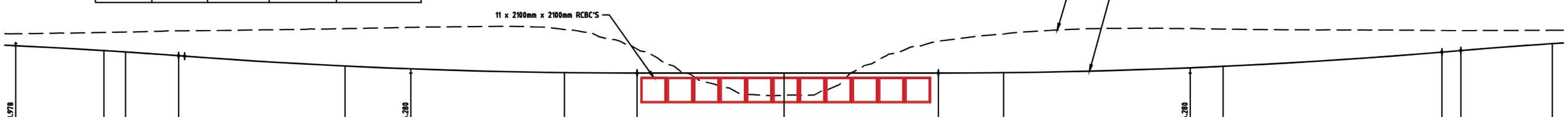


GENERAL ARRANGEMENT - DAF WATERWAY 05 - PURPLE
SCALE 1:200

CULVERT SETOUT				
POINT #	EASTING	NORTHING	ELEVATION	EXISTING GRADE
D1	355333.888	7060166.103	403.6500	1%
U1	355337.596	7060157.249	403.7000	



CUT/FILL	-1.101	-1.658	-1.820	-2.265	-3.413	-3.786	-3.939	-2.192	2.036	-2.920	-3.538	-3.592	-3.410	-1.977	-1.825	-1.225
EXISTING SURFACE	409.879	409.992	410.027	410.131	410.337	410.452	410.259	408.472	404.244	409.200	409.850	410.350	410.302	410.171	410.162	410.195
DESIGN CENTRELINE	408.778	408.334	408.207	407.866	406.924	406.666	406.320	406.280	406.280	406.280	406.312	406.758	406.892	408.194	408.338	408.970
CHAINAGE	12810.000	12818.036	12820.000	12824.835	12840.000	12846.000	12860.000	12866.610	12880.000	12894.059	12900.000	12917.000	12920.000	12939.941	12941.665	12950.000

VERTICAL GEOMETRY: L=29.67 R=550; L=41.22 R=550; L=45.88 R=550; L=23.67 R=550

HORIZONTAL GEOMETRY: R=-130 L=88.47m; L=366.57m

GRADE: -2.100%; -7.495%; 0.000%; 8.342%

Datum = 392.0

LONGITUDINAL SECTION MC01
Horizontal scale 1:200
Vertical scale 1:200

DESIGN BASIS/NOTES:

AS PER DEPARMENT OF AGRICULTURE AND FISHERIES (DAF) ACCEPTED DEVELOPMENT REQUIRMENTS FOR OPERATIONAL WORK THAT IS CONSTRUCTING OR RAISING WATERWAY BARRIER WORKS DATE EFFECTIVE 1ST OCTOBER 2018, THE CONSTRUCTION OF NEW CULVERT CROSSINGS ON MAJOR IMPACT (PURPLE) WATERWAYS IS NOT ACCEPTED DEVELOPMENT. IT IS ASSESSABLE DEVELOPMENT AND REQUIRES A DEVELOPMENT APPROVAL UNDER THE PLANNING ACT.

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0 50 100mm

4 2 0 4 8
SCALE BAR (m)
1:200

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D	14.08.2024	ISSUED FOR DAF APPROVAL	KK	RA	RA
E	18.09.2024	ISSUED FOR DAF APPROVAL	KK	RA	RA

Vestas WGA

TARONG WIND FARM
CIVIL WORKS
DAF WATERWAY 05 - PURPLE
GENERAL ARRANGEMENT

A1 DOCUMENT NUMBER
Project Number Sheet No. Rev.
Design Drawn
WGA221123-DR-CV-0651 E

LEGEND:

- EXISTING LEVELS
- EXISTING CONTOURS
- P.19.600 DESIGN LEVELS
- TABLE DRAIN
- DISTURBANCE FOOTPRINT
- CTQR PAVEMENT (300mm THICK 3% CEMENT STABILISED QUARRY RUBBLE - REFER DRG 0662 FOR DETAILS)
- ROCK PITCHING. MINIMUM 800mm THICK SITE WON ROCK (D50=400mm) ON BIDIM A34 GEOFABRIC
- CONCRETE HEADWALL AND APRON CAST INSITU (REFER DRG 0662 FOR DETAILS)
- EXTENT OF CONCRETE PAVEMENT (250mm THICK N40 SLAB - REFER TO DRG 0663 FOR DETAILS)
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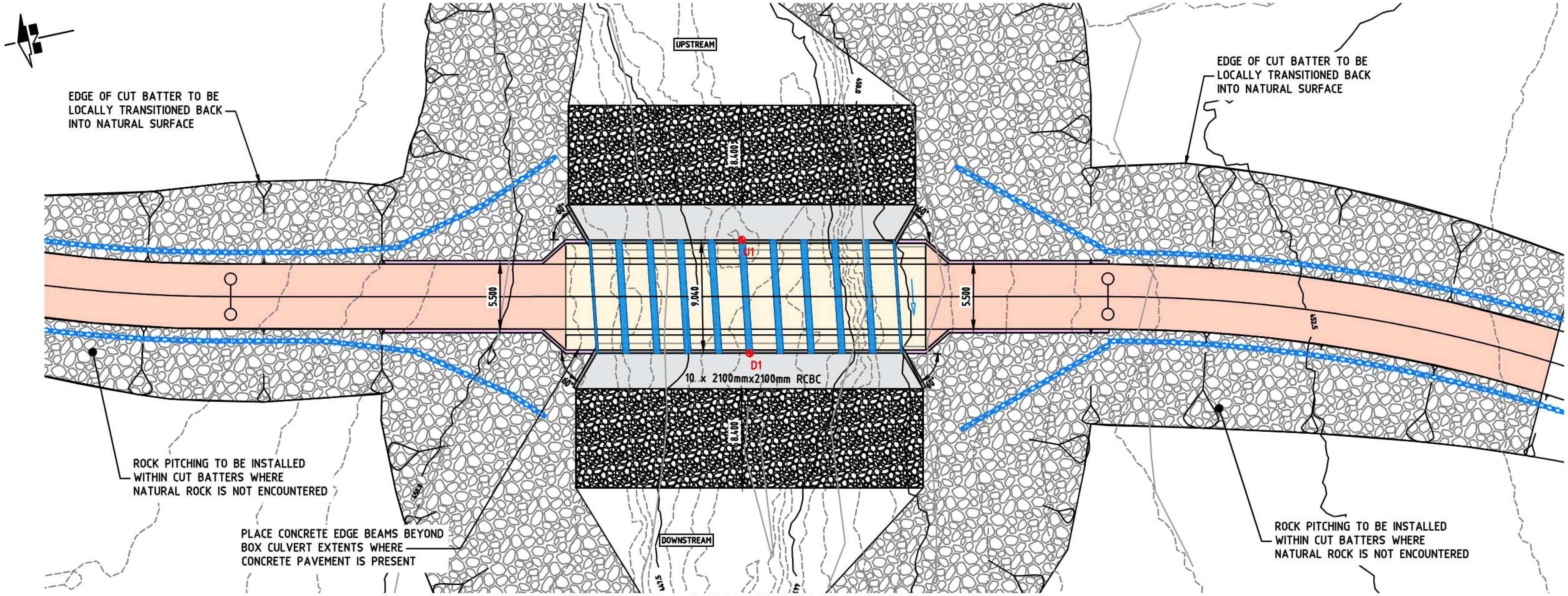
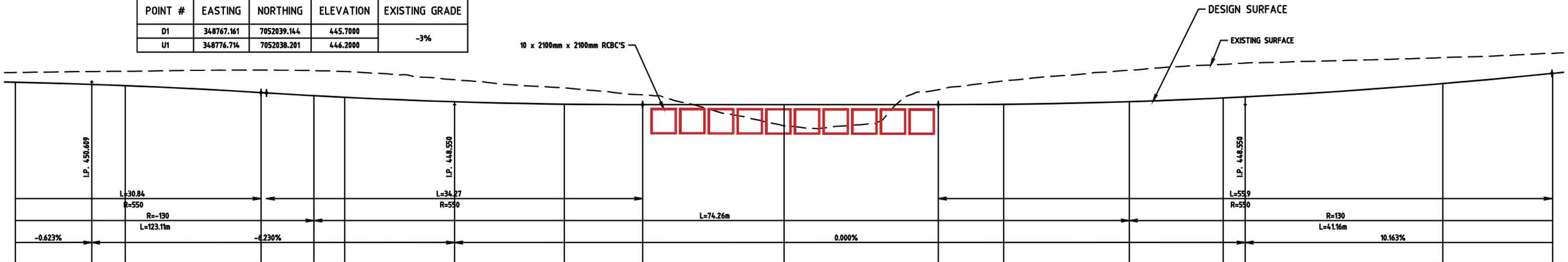


GENERAL ARRANGEMENT - DAF WATERWAY 06 - PURPLE

SCALE 1:200

CULVERT SETOUT

POINT #	EASTING	NORTHING	ELEVATION	EXISTING GRADE
D1	348767.161	7052039.144	445.7000	-3%
U1	348776.714	7052038.201	446.2000	



CHAINAGE	CUT/FILL	EXISTING SURFACE	DESIGN CENTRELINE
2030.000	-0.891	451.478	450.587
2036.950	-1.170	451.563	450.393
2040.000	-1.300	451.580	450.280
2052.370	-2.052	451.700	449.648
2057.190	-2.283	451.648	449.365
2060.000	-2.345	451.564	449.219
2070.000	-2.013	450.829	448.817
2080.000	-1.481	450.077	448.596
2087.134	-0.886	449.436	448.550
2100.000	1.918	446.632	448.550
2114.052	-1.363	449.913	448.550
2120.000	-2.136	450.718	448.582
2131.447	-2.860	451.685	448.825
2140.000	-3.048	452.210	449.162
2142.000	-3.079	452.339	449.260
2160.000	-2.364	452.833	450.469
2170.000	-1.817	453.212	451.396

LONGITUDINAL SECTION MC117

Horizontal scale 1:200

Vertical scale 1:200

DESIGN BASIS/NOTES:

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0 50 100mm

4 2 0 4 8

SCALE BAR (m) 1:200

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E	18.09.2024	ISSUED FOR DAF APPROVAL	KK	RA	RA

Vestas WGA

TARONG WIND FARM

CIVIL WORKS

DAF WATERWAY 06 - PURPLE

GENERAL ARRANGEMENT

A1 | DOCUMENT NUMBER | Project Number | Sheet No. | Rev. | Design | Drawn

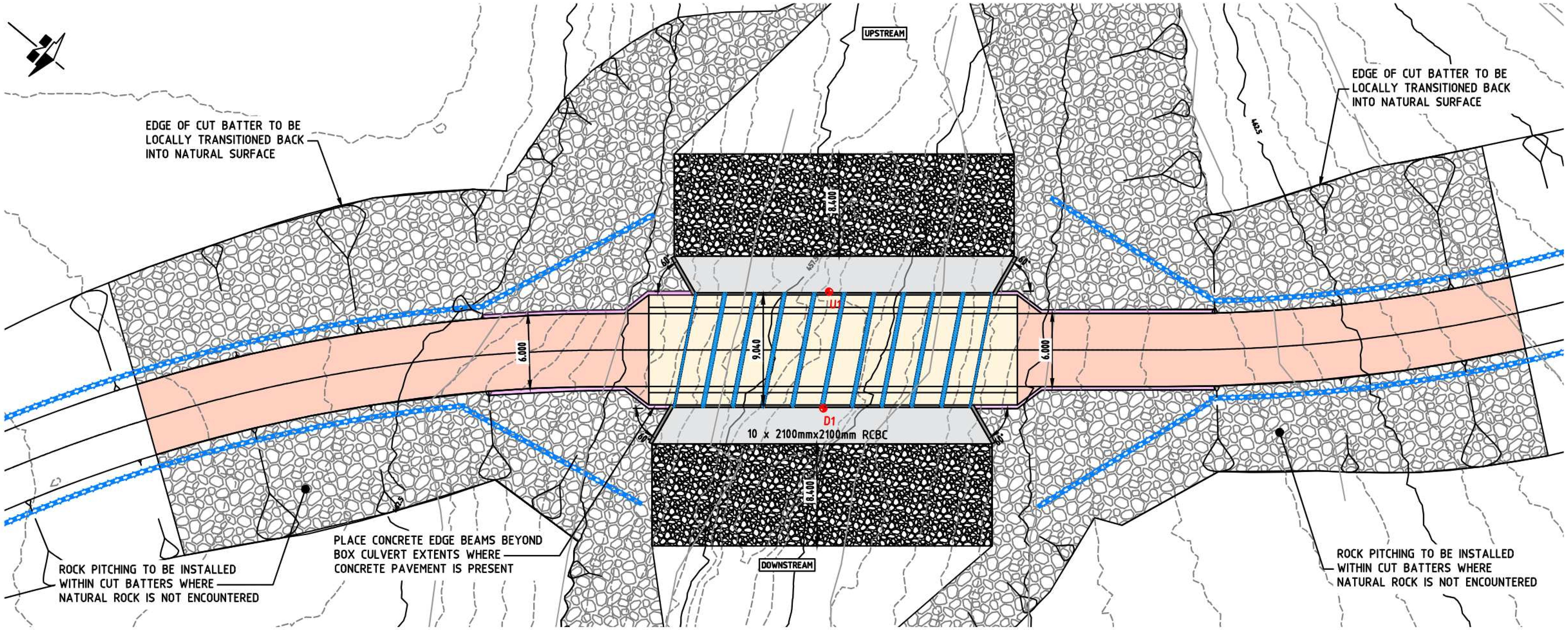
WGA221123-DR-CV-0661 E

LEGEND:

464.56	EXISTING LEVELS
	EXISTING CONTOURS
P.19.600	DESIGN LEVELS
	TABLE DRAIN
	DISTURBANCE FOOTPRINT
	CTQR PAVEMENT (300mm THICK 3% CEMENT STABILISED QUARRY RUBBLE - REFER DRG 0672 FOR DETAILS)
	ROCK PITCHING. MINIMUM 800mm THICK SITE WON ROCK (D50=400mm) ON BIDIM A34 GEOFABRIC
	CONCRETE HEADWALL AND APRON CAST INSITU (REFER DRG 0672 FOR DETAILS)
	EXTENT OF CONCRETE PAVEMENT (250mm THICK N40 SLAB - REFER TO DRG 0673 FOR DETAILS)
	CONCRETE EDGE BEAM (REFER DRG 0673 FOR DETAILS)
	ROCK PITCHING. MINIMUM 600mm THICK SITE WON ROCK (D50 = 300mm) ON BIDIM A34 GEOFABRIC

NOTES:

1. EMBANKMENT SLOPES SHALL BE AS PER THE FOLLOWING:
   - CONCRETE HEADWALL AT MAXIMUM 1:1 SLOPE.
   - ROCK PITCHING AT MAXIMUM 1:2 SLOPE.
   - ALL OTHER FILL/CUT BATTERS, AS PER STANDARD WINDFARM DESIGN CRITERIA.
2. CROSSING HAS BEEN DESIGNED TO PROTECT AGAINST SCOUR AND OVERTOPPING EROSION UP TO THE 20% AEP STORM EVENT
3. CULVERT SET OUT TO BE VERIFIED ONSITE BY THE CONTRACTOR. CULVERT SET OUT PROVIDED IN THE ENCLOSED SCHEDULES MAY NEED LOCAL ADJUSTMENTS TAKING INTO ACCOUNT:
   - DAF WATERWAY REQUIREMENTS AS DETAILED.
   - VERTICAL SET OUT DISCREPANCIES THAT MAY OCCUR IN USING THE PROVIDED SURVEY INFORMATION
4. CULVERT CELLS HAVE BEEN ALIGNED TO RUN PARALLEL (WITHIN 10 DEGREES) TO THE DIRECTION OF FLOW AT THE POINT OF THE CROSSING TO MINIMISE TURBULENCE WITHIN THE CULVERTS.

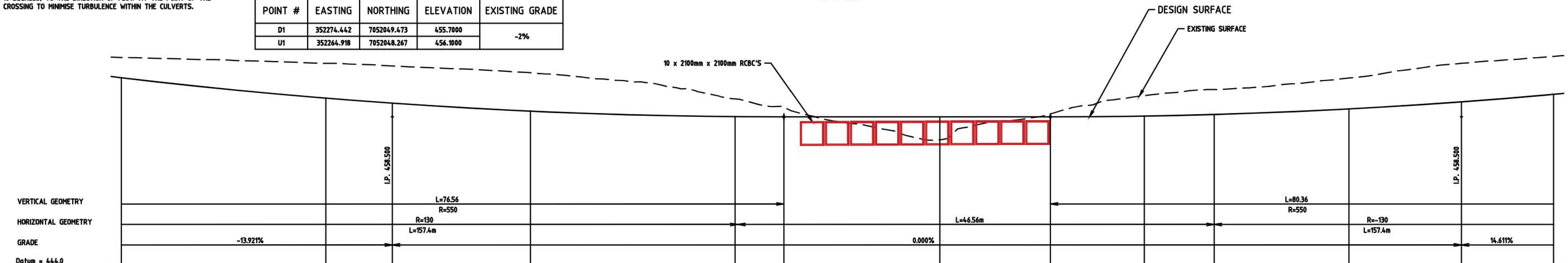


CULVERT SETOUT

POINT #	EASTING	NORTHING	ELEVATION	EXISTING GRADE
D1	352274.442	7052049.473	455.7000	-2%
U1	352264.918	7052048.267	456.1000	

GENERAL ARRANGEMENT - DAF WATERWAY 07 - PURPLE

SCALE 1:200



CUT/FILL	-1.986	-3.401	-3.633	-3.752	-1.734	-0.916	2.250	-0.289	-2.001	-2.434	-3.012	-3.756	-3.705
EXISTING SURFACE	464.301	463.724	463.465	462.810	460.255	459.416	456.250	458.789	460.577	461.167	462.286	463.724	464.403
DESIGN CENTRELINE	462.315	460.323	459.832	459.058	458.521	458.500	458.500	458.500	458.577	458.733	459.274	459.968	460.699
CHAINAGE	2020.000	2040.000	2046.500	2060.000	2080.000	2084.782	2100.000	2110.820	2120.000	2126.830	2140.000	2151.000	2160.000

LONGITUDINAL SECTION MC02

Horizontal scale 1:200

Vertical scale 1:200

DESIGN BASIS/NOTES:

AS PER DEPARMENT OF AGRICULTURE AND FISHERIES (DAF) ACCEPTED DEVELOPMENT REQUIRMENTS FOR OPERATIONAL WORK THAT IS CONSTRUCTING OR RAISING WATERWAY BARRIER WORKS DATE EFFECTIVE 1ST OCTOBER 2018, THE CONSTRUCTION OF NEW CULVERT CROSSINGS ON MAJOR IMPACT (PURPLE) WATERWAYS IS NOT ACCEPTED DEVELOPMENT. IT IS ASSESSABLE DEVELOPMENT AND REQUIRES A DEVELOPMENT APPROVAL UNDER THE PLANNING ACT.

AS SUCH, DESIGN OF THE MAJOR IMPACT (PURPLE) WATERWAY HAS BEEN BASED ON REQUIREMENTS AND PERFORMANCE OUTCOMES OUTLINED IN THE QUEENSLAND GOVERNMENT - STATE DEVELOPMENT ASSESSMENT PROVISIONS GUIDE: STATE CODE 18: CONSTRUCTIING OR RAISING WATERWAY BARRIER WORKS IN FISH HABITATS, DATED MARCH 2022.

When sheet printed full size, the scale bar is 100mm.

0 50 100mm

SCALE BAR (m) 1:200

THIS DRAWING INCLUDES COLOURED INFORMATION

COPIES OF THIS DRAWING MUST BE PRODUCED IN COLOUR

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

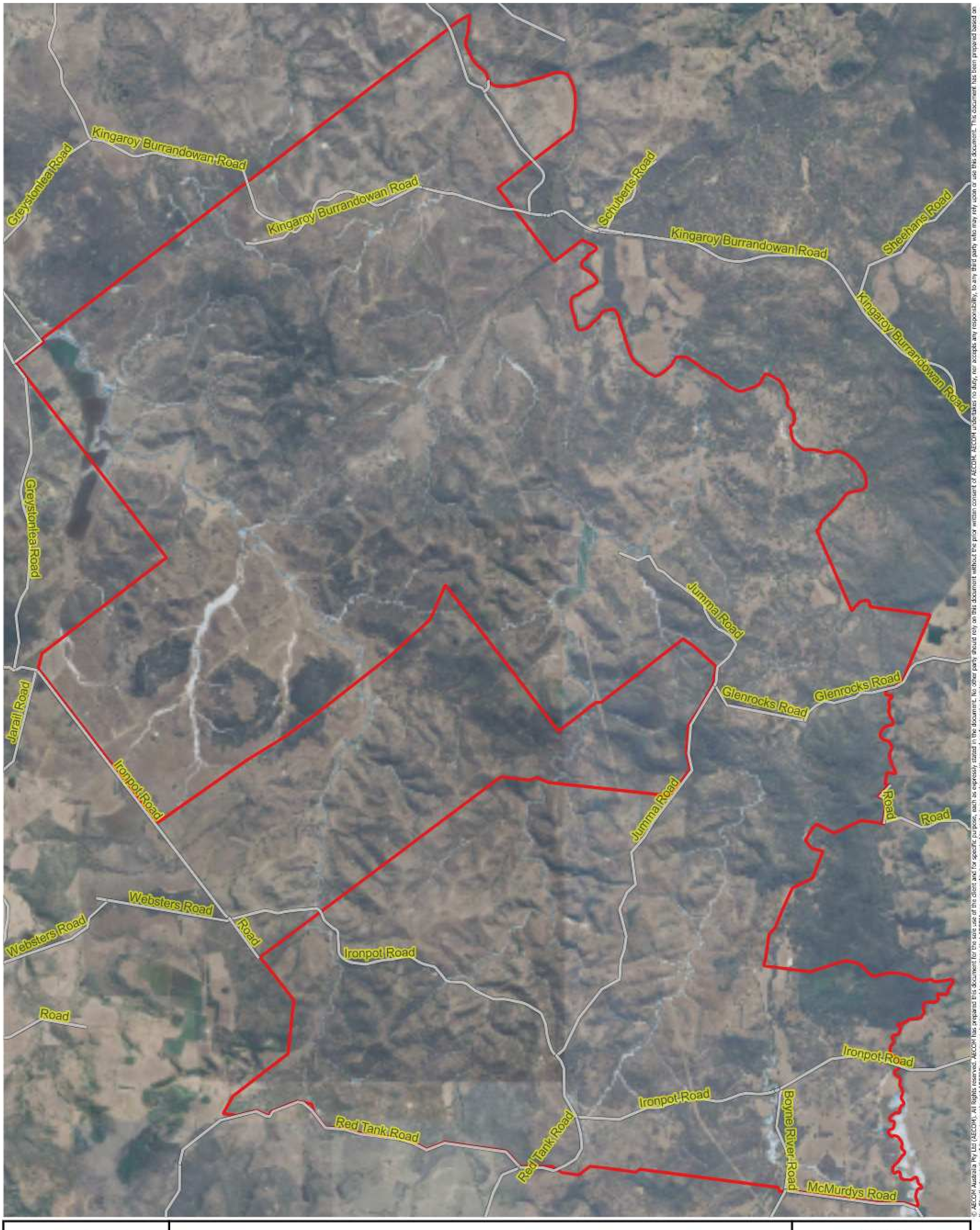
REV.	DATE	DESCRIPTION	DRAFT	ENG.	CHKD
A	14.06.2023	ISSUED FOR INFORMATION	JC	EN	MH
B	09.10.2023	ISSUED FOR PRELIMINARY DAF SUBMISSION	PM	EN	MH
C	07.02.2024	RE-ISSUED FOR PRELIMINARY DAF SUBMISSION	PM	RA	EN
D	14.08.2024	ISSUED FOR DAF APPROVAL	KK	RA	RA
E	18.09.2024	ISSUED FOR DAF APPROVAL	KK	RA	RA

Vestas WGA

TARONG WIND FARM
CIVIL WORKS
DAF WATERWAY 07 - PURPLE
GENERAL ARRANGEMENT

A1 DOCUMENT NUMBER

WGA221123-DR-CV-0671 E



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

Site_Boundary
Existing_Roads
Flood Depth(m)

Flood Depth (m)

<= 0.10	1.50 - 2.25
0.10 - 0.50	2.25 - 3.00
0.50 - 1.00	3.00 - 3.75
1.00 - 1.50	3.75 - 4.50
	4.50 - 5.00
	> 5.00

Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Depth (m)
Pre-Developed: 20% AEP

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 1

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz

AECOM

NORTH

GDA94 / MGA zone 56 EPSG:28356

0 0.9 1.8 km

Legend

- Site_Boundary
- Existing_Roads

Flood Depth(m)

Flood Depth (m)

- <= 0.10
- 0.10 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.25
- 2.25 - 3.00
- 3.00 - 3.75
- 3.75 - 4.50
- 4.50 - 5.00
- > 5.00

Attribution of Sources: © Google Satellite Imagery

TWWF

Map Type: Depth (m)

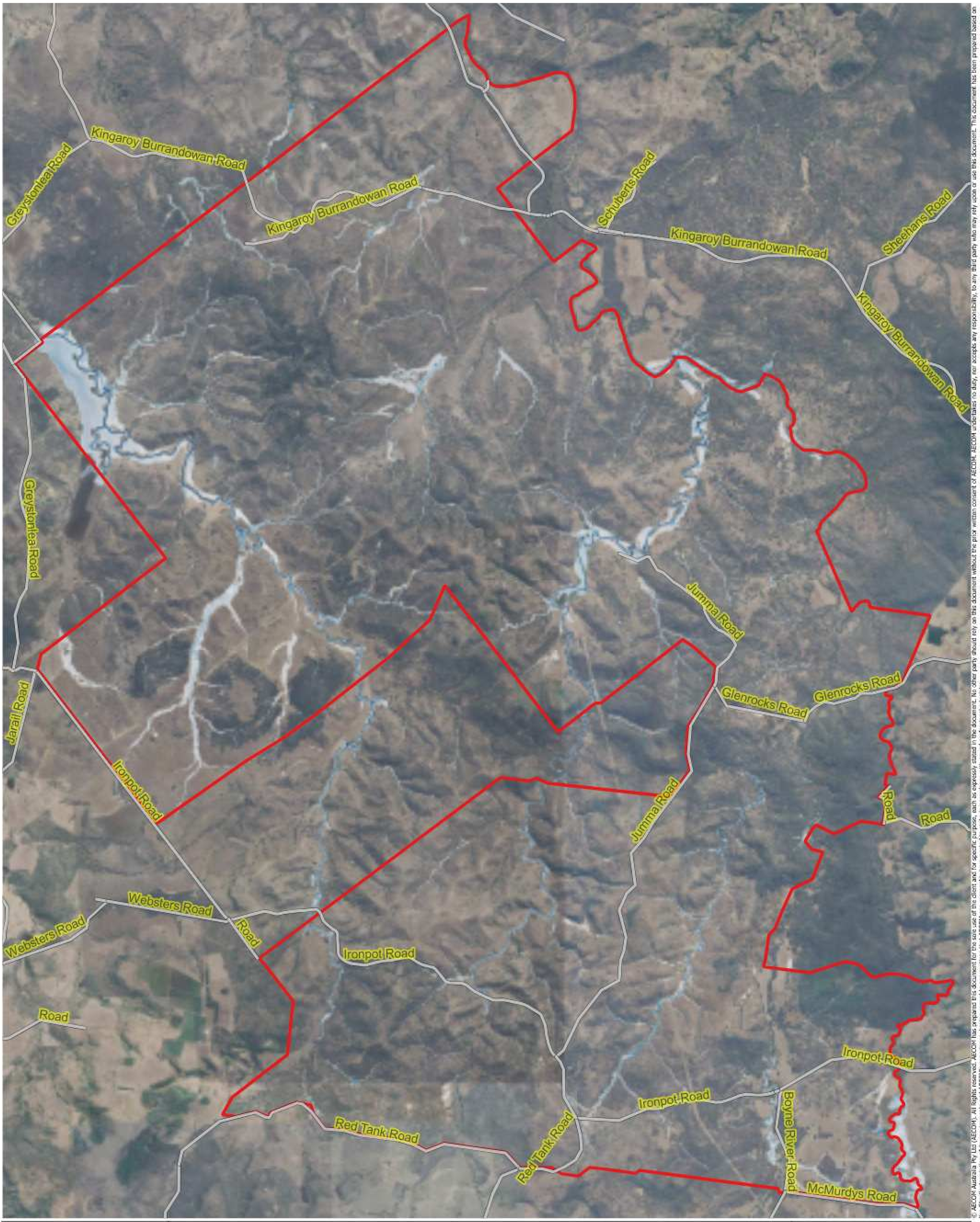
Pre-Developed: 1% AEP

LAST MODIFIED: 2025-05-14

VERSION: 0

MAP 2

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

Site_Boundary
Existing_Roads
Flood Depth(m)

Flood Depth (m)
<= 0.10
0.10 - 0.50
0.50 - 1.00
1.00 - 1.50
1.50 - 2.25
2.25 - 3.00
3.00 - 3.75
3.75 - 4.50
4.50 - 5.00
> 5.00

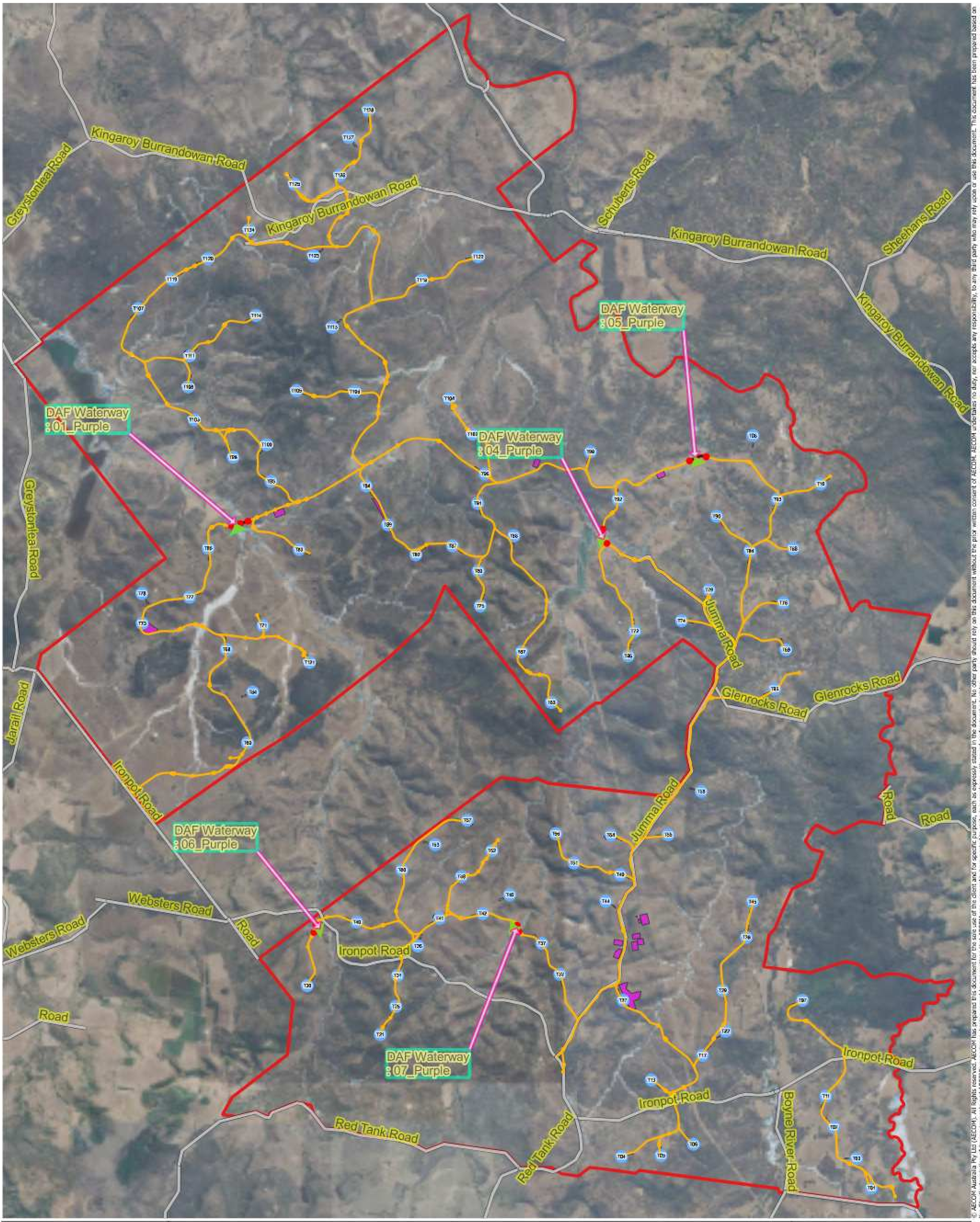
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Depth (m)
Pre-Developed: 0.5% AEP

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 3

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads

Flood Depths (m)

- <= 0.10
- 0.10 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.25
- 2.25 - 3.00
- 3.00 - 3.75
- 3.75 - 4.50
- 4.50 - 5.00
- > 5.00

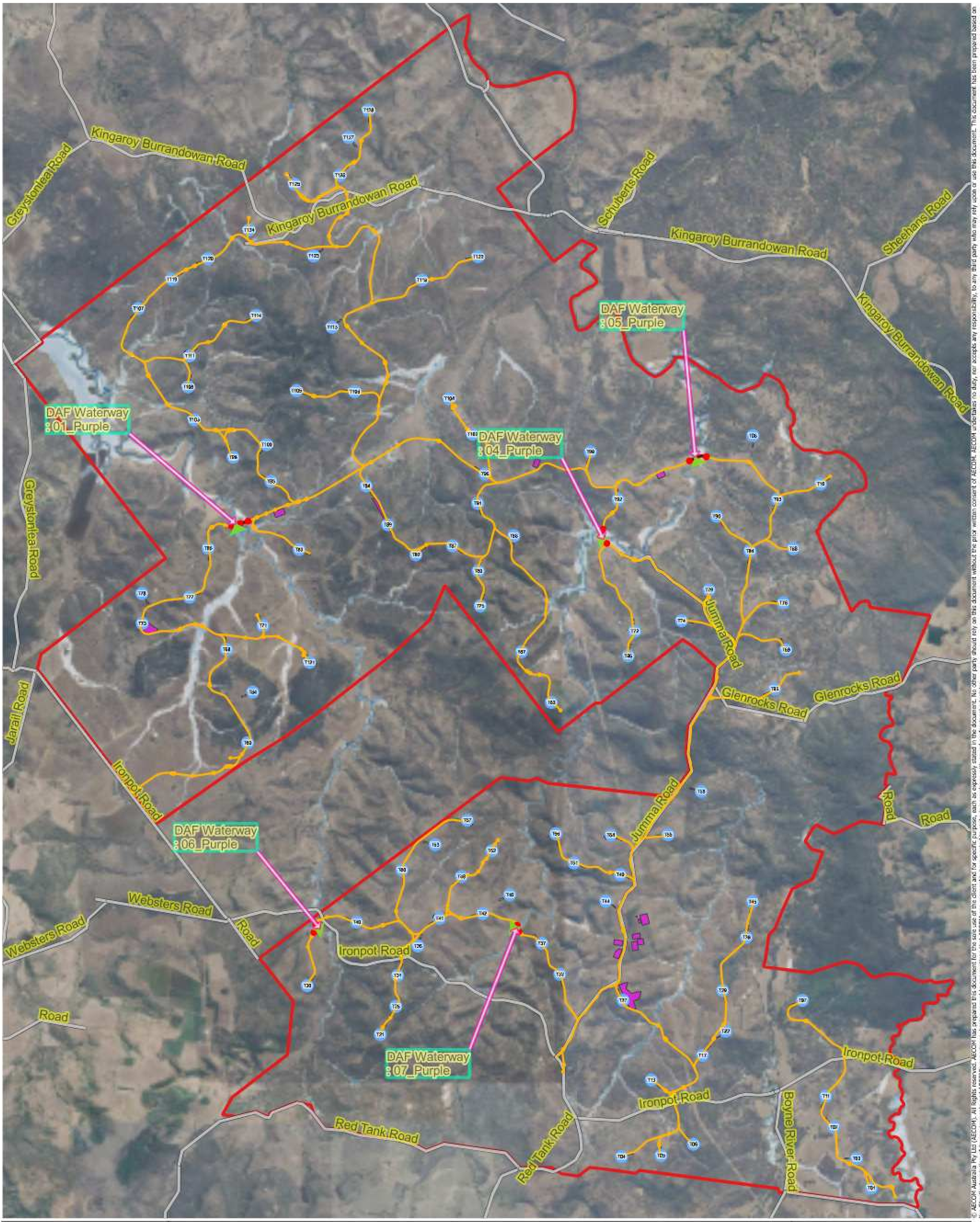
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Depth (m)
Post-Developed: 20% AEP

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 4

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356

0 0.9 1.8 km

Legend

- Designed Culverts
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads

Flood Depths (m)

- <= 0.10
- 0.10 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.25
- 2.25 - 3.00
- 3.00 - 3.75
- 3.75 - 4.50
- 4.50 - 5.00
- > 5.00

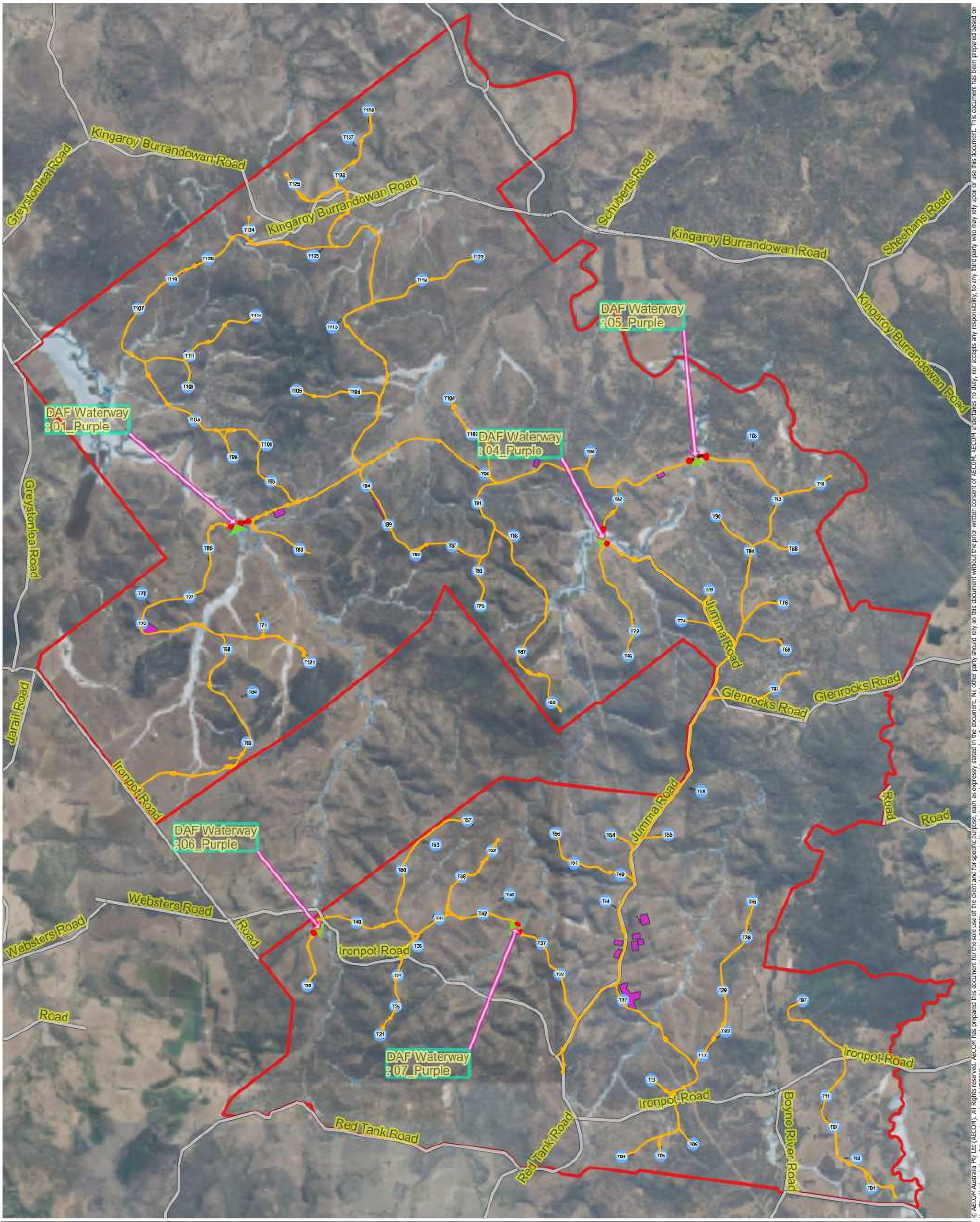
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Depth (m)
Post-Developed: 1% AEP

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 5

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356

0 0.9 1.8 km

Legend

- Designed Culverts
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads

Flood Depths (m)

- <= 0.10
- 0.10 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.25
- 2.25 - 3.00
- 3.00 - 3.75
- 3.75 - 4.50
- 4.50 - 5.00
- > 5.00

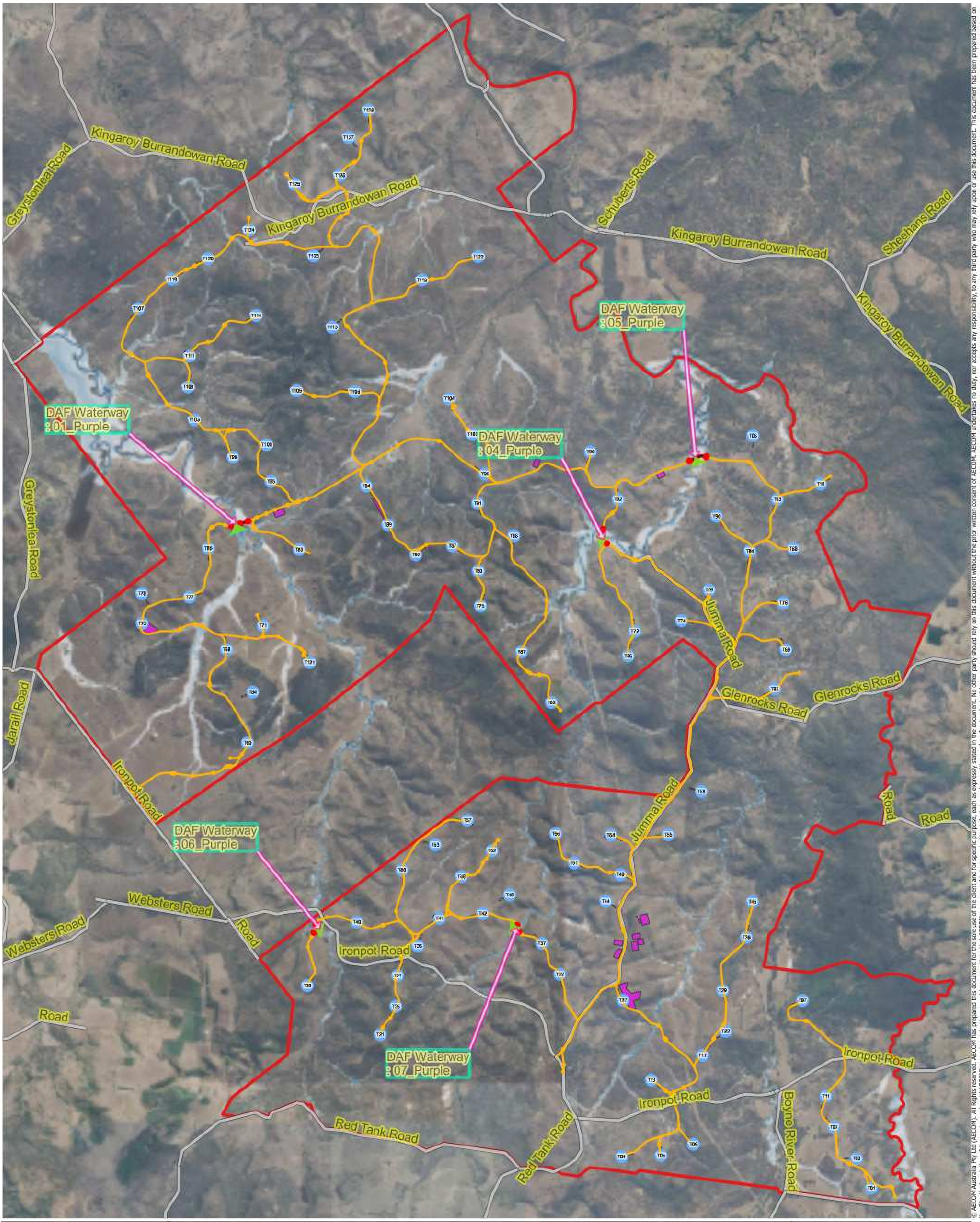
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Depth (m)
Post-Developed:
1%AEP + 10pcBLK

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 6

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356

0 0.9 1.8 km

Legend

- Designed Culverts
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads

Flood Depths (m)

- <= 0.10
- 0.10 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.25
- 2.25 - 3.00
- 3.00 - 3.75
- 3.75 - 4.50
- 4.50 - 5.00
- > 5.00

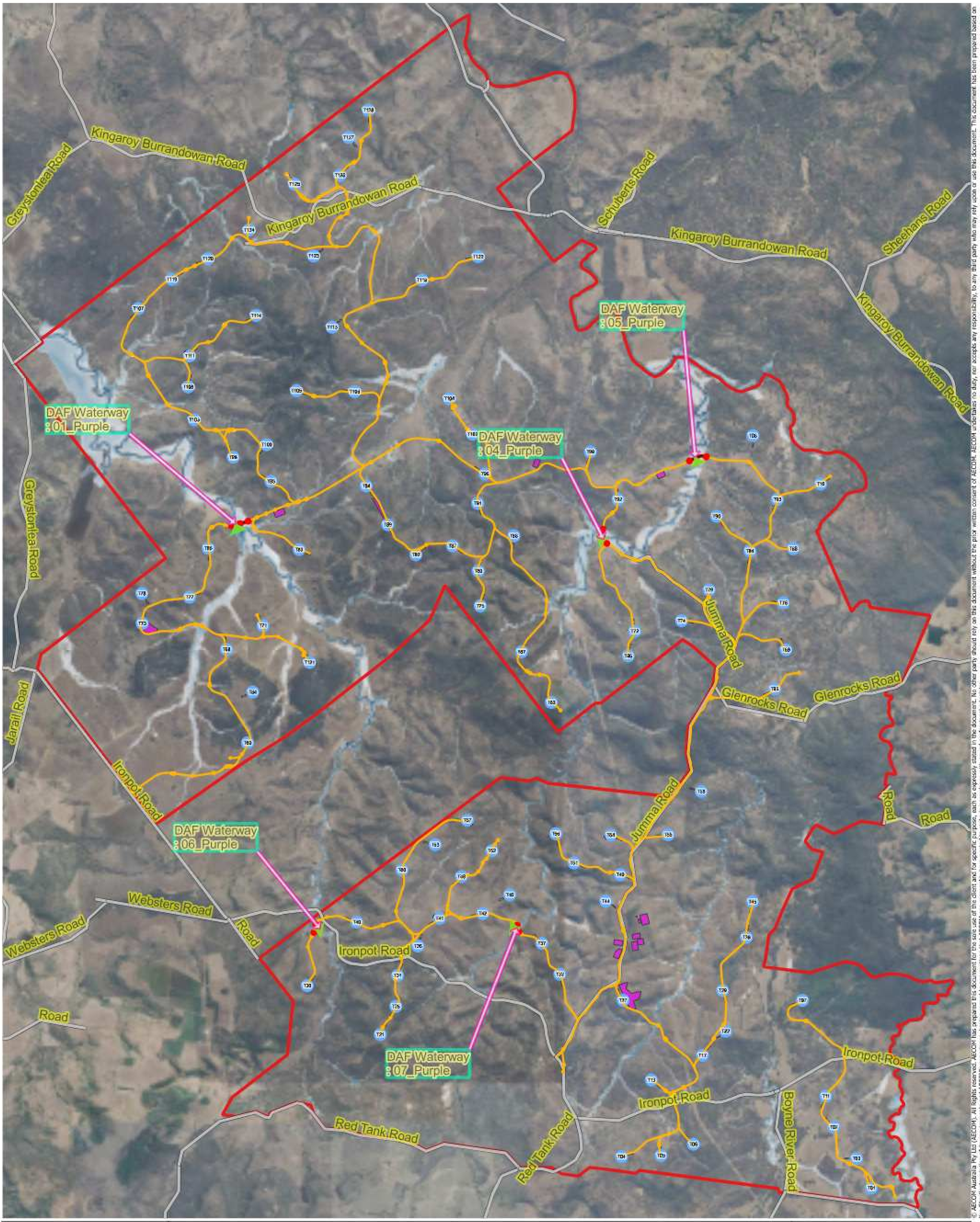
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Depth (m)
Post-Developed: 0.5% AEP

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 7

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads

Flood Depths (m)

- <= 0.10
- 0.10 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.25
- 2.25 - 3.00
- 3.00 - 3.75
- 3.75 - 4.50
- 4.50 - 5.00
- > 5.00

Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Depth (m)
Post-Developed: 1% AEP+CC_2090_RCP_8.5

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 8

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz

AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

Site_Boundary	Velocity (m/s)	1.50 - 2.00	3.50 - 4.00
Existing_Roads	<= 0.50	2.00 - 2.50	4.00 - 4.50
	0.50 - 1.00	2.50 - 3.00	> 4.50
	1.00 - 1.50	3.00 - 3.50	

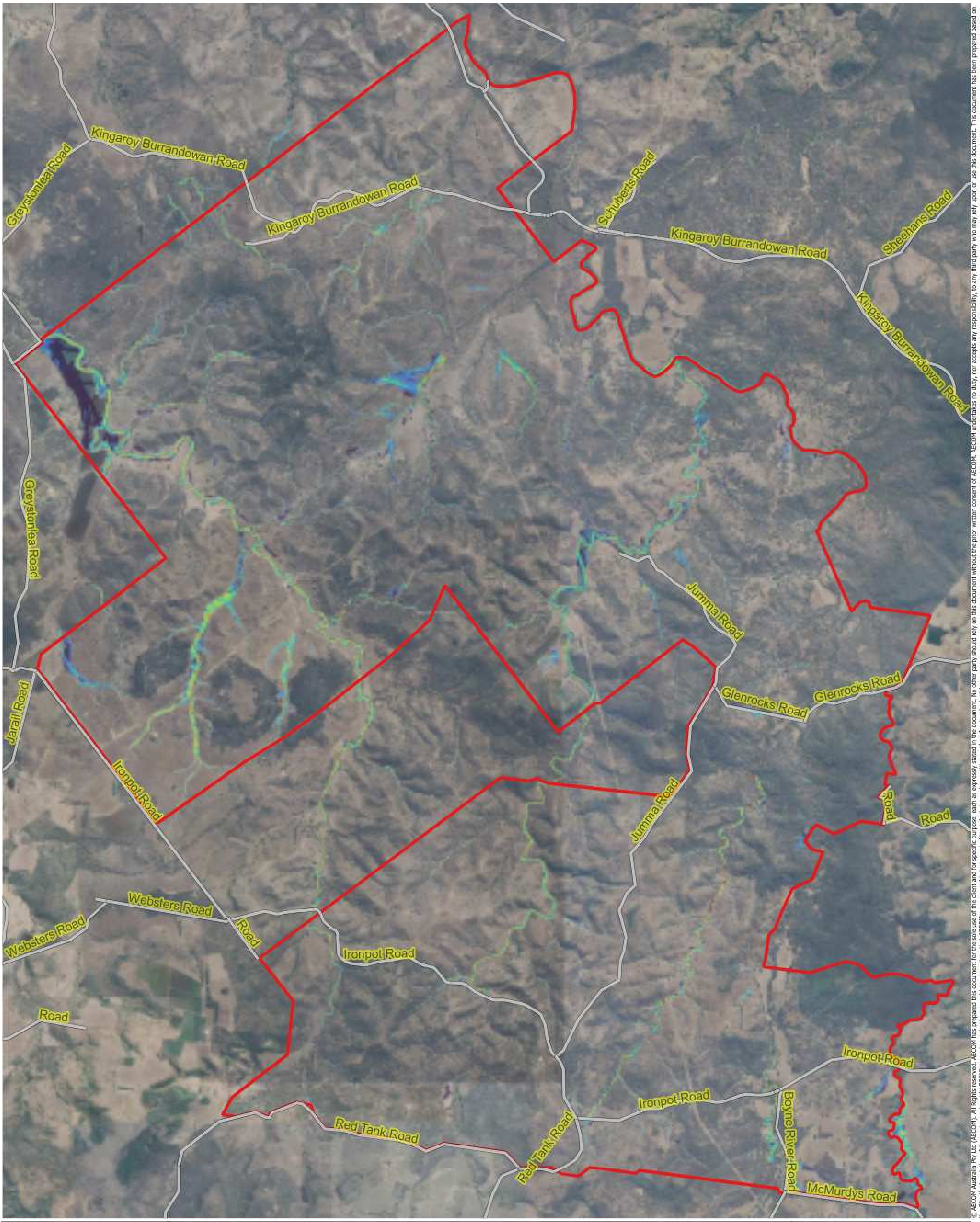
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Velocity (m/s)
Pre-Developed: 20% AEP

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 9

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

Site_Boundary	Velocity (m/s)	1.50 - 2.00	3.50 - 4.00
Existing_Roads	<= 0.50	2.00 - 2.50	4.00 - 4.50
	0.50 - 1.00	2.50 - 3.00	> 4.50
	1.00 - 1.50	3.00 - 3.50	

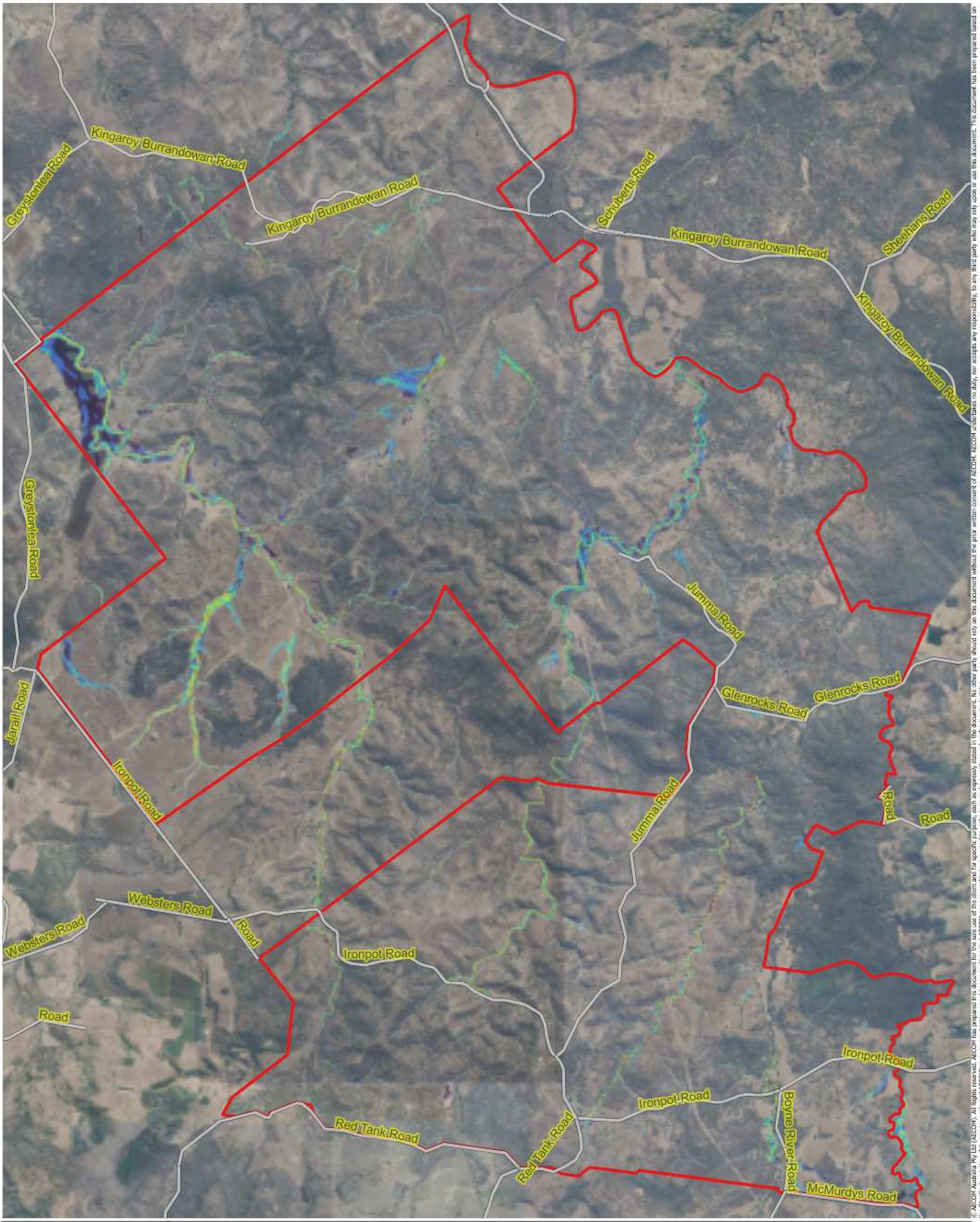
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Velocity (m/s)
Pre-Developed: 1% AEP

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 10

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

Site_Boundary
Existing_Roads

Velocity (m/s)
<= 0.50
0.50 - 1.00
1.00 - 1.50
1.50 - 2.00
2.00 - 2.50
2.50 - 3.00
3.00 - 3.50
3.50 - 4.00
4.00 - 4.50
> 4.50

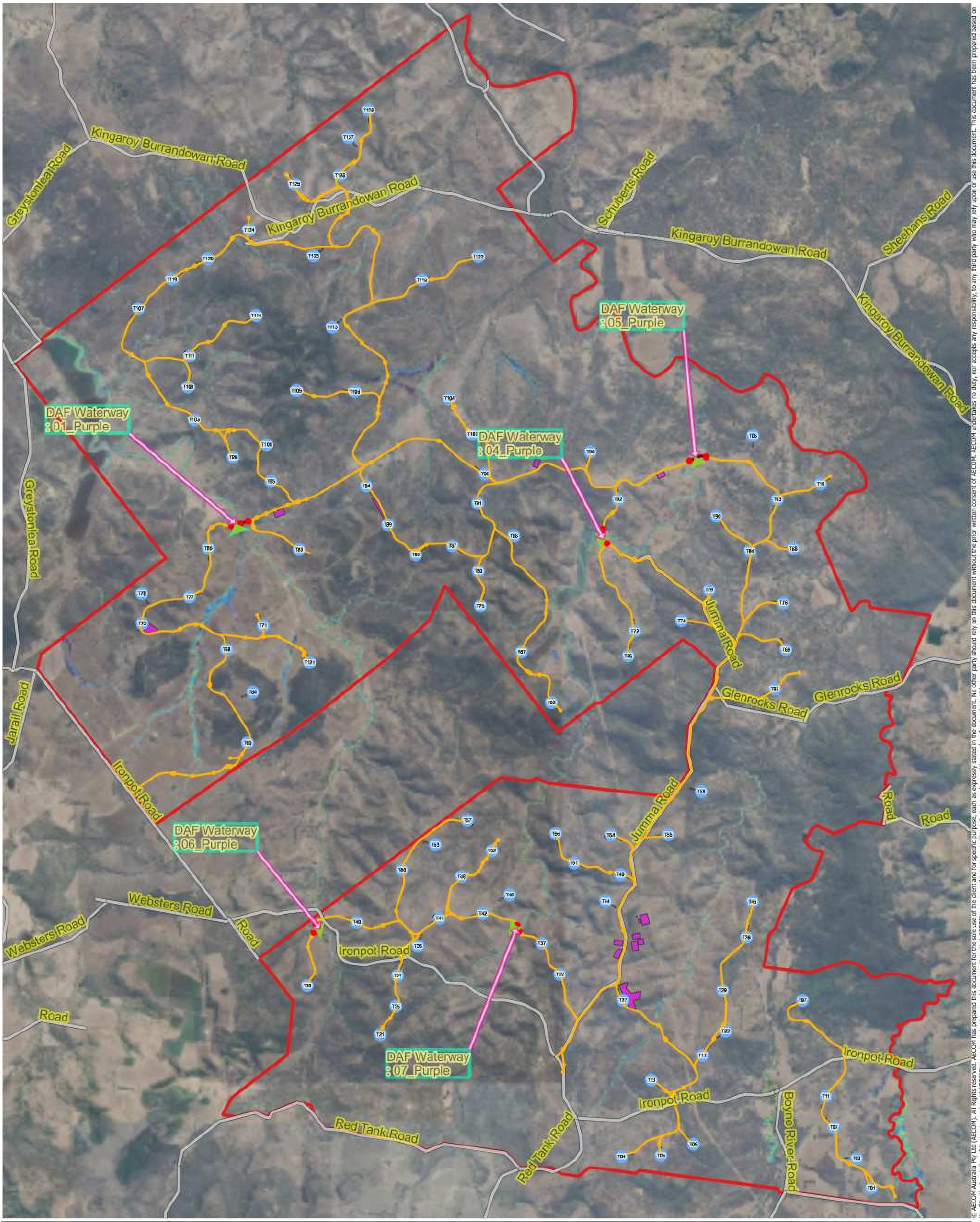
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Velocity (m/s)
Pre-Developed: 0.5% AEP

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 11

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Velocity (m/s)

- <= 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 4.50
- > 4.50

AECOM

NORTH

GDA94 / MGA zone 56 EPSG:28356

0 0.9 1.8 km

Sources: © Google Satellite Imagery

TWWF

Map Type: Velocity (m/s)

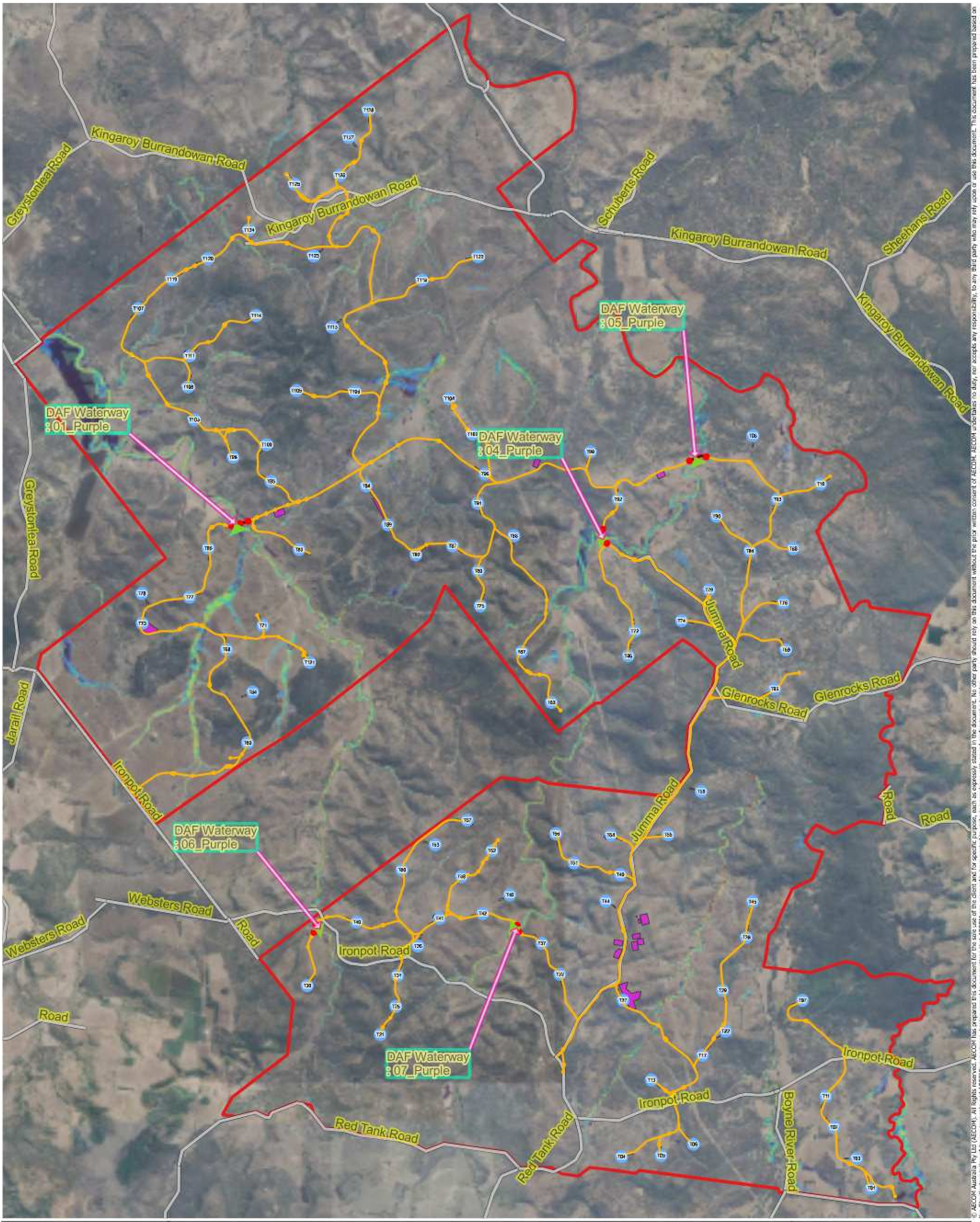
Post-Developed: 20% AEP

LAST MODIFIED: 2025-05-14

VERSION: 0

MAP 12

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Velocity (m/s)

- <= 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 4.50
- > 4.50

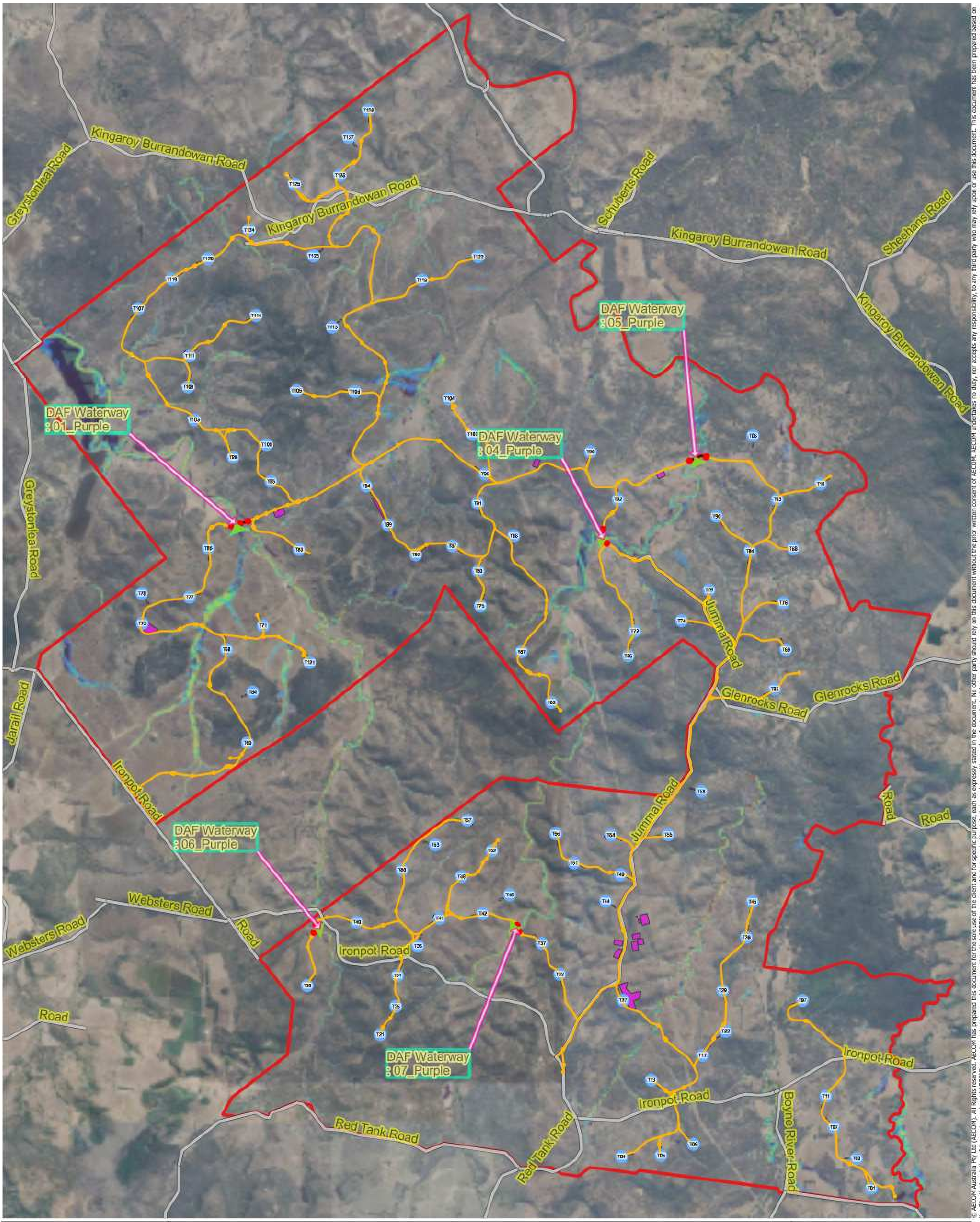
Sources: © Google Satellite Imagery

TWWF
Map Type: Velocity (m/s)
Post-Developed: 1% AEP

LAST MODIFIED: 2025-05-16
VERSION: 0

MAP 13

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Velocity (m/s)

- <= 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 4.50
- > 4.50

Sources: © Google Satellite Imagery

TWWF
Map Type: Velocity (m/s)
Post-Developed: 1%AEP + 10pcBLK

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 14

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz

AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Velocity (m/s)

- <= 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 4.50
- > 4.50

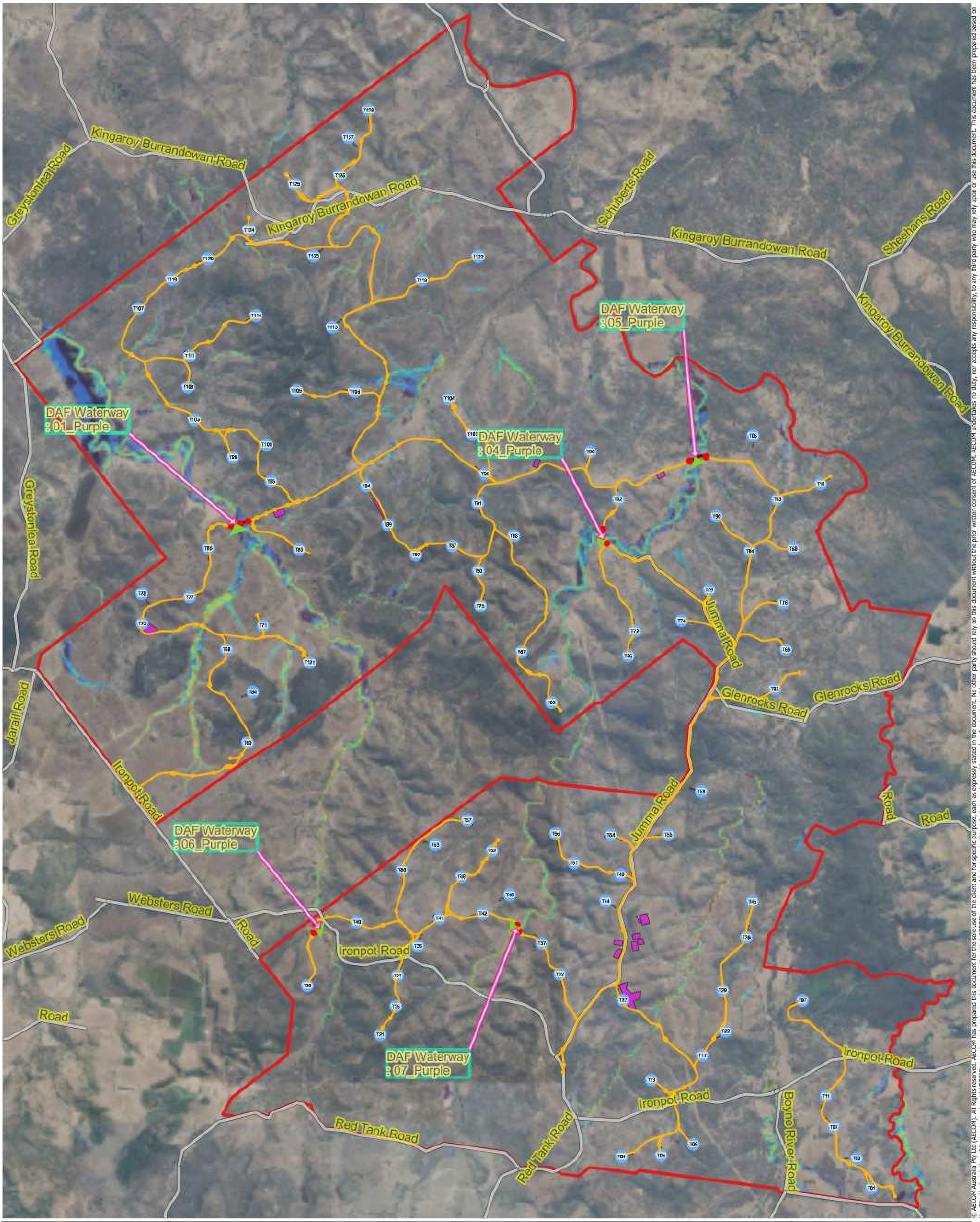
Sources: © Google Satellite Imagery

TWWF
Map Type: Velocity (m/s)
Post-Developed: 0.5% AEP

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 15

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Velocity (m/s)

- <= 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 4.50
- > 4.50

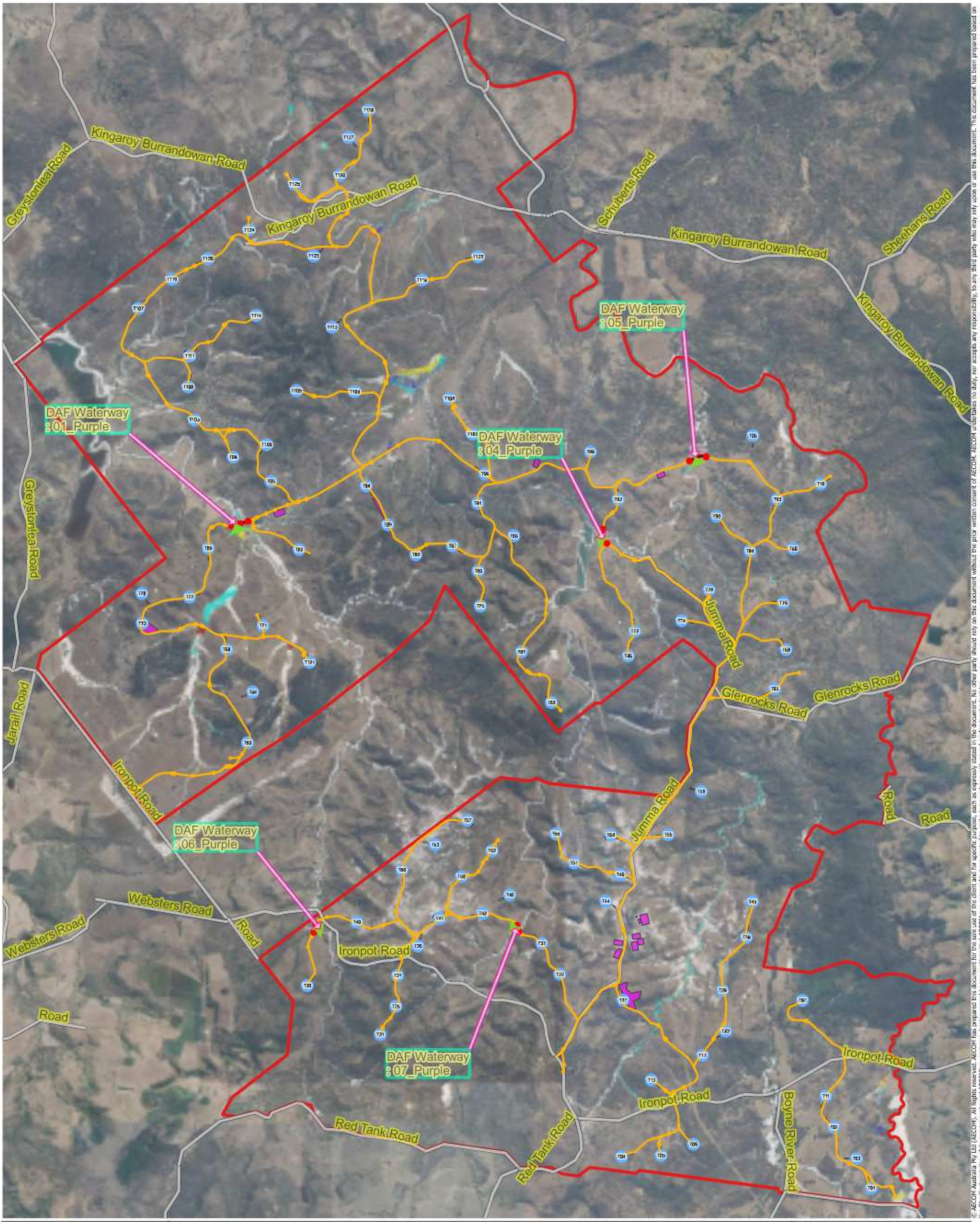
Sources: © Google Satellite Imagery

TWWF
Map Type: Velocity (m/s)
Post-Developed: 1% AEP+CC_2090_RCP_8.5

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 16

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Afflux (m)

- <= -0.25
- -0.25 - -0.15
- -0.15 - -0.05
- -0.05 - -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.075
- 0.075 - 0.1
- 0.10 - 0.125
- 0.125 - 0.15
- 0.15 - 0.25
- > 0.25

Afflux_wd

- Was Wet Now Dry
- Was Dry Now Wet

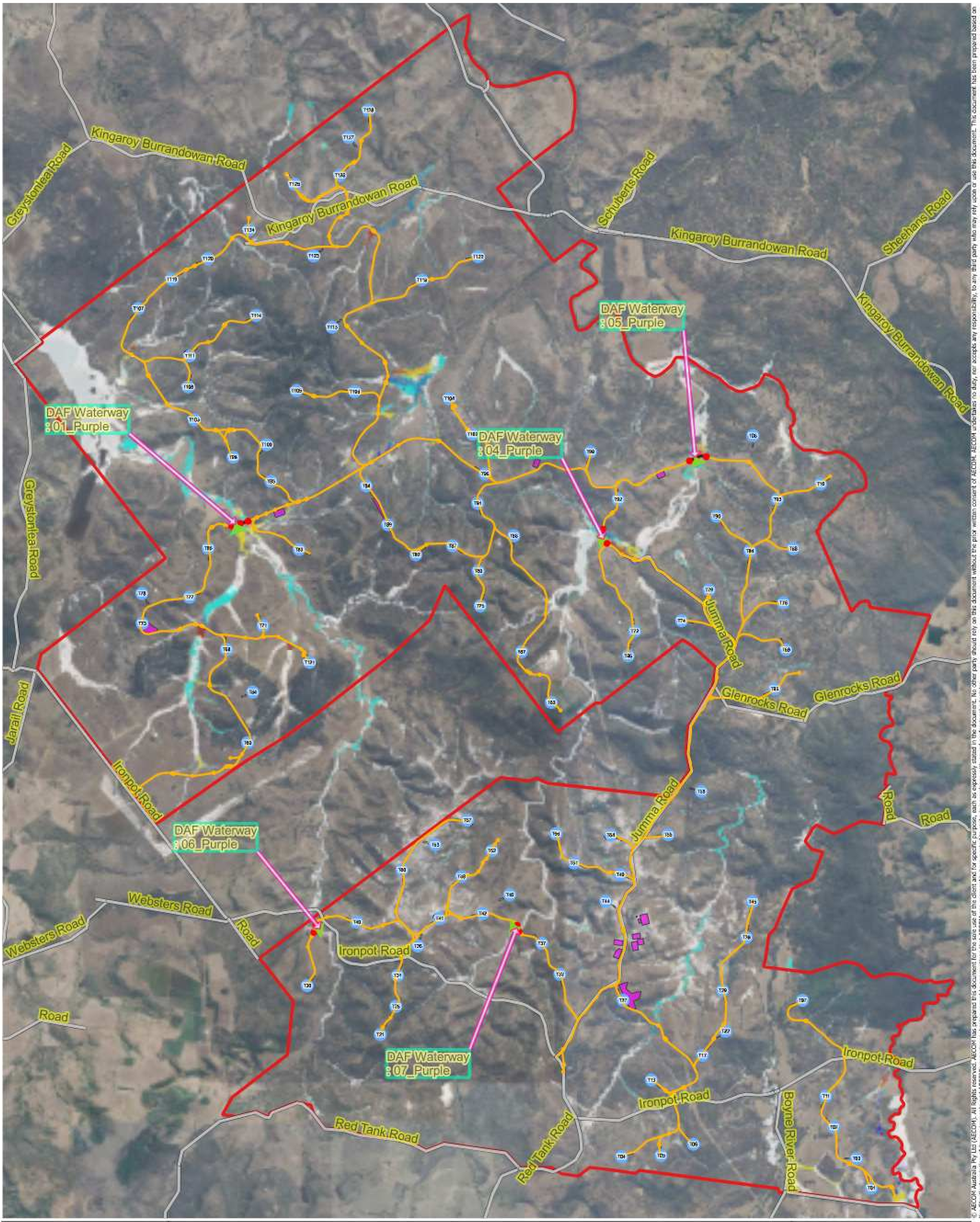
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Afflux (m)
Impacts-Afflux: 20% AEP Post Dev minus 20% AEP Pre Dev

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 17

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Afflux (m)

- <= -0.25
- -0.25 - -0.15
- -0.15 - -0.05
- -0.05 - -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.075
- 0.075 - 0.1
- 0.10 - 0.125
- 0.125 - 0.15
- 0.15 - 0.25
- > 0.25

Afflux_wd

- Was Wet Now Dry
- Was Dry Now Wet

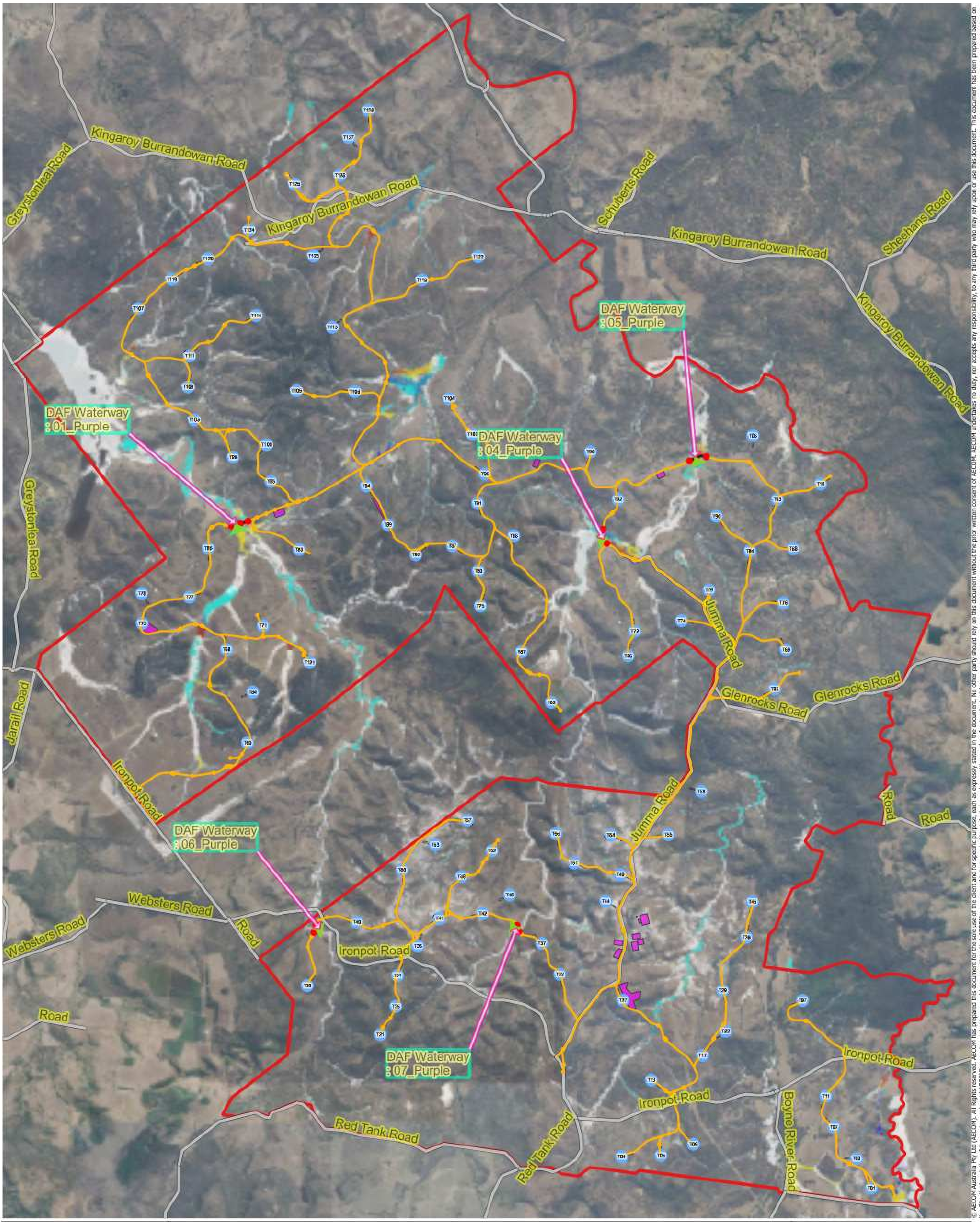
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Afflux (m)
Impacts-Afflux: 1% AEP Post Dev minus 1% AEP Pre Dev

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 18

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Afflux (m)

- <= -0.25
- -0.25 - -0.15
- -0.15 - -0.05
- -0.05 - -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.075
- 0.075 - 0.1
- 0.10 - 0.125
- 0.125 - 0.15
- 0.15 - 0.25
- > 0.25

Afflux_wd

- Was Wet Now Dry
- Was Dry Now Wet

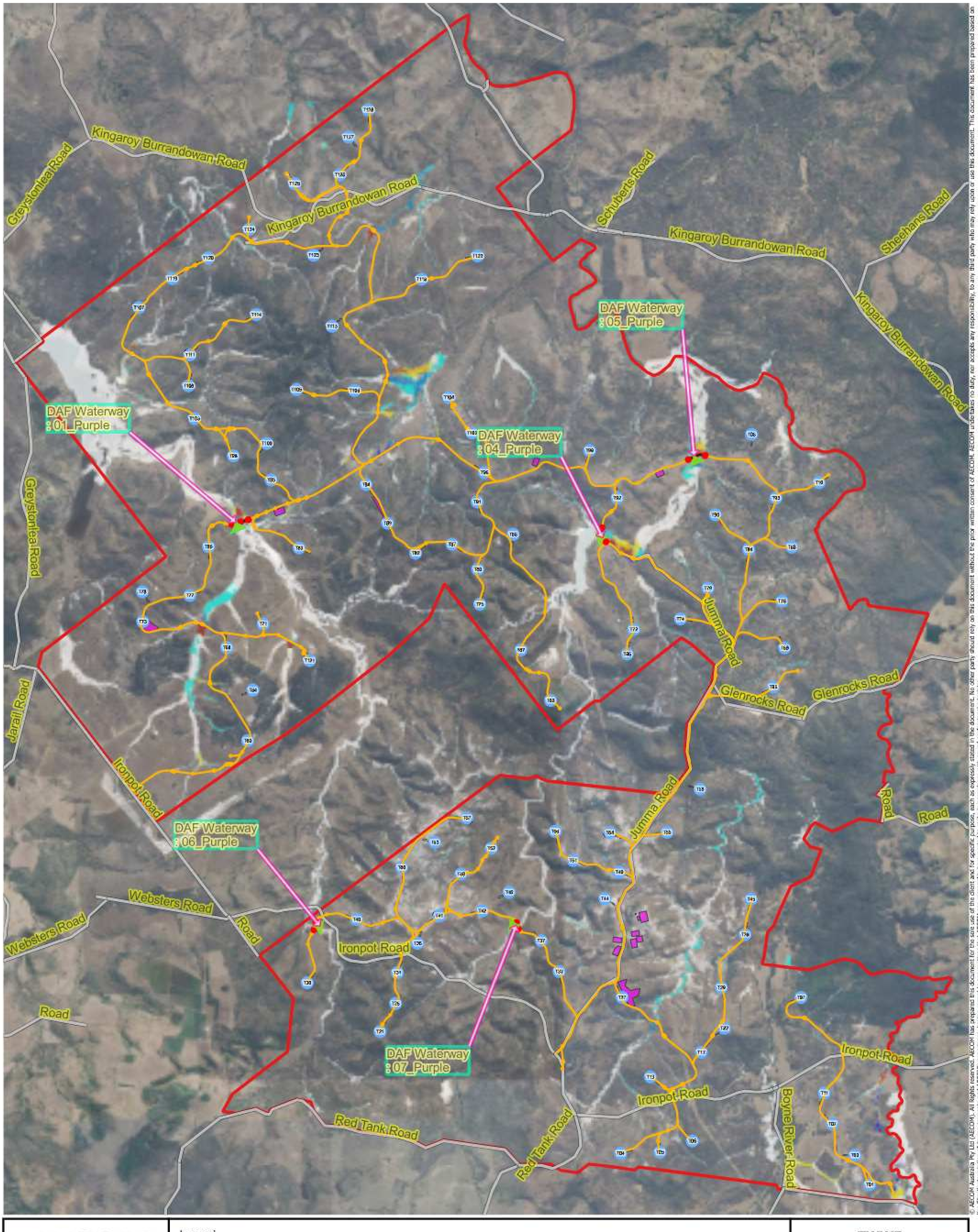
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Afflux (m)
Impacts-Afflux: 1% AEP + 10pcBLK Post Dev minus 1% AEP Pre Dev

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 19

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Afflux (m)

- <= -0.25
- -0.25 - -0.15
- -0.15 - -0.05
- -0.05 - -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.075
- 0.075 - 0.1
- 0.10 - 0.125
- 0.125 - 0.15
- 0.15 - 0.25
- > 0.25

Afflux_wd

- Was Wet Now Dry
- Was Dry Now Wet

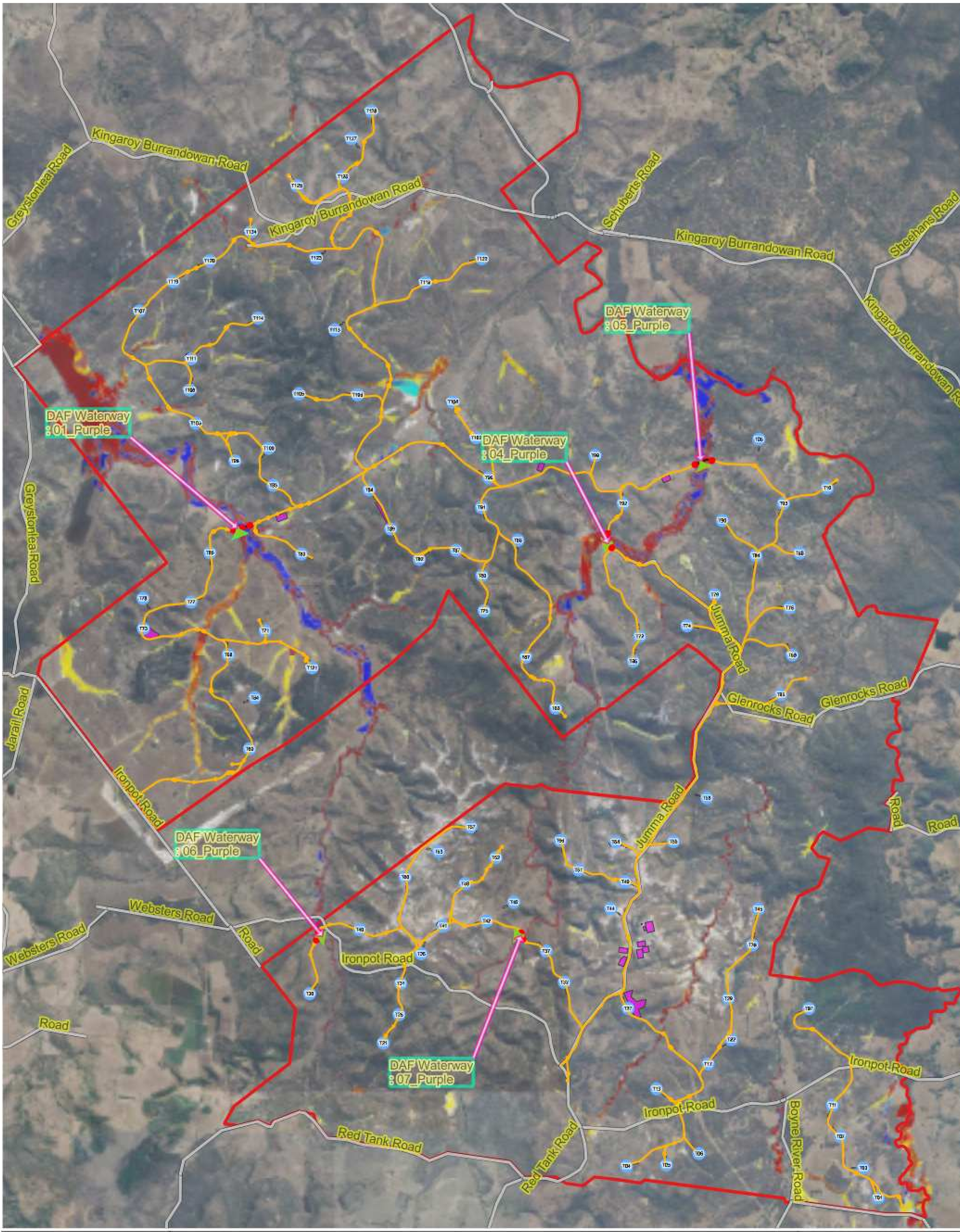
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Afflux (m)
Impacts-Afflux: 0.5% AEP Post Dev minus 0.5% AEP Pre Dev

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 20

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Road levels based on drawings
- Road raised 1.5m in hydraulic model
- Existing_Roads

Afflux (m)

- <= -0.25
- -0.25 - -0.15
- -0.15 - -0.05
- -0.05 - -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.075
- 0.075 - 0.1
- 0.10 - 0.125
- 0.125 - 0.15
- 0.15 - 0.25
- > 0.25

Afflux_wd

- Was Wet Now Dry
- Was Dry Now Wet

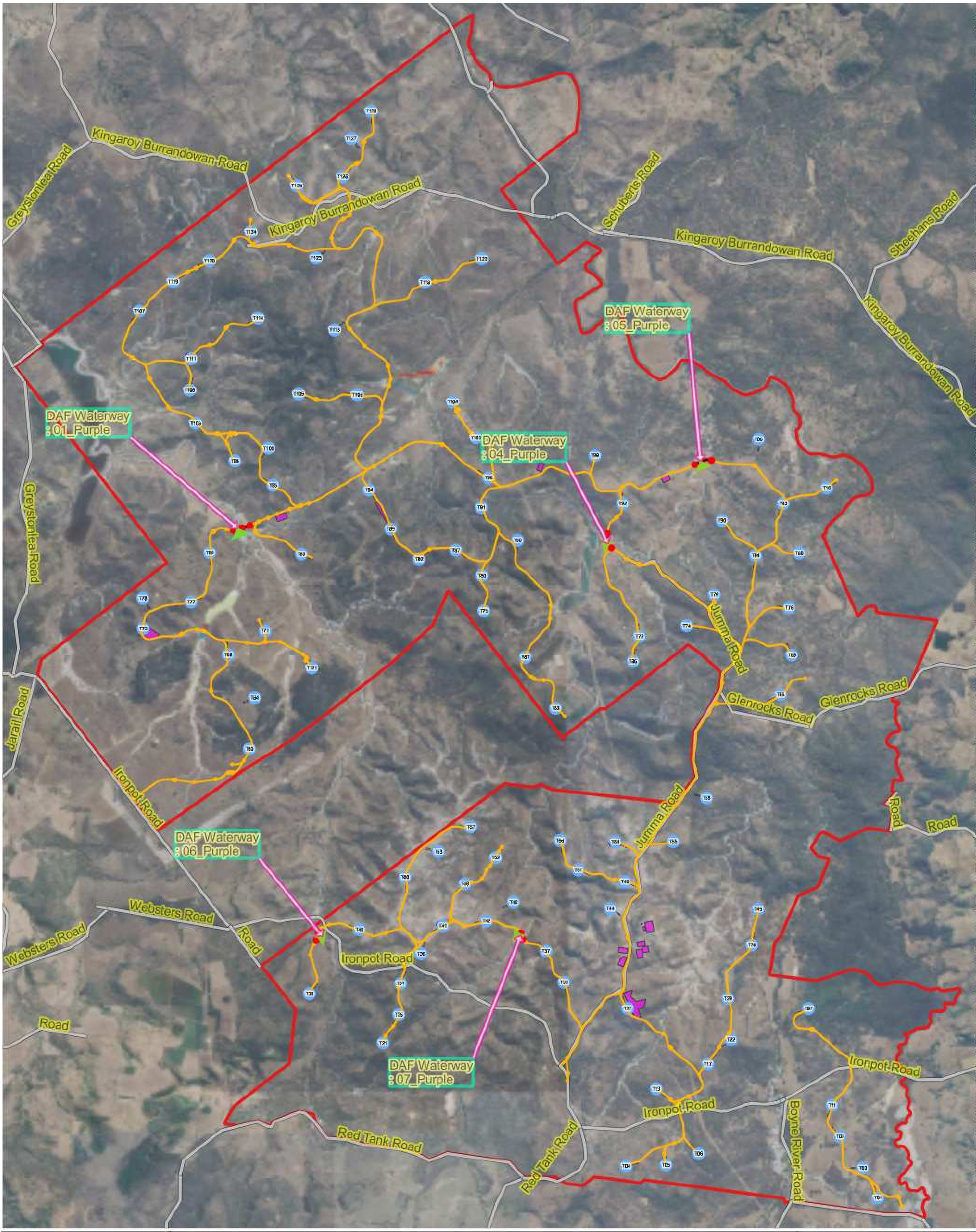
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Afflux (m)
Impacts-Afflux: 1% AEP+CC_2090_RCP_8.5 Post Dev minus 1% AEP Pre Dev

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 21

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356

0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads
- Road raised 1.5m in hydraulic model
- Road levels based on drawings

Change in Velocity (m/s)

- < -0.20
- -0.20 to -0.15
- -0.15 to -0.10
- -0.10 to -0.05
- -0.05 to 0.00
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- > 0.20

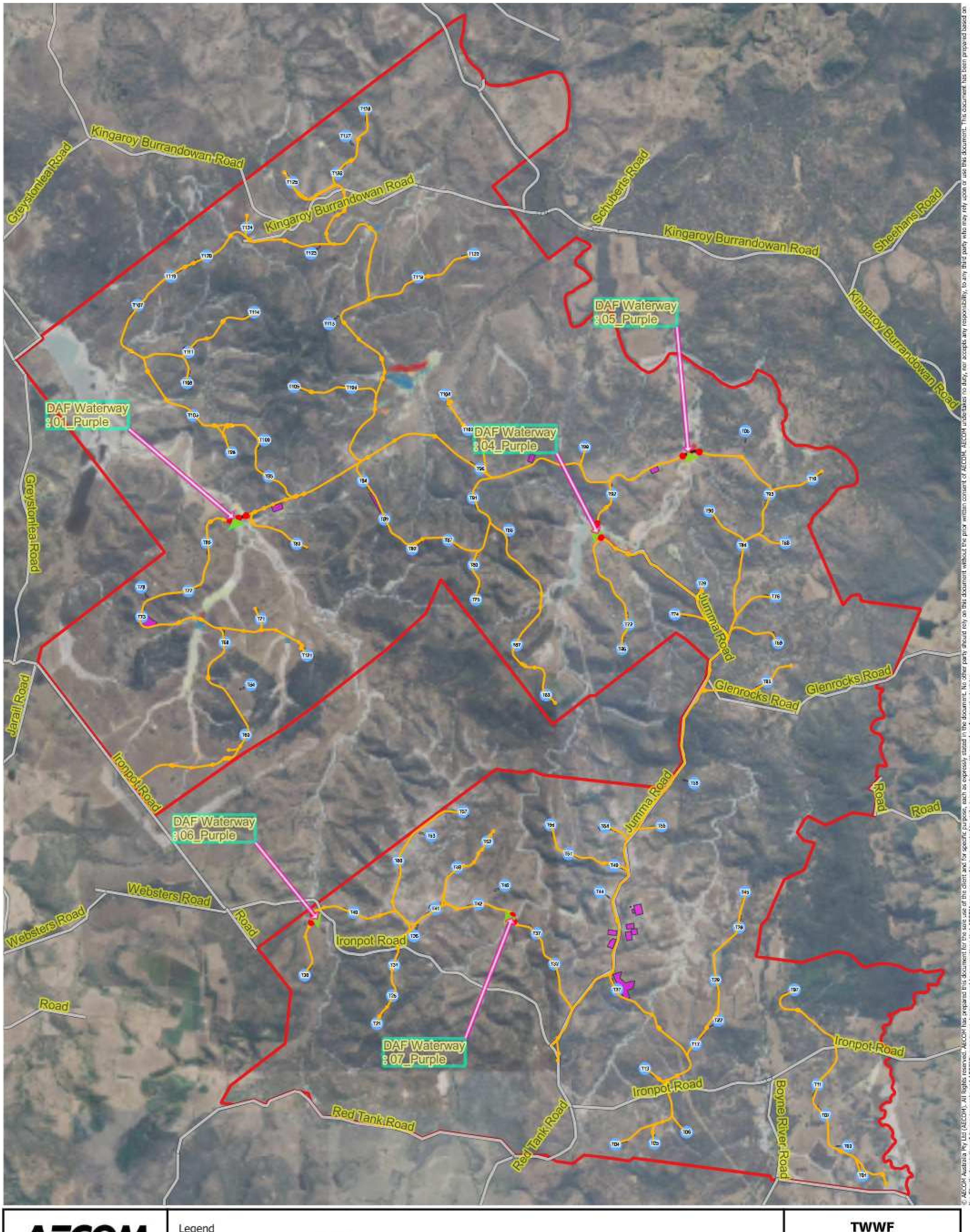
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Change in Velocity (m/s)
Impacts-Change in Velocity: 20% AEP Post Dev minus 20% AEP Pre Dev

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 22

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356

0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads
- Road raised 1.5m in hydraulic model
- Road levels based on drawings

Change in Velocity (m/s)

- < -0.20
- -0.20 to -0.15
- -0.15 to -0.10
- -0.10 to -0.05
- -0.05 to 0.00
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- > 0.20

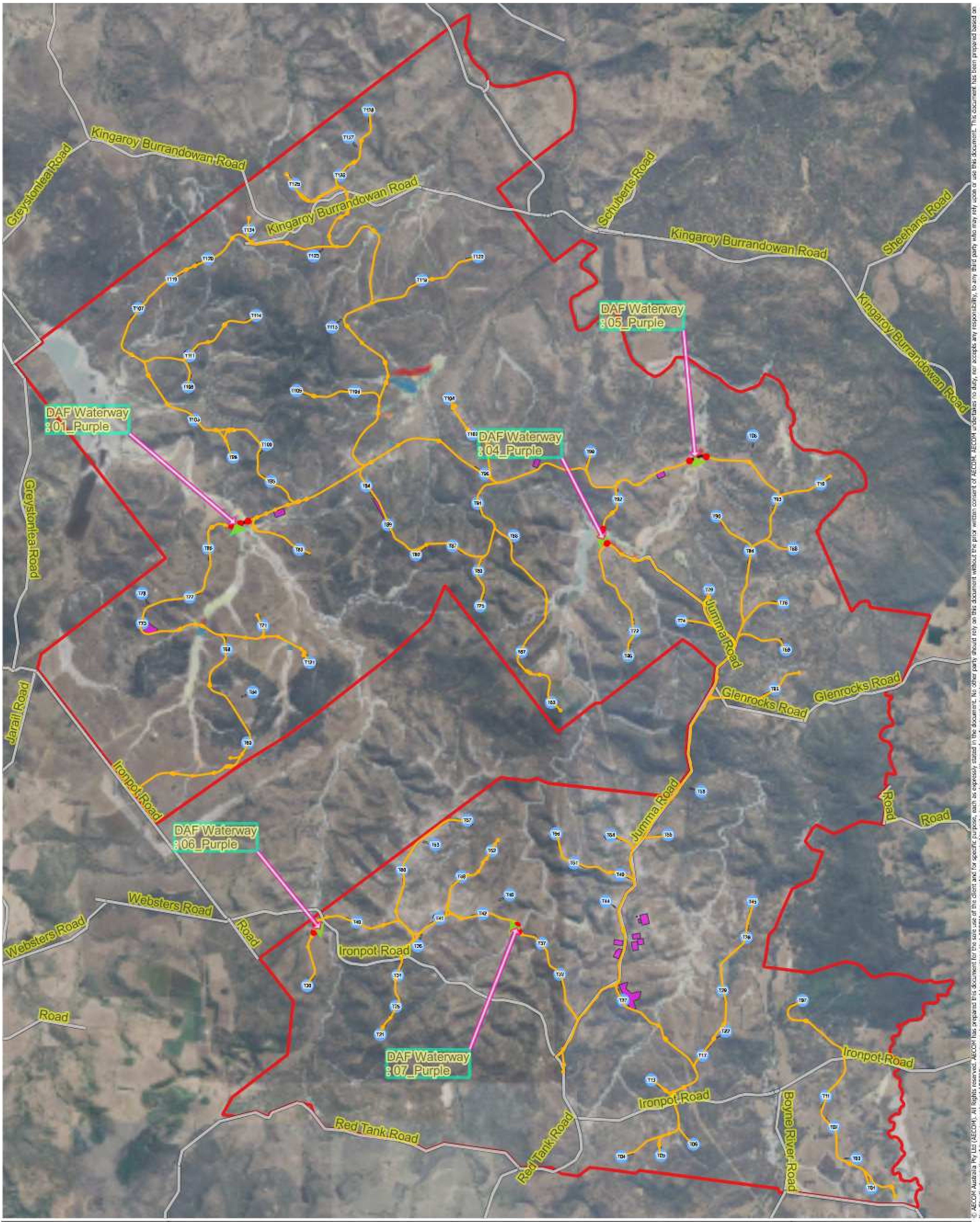
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Change in Velocity (m/s) Impacts-Change in Velocity: 1% AEP Post Dev minus 1% AEP Pre Dev

LAST MODIFIED: 2025-05-16
VERSION: 0

MAP 23

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads
- Road raised 1.5m in hydraulic model
- Road levels based on drawings

Change in Velocity (m/s)

- < -0.20
- -0.20 to -0.15
- -0.15 to -0.10
- -0.10 to -0.05
- -0.05 to 0.00
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- > 0.20

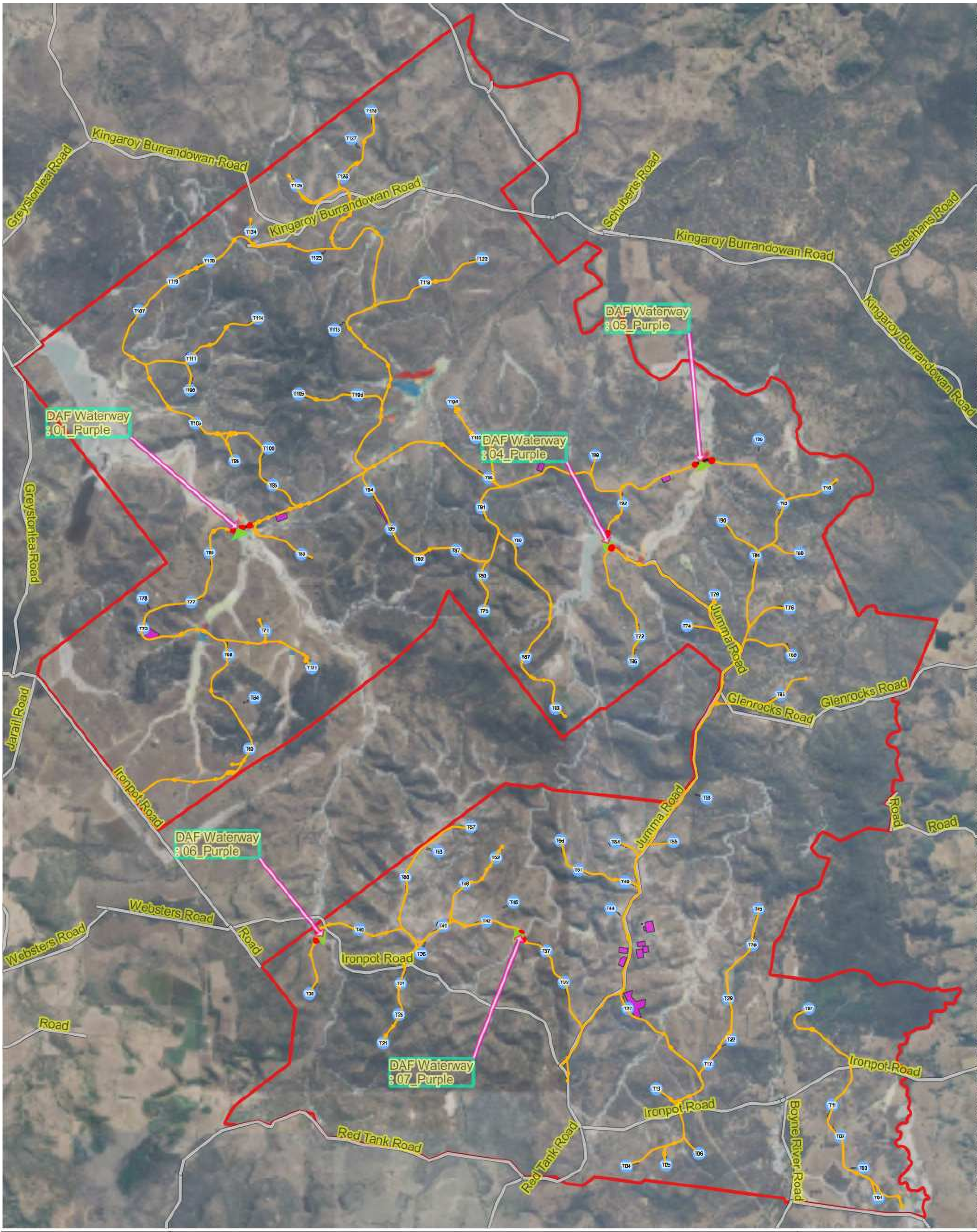
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Change in Velocity (m/s)
Impacts-Change in Velocity: 1% AEP + 10pcBLK Post Dev minus 1% AEP Pre Dev

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 24

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356

0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads
- Road raised 1.5m in hydraulic model
- Road levels based on drawings

Change in Velocity (m/s)

- < -0.20
- -0.20 to -0.15
- -0.15 to -0.10
- -0.10 to -0.05
- -0.05 to 0.00
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- > 0.20

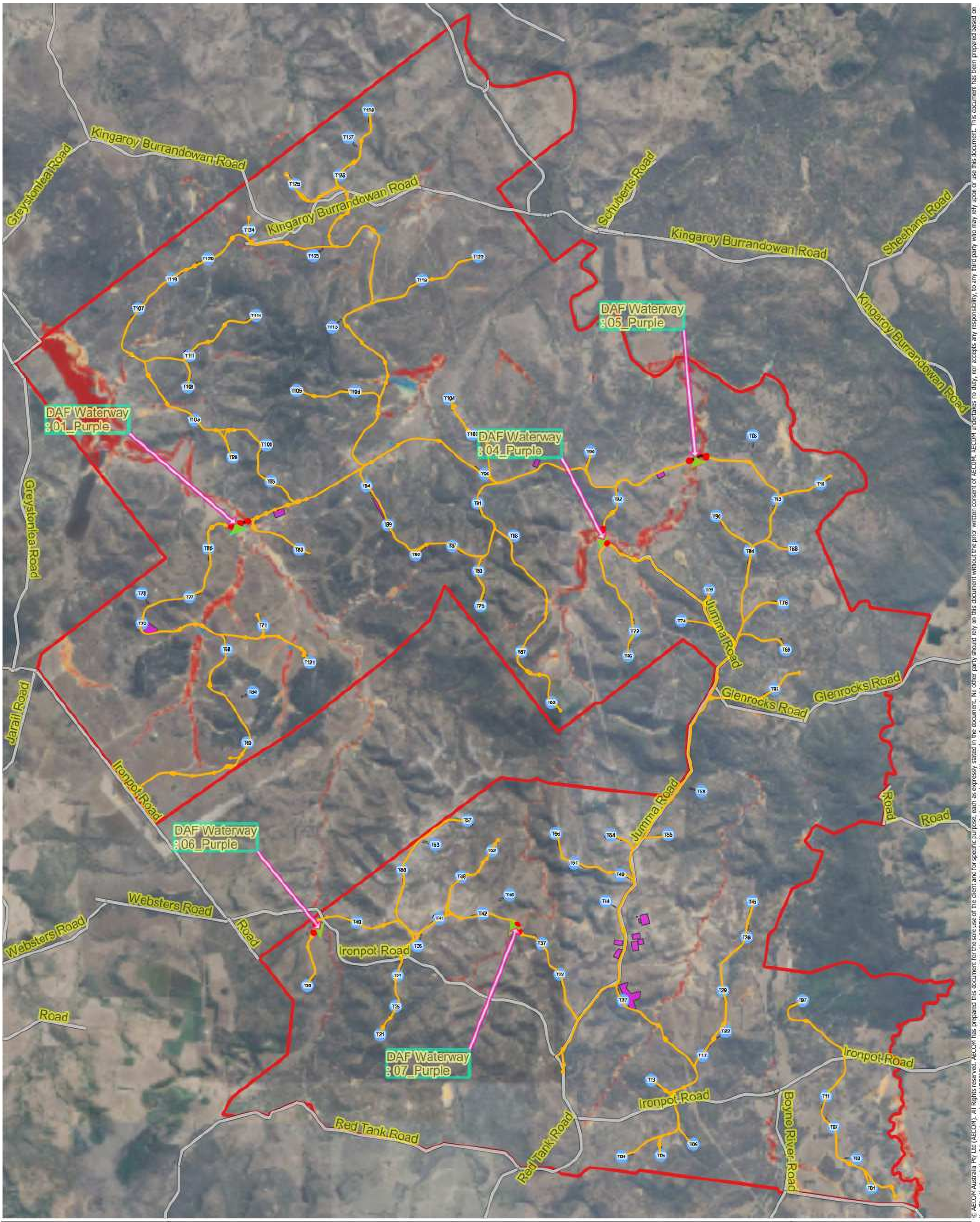
Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Change in Velocity (m/s)
Impacts-Change in Velocity: 0.5% AEP Dev minus 0.5% AEP Pre Dev

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 25

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz



AECOM

NORTH
GDA94 / MGA zone 56 EPSG:28356
0 0.9 1.8 km

Legend

- Designed Culverts
- Wind Turbine Generators
- Turbine Hardstands
- Infrastructure Areas
- Site_Boundary
- Existing_Roads
- Road raised 1.5m in hydraulic model
- Road levels based on drawings

Change in Velocity (m/s)

- < -0.20
- -0.20 to -0.15
- -0.15 to -0.10
- -0.10 to -0.05
- -0.05 to 0.00
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- > 0.20

Attribution of Sources: © Google Satellite Imagery

TWWF
Map Type: Change in Velocity (m/s)
Impacts-Change in Velocity: 1% AEP+CC_2090_RCP_8.5 Post Dev minus 1% AEP Pre Dev

LAST MODIFIED: 2025-05-14
VERSION: 0

MAP 26

Filepath - Z:\605x\60563866\2022 Flood Update\GIS_Tuflow\20250505_Results_DES1_AJ_Rev1.qgz