



Stormwater Assessment

Cattle Creek Wind Farm

PREPARED FOR

RWE

RWE Cattle Creek Onshore Wind
Pty Ltd

DATE

16 July 2026

REFERENCE

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Stormwater Assessment

Cattle Creek Wind Farm

0706881



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ACRONYMS AND ABBREVIATIONS

Acronym	Description
AO	Acceptable Outcome
AHD	Australian Height Datum
BESS	Battery Energy Storage System
BPESC	Best Practice Erosion and Sediment Control
Disturbance Footprint	The area of direct disturbance associated with the construction, operation and decommissioning of the Project, which is 2,221.2 ha.
DSDIP	Queensland Government Department of State Development, Infrastructure and Planning
EAR	Ecological Assessment Report

Acronym	Description
ERM	Environmental Resources Management Australia Pty Ltd
ESCPC	Erosion and Sediment Control Plan - Construction
EV	Environmental Value
HV	High voltage
kV	Kilovolt
IECA	International Erosion Control Association (Australasia)
LV	Low voltage
MV	Medium voltage
O&M	Operational and Maintenance
PO	Performance Outcome
Project Area	The wind farm area covering twelve separate lots over 20,404.5 ha.
Proponent	RWE Cattle Creek Onshore Wind Pty Ltd
Project	Cattle Creek Wind Farm
PRP	Primary Rehabilitation Plan
QFAO	Queensland Floodplain Assessment Overlay
RMP	Rehabilitation Management Plan
RUSLE	Revised Universal Soil Loss Equation
SDAP	State Development Assessment Provisions (Version 3.6)
SSPO	Site Stabilisation Plan - Operations
SWMP	Stormwater Management Plan
TRC	Toowoomba Regional Council
WDRC	Western Downs Regional Council
WQO	Water Quality Objective
WTG	Wind Turbine Generator

1. INTRODUCTION

1.1 PROJECT BACKGROUND

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by RWE Cattle Creek Onshore Wind Pty Ltd (RWE) (the Proponent) to undertake a stormwater assessment for the proposed Cattle Creek Wind Farm (the Project) located within the Toowoomba Regional Council (TRC) and Western Downs Regional Council (WDRC) Local Government Areas (LGAS) in South East Queensland, Australia.

1.2 OBJECTIVE AND SCOPE

The objective of this Report is to assist the Proponent in determining potential stormwater related risks associated with the Project, and to assess compliance against the relevant stormwater related performance outcomes that are prescribed in the Queensland Government State Code 23 – Wind farm development (v3.6), and State Code 27 – Battery storage facility development (v3.6).

The scope of the investigation entails:

- A desktop-based investigation to identify and describe the existing environmental values of the site;
- Assess the effect the Project is likely to have on stormwater quality and stormwater quantity; and
- Prepare a conceptual stormwater report that provides guidance to avoid adverse effects through design and siting (this Report).

Where impacts to stormwater and runoff are unavoidable, description of best practice management measures are presented.

1.3 PROPOSED PROJECT DESIGN

The Project consists of the construction, operation, maintenance, and decommissioning of up to 135 wind turbine generators (WTGs), Battery Energy Storage System (BESS) of up to 450 megawatt (MW) and ancillary infrastructure (supporting infrastructure) consisting of:

- WTG foundations, crane hardstands, crane boom laydown, blade laydown and rotor assembly area; and
- Access tracks, including:
 - New and upgraded tracks within the Project Area, generally comprising of a nominal range of 5.5 m – 10 m wide permanent access track, and a maximum 50 - 95 m wide cleared corridor for Oversize Overmass (OSOM) vehicles;
- Low voltage (LV) and medium voltage (MV) underground cabling, as well as MV and high voltage (HV) overhead transmission lines;
- Internal collector substations;
- A switching station adjacent to the existing 330 kV Powerlink transmission line. This has been accounted for within the Disturbance Footprint, thereby allowing the clearing of the site to be assessed as part of the impacts associated with the Project (noting, however, that the switching station infrastructure will be constructed, owned and operated by Powerlink);

- Permanent meteorological masts;
- Construction compounds and laydown areas;
- Washdown areas;
- Operational and maintenance facilities; and
- A construction workers accommodation facility.

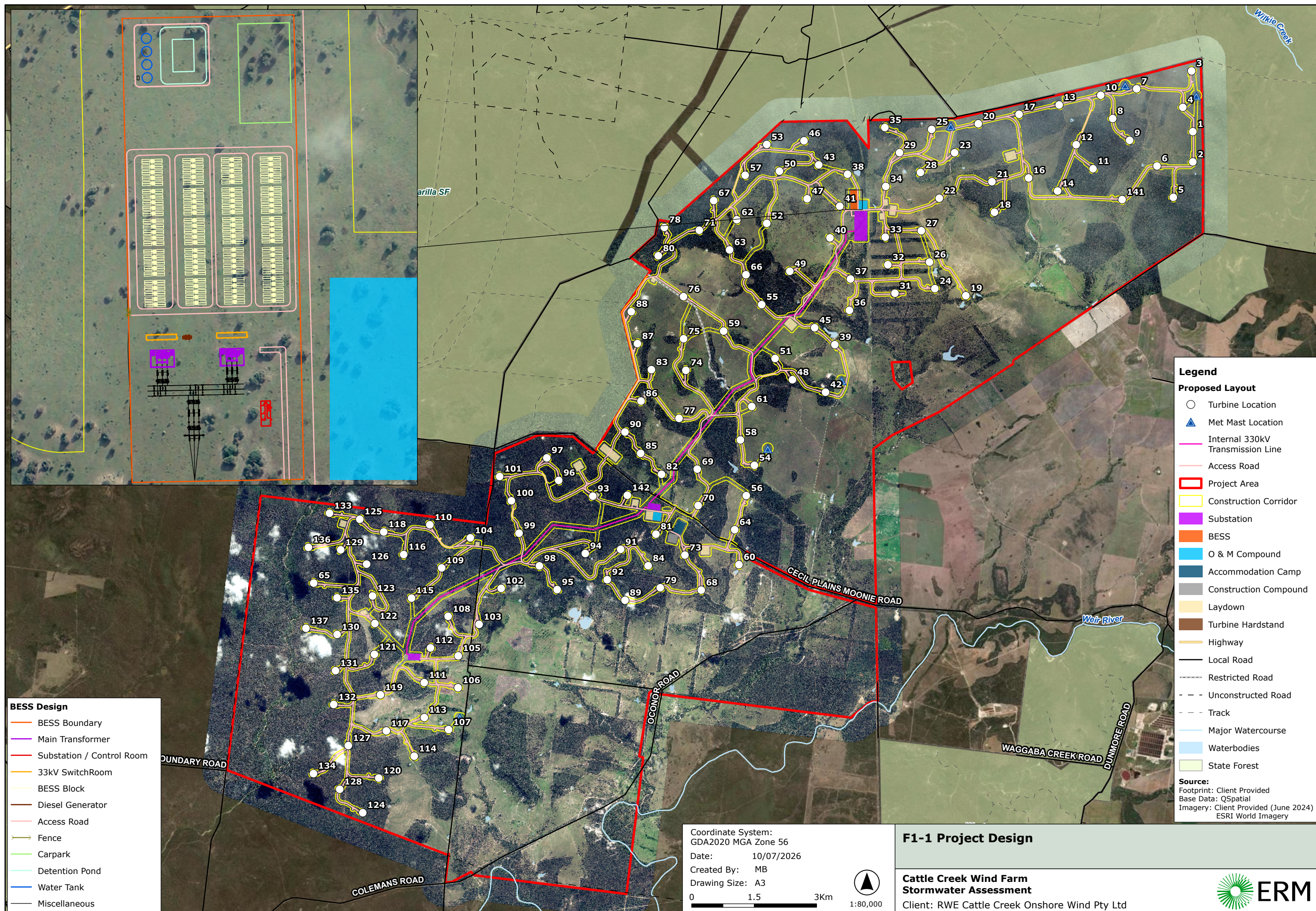
Further, there is the potential for the inclusion of the below infrastructure:

- Concrete batching plants
- Borrow pits; and
- Communications tower.

The Project Area fully encompasses the properties as described in Table 1-1, covering an area of 20,404.5 hectares (ha). For the purposes of this assessment, impacts will be assessed against the Project's disturbance footprint across 2,221.2 ha. The Project Design is shown in Figure 1-1.

TABLE 1-1 PROJECT AREA DETAILS

Project Area Details			
Real Property Description	Lot and Plan	Tenure	Easement
	2DY452	Freehold	-
	27CP882781	Freehold	GSP112990
	2DY831	Freehold	HSP112991
	3RP174414	Freehold	JSP109190
	1RP174414	Freehold	-
	16SP201705	Freehold	-
	15SP201705	Freehold	-
	2RP174414	Freehold	-
	8DY247	Freehold	-
	9DY247	Freehold	-
	22DY800	Freehold	-
	21DY218	Freehold	-
	Unnamed road reserves	Road Reserve	-
	Cecil Plains Moonie Road	Road Reserve	-
	O'Connor Road	Road Reserve	-
Disturbance Footprint	2,221.2 hectares (ha)		
Project Area	20,404.5 ha		



BESS Design

- BESS Boundary
- Main Transformer
- Substation / Control Room
- 33kV SwitchRoom
- BESS Block
- Diesel Generator
- Access Road
- Fence
- Carpark
- Detention Pond
- Water Tank
- Miscellaneous

Legend

Proposed Layout

- Turbine Location
- Met Mast Location
- Internal 330kV Transmission Line
- Access Road
- Project Area
- Construction Corridor
- Substation
- BESS
- O & M Compound
- Accommodation Camp
- Construction Compound
- Laydown
- Turbine Hardstand
- Highway
- Local Road
- Restricted Road
- Unconstructed Road
- Track
- Major Watercourse
- Waterbodies
- State Forest

Source:
Footprint: Client Provided
Base Data: QSpatial
Imagery: Client Provided (June 2024)
ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 10/07/2026

Created By: MB

Drawing Size: A3

0 1.5 3Km

1:80,000

F1-1 Project Design

**Cattle Creek Wind Farm
Stormwater Assessment**

Client: RWE Cattle Creek Onshore Wind Pty Ltd



2. LEGISLATIVE CONTEXT

The Queensland Government's State Assessment and Referral Agency's (SARA) State Development Assessment Provisions (SDAP, version 3.6) outlines assessment benchmarks (State Codes) that a development application is to be assessed against. The purpose of this stormwater assessment is to assess the Project against the stormwater aspects of the following SDAP codes:

- State Code 23: Wind farm development; and
- State Code 27: Battery storage facility development.

2.1 STATE CODE 23: WIND FARM DEVELOPMENT

State Code 23 provides a Planning and Impact Assessment Code to protect communities and the environment from adverse impacts resulting from the construction, operation and decommissioning of Wind Farm development. The Performance Outcomes (PO) for material change of use are outlined in Table 23.1 of State Code 23. This Report has been prepared to address the POs under the "Natural drainage patterns" and "Protecting water quality and erosion control" sections of Table 23.1 of State Code 23 (v3.6) (DSDIP, 2026b), as detailed in Table 2-1.

TABLE 2-1 STATE CODE 23 (V3.6, 2026) PERFORMANCE OUTCOMES AND ACCEPTABLE OUTCOMES: NATURAL DRAINAGE PATTERNS AND PROTECTING WATER QUALITY AND EROSION CONTROL

Performance outcomes		Acceptable Outcomes
Natural Drainage Patterns		
P06	The wind farm, including ancillary infrastructure, is designed and sited to minimise crossings of and interference with natural drainage lines, waterways and wetlands.	There are no acceptable outcomes for this code
Protecting water quality and erosion control		
P07*	Development is designed to avoid areas of high erosion risk, where failure of erosion management devices would result in permanent and/or adverse impacts on receiving waterways or wetlands	
P08	Development is constructed to maintain or improve the water quality of receiving waters, waterways and wetlands by: ▪ minimising erosion and run off; ▪ managing drainage control; and ▪ preserving the bank stability of affected waterways and drainage lines	
P09	Areas cleared for construction are progressively stabilised during construction to ensure that erosion and run off to the surrounding landscape and waterways is minimised to the greatest extent possible.	

*P07 has been addressed in the Erosion Risk Assessment report (ERM, 2026)

The Department of State Development, Infrastructure and Planning's (DSDIP) planning guideline document for State Code 23 specifies that compliance with PO6, PO8, and PO9 will be achieved through conditions of approval requiring the preparation of the following plans:

- PO6 – Stormwater Management Plan (SWMP);
- PO8 – Erosion and Sediment Control Plan – Construction (ESCPC); and
- PO9 – SWMP, ESCPC, Rehabilitation Management Plan (RMP) and Site Stabilisation Plan – Operations (SSPO).

The purpose of this assessment is to determine the level of risk to natural drainage lines and water quality associated with the Project, and whether the level of risk is manageable to a level so that the Project can achieve compliance with PO6 - PO9 through the preparation of the above plans.

A separate Erosion Risk Assessment (ERM, 2026), using the Revised Universal Soil Loss Equation (RUSLE), has been undertaken to meet the PO7 requirements for an Erosion Risk Assessment outlined in State Code 23.

2.2 STATE CODE 27: BATTERY STORAGE FACILITY DEVELOPMENT

The purpose of State Code 27 is to ensure that large-scale battery projects (>50 MW) are appropriately located, designed, and operated to manage potential impacts on safety, amenity, and network reliability, while supporting Queensland's renewable energy transition. The POs for material change of use are outlined in Table 27.1 of State Code 27. This Report has been prepared to address the POs under the "Protecting water quality and stormwater management" section of Table 27.1 of State Code 27, as detailed in Table 2-2.

TABLE 2-2 STATE CODE 27 (V3.6, 2026) PERFORMANCE OUTCOMES AND ACCEPTABLE OUTCOMES: PROTECTING WATER QUALITY AND STORMWATER MANAGEMENT

Performance Outcomes	Acceptable Outcomes
Protecting water quality and stormwater management	
PO16^a Development: • minimises the disturbance of high risk soils^b; and • manages the release of soil based contaminants.	There are no acceptable outcomes for this code
PO17^c Development maintains the water quality of receiving waters, waterways and wetlands by: • avoiding locating in waterways^d and wetlands; • minimising crossings of and interference with natural drainage lines, farm drainage and irrigation infrastructure; • minimising erosion and sediment run off; • managing drainage control; and • preserving the bank stability of affected waterways and drainage lines avoiding non-essential hardening or unnatural modification of the waterway.	
PO18 Development prevents the release of contaminants to surface water or groundwater in the event of an incident, including a fire or explosion.	

Performance Outcomes	Acceptable Outcomes
PO19^c Development minimises interference with overland flow paths.	

^a Aspect of PO16 have been addressed in the Erosion Risk Assessment (ERM, 2026)

^b State Code 27 defines high risk soils as areas with erosive, dispersive, sodic, saline and/or acid sulfate soils

^c As per the State Code 27 Planning Guideline (DSDIP, 2025b), if during an assessment, SARA is of the view components of PO17 and PO19 can be complied with through conditions, the approval will require the preparation of a detailed Stormwater Management Plan (SWMP) and Rehabilitation Management Plan (RMP).

^d State Code 27 defines waterways as per the Queensland *Fisheries Act 1994*, which includes a river, creek, stream, watercourse, drainage feature or inlet of the sea

3. ENVIRONMENTAL SETTING

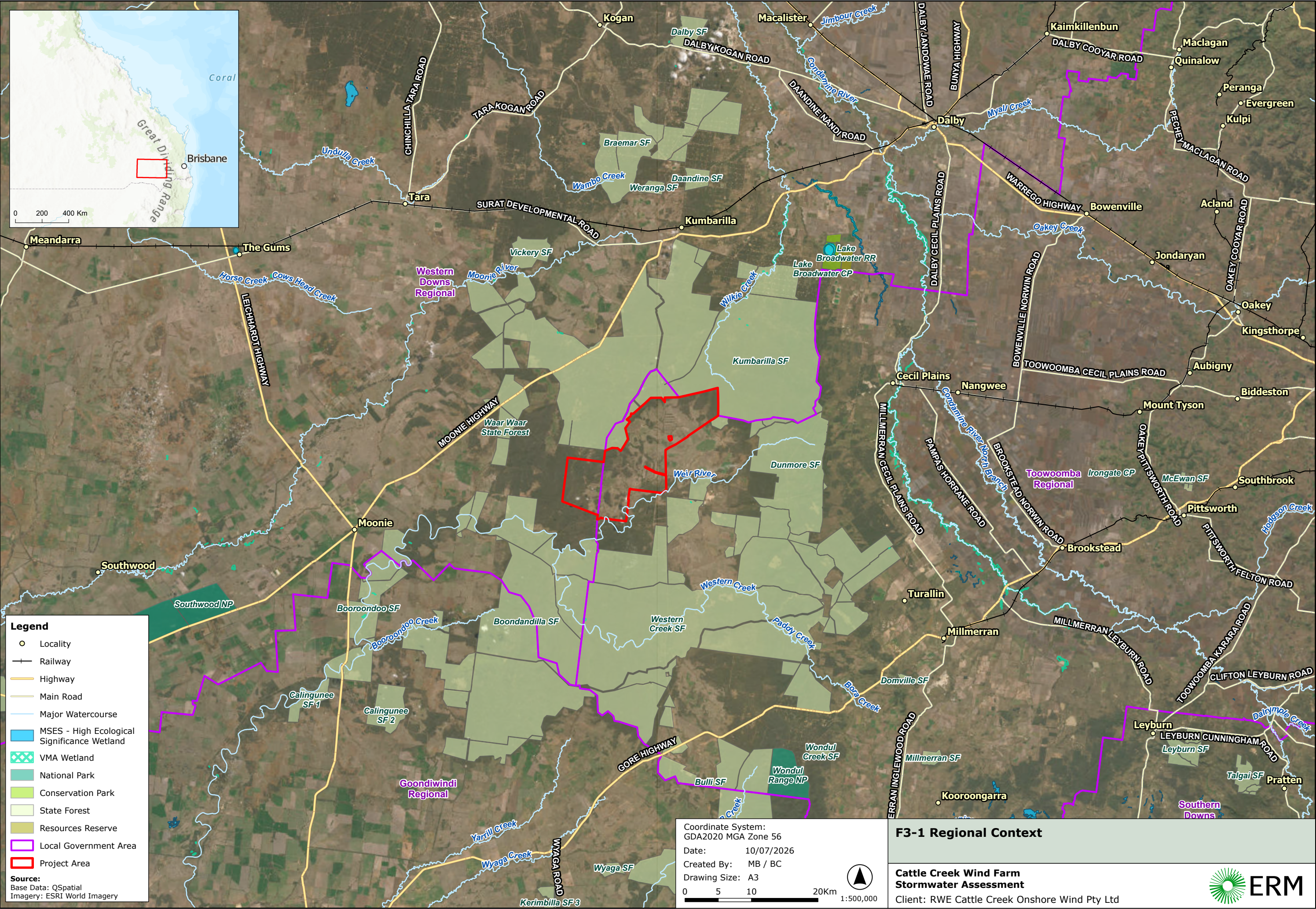
3.1 LOCATION AND LAND USE

The Project Area is located within the TRC and WDRC LGAs, approximately 200 km west of Brisbane in South East Queensland, Australia (Figure 3-1).

Located within the Rural Zone of the TRC and WDRC, the predominant land use of the region is cattle grazing, animal husbandry and related rural activities. With the land use being cattle grazing, the landscape has been majorly influenced by historical grazing, with large areas of cleared land featuring no remnant vegetation. The surrounding landscape within the locality (10 km) has also been historical land clearing and cattle grazing, with the exception of surrounding State Forests.

The Project Area lies adjacent to and within the locality (10 km) of several State Forests:

- The Kumbarilla State Forest is located on the northern boundary of the Project Area;
- The Western Creek State Forest is located approximately 5 km south-east of the Project Area; and
- Dunmore State Forest is located approximately 10 km south-east of the Project Area.



3.2 CLIMATE AND RAINFALL

The climate of the region is characterised by a distinct wet season from October through to March. On average, the highest rainfall month is December, with an average of 97 mm. The dry season extends from April to September, with August the lowest rainfall month (25 mm on average). Mean annual rainfall for the region is approximately 620 mm.

Monthly rainfall data is presented in Figure 3-2, with data collected from November 2000 to August 2025 at the Bureau of Meteorology (BoM) Dunmore Exchange TM weather station (station no. 041545) which is located approximately 7 km east of the Project Area.

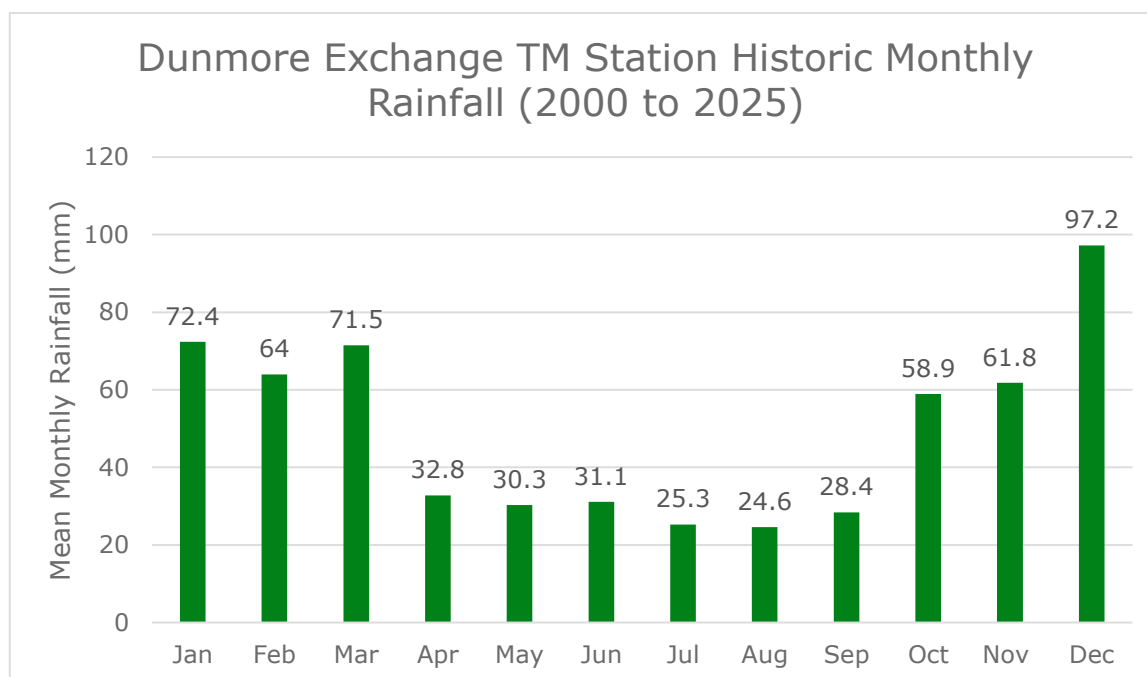


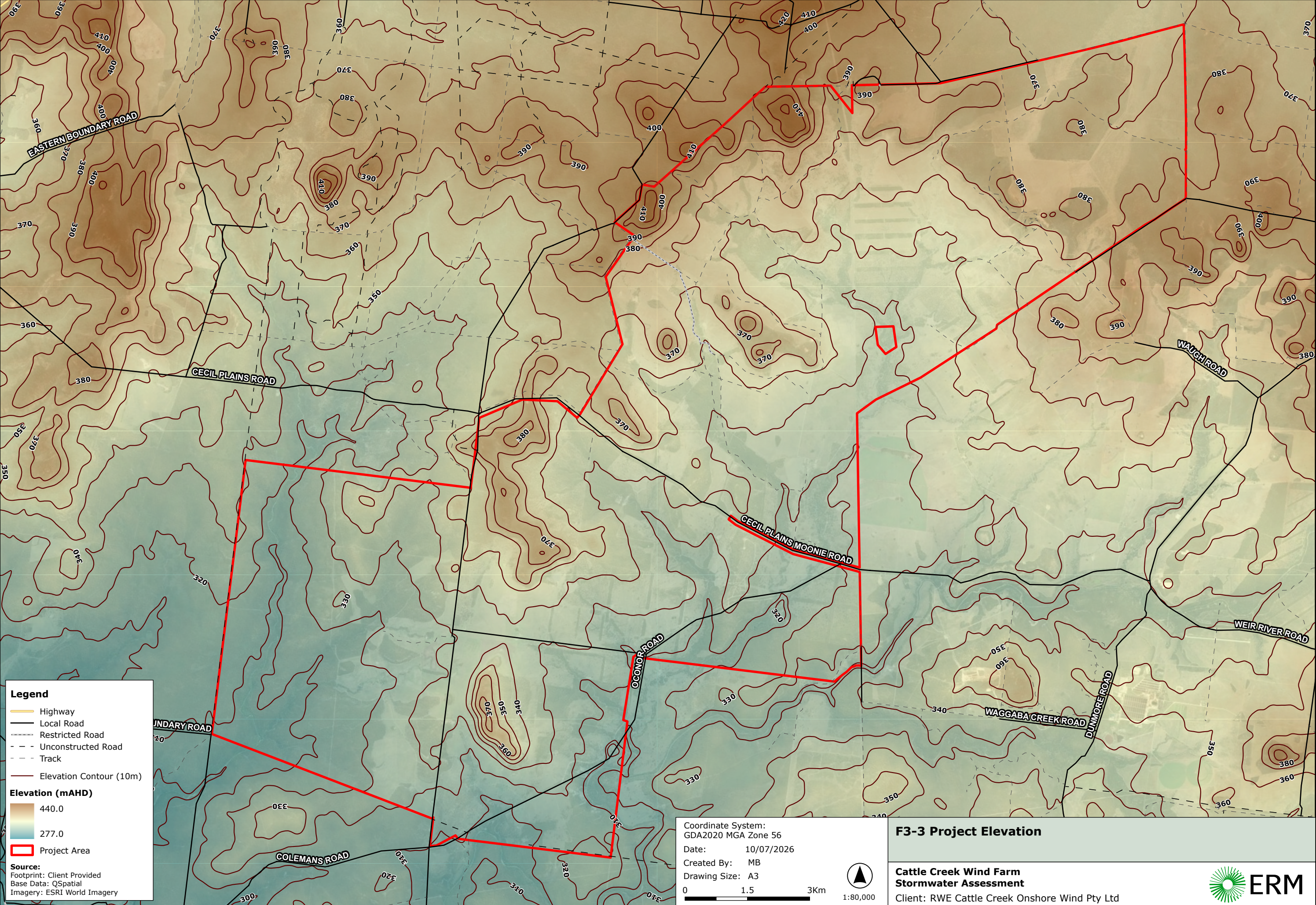
FIGURE 3-2 DUNMORE EXCHANGE TM STATION (NO. 041545) HISTORIC MONTHLY RAINFALL

3.3 NATURAL DRAINAGE PATTERNS

3.3.1 TOPOGRAPHY AND LANDFORM

The Atlas of Australian Soils (AAS) Queensland defines much of the Project Area as gently undulating plains, with smaller regions of low hills and dissected low ranges. Figure 3-3 depicts the topography across the Project Area and surrounding region, as well as the elevation of the Project Area, which generally falls from the hilly terrain in the northeast to the plains surrounding Waar Waar Creek and the Weir River in the southwest.

The maximum elevation is approximately 410 m Australian Height Datum (AHD) in the northeast, with the minimum elevation recorded at approximately 310 m AHD in the southwest. There are several isolated peaks along this elevation gradient, with a notable peak of 370 m AHD in the southern region: a 30 m incline over approximately 250 m.



3.3.2 SOILS

State Code 27 defines “high risk soils” as areas with erosive, dispersive, sodic, saline and/or acid sulfate soils. Whilst no site-specific soil sampling has been undertaken as part this scope, a desktop review has been undertaken to understand the characteristics, and potential risks, associated with the Project Area’s soil landscape.

Figure 3-4 provides overview of the soils in the Project Area as per the Australian Soil Classification (ASC), indicating a strong presence of sodosol (dominant entities Braemar, Knoll, Leyburn, and Weranga) kandosol (dominant entities Flinton and Minnabilla), and vertosol (dominant entity Calingunee) soils is observed throughout the Disturbance Footprint. The BESS footprint is wholly located upon Calingunee soils (vertosol).

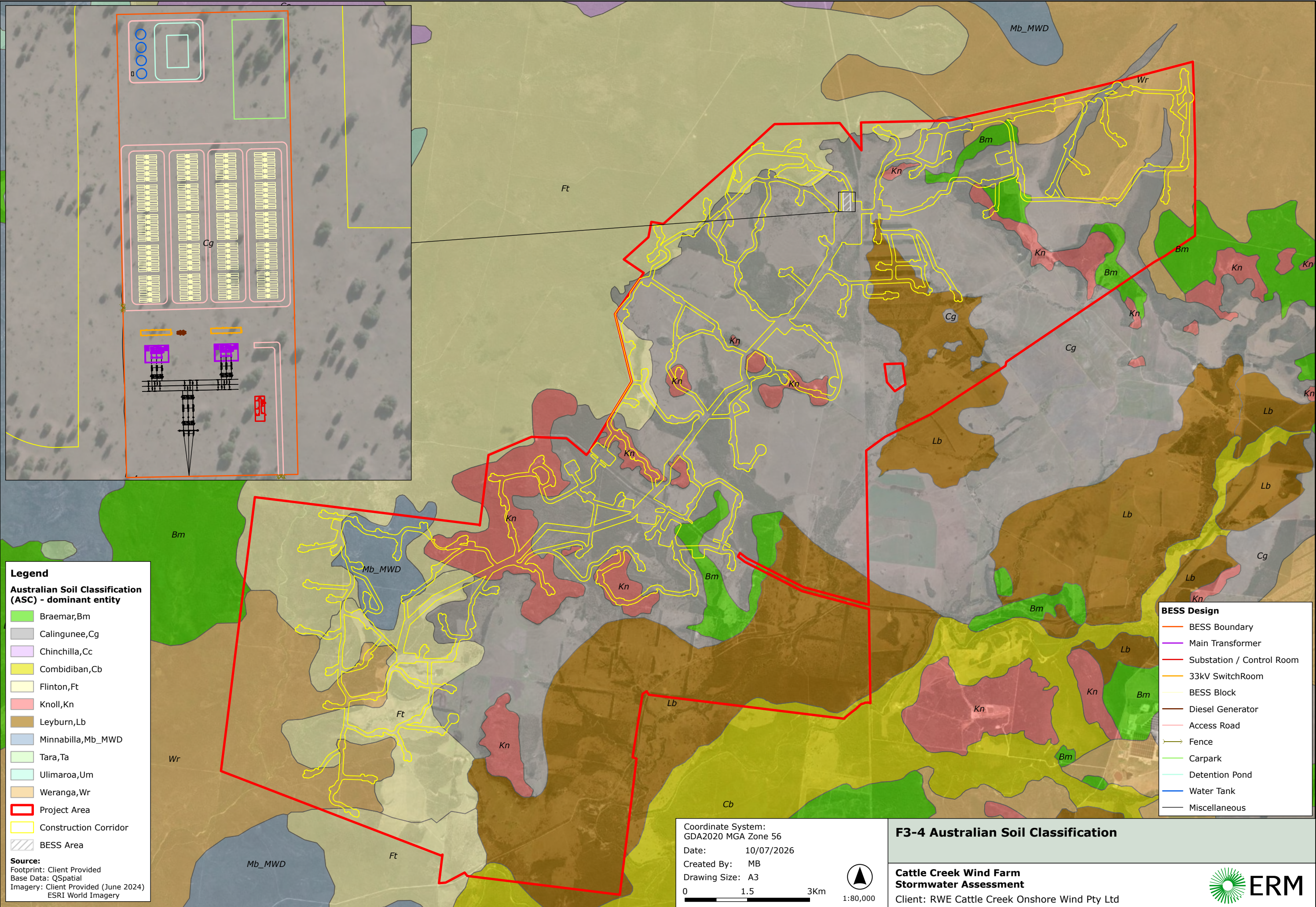
The Central Darling Downs Land Management Manual Field Manual (Harris et.al, 1999) provides brief descriptions of each of the Project Area’s soil types, as detailed in Table 3-1.

TABLE 3-1 BRIEF DESCRIPTION OF SOILS (HARRIS ET.AL, 1996)

Australian Soil Classification	Dominant Entity	Brief Description
Sodosol	Braemar	Texture contrast soil with a moderately thick (20-40 cm), bleached sandy surface, over mottled, yellow or grey clay subsoils on sandstone
	Knoll	Very shallow (30 cm), gravelly, grey or dark reddish brown sandy loams to loams over sandstone
	Leyburn	Deep (100-150 cm) texture contrast soil with a shallow, hardsetting, bleached loamy sand to clay loam surface, frequently gravelly (20 cm), over yellowish brown and brown clay subsoils on mixed sandstone / traprock alluvium
	Weranga	Texture contrast soil with a thin (<15 cm), bleached sandy loam to sandy clay loam surface, over mottled, grey or yellow sandy clay subsoil on sandstone
Kandosol	Flinton	Moderately deep to deep (50-105 cm) soils with red or brown loams over red or brown clay loam to clay subsoils on lateritised sandstone
	Minnabilla	Very shallow (<45cm), gravelly, red (may occasionally be black) soils; rock outcrop (Maher, 1996)
Vertosol	Calingunee	Moderately deep to deep (60-150 cm), dark brown or grey self-mulching cracking clays with moderate gilgai on fine grained sediments

The corresponding erosion potential of the Project Area soils is assessed in Section 3.4.2.

National scale acid sulfate soils mapping (accessible via Queensland Globe) shows that no disturbance is proposed to occur within areas where acid sulfate soils are predicted to occur.



3.3.3 DRAINAGE BASINS

The Project Area is located across the Border Rivers Basin, the Balonne-Condamine Basin, and the Moonie Basin (Figure 3-5). With the majority of the Project Area falling within the Border Rivers Basin, the northeastern is corner located within the Balonne-Condamine Basin. A very small portion in the north of the Project Area is in the Moonie Basin. All three basins are sub-catchments of the encompassing Murray-Darling Basin.

Table 3-2 presents the total Disturbance Footprint area within each drainage basin. The BESS footprint will be wholly confined to the Border Rivers Basin.

TABLE 3-2 DISTURBANCE FOOTPRINT BASIN IMPACT

Drainage Basin	Disturbance Footprint extent (ha)
Border Rivers	1,935.34
Balonne Condamine	272.34
Moonie	3.32
Total	2,220.87*

*Due to rounding errors, there is a 0.33 ha discrepancy from the defined Disturbance Footprint (2,221.2 ha)

3.3.4 WATERWAYS

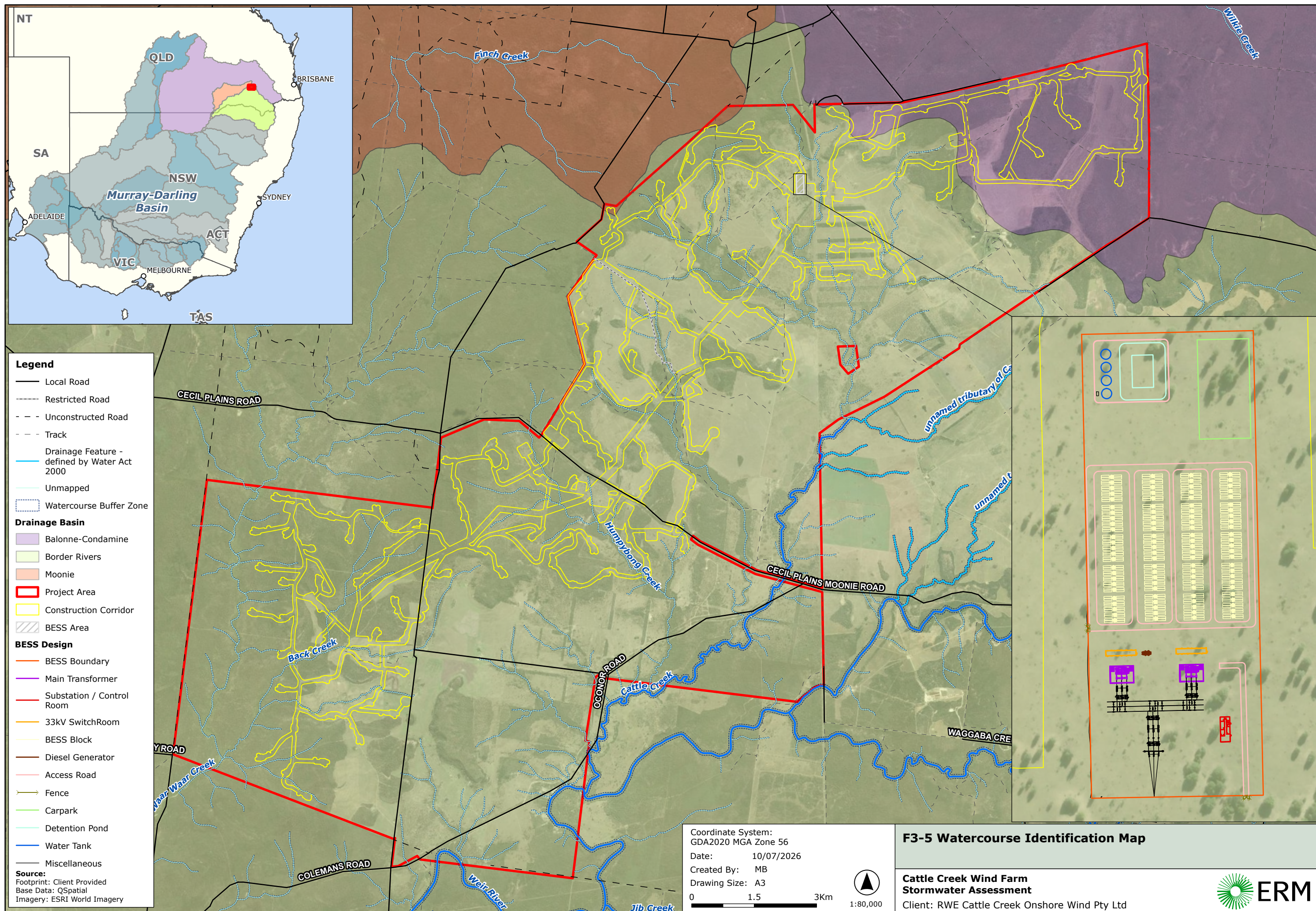
As a means of assessing impacts to natural drainage lines, the Queensland Government's Watercourse identification map (WIM) was consulted to identify the types of surface water features that are present within, and surrounding the Project Area and to understand the extent to which the Disturbance Footprint (i.e. the extent of clearing) interacts with any mapped or unmapped waterways (as defined by the *Water Act 2000*). For the purposes of this assessment, buffer zones have been applied to the features of the WIM to understand impacts in the vicinity of waterways. To support the assessment, a 50 m buffer has been applied to "Watercourses", a 25 m buffer has been applied for "Drainage Features" and a 10 m buffer has been applied to "Unmapped" features respectively.

An overview of the drainage features and waterways (as captured by the WIM) present within the Project Area is shown in Figure 3-5. Initial assessment shows that there are several instances where the Disturbance Footprint intersects with a surface water feature, primarily at locations where the access track network crosses these water features. All crossings occur at features classified as "unmapped" waterways. The BESS footprint does not intersect with any feature or buffer zone identified on the WIM.

The defining watercourse of the region is the Weir River. The river flows east to west in close proximity to the southeastern boundary of the Project Area, intersecting the Project Area at several points, notably flowing through the southern portion of the Project Area. All other drainage features and unmapped waterways that flow through the Project Area are tributaries of the Weir River, the most notable of which being Waar Waar Creek and Back Creek in the west and Cattle Creek and Humpybong Creek in the central region.

There are several other ephemeral and perennial unmapped waterways within the Project Area that flow into these defined features.

All defined waterways identified within the Project Area belong to the Border Rivers Basin. As per the watercourse identification map, there are no mapped or unmapped waterways from the Moonie or Balonne-Condamine Basins within the Project Area, as such there are no watercourse crossings within these basins. The Project Area and parts of the Disturbance Footprint however are located within the upper catchments of Finch Creek (Moonie Basin) and Wilkie Creek (Balonne-Condamine basin).



3.3.5 FLOOD ZONES

3.3.5.1 1% AEP FLOOD MODELLING

Flood modelling was undertaken by GHD in 2024 as a means of understanding the extent and depth of the 1% Annual Exceedance Probability (AEP) flood event in relation to the Project Area. The outputs of the 1% AEP flood modelling predictions are presented in Figure 3-6.

Key assumptions used in the flood model include (GHD, 2024):

- Modelling has only been conducted for the existing pre-development conditions;
- Outputs of the 1% AEP design event (Figure 3-6) represent peak depths from each simulated storm duration and temporal pattern. As such, each cell represents a maximum computed value over a series of simulated design events, rather than an instantaneous point in time;
- The potential impacts due to climate change were not considered in the study;
- No model calibration or data validation exercises were undertaken as part of the scope.

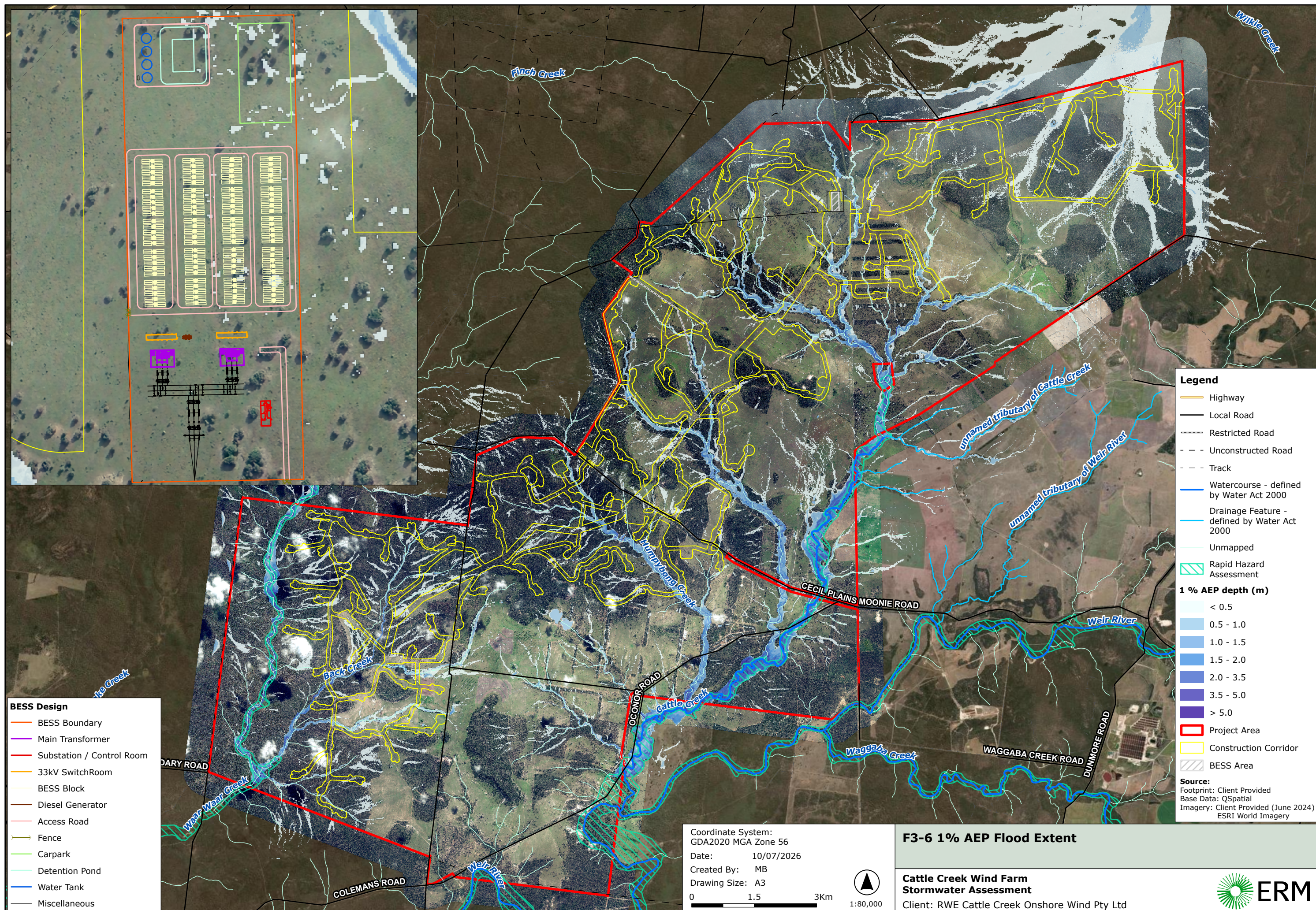
The estimated maximum flood depth for the 1% AEP flood is presented in Figure 3-6. The modelling shows that the areas of greatest flood extent and depth within the Project Area primarily occur along the defined waterways of the Project Area, namely Cattle Creek and Humpybong Creek in the central region, and along Waar Waar Creek in the Project Area's west. Disturbance Footprint interactions with the 1% AEP flood extent primarily occur along sections of the access track network.

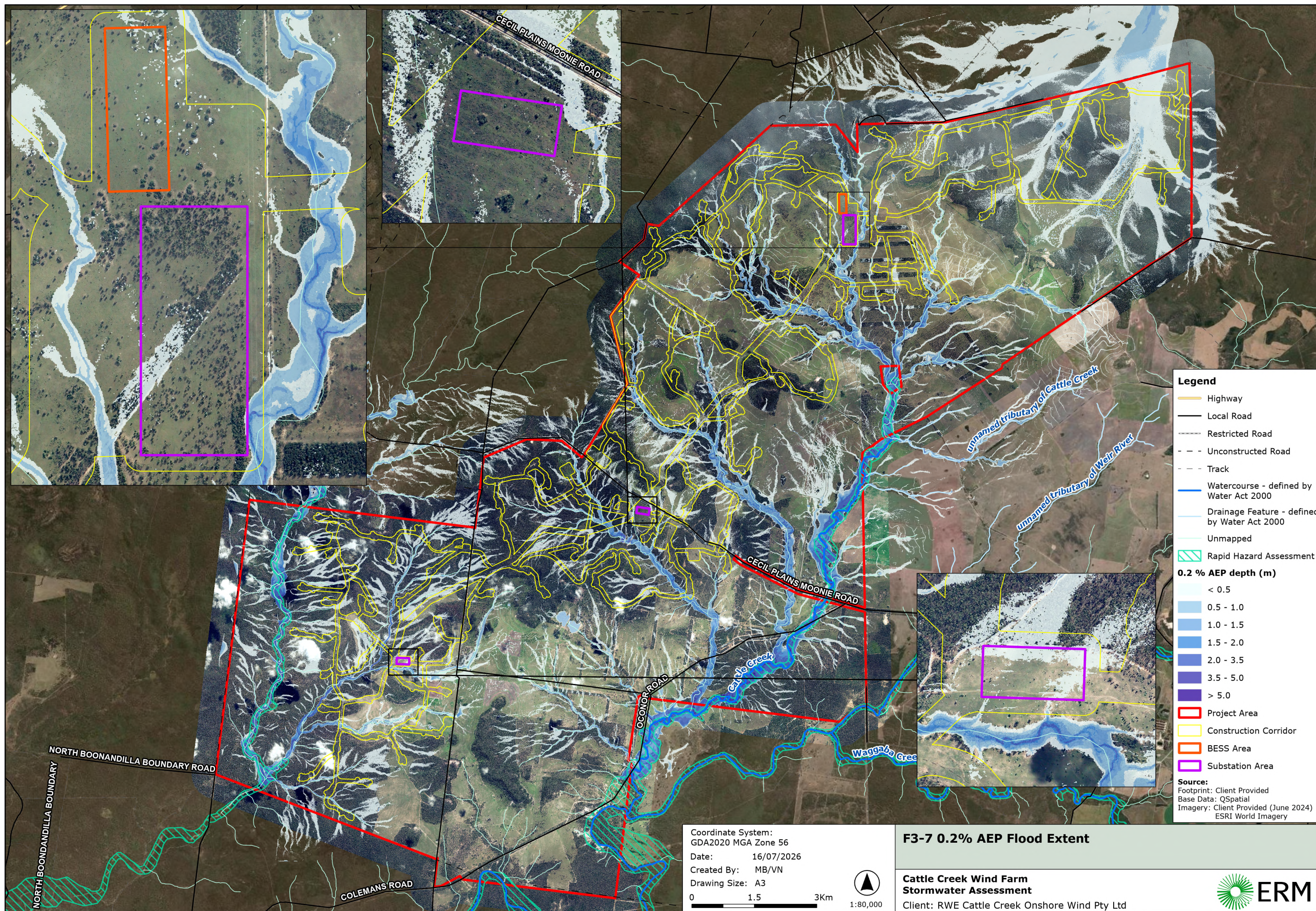
The modelled flood depth interacting with sections of the access track network is predominantly <0.5 m, with the greatest modelled depths observed at the Back Creek crossing in the west of the Project Area. Where the modelled flood extent is predicted to interact with hard standing infrastructure such as the WTGs, BESS, substations, and O&M compound, the interaction is highly sporadic and spatially variable, and is typically confined to a flood depth of <0.5 m.

3.3.5.2 0.2% AEP FLOOD MODELLING

Flood modelling was undertaken by GHD in 2024 as a means of understanding the extent and depth of the 0.2% AEP flood event in relation to the Project Area. The outputs of the 0.2% AEP flood modelling predictions is presented in Figure 3-7.

From the 0.2% AEP flood modelling the BESS and substations for the Project will not be impacted by the 0.2% AEP flood event.





3.4 WATER QUALITY AND EROSION

3.4.1 WATER QUALITY OBJECTIVES

To assess potential impacts on water quality, it is important to understand the existing environmental conditions of the receiving environment.

The Environmental Protection (Water and Wetland Biodiversity) Policy 2019 specifies Water Quality Objectives (WQOs) to protect Environmental Values (EVs) within drainage basins across Queensland.

WQOs and EVs for waters within the Border Rivers and Moonie River basins are outlined in the Queensland Border Rivers and Moonie River basins Environmental Values and Water Quality Objectives scheduling document.

For waters within the Condamine River Basin, WQOs are outlined in the Condamine River Basin Environmental Values and Water Quality Objectives scheduling document.

As per mapping in WQ4161 – Border Rivers Basin, WQ4171 – Moonie River Basin, and WQ4223 – Condamine River Basin, the Project Area and its receiving waters are located within the “Kumbarilla Ridge” water type. WQOs to protect aquatic ecosystem EVs in Kumbarilla Ridge waters are outlined in Appendix A.

3.4.2 PRE-DEVELOPMENT EROSION RISK

To understand potential erosion risk associated with the Project Area, an Erosion Risk Assessment (ERM, 2026) was undertaken using the Revised Universal Soil Loss Equation, allowing for the identification of areas that may be of high risk to erosion and to thereby inform the site layout (Disturbance Footprint).

The RUSLE assessment determines average annual soil loss (A) with the following equation:

$$A = R \times K \times LS \times C \times P$$

Where;

- A is the mean annual soil loss;
- R is the rainfall erosivity;
- K is soil erodibility factor;
- L is the slope length factor;
- S is the slope steepness factor;
- C is the cover management factor; and
- P is the erosion practice factor

The above input factors for the Project’s RUSLE assessment were informed by publicly available information sources, such as the Queensland Government’s QSpatial Catalogue (DETSI, 2020) and Queensland Globe. The Erosion Risk Assessment provides further detail on the values adopted for each input factor.

Erosion risk was then classified as per the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control (BPESC) Book 1, which adopts a classification system that ranks erosion risk based on annual soil loss rates (that were determined from the RUSLE assessment). This classification system is presented in Table 3-3.

TABLE 3-3 EROSION RISK CLASSES

Soil Loss Class	Mean Annual Soil Loss (t/ha/yr)	Erosion Risk
1	<150	Very Low
2	151 to 225	Low
3	226 to 350	Low – Moderate
4	351 to 500	Moderate
5	501 to 750	High
6	751 to 1500	Very High
7	>1500	Extremely High

The outputs of the RUSLE assessment are presented in Table 3-4 and Figure 3-8, and show that the Project Area is predominantly comprised of areas classified as very low erosion risk (i.e. <150 t/ha/yr), with approximately 99.9% of the Disturbance Footprint located within areas classified as very low to low – moderate erosion risk. Areas classified by an erosion risk class of moderate or greater (i.e. >351 t/ha/yr) represent approximately 0.1% of the Disturbance Footprint, with no areas of the Disturbance Footprint represented by a very high or extremely high erosion risk (i.e. >751 t/ha/yr). The BESS area is proposed to only disturb areas of very low erosion risk.

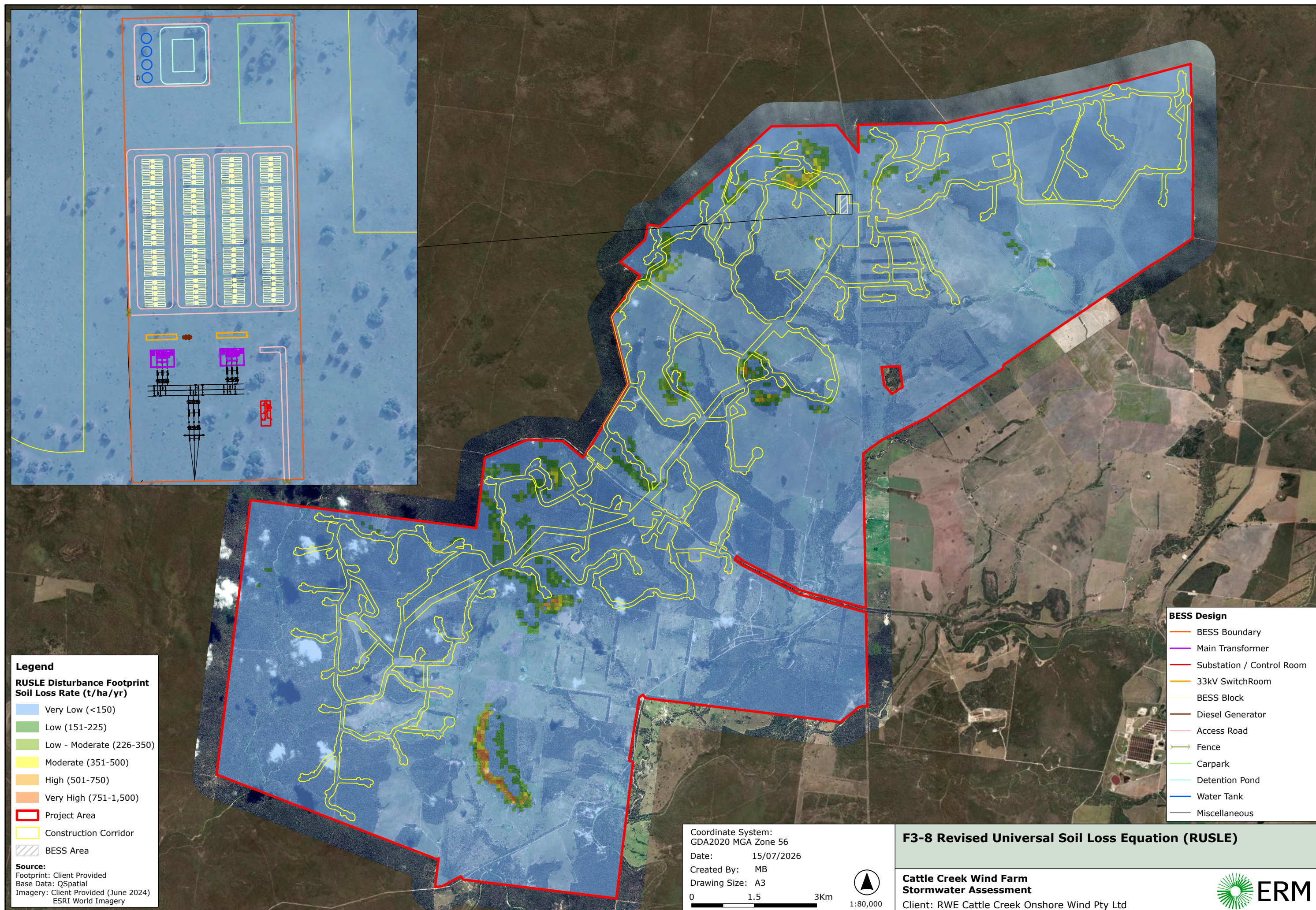
The predominantly very low erosion risk can be attributed to low S-factor (slope gradient) and L-factor (slope length) values throughout the Disturbance Footprint.

TABLE 3-4 DISTURBANCE FOOTPRINT EROSION RISK

Erosion Risk	Mean Annual Soil Loss (t/ha/yr)	Disturbance Footprint Area (ha)*	Disturbance Footprint Percentage (%)
Very Low	<150	2155.65	97.04
Low	151 - 225	44.56	2.01
Low - Moderate	226 - 250	18.39	0.83
Moderate	351 - 500	2.27	0.10
High	501-750	0.5	0.02
Very High	751 - 1500	0	0
Extremely High	>1500	0	0

*Due to rounding errors, the total Disturbance Footprint Area (ha) presented in Table 3-4 equates to 2,221.37 ha, a 0.17 ha discrepancy from the defined 2,221.2 ha Disturbance Footprint

It should be noted that no additional fieldwork or soil sampling was undertaken specifically for the assessment. Whilst the initial assessment utilises publicly available data, inputs to the RUSLE assessment can be further refined and calibrated by collecting site specific information including soil samples and geotechnical survey. Nonetheless, as per State Code 23, the RUSLE methodology provides a high-level assessment of potential sediment loss.



Legend

RUSLE Disturbance Footprint
Soil Loss Rate (t/ha/yr)

- Very Low (<150)
- Low (151-225)
- Low - Moderate (226-350)
- Moderate (351-500)
- High (501-750)
- Very High (751-1,500)

Project Area

- Construction Corridor
- BESS Area

Source:
Footprint: Client Provided
Base Data: QSpatial
Imagery: Client Provided (June 2024)
ESRI World Imagery

BESS Design

- BESS Boundary
- Main Transformer
- Substation / Control Room
- 33kV SwitchRoom
- BESS Block
- Diesel Generator
- Access Road
- Fence
- Carpark
- Detention Pond
- Water Tank
- Miscellaneous

Coordinate System:
GDA2020 MGA Zone 56

Date: 15/07/2026

Created By: MB

Drawing Size: A3

0 1.5 3Km

1:80,000

F3-8 Revised Universal Soil Loss Equation (RUSLE)

Cattle Creek Wind Farm
Stormwater Assessment

Client: RWE Cattle Creek Onshore Wind Pty Ltd



4. POTENTIAL IMPACTS

4.1 POTENTIAL IMPACTS TO NATURAL DRAINAGE PATTERNS

Impacts on natural drainage patterns are expected to arise where disturbance areas (both temporary and permanent) have the potential to alter natural drainage lines, waterways and wetlands.

4.1.1 WATERCOURSE CROSSINGS

As per the Queensland Government's Watercourse Identification Map, the Disturbance Footprint will not cross any mapped drainage features or watercourses as defined by the *Water Act 2000*. All identified crossing will occur at unmapped waterways.

In general, most waterway crossings will have some influence on the conditions surrounding the crossing site. However, suitably designed and constructed waterway crossings consider the long-term stream dynamics at the crossing site to minimise potential impacts. Failure to do so potentially risks long term damage to the surrounding waterway and potential damage to, and/or failure of the crossing structure. The potential impacts associated with waterway crossings are site-specific but, in general, may include:

- Increased sediment and nutrient loads due to altered roadside drainage arrangements;
- The disturbance and/or removal of riparian and in-stream vegetation;
- Prevention of fish passage/aquatic fauna through the crossing structure; and
- The alteration of the stream's natural flow pattern, both in-channel and floodplain flows, including:
 - The reduction in hydraulic capacity through the structure (possible low flow damming effect and reduction in aquatic health);
 - The raising of water levels (an increased afflux or backwater effect) upstream of the crossing structure, potentially increasing the flooding upstream;
 - Increased hydraulic forces and hence erosion potential surrounding the crossing structure through the concentration of flows and poor design arrangements (concentration of flow); and
 - A rise in water level on the upstream side of a crossing caused when the effective flow area at the crossing is less than the natural width of the stream (afflux).

For the most part, the Disturbance Footprint has been sited to avoid the crossing of significant water features. Watercourse crossings occur predominantly due to the intersection of the access track network with unmapped waterways, noting that the access track network has been sited to utilise existing tracks where practicable.

Diversion of mapped drainage lines and waterways is generally not anticipated to support the construction and operation of larger footprint hard standing infrastructure, however as per the WIM there are some instances where WTG hardstands are proposed to be situated within "Unmapped" waterways (Figure 3-5). Where avoidance is not practicable, localised diversions may be required. Larger hard standing infrastructure, and site grading activities to support their development, may also interfere with overland flow pathways that contribute to drainage lines and waterways. These impacts are expected to be most prominent throughout periods of high rainfall (October to March). Diversion of lateral flows may result in higher volume concentrated flows, and the ponding of stormwater flows where appropriate drainage controls are not employed.

All crossings occur at “Unmapped” waterways, the majority of which are low-flow intermittent waterways that occur in the upper portion of the catchment. Crossings at these minor drainage lines are expected to be manageable through the implementation of best practice measures designed to convey a minimum 50% AEP event, with major tracks designed to accommodate the 20% AEP event (Green et.al, 2015). Overtopping of access tracks may occur in events that exceed the 20% AEP event, with changes to the flow profile of existing waterways expected to arise in these instances.

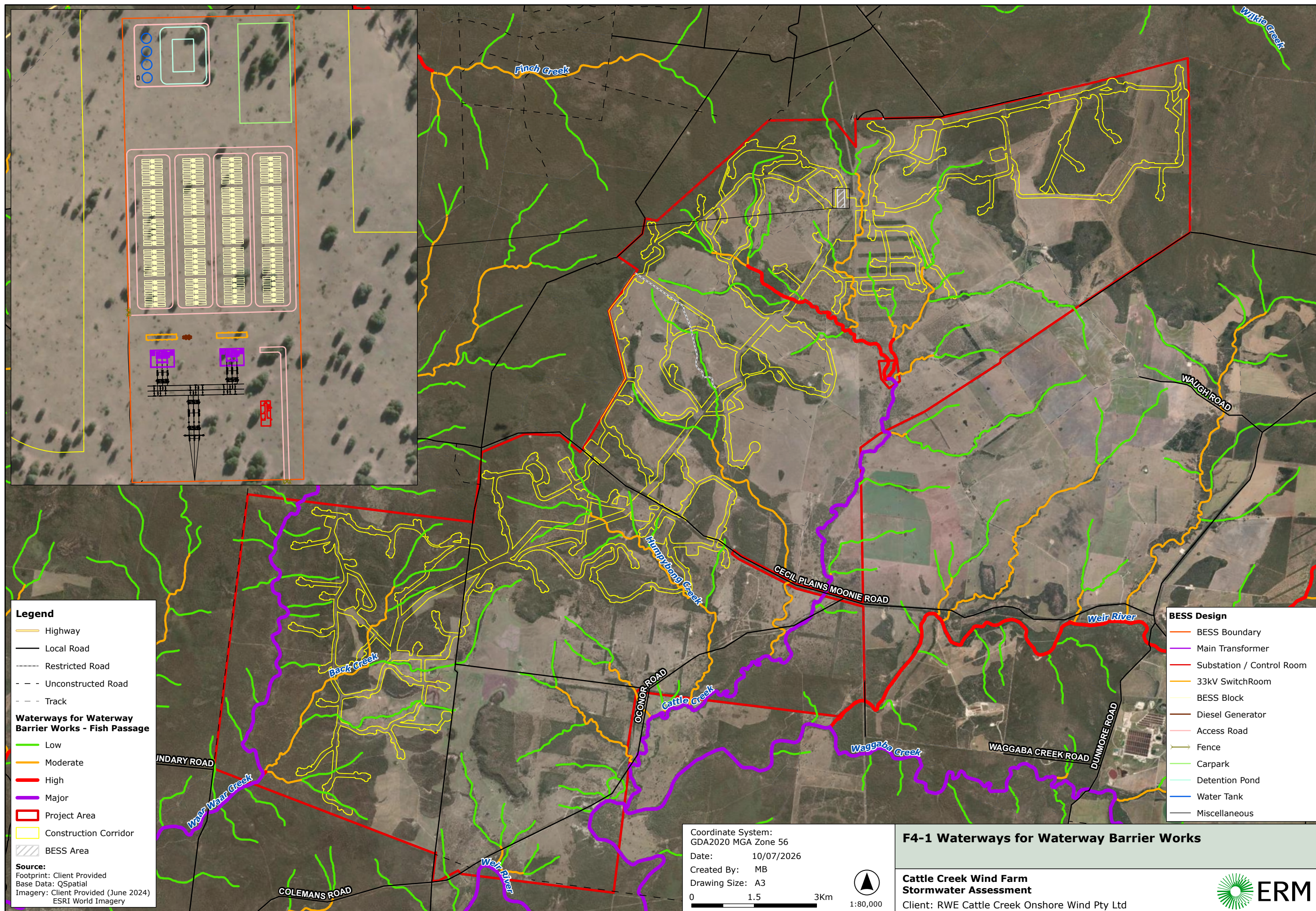
It is anticipated that temporary and permanent watercourse crossings that are proposed as a result of the Project will require waterway barrier works (as defined by the *Fisheries Act 1994*). A review of the “QLD waterways for waterway barrier works” spatial data layer on Queensland Globe (Figure 4-1) indicates that there is one instance where the Disturbance Footprint is proposed to intersect with a waterway defined as “High Risk”. This occurs along the footprint of the access road network leading to WTG 49. Eight crossings occur at “Moderate Risk” waterways, with all other crossings occurring at waterways classified as “Low Risk”, or at minor “unmapped” waterways not captured by the waterway barrier works mapping. Several instances are shown on Figure 4-1 where waterways intersect the internal 330 kV transmission line, however as the line is overhead, these instances do not constitute watercourse crossings.

The intent of the waterway barrier works identification and approval process is to maintain passage for fish upstream and downstream of the crossing. Generally, waterways higher in the catchment with reduced habitat area and steeper slopes, such as those observed throughout the Project Area, are expected to have smaller populations of fish (DAF, 2023). Design considerations will be required to minimise impacts on fish passage at identified crossings, with risk management controls specified in the SWMP. Approval to undertake waterway barrier works may be required, however this will be determined during later phases of the Project.

In addressing PO6 of State Code 23, the provided site plan (Figure 3-5) demonstrates that where practicable, the wind farm, including ancillary infrastructure has been designed and sited to minimise crossings and interference with natural drainage lines, waterways and wetlands. Unavoidable interferences occur to allow for necessary site access and to accommodate the WTG layout, although instances of such have been minimised, with preference for low-flow intermittent waterway features where such interferences are necessary.

Unacceptable impacts to receiving waterways, wetlands and catchments will be avoided through appropriate design, localised and controlled diversions where required, and the implementation of best-practice drainage, erosion and rehabilitation measures as detailed in the SWMP. Measures to be included in the SWMP are outlined in Section 5.1.

With regard to PO17 of State Code 27, the site plan (Figure 3-5) demonstrates that the BESS is located beyond the location and buffer zone of any identified waterways and wetlands. No crossings or interference with natural drainage lines is proposed as part of the BESS development, and no non-essential hardening or unnatural modification of a waterway is proposed. To address drainage control and bank stability for the BESS, a statement has been prepared by a Registered Professional Engineer of Queensland (RPEQ) in Section 6, with detailed measures to be outlined in a SWMP and RMP as per the State Code 27 Planning Guideline for PO17 and PO19.



4.1.2 CHANGES IN CATCHMENT CHARACTERISTICS

Changes in hydrology would typically be associated with a change in the imperviousness of the catchment, or as a result of substantial diversion of overland flows due to the Project. This could occur throughout all phases, from construction, during operation and through to the decommissioning phases.

The Disturbance Footprint extent is anticipated to cover an estimated 1,945 ha in the Border Rivers basin, representing 0.13% of the Macintyre and Weir sub-basin of the Border Rivers basin. Disturbance in the respective sub-catchments of the Moonie and Balonne-Condamine basins represents <0.01%. Impacts on a basin scale will not be perceptible or measurable.

At a more localised scale, the Disturbance Footprint is representative of approximately 11% of the encompassing Project Area. Impacts to drainage lines on a local scale may arise if changes to local catchment characteristics are left unmitigated.

Review of the proposed Project Design (Section 1.3) indicates that impacts to local drainage lines may arise due to the following:

- Reduced infiltration of stormwater flows resulting in increased waterway flows, particularly during lesser rainfall events;
- Site grading activities resulting in changes to local flow regimes (sheet flow vs concentrated flows) and the diversion of mapped water features; and
- Access tracks intercepting and diverting sheet flows.

It should be noted that the 2,221.2 ha Disturbance Footprint is inclusive of all disturbance and infrastructure areas, and it is anticipated that only a small portion of the footprint will comprise impervious infrastructure. Review of the Project layout has identified that infrastructure that may introduce newly impervious surfaces to the Project Area includes the 135 WTGs and associated foundations, and sections of the switching station, BESS, O&M facilities, and the meteorological masts. Disturbance represented by temporary construction facilities shall be appropriately rehabilitated following the construction phase.

Review of the Project Design demonstrates that the Disturbance Footprint has been sited to utilise the topography of the pre-development landscape (Section 3.3.1), with newly formed access tracks utilising contours to access high-elevation WTGs, and larger footprint infrastructure situated in the lower-lying plains to maintain, where practicable, pre-development flow regimes. These design elements ensure impacts related to the extensive reshaping of landscape features due to site grading activities are minimised. Best practice drainage controls are expected to be sufficient in managing potential impacts and will be implemented to maintain sheet flow conditions around construction and infrastructure areas.

Furthermore, given the situation of the Disturbance Footprint at the headwaters of the Border Rivers, Moonie, and Balonne-Condamine catchments, upstream overland flows of large volumes are unforeseen. Best practice measures are expected to be sufficient in managing upstream flow volumes and maintaining pre-development flow conditions (as sheet flow where practicable) to avoid any measurable impacts to waterways and drainage lines.

With regard to PO8 of State Code 23, the wind farm components of the Project have been sited to minimise impacts to catchment characteristics. Best practice measures as outlined in Section 5.1 are anticipated to be sufficient to manage drainage.

In addressing PO19 of State Code 27, the site plan (Figure 3-5) demonstrates that the BESS has been located to minimise interference with overland flow paths. The BESS is located outside of the buffer zones of mapped waterways and wetlands and is sited on relatively flat terrain to limit the need for extensive earthworks or flow diversion. Overland flows will be managed through measures detailed in Section 5.1 to avoid the concentration or redirection of overland flow paths. In accordance with the State Code 27 planning guideline for PO19, these measures have been addressed in the RPEQ statement (Section 6) and will be detailed within the SWMP and RMP.

4.1.3 FLOODING

The location of infrastructure within identified flood zones presents a risk to natural drainage patterns, where the situation of impervious infrastructure alters drainage flows and flood zones. As per the modelled 1% AEP flood zone (Figure 3-6) the disturbance footprint of identified impervious infrastructure (WTGs, BESS, substations, O&M compound) is primarily located beyond the 1% AEP flood extent. Where the 1% AEP flood is modelled to interact with the footprint of such infrastructure, it is typically sporadic and confined to depths of <0.5 m. As such direct impacts to flood zones (such as floodwater afflux) are not likely to occur (final determination subject to detailed flood assessment, should this be required). Indirect impacts may arise where there is an increase in the extent of hard stand infrastructure throughout the upstream catchment of identified flood zones. Such impacts are also subject to determination in a detailed flood assessment.

As per Figure 3-6 the access track network is proposed to intersect with the 1% AEP flood zone at several locations, primarily where crossings of watercourses and tributaries are proposed to occur. Watercourse crossings have the potential to alter downstream flood behaviour due to potential flow restrictions. The extent and depth of the 1% AEP flood at watercourse crossings is greater at larger stream order drainage features, such as Back Creek and Humpybong Creek. A majority of watercourse crossings occur at minor tributaries, where the modelled 1% AEP flood depth is confined to <0.5 m. Conveyance infrastructure at crossings will be designed to convey flows in the 50% AEP flood event, with major tracks designed to convey flows up to the 20% AEP flood event (Green et.al, 2015). In larger flood events, changes in flow characteristics and upstream ponding of floodwaters may occur.

4.2 POTENTIAL IMPACTS TO WATER QUALITY AND EROSION CONTROL

4.2.1 EROSION IMPACTS

Erosion related impacts were identified in the Erosion Risk Assessment (ERM, 2026), which assessed erosion potential using the RUSLE methodology. The output of the RUSLE assessment is presented in Figure 3-8, and shows that the Project Area encompasses areas primarily classified as having a very low erosion risk, with the Disturbance Footprint situated in areas of predominantly very low erosion risk. Limiting disturbance to very low erosion risk areas will limit unacceptable risk to receiving waterways and catchments during construction.

Construction and ground disturbance activities are expected to present to an elevated erosion risk, particularly in sloped areas, with erosion impacts associated with these activities amplified in the small portion of the Disturbance Footprint (~0.1%) defined by a moderate to high erosion risk. The construction of OSOM routes may also present an elevated erosion risk due to the more onerous cut and fill depths that are required along these wide routes. Measures to mitigate these impacts are outlined in the Erosion Risk Assessment.

With regard to the SDAP POs for State Code 23 and State Code 27, the Erosion Risk Assessment (ERM, 2026), demonstrates that the Project has been designed to avoid areas of high erosion risk. The wind farm layout demonstrates minimisation of high erosion risk areas, and the BESS component of the Project is wholly located beyond the scope of mapped high erosion risk areas. Soil mapping for the Project Area (Section 3.3.2) demonstrates that no high-risk soils (as defined by State Code 27) are proposed to be disturbed by the BESS facility. The release of any soil-based contaminants generated from disturbances associated with both the wind farm and BESS aspects of the Project is considered manageable with BPESC measures prior to, during, and after construction

In line with PO9 of State Code 23, erosion and run off to the surrounding landscape and waterways must be minimised to the greatest extent possible. Measures for the progressive rehabilitation and site stabilisation of disturbed areas are outlined in Section 5.3.

4.2.2 OTHER WATER QUALITY IMPACTS

Other potential impacts to stormwater quality as a result of the Project include the following:

- Leakage or accidental spillage of oil, fuel or other liquids associated with the Project, with potential for drainage to local waterways if not appropriately managed;
- Release of contaminants to stormwater due to improper management and containment of washdown area water;
- If the water used for dust suppression is of a poorer quality compared with the background surface water quality, this can cause an impact to the quality of surface water and soils;
- Chemical leaks from batteries, such as accidental damage during installation has the potential to migrate off site if not managed; and
- Release of concrete based pollutants resulting in an increase in the pH of surface waters. There are four proposed concrete batching plants across the Project Area, which will support the production of concrete for WTG foundations and other infrastructure footings. Construction activities that may result in the release of concrete based pollutants include the following:
 - Concrete batching, cutting, and disposal;
 - Spills of wet concrete;
 - Dampening of freshly laid concrete;
 - Cleaning of concrete polluted equipment (e.g. machinery, vehicles, tools) without appropriate controls for the capture of contaminated cleaning water; and
 - Concrete dust released into waterways.

In line with PO16 of State Code 27, desktop review (Section 3.3.2) suggests that no water quality impacts are anticipated to arise as a result of disturbance to high risk soils (erosive, dispersive, sodic, saline and/or acid sulfate soils) for either the BESS or wind farm components of the Project. To ensure the BESS component meets the compliance requirements of State PO18 of Code 27, measures to contain the release of contaminants to surface water or groundwater in the event of an incident, including a fire or explosion are detailed in Section 5.2.

5. MITIGATION AND CONTROL MEASURES

The proposed mitigation and control measures outlined in this section are to be used to inform the development of the relevant site-specific plans required under the State Code 23 (v3.6) planning guidelines for PO6, PO8, and PO9 and the State Code 27 (v3.6) planning guidelines for PO17 and PO19. The schedule for the development of these plans is outlined in Table 5-1 and Table 5-2.

TABLE 5-1 STATE CODE 23 SCHEDULE OF PLANS

Plan	Relevant PO(s)	Timeline	Requirements ¹
Erosion and Sediment Control Plan – Construction (ESCPC)	PO8, PO9	Prior to commencing any on-site clearing	- Prepared by a suitably qualified professional - Prepared in accordance with best practice guidelines and standards - Recommend measures to prevent and/or mitigate accelerated soil erosion - Include a monitoring and reporting program - Include an emergency response protocol to minimise erosion and run off during extreme weather events experienced during the construction period
Rehabilitation Management Plan (RMP)	PO9	After construction has commenced and prior to its completion	- Prepared by a suitably qualified ecologist - Be generally in accordance with relevant sections of a lodged Ecological Assessment Report (EAR) or Primary Rehabilitation Plan (PRP) - Outline how areas cleared for construction will be rehabilitated, and/or restored, and/or stabilised - Prepared cognisant of and complimentary to a SSPO - Reflective of agreements to deliver parts of the disturbance footprint to a condition requested by landowners
Stormwater Management Plan (SWMP)	PO6, PO9	Prior to the commencement of full operations of the wind farm	Informed by the RMP, ESCPC, and SSPO to ensure an integrated approach to site rehabilitation, erosion management and stabilisation
Site Stabilisation Plan – Operations (SSPO)	PO9	Prior to the commencement of full operations	- Prepared in accordance with best practice erosion guidelines and standards - Informed by the RMP, SWMP, and ESCPC to ensure an integrated approach to site rehabilitation, erosion management and stabilisation

¹Requirements as specified in the DSDIP Planning Guideline State Code 23: Wind farm development (DSDIP, 2025a)

TABLE 5-2 STATE CODE 27 SCHEDULE OF PLANS

Plan	Relevant PO(s)	Timeline	Requirements ¹
Stormwater Management Plan (SWMP)	PO17, PO18, PO19	Prior to the full operations of the Battery Storage Facility	Demonstrate appropriate containment and disposal/treatment of water, including fire water

Plan	Relevant PO(s)	Timeline	Requirements ¹
Rehabilitation Management Plan (RMP)	PO17, PO19	After construction has commenced and prior to its completion	• Prepared by a suitably qualified ecologist • Be generally in accordance with relevant sections of a lodged EAR or PRP • Outline how areas cleared for construction will be: ◦ rehabilitated (returned over time to pre-disturbance regional ecosystem or condition); and/or ◦ restored (using grasses, groundcovers and other local indigenous species that are consistent with the composition of surrounding vegetation communities); and/or ◦ stabilised (using hard engineering devices and measures complemented by landscaping) ◦ prepared cognisant of and complementary to a Site Stabilisation Plan – Operations (SSPO) (which will also be conditioned to achieve compliance with PO19)

¹Requirements as specified in the DSDIP Planning Guideline State Code 27: Battery storage facility development (DSDIP, 2025b)

5.1 MEASURES TO PROTECT NATURAL DRAINAGE LINES

The avoidance and minimisation of watercourse crossings is the most effective measure in avoiding impacts to natural drainage lines, however where this is not practicable, mitigation measures are to be implemented to maintain pre-development conditions and preserve the bank stability of impacted waterways.

TABLE 5-3 MEASURES TO PROTECT NATURAL DRAINAGE LINES

Impact	Measures
Natural Drainage Lines – watercourse crossings (linear infrastructure)	Reference should be made to best practice guidelines, such as IECA BPESC Books 1-3 Appendix I – Instream Works. Measures should include: • Where practicable, allow for pre-development flows in the drainage feature to be maintained (e.g. via a pump bypass system) during periods of streamflow. Crossings will be designed to convey flows in the 50% AEP flood event, with major tracks designed to convey flows up to the 20% AEP flood event (Green et.al, 2015); • Avoid where practicable altering the dimensions of the channel; • Undertake construction works during periods when flows are minimal, if not absent;

Impact	Measures
	• To ensure bank stability during and after construction activities, employ best practice channel clearing and stabilisation requirements as per Table I11 of IECA BPESC Book 3 (Table 5-6); and • Ensure culverts are sized appropriately to provide adequate flow conveyance throughout the post-construction and operational phases. Design considerations will be required to manage impacts that may arise due to waterway barrier works. Where appropriate, crossings shall be compliant with the <i>Accepted development requirements for operational work that is constructing or raising waterway barrier works</i> (Fisheries Queensland, 2025). Key measures should seek to maintain waterway connectivity and provide fish passage at watercourse crossings. Waterway barrier works approvals, if required, will be sought at a later stage in the Project.
Natural Drainage Lines – changes in catchment characteristics	To mitigate against impacts related to increased runoff caused by sealed and impervious surfaces, adequate drainage controls must be implemented. Drainage controls shall consider the recommendations of the Queensland Urban Drainage Manual (QUDM) (IPWEA, 2017) such as: • Diversion channels or catch drains to be established around construction and material storage areas to divert excess flow from impervious surfaces around the site and maintain natural drainage pathways; • Clean, sealed surfaces (such as roofs) to be connected to the permanent drainage system soon as constructed to capture excess runoff developed from these impervious surfaces; • Measures such as level spreaders will be established to ensure concentrated flows leaving infrastructure areas are avoided and that sheet flows are maintained; and • Outfall structures to be fitted with appropriate scour protection to dissipate flow energy. Impacts resulting from site grading activities should be managed through appropriate rehabilitation and stabilisation activities, as outlined in Section 5.3.
Natural Drainage Lines - flooding	• Where practicable, locate all permanent infrastructure, construction compounds and other buildings above the predicted 1% AEP flood levels;

Impact	Measures
	- Environmental control measures (waste, chemical and hazardous storage, spill kits, vehicle and machinery washdown areas, laydown areas) to be located outside of the 1% AEP flood zone; - Appropriate sizing of drainage channels and flood controls (i.e. culverts at waterway and drainage feature crossings); and - During construction, avoid activities during high rainfall periods of the year that may induce a higher flooding risk. Rainfall data from Dunmore Exchange TM Station near the Project Area indicates the wet season period falls between October to March.
Access tracks intercepting overland flows	- Appropriate stormwater drainage to allow for the free discharge of stormwater from roads. Refer to Table 4.3.11 of the IECA BPESC Books 1-3 (2025) for further detail; - Implementation of measures such as whoa-boys or diversion banks to promote the shedding of stormwater from access tracks at regular intervals; and - Use of level spreaders to disperse concentrated flow and promote downgradient sheet flow.

5.2 MEASURES TO PROTECT WATER QUALITY AND LIMIT EROSION

General measures to mitigate any water quality related impacts that may arise due to the Project are outlined in Table 5-4.

TABLE 5-4 MEASURES TO PROTECT WATER QUALITY AND LIMIT EROSION

Impact	Measures
Water quality – erosion	Measures to limit erosion are to be outlined in the ESCPC which, will be prepared prior to any on-site clearing occurring. Further information on the measures that should be included in the ESCPC are detailed in the Erosion Risk Assessment.
Water quality – other pollutants	- Pre-construction monitoring of receiving waters to develop a baseline dataset. Refer to Section 5.2.1 for further detail; - Flow diversion banks, diversion channels, catch drains, table drains, chutes and clean water diversions to be installed along the high side of each infrastructure area to ensure that during and after storm events, clean water upstream flows are not contaminated with construction material and/or particulates that might enter the downstream system; - Bunding of areas identified as potential contaminant sources. This may include chemical and fuel storage areas, washdown bays, BESS, O&M facilities, and concrete batching plants;

Impact	Measures
	• Spill response kits to be made available on site and in each vehicle; and • Site personnel to be made aware of the correct spill response and management procedures that are to be implemented on site. Implementation of these measures will ensure the Project adheres to the requirement of State Code 27 PO18 in ensuring that the Project prevents the release of contaminants to surface water or groundwater, particularly in the event of an incident, including a fire or explosion. The following measures are outlined to minimise impacts related to on-site concrete batching: • On-site concrete batching carried out behind earth bunds (or other such measures) to capture and contain concrete-laden waste and spills; and • All concrete batching and pouring equipment will be rinsed in the designated washdown bays. Equipment washdown water to be contained on-site prior to treatment and disposal.

5.2.1 WATER QUALITY BASELINE MONITORING PROGRAM

Prior to the commencement of construction activities, a downstream surface water quality monitoring program should be implemented to establish baseline conditions and to ensure any potential impacts to water quality due the Project can be monitored and mitigated as required.

Details of the monitoring program will be outlined in the ESCPC, and will seek to monitor for the relevant parameters outlined in the EPP (Water) WQOs as specified in Appendix A. Given the Project Area's location across three drainage basins, it is recommended that sampling locations allow for the establishment of a baseline and an assessment of impacts across each basin. Recommended sampling locations include upstream (where applicable) and downstream locations along key waterways in the Border Rivers Basin (i.e. Cattle Creek, Waar Waar Creek, Weir River) and the Balonne-Condamine Basin (i.e. Wilkie Creek). Given the minor extent of disturbance within the Moonie Basin, the implementation of a monitoring program along Finch Creek is not considered practicable. Rather, best practice controls as outlined in this Report should be employed to protect water quality values within Finch Creek and the Moonie Basin.

It should be noted that some of these waterways have intermittent flows, and as such the collection of monitoring data may be challenging. This will be considered in the development of the monitoring program.

5.3 MEASURES FOR SITE REHABILITATION AND STABILISATION

Throughout the construction phase, areas disturbed by construction activities should be progressively disturbed to manage erosion risk. Compliance with State Code 23 PO9 requires that areas for construction are progressively stabilised during construction to ensure that

erosion and runoff to the surrounding landscape and waterways is minimised to the greatest extent possible. As detailed in Table 5-1, compliance with PO9 will be achieved through a combination of approval conditions requiring the preparation and implementation of a RMP, ESCPC, SWMP, and SSPO. Rehabilitation and stabilisation works for the site should be outlined in the RMP (for construction works) and the SSPO (for the operational phase) and adhere to best practice guidance such as the IECA BPESC books.

Chapter 4.4 of the IECA Book 1 provides guidance surrounding the best practice land clearing, erosion control and site rehabilitation measures to be implemented based on the level of erosion risk. Additionally, best practice requirements for the clearing and progressive stabilisation of drainage channels are outlined in Appendix I of IECA Books 1-3. These requirements are summarised in Table 5-5 and Table 5-6.

TABLE 5-5 BEST PRACTICE LAND CLEARING AND REHABILITATION REQUIREMENTS (TABLE 4.4.7 IECA BPESC BOOKS 1-3, 2025)

Erosion Risk Class (RUSLE) ¹	Estimated Soil Loss Rate (t/ha/yr)	Erosion Risk Rating	Maximum weeks for land clearing works	% cover required for rehabilitation of finished areas	No. of days to achieve cover on completed areas	No. of days cover must be applied on exposed areas if no works occurs	No. of days that stockpiles require covering within
All cases		All reasonable and practicable steps taken to apply best practice erosion control measures to completed earth works, or otherwise stabilise such works, prior to anticipated rainfall-including existing unstable, undisturbed, soil surfaces under the management or control of the building/construction works.					
Very Low	<150	Very Low	4 – 8 ²	60	10 – 30 ²	10 – 30 ²	15 – 28 ²
Low	151 to 225	Low	4 – 8 ²	70	10 – 30 ²	10 – 30 ²	15 – 28 ²
Low/Moderate	226 to 350	Moderate	4 – 6 ²	70	10 – 20 ²	10 – 20 ²	15 – 28 ²
Moderate	351 to 500						
High	501 to 750	High	4	75	10	10	10
Very High	751 to 1500						
Extremely High	>1500	Extreme	2	80	5	5	5

¹Erosion risk classes derived from the RUSLE assessment conducted for the Project. As such, this table should be read in conjunction with the RUSLE mapping (Figure 3-8) to determine the best practice requirements that a given location is subjected to.

²Depending on the season. Shorter duration during the wet season (October to March), longer duration in the dry season (April to September).

TABLE 5-6 BEST PRACTICE CHANNEL CLEARING AND STABILISATION REQUIREMENTS (TABLE G6 IECA BPESC BOOKS 1-3, 2008)

Erosion Risk Rating ¹	Expected 24-hour rainfall	Average monthly rainfall	Maximum weeks for channel clearing works	Minimum % cover to be achieved on disturbed soil surfaces	No. of days (following completion of works) to achieve cover on disturbed soil surfaces	No. of days, that if exceeded, non-completed channel works must be stabilised	Other
All cases			All reasonable and practicable steps taken to apply best practice erosion control measures to completed channel works, or otherwise stabilise such works, prior to an anticipated increase in stream flow.				
Very Low	0 to 2 mm	0 to 30 mm	8	70 ²	30	30	N/A
Low	2+ to 10 mm	30+ to 45 mm	6	70 ²	30	30	N/A
Moderate	10+ to 25 mm	45+ to 100 mm	4	80 ²	10	20	Appropriate consideration given to the use of rock protection, biodegradable Erosion Control Mesh or the equivalent, on all erodible stream banks subject to high velocity flows
High	25+ to 100 mm	100+ to 225 mm	2	90 ²	5	10	
Extreme	>100 mm	>225 mm	1	90 ²	5	5	

¹Erosion risk rating based on daily/monthly rainfall (IECA Table I10). Refer to Figure 3-2 for local average monthly rainfall values.

²Minimum cover requirement may be reduced if the natural cover of the immediate land is less than the nominated value, for example in arid and semi-arid areas

6. RPEQ STATEMENT

This statement pertains to the supporting action guidance provided for BESS facilities as stated in PO17 and PO19 of DSDIP State Code 27 (2025b).

The drainage control and bank stability measures, where relevant, identified in this stormwater assessment, align with industry good practice for developments of this nature. These measures, some of which are to be defined during detailed design and in relevant management plans which are to be produced, aim to manage overland flows and prevent concentrated runoff such that pre-development conditions are not materially altered by the BESS development.

Effective development and implementation of the relevant management plans identified within this Report will ensure that during the construction and operation phases of the BESS development, waterway banks will not be destabilised, and disturbed areas will be revegetated.

This statement is endorsed by Chris Gimber, RPEQ number 16126.

7. CONCLUSION

This stormwater assessment for the Project considers the potential risks based on the current description of the Project and the indicative layout provided by the Proponent. Table 7-1 demonstrates how the wind farm development complies with the performance outcomes outlined in State Code 23, with Table 7-2 outlining compliance against State Code 27.

TABLE 7-1 COMMENTS AGAINST STATE CODE 23

Performance outcomes		Compliance Status
Natural Drainage Patterns		
P06	The wind farm, including ancillary infrastructure, is designed and sited to minimise crossings of and interference with natural drainage lines, waterways and wetlands.	Where possible, all hard standing will be located away from natural drainage lines, waterways and wetlands. WTG hardstands may be within natural drainage lines and require diversion. The access track network has been sited to minimise crossings, with crossings to occur only at intermittent waterways defined as "Unmapped" under the WIM. Crossings at these features is necessary to access the site, with interference to be managed by best practice controls specified in the SWMP, with targeted controls identified to manage crossings at moderate and high-risk WWBW waterways. Project is compliant¹
Protecting water quality and erosion control		
P07	Development is designed to avoid areas of high erosion risk, where failure of erosion management devices would result in permanent and/or adverse impacts on receiving waterways or wetlands	An Erosion Risk Assessment was conducted using the RUSLE method to inform the site layout. The site layout has been designed to ensure that disturbance will only occur in areas of the Project Area that are defined by very low erosion risk and/or can be appropriately managed with best practice measures during and after construction. Project is compliant
P08	Development is constructed to maintain or improve the water quality of receiving waters, waterways and wetlands by: ▪ minimising erosion and run off; ▪ managing drainage control; and ▪ preserving the bank stability of affected waterways and drainage lines	As per the Erosion Risk Assessment, the Disturbance Footprint has been sited to avoid areas of high erosion risk. Best practice measures will be sufficient in mitigating minor erosion and runoff impacts that do arise. Impacts relating to drainage control and bank stability are expected to be manageable through the implementation of best practice drainage and site stabilisation controls. All measures to be detailed in the ESCPC prior to construction. Project is compliant²
P09	Areas cleared for construction are progressively stabilised during construction to ensure that erosion and run off to the surrounding landscape and waterways is minimised to the greatest extent possible.	Disturbed areas will be progressively rehabilitated in accordance with best practice guidelines (such as IECA best practice requirements for the clearing and stabilisation of land and for channels). Rehabilitation and

Performance outcomes	Compliance Status
	stabilisation measures will be outlined in the RMP and SSPO. Project is compliant³

¹Compliance is subject to the preparation of an appropriate SWMP prior to commencement of full operations of the wind farm

²Compliance is subject to the preparation of an appropriate ESCPC prior to commencing any on-site clearing

³Compliance is subject to the preparation of an appropriate RMP, ESCPC, SWMP, and SSPO

TABLE 7-2 COMPLIANCE WITH STATE CODE 27

Performance Outcomes	Project Compliance
Protecting water quality and stormwater management	
PO16 Development: - minimises the disturbance of high risk soils: and - manages the release of soil based contaminants.	- The BESS development is not proposed to disturb high risk soils - All disturbance for the BESS is set to occur in areas of very low erosion risk - Appropriate ESC measures will be employed (particularly throughout the high-risk construction phase) in accordance with the IECA BPESC Books, and through the development and implementation of the ESCPC. Project is compliant
PO17 Development maintains the water quality of receiving waters, waterways and wetlands by: - avoiding locating in waterways and wetlands; - minimising crossings of and interference with natural drainage lines, farm drainage and irrigation infrastructure; - minimising erosion and sediment run off; - managing drainage control; and - preserving the bank stability of affected waterways and drainage lines avoiding non-essential hardening or unnatural modification of the waterway.	- The BESS development is located outside of any identified waterways and wetlands. - There are no waterway crossings proposed as a part of the BESS. - Erosion and sediment runoff will be minimised through disturbance of very low risk erosion areas, and the implementation of IECA BPESC measures as specified in the ESCPC. - Potential impacts to stormwater flows will be managed through the construction of appropriate drainage controls in accordance with the QUDM manual. - No non-essential hardening or unnatural modification of waterways is set to occur. Project is compliant¹
PO18 Development prevents the release of contaminants to surface water or groundwater in the event of an incident, including a fire or explosion.	Components of the BESS area will be appropriately bunded to ensure the capture of contaminants in the event of an incident. Project is compliant

Performance Outcomes	Project Compliance
PO19 Development minimises interference with overland flow paths.	Impacts to overland flow pathways due to the BESS are not anticipated to be extensive. Project design and appropriate drainage controls will assist in ensuring that the BESS does not result in significant changes to pre-development hydrology. Project is compliant¹

¹If the project is approved it will require the preparation of a detailed Stormwater Management Plan (SWMP) and Rehabilitation Management Plan (RMP).

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APPENDIX A

KUMBARILLA RIDGE WATER QUALITY OBJECTIVES

TABLE 8-1 AQUATIC ECOSYSTEM WATER QUALITY OBJECTIVES - BORDER RIVERS AND MOONIE BASINS, CONDAKINE RIVER BASIN

Water area/type (refer plan WQ4161, WQ4171, WQ4223)	Management intent (level of protection)	Water Quality Objectives to Protect Aquatic Ecosystem EV												
		Note: WQOs for indicators are shown as a range of 20 th , 50 th , and 80 th percentiles to be maintained or achieved (e.g. 3-4-5), lower and upper limits (e.g. pH: 7.2-8.2), or as a single value (e.g. <15). For single value WQOs, medians of test data are compared against the draft WQO.												
		HEV – high ecological value; SD – slightly disturbed; MD – moderately disturbed, ID – Insufficient Data												
		Sources: S1: Local datasets/reporting; S2: Murray-Darling Basin Plan 2012, Schedule 11 (A2, B1, B2, C2). Unless otherwise indicated, attribute the source for all values to S1.												
		Amm N (µg/L)	Oxid N (µg/L)	Total N (µg/L)	FRP (µg/L)	Total P (µg/L)	Chl-a (µg/L)	DO (% sat)	Turb (NTU)	SS (mg/L)	pH	Conductivity (µS/cm)	Sulfate (mg/L)	Alkalinity (mg/L as CaCO ³)
Kumbarilla Ridge	MD	Low Flow <12.8m³/s (cumeecs) at gauge 422336A – Condamine River at Brigalow												
		4	4	860	20	170	9	60-110% (s2)	110	ID	6.8-7.6	170	3	35
		High Flow ≥12.8m³/s (cumeecs) at gauge 422336A – Condamine River at Brigalow												
		ID	ID	2000 (s2)	ID	450 (s2)	ID	60-110% (s2)	270 (s2)	ID	7.0-8.5 (s2)	ID	ID	ID

Indicators: Amm N – ammonium nitrogen; Oxid N – oxidised nitrogen; Total N – Total Nitrogen; FRP – filterable reactive phosphorus; Total P – Total Phosphorous; Chl-a – chlorophyll-a; DO – dissolved oxygen; Turb – Turbidity; SS – total suspended solids.

Units: % saturation – percent saturation; µg/L – micrograms per litre; NTU – nephelometric turbidity units; m – metres; mg/L – milligrams per litre; µS/cm – microsiemens per centimetre

TABLE 8-2 ADDITIONAL INDICATORS FOR AQUATIC ECOSYSTEM ENVIRONMENTAL VALUE - BORDER RIVERS AND MOONIE BASINS, CONDA-MINE RIVER BASIN

Water area/type (refer plan WQ4161, WQ4171, WQ4223)	Management intent (level of protection)	Additional Water Quality Objectives to Protect Aquatic Ecosystem EV	
		HEV – high ecological value; SD – slightly disturbed; MD – moderately disturbed	
		Sources: S1: Local datasets/reporting; S2: Murray-Darling Basin Plan 2012, Schedule 11 (A2, B2, C2), S3: ANZG, 2018	
Toxicants (Including Pesticides, Herbicides) (s3)			
All basins – HEV, SD fresh waters	HEV/SD	- Toxicants (including metals, biocides) in water: refer to 99% species protection values contained in: - ANZG (2018) ‘toxicant default guideline values for water quality in aquatic ecosystems’, as amended - The following sources, where their guideline values post-date the specified ANZG guideline value, or where there is no ANZG value specified for a toxicant (Note: the ANZG specifies the date of guideline development for each toxicant): - Biocides: King et al (2017, as amended) (vol 1 and 2) <i>Proposed aquatic ecosystem protection guideline values for pesticides commonly used in the Great Barrier Reef catchment area</i> (available from Queensland Government publications) - Toxicants in sediments: refer to ANZG ‘toxicant default guideline values for sediment quality’ Anti-fouling: Comply with <i>Anti-fouling and in-water cleaning guidelines</i> (2015, as amended)	
All basins – fresh waters not mapped as HEV, SD	MD	- Toxicants (including metals, biocides) in water: - Waters outside developed reaches (low level of disturbance): refer to 99% species protection values contained in sources below - Waters within developed reaches: refer to 95% species protection values (or 99% species protection values for those toxicants identified in ANZG as having bioaccumulation potential) contained in sources below - ANZG (2018) ‘toxicant default guideline values for water quality in aquatic ecosystems’, as amended	

Water area/type (refer plan WQ4161, WQ4171, WQ4223)	Management intent (level of protection)	Additional Water Quality Objectives to Protect Aquatic Ecosystem EV	
		HEV – high ecological value; SD – slightly disturbed; MD – moderately disturbed	
		Sources: S1: Local datasets/reporting; S2: Murray-Darling Basin Plan 2012, Schedule 11 (A2, B2, C2), S3: ANZG, 2018	
		</	

Water area/type (refer plan WQ4161, WQ4171, WQ4223)	Management intent (level of protection)	Additional Water Quality Objectives to Protect Aquatic Ecosystem EV	
		HEV – high ecological value; SD – slightly disturbed; MD – moderately disturbed	
		Sources: S1: Local datasets/reporting; S2: Murray-Darling Basin Plan 2012, Schedule 11 (A2, B2, C2), S3: ANZG, 2018	
State Planning Policy			
State Planning Policy	All	• Border Rivers and Moonie Basin: Refer to section 3.2 of the Border Rivers and Moonie River basins Environmental Values and Water Quality Objectives • Condamine River Basin: Refer to section 3.4 of the Condamine River Basin Environmental Values and Water Quality Objectives	
Groundwaters (s2)			
Groundwaters (s2)	HEV	• Refer to the separate schedule document under the EPP (Water and Wetland Biodiversity), Queensland Murray-Darling and Bulloo basins Groundwater. Where groundwaters interact with surface waters, groundwater quality should not compromise identified EVs and WQOs for those waters. • <i>'Protection of groundwater quality is imperative to ensure the protection of healthy ecosystems and maintenance of environmental values as well as for future economic and population growth' (Australian Government, 2013)</i>	

TABLE 8-3 SALINITY WQOS FOR THE PURPOSES OF LONG-TERM SALINITY PLANNING AND MANAGEMENT

Water Quality Target Values for Long-Term Salinity Planning and Management									
Valley	Baseline as at 1 Jan 2000			End-of-Valley targets (as absolute value)			Valley reporting site	AWRC Site Number	Map EoV Site ID
	Salinity (EC µS/cm)		Salt Load (t/yr)	Salinity (EC µS/cm)		Salt Load (t/yr)			
	Median (50%ile)	Peak (80%ile)	Mean	Median (50%ile)	Peak (80%ile)	Mean			
Queensland									
Border Rivers	250	330	50,000	250	330	50,000	Barwon R @ Mungindi	416001	70
Moonie	140	150	8,700	140	150	8,700	Moonie R @ Fenton	417204A	71
Condamine-Balonne	170	210	4,200	170	210	4,200	Ballandool R @ Hebel-Bollon Rd	422207A	83
	170	210	5,000	170	210	5,000	Bokhara R @ Hebel	422209A	82



Water Quality Target Values for Long-Term Salinity Planning and Management									
	150	280	6,500	150	280	6,500	Briarie Ck @ Wollerbilla-Hebel Rd	422211A	84
	170	210	29,000	170	210	29,000	Culgoa R @ Brenda	422015	85
	160	210	10,000	160	210	10,000	Narran R @ New Angledool	422030	81



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