Water Assessment

Blayney 4C & 7C
Solar Farm & BESS

May 2025

edpr.com

DOCUMENT CONTROL

Report Title:		Water Assessment – Orange South 7A Solar Farm & BESS			
Rev	Date	Status	Author/s	Reviewed	Approved
1	17/01/2025	First issue	B.D.	J.J.	J.J.
2	11/02/2025	Second issue	B.D.	J.J.	J.J.
3	11/06/2025	Third Issue	B.D.	D.D.	J.J

A person or organisation choosing to use documents prepared by EDPR Australia accepts the following:

a) Conclusions and figures presented in draft documents are subject to change. EDPR Australia accepts no responsibility for use outside of the original report.

b) The document is only to be used for purposes explicitly agreed to by EDPR Australia.

c) All responsibility and risks associated with the use of this report lie with the person or organisation who chooses to use it.

EDPR Australia Pty Ltd
ABN 38 633 420 309

Level 4, 54 Marcus Clarke Street
Canberra ACT 2601

GPO Box 1429
Canberra ACT 2601

Email: australia@edp.com
Website: www.edpr.com

ABOUT EDPR AUSTRALIA

EDPR Australia, formerly ITP Development, is a renewables developer focused on delivering clean energy to the Australian market. Based in Canberra with a regional office in Sydney, EDPR Australia has a growing portfolio of renewable developments across regional Australia, specialising in both large and town-scale solar farms and BESS projects designed to match current and future electricity demand.

Leveraging expertise from our focused team and specialist consultants, EDPR Australia holds extensive experiences in landholder engagement, planning approvals, systems design, financing, engineering, electrical connection approvals, and commissioning. We maintain relationships with multiple stakeholders to ensure projects are successfully delivered in accordance with their expectations.

EDPR Australia is part of EDP Renewables APAC group, which is headquartered in Singapore and has a pan-regional presence with approximately 1.3 GWp of committed solar capacity. EDP Renewables APAC is part of EDP Renewables (Euronext: EDPR), a global leader in the renewable energy sector with more than 15 GW installed capacity in 29 markets across Europe, North America, South America and Asia Pacific. EDP group is recognised as the world's most sustainable energy utility company with an ambition to be Net-Zero by 2040, under the new Science Based Targets initiative (SBTi) Net-Zero Standard.

ABBREVIATIONS

AC	Alternating Current
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
BESS	Battery Energy Storage System
BoM	(Australian) Bureau of Meteorology
DC	Direct Current
DCP	Development Control Plan
EPI	Environmental Planning Instrument
Ha	Hectare
LEP	Local Environmental Plan
MW	Megawatt, unit of power (1 million Watts)
NDWI	Normalized Difference Water Index
NSW	New South Wales
PV	Photovoltaic
SDL	Sustainable Diversion Limit
SES	State Emergency Service
SEPP (T&I)	State Environmental Planning Policy (Transport and Infrastructure) 2021

TABLES

FIGURES

CONTENTS

1. INTRODUCTION

1.1. Overview

This report, which provides a desktop water assessment to support the Development Application for the project, includes a:

- Desktop review of local hydrology and catchment and water quality data.
- Assessment of on-site mapped watercourse characteristics.
- Desktop review of surface and groundwater quality data.
- Desktop review of the flood risk potential against the Local Environmental Plan.
- Desktop impact assessment against NSW policies and referenced industry standards for solar arrays.
- Desktop management assessment with mitigation measures recommended for construction and operation.

1.2. Limitations of Assessment

The assessment is based on publicly available information and data and does not include a site inspection, sampling, or any additional hydrological and/or hydraulic modelling.

2. PROJECT DESCRIPTION

2.1. Solar Farm

EDPR Australia is proposing to develop a town-scale solar farm (referred to as Blayney 4C & 7C), as described in the summary sheet in ***Table 1*** below. The site is located approximately 2.6km north-west of the township of Blayney, NSW within the Blayney Shire Council local government area (see ***Figure 1***).

Table 1 – Site Information

Parameter	Description
Project name	Blayney 4C & 7C
Development Type	2 x 5MW Solar Farm (Tracker System) & BESS
Lot/DP(s)	Lot 74 / DP750390 (4C); Lot 83 / DP750390 (7C)
Street address	180 Greghamstown Road, Blayney NSW 2799
Council	Blayney Shire Council
AC capacity	4.99 MW (per site)
Property area (total parcel)	32.8 ha
Development fenced area	16.4 ha (4C) – 15.6 ha after proposed subdivision 16.4 ha (7C) – 17.2 ha after proposed subdivision
Current land use	Cattle grazing

EDPR Australia is proposing to develop two 4.99 MW_{AC} Tracker System solar farms at 180 Greghamstown Road, Blayney, NSW. The property consists of two existing lots: Lot 74/DP750390, designated for the Blayney 4C solar farm site, and Lot 83/DP750390, designated for the Blayney 7C site. The current sizes of the lots are 16.4 hectares and 16.4 hectares, respectively, and a minor boundary adjustment is proposed to provide access to the northern solar farm site (Blayney 7C). The land has been utilised for cattle grazing.

There are to be approximately 10,300 solar modules per site, installed in rows that are around 120 metres long running east to west. The height of each module is approximately 2.0 m to 2.75 m and the mounting system is constructed on piles that are driven into the ground, typically within the depths of 1.5 m to 3.0 m. Each row of solar photovoltaic (PV) modules will rotate to track the sun across the sky from east to west each day.

Each solar farm will also consist of an inverter station, which incorporates two inverter units, the high/medium voltage switchgear and transformers. The inverter station is ground mounted and incorporated on a 12.19 m

skid. Allowance is made for a 2.9-metre-high battery energy storage system (BESS) on a 12.1m skid alongside the inverter stations.

During construction, there is expected to be approximately 50 personnel on site working from 7 am to 4 pm Monday through Friday. It is anticipated there will be up to around 40 light vehicle trips per day, with a maximum of around 30 light vehicles on site at any one time. The construction stage is expected to take approximately 4 months. Once operational, the sites will be unmanned, and maintenance is expected to be carried out quarterly by a crew of 2 – 3 people.

Solar panels and related infrastructure will be decommissioned and removed upon cessation of operations. This is likely to occur within two years of the end of the project. The site can then be returned to the pre-development land use or as agreed to.

Figure 1 – Proposed solar farm site and surrounding area

2.2. Hydrology, climate and topographic conditions

The proposed site for the Blayney 4C & 7C solar farm is within the Blayney Shire Council area.

Blayney in NSW (870m AHD) is located in the northeastern part of Lachlan water sharing region[1]. Other towns in the broad vicinity include Bathurst (670m AHD) to the northeast and Orange (860m AHD) to the northwest. Within the town area of Blayney, the Belubula River is the major watercourse, with the smaller Abattoir Creek running along the northern edge of the town (Jacobs, 2015). The Belubula River flows in a southerly direction from Blayney for 7kms before flowing into the Carcoar Dam. It then flows approximately 160kms to join the Lachlan River near the town of Gooloogong.

The catchment area of the Lachlan River system covers 8% of the Murray–Darling Basin and contributes 6.5% of water in the basin (MDBA, 2023). More than 80% of the catchment is used for agriculture. Land along the river is irrigated for fruit, vegetables, cotton, rice, fodder crops, cereals, dairy and farming. The slopes and eastern plains support livestock grazing. The Lachlan River passes through temperate forests in the east and semi-arid woodlands, mallee and scrublands in the west. The river and associated floodplains provide a wide range of aquatic habitats. The Great Cumbung Swamp contains one of the largest stands of River Red Gums in NSW and is one of the most important waterbird-breeding areas in eastern Australia (MDBA, 2023). These environmental values and land use practices are dependent on the waterways of the catchment.

2.2.1. Mapped watercourses

The project sites contain two (2) mapped watercourses (***Figure 3***), identified to be first order streams based on the ***Strahler system*** approach. According to the EPI – Riparian Lands dataset (utilised by *SIX Maps*), the first order stream on Lot 83/DP750390 (northern lot) partially traverses the eastern half of the lot; and the first order stream on Lot 74/DP750390 (southern lot) traverses the lot from a north-western to south-eastern direction. Interpretation of relevant *Department of Planning and Environment–Water* (DPE–Water) guidelines and regulations indicate that first order streams fall under the definition of a "minor stream".

On-site investigations, along with desktop assessments, indicate that both streams, while mapped as watercourses, lack the distinct features of watercourses such as a bed and bank. The southern stream lacks clear, distinguishable characteristics typically associated with a watercourse, rendering it impossible to identify any flow path. At the top end of the northern mapped watercourse, there is a narrow dirt track that is indicative of cattle use as a pathway to the man-made dam located near the eastern boundary of Lot 83 (see Photo N-01). The track leads to a section of bare, raised land, predominately raised on the 'eastern' side, which shows significant signs of erosion. The ground then tapers into near-level land as the track approaches the man-made dam, rendering it not possible for the pathway to hold any significant amount of water. Neither of these mapped watercourses feature any distinct riparian habitation, and are not mapped on the SEED Portal Riparian Vegetation Condition Index or the Blayney Local Environmental Plan 2012's Riparian Land and Waterways Map (found here).

Photographs taken in the vicinity of the streams, along with a reference map, are provided in the ***APPEND*** section below for further clarification.

[1] NSW Government (2024) Map of Water Sharing Plan Regions.

In terms of layout, the solar farm panels and infrastructure are designed to maximise land use while minimising impacts on the land. As illustrated in the DA Drawing Pack submitted with the development application for this project, each tracker array (row) is approximately 120 metres in length. The mounting system is constructed on galvanised steel piles/rods (similar to fence posts) that are driven into the ground, typically within depths of 1.5 to 3.0 metres, thereby avoiding or minimising the need for concreting or extensive earthworks. The piles along the tracker arrays are spaced approximately 7 to 10 metres apart, and the rows are installed with over 7 metres spacing between them (from pile to pile) to minimise row shading. A typical cross section of a tracker system installation is shown in ***Figure 4*** below. As described and illustrated, the design of the system's primary mounting fixtures allows the solar modules to be elevated off the ground with generous spacing between the piles, enabling the preservation of the existing natural terrain of the land. For these reasons, the ground beneath the panels can be largely preserved and negligibly impacted.

For the purposes of the DPE–Water assessments, this assessment demonstrates that the mapped streams do not exhibit the distinct features of a watercourse, such as a bed and bank. Based on waterfront land guidelines, where a watercourse does not exhibit the features of a defined channel with bed and banks, the Office of Water may determine that the watercourse is not waterfront land for the purposes of the Water Management Act (***Figure 2***). Therefore, based on the findings of this assessment, it is contended that these sections of the watercourses should be determined not to be waterfront land for the purposes of the WM Act.

Table 1. Recommended riparian corridor widths

Watercourse type	VRZ width (each side of watercourse)	Total RC width
1st order	10 metres	20 m + channel width
2nd order	20 metres	40 m + channel width
3rd order	30 metres	60 m + channel width
4th order and greater (includes estuaries, wetlands and any parts of rivers influenced by tidal waters)	40 metres	80 m + channel width

Note: where a watercourse does not exhibit the features of a defined channel with bed and banks, the department may determine that the watercourse is not waterfront land for the purposes of the WM Act.

Figure 2 – Riparian corridor widths (Source: Controlled activities – Guidelines for riparian corridors on waterfront land)

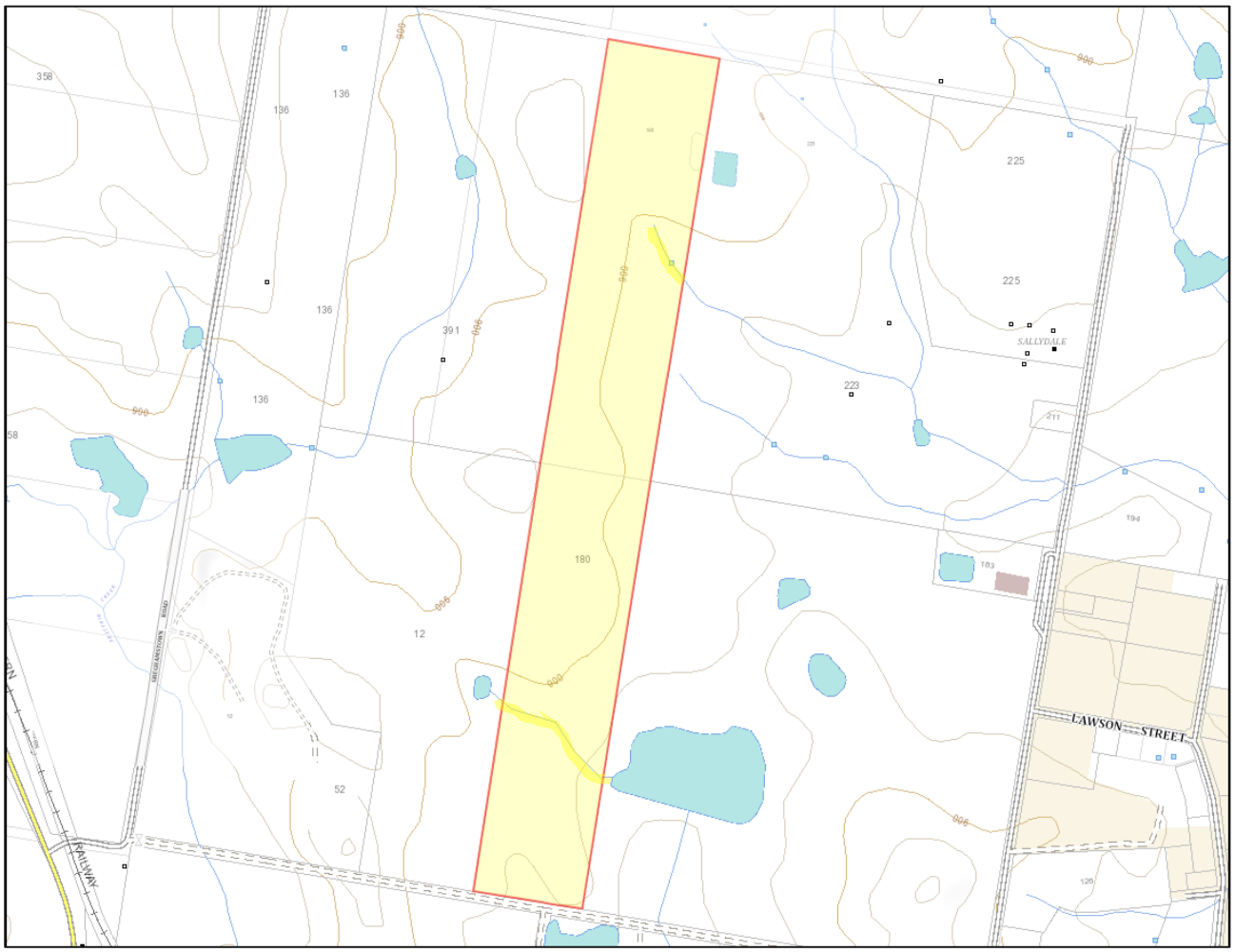

Figure 3 – Mapped first order streams

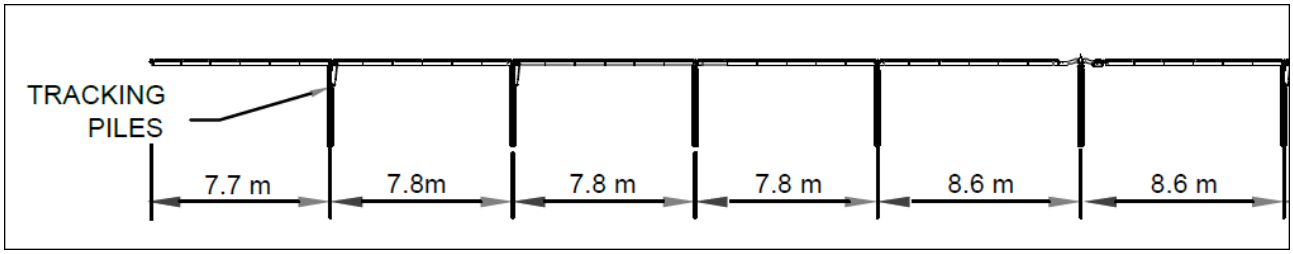

Figure 4 – Tracker System simplified design (typical tracker row)

3. LEGISLATIVE CONTEXT

NSW has a comprehensive legislative and policy framework for the management of floodplain risk and flood prone areas of the state with clear areas of responsibility, as outlined below in ***Figure 5***.

Figure 5 – Floodplain risk management and planning process

3.1. Local Government Act 1993

The Local Government Act provides the legal framework for the system of local governments of the state of NSW. Specific to this project is Section 733, which exempts councils from liability in relation to flood prone land under the provision that they have undertaken substantial assessments in accordance with the latest approval manual.

The 2005 gazetted Floodplain Development Manual is the current approved manual that supports section 733 and the NSW Government's Flood Prone Land Policy. Both the manual and the policy provide councils with the framework to implement processes and sustainable strategies to manage the floodplain risks that specifically impact human occupation.

3.2. Environment Planning and Assessment Act 1979

This is an Act to instate an environmental planning system and assessment arrangement for NSW. In 2017, there were major amendments passed with a view of improving the planning system through simpler processes, improved strategic planning and community participation to enable more balanced and transparent decision making. ***Section 3.4*** makes provision for the preparation of development control plans by relevant authorities (outlined further in ***Section 3.4.1***).

3.3. Water Management Act 2000

The Act offers sustainable and integrated management of the State's water sources for the benefit of both present and future generations. Water management principles are intended to guide decision-making under

the Act in relation to floodplain management. They require the existing and future risk to human life and property, arising from occupation of the floodplain, to be minimised.

3.4. Blayney Local Environmental Plan 2012

The Blayney Local Environmental Plan 2012 (current version for October 2024) aims to make local environmental planning provisions for land in the region in accordance with the relevant standard instrument. The LEP includes specific information for residents in the town of Blayney.

The Plan identifies prohibited and permitted types of development within the local area. Some types of development are also regulated by specific state environmental planning policies. The Plan (Part 5.21) does provide specific management requirements for flood planning, which applies to land at or below the flood planning level (1 in 100 ARI plus 0.5m freeboard). It requires that development consent cannot be granted unless the proposed development is compatible with the flood hazard of the land, will not significantly cause adverse impacts to other developments, the environment and the community, and incorporates measures to manage risk to life.

The site is shown in relation to a series of flood maps showing the flood planning area from the Blayney LEP (2012) in ***Figure 6*** and a flood risk study published by Craig and Rhodes (2019) in ***Figure 7***. It shows the site in relation to modelled areas for 1% AEP for the nearest available maps. Properties close to the Belubula River are at high risk of floodwaters The site for the proposed solar farm is approximately 500m from the nearest edge of the 1% AEP inundation area at Abattoir Creek. The site is not at risk of major flooding. There is potential for some localised (minor) inundation from minor drainage lines running through the site (see ***Figure 8*** below). Hydrological modelling using 5-metre resolution Digital Elevation Model (DEM) data for the site shows that the drainage channels running through the site are relatively minor, with flow direction mostly towards the south and southwest (see ***Figure 8*** and ***Figure 9***).

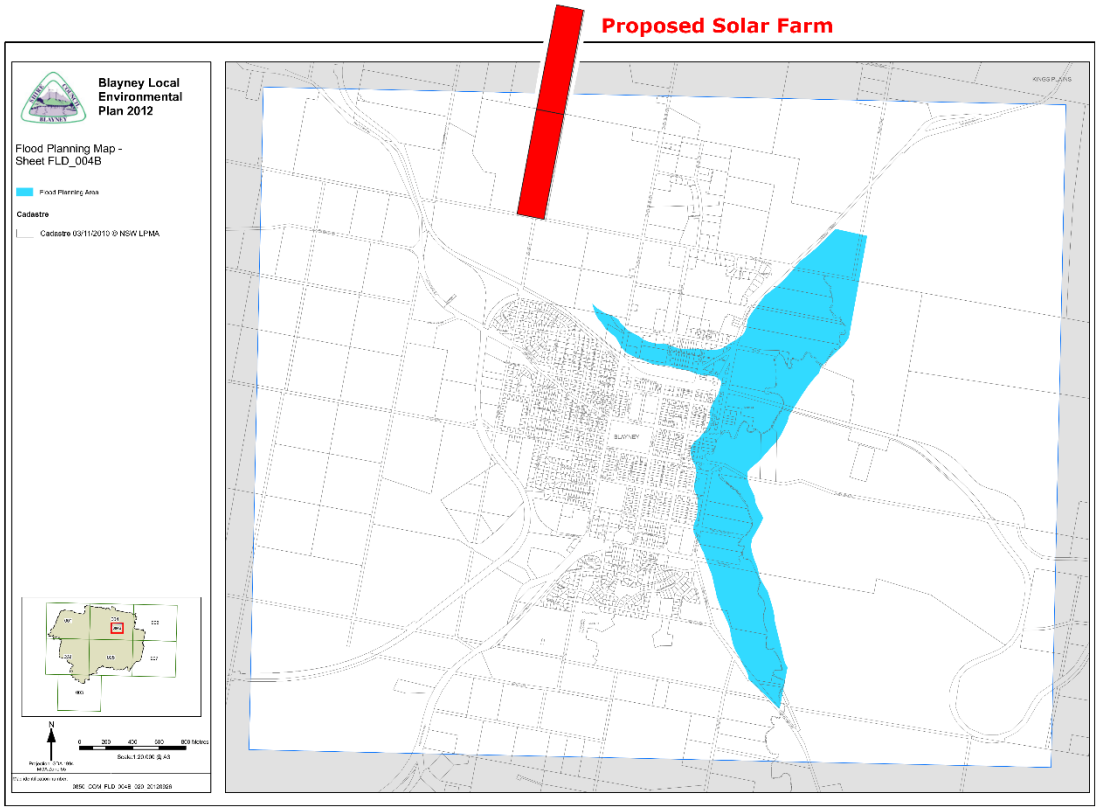

Figure 6 – Site in relation to Blayney LEP Flood Planning Area[2] (Source: NSW Legislation, 2025)

[2] Additional data from NSW Government Spatial Services Six Maps

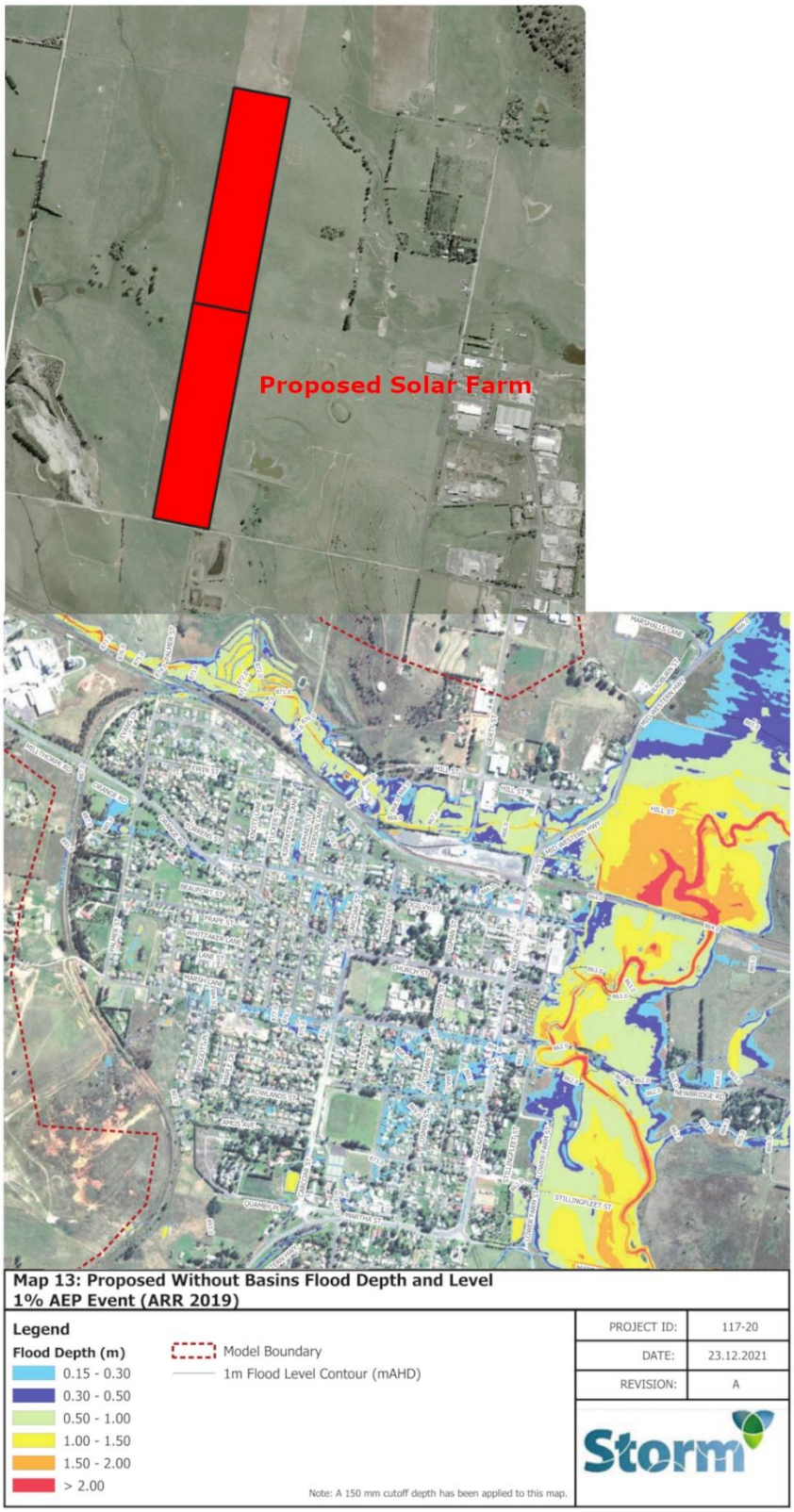

Figure 7 – Site in relation to 100-year ARI flood hazard
(Source: adapted from Craig and Rhodes 2019)

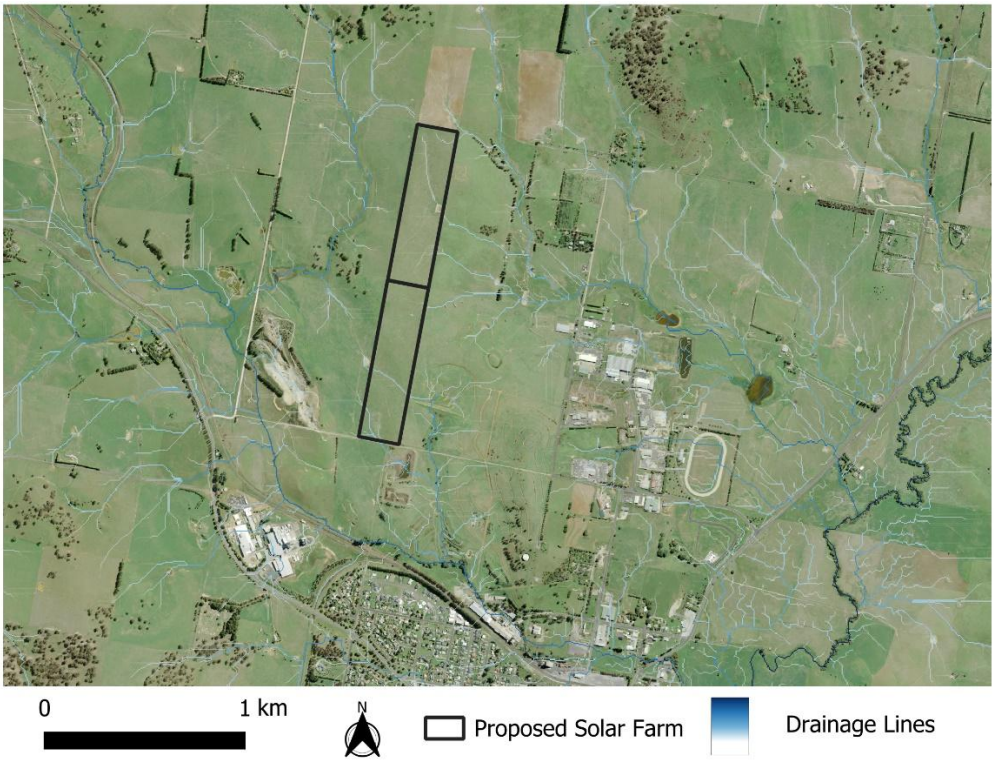

Figure 8 – Localised drainage patterns modelled from 5m DEM data

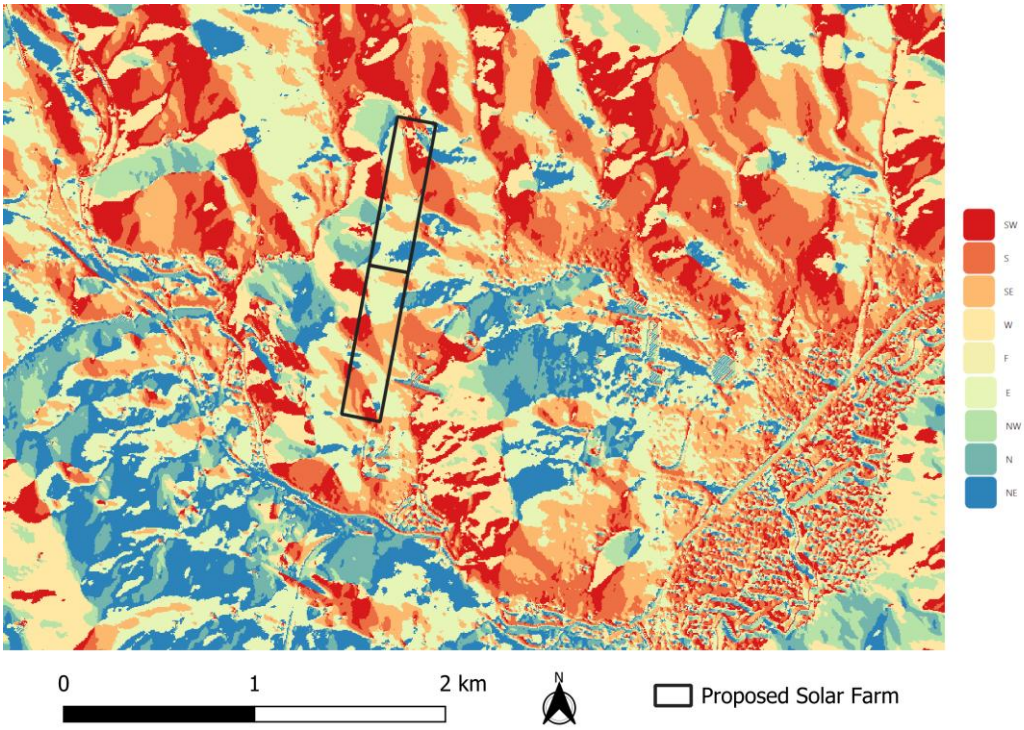

Figure 9 – Flow direction modelled from 5m DEM data

3.4.1. Blayney Shire Council Development Control Plan 2018

The Blayney Shire Council Development Control Plan (DCP) 2018, which was approved by the Council in September 2018, provides guidance for developments in conjunction with the statutory planning controls of the Blayney Local Environmental Plan 2012. The guidance provides proponents with criteria and considerations that need to be addressed when preparing and submitting development applications.

The guidance on flood protection states that the consent authority must be satisfied on a number of points regarding developments, including that the development:

a) is compatible with the flood hazard of the land; and

b) is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties; and

c) incorporates appropriate measures to manage risk to life from flood;

d) is not likely to significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.

Development Control Plans typically state that planning restrictions will apply to development on land below the 'flood planning level' of watercourses. The 'flood planning level' refers to "…the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard" (NSW Legislation, 2020, page 48).

NSW local government DCPs also typically provide guidance on stormwater drainage systems for rural lots and large residential lots, which are relevant to the proposed solar farm site. Guidelines typically suggest that, where drainage easements over downstream properties is required, consent from the owners of the downstream properties is to be submitted with the development application. The Blayney Shire Council DCP states that "…If the land is affected by flood related development controls, fence types must be designed to allow flood conveyance and prevent additional flooding on adjacent properties" (section C2.6). The specific section of the DCP environmental management and hazards regarding flooding (G4) is noted as being added at a future date. However, section C4.2 notes that construction "… must be sited so as to avoid, or if not avoid, mitigate or minimise the impacts from natural hazards (including but not limited to flooding, stormwater hazards, bushfire etc.)" Council DCPs commonly note that a combination of measures be incorporated in the design and/or construction and alteration of individual buildings or structures subject to flooding, and the use of flood compatible materials.

3.4.2. Blayney Community Strategic Plan 2022 - 2032

The Blayney Community Strategic Plan 2012-2032 is planned and executed under key themes identified through extensive community consultation. It is the Council's highest level of planning and has been developed following an extensive consultation process (Blayney Shire Council, 2022). The vision is underpinned by five future directions:

- **Maintain and Improve Public Infrastructure and Services:** Road and transport networks remain critical for market access of agricultural produce, industry, mining and tourism and we rely on improving road safety on our road network;

- **Build the Capacity and Capability of Local Governance and Finance:** Present relationships and networks will benefit from a planned approach to community engagement and involvement in decisions and activities that are important to residents;

- **Diversify and Grow the Blayney Shire Local and Visitor Economy:** Our agricultural and visitor economy is our growth industry; with built and natural heritage, annual regional and community events, wine and food, accommodation and many natural and heritage attractions providing the major drawcards to the region;

- **Enhance recreational facilities and networks that support health and wellbeing of the community, sport, heritage and cultural interests:** Respecting and preserving our history … will demonstrate innovation in enhancing our built assets so that the facilities are modern and accessible;

- **Protect our Natural Environment:** The natural environment and open space is highly valuable for agriculture and retention of native flora and fauna habitat within the landscape and our river systems.

The only theme to specifically mention flood or water management is theme five ("protect our natural environment") which asserts that "The biodiversity and health of our river and water ways is also important" and that "…waterways and tributaries that flow into our regional water catchments and water supply sources are clean, healthy and biodiverse" (Blayney Shire Council, 2022: 27-28). However, also implicit within the themes above, is the need for strategies that minimise the impact on the environment from development activities and to maintain and manage water quantity and quality.

3.5. State Environmental Planning Policy (Transport and Infrastructure) 2021

Part 2.3, Division 7 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP (T&I)) relates to 'Flood Mitigation Work'. This policy provides details on the types of works which may be required for land that is susceptible to flooding by the probable maximum flood event, also known as flood liable land. The SEPP (T&I) states that consultation with the relevant council is required if the proposal will alter flood patterns other than to a minor extent, and their response must be taken into consideration. The Project area is not within the mapped flood planning area under the Local Environmental Plan and does not require additional flood mitigation work.

As noted in Section 3.4 above, there is the potential for some flooding of the project area.

3.6. Protection of the Environment Operations (POEO) Act 1997

The POEO Act aims to protect, restore and enhance the quality of the environment in NSW, while still having regard for ecological sustainable development.

With relevance to the site, the Act aims to reduce risks to human health and avoid degradation of the environment by promoting pollution prevention through the reduction of materials used and advocating for the re-use, recovery or recycling of materials. The Act contains the requirements for the management of water discharges and the offences that relate to pollution. Section 148 requires that any pollution incidents, or those that threaten material harm to the environment, must be notified to the relevant authority (e.g., NSW Environment Protection Authority).

3.7. Soil Conservation Act 1938

This Act makes provisions for the conservation of soil resources and mitigation of erosion. The Act allows the Minister for Primary Industries [3] to issue soil conservation notices, declare areas to be sites of erosion hazard and proclaim works in catchment areas. The Act also outlines specific regulations regarding the Rural Assistance Act 1989.

Of general relevance to this project is the promotion of sustainable use and prevention of loss of soil resources from a site.

[3] Except Parts 2A, 3 and 4, and sections 15 and 30A insofar as they relate to Parts 2A, 3 and 4, jointly with the Minister for the Environment.

4. CATCHMENT AND FLOOD HISTORY

The Project is located to the north of the town of Blayney. According to spatial data from the Australian Hydrological Geospatial Fabric (Geofabric), the proposed facility is located within a large sub-catchment that includes the Belubula River (see ***Figure 10*** below), which flows south and then west before joining the Lachlan River. The project site is within a relatively flat area, running across several low hilltops with a gradual slope to the southeast and heights ranging from approximately 909m (AHD) on the northern side of the site to 887m (AHD) on the southern side (***Figure 11***). The surrounding area has some small hills to the north and east reaching heights of 964m contour values. The centre of the site has an elevation of 904m (AHD)[4]. The land is mostly cleared of native vegetation and is currently used for farming.

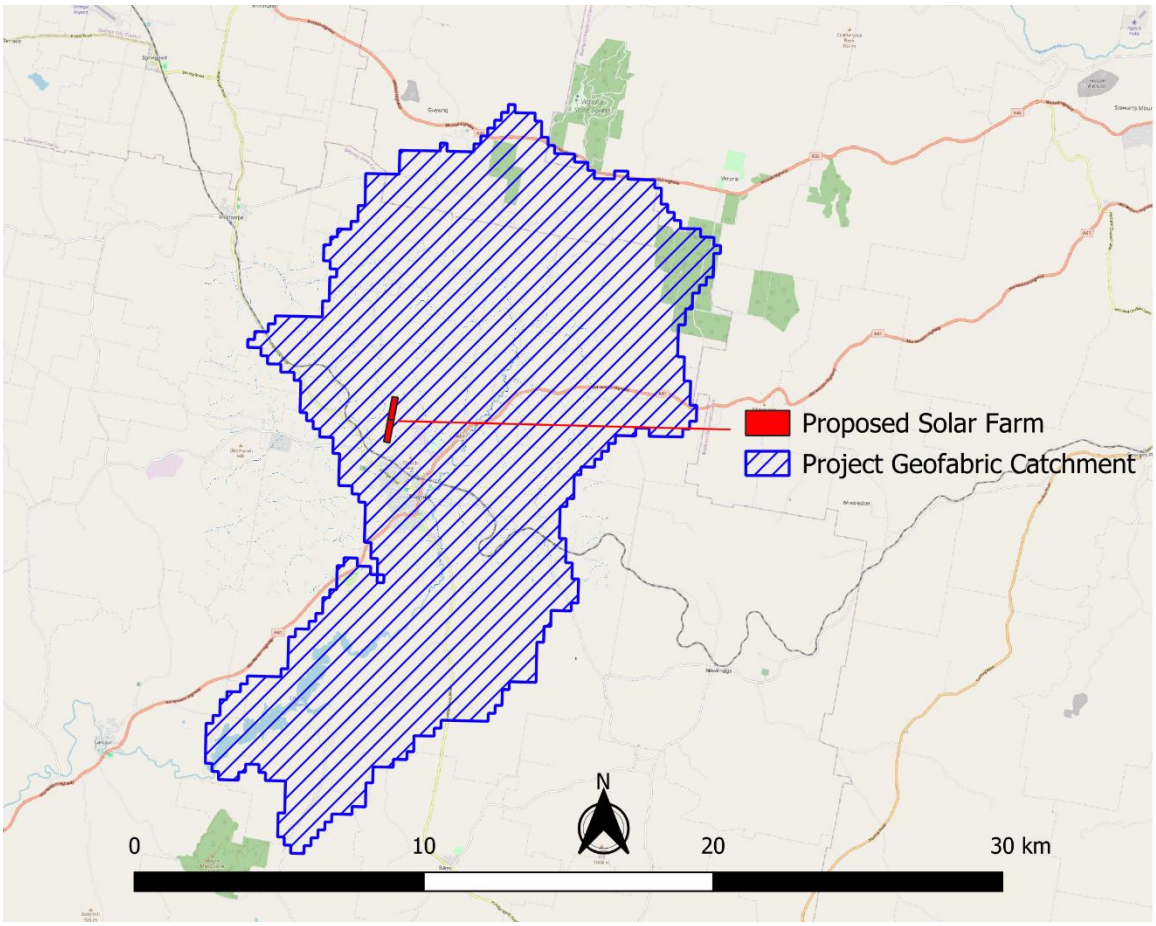

Figure 10 – Catchment of the project area identified in Geofabric

[4] Elevation values sourced from ELVIS - Elevation and Depth - Foundation Spatial Data (location 33.5090823°/ 149.2437902°)

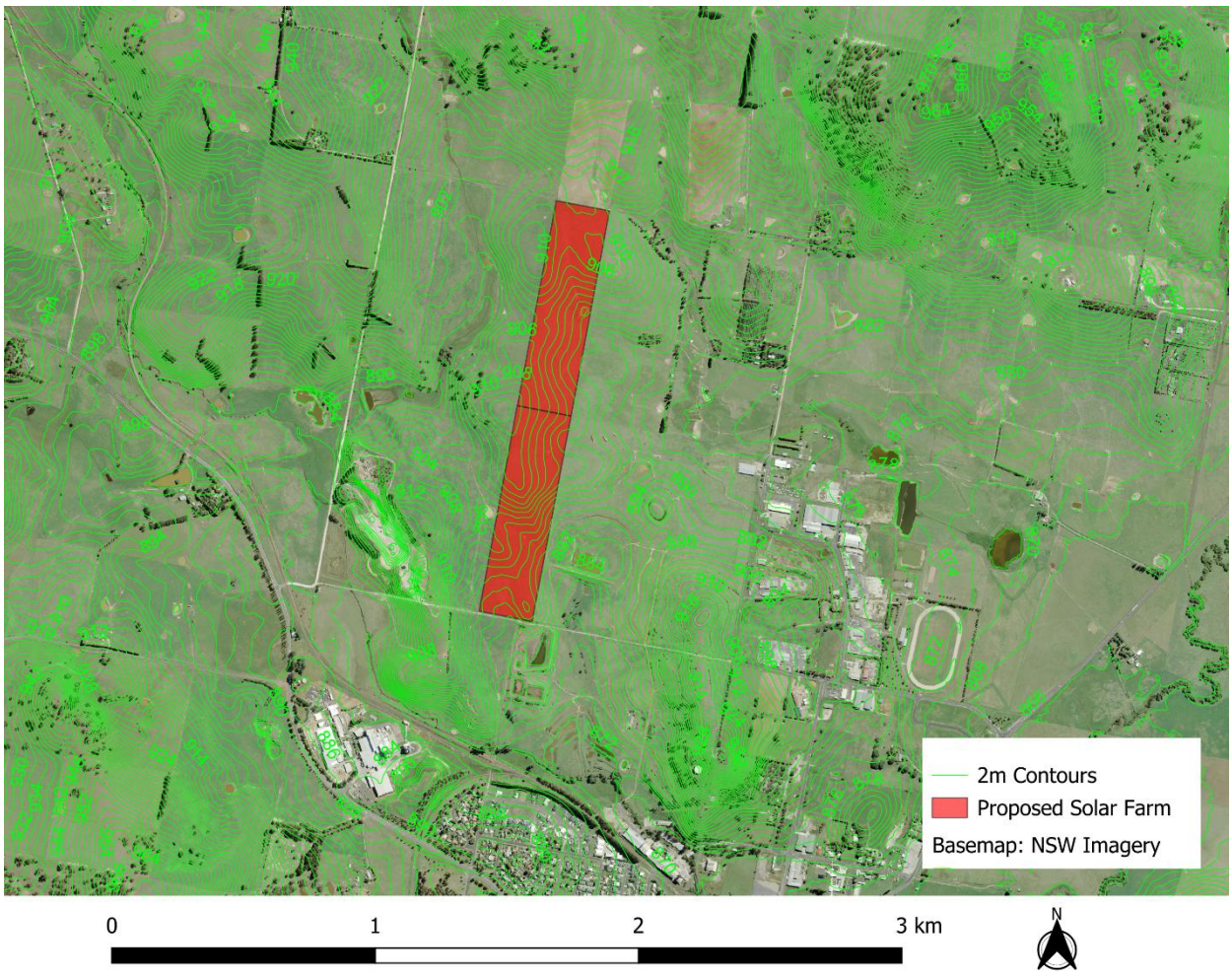

Figure 11 – Site topography

4.1. Blayney Flood Study and Nature of Flooding

As part of a flood study for the Blayney Shire Council, Craig and Rhodes (2019) provide a 1% AEP inundation map for the immediate Blayney town area which shows the potential for flooding of some areas. An earlier flood study by Jacobs (2015) also provides information on the nature of flooding. The Belubula River is the major watercourse which runs adjacent to the town, along the eastern edge of the urban area. A smaller named watercourse, Abattoir Creek, is located north of the railway line. During severe weather events, the Belubula River and its tributaries have experienced high flow levels resulting in the closure of roads in the town area of Blayney (e.g. Hobbys Yards Road, Farm Lane, Henry Street and Newbridge Road). Jacobs (2015: 6) note that while properties close to the Belubula River are at high risk of floodwaters, properties away from the Belubula River are also at risk from overland flooding as a result of large upstream catchments draining through the township. ***Figure 6*** and ***Figure 7*** (above – ***Section 3.4***) provide an indication of the location of the project site in relation to the modelled areas inundated by a 1% AEP flood and the Blayney LEP Flood Planning Area. These maps indicate that the project site is unlikely to flood. There is potential for some localised (minor) inundation from minor drainage lines running through the site (see ***Section 3.4*** above and ***Figure 9***); however, there has been negligible occurrence of, or likelihood of, localised inundation from Abattoir Creek.

5. AVAILABLE DATA

Climatic data and water quality and quantity monitoring information is available in the region as outlined in the following sections.

5.1. Rainfall for selected stations

The Bureau of Meteorology (BOM, 2020) has a station to the north of Blayney at the Orange Agricultural Institute (station number 063254). ***Table 2*** below outlines the average annual and maximum daily, monthly and annual rainfall for the Orange Agricultural Institute station and another selected station (i.e. station number 063005 – Bathurst Agricultural Station) Average monthly values for these rainfall stations are provided below in ***Table 3***.

Table 2 – Rainfall

Station Number	Station Name	Period of Record	Rainfall (mm)			
			Average Annual	Highest Annual	Maximum Daily	Highest Monthly
063254	Orange Agricultural Institute	1966 - present	941.3	1514.2	103.4	300.7
063005	Bathurst Agricultural Station	1908 - present	640.1	1275.2	108.7	242.4

Table 3 – Average Monthly Rainfall

Station Number	Rainfall (mm)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
063254	99.1	71.6	62.7	63.8	79	62.2	89	102.1	80	88.5	70.9	72.2
063005	68.0	57.8	53.6	42.1	41.4	44.3	47.8	49.9	46.6	58.8	63.5	65.1

Flood-producing weather systems across the region include inland troughs, cold fronts, and thunderstorms. Consequently, each rainfall event is a function of the prevailing meteorological conditions. Therefore, the rainfall data provides useful information about expected seasonal rainfall in the area.

5.2. Streamflow

There is a government surface water monitoring site located on the Belubula River within 6.2 km of the site. Streamflow records (***Table 4***) for this site are available for this location from the WaterNSW Real-time portal. Another water monitoring site at Belubula The Needles (412056) is listed as having full streamflow records as well.

Table 4 – Stream Gauging Stations

Station Number	Station Name	Available/Relevant Data	Distance from project area
412077	Belubula @ Carcoar	Watercourse Level, Watercourse Discharge, Water Temperature, Electrical Conductivity @ 25deg C	14.2 km southwest
412056	Belubula The Needles	Watercourse Level, Watercourse Discharge, Water Temperature, Electrical Conductivity @ 25deg C	37.8 km west

Generally, data from the available stream gauges do not provide specific information on local site flooding but are more useful in the context of assessing major regional flooding events that may impact on-site access. Information is publicly available from WaterNSW Real-time data portal and could be incorporated into site management plans.

5.3. Groundwater and Hydrogeological Conditions

Blayney falls within the NSW Murray-Darling Basin Fractured Rock Groundwater Sources, Water Source 1 (Lachlan Fold Belt Groundwater Source), as shown in ***Figure 12*** below. NSW DPIE (2022a) provides a description of geology and hydrogeology of this unit. Water quality within the source varies significantly based on rock type, fracture density, aquifer depth and climate. Salinity ranges from fresh to saline. Groundwater quality for is moderate to fresh (0 – 500 TDS mg/L) in the western part of the NSW MBD Fractured Rock WRPA near Blayney (see ***Figure 13*** below). The *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020* reserves for the environment all water in excess of the Long-Term Average Annual Extraction Limit (or LTAAEL) for each groundwater source on a long-term average annual basis (NSW DPIE, 2022: 71). There are groundwater dependent ecosystems near Blayney of moderate to high potential (see ***Figure 14*** below). The project catchment site is near an area of groundwater vulnerability according to Environmental Planning Instrument (EPI) data (see ***Figure 15*** below).

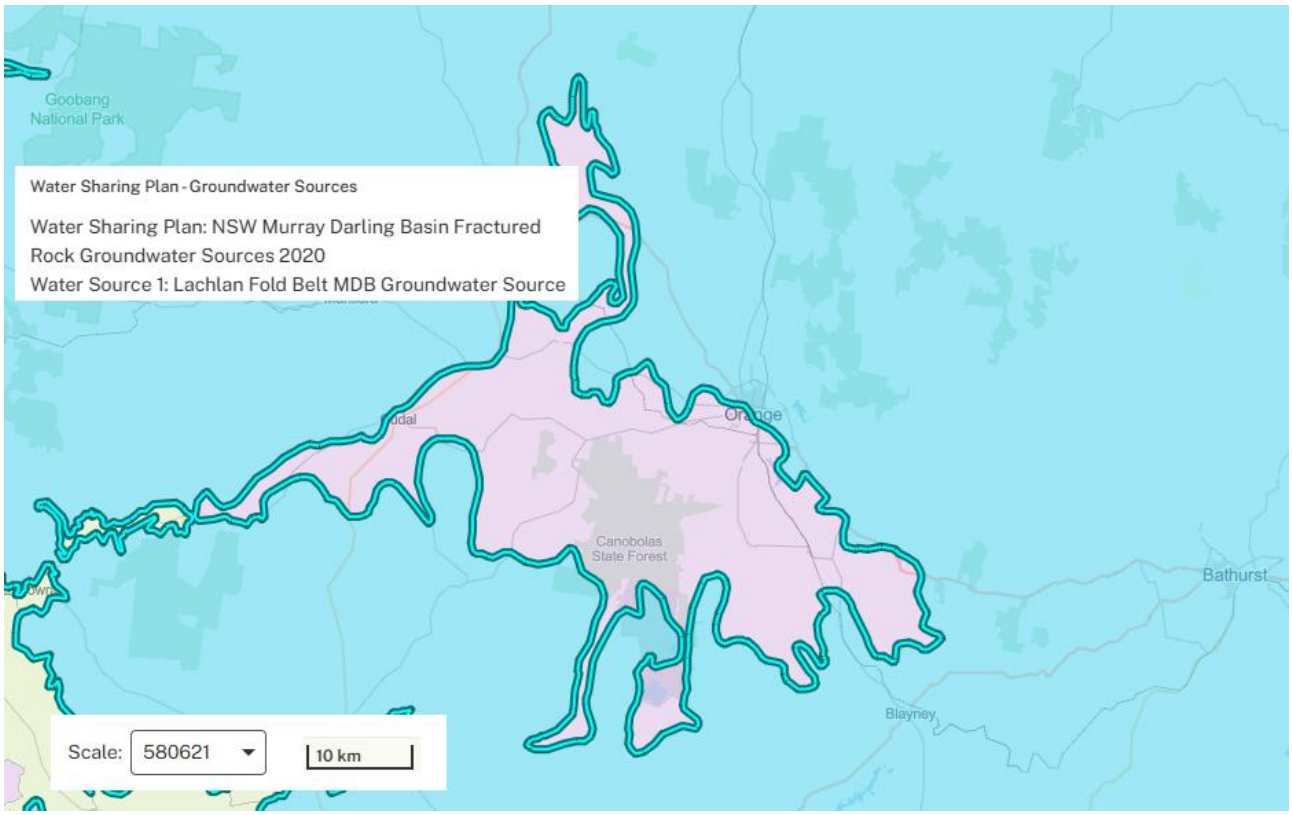

Figure 12 – The Lachlan Fold Belt Groundwater Source (source: NSW DCCEEW, 2022)

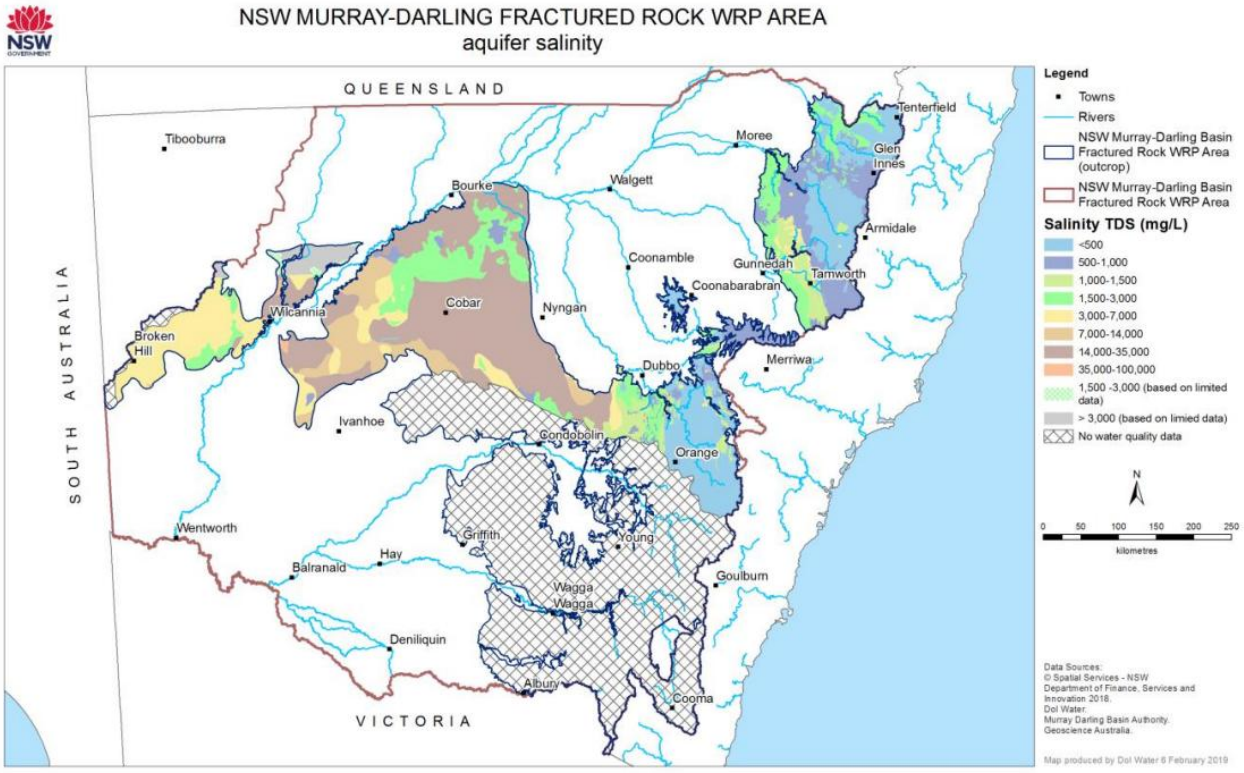

Figure 13 – Groundwater Salinity in the NSW MDB Fractured Rock WRPA (source: NSW DPE, 2022a: 105)

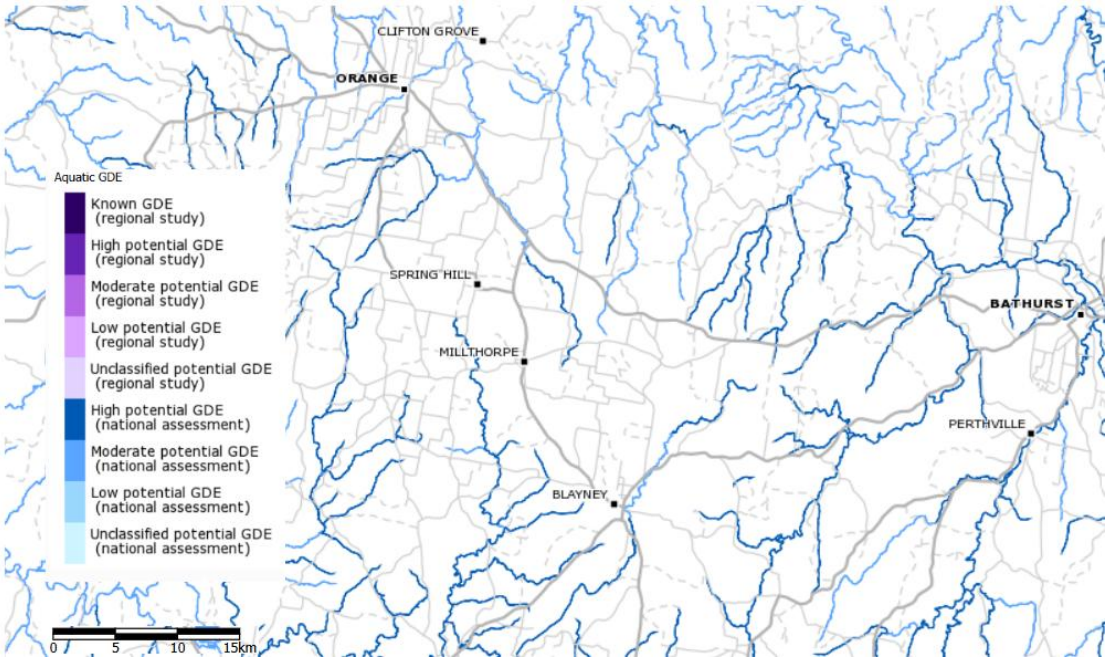

Figure 14 – Groundwater dependent ecosystems near Blayney (source: BOM, 2020)

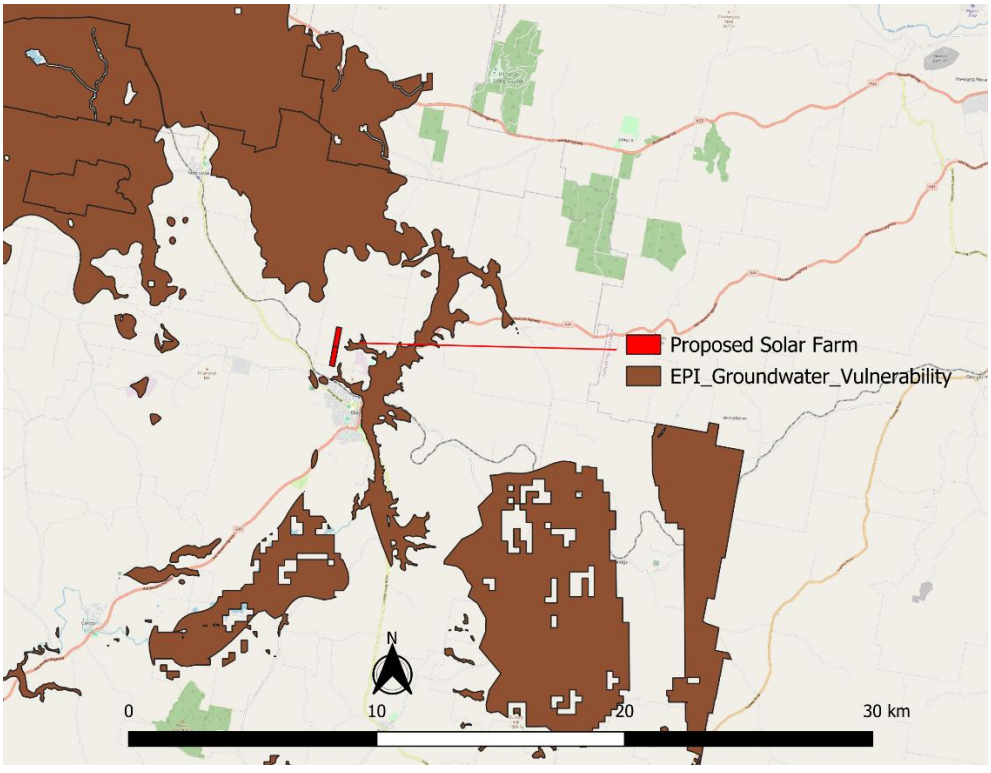

Figure 15 – The project location and EPI groundwater vulnerability areas

5.4. Surface Water and Riparian Conditions

The main river in the area is the Belubula, which rises near Blayney before flowing south to Carcoar Dam and then joining the Lachlan River near Gooloogong. The Belubula River is a regulated source and is subject to a water sharing plan (NSWDPE, 2020). As with other regulated river sources within the Murray-Darling Basin, the NSW Department of Planning and Environment has recently made amendments to the Belubula regulated water sharing plan (NSWDPE, 2023) and a draft was available for public exhibition until 10 January 2025. Key characteristics of the Belubula River system are summarised by NSWDPI (2013) and NSWDPE (2025):

- The Belubula River is regulated through releases from Carcoar Dam. The storage capacity of the dam is 35,800 ML and has a small catchment area of 230 kilometres squared. Only ten per cent of total annual flow in the river comes from dam releases, the remaining 90 per cent is derived from inflows from unregulated tributaries
- The annual average flow in the river is 174 GL where daily flows can range between 0 and 5.5 GL
- Due to the high connectivity between the regulated Belubula River and the adjoining alluvial aquifer which is located in the downstream half of the system, flow from the river into the alluvial aquifer is well recognised.
- Little information is available on the ecological features of the regulated Belubula River but a number of threatened or endangered species have been recorded or are predicted to occur in the river including Macquarie and Silver Perch, Southern Bell Frog, Brolga and the Australasian Bittern.
- In the lower reaches of the river, downstream of Canowindra, there are few wetland features (e.g. billabongs) which are generally in poor health.
- Core objectives of the water sharing plan are to protect, enhance and restore the condition of the source and associated water-dependent ecosystems; maintain and improve access to water for agriculture and other industries and maintain social and cultural values for Aboriginal people.

The broader Lachlan catchment has 9 nationally important wetlands including the Booligal Wetlands and Great Cumbung Swamp (NSWDPE, 2022). The water quality index scores for the Belubula River in 2021-2022 are listed as moderate (see ***Figure 16*** below). Recovery potential of the Belubula River and its tributaries in the show strategic values and value for conservation (see ***Figure 17*** below).

The proposed site activity is not expected to materially contribute to any regional groundwater issues, particularly those associated with nearby farming districts.

Based on the current available information, potential adverse surface water-related impacts to the site include:

- Site accessibility and inundation.
- Managing downstream sedimentation.

As there will be no extraction of groundwater or interference with the groundwater table during project activities, potential for impacts have not been considered further.

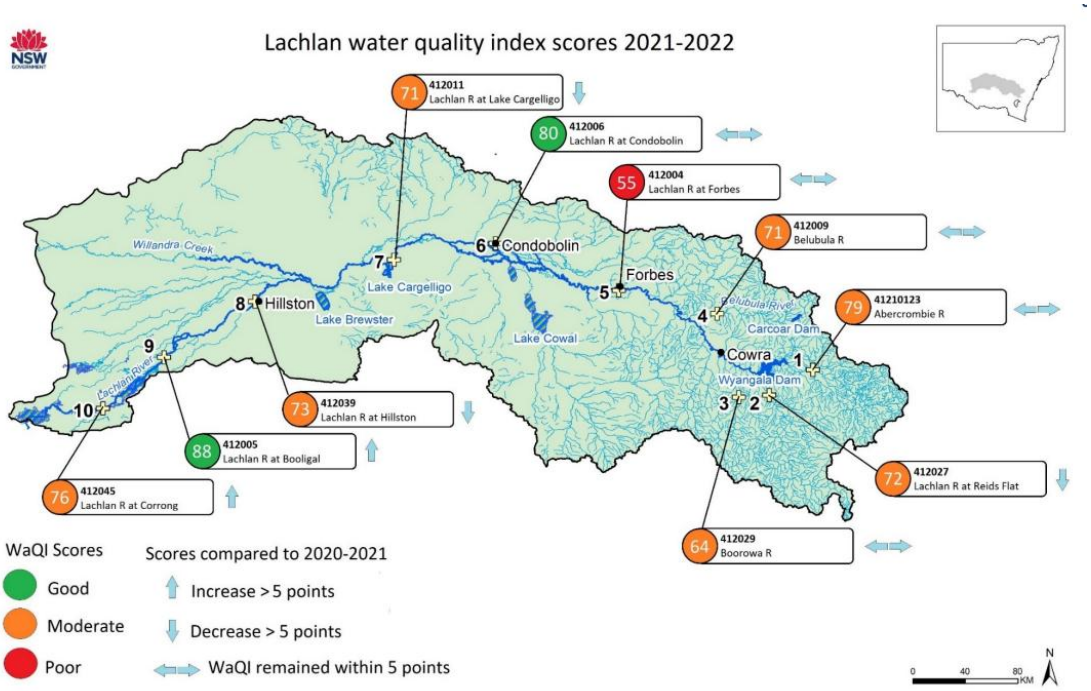

Figure 16 – Lachlan catchment water quality index scores (source: NSWDPE, 2022: 4)

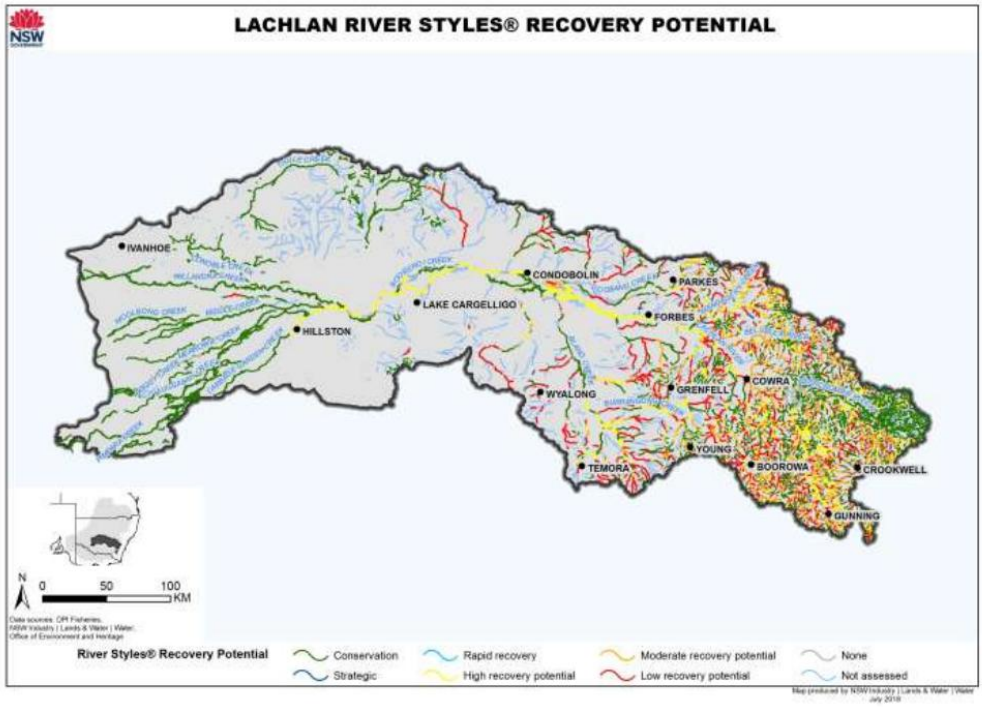

Figure 17 – River recovery potential in the Lachlan catchment (source: NSWDPIE, 2020: 38)

6. POTENTIAL IMPACTS

The proposed site activity is not expected to materially contribute to any regional groundwater issues, particularly those associated with nearby farming districts.

Based on the current available information, potential adverse surface water-related impacts to the site include:

- Site accessibility and inundation.
- Managing downstream sedimentation.

As there will be no extraction of groundwater or interference with the groundwater table during project activities, potential for impacts have not been considered further.

6.1. Flooding

The flood planning area from the Blaney Local Environmental Plan (2012) and the 100-year ARI floodway modelled by Craig and Rhodes (2019) indicate that the project site is at low risk of flooding. There is some potential for localised (minor) inundation from minor drainage lines running through the site (see ***Figure 8*** above). The water will flow in a south and south-westerly direction.

6.2. Water quality and erosion

The project has the potential to alter existing water quality conditions within the site. The impervious area of solar facilities is typically only marginally increased owing to associated hardstand and building areas. However, the panels may impact the nature of vegetation/grass coverage on the site, which has the potential to increase surface runoff and peak discharge. Increased flow concentration off the panels also has the potential to erode soil at the base of solar panels (Cook & McCuen, 2013).

Furthermore, as the site has been historically used for farming there is very little natural ground cover vegetation. The eSPADE resource (NSWOEH, 2020), provides a Soils Profile Report (id: 1004014) for a site within 100m to the northeast of the proposed solar site (see ***Table 5*** and ***Figure 18*** below). Site 1004014 indicates a soil profile of silty loam with nil cracks in the top and lower horizons. There has been extensive clearing at the site with improved pasture in the general area. There is the potential that the proposed solar site runoff will contain sediments and increase turbidity or other water quality parameters in downstream water ways.

Table 5 – Site details for eSPADE site 1004014

SITE DETAILS

Site Location:	Site area 1:Directly north of Blayney
Profile Details:	Urban Capability Study: Blayney Industrial Sites 1976 - WRD Survey (1004014), Profile 7, collected from a auger by Project Water Reforms on 01 March, 1976
Map Reference:	MGA Grid Reference: Zone 55, 708713E, 6290884N. 8730 BLAYNEY (1:100000) map sheet.
Physiography:	footslope on tuff lithology. Slope 3.0% (not recorded).
Vegetation/Land Use:	
Surface Condition:	
Erosion/Land Degradation:	
Soil Hydrology:	
Soil Type:	Gn2.95 (PPF)
Base of observation:	
Profile Field Notes:	

SOIL DESCRIPTION

Layer 0

0.00 - 0.00 m

Layer 1

0.00 - 0.20 m	Texture:	silty loam
	Colour:	colour not recorded with no recorded mottles
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are nil, macropores are nil
	Field chemical tests:	Field pH is 6.5 (Raupach),

Layer 2

0.20 - 0.40 m	Texture:	silty loam
	Colour:	colour not recorded with no recorded mottles
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are nil, macropores are nil
	Field chemical tests:	Field pH is 8.5 (Raupach),

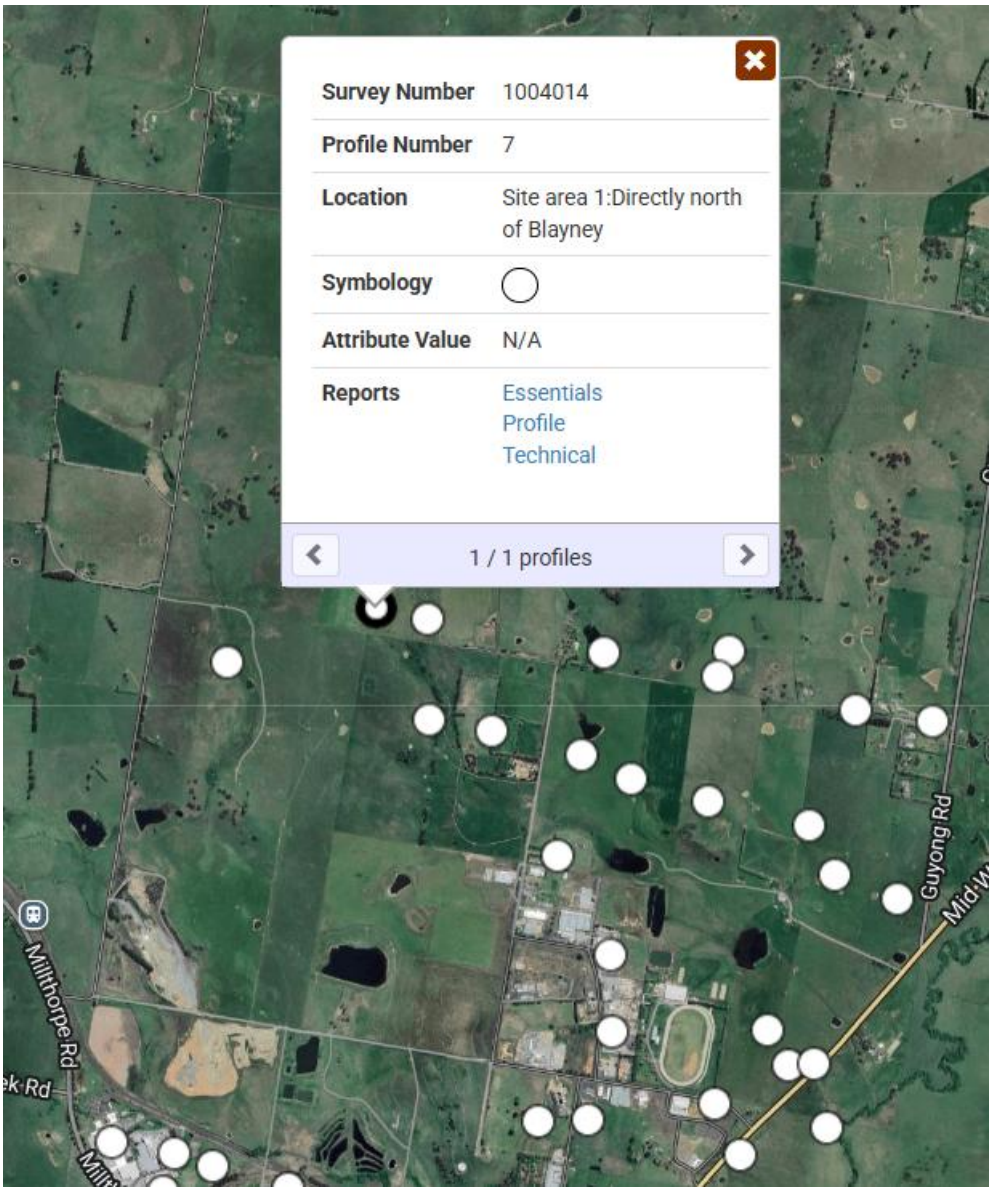

Figure 18 – The location of the eSPADE site 1004014 (Source: espade.environment.nsw.gov.au)

7. PROPOSED MITIGATION MEASURES

7.1. Site accessibility and inundation

The site accessibility and potential for inundation issues may be managed in the project's risk management register(s) owing to the regional nature of the events and the potential to impact whole of site works. There should be procedures in place to halt construction during heavy rainfall to reduce impacts to the project construction and to increase sedimentation downstream.

7.2. Downstream sedimentation

Impacts associated with erosion and sedimentation resulting from construction activities can be minimised by undertaking works in accordance with provisions of the NSW government's best practice sediment and erosion control series, Managing Urban Stormwater: Soils and Construction (DECC, 2008).

Proposed mitigation measures associated with managing downstream actionable nuisance (sedimentation) are outlined in ***Table 6***.

Table 6 – Proposed Mitigation Measures

Stage	Measure	Activities/Approach
Design	Site drainage and water quality controls	Design Basis • Undertake hydrological assessment of the site's catchment in accordance with relevant methods outlined in Australian Rainfall and Runoff. • Determine sediment management targets and drainage control standards in accordance with Managing Urban Stormwater: Soils and Construction Vol 1 (Blue Book) (DECC, 2008). • Develop a site erosion and sediment control plan in accordance with the Blue Book. • Develop site drainage design incorporating detention basins and sedimentation management structures where relevant. • Permanent site drainage should coincide with temporary arrangements where possible.
Construction and/or Demolition	Site drainage and water quality controls	General site works: • Catch drains to be located downslope of any proposed road works. • Install location appropriate sediment fences or other applicable control measures, depending on whether the feature is upstream or downstream of a disturbed part of the site or will need to be trafficable.

		• All stormwater collection points need to have appropriate sedimentation and erosion controls. • Undertake ongoing inspections of stormwater facilities and water control measures to assess their effectiveness. • Vibration grids or wash bays at all construction exits. • Level spreaders at locations where concentrated flow is discharged offsite to ensure sheet flow-like conditions are maintained. • Flat land erosion control options include erosion control blankets, gravelling, mulching, soil binder, turfing and revegetation.
Construction and/or Demolition	Stormwater point source control	In the event of concrete works: • Do not undertake works if chance of heavy rain. • Store rinsate[5] water, if applicable, separately to other water on site and dispose of offsite as appropriate. • Block on site drains in the area of the works and remove any contaminated runoff. In the event that dewatering practices are required: • Pump hose intakes for withdrawing water from excavations will be elevated to minimise sediment pumping and directed to a containment area for settling prior to discharge. • Limit direct discharge offsite (consistent with the design requirements for sediment pond discharge). • Stormwater collected on site should be reused where possible. Controls should be inspected and maintained on a regular basis. All water released from sediment basins should be clear or disposed of offsite by vehicle. • Material and waste storage areas should be designed and operated to minimise interaction with surface waters. • Vehicle washdown areas should be located away from water courses.

[5] A dilute solution of chemical resulting from washing the container and equipment with water, as defined by NSW EPA accessed 20 December 2018 https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences/authorised-officers/glossary#r

8. APPENDICES

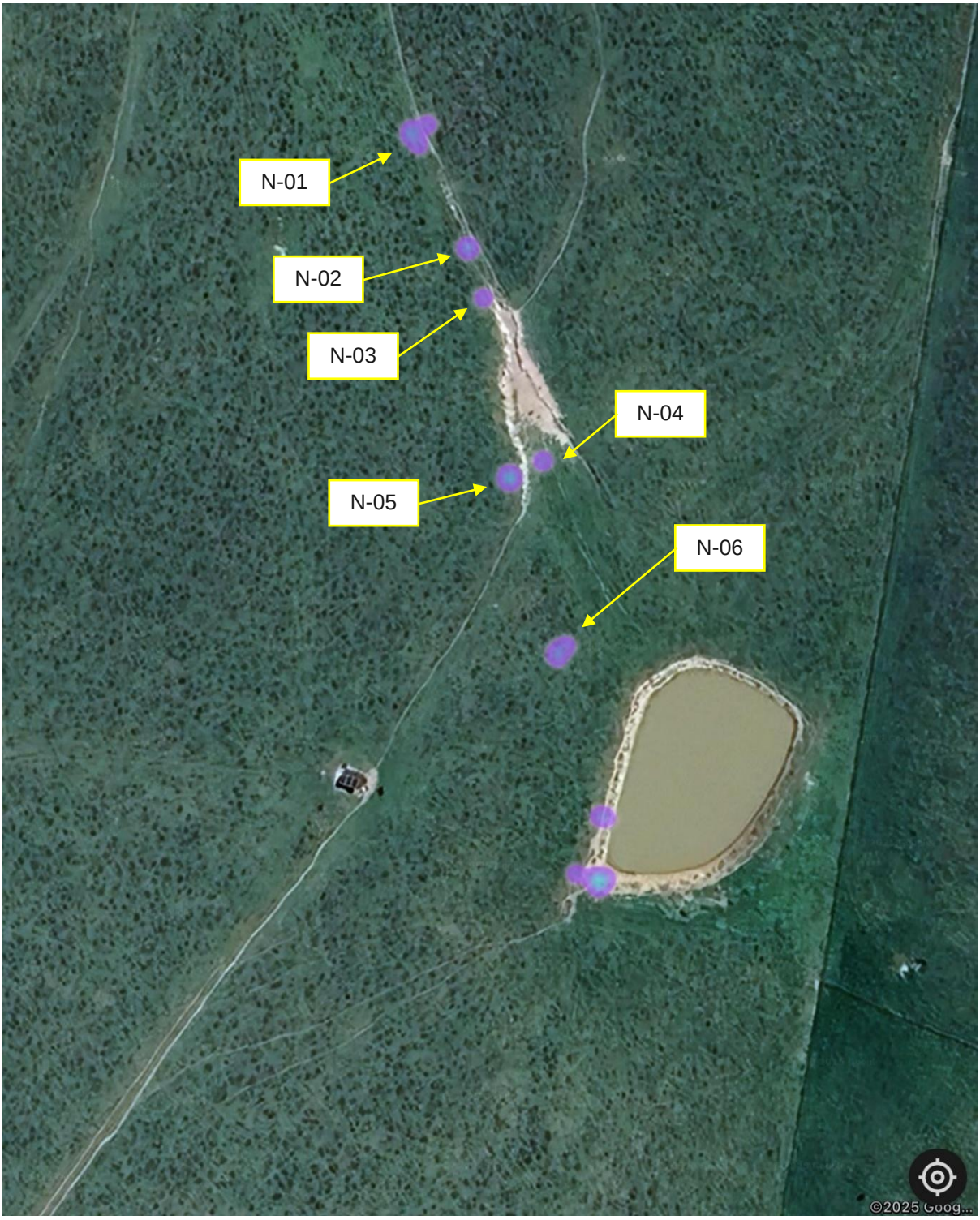

Figure 16 - Northern watercourse (1st order stream) - Blayney 7C site

Figure 17 - Southern watercourse (1st order stream) - Blayney 4C site

Figure 18 – Northern Stream (N-01); north-west-facing

Figure 19 – Northern Stream (N-02); south-east-facing

Figure 20 – Northern Stream (N-03); north-west-facing

Figure 21 – Northern Stream (N-04); south-east-facing

Figure 22 – Northern Stream (N-05); north-facing

Figure 23 – Northern Stream (N-06); east-facing

Figure 24 – Southern Stream (S-01); north-west-facing

Figure 25 – Southern Stream (S-02); east-facing

Figure 26 – Southern Stream (S-03); east-facing

Figure 27 – Southern Stream (S-04) ; north-facing

Figure 28 – Southern Stream (S-05); east-facing

Figure 29 – Southern Stream (S-06) ; east-facing

9. REFERENCES

Blayney Shire Council,(2022) Blayney Shire Community Strategic Plan 2022-2032, https://www.blayney.nsw.gov.au/council/council-information/plans-and-strategies#csp [accessed 15th January 2025]

Bureau of Meteorology (2020) Australian Data Archive for Meteorology, online database, Commonwealth of Australia, http://www.bom.gov.au/climate/data/ [accessed 15th January 2025]

Bureau of Meteorology (2020) Groundwater Dependent Ecosystems Atlas, online, Commonwealth of Australia, http://www.bom.gov.au/water/groundwater/gde/ http://www.bom.gov.au/climate/data/ [accessed 15th January 2025]

Cook, L. M., McCuen, R. H. (2013) Hydrologic response of solar farms, Journal of Hydrologic Engineering, v 18, n 5, p 536-541.

Craig & Rhodes (2019) Addendum to Blayney Flood Study - Update to Australian Rainfall and Runoff 2019 Guidelines, https://www.blayney.nsw.gov.au/ArticleDocuments/902/117-20%20Addendum%20to%20Blayney%20Flood%20Study%20v2.pdf.aspx [accessed 15th January 2025]

Department of Environment, Climate Change and Water (2008) Managing Urban Stormwater: Soils and Construction Vol 2A.

Jacobs Group (2015) Blaney Flood Study, https://www.blayney.nsw.gov.au/ArticleDocuments/902/BSC_FloodStudy_reduced.pdf.aspx [accessed 15th January 2025]

Murray-Darling Basin Authority (2023), Lachlan catchment Snapshot, https://www.mdba.gov.au/basin/catchments/southern-basin-catchments/lachlan-catchment https://www.mdba.gov.au/basin/catchments/southern-basin-catchments/lachlan-catchment

Natural Resources Commission (2013), Review of 2004 Water Sharing Plans NSW Office of Water, https://www.nrc.nsw.gov.au/_literature_177684/Review_of_2004_water_sharing_plans_-_Final_report [accessed 25th November 2019]

NSW Government (2020), Environmental Planning Instrument - Groundwater Vulnerability (spatial data) https://www.planningportal.nsw.gov.au/opendata/dataset/epi-groundwater-vulnerability [accessed 1st October 2024]

NSW Department of Climate Change, Energy, the Environment and Water, (2022), Water Sharing Plans-Groundwater Sources-Spatial Dataset, accessed from The Sharing and Enabling Environmental Data Portal https://datasets.seed.nsw.gov.au/dataset/5fb04878-a0b5-4d2a-b7ce-c302c28deb72 [accessed 1st October 2024]

NSW Department of Planning and Environment, (2020), Lachlan Surface Water Monitoring, Evaluation and Reporting Plan, https://www.mdba.gov.au/sites/default/files/publications/schedule-j.-lachlan-surface-water-monitoring-evaluation-and-reporting-plan.pdf [accessed 15th January 2025]

NSW Department of Planning and Environment, (2023), Changes to the Belubula regulated water sharing plan, https://water.dpie.nsw.gov.au/__data/assets/pdf_file/0020/550460/belubula-regulated-water-summary-of-changes.pdf [accessed 15th January 2025]

NSW Department of Primary Industries, (2013), Water sharing plan for the Belubula Regulated River Water Source, https://water.dpie.nsw.gov.au/__data/assets/pdf_file/0011/166835/belubula-reg-river-background.pdf [accessed 15th January 2025]

NSW Department of Primary Industries (2006), Reducing the Impact of Weirs on Aquatic Habitat - New South Wales Detailed Weir Review. Namoi CMA region. Report to the New South Wales Environmental Trust. NSW Department of Primary Industries, Flemington, NSW, https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/634122/Namoi-DWR-report.pdf [accessed 25th September 2020]

NSW Department of Planning, Industry and Environment, (2025), Draft Water Sharing Plan for the Belubula Regulated Water Source 2025, https://water.dpie.nsw.gov.au/__data/assets/pdf_file/0009/622467/draft-belubula-wsp-2025.pdf [accessed 21st December 2023]

NSW Department of Planning, Industry and Environment, (2020), eSPADE resource, https://www.environment.nsw.gov.au/eSpade2Webapp [accessed 21st December 2023]

NSW Department of Planning, Industry and Environment, (2022), NSW Murray–Darling Basin Fractured Rock Water Resource Plan- GW11 NSW Murray–Darling Basin Fractured Rock Water Resource Plan Area, https://www.mdba.gov.au/sites/default/files/publications/nsw-murray-darling-basin-fractured-rock-water-resource-plan.pdf [accessed 1st October 2024]

NSW Legislation, (2020), Water Sharing Plan for the Namoi Alluvial Groundwater Sources Order 2020 https://legislation.nsw.gov.au/view/pdf/asmade/sl-2020-346 [accessed 21st December 2023]

NSW Legislation, (2025), Blayney Local Environmental Plan 2012, https://legislation.nsw.gov.au/view/html/inforce/current/epi-2012-0573 [accessed 15th January 2025]