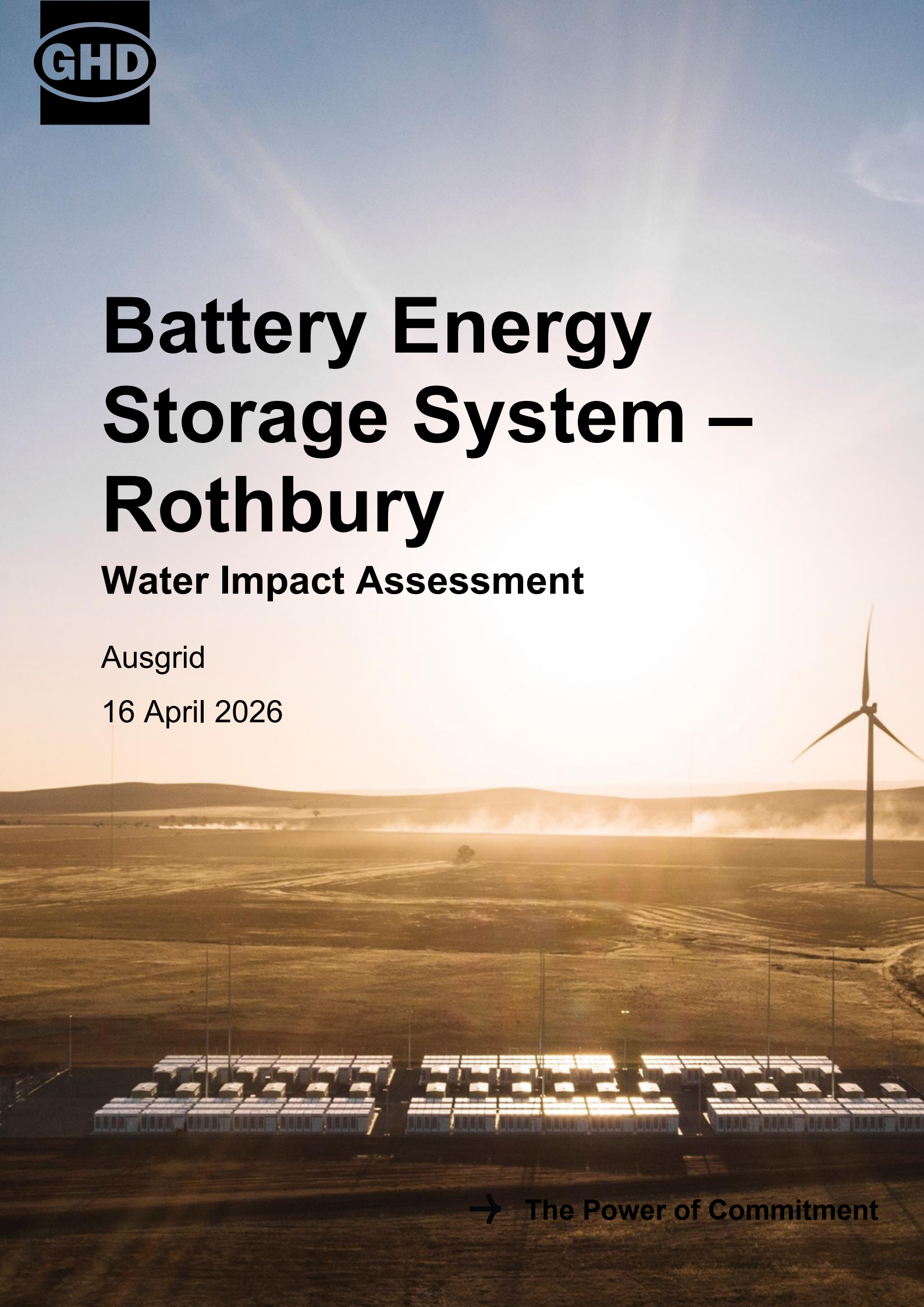
Battery Energy Storage System – Rothbury

Water Impact Assessment

Ausgrid

16 April 2026



The Power of Commitment

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GHD Pty Ltd | ABN 39 008 488 373
133 Castlereagh Street, Level 15
Sydney, New South Wales 2000, Australia
T +61 2 9239 7100 | **F** +61 2 9239 7199 | **E** sydmail@ghd.com | **ghd.com**

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Terms and abbreviations

Term/Abbreviation	Definition
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council Water Quality Guidelines
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
ARI	Average Recurrence Interval
ASS	Acid Sulfate Soils
BESS	Battery Energy Storage System
BOM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
DCP	Development Control Plan
DPE	Department of Planning and Environment
EC	Electrical conductivity
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority
EP&A	Environmental Planning and Assessment Act 1979
EY	A design event expressed in X Exceedances per Year, e.g. 2 Exceedances per Year (2EY)
FIRA	Flood Impact and Risk Assessment
GDE	Groundwater Dependent Ecosystem
GPT	Gross Pollutant Trap
IPCC	Intergovernmental Panel on Climate Change
LGA	Local Government Area
LEP	Local Environmental Plan
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
NEM	National Energy Market
NWQMS	National Water Quality Management Strategy
PIRMP	Pollution Incidence Response Management Plan
PMF	Probable Maximum Flood
POEO Act	Protection of the Environment Operations Act 1997
RCP	Representative Concentration Pathway
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
SWMP	Soil and Water Management Plan
The Blue Book	Managing Urban Stormwater, Soils and Construction, Volume 1 (Landcom, 2004)
The Project	The Battery Energy Storage System and associated infrastructure
The Project Area	The area to be disturbed for the construction and operation of the Project
The Site	The property lot boundary
TSS	Total Suspended Solids

Term/Abbreviation	Definition
WM Act	Water Management Act 2000
WMP	Water Management Plan
WSP	Water Sharing Plan

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1. Introduction

1.1 The Project

The Project involves the construction and operation of a battery energy storage system (BESS) at 1309 Wine Country Drive, Rothbury, NSW (the site). The site is located approximately 48 km north-west of Newcastle CBD, and 4 km south of the town of North Rothbury.

The Project will include the development of the following infrastructure:

- Construction, operation, and maintenance of a BESS with up to 135 MW maximum power output capacity over a 4 hour duration (i.e. up to 540 MWh).
- Containerised battery units and associated infrastructure, including inverters and medium voltage transformers.
- 33 kV underground cable connection from the battery units to the existing Rothbury Zone Substation infrastructure.
- Combined switch room and control room building.
- An operation and maintenance building.
- A warehouse to store equipment and materials/plant related to maintaining the battery units
- Ring Main Units (RMU).
- One auxiliary transformer.
- Backup diesel generator.
- Onsite car parking.
- Other ancillary infrastructure including internal access roads and laydown areas, stormwater management, boundary security fencing, a noise barrier, lighting and CCTV.

The operational lifetime of the BESS is expected to be approximately 50 years. Figure 1.1 provides the Project layout.

1.2 Study area

The site is located at 1309 Wine Country Drive, Rothbury, NSW 2320, within the Cessnock City Council local government area (LGA). The site includes the Project as well as an existing Ausgrid 132 kV/11 kV Rothbury Zone Substation. The study area includes the site as well as surrounding areas and watercourses relevant to the project within a 2 km radius.

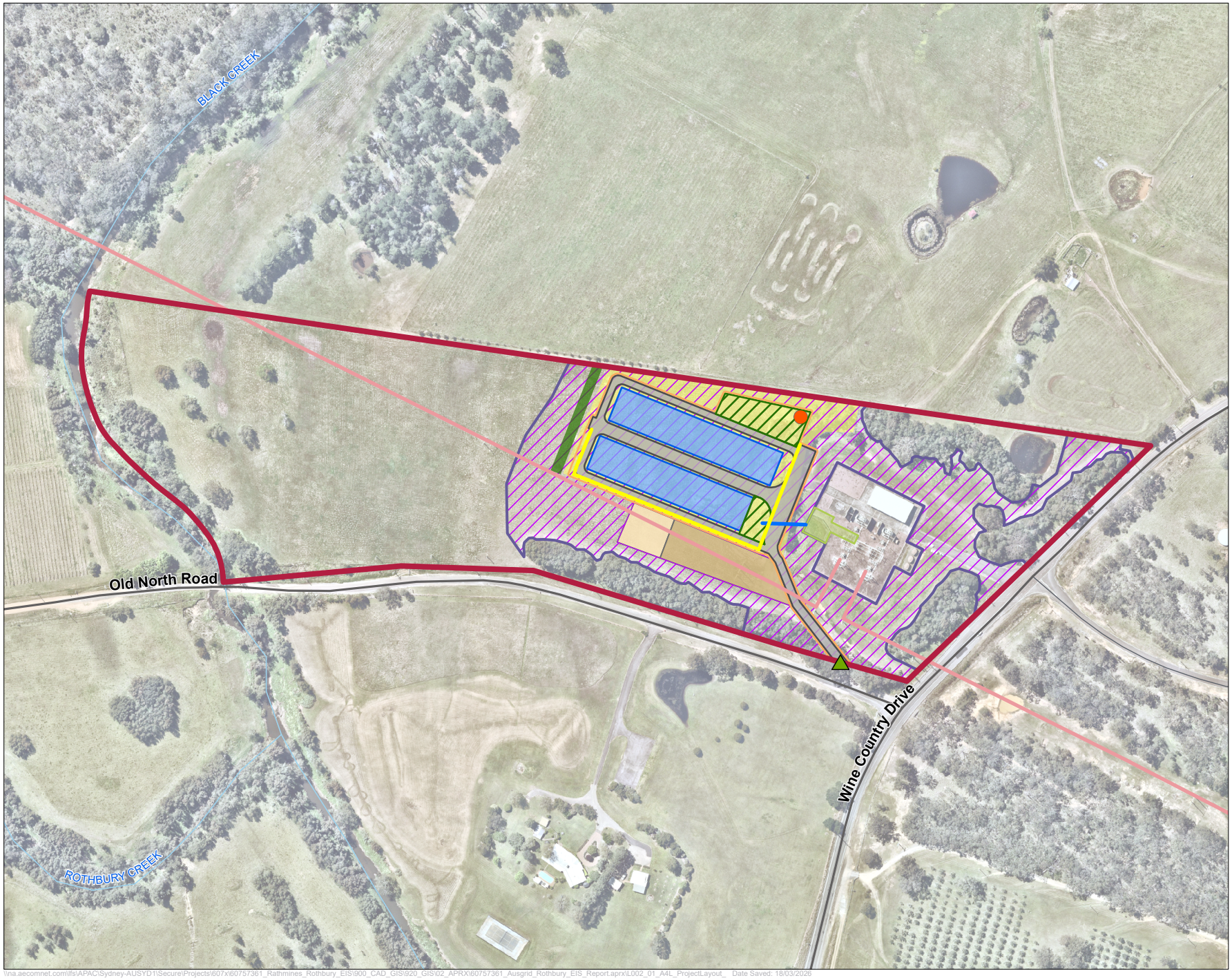
1.3 Secretary's Environmental Assessment Requirements

This report has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) that were issued for the Project (SSD-85939708) on 3rd July 2025. The SEARs relevant to this assessment are summarised in Table 1.1. Agency advice to inform the SEARs is provided in Appendix B.

Table 1.1 Secretary's environmental assessment requirements

Issue	SEARs	Where addressed
Water	An assessment of the likely impacts of the development (including flooding and flood modelling) on surrounding watercourses (including their Strahler Stream Order), groundwater resources and surface water movements, and measures proposed to monitor, reduce and mitigate these impacts including water management.	Section 5 Section 6
	A site water balance for the development.	Section 5.5.3

Issue	SEARs	Where addressed
	Details of water requirements and supply arrangements for construction and operation (including consultation with suppliers).	Section 5.5
	A description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom, 2004) and *Managing Urban Stormwater: Soils and construction – Volume 2A manual (Landcom, 2008).*	Section 6.1
	Assessment of the impacts of the development on hydrology and groundwater (if extraction or interference is proposed), including any changes to overland flows and groundwater levels on-site or off-site, and detail design solutions and operational procedures to manage impacts.	Section 5.1, 5.3, 6
	Where the project involves works within 40 m of any river, lake or wetlands (collectively waterfront land), identify likely impacts to the waterfront land, and how the activities are to be designed and implemented in accordance with the DPI *Guidelines for Controlled Activities on Waterfront Land* (2018) and (if necessary) *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (DPI 2003), *and Policy & Guidelines for Fish Habitat Conservation & Management* (DPE, 2013).	Section 5.3
	Flood Risk: – Identification of any flood risk on site having regard to adopted flood studies, the potential effects of climate change and any relevant provisions of the NSW Flood Risk Management Manual. • Where the development could alter flood behaviour, affect flood risk to the existing community or expose its users to flood risk, provide a flood impact and risk assessment (FIRA) prepared in accordance with the *Flood Impact and Risk Assessment – Flood Risk Management Guide LU01*. • Detailed design solutions and operational procedures to mitigate flood risk where required.	Section 5.1



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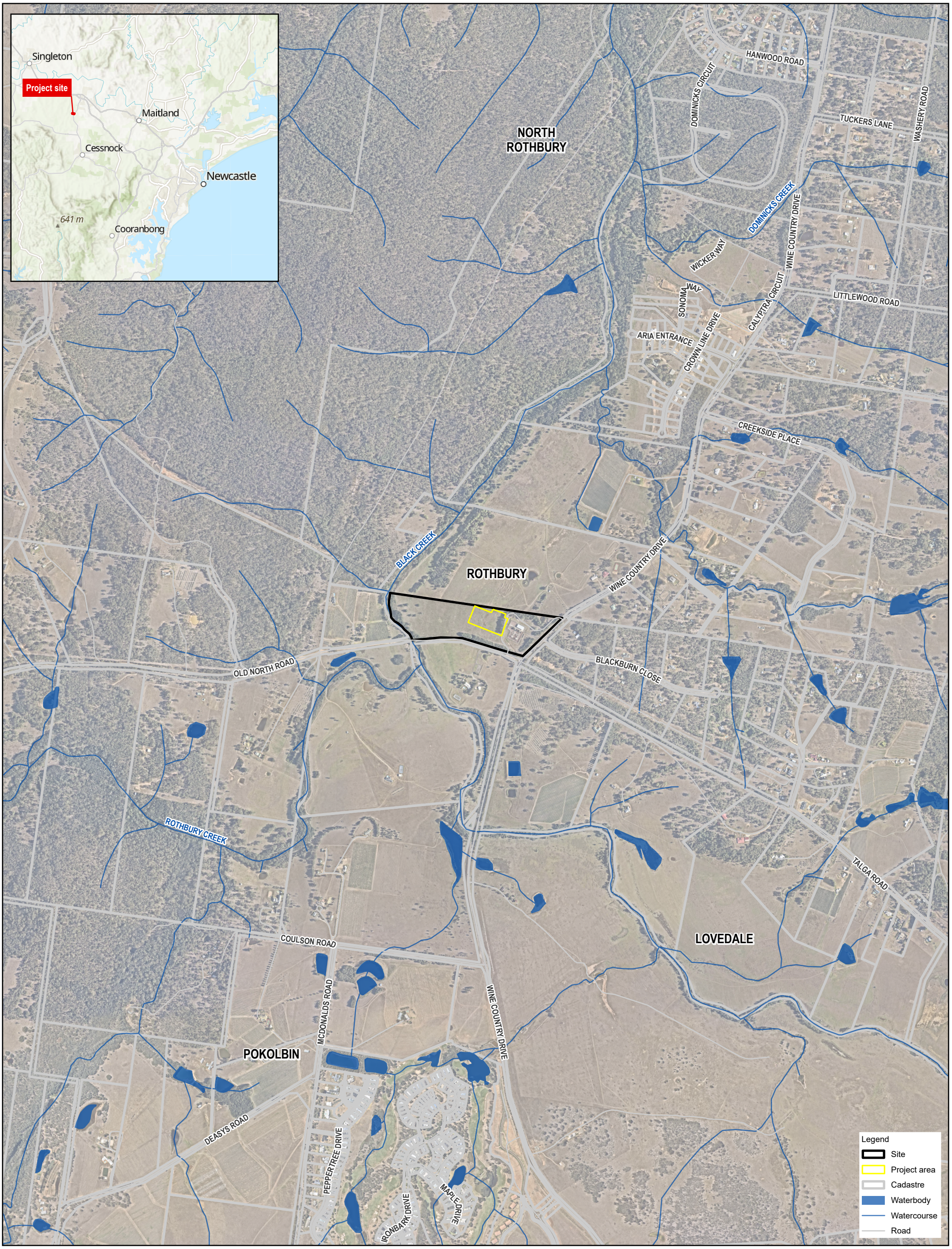
FIGURE 3-1:
INDICATIVE PROJECT LAYOUT
Legend

- The site
- Project Area
- Operational Footprint
- Laydown area
- Ancillary facilities
- Fire water tank system
- Containerised battery units
- Internal site road
- Construction car parking
- Construction site office
- Asset Protection Zone
- Proposed landscaping
- 33 kV grid connection
- Noise barrier
- Project entry/exit
- HV connection infrastructure (subject to separate approvals process)
- Main road
- Watercourse
- Existing transmission lines

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Rothbury BESS
Water Impact Assessment

Locality and site

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

FIGURE 1.2

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Data source: NSWSS 2025: Suburb, Cadastre, Road, Inland water. World Hillshade: Esri, CGIAR. World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community. Nearmap WMS Server: Imagery extracted on 15/04/2026.
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1.4 Purpose of this report

The purpose of this report is to assess the potential soil and water impacts arising from the construction and operation of the Project. The report:

– Addresses the SEARs listed in Section 1.3.
– Describes the existing environment with respect to surface water.
– Assesses the impacts of constructing and operating the Project on surface water.
– Recommends measures to mitigate and manage any impacts identified.

1.5 Structure of this report

The structure of the report is outlined below:

– Chapter 1 – Provides an introduction to the report.
– Chapter 2 – Outlines the assessment methodology.
– Chapter 3 – Describes the legislation, policy and guidelines as relevant to this assessment.
– Chapter 4 – Describes the existing environment regionally and within the site.
– Chapter 5 – Provides an assessment of impact, including consideration of the proposed soil and water management strategy.
– Chapter 6 – Specifies required mitigation measures based on the impact assessment.
– Chapter 7 – Provides a summary of the impacts and mitigation measures.

2. Assessment methodology

The methodology for the Project comprised four key components:

– A review of relevant legislation, policy, and guidelines.
– Identification of the existing environmental baseline.
– Assessment of the water impacts of the Project
– Specification of mitigation measures for identified impacts (if any), and identifying any notable residual impacts following implementation of the mitigation measures.

The activities involved in each of these components is described below.

2.1 Review of relevant legislation, policy and guidelines

A review of relevant legislation, policies, and guidelines was conducted to establish the regulatory context for the assessment. This included, but was not limited to, key statutory documents:

– *Environmental Planning and Assessment Act 1979 (EP&A Act)*
– *Protection of the Environment Operations Act 1997 (POEO Act)*
– *Water Management Act 2000 (WM Act)*
– *Managing Urban Stormwater: Soils and Construction (Landcom, 2004)*
– *NSW Flood Risk Management Manual (2023)*
– *Australian Rainfall and Runoff (2019, updated 2024)*

These documents provided the regulatory framework for assessing water-related impacts, including flood risk and surface and groundwater quality. Further details of these documents and requirements relevant to the Project are provided in Section 3.

2.2 Existing environment

A baseline assessment of existing environmental conditions was undertaken to characterise site-specific risks associated with hydrology, water quality, and flooding. This included:

– Hydrology and drainage: Reviewing regional and local watercourses, drainage patterns, and nearby waterbodies.
– Surface water quality: Reviewing existing water quality information as it relates to potential interactions of the Project with the surrounding environment.
– Groundwater: Evaluating groundwater conditions based on nearby monitoring bores, including depth, flow direction, and potential groundwater-dependent ecosystems.
– Flood risk assessment: Identifying existing flood behaviour, including site inundation risks under various design storm events, using available flood studies and newly developed site-specific flood modelling.

These and other existing environment conditions are described in detail in Section 4.

2.3 Impact assessment

A structured impact assessment was conducted to evaluate potential effects of the Project on hydrology, flooding, surface water, and groundwater based on the existing environment outlined above. This included:

– Hydrology and drainage: Assessing potential changes to local drainage patterns.
– Surface water quality: Evaluating the risk of erosion, sedimentation, and pollutant discharge during both construction and operational phases.
– Groundwater: Identifying any potential impacts on groundwater quality and flow.
– Flood risk: Assessing changes to flood behaviour associated with the project on nearby receptors.

– Cumulative impacts: Reviewing potential interactions with other projects in the region to assess broader water-related implications.

2.4 Identification of mitigation measures

Where impacts were identified as part of the impact assessment, mitigation measures were specified. Residual impacts following implementation of recommended mitigation measures are also provided.

3. Relevant legislation, policy and guidelines

3.1 NSW legislation

3.1.1 Environmental Planning and Assessment Act 1979

The EP&A Act is the core legislation relating to planning and development activities in NSW and provides the statutory framework under which developments are assessed. The EP&A Act aims to encourage the proper management, development and conservation of resources, environmental protection and ecologically sustainable development.

The Project is deemed to be SSD (SSD - 85939708) under the EP&A Act and is subject to the preparation of an EIS. As part of the Project EIS, the SEARs issued for the Project (refer Section 1.3) have identified the requirement to prepare a Water Impact Assessment (WIA) (this document).

3.1.2 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is administered by the NSW Environment Protection Authority (EPA), which is an independent statutory authority and the primary environmental regulator for NSW. The objectives of the POEO Act are to protect, restore and enhance the quality of the environment. Some of the mechanisms that can be applied under the POEO Act to achieve these objectives include programs to reduce pollution at the source and monitoring and reporting on environmental quality. The POEO Act regulates and requires licensing for environmental protection, including for water pollution and water resource impacts.

Under the POEO Act, an Environment Protection Licence (EPL) is required for premises at which a 'scheduled activity' is conducted. Schedule 1 of the POEO Act lists activities that are scheduled activities for the purpose of the Act. Licence conditions relate to pollution prevention and monitoring and can control the air, noise, water and waste impacts of an activity. An EPL is not required for the Project.

3.1.3 Water Management Act 2000

The aim of the WM Act is to ensure that water resources are conserved and properly managed for sustainable use benefiting both present and future generations. It is also intended to provide formal means for the protection and enhancement of the environmental qualities of waterways and in-stream uses as well as to provide for protection of catchment conditions.

Water sources in NSW are managed via Water Sharing Plans (WSPs). Provisions outlined within WSPs exist to ensure water is provided to support the ecological processes and environmental needs of groundwater dependent ecosystems and waterways. WSPs also regulate how the water available for extraction is shared between the environment, basic landholder rights, town water supplies and commercial uses. Water Access Licences (WALs) entitle licence holders to specify share components in the available water that may be sustainably extracted from a particular water source. The actual volume of water available to be extracted may vary, dependent on available water determinations made under the WM Act. Available water determinations are made for each WAL category in each water source and are generally made at the start of a water year, although may be altered at any time. SSD projects are exempt from requiring water supply works and use approvals under the WM Regulation (General) 2018) and the EP&A Act, as these would form part of the development consent for a project.

The Project is located within the Black Creek Water Source which is regulated by the WSP for the Hunter Unregulated and Alluvial Water Sources 2022. The Sydney Basin – North Coast groundwater source (regulated by the WSP for the North Coast Fractured and Porous Rock Groundwater Sources 2016) also underlies the site. Ausgrid do not seek to obtain utilise surface water or groundwater from within the site as part of the Project. Water sourcing arrangements are described in Section 5.5.

3.1.4 Local environmental plans

Local environmental plans (LEPs) are the principal planning document for local councils, controlling the development of land across the LGA. The permissibility of an SSD project is not generally controlled by the LEP, though LEPs provide a reference point for expectations in relation to flooding controls. The Cessnock LEP (2011) includes a clause on flood planning with the following objectives in relation to development:

– Minimise the flood risk to life and property associated with the use of land.
– Allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change.
– Avoid significant adverse impacts on flood behaviour and the environment.
– Enable the safe occupation and efficient evacuation of people in the event of a flood.

The flood planning clause applies to land identified as within a "flood planning area" on the Flood Planning Map. This clause identifies that development consent must not be granted to development on land to which this clause applies, unless the consent authority is satisfied that the development:

– Is compatible with the flood function and behaviour on the land.
– Will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties.
– Will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood.
– Incorporates appropriate measures to manage risk to life in the event of a flood.
– Will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.

The existing flood condition of the site is discussed in Section 4.7. An assessment of the proposed flood conditions arising from the Project have been assessed in Section 5.1.

3.1.5 Development Control Plans

Development Control Plans (DCPs) specify detailed planning and design guidelines to support the provisions in the LEP. DCPs are not applicable to SSD projects through still provide a reference point for the expectations of water quality controls.

Whilst there are no pollutant reduction targets for the site itself within the Cessnock City Council DCP (2010), typical council pollutant reduction targets have been used as a reference point and implemented in this assessment (refer to Section 5.2.2).

3.2 Policies and guidelines

3.2.1 NSW Government Water Quality and River Flow Objectives

The NSW Water Quality and River Flow Objectives (DCCEEW 2006) are the agreed environmental values and long-term goals for each catchment in NSW. The objectives are intended to be considered in assessing and managing the potential impacts of activities on waterways.

The Project is mapped in the catchment of Black Creek, a waterway within the broader Hunter River catchment. Black Creek is characterised by DCCEEW (2006) as a controlled river with increased flow. The NSW Water Quality and River Flow Objectives relevant to the Project are described in Section 4.1.

3.2.2 Australian and New Zealand water quality guidelines

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000; ANZG 2018), are the benchmark documents of the National Water Quality Management Strategy (NWQMS) which provide a guide for assessing and managing ambient water quality in a wide range of water resource types and according to specified environmental values, such as aquatic ecosystems, primary industries, recreation and drinking water.

The ANZECC (2000) guidelines present numerical guidelines which can be used as a basis to assess the impact of the Project against defined objectives or values for the receiving waters. The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) provide guidance for assessing and managing ambient water quality according to specified environmental values, published following scientific review of the ANZECC (2000) guidelines.

The Water Quality Management Framework (ANZG 2018) provides the key requirements for determining appropriate guideline values or performance criteria to evaluate the results of water quality monitoring programs. The application of ANZG (2018) and ANZECC (2000) in the NSW Water Quality is discussed in Section 4 and 0.

3.2.3 NSW Flood Risk Management Manual 2023 and NSW Flood Prone Land Policy

The NSW Flood Risk Management Manual 2023 and NSW Flood Prone Land policy provide for the management of flood-prone land within NSW. The manual “promotes the use of a merit approach which balances social, economic, environmental and flood risk parameters to determine whether particular development or use of the floodplain is appropriate and sustainable”. The NSW Flood Risk Management Manual 2023 is supported by several compendium guidelines. These guidelines are provided in relation to the management of flood liable lands, including any development that has the potential to influence flooding, particularly in relation to increasing the flood risk to people and infrastructure.

Impacts to flood behaviour resulting from the project would be subject to consideration in accordance with the Floodplain Development Manual. Flood risk management in accordance with these policies is discussed in Section 5.1.

3.2.4 Australian Rainfall and Runoff

Australian Rainfall and Runoff (ARR) (Babister et al. 2019) is a national guideline document, data (including design rainfalls and other hydrologic data) and software suite that is used for the estimation of design flood characteristics in Australia. The approaches presented in ARR 2019 are essential for policy decisions and projects including infrastructure, town planning, mining, development of rural and urban floodplain management plans, operation of river systems, and estimation of extreme flood levels.

The flood assessment of the Project has been undertaken in accordance with the methodology and data provided by ARR 2019, including its latest 2024 revisions, as described in Section 5.1.

3.2.5 Managing Urban Stormwater – Soils and Construction

Managing Urban Stormwater, Soils and Construction, Volume 1 (Landcom 2004), more commonly referred to as ‘The Blue Book’, provides guidance and performance standards with relation to the control of erosion and sediment. Throughout NSW the performance standards of Landcom (2004) are commonly used to assess the suitability of proposed controls and residual risk and are commonly included by the EPA in relevant regulatory requirements. The guidelines are supported by the NSW EPA, as well as throughout other NSW government agencies, local government and industry.

The guidelines are referenced and implemented through the development of recommended mitigation measures for soil and water management for the Project, as described in Section 6.

3.2.6 Guidelines for controlled activity approvals

Section 91 of the WM Act details the requirements for obtaining a controlled activity approval to permit work to be carried out on waterfront land. This includes the bed of any river, lake or estuary and any land within 40 m of its highest bank. Section 4.41 of the EP&A Act specifically exempts SSD projects from the requirement for controlled activity approvals. However, it remains an offence for an SSD project to harm waterfront land when carrying out any controlled activity that is not essential to the carrying out a development in accordance with a development consent (refer Section 345 Clause 3(a), WM Act 2000).

The former NSW DPE has published a number of guidelines on the types of controlled activities and the protection of waterfront land. These guidelines provide recommendations for the design and construction of instream works and an indication of the width of riparian zones to be considered.

Whilst the Project's SEARs request this assessment be undertaken the Project does not propose to undertake works within 40 m of a waterway that would trigger the controlled activities guidelines.

3.2.7 NSW Aquifer Interference Policy 2012

The *NSW Aquifer Interference Policy* (NSW AIP) (DPI, 2012) outlines the water licensing requirements under the *Water Act 1912* and WM Act. A water licence is required whether water is taken for consumptive use or whether it is taken incidentally by the aquifer interference activity (such as dewatering), even where that water is not being used consumptively as part of the activity's operation.

Under the WM Act, a WAL gives its holder a share of the total entitlement available for extraction from the groundwater source. The WAL(s) held by the person undertaking the extraction must cover a sufficient share component and water allocation to account for the take of water from the relevant water source at all times. Sufficient access licences must be held to account for all water taken from a groundwater or surface water source as a result of an aquifer interference activity, both for the life of the activity and after the activity has ceased.

The NSW AIP requires that potential impacts on groundwater sources, including groundwater users and Groundwater Dependent Ecosystems (GDEs), be assessed against the Minimal Impact Considerations outlined in Table 1 of the policy. Impacts to groundwater are assessed in Section 5.4.

3.2.8 Cumulative Impact Assessment Guidelines for State Significant Projects

The Cumulative Impact Assessment Guidelines for State Significant Projects (The Guidelines)(DPIE 2022a) provide guidance for undertaking a cumulative impact assessment; where the combined effect of the Project and nearby projects are assessed for any compounding impacts on key matters, sensitive receptors or important features. Relevant future projects may be identified via the NSW Major Projects website and relevant local government developments. The assessment should consider:

– The government's strategic planning framework for the area, having regard to any relevant legislation, plans, policies or guidelines
– The Project and other potentially relevant future projects that may be developed over the same time period or similar timeframes as the Project
– Potential material impacts on features including National Parks and other protected areas, environmentally sensitive areas, threatened species and ecological communities, important natural resources, culturally significant resources, key infrastructure and industries, sensitive land use zones, population centres, settlements and residential areas (key matters)
– The likely scale and nature of the cumulative impacts of these projects.

A cumulative impact assessment has been undertaken for the Project and is discussed in Section 5.6.

4. Existing environment

This section summarises the key features of the existing environment with respect to water.

4.1 Regional context

The site is located in the catchment of Black Creek, part of the wider Hunter River, shown in Figure 4.1. The Hunter River catchment is the largest coastal catchment in NSW, covering an area of approximately 21,500 square kilometres (km) (DPIE 2024). The catchment includes the major town of Cessnock, approximately 13.5 kilometres south of the site, and the major city of Newcastle, approximately 48 km north-east of the site and located at the mouth of the Hunter River. Major towns in the catchment include Maitland, Singleton, Muswellbrook and Raymond Terrace. Water use within the catchment supports a large population and diverse range of users, including Hunter Water Corporation, local councils, power generation, coal mines, heavy industry, dryland agriculture, grazing and irrigated agriculture including use for Hunter Valley wineries.

Elevations within the Hunter River catchment range from less than 50 mAHD supporting floodplains and estuarine areas to peaks of 1,500 mAHD in the mountain ranges in Barrington Tops. The western area of the catchment contains large areas of wilderness and national park areas.

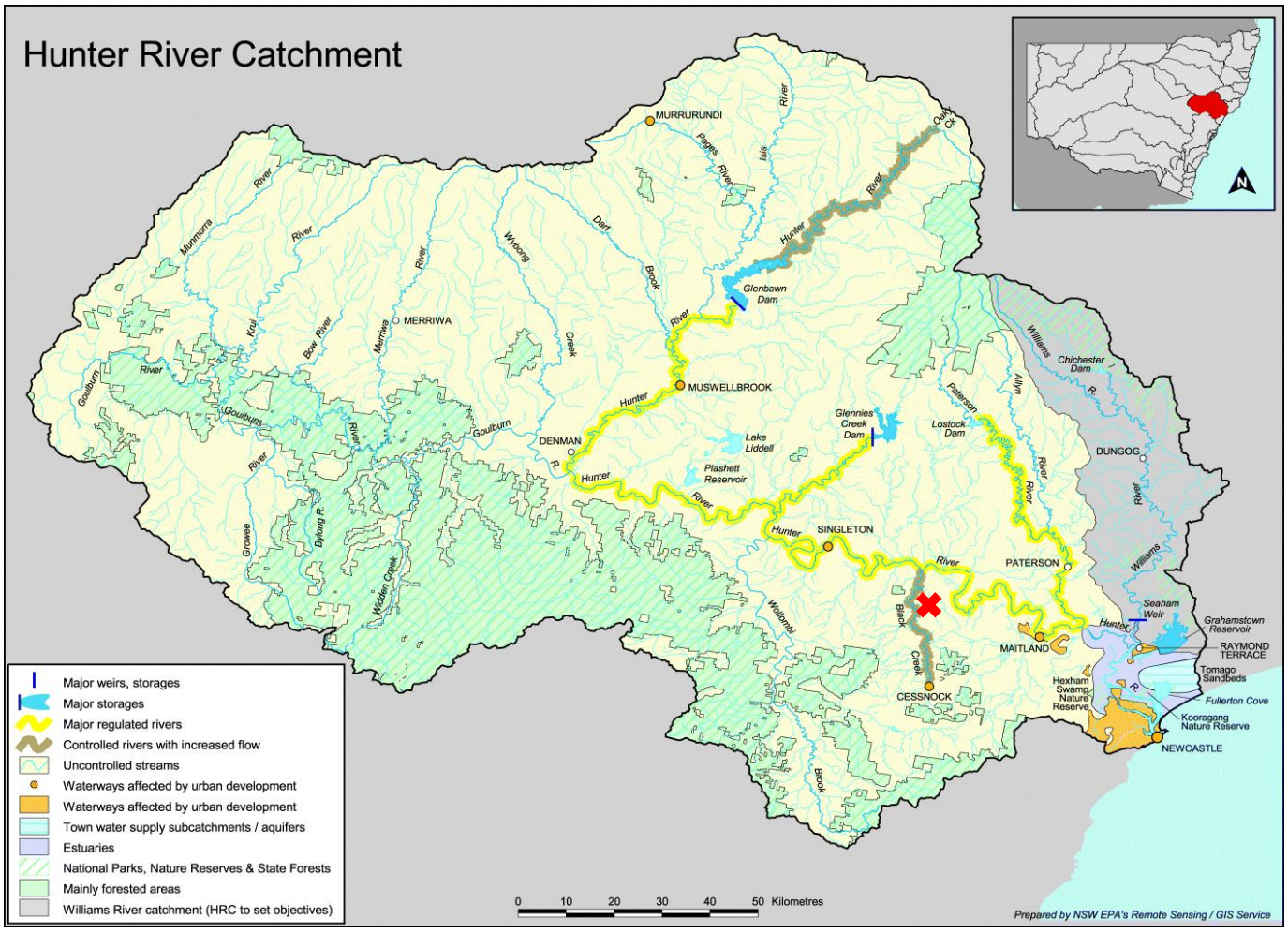


Figure 4.1 Hunter River Catchment map (NSW DCCEEW 2024) with the approximate site marked with red cross

The site is located near Black Creek and falls within an area of controlled rivers with increased flow. Black Creek experiences higher and more constant flows than its natural state as a result of sewage effluent discharged from the Cessnock Wastewater Treatment Works (WWTW) (DCCEEW 2006). The Cessnock WWTW services

Cessnock, Aberdare, Bellbird and Nulkaba and provides tertiary treatment of wastewater (Hunter Water, 2025a). Discharges to Black Creek are regulated by an environmental protection licence (EPL no. 227) for 1000-5000 ML of maximum annual discharge (NSW EPA, 2025a). These outflows have raised nutrient levels in Black Creek.

The water quality and river flow objectives relevant to the site (controlled rivers with increased flow) are listed in Table 4.1 and Table 4.2 respectively.

The water quality objectives are consistent with the national framework for assessing water quality provided by Australian and New Zealand Guidelines for Fresh and Marine Water Quality *(*ANZG 2018) and have been considered in the assessment of surface water quality, discussed in Section 4.8. The river flow objectives have been considered in the assessment of hydrology and flooding, as discussed in Section 5.1.

Table 4.1 NSW Water Quality Objectives (controlled rivers with increased flows)

Water quality objective	Detail
Aquatic ecosystems	Maintaining or improving the ecological condition of waterbodies and their riparian zones over the long term.
Livestock water supply	Protecting water quality to maximise the production of healthy livestock
Irrigation water supply	Protecting the quality of waters applied to crops and pasture
Homestead water supply	Protecting water quality for domestic use in homesteads including drinking, cooking and bathing

Table 4.2 NSW River Flow Objectives (controlled rivers with increased flows)

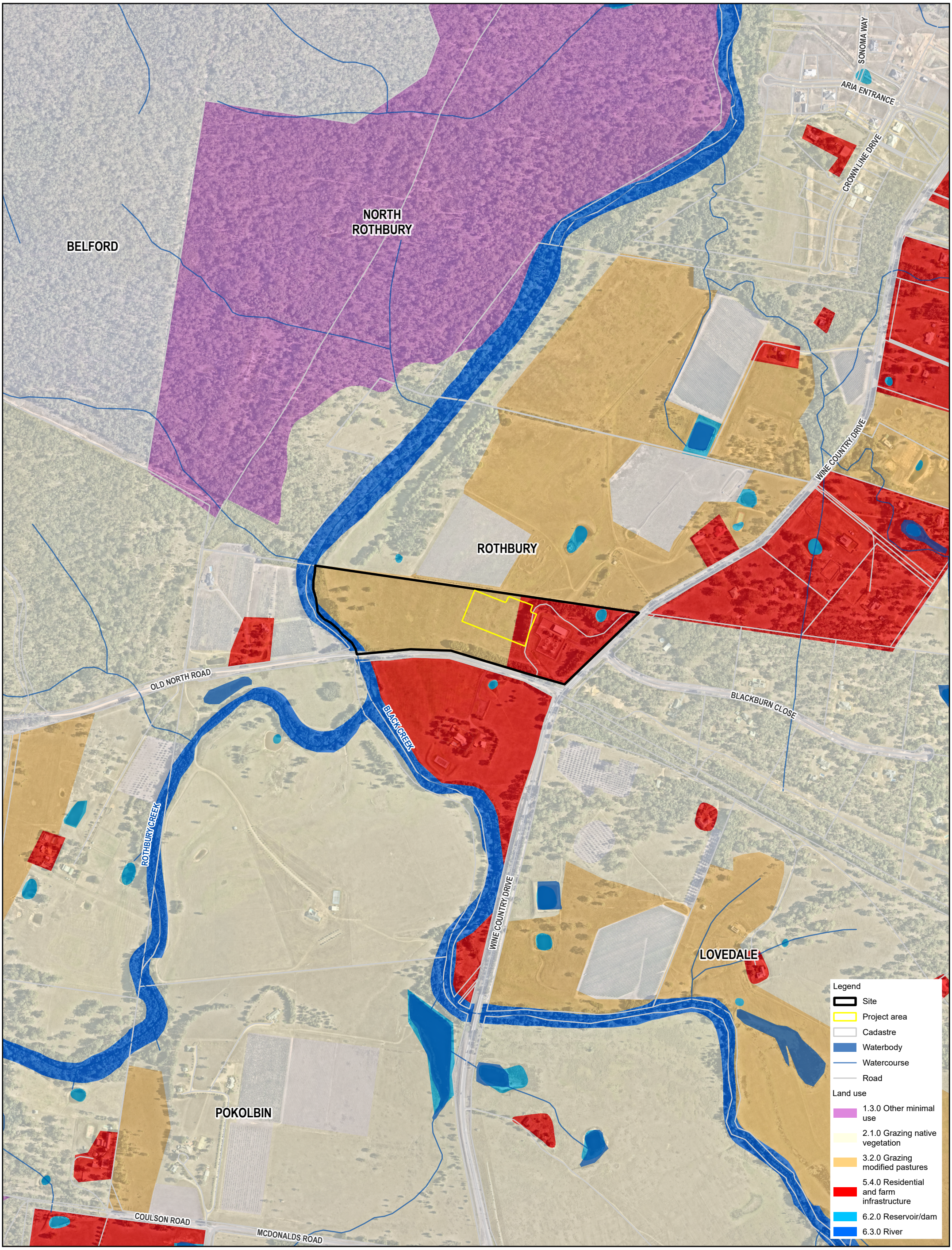
River flow objective	Detail
Protect natural low flows	Protect natural low flows
Mimic natural drying in temporary waterways	Mimic the natural frequency, duration and seasonal nature of drying periods in naturally temporary waterways.
Maintain natural flow variability	Maintain or mimic natural flow variability in all streams.
Manage groundwater for ecosystems	Maintain groundwater within natural levels and variability, critical to surface flows and ecosystems.
Minimise effects of weirs and other structures	Minimise the impact of instream structures.

4.2 Site description and land use

The site is located at 1309 Wine Country Drive, Rothbury, NSW 2320, within the Cessnock City Council (LGA. The site and the surrounding study area consists of the existing 132 kV/11 kV Rothbury Zone Substation owned by Ausgrid, as well as native and exotic vegetation. The land itself is zoned as RU2 Rural Landscape under the Cessnock LEP, with surrounding land uses including primary production (small lots), environmental management and further rural landscape. Approximately 205 m west of the Project Area is Black Creek, which generally flows south to north until its confluence with the Hunter River.

Review of the 2017 NSW land use spatial dataset (DPE 2017) was undertaken to identify the nearby land uses to the site. This spatial dataset is presented in Figure 4.2. The direct land use of the site is classified as “Residential and Farm Infrastructure” and “Grazing Modified Pastures”. The land uses immediately surrounding the site include “River” (Black Creek) to the west, “Perennial Horticulture” to the north, “Transport and Communications” (Old North Road) to the south and to the east (Wine Country Drive). The land uses surrounding the site are consistent with rural and agricultural areas.

The site has historically been shaped and affected by agriculture. A high level of disturbance as a result of historic agricultural activities and construction of the Rothbury Zone Substation is noted at the site (AECOM, 2025).



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Map Projection: Transverse Mercator
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Grid: GDA2020 MGA Zone 56

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Land use

FIGURE 4.2

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Print date: 15 Apr 2026 - 15:33

Data source: NSWSS, 2025: Suburb, Cadastre, Road. DCCEEW, 2017: Land use. Nearmap WMS Server: Extracted on 15/04/2026.
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4.3 Climate

Patched point climate data was obtained from the Scientific Information for Landowners (SILO) database operated by Queensland Government's Department of Environment and Science (DES 2024). SILO point data consists of interpolated estimates based on historically observed data from BOM climate stations. For this assessment, SILO data was obtained for the grid point -32.7, 151.35, which is located approximately 2.45 km north-east of the site. Climate statistics for the site between 1970 and 2024 are presented in Figure 4.3.

Review of Bureau of Meteorology (BOM) climate Köppen classification mapping indicates the site is located in a temperate climate zone and is characterised by hot summers, with no dry season. Monthly rainfall is relatively uniform throughout the year, with slightly increased median rainfall occurring in November through March, compared with other months. The annual average rainfall is 762.2 mm, with a maximum of 1,285.5 mm recorded in 2022 and minimum of 375.2 mm recorded in 2019.

Strong seasonality in evapotranspiration is observed throughout the year, with the highest monthly totals observed in November through February. The annual average evapotranspiration is approximately 1,461.8 mm.

A moisture deficit (annual evapotranspiration less annual rainfall) is observed in all months, with an average annual moisture deficit of 699.6 mm per year, indicating the presence of moisture in environmental conditions are more strongly dominated by evapotranspiration throughout the year.

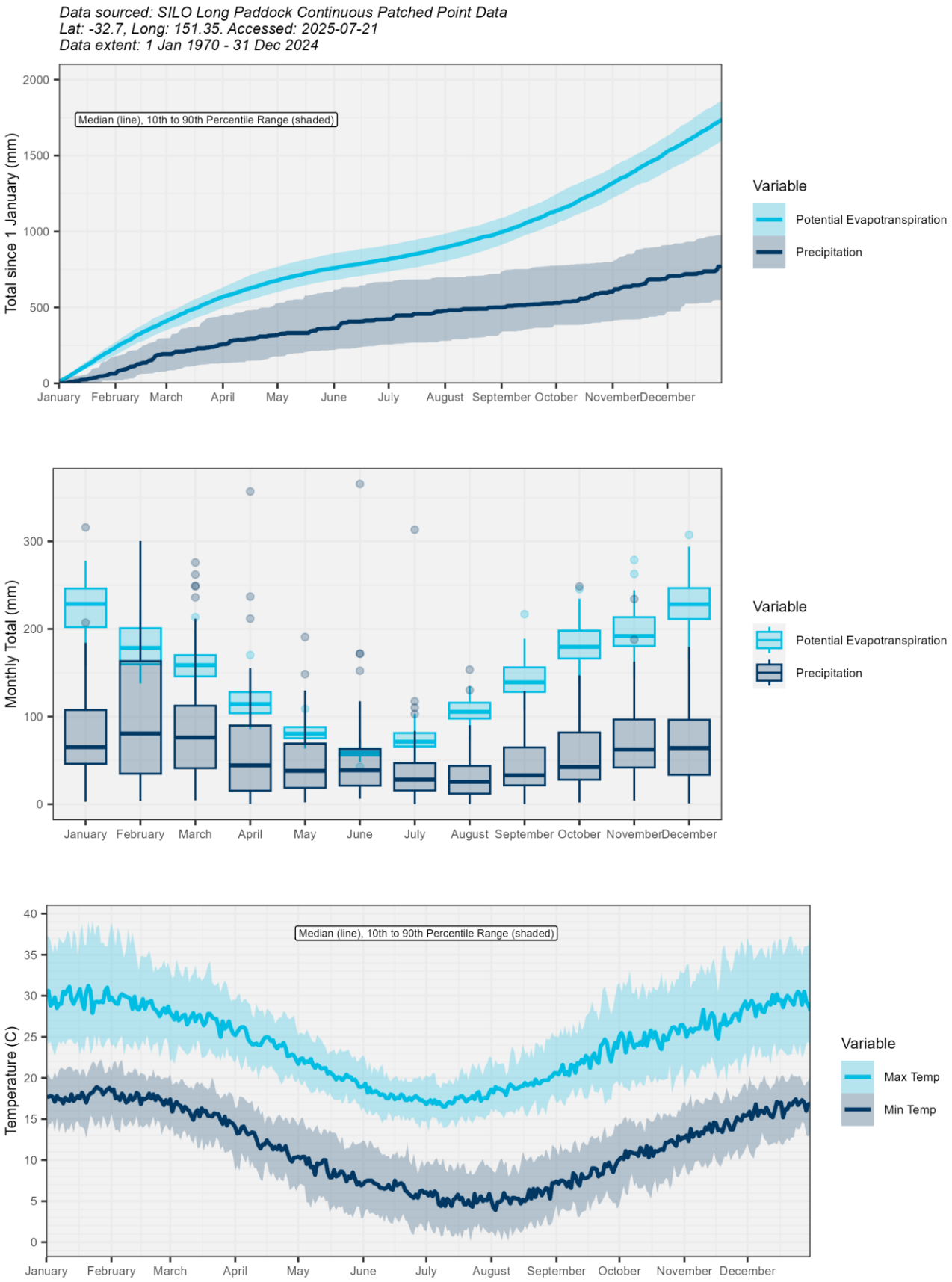


Figure 4.3 *Climate statistics - SILO grid point -32.7, 151.35*

4.4 Soils

The site is fully located across the Branxton soil landscape, which encompasses a large area surrounding Black Creek (eSPADE, 2024). Generally, soils within the Branxton soil landscape consist of sandy loams, medium clays and loamy sands. It is noted that some acid topsoils are encountered within the Branxton landscape, however, acid sulfate soils (ASS) are not mapped over the site according to the Cessnock LEP (Cessnock City Council, 2011). Soils underlying the site are mapped in Figure 4.4.

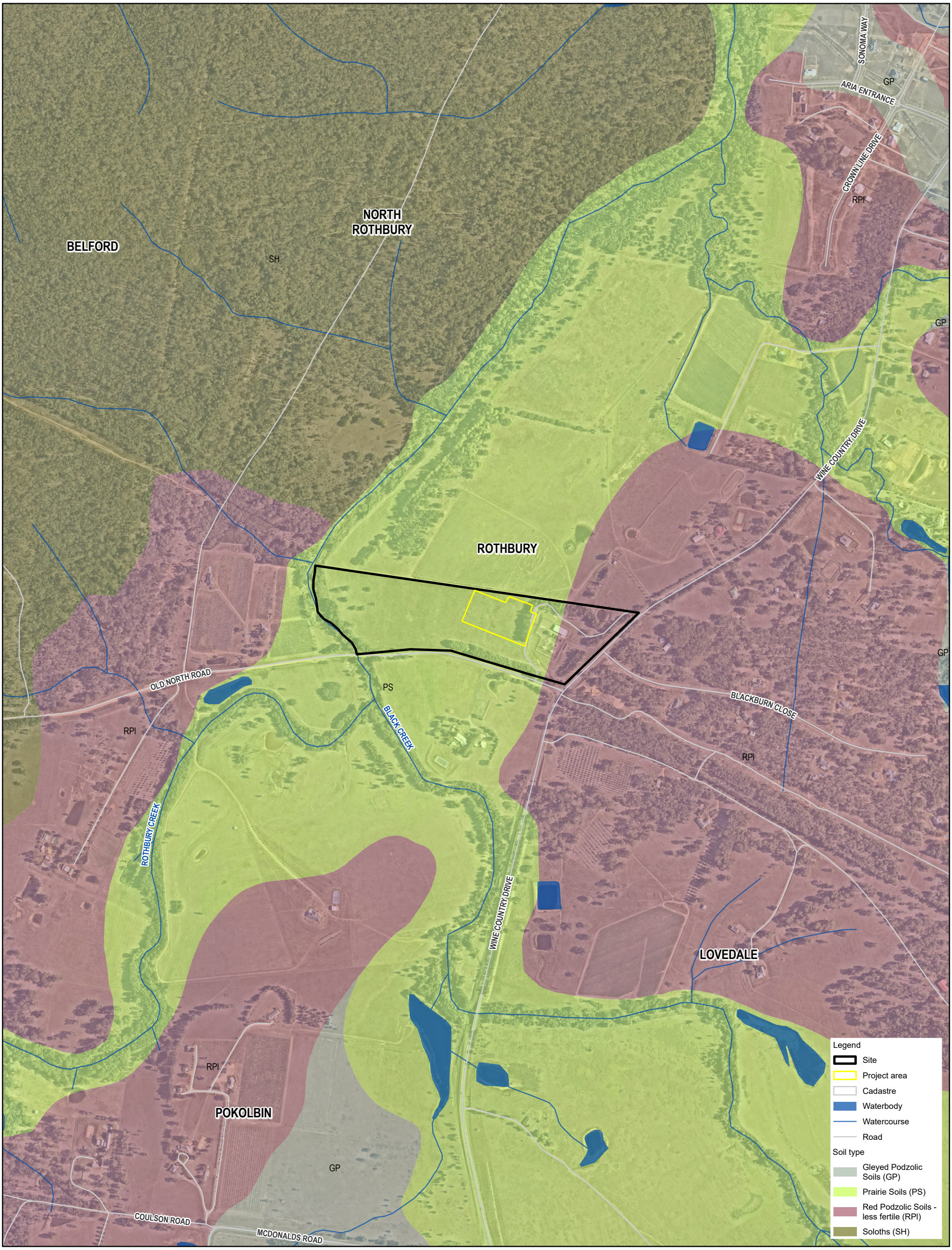
A search of the EPA's List of Notified Sites did not return the site as having been reported to the EPA for contamination under the *Contaminated Land Management Act 1997* (CLM Act) (NSW EPA, 2025b).

The area surrounding the site to the south, west, and north lies the Rothbury soil landscape. This landscape is characterised by undulating and low rolling hills, and consists of Red and Yellow Podzolic Soils on the upper-mid slopes, Brown Soloths on low slopes, and Prairie Soils in the drainage lines (eSPADE, 2024).

A geotechnical assessment conducted by RCA Australia for the Project Area (RCA, 2025) reported on subsurface conditions based on a number of borehole and test pit logs. Generally, the soils underlying the site included:

– Clay / silt fill associated with earthworks for the existing substation, up to 1.1 m depth in some locations.
– Topsoil sand and silt generally across the Project Area, up to 0.5 m deep in some locations.
– Alluvial soils below this layer of topsoil across the Project Area. These soils included silty sand and clayey sand, with layers of low-medium plasticity sandy clay, some gravel and cobble in deeper areas. This alluvial soil layer was up to 4.3-5.5 m thick.
– Residual soils and extremely weathered materials (sandy clay, silty clay / clayey silt) was encountered in three boreholes at depths of between 4.5 and 6 m beneath the layer of alluvial soils.

Generally, soils at the site consisted of low strength alluvial soils, and were soft / waterlogged in places during the geotechnical investigation (which occurred after a period of heavy rainfall over the preceding week). It was noted that the waterlogging of soils was likely to have been exacerbated by stormwater generated prior to the investigation being undertaken (discussed further in Section 4.6).



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Soils

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FIGURE 4.4

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Print date: 15 Apr 2026 - 15:33

Data source: NSWSS, 2025: Suburb, Cadastre, Road. EDP, 2025: Acid sulphate soil risk, Soil Type. Nearmap WMS Server: Extracted on 15/04/2026.
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4.5 Topography

The site itself is located within a generally flat area, with the surface generally sloping north towards a farm dam located on a neighbouring property. Other parts of the project site generally falls to the west towards Black Creek at slopes of approximately 1 to 5%. Lower elevations of the project site include the banks of Black Creek which are relatively steep, up to approximately 25%. The topography of the site is shown in Figure 4.5.

4.6 Hydrology and drainage

Regionally, the site is located within the Black Creek catchment. Black Creek is located approximately 205 m west of the Project Area and is a sixth order watercourse as it passes the site. The creek generally flows south to north until it meets the Hunter River approximately 16.5 kilometres downstream of the site. The contributing catchment to Black Creek upstream of the site includes the tributaries Rothbury, Deadmans, First, Middle and Pokolbin Creeks, draining largely agricultural uses and urban uses.

A review of the NSW Riverstyles mapping (DPSI 2024) identified that Black Creek has poor geomorphic condition but moderate potential to recover from its current condition. Extensive catchment disturbance has been noted for the creek.

During smaller rainfall and flow events, the site drains north into a neighbouring farm dam (mapping of waterways and waterbodies by NSW Government, do not include this farm dam), including conveying water arriving from upstream areas east of Wine Country Drive, which are directed around the existing Rothbury Zone Substation. Within the project site, surface waters around the Rothbury Zone Substation are collected by a series of informal flow pathways, culverts and small farm dams, with runoff ultimately flowing north into the neighbouring farm dam. A larger farm dam is located outside of the Project Area to the north-east and is anticipated to capture a small catchment from Wine Country Drive.

During larger events, flow at the site continues to drain north, however Black Creek spills onto the surrounding floodplain, forming flood runners that are roughly parallel to the alignment of the creek. These flood runners are located to the west and north of the site.

BELFORD
NORTH ROTHBURY
ROTHBURY
OLD NORTH ROAD
WINE COUNTRY DRIVE
BLACKBURN CLOSE
BLACK CREEK
ROTHBURY CREEK
LOVEDALE
POKOLBIN

Legend
- Site
- Project area
- Cadastre
- Waterbody
- Existing key flow paths
- Watercourse
- Contour (2m)
- Road

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Topography and hydrography

FIGURE 4.5

Data source: NSWSS, 2025: Suburb, Cadastre, Road, Contour.Nearmap WMS Server: Extracted on 15/04/2026.
Created by: lmanasan

4.7 Existing flood conditions

The dominant flood mechanisms at the site are flooding from the local catchment and riverine flooding from Black Creek. Two separate models were used to characterise existing flood conditions at the site:

– Flooding relevant to the local catchment were assessed using a rain-on-grid flood model presented in Appendix A.
– Flooding relevant to the regional catchment were assessed using the Black Creek Stage 2 Flood Study was completed by WMAwater for Cessnock City Council in 2015, which was updated to reflect latest revisions to ARR 2019

Existing flood conditions were assessed for the following events and scenarios:

– 5% AEP for 2030 using Shared Socio-economic Pathways scenario (SSP) SSP2-4.5. This event was used as an indication of the 'current' 1 in 20 AEP event.
– 1% AEP for 2030 using Shared Socio-economic Pathways scenario (SSP) SSP2-4.5. This event was used as an indication of the 'current' 1 in 100 AEP event.
– 1% AEP for 2080 using SSP2-4.5. This event was used as an indication of the 'future' 1 in 100 AEP event, in the event of lower levels of global warming due to greater intervention measures.
– 1% AEP for 2080 using SSP5-8.5. This event was used as an indication of worst 1 in 100 AEP event anticipated during the site's operation, using a conservative climate future with minimal intervention measures.
– Probable Maximum Flood (PMF) for 2080 using SSP5-8.5. This event was used as an indication of the probable maximum flood event anticipated during the site's operation, using a conservative climate future with minimal intervention measures.

4.7.1 Existing flood model results

Results from local and regional model were analysed together, which allowed for identifying whether the local or regional catchment governed flood behaviour at various parts of the site. The site was determined to be subject to flooding due to overland flow drainage from the local catchment and from regional (riverine) flooding of Black Creek.

As noted in Section 4.6, the Project is located within a localised depression, which generally drains north into an adjoining property towards a neighbouring farm dam. In smaller events (e.g. the current-day 5% AEP, approximately represented by 2030 SSP2-4.5), there is shallow localised flooding in the area where the Project is proposed, associated with these drainage pathways (see Figure A001 in Appendix B). Flows are slow moving and hazard is low (generally H1 – generally safe for vehicles, people and buildings, see Figure A003 in Appendix B). Regional flooding from Black Creek does not impact the site, but begins to back up towards the site from the northern property (see Figure D001 in Appendix C). Old North Road is fully inundated in all events modelled, including the 5% AEP, with extreme hazard (H6 – unsafe for people and vehicles).

In less common events such as the 1% AEP, regional flooding associated with Black Creek continues to spill further out across the surrounding floodplain (see Figure D004, D007 and D010 in Appendix C). In the 1% AEP storms modelled, floodwaters within the Project Area remain shallow (generally in the order of 0.15-0.3 m) and are slow-moving (see Figure A004, A007 and A010 in Appendix B). During future 1% AEP under the worst-case climate change scenario (2080 SSP5-8.5), regional flooding from Black Creek backs up towards the site from the north (Figure D010 in Appendix C). At the same time, local flooding ponds near the corner of the existing Rothbury Zone Substation, resulting in increased levels at the site of approximately 41.2 mAHD (Figure A010 in Appendix B). This flood level was used to inform the setting of the pad level, to the critical 1% AEP peak flood level (under 2080 SSP5-8.5) with at least 300 mm freeboard taken as the Flood Planning Level (FPL) (see Section 5.1.2.1). Increased depth during these events results in slight increases of hazard up to H2 (unsafe for small vehicles) hazard mapped in parts of the site where the Project is proposed (Figure A012 in Appendix B).

During the PMF event, the entire site and much of Wine Country Drive is inundated in existing conditions (see Figure D013 in Appendix C). There are flood depths of up to approximately 8 m at the site and 6 m over the existing Rothbury Zone Substation as the Black Creek floodplain is inundated up to 1 km in width. Flood depths across Wine Country Drive are also anticipated up to around 1-3 m. The regional flood level in this event is

approximately 47.6 mAHD over the area of the proposed pad and results in notable impacts to road serviceability with Old North Road and Wine Country Drive having very high hazard up to H6.

4.8 Water quality

Water quality in Black Creek is disturbed by its existing surrounding agricultural land use, runoff from impervious surfaces located in urban centres upstream of the site and flows received from Cessnock Wastewater Treatment Works (WWTW). This has produced elevated nutrient levels in Black Creek. Outflows from the Cessnock WWTW are regulated under EPL 227 (NSW EPA, 2025). WaterNSW also undertakes water monitoring at Black Creek in Rothbury (Station number 210089), approximately 570 m upstream of the site and 14.3 km downstream of Cessnock WWTW. Monitoring of electrical conductivity (at 25ºC in µS/cm) occurred from 24th June 1996 to 24th February 2009. It is noted that since cessation of monitoring of electrical conductivity, further upgrade works have improved the quality of outflows from Cessnock WWTW (conducted in 2021-2024) (Abergeldie, 2025). Monitoring occurred often at a sub daily (but irregular) timestep, with mean electrical conductivity of the creek being 1,397 µS/cm over the period (slightly brackish). Maximum electrical conductivity was recorded at 5,816.5 µS/cm (12 February 2009) and minimum electrical conductivity was recorded at 293.2 µS/cm (12 March 2003), indicating large variability in water quality conditions (WaterNSW, 2025).

4.9 Groundwater

Groundwater in the vicinity of the site is likely to flow towards Black Creek, a major tributary of the Hunter River.

4.9.1 Groundwater monitoring bores (RCA, 2025)

As noted in Section 4.4, RCA conducted a geotechnical investigation over the Project Area, from 27th to 30th May 2025. T boreholes and 8 test pits were sampled and logged as part of the works over this period, including logging of groundwater levels. It was noted that a number of borehole locations had to be moved as they were inaccessible due to soft and waterlogged ground at the time of the investigation. According to SILO interpolated grid point data for the closest grid point to the site (-32.70, 151.35), 170.3 mm of rain was received in the eight days prior to the fieldwork beginning, with another 22.6 mm of rain received on the first day of the fieldwork (27th May 2025). It is noted that because of this significant rainfall, groundwater conditions and levels would not have stabilised prior to measurement and are expected to have been elevated above normal levels. These are not considered to be reflective of regular conditions at the site.

The geotechnical investigation determined that groundwater seepage was observed in 10 out of the 21 sampled locations, at depths between 0.8 m and 4.0 m. This is summarised in Table 4.3.

Table 4.3 Summary of depth to groundwater and soil conditions (RCA, 2025)

Location	Thickness of Fill / Topsoil (m)	Thickness of Alluvial Soils (m)	Top of Residual Soil / Extremely Weathered Material (mbgl)	Groundwater / seepage (mbgl)
BH101	0.5	5.5	6	4
BH102	0.5	5.5	6	1.8
BH103	0.2	4.3	4.5	Not observed
BH104	0.1	>4.35	Not encountered	2.5
BH106	0.2	>3.8	Not encountered	Not observed
BH107	0.1	>3.9	Not encountered	Not observed
BH108	0.2	>3.6	Not encountered	Not observed
BH109	0.2	>3.8	Not encountered	Not observed
BH111	1.5	>2.5	Not encountered	Not observed
BH112	0.1	>1.9	Not encountered	Not observed
BH113	0.1	>1.9	Not encountered	1
TP114	0.15	>1.15	Not encountered	Not observed
BH115	0.15	>1.85	Not encountered	1.8
TP116	0.2	>1.8	Not encountered	0.8

Location	Thickness of Fill / Topsoil (m)	Thickness of Alluvial Soils (m)	Top of Residual Soil / Extremely Weathered Material (mbgl)	Groundwater / seepage (mbgl)
BH117	0.1	>1.9	Not encountered	1.8
TP118	0.1	>1.9	Not encountered	1.3
TP119	0.2	>1.8	Not encountered	Not observed
TP120	0.2	>1.8	Not encountered	Not observed
TP121	0.1	>1.9	Not encountered	1.6
TP122	0.1	>1.9	Not encountered	Not observed
TP123	0.1	>1.9	Not encountered	1.7

4.9.2 WaterNSW groundwater bores

A search of the WaterNSW Water Information Hub (Real time data) was also undertaken to identify groundwater bores within 1 km of the site for the purpose of reviewing historical groundwater levels. The identified bores are detailed in Table 4.4. In the absence of groundwater elevation information, the approximate groundwater elevations presented in Table 4.4 were calculated using elevations taken from a Digital Elevation Model (NSW SS 2014) and standing groundwater water levels.

Table 4.4 Groundwater monitoring bores (WaterNSW 2024)

ID	Bore depth	Lithology (m)	Date of log	Standing water level (m)	Yield (L/s)	Licence	Groundwater elevation (mAHD)	Approx. distance to site
GW050646	38	0 - 1, Soil 1 - 4, Clay 4 - 38, Shale	1/8/1980	19	0.38	Stock (active)	36.67*	541
GW080956	76	0 - 0.05, Topsoil 0.05 - 0.07, Ironstone 0.07 - 12, Shale 12 - 76, Shale	1/10/2005	1	1	Fire-fighting, Monitoring (cancelled)	51.369*	659
			21/3/2011	11.45	Not reported		40.919*	
			17/8/2012	10.675	Not reported		41.694	

* = estimated

As shown in Table 4.4, the lithology logs indicate varying groundwater levels at these groundwater monitoring bore locations, noting that both bores are located significantly further away from Black Creek than the site, and as such, groundwater levels may not be representative of conditions within the site.

All groundwater bores in the vicinity of the site are mapped in Figure 4.7.

4.9.3 Groundwater dependent ecosystems

A review of the High Ecological Value Aquatic Ecosystems (HEVAE) dataset (DCCEEW, 2018) was undertaken to identify potential Groundwater Dependent Ecosystems (GDEs) near the site. Areas of HEVAE vegetation that have a medium probability of being groundwater dependent were identified within the site, notably in areas where trees exist. Medium-probability GDEs have also been identified approximately 200 m southwest and west of the Project Area in the riparian corridor of Black Creek. A review of the Bureau of Meteorology GDE Atlas found no terrestrial GDEs on the site, however there were low potential GDEs located to the east of Wine Country Drive and high potential GDEs along Black Creek (BOM, 2025b).



Figure 4.6 ***Sampling locations during geotechnical investigation***



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Groundwater receptors

FIGURE 4.7

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Data source: NSWSS, 2025: NPWS, Suburb, Inland water, Road. DCCEEW, 2026: GDE HEVAE. BOM, 2026: GW Borehole.Nearmap WMS Server: Extracted on 15/04/2026.
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5. Impact assessment

An assessment of water related impacts is provided in the following sections, considering the existing environment and proposed soil and water management strategy for the project. Where it is identified that potential impacts to water resources near the Project are not acceptable, mitigation and management measures are recommended (refer to Section 6).

5.1 Hydrology and flooding

5.1.1 Construction phase flood impacts

As the proposed construction period is relatively short (*22 months*), a standalone quantitative assessment of construction-phase flooding has not been undertaken. Instead, assessment of the operation phase flood impacts can be used to identify the potential magnitude of changes in flood extent during the construction stage. The short duration of the construction phase should be considered when interpreting risk. Without the implementation of appropriate flood management measures, inundation of the site by floodwater has the potential to:

– Detrimentally impact downstream waterways through the transport of sediments and construction materials by floodwaters.
– Obstruct the passage of floodwater and overland flow through the provision of temporary measures such as construction compounds and stockpiles.
– Result in restricted accessibility to work areas due to ponded water or soft ground conditions.

Direct construction phase flood impacts are anticipated to be negligible, however minor impacts to local runoff pattern may occur, and indirect impact associated with construction phase water quality may also occur, as discussed in Section 5.2.1.

5.1.2 Operation phase flood impacts

5.1.2.1 Development case flood model configuration

Based upon on the existing local (overland) flood conditions in the vicinity of the site (refer to Section 4.7) and the relative increase in hardstand area associated with the Project, flood measures to minimise operational phase flood were included as part of the design. The measures intend to manage the runoff that passes under Wine Country Drive into the site and around the existing Rothbury Zone Substation, since the proposed works could block existing flow pathways towards the north of the site. The measures include:

– Provision of a grass-lined channel, running parallel to the southern boundary of the site directing flows to the west towards Black Creek. The channel is intended to be free surface draining with no ponded water to remain in the channel. Detailed design will confirm the location and detail of controls to minimise velocities at the discharge point towards Black Creek, to avoid scour and erosion in events up to the 10% AEP (and greater if feasible).
– Formalisation of drainage around the Rothbury Zone Substation. Minor amendments are required to allow floodwaters to be conveyed around the site and minimise ponding.
– Erosion protection at the location of controlled concentrated discharge point. Scour could occur if erosion protection is not provided.

Flood modelling was conducted in both the regional and local models for the design case, through alteration of the flood model topography, inclusion of proposed drainage configuration, and modification of land-use/roughness. The design level for the pad was proposed to be set to provide at least 300 mm freeboard above the critical 1% 2080 SSP5-8.5 peak flood level and designed to be free-surface draining with a slope of approximately 1% across the pad. As the freeboard may be greater than 300 mm, up to approximately 500 mm, a pad level was modelled corresponding to 500 mm of freeboard. This is conservative in relation to the assessment of offsite flood impact under the PMF. This corresponds to a modelled pad level that varies between 40.6 mAHD and 42.1 mAHD. Further details of the flood model methodology is provided in Appendix A for the local model, with the same

topography changes and drainage changes applied for the site in the regional model. The roughness categorisation used in the local model was overlain for the site in the regional model.

Flood mapping of both proposed conditions and flood impact (afflux – difference between proposed and existing conditions) is provided in Appendix B (for the local model) and Appendix C (for the regional model).

5.1.2.2 Development case flood model results

Consistent with the analysis of the existing case results, results from local and regional models were analysed together for the Project, to identify whether the local or regional catchment governed flood behaviour at various parts of the site. Generally, results reflected a decrease in flood level and velocity to the north of the Project, and an increase in flood level and velocity to the west of the Project as flows are directed around the proposed BESS pad and towards Black Creek. This mechanism is more pronounced in extreme events, noting that no significant change to offsite hazard is associated with the Project in any event.

For the 5% AEP and all 1% AEP events modelled, generally:

– There is localised ponding south of the pad and near the existing Rothbury Zone Substation. This is caused by runoff (as modelled in the local model) that normally would drain to the north and in larger events as well as upstream breakouts of Black Creek into flood runners (as modelled in the regional model), that are now obstructed by the proposed pad (see Figure B010 in Appendix B and Figure E010 in Appendix C).
– Floodwaters are generally shallow, slow moving and with low hazard (H1-H2) at the site, except where associated with dedicated drainage lines (see Figure B011 and B012 in Appendix B).
– Offsite changes in flood levels include decreased flows to the northern neighbouring farm dam demonstrated in the local model (see Figure C010 in Appendix B). Increases in flood levels (up to 100 mm) occur where the proposed channel south of the pad discharges northwest onto the uninhabited floodplain of Black Creek (see Figure C010 in Appendix B). This does not correspond to a substantial increase in hazard (see Figure C012 of Appendix B and Figure F012 in Appendix C).
– There is no change in flood level along Old North Road or Wine Country Drive due to either regional or local flooding (see Figures C010 in Appendix B and F010 in Appendix C).
– Regional flooding from Black Creek only reaches the Project Area in the future worst-case climate scenario (1% AEP 2080 SSP5-8.5), with the pad surface level elevated at least 500mm above this level and remaining flood free (see Figure E010 in Appendix C).

In the future PMF event (2080 SSP5-8.5), the whole site (both the Project and existing Rothbury Zone Substation) remains fully inundated (see Figure E013 of Appendix C), consistent with modelling of existing conditions. There is widespread inundation of the floodplain and Wine Country Drive is also inundated, consistent with existing conditions. Hazard across the site, Old North Road and Wine Country Drive also remains high (up to H6) (Figure E015 of Appendix C). Since the proposed pad is located within the flow path of Black Creek, increases to flood levels continue upstream for approximately 6 km up Black Creek and 2.5 km up Rothbury Creek. However, these increases in flood levels are generally less than 0.04 m within the broader region. They do not correspond to a wholescale increase in flooded extent in the future PMF event nor a substantial increase in flood risk, despite localised areas of an increase in one hazard categorisation (see Figure F015 in Appendix C). Where this occurs over Wine Country Drive, it is noted that this road would be impassable in the PMF (2080 SSP5-8.5) based upon existing infrastructure and conditions.

Overall, notable offsite changes in flood characteristics are primarily limited to the PMF event, with minor increases in flood levels downstream of the drainage works on the uninhabited floodplain due to local flooding conditions. However, these changes are considered relatively minor and are not anticipated to result in material changes in flood hazard. It is considered unlikely that any social or economic impacts relating to flooding would occur as a result of the Project.

Based on both the existing and proposed future flood hazard associated with the Project, while changes to flood hazard are not anticipated to significant, portions of the site are susceptible to localised flooding. Configuration of local drainage should be considered as part of the detailed design, construction and operational phases of the Project.

5.2 Surface water quality

5.2.1 Construction phase surface water quality

Various activities associated with the Project have the potential to impact surface water quality. These include:

– Earthworks, excavation and disturbance of soils, which may mobilise surface sediments resulting in erosion and sedimentation.
– Handling and operation of equipment containing hazardous materials such as fuels, batteries, and oils which may contaminate surface runoff and enter local watercourses, including Black Creek.

The potential for each of these activities to impact on watercourses is outlined below.

Erosion and sedimentation

Disturbance of in-situ and stockpiled soils has the potential to result in erosion and sedimentation. This may arise from earthworks, excavation, clearing and grubbing, and any activities where the existing surface is disturbed. Once disturbed, these materials are prone to being mobilised into downstream waterways primarily from rainfall derived runoff, resulting in a potential risk to downstream water quality. As a result, the primary contaminant of concern would be suspended solids (i.e. turbidity).

The scale of disturbance proposed is relatively small based upon the Project Area, which substantially reduces potential impact associated with the works. A soil loss hazard assessment was undertaken (see Appendix E for more information) and identified the soil loss hazard is anticipated to be very low. Impacts are therefore anticipated to be minor and can be suitably managed through the implementation of standard sediment and drainage controls. Sedimentation basins are not anticipated to be required according to Blue Book recommendations, as the estimated average annual soil loss from the total disturbed area is less than 150 m^3/yr (Landcom, 2004).

Hazardous materials

The handling of materials hazardous to downstream waterways would be required during construction. Potential activities that may involve the handling of hazardous materials include:

– Maintenance and refuelling of plant (e.g., hydrocarbons)
– Installation of concrete slabs (e.g., alkalinity)
– Handling of battery unit components (e.g., metals)
– Accidental spills of stored materials (e.g., fuels, oils)
– Accidental spills during the installation of transformers or similar infrastructure (e.g., mineral oils)
– Unexpected contamination that poses a risk to water quality

The potential impact associated with the handling of these components includes mobilisation into receiving waterbodies either via direct flow of the material or washing from rainfall derived runoff or applied water (e.g., during dust suppression). With no mitigation applied, this material may become mobilised into receiving waterbodies such as Black Creek, where impacts to both flora and fauna may occur. The impact of mobilisation of these hazardous materials into these environments would vary in terms of persistence and severity but would generally be adverse.

It is noted that handling of hazardous materials has already occurred, and continues to occur, at the site. This includes the usage of hydrocarbons, fuels, oils etc. that are associated with current operation and ongoing maintenance of the existing Rothbury Zone Substation. No measurable impacts associated from the handling of these materials has been observed.

There is risk posed by the handling of hazardous materials associated with the battery units to be installed at the site. As hazardous materials are already successfully managed on the site, it is anticipated that the handling of new hazardous materials can also be undertaken without measurable impact. Risks to water quality associated with the hazardous materials within the battery units will require management via a Soil and Water Management Plan (SWMP), detailed in Section 6.

5.2.2 Operational phase surface water quality

Potential water quality risks during operation of the Project were assessed and identified in the following two categories:

– General risks associated with the addition of relatively large impervious areas that apply to most activities and are typically associated with increasing urbanisation.
– Specific risks associated with the nature of the proposed works (e.g., transformer oil, battery metals) that are not necessarily applicable to typical urbanisation activities.

General risk

Developments where the land-use is changed, such as increasing the fraction of impervious areas, can result in increases to water quantity and changes water quality (specifically nutrient and gross pollutant loads in downstream stormwater networks and receiving waterways). The Project proposes to construct new impervious areas for the Project. This would increase the impervious area of the local catchment by approximately 1.38 ha.

To address water quality impacts arising from changes in pollutant loads, a conceptual stormwater quality treatment train was developed in accordance with typical Council pollutant reduction targets, noting that there are no specific targets published by Cessnock City Council for the area. The conceptual stormwater quality treatment train considers the implementation of an end of system gross pollutant trap (GPT). The conceptual stormwater quality treatment train was assessed in the E-Water software package, MUSIC, considering the proposed hardstand area of approximately 1.38 ha. Rainfall inputs to the MUSIC modelling were obtained from Cessnock Airport AWS (Station ID 061260), and potential evapotranspiration inputs were sourced from the SILO database for the grid point closest to the site (-32.70, 151.35).

One outlet is proposed, located in the south-west corner of the Project Area, conveying runoff from the pad. The outlet would flow into a proposed drainage channel (see Section 5.1.2.1) and discharge northwest towards Black Creek. A stormwater quality treatment train was developed and assessed to treat the four-exceedances per year (4-EY), 5-minute design storm (equating to approximately 22 L/s). The conceptual treatment train was developed for the management of typical urban pollutants including total suspended solids, nutrients and gross pollutants. The treatment train consists of:

– One GPT Ecoceptor with a capacity to manage total inflows > 24 L/s (or an equivalent product).
– One end of system bioretention basin approximately sized with the following dimensions and features:
  - Length of 15 m, width of 9 m and depth of 1 m (inclusive of a 0.5 m freeboard depth above the filter media) with side slopes of 1H:1V
  - Filter media consisting of sandy loam, with a filter depth of 0.5 m to allow for vegetation growth.
  - A lined base with underdrain provided.

This conceptual treatment train has been developed to demonstrate that typical Council pollutant reduction targets can be achieved. It is noted that alternative stormwater quality controls may be used if developed through detailed design and modelled to achieve the target reductions.

Results of the modelling are shown in Table 5.1, identifying that the conceptual stormwater treatment train is expected to achieve common Council pollutant load reduction targets. On this basis, the Project is not anticipated to result in adverse surface water quality impacts.

Table 5.1 Water quality treatment train effectiveness

Pollutant	Pre-treatment (kg/yr)	Post-treatment (kg/yr)	Typical Council reduction target (%)	Modelled reduction (%)
Total Suspended Solids	1,771.7	181.4	80%	90%
Total Phosphorus	2.82	0.85	45%	70%
Total Nitrogen	21.1	8.27	60%	61%
Gross Pollutants	282.0	0	90%	100%

Specific risks

Specific activities associated with the operation of the Project that may cause impacts to downstream waterways include the release of potential hazardous materials into downstream waterways. Potential mobilisation of materials into downstream waterways may occur either via direct flow of the material itself, through washing from rainfall derived runoff or from fire water. Once mobilised into downstream waterways, impacts to both flora and fauna are likely and would vary in terms of persistence and severity. These are assessed below.

– Handling of materials that pose enhanced water quality risks, should any accidental release occur, is anticipated to occur from time to time (i.e. hydrocarbons, fuel), as part of maintenance during the Project's operation. These are anticipated to pose a moderate risk to local water quality.
– As the battery and transformer units would be fully enclosed without the generation of leachate or other process wastewaters, these elements would pose a negligible risk to water quality. During any system failures, including fire; water would not be applied to the units and contaminated water would not be generated.

Potential operational phase water quality impacts may result in moderate localised impacts to receiving waterbodies, such as Black Creek. Mitigation measures are recommended to manage these impacts, outlined in Section 6.

5.3 Waterfront land

The Project is not located within waterfront land and no impacts to waterfront land as defined by the WM Act and *Water Management (General) Regulation 2025* are anticipated.

5.4 Groundwater

The primary mechanism for groundwater impacts during construction include excavation and the potential exposure of groundwater requiring water management. As identified in Section 4.9, the geotechnical investigation undertaken for the site was conducted following a period of heavy rainfall, and groundwater levels likely had not stabilised following this rainfall. Notwithstanding, groundwater levels during the geotechnical investigation varied between 0.8 and 4 mbgl, but were generally in the order of 1-2 mbgl. The Project involves some excavation works associated with stormwater works, realignment of a culvert and provision of a bioretention basin. Cabling works would be required to allow for connection to the existing Rothbury Zone Substation. Interception of groundwater may occur during the construction phase and require dewatering, particularly after periods of heavy rainfall. Mitigation measures for this impact are proposed, which are further discussed in Section 6.

Impacts to groundwater quality are generally not expected with appropriate management of surface water quality through the mitigation measures outlined in Section 6.

No impacts to groundwater are anticipated during the operational phase as no ongoing interaction with the subsurface is proposed.

5.5 Water supply

5.5.1 Construction

The site would require water for dust suppression, earthworks, and landscaping during the construction phase. An upper limit construction demand estimate was developed based on the daily average potential evapotranspiration excess at the site. The construction non-potable demand for the purposes of dust suppression and landscaping is in the order of 4.1 megalitres (ML) over the 22-month construction period. Construction water would be sourced externally through mains water or through a commercial supplier following detailed design and once construction staging is confirmed. Water would be imported to site via water tanker. With a typical tanker capacity of 15 kL, this would equate to less than one tanker per day on average over the whole construction period. Extraction from surface water or groundwater sources under WAL entitlement is not proposed.

Approximately 0.2 ML of potable water will be required for the construction workforce (at a peak of 100 staff). This will be supplied through mains connection or bottled water.

During detailed design and construction planning, construction water demands will be refined in accordance with the staging plan for the site. No impacts to surface or groundwater resources arising from supply are anticipated given the relatively minor quantities of water required during construction that would be sourced externally.

5.5.2 Operation

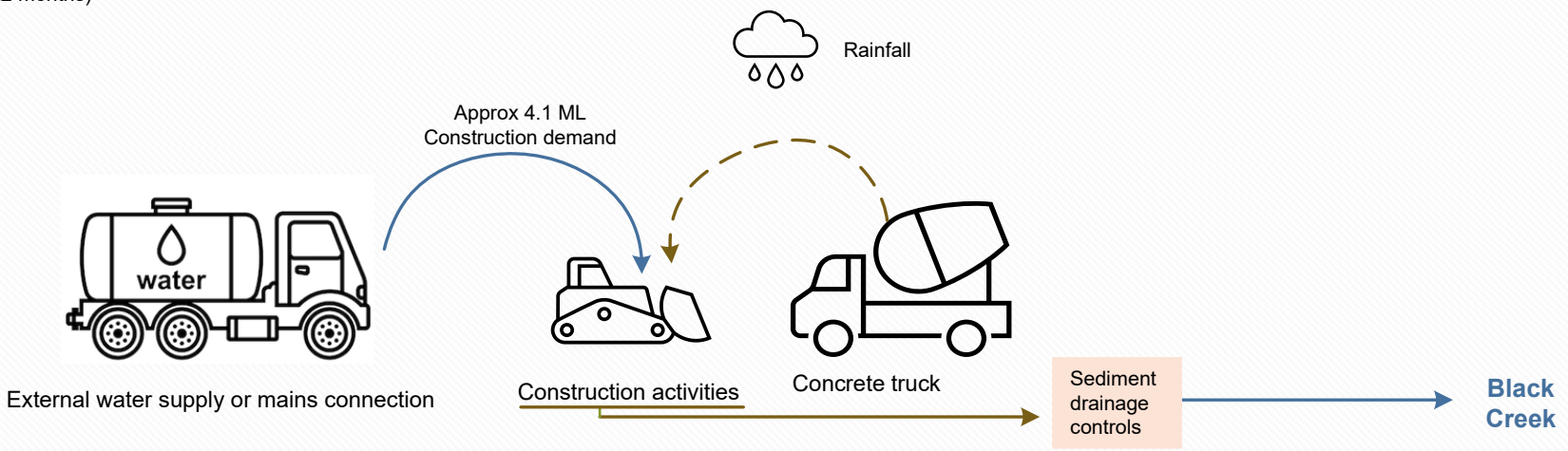
During operation, water will be stored and utilised for fire suppression and emergency management purposes. Any other water (e.g. for onsite amenities) will be sourced from the existing mains connection and anticipated to be approximately 120 kL per year. As connection to and use of mains water is proposed, no WALs or take from other onsite water resources will be required. Therefore, during operation, no impacts to surface or groundwater resources arising from water take would occur.

5.5.3 Water balance

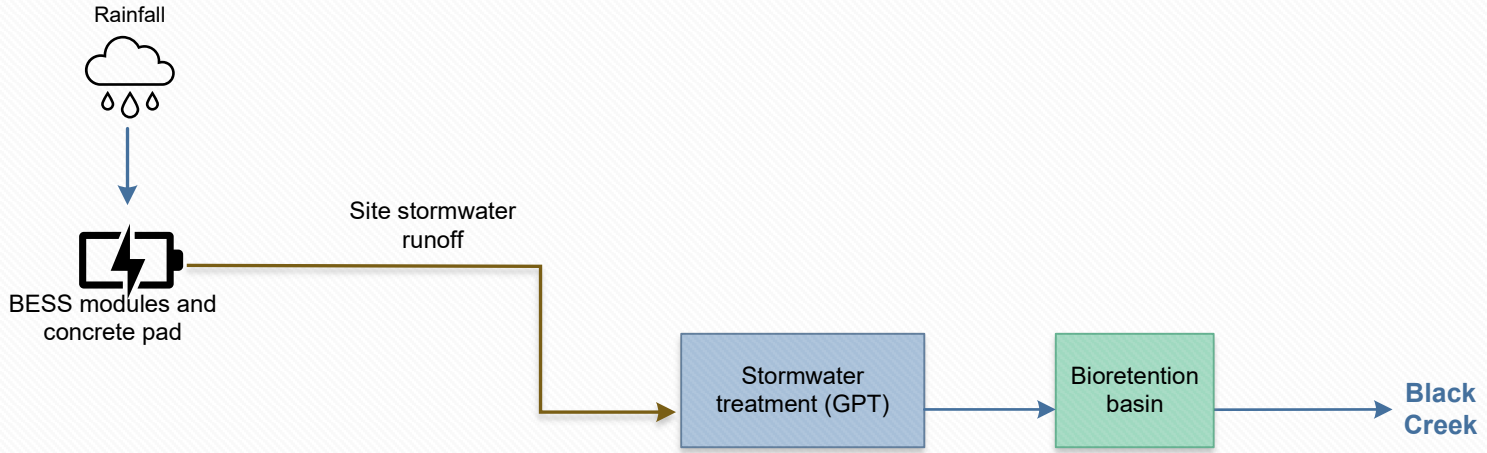
A conceptual site water balance identifying the demands, water uses and outflows of the different water types is presented in Figure 5.1.

Construction phase

(Approximately 22 months)



Operational Phase



Legend

- Clean water flow
- Dirty water flow
- Water entrained in material

GHD

Ausgrid Operator Partnership
Rothbury BESS
Water Impact Assessment

Site Water Balance

Project No. **12655502**
Revision No. **0**
Date **15/04/2026**

Figure 5.1

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5.6 Cumulative impacts

An issue-specific cumulative impact assessment has been undertaken, considering future projects located within the catchment of Black Creek. While the individual impacts of these projects may be minor, when they occur at the same time as the Project, they may result in material impacts on the receiving environment. A summary of identified future projects is included in Table 5.2 and is discussed below:

– For flooding, the impact assessment identified that no substantial changes in construction and operational phase flood conditions are anticipated and therefore cumulative impacts with other projects would be negligible.
– There is a risk of erosion and sediment impacts for all projects where earthworks or disturbances of soils are required. Where construction periods overlap, cumulative impacts to waterways may occur, which should be considered in construction-phase controls.

Overall, cumulative impacts are not anticipated to occur, however prior to construction, the SWMP should be updated or amended as required, considering nearby projects.

Table 5.2 Projects located within the Black Creek catchment

Project	Status	Location	Distance from site	Key element	Summary of assessment	Relevance to Project	Impact assessment
Sunshine Estate BESS (SSD-92914712)	Prepare EIS	1337 Wine Country Drive, Rothbury, NSW	Adjacent lot (0 km)	Flooding Water quality – construction phase	– Whilst the assessment for the project has not yet been undertaken, the Scoping Report notes that flood modelling would be undertaken to assess the potential for negative impacts on offsite flood behaviours (NGH Pty Ltd, 2025). Mitigation measures (if necessary) would be informed by this modelling. – Flood modelling undertaken for this Project indicates a reduction in flood levels and velocities for this site as a result of the proposed pad location (see Section 5.1.2.2) – Construction is currently proposed from February 2027 to February 2028.	– Located directly north of site. – Located directly downstream within Black Creek catchment	If the project is approved, there may be a cumulative impact on surface water quality due to potential overlap in construction periods.
Huntlee New Town Stage 1 (MP10_0137) Huntlee New Town Stage 2 (SSD-70748466) Huntlee Arcare Seniors Housing (SSD-54836993)	MP10_0137 Mod 25 – Prepare Mod Report SSD-70748466 – Assessment SSD-54836993 - Determination	Huntlee New Town (Branxton-North Rothbury)	Stage 1: approx. 3.9 km north-east Stage 2: 2.8 km north Arcare: 5.4km north-east	Flooding Water quality – construction phase	– Part of the Huntlee Stage 1 works are still in construction, with the latest Modification (Mod 25) involving a planned expansion of the Stage 1 project boundary. – It is noted in the flooding assessments conducted for the Stage 1 works (Mod 9- WorleyParsons, 2012) that downstream peak water levels and flows were limited to below existing conditions during the 1% AEP, including a climate change scenario involving a 10% increase in rainfall intensity. Later modelling by Northrop demonstrated that there would be no adverse flood impact expected for the downstream Northern Railway Embankment (Northrop, 2021). The latest modelling (undertaken for Mod 21) determined that with the provision of onsite detention, no significant adverse impact on flood behaviour will occur during the regional flood event (Northrop, 2022). – Stage 2 of the Huntlee New Town works (SSD 54836993) is to assess flooding and modelling undertaken for the 10%, 1% and PMF events, with mitigation measures to be provided to minimise impacts of flooding. – The Huntlee Arcare Seniors Housing (SSD-54836993) development is located above the PMF level and as such expected to have no downstream impact on regional flooding (Lanigan Civil, 2024).	– Significant new urban release area downstream of the Project, within the same catchment of Black Creek.	No cumulative flood impact anticipated, as regional flood impacts have been modelled to be effectively mitigated with the provision of onsite detention (Northrop, 2022). There may be a cumulative impact on surface water quality due to potential overlap in construction periods.

6. Mitigation measures

6.1 Construction

As outlined in Section 5.2.1, the disturbance of soils and handling of hazardous materials would occur during construction. As noted in Section 5.4, there is a risk that groundwater may be intercepted during excavation works associated with the Project.

Additionally, as noted in the cumulative impact assessment undertaken in Table 5.2, construction periods for the Sunshine Estate BESS and Huntlee urban release area (including modifications to the Stage 1 works, Stage 2 and Huntlee Arcare Seniors Housing projects) may overlap with the construction phase of the Project. These concurrent projects may impact downstream water quality.

Complete elimination of water quality risks for all rainfall events during construction is not feasible since disturbance of soils for the Project is unavoidable and inherent to the proposed activities. A detailed Construction Environmental Management Plan (CEMP) would be prepared and implemented for the Project. The CEMP would contain environmental control measures and a detailed Soil and Water Management Plan (SWMP). It would also contain measures to manage the handling of and interactions with any dewatered groundwater during construction.

The SWMP would outline the implementation of erosion and sediment control measures in accordance with the Blue Book (Landcom 2004), a key resource for the design and construction of stormwater management. It is expected that erosion and sediment controls would be installed in accordance with *Managing Urban Stormwater: Soils and construction – Volume 2A manual* (DECC 2008). Specific controls that are applicable to the Project would be included in the SWMP, including:

– Minimising the risk of erosion and sedimentation, with a priority on minimising the extent and duration of disturbance. Disturbed areas should be vegetated and stabilised as soon as practicable to do so.
– Handling of soils, including the management of unexpected finds of contaminated materials.
– Handling of hazardous materials and procedures to manage spills to reduce and address soil and water contamination, including fuel storage and management of transformer oils.
– Emergency response procedures during flood conditions.
– Consideration of nearby projects and monitoring of conditions upstream and downstream during any overlapping construction periods.

Prior to any soil disturbance or activities that pose a water quality risk during construction, drainage and other erosion sediment and environmental controls would first be implemented, in accordance with the SWMP.

The risk of groundwater interception would be assessed during detailed design and prior to construction.

6.2 Operation

Operational phase impacts associated with water should be managed as part of the detailed design of the Project as well as considered as part of Ausgrid's environmental procedures for the site.

6.2.1 Detailed design

The management of stormwater quantity and quality should be considered as part of the detailed design of the Project. The detailed design of the stormwater management system would be undertaken following Project approval and should include the following:

– Confirmation through water quality modelling that the typical Council pollutant reduction requirements specified in this report can be met.

– Confirmation that the proposed stormwater drainage layout and sizing of the proposed drainage and water quality infrastructure to ensure the appropriate management of flood and storm waters. This should include measures to avoid scour and erosion at discharge points in events up to the 1 in 10 AEP.
– Confirmation that the outcomes of the flood assessment presented in this report continue to be met. This should include quantitative re-simulation of flood models if the design includes variations to configurations or features than what was assessed in this impact assessment.

6.2.2 Environmental procedures

It is recommended that operational controls relevant to water are included in a new site-specific Operational Environment Management Plan (OEMP). The relevant document should include the following measures relevant to water:

– Procedures to maintain drainage features at the site, including open channels, culverts, water quality controls (bioretention basin and GPT) and all pits and outlets. These should be maintained in accordance with the manufacturer's specifications and kept free-draining.
– Identifying procedures to appropriately handle hazardous materials such that they can be contained within the site. Specified responses to a pollution incident should be documented for the unlikely event that hazardous materials are conveyed outside of the site boundary.
– Outlining responses for personnel that may be onsite during flood events. This should consider the Australian Government Business emergency management plan template (business.gov.au) to help protect operations before, during and after an emergency.

With implementation of the mitigation measures as described above, no residual impacts from the Project during the operational phase are anticipated.

7. Conclusion

A Water Impact Assessment has been prepared to address the impacts associated with the Project, as required by the SEARs. The report outlines the existing environment and assesses potential impacts related to water quality, flooding, groundwater and water supply. The assessment and mitigation measures are summarised below:

– Minor impacts associated with changes to water quality during the construction phase associated with erosion and sedimentation as well as the handling of hazardous materials. This risk may be exacerbated during times of flood or during overlapping construction projects at nearby lots. Recommended mitigation measures include developing a Soil and Water Management Plan in accordance with the Blue Book, and with consideration for emergency response during times of flooding for the construction phase. This plan will include documenting environmental procedures for the operation of the Project relevant to handling of hazardous materials. It would also contain measures to manage the handling of and interactions with any dewatered groundwater during construction.
– Potential minor impacts during the operational phase of the Project associated with changes to water quality arising from a change in land-use and additional impervious areas. Water quality modelling undertaken indicated that typical Council guidelines for urban water quality could be achieved as part of the design of the facility and no resulting impacts were anticipated. No additional mitigation measures were identified as being required. During operation, environmental procedures should be documented to maintain relevant water quality infrastructure.
– Potential minor impacts during the operational phase of the Project associated with changes to water quality arising from potential mobilisation of contaminants associated with the use of hazardous materials (e.g. fuels, oils). Mitigation measures include procedures for the appropriate handling and containment of hazardous materials onsite (including response to a pollution incident), to be specified in the site OEMP.
– Potential changes to off-site flood conditions were identified to be minor and in areas with no receptors. The design measures included in the modelling, including the provision of additional drainage infrastructure, the realignment of existing culverts and the design level stipulated for the pad (set to the 1% 2080 SSP5-8.5 peak flood level + freeboard) indicated that impacts could be appropriately managed. Detailed design of the Project should confirm these outcomes and consider flood behaviour during the PMF. During operation, environmental procedures should be documented to maintain relevant stormwater infrastructure and identify responses during flood events.

Other impacts associated with groundwater and water supply were not anticipated and accordingly no mitigation measures were identified. A search of nearby projects was reviewed and identified that whilst there are several projects within the catchment with overlapping construction phases as this Project, cumulative impacts would be able to be minimised using standard erosion and sediment controls, and a hazardous material handling procedures outlined in the Blue Book (Landcom, 2004). As a result, no significant cumulative impacts to Black Creek are anticipated to arise from the Project.

With the implementation of the above measures, the Project is not anticipated to result in material impacts to water resources.

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Appendices

Appendix A

Local flood modelling methodology

This appendix provides technical details surrounding the development of the local (overland) flood model developed in TUFLOW, referenced in the assessment of existing flooding conditions (Section 4.7) and flood impact assessment for the development (Section 5.1).

Details surrounding the model set-up and assumptions are outlined in the following sections.

A-1 Model layout

A two-dimensional (2D) rain-on-grid TUFLOW model was developed for the EIS flood assessment, to model both existing flooding conditions at the site as well as the design case with a site layout provided by Ausgrid (Figure A.1). Flood modelling was used to inform the selection of a design pad level to provide flood immunity in the 1% 2080 SSP5-8.5 event.

The existing substation building to the east was also raised to reflect the obstruction of flows by this building.



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1:5,000 @ ISO A3
0 100 200
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Rothbury BESS
Water Impact Assessment

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Modelled pad levels

FIGURE A.1

\\ghdnet\ghd\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\Rothbury\12655502_Roth_WIA.aprx\12655502_R006_ModelledPadLevels
Print date: 15 Apr 2026 - 15:40

Data source: GHD, 2026: Project site, Pad, Elevation. NSWSS, 2025: Suburb, Cadastre, Road. Nearmap WMS Server: Extracted on 15/04/2026.
Created by: Imanasan

A-1-1 Representation of pad

Battery units would be positioned on a pad which provides a freeboard of 500mm above the approximate 1% AEP flood level at the site for the end of its operational life (2080) conservatively assuming a worst-case climate change scenario with minimal climate interventions. This corresponds to the 1% AEP under SSP5-8.5 in the year 2080.

A-1-2 Representation of proposed drainage

The representation of existing drainage was informed by survey data provided by Ausgrid and is represented in Figure A.2.

Regarding the proposed drainage infrastructure, a drainage channel is proposed south of the pad to convey flows that would otherwise pond between the pad and Old North Road. This drainage channel was modelled as an open, trapezoidal channel aligned directly south of the pad from the outlet of the twin-barrelled culverts underneath the existing access road to the site. The drainage channel travels to the south-west corner of the Project Area where it then travels north-west. The grass-lined channel would discharge flows onto the grassed area flowing down towards Black Creek. The length of the drainage channel is approximately 230m, with a top width of approximately 4m. The alignment of this channel is displayed in Figure A.3.

In addition to this, another drainage channel was proposed in order to replace the existing 0.15m diameter culvert that discharges flows from underneath the existing substation onto the area where the pad is proposed. This second drainage channel was also modelled as an open, trapezoidal channel with top width of approximately 4m, roughly parallel to the access road. It would direct flows from between the existing substation and proposed pad into the twin-barrelled culverts under the access road and into the first drainage channel.

Another existing culvert to the north currently discharges flows from underneath the existing substation into a farm dam that is currently located where the pad is proposed. This farm dam was removed in the design case, and the culvert was realigned to discharge north of the pad. All other features of the existing culvert were retained.



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1:5,000 @ ISO A3

0 100 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

Ausgrid
Rothbury BESS
Water Impact Assessment

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Existing case drainage configuration

FIGURE A.2

\\ghdnet\ghd\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\Rothbury\12655502_Roth_WIA.aprx\12655502_R007_ExistingCaseDrainageConfiguration
Print date: 15 Apr 2026 - 15:38

Data source: GHD, 2026: Project site, Pad, Drainage. NSWSS, 2025: Suburb, Cadastre, Road. Nearmap WMS Server: Extracted on 15/04/2026.
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1:5,000 @ ISO A3

0 100 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

Ausgrid
Rothbury BESS
Water Impact Assessment

Development case drainage configuration

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

FIGURE A.3

\\ghdnet\ghd\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\Rothbury\12655502_Roth_WIA.aprx\12655502_R008_DevelopmentCaseDrainageConfiguration
Print date: 15 Apr 2026 - 15:32

Data source: GHD, 2026: Project site, Pad, Drainage. NSWSS, 2025: Suburb, Cadastre, Road. Nearmap WMS Server: Extracted on 15/04/2026.
Created by: Imanasan

A-2 Boundary conditions

Boundary conditions were adopted for three locations in the model, detailed below.

A-2-1 Wine Country Drive boundary condition

A boundary condition was added along the southern boundary of the model domain, including perpendicular to Wine Country Drive, to prevent the inaccurate accumulation of flows within the model domain where they should instead flow towards Black Creek or south of the site. This boundary condition was specified as a HT (head v.s. time) boundary, with a constant head specified to be lower than the topography within the model domain to allow outflow to occur.

A-2-2 Black Creek and northern floodplain boundary conditions

Additionally, boundary conditions were added to the downstream extent of Black Creek (northern boundary of the model domain) and across the northern extent of the floodplain. These boundary conditions were configured as HQ (water level v.s. flow) boundaries to allow outflows from the model and prevent the inaccurate accumulation of flows downstream. A stage-discharge curve was automatically generated within TUFLOW via the specification of the approximate slope based on topographical information for these two boundary conditions.

A-3 Model domain extent

The 2D rain-on-grid TUFLOW model boundary extent was determined via analysis of the surrounding topography of the site, both through review of publicly available LiDAR and survey data, and potential flow routes. The model boundary extent was informed by delineation of the local catchment draining to Black Creek, with the model domain extent mapped in Figure A.4.



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1:8,000 @ ISO A3

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

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Water Impact Assessment

Tuflow model boundary extent

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

FIGURE A.4

\\ghdnet\ghd\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\Rothbury\12655502_Roth_WIA.aprx\12655502_R009_TuflowModelBoundaryExtent
Print date: 15 Apr 2026 - 15:41

Data source: GHD, 2026: Project site, Pad, Model boundary. NSWSS, 2025: Suburb, Cadastre, Road. Nearmap WMS Server: Extracted on 15/04/2026.
Created by: Imanasan

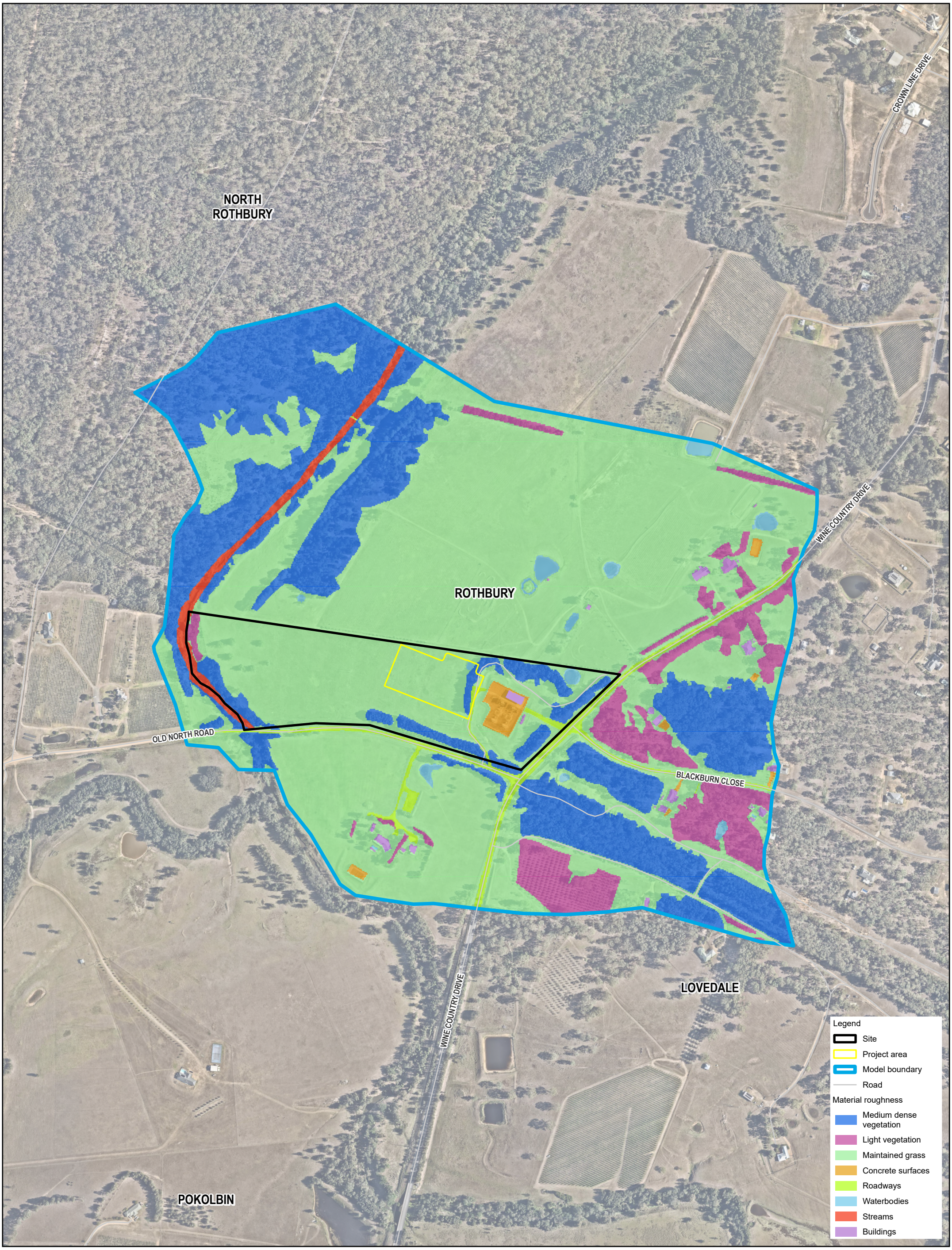
A-4 Material roughness

The material roughness values for the existing and design cases were configured to reflect the surface, vegetation and condition of the land within the model boundary. The following categorisation and roughness values were used across the model domain, stated in Table 8.1. This categorisation was also overlain over existing roughness categorisation for finer precision in the regional TUFLOW model.

The existing scenario model was categorised by surface type according to available aerial imagery sourced from Nearmap (2025), delineated as shown in Figure A.5. The material roughness categorisation for the development scenario model is shown in Figure A.6. This was also used in the regional model for consistency.

Table 8.1 Material roughness values used in TUFLOW model

Surface type	Mannings roughness
Dense vegetation	0.070
Medium dense vegetation	0.060
Light vegetation	0.050
Maintained grass	0.040
Short grass with isolated trees	0.030
Concrete surfaces	0.016
Roadways	0.025
Waterbodies and streams	0.030
Buildings	3.000



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1:6,000 @ ISO A3

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

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Ausgrid
Rothbury BESS
Water Impact Assessment

Material roughness categorisation (existing)

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

FIGURE A.5

\\ghdnet\ghd\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\Rothbury\12655502_Roth_WIA.aprx\12655502_R010_Existing_MaterialRoughness
Print date: 15 Apr 2026 - 15:32

Data source: GHD, 2026: Project site, Pad, Model boundary, Material roughness. NSWSS, 2025: Suburb, Cadastre, Road. Nearmap WMS Server: Extracted on 15/04/2026.
Created by: Imanasan

NORTH ROTHBURY

ROTHBURY

LOVEDALE

POKOLBIN

CROWN LINE DRIVE

WINE COUNTRY DRIVE

OLD NORTH ROAD

BLACKBURN CLOSE

WINE COUNTRY DRIVE

Legend

- Site
- Project area
- Model boundary
- Road

Material roughness

- Medium dense vegetation
- Light vegetation
- Maintained grass
- Concrete surfaces
- Carpark
- Roadways
- Waterbodies
- Streams
- Buildings

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1:6,000 @ ISO A3

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

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Rothbury BESS
Water Impact Assessment

Material roughness categorisation (design)

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

FIGURE A.6

\\ghdnet\ghd\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\Rothbury\12655502_Roth_WIA.aprx\12655502_R011_Design_MaterialRoughness
Print date: 15 Apr 2026 - 15:41

Data source: GHD, 2026: Project site, Pad, Model boundary, Material roughness. NSWSS, 2025: Suburb, Cadastre, Road. Nearmap WMS Server: Extracted on 15/04/2026.
Created by: Imanasan

Appendix B

Local (overland) flood mapping

Legend

- Site Boundary
- Cadastre

Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

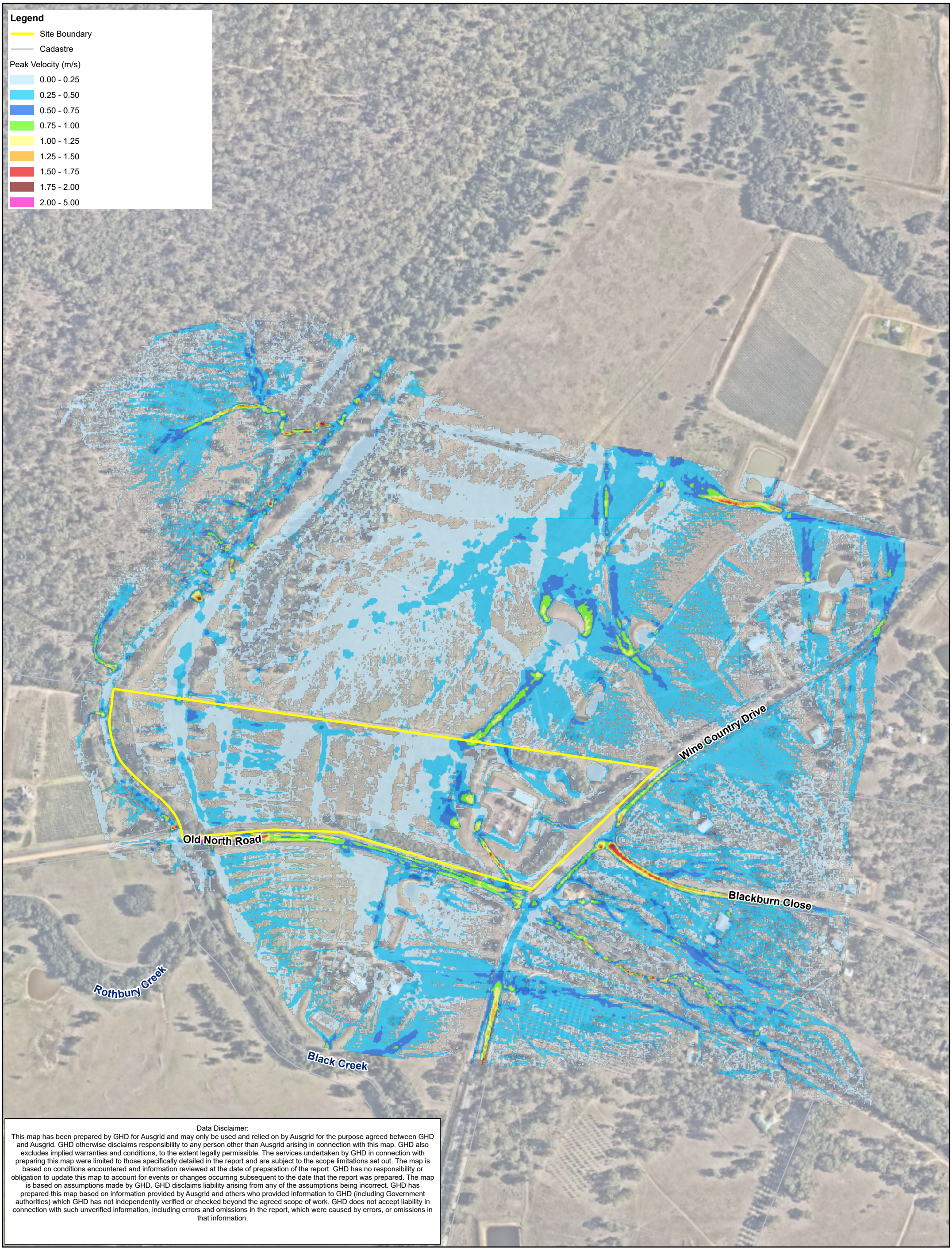
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Flood Extent and Depth
5% AEP 2030 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A001

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:11

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Peak Velocity
5% AEP 2030 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A002

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:11

Data source: Nearmap WMS Server:
Created by: obourke

Legend

- Site Boundary
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Hydraulic Hazard
5% AEP 2030 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A003

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:11

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

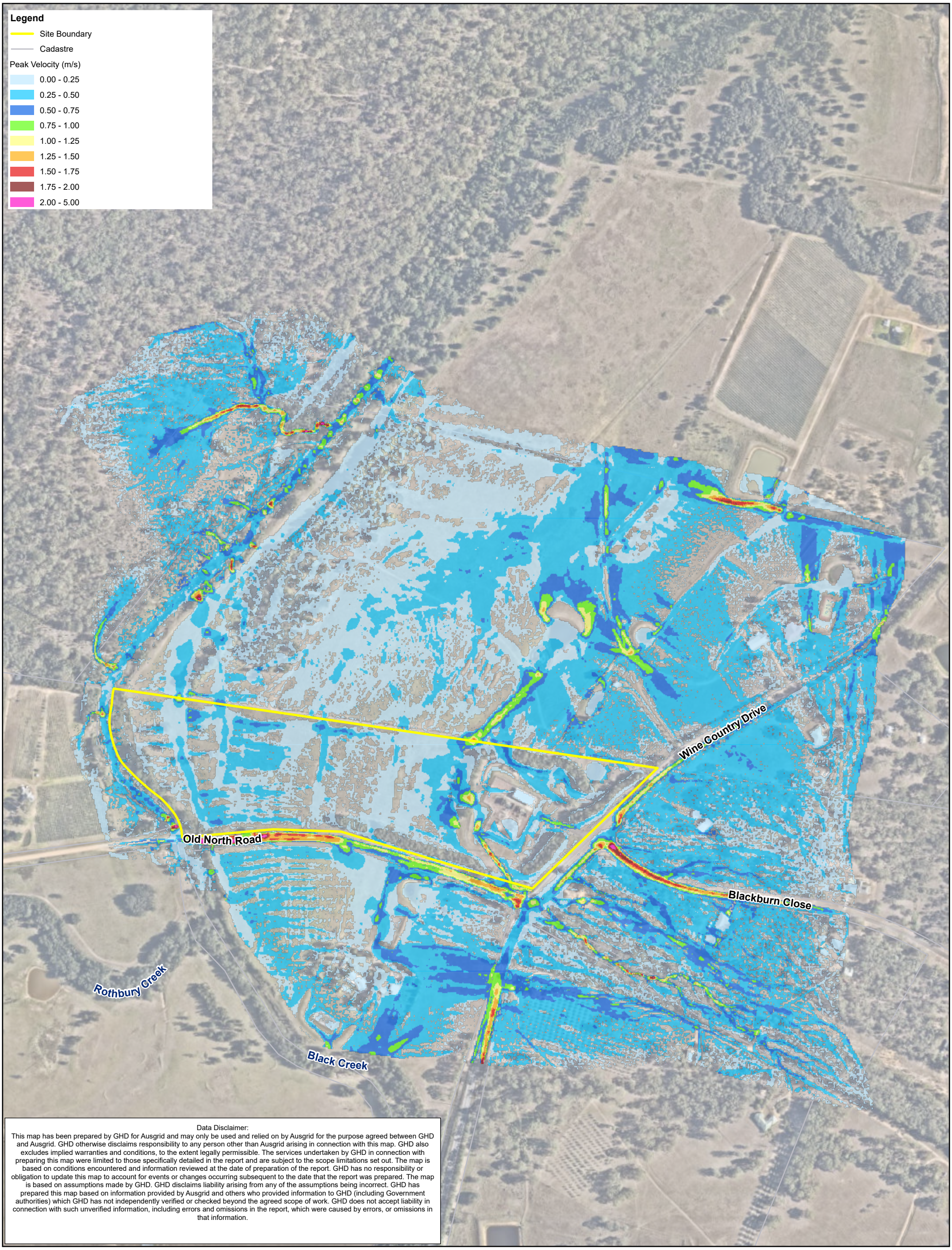
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Flood Extent and Depth
1% AEP 2030 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A004

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:11

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Peak Velocity
1% AEP 2030 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A005

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Print date: 15 Apr 2026 - 21:11

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Hydraulic Hazard
1% AEP 2030 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A006

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:11

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Flood Extent and Depth
1% AEP 2080 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A007

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:11

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Peak Velocity (m/s)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 5.00

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Peak Velocity
1% AEP 2080 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A008

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:11

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Hydraulic Hazard
1% AEP 2080 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A009

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

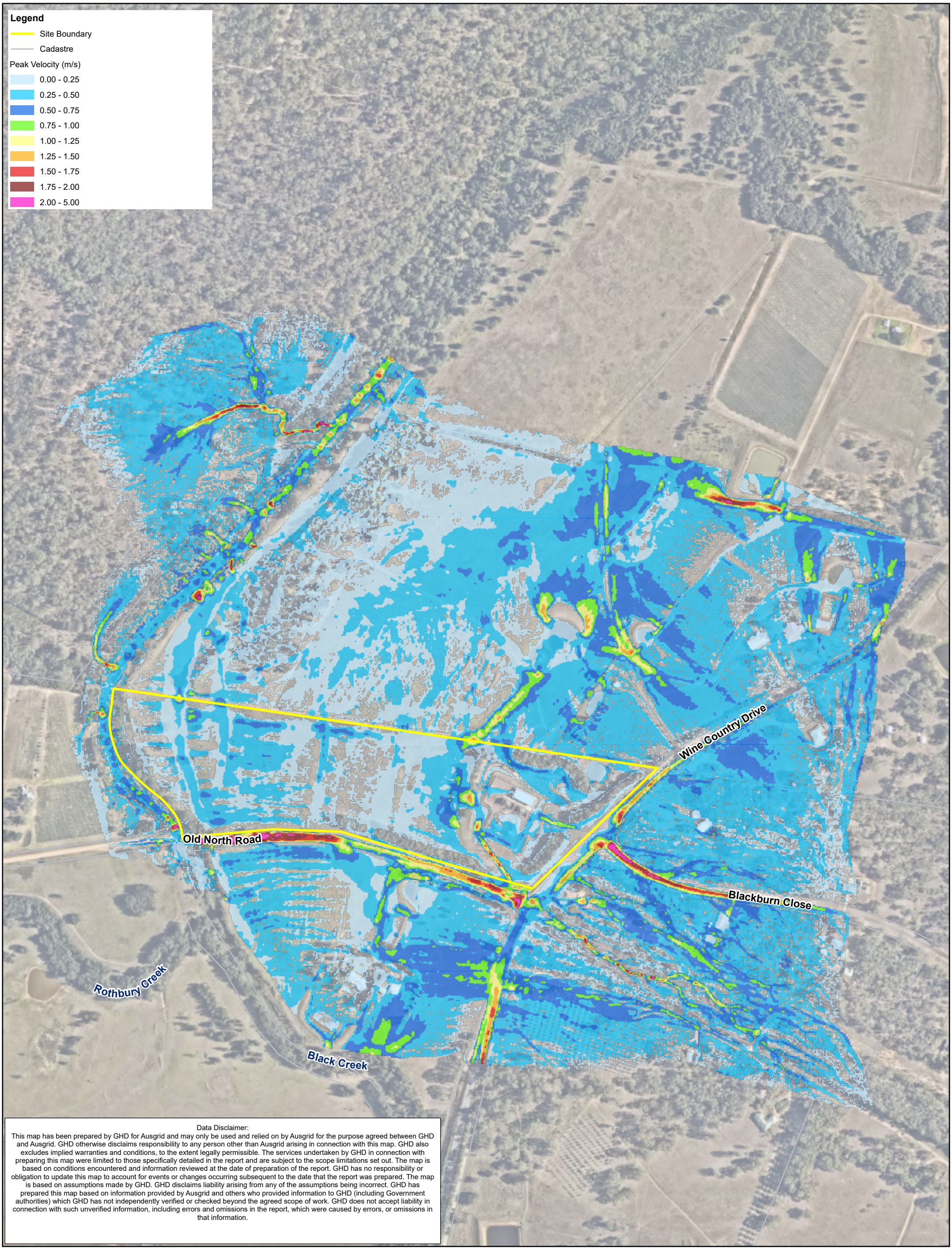
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Flood Extent and Depth
1% AEP 2080 SSP5-8.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A010

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

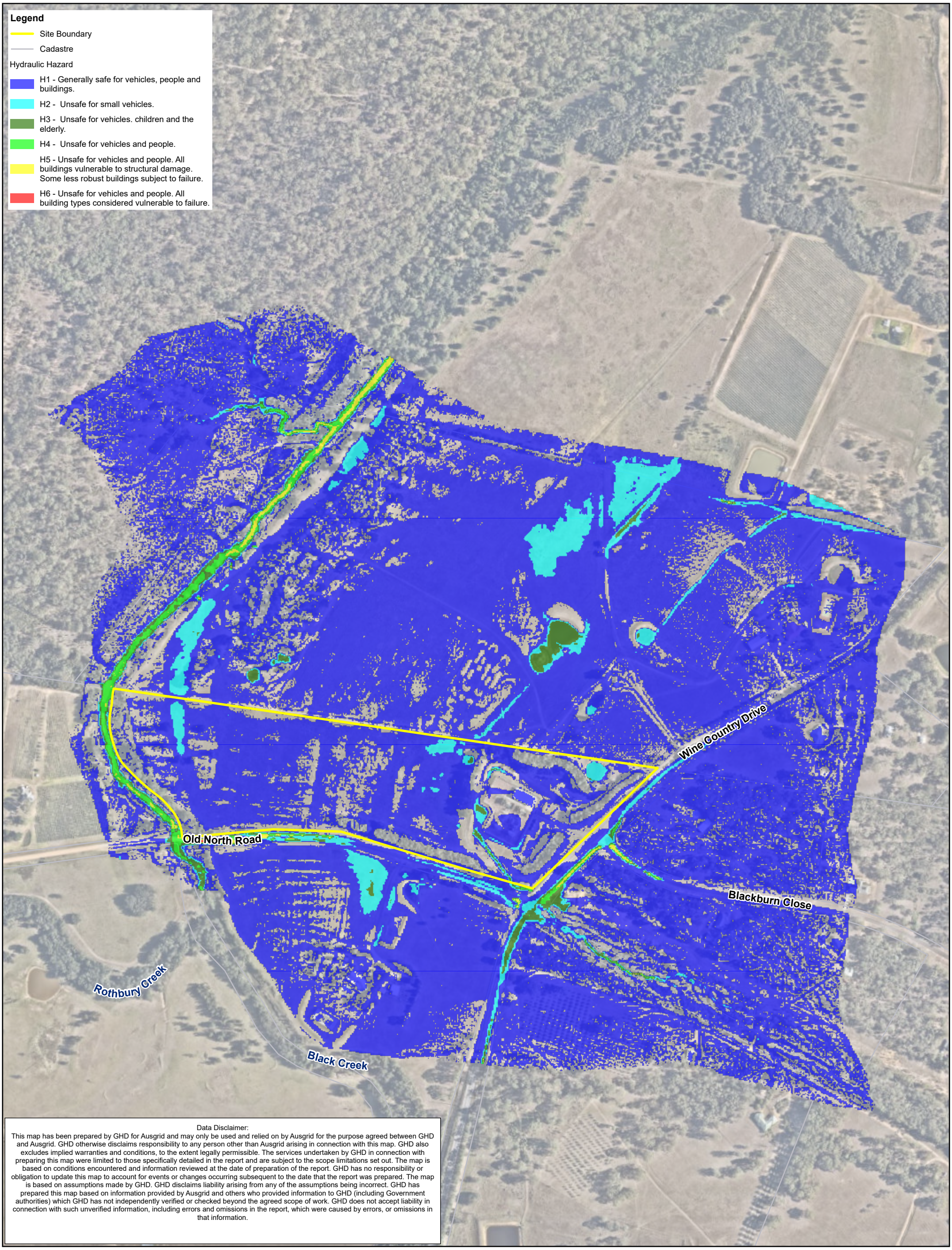
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Peak Velocity
1% AEP 2080 SSP5-8.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A011

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server: .
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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Hydraulic Hazard
1% AEP 2080 SSP5-8.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A012

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

Black Creek

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

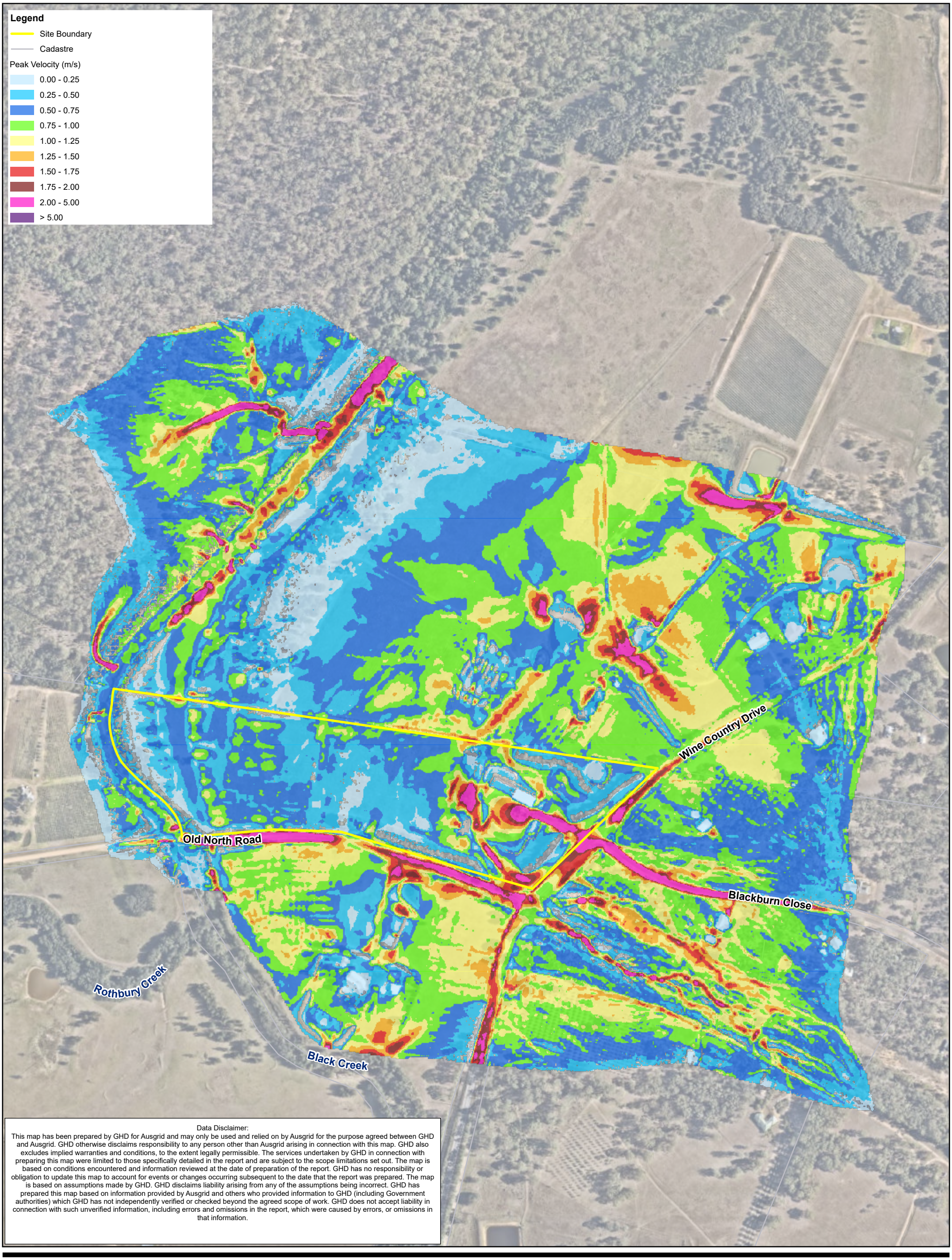
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Flood Extent and Depth
PMF 2080 SSP5-8.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A013

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Peak Velocity
PMF 2080 SSP5-8.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A014

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

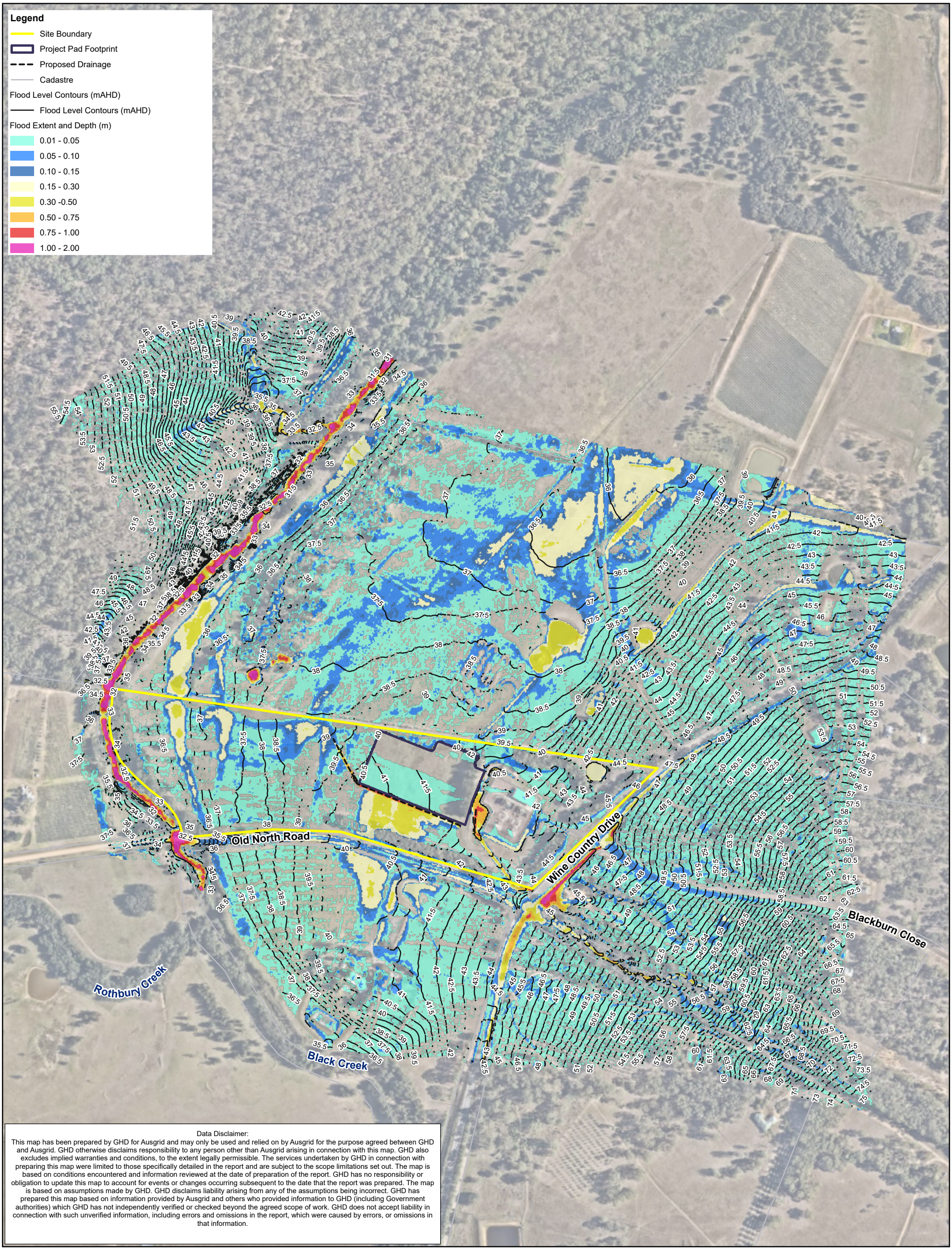
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Pre-Development - Hydraulic Hazard
PMF 2080 SSP5-8.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure A015

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

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1:4,750 @ ISO A3
0 60 120
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

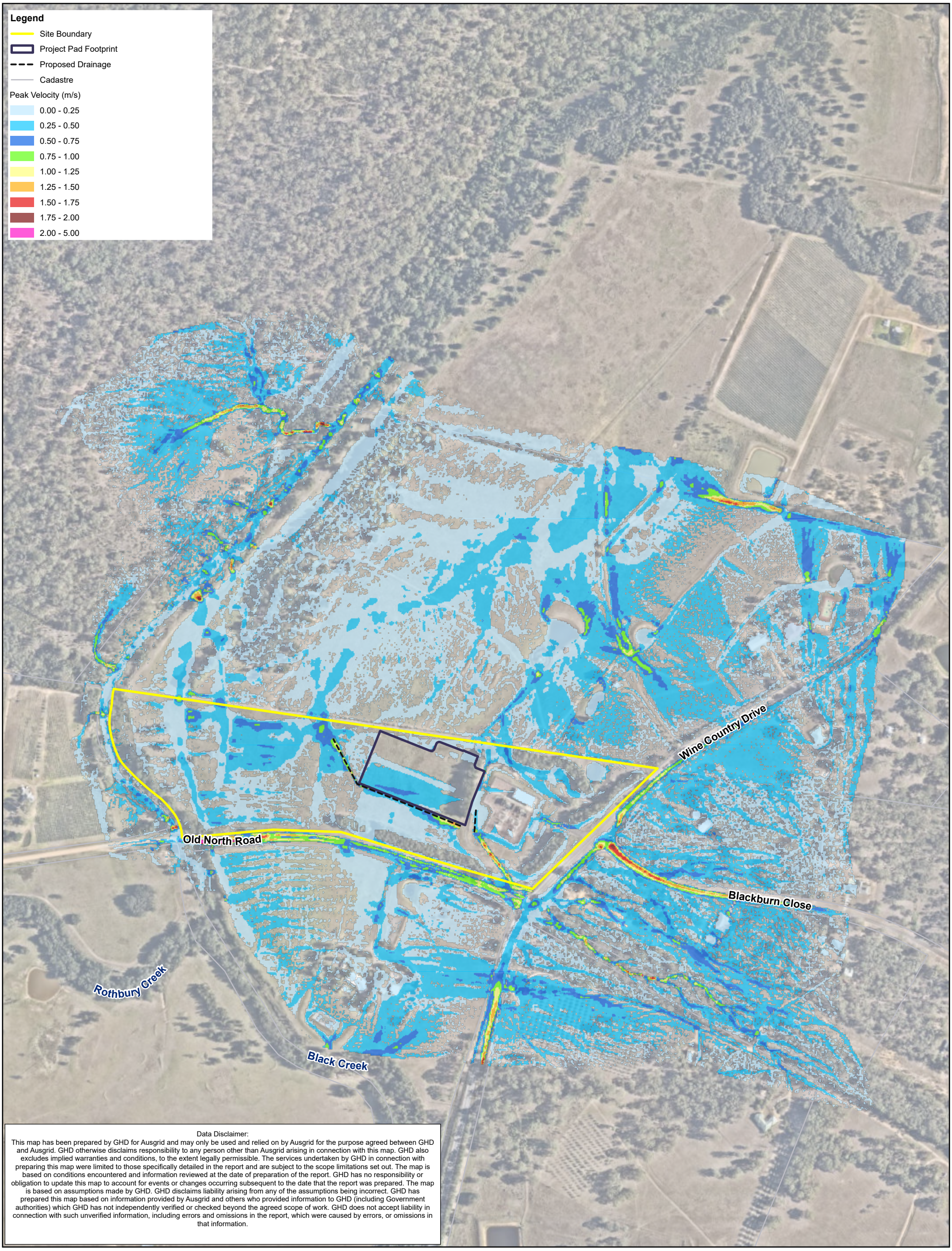
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Flood Extent and Depth
5% AEP 2030 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B001

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server: .
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1:4,750 @ ISO A3
0 60 120
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Peak Velocity
5% AEP 2030 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B002

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server:
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Hydraulic Hazard
5% AEP 2030 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B003

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Flood Level Contours (mAHD)

- Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

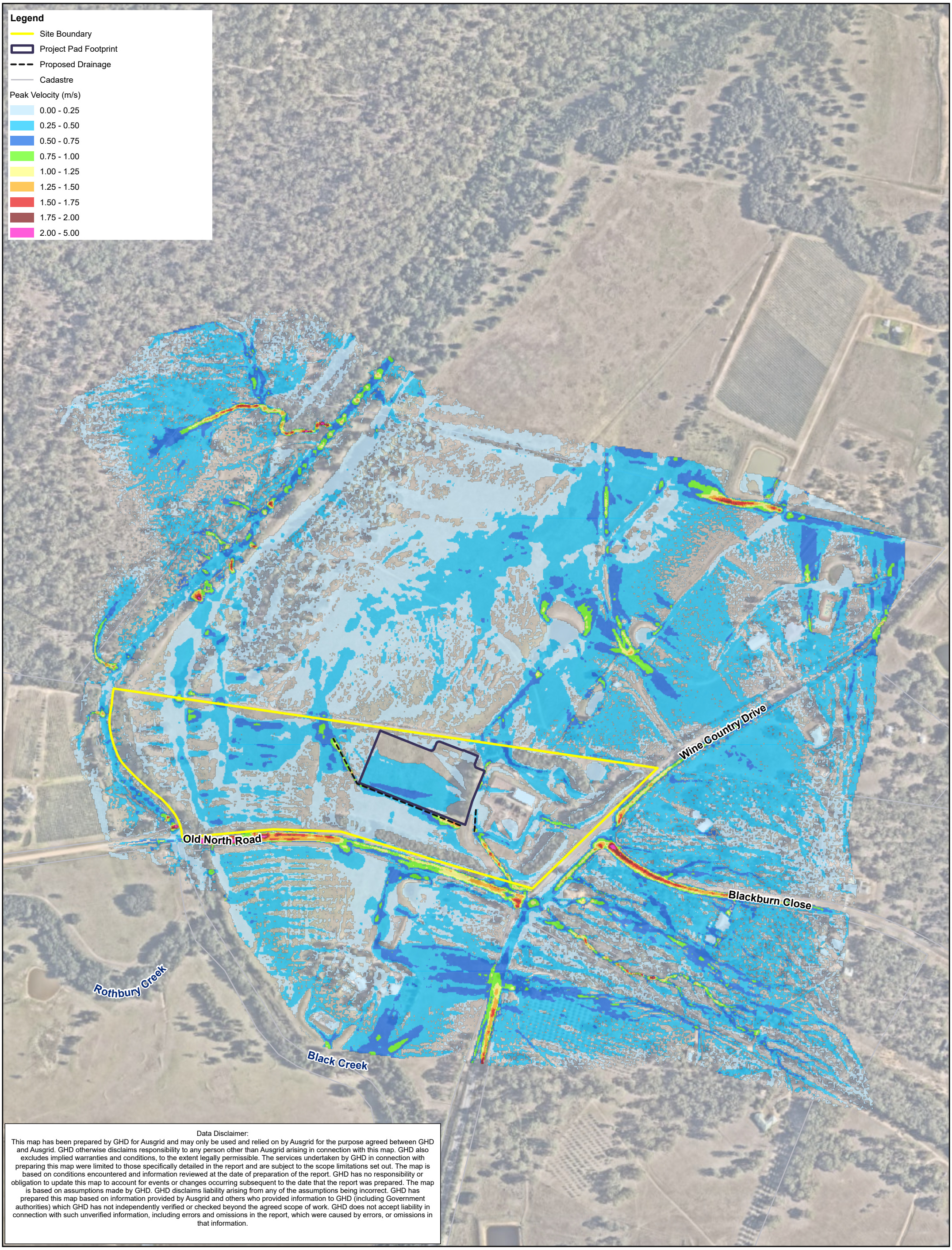
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Flood Extent and Depth
1% AEP 2030 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B004

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:12

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Peak Velocity
1% AEP 2030 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B005

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

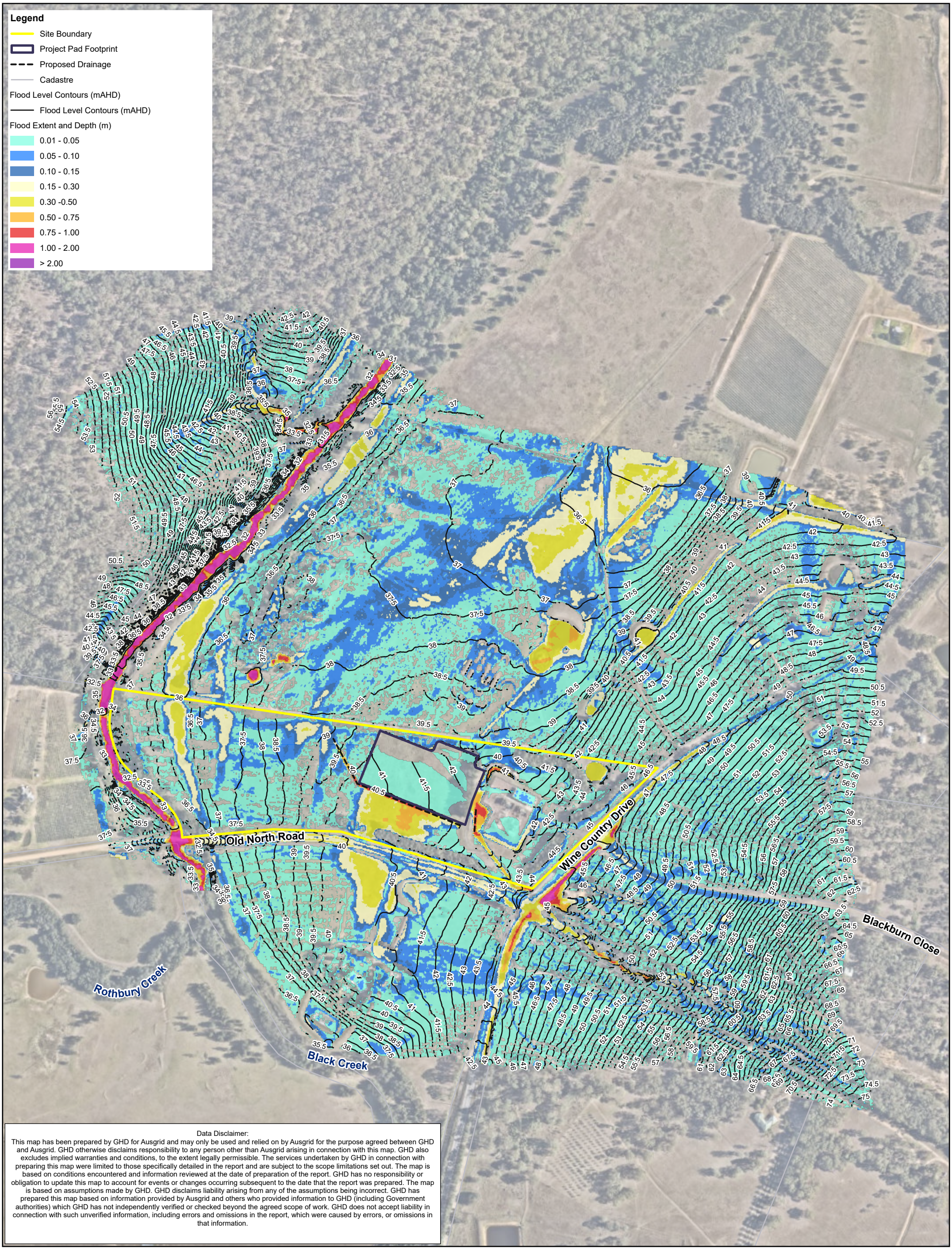
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Hydraulic Hazard
1% AEP 2030 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B006

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3
0 60 120
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

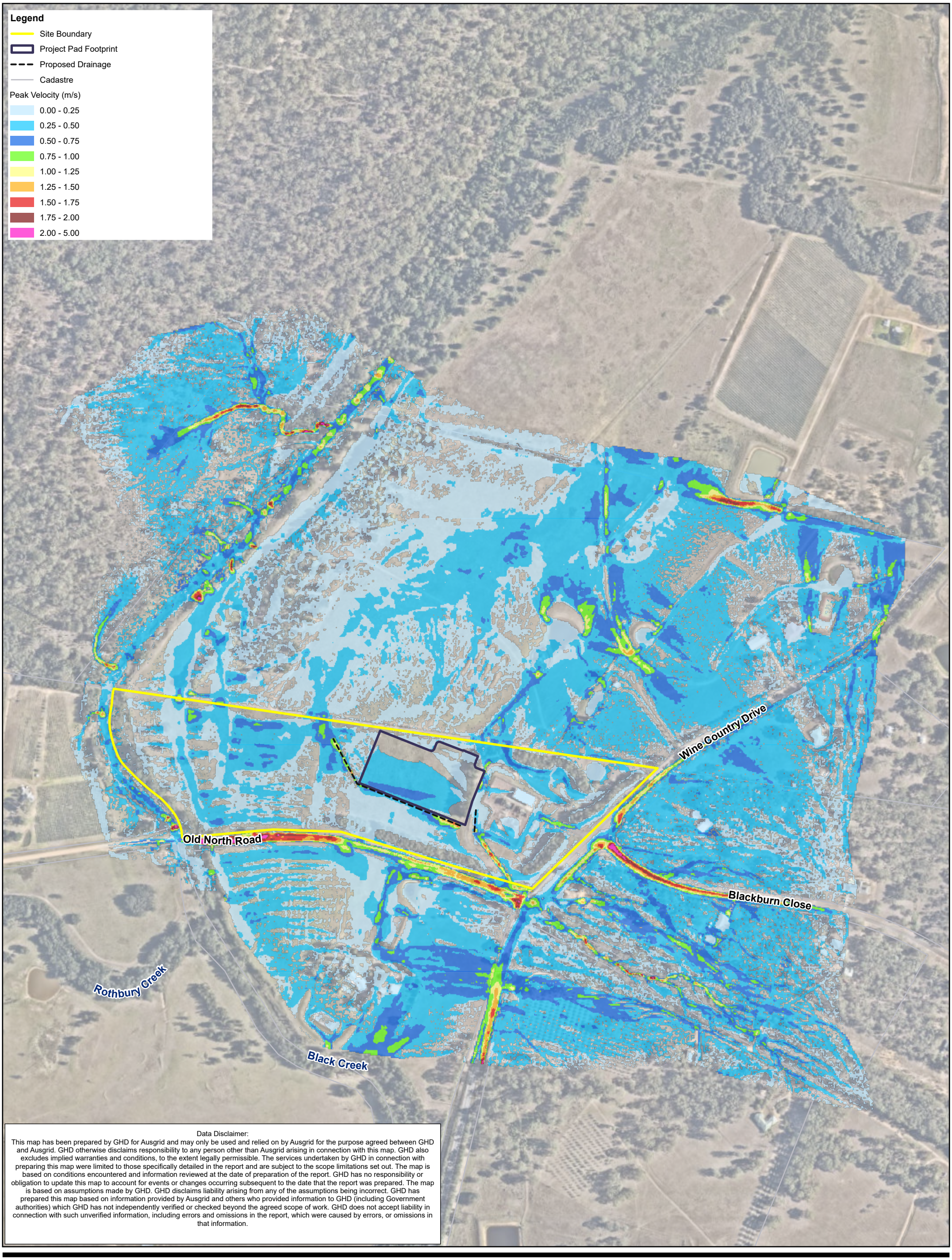
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Flood Extent and Depth
1% AEP 2080 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B007

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Peak Velocity
1% AEP 2080 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B008

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Hydraulic Hazard
1% AEP 2080 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B009

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Flood Level Contours (mAHD)

- Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Flood Extent and Depth
1% AEP 2080 SSP5-8.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B010

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Peak Velocity (m/s)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 5.00

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Peak Velocity
1% AEP 2080 SSP5-8.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B011

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Hydraulic Hazard
1% AEP 2080 SSP5-8.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B012

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Flood Level Contours (mAHD)

- Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

Black Creek

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

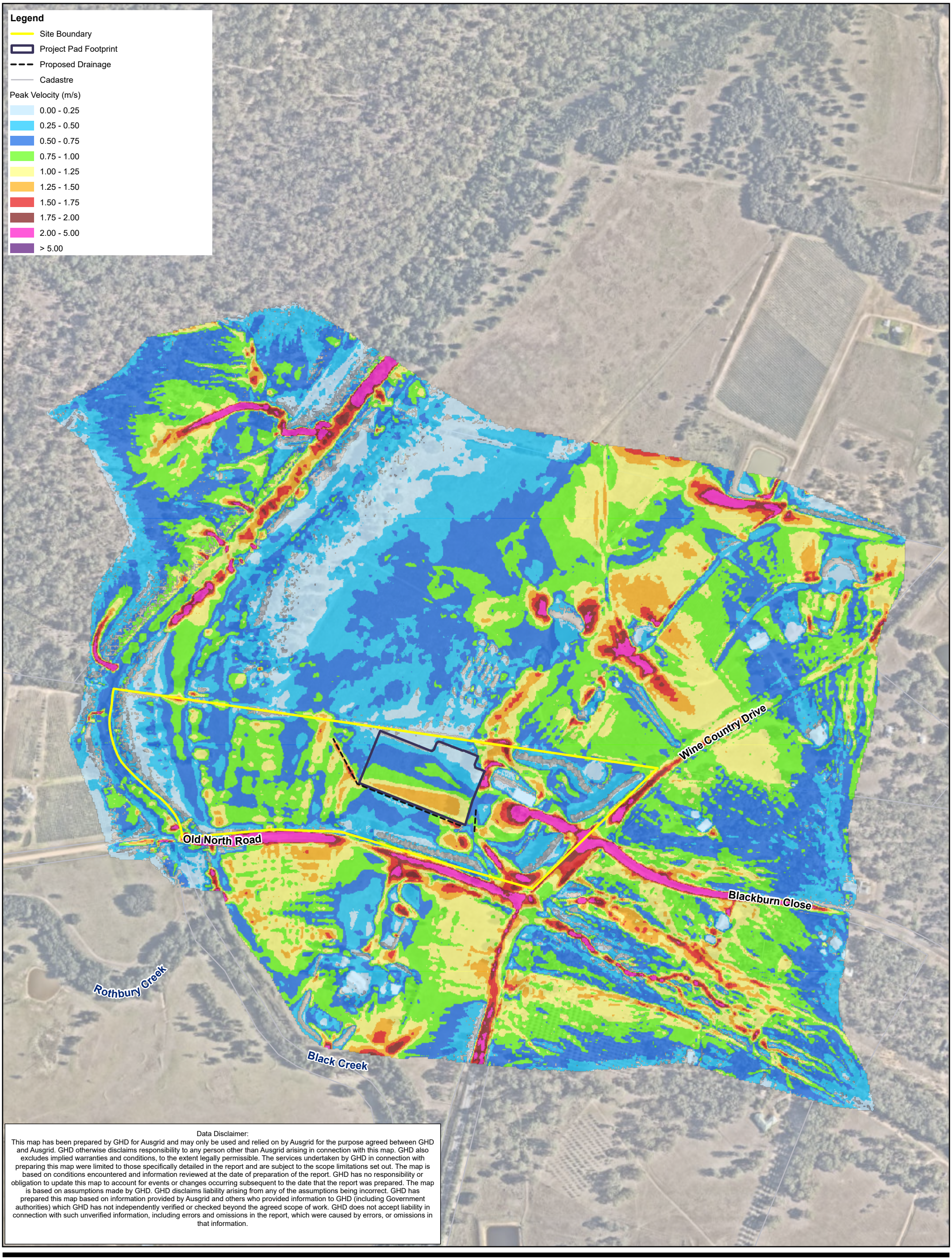
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Flood Extent and Depth
PMF 2080 SSP5-8.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B013

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Peak Velocity
PMF 2080 SSP5-8.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B014

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:13

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

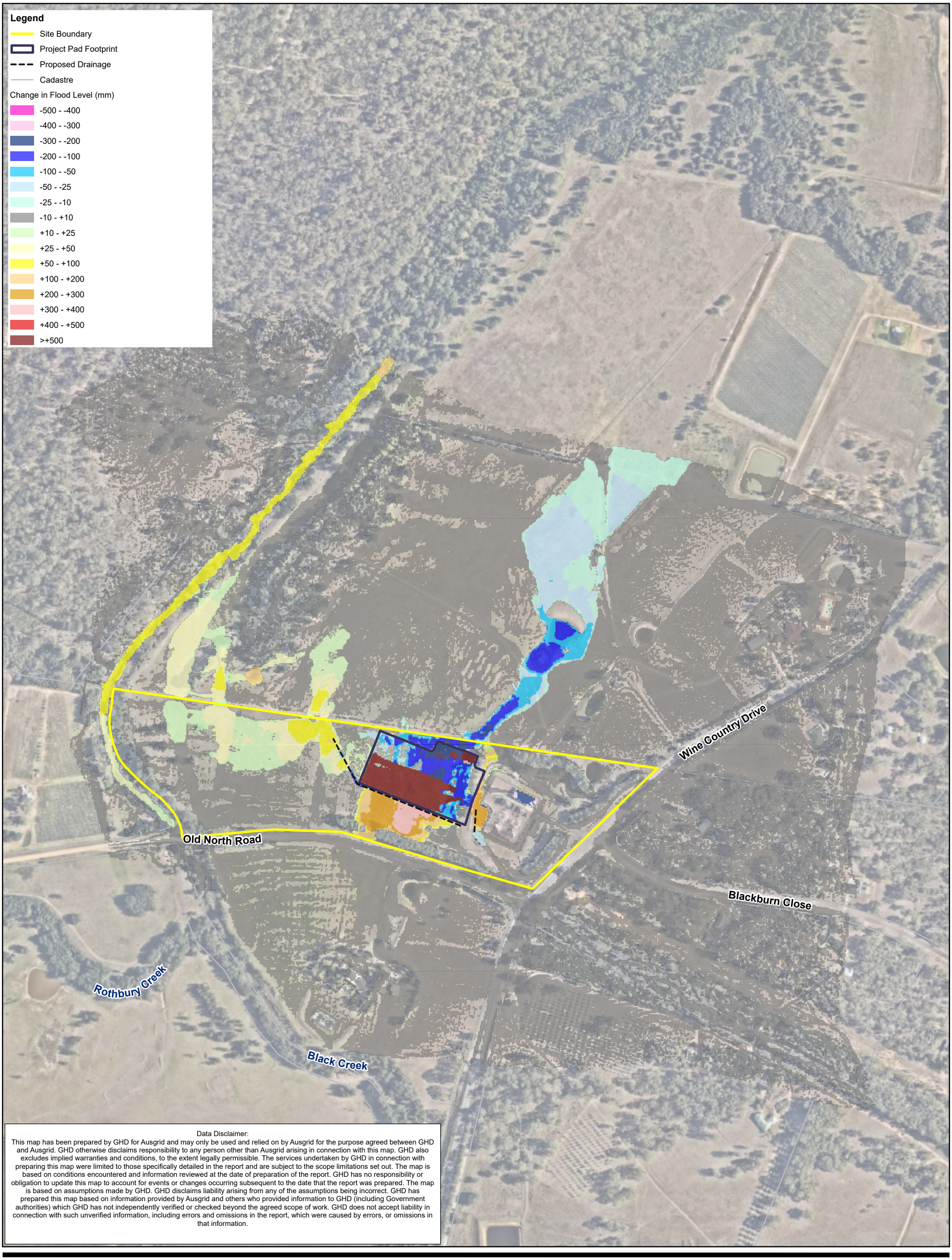
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Post-Development - Hydraulic Hazard
PMF 2080 SSP5-8.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure B015

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

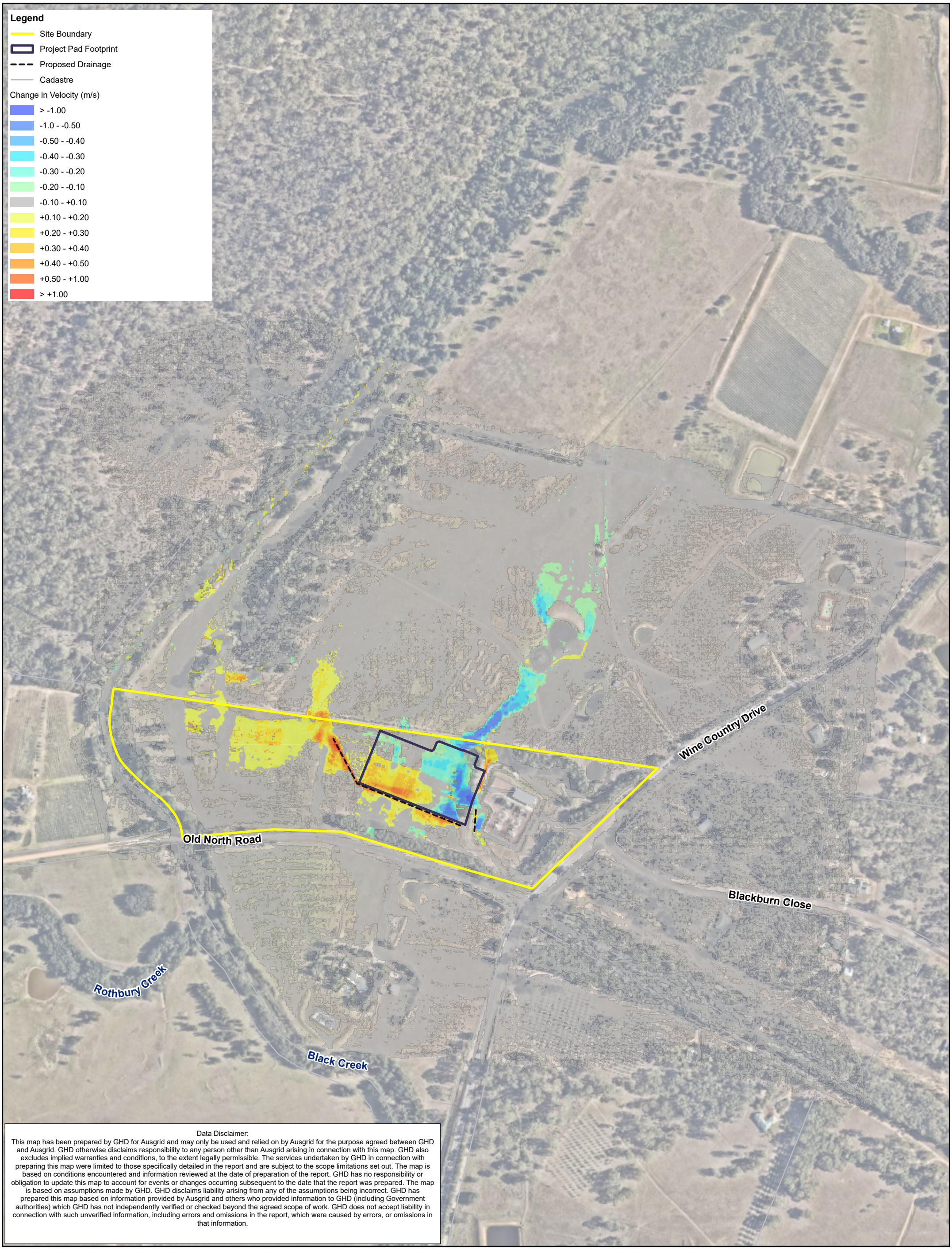
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Flood Level
5% AEP 2030 SSP2-4.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C001

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Velocity
5% AEP 2030 SSP2-4.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C002

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Hazard

- Increase by 5 Hazard Categories
- Increase by 4 Hazard Categories
- Increase by 3 Hazard Categories
- Increase by 2 Hazard Categories
- Increase by 1 Hazard Categories
- No Change in Hazard
- Decrease by 1 Hazard Categories
- Decrease by 2 Hazard Categories
- Decrease by 3 Hazard Categories
- Decrease by 4 Hazard Categories
- Decrease by 5 Hazard Categories

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Hazard
5% AEP 2030 SSP2-4.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C003

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Flood Level (mm)

- -500 - -400
- -400 - -300
- -300 - -200
- -200 - -100
- -100 - -50
- -50 - -25
- -25 - -10
- -10 - +10
- +10 - +25
- +25 - +50
- +50 - +100
- +100 - +200
- +200 - +300
- +300 - +400
- +400 - +500
- >+500

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Flood Level
1% AEP 2030 SSP2-4.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C004

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Velocity (m/s)

- > -1.00
- -1.0 - -0.50
- -0.50 - -0.40
- -0.40 - -0.30
- -0.30 - -0.20
- -0.20 - -0.10
- -0.10 - +0.10
- +0.10 - +0.20
- +0.20 - +0.30
- +0.30 - +0.40
- +0.40 - +0.50
- +0.50 - +1.00
- > +1.00

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Velocity
1% AEP 2030 SSP2-4.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C005

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Hazard

- Increase by 5 Hazard Categories
- Increase by 4 Hazard Categories
- Increase by 3 Hazard Categories
- Increase by 2 Hazard Categories
- Increase by 1 Hazard Categories
- No Change in Hazard
- Decrease by 1 Hazard Categories
- Decrease by 2 Hazard Categories
- Decrease by 3 Hazard Categories
- Decrease by 4 Hazard Categories
- Decrease by 5 Hazard Categories

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Hazard
1% AEP 2030 SSP2-4.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C006

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Flood Level (mm)

- -500 - -400
- -400 - -300
- -300 - -200
- -200 - -100
- -100 - -50
- -50 - -25
- -25 - -10
- -10 - +10
- +10 - +25
- +25 - +50
- +50 - +100
- +100 - +200
- +200 - +300
- +300 - +400
- +400 - +500
- >+500

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

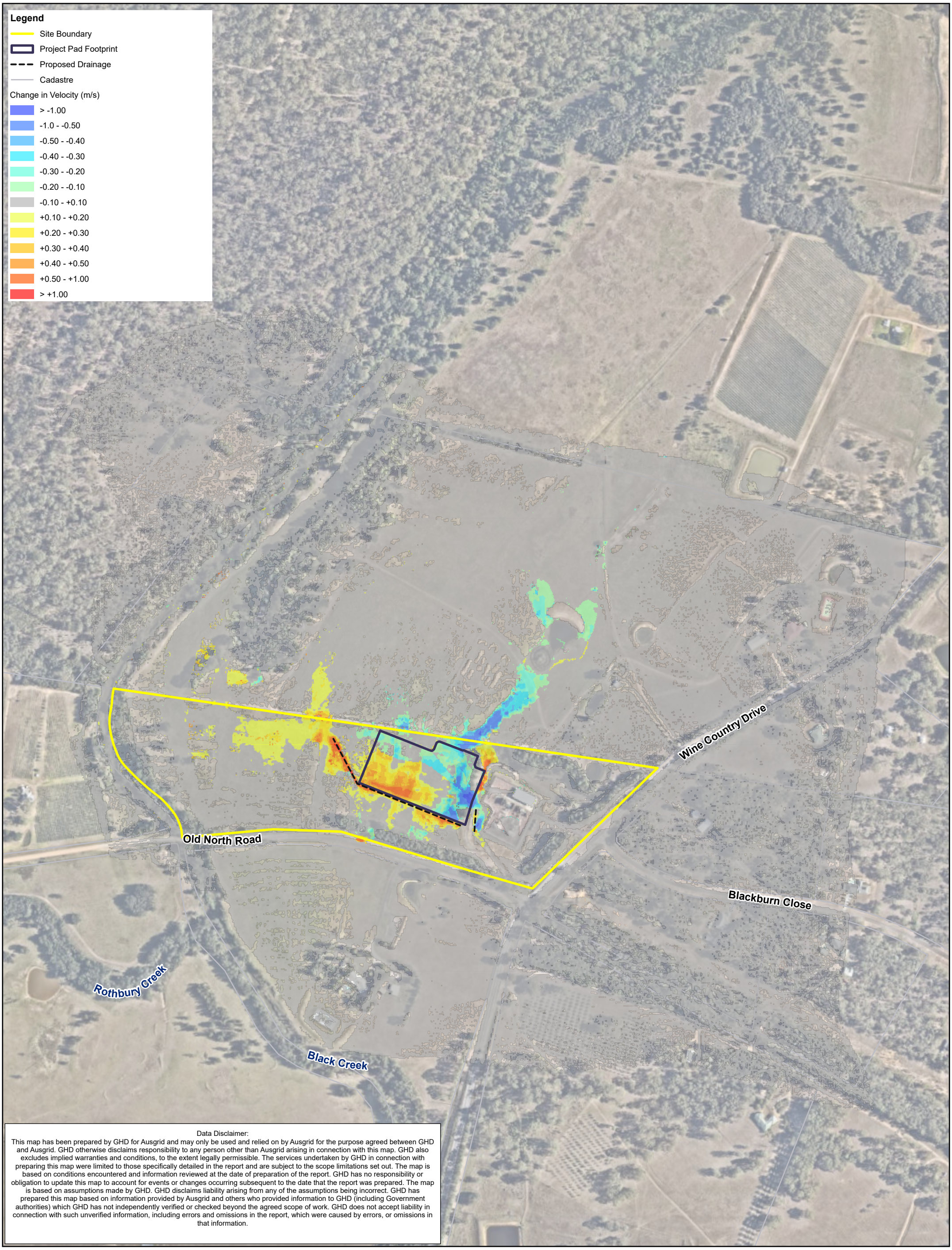
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Flood Level
1% AEP 2080 SSP2-4.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C007

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Velocity
1% AEP 2080 SSP2-4.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C008

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Hazard

- Increase by 5 Hazard Categories
- Increase by 4 Hazard Categories
- Increase by 3 Hazard Categories
- Increase by 2 Hazard Categories
- Increase by 1 Hazard Categories
- No Change in Hazard
- Decrease by 1 Hazard Categories
- Decrease by 2 Hazard Categories
- Decrease by 3 Hazard Categories
- Decrease by 4 Hazard Categories
- Decrease by 5 Hazard Categories

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Hazard
1% AEP 2080 SSP2-4.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C009

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Flood Level (mm)

- -500 - -400
- -400 - -300
- -300 - -200
- -200 - -100
- -100 - -50
- -50 - -25
- -25 - -10
- -10 - +10
- +10 - +25
- +25 - +50
- +50 - +100
- +100 - +200
- +200 - +300
- +300 - +400
- +400 - +500
- >+500

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

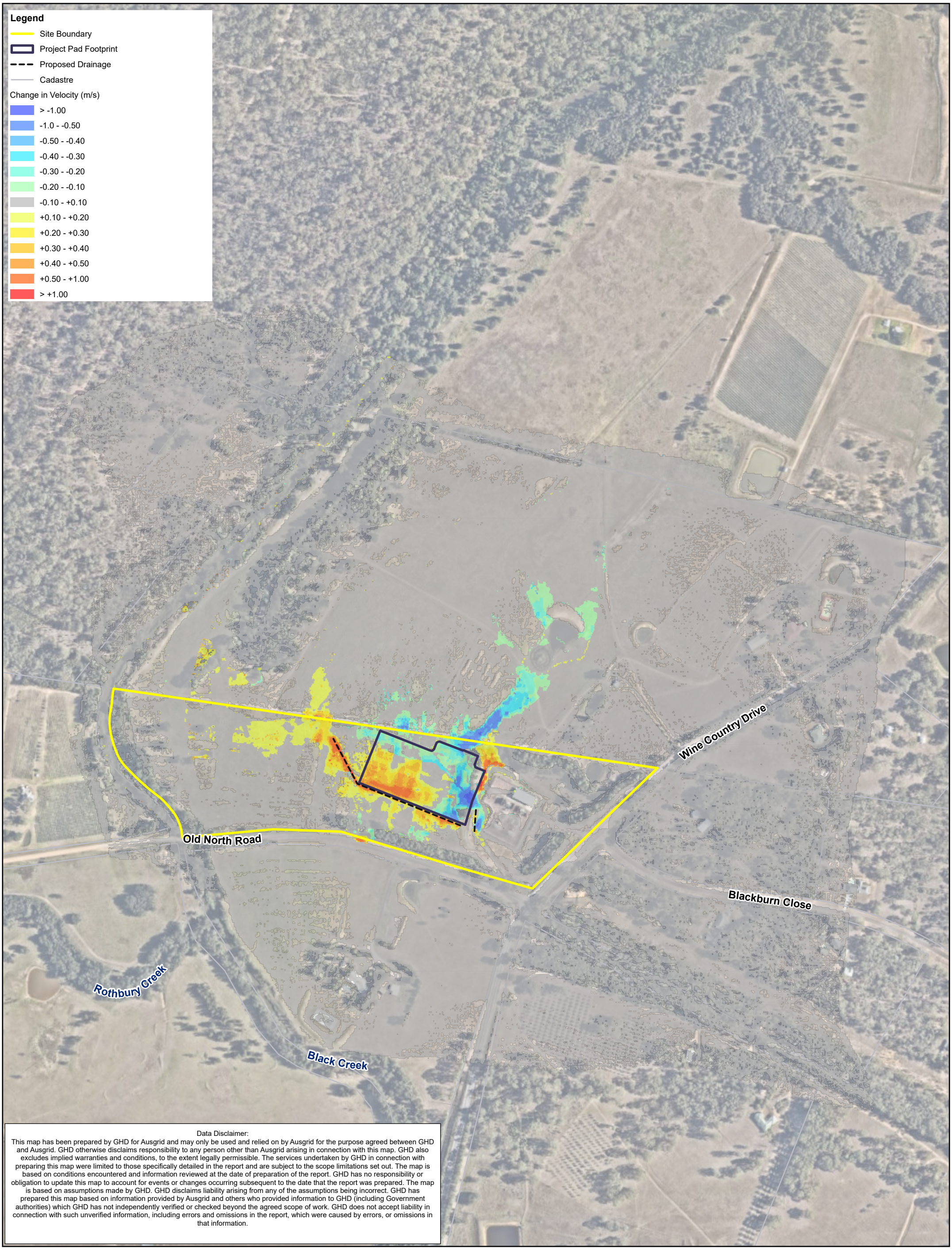
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Flood Level
1% AEP 2080 SSP5-8.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C010

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:14

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Velocity
1% AEP 2080 SSP5-8.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C011

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:15

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Hazard

- Increase by 5 Hazard Categories
- Increase by 4 Hazard Categories
- Increase by 3 Hazard Categories
- Increase by 2 Hazard Categories
- Increase by 1 Hazard Categories
- No Change in Hazard
- Decrease by 1 Hazard Categories
- Decrease by 2 Hazard Categories
- Decrease by 3 Hazard Categories
- Decrease by 4 Hazard Categories
- Decrease by 5 Hazard Categories

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Hazard
1% AEP 2080 SSP5-8.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C012

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:15

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Flood Level (mm)

- >-500
- -500 - -400
- -400 - -300
- -300 - -200
- -200 - -100
- -100 - -50
- -50 - -25
- -25 - -10
- -10 - +10
- +10 - +25
- +25 - +50
- +50 - +100
- +100 - +200
- +200 - +300
- +300 - +400
- +400 - +500
- >+500

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

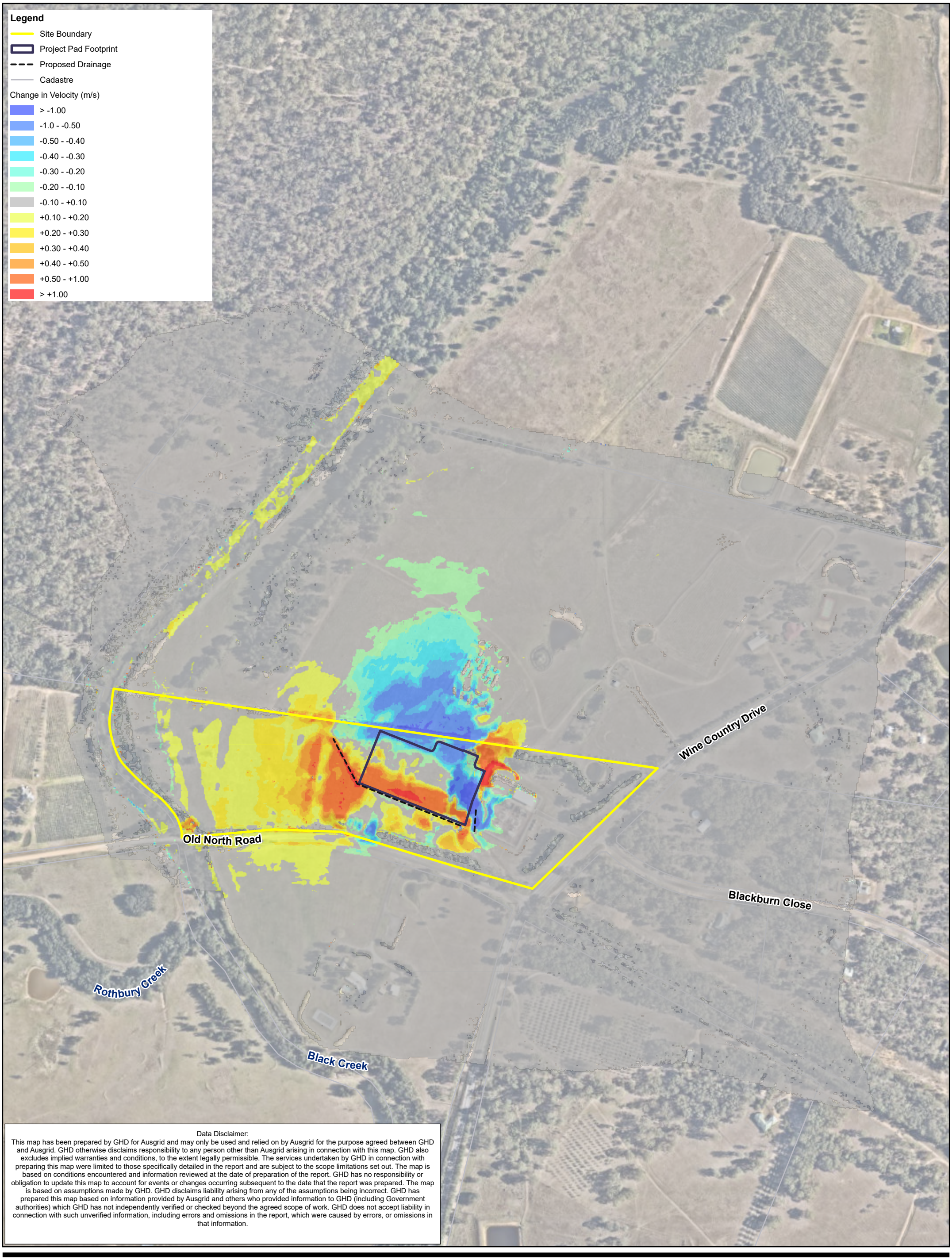
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Flood Level
PMF 2080 SSP5-8.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C013

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:15

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Velocity
PMF 2080 SSP5-8.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C014

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:15

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Hazard

- Increase by 5 Hazard Categories
- Increase by 4 Hazard Categories
- Increase by 3 Hazard Categories
- Increase by 2 Hazard Categories
- Increase by 1 Hazard Categories
- No Change in Hazard
- Decrease by 1 Hazard Categories
- Decrease by 2 Hazard Categories
- Decrease by 3 Hazard Categories
- Decrease by 4 Hazard Categories
- Decrease by 5 Hazard Categories

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Local
Water Impact - Change in Hazard
PMF 2080 SSP5-8.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure C015

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:15

Data source: Nearmap WMS Server: .
Created by: obourke

Appendix C

Regional (riverine) flood mapping

Legend

Site Boundary

Cadastre

Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

38

38

38.5

39

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

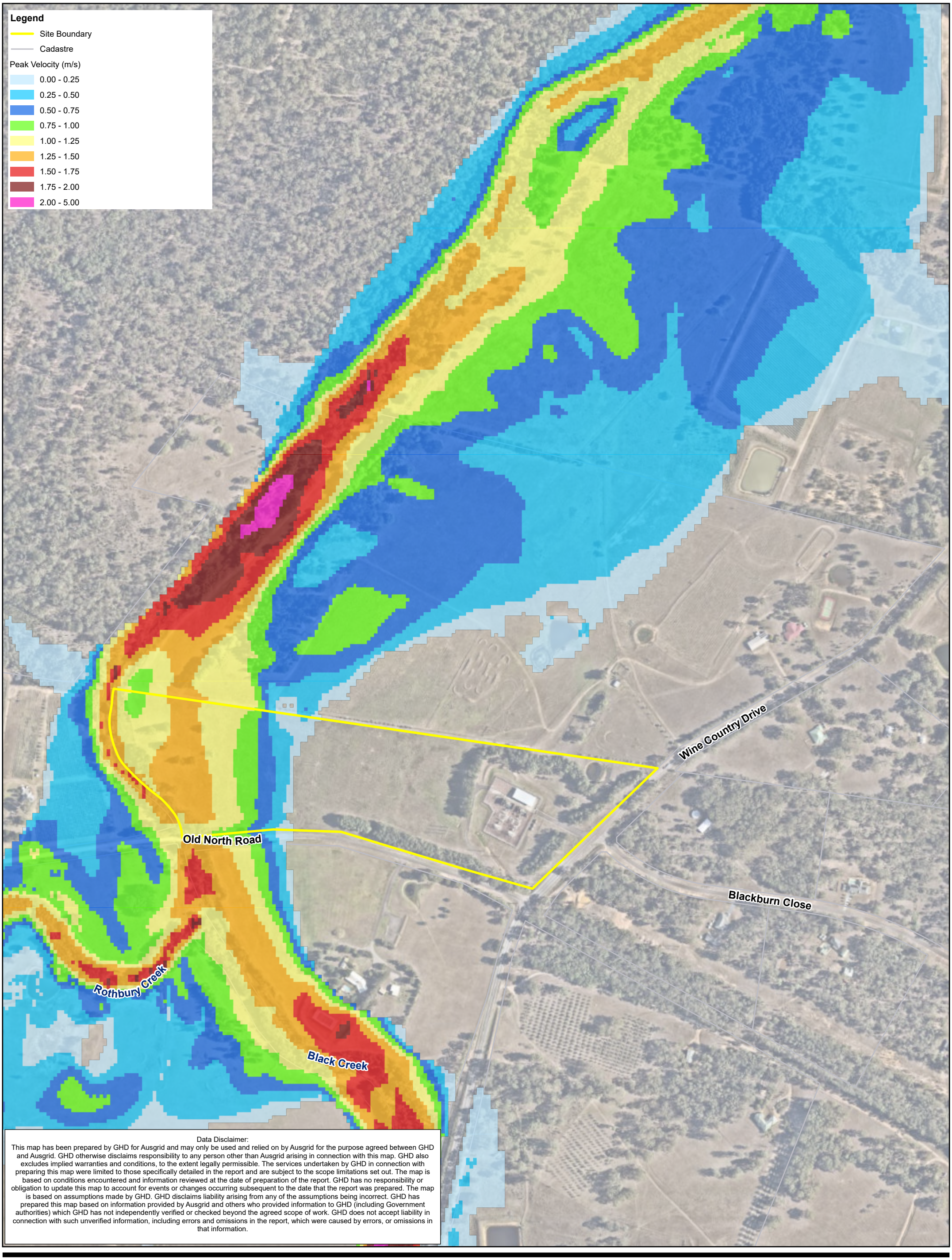
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Flood Extent and Depth
5% AEP 2030 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D001

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

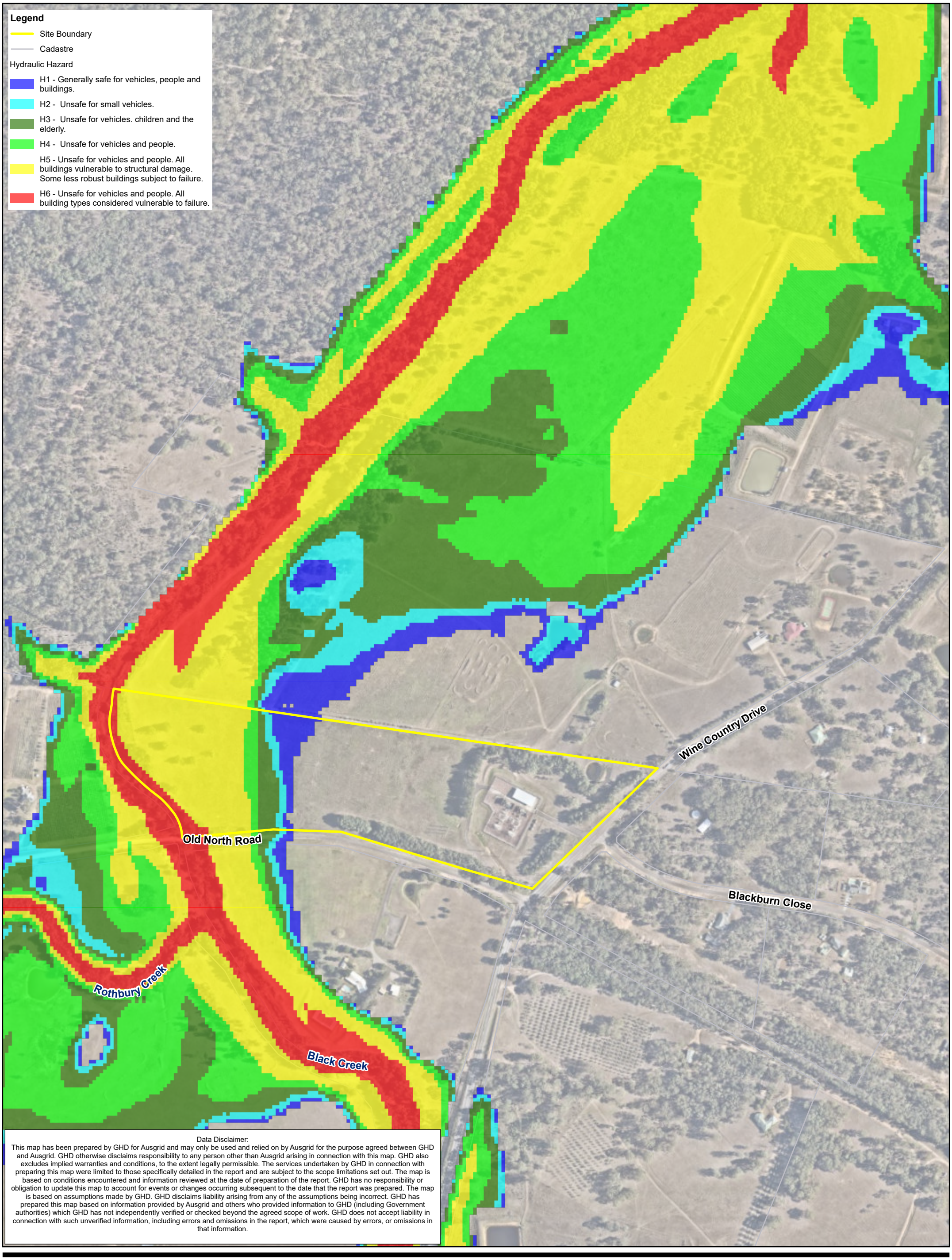
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Peak Velocity
5% AEP 2030 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D002

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

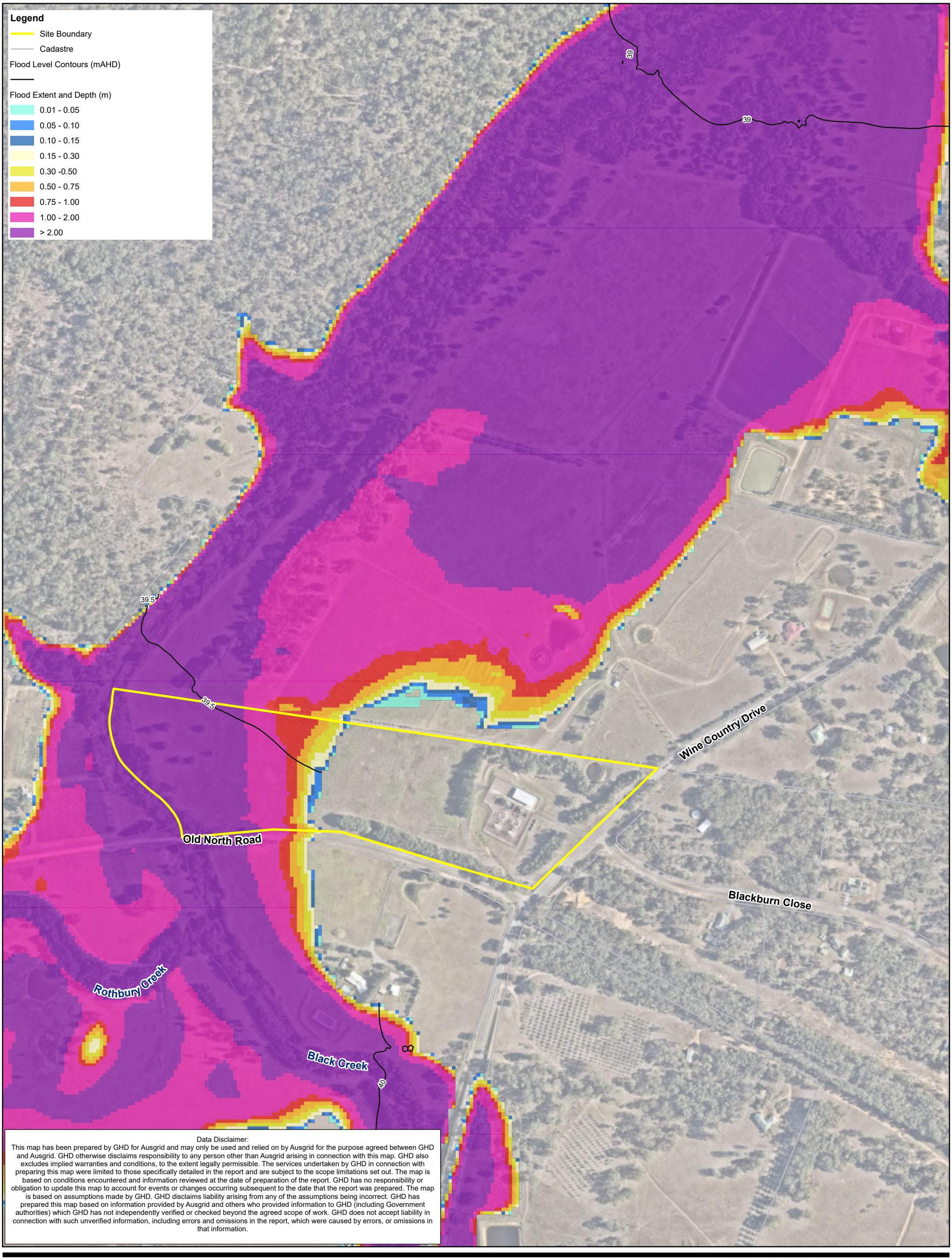
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Hydraulic Hazard
5% AEP 2030 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D003

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

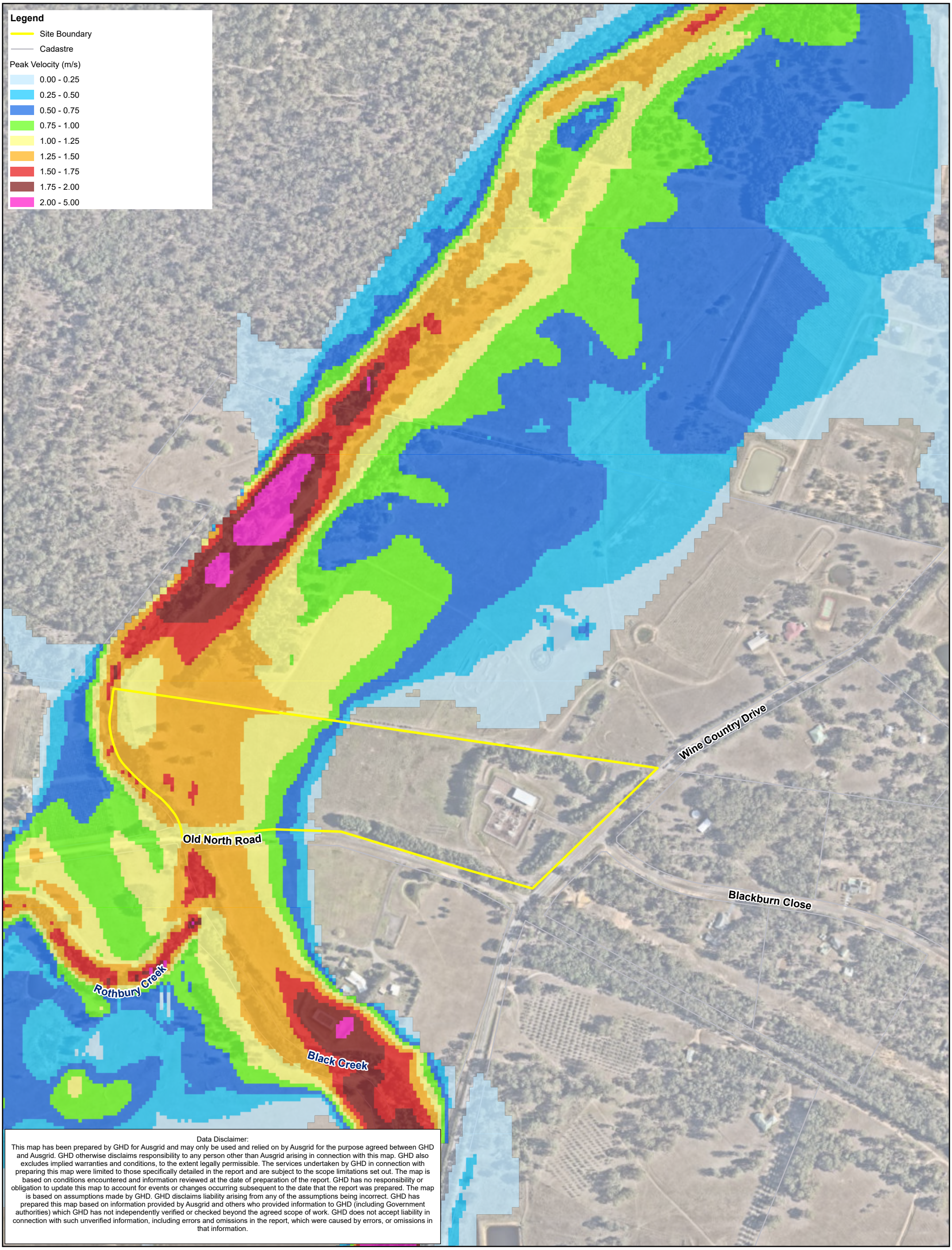
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Flood Extent and Depth
1% AEP 2030 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D004

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Peak Velocity
1% AEP 2030 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D005

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Hydraulic Hazard
1% AEP 2030 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D006

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

39

39

39.5

40

42

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

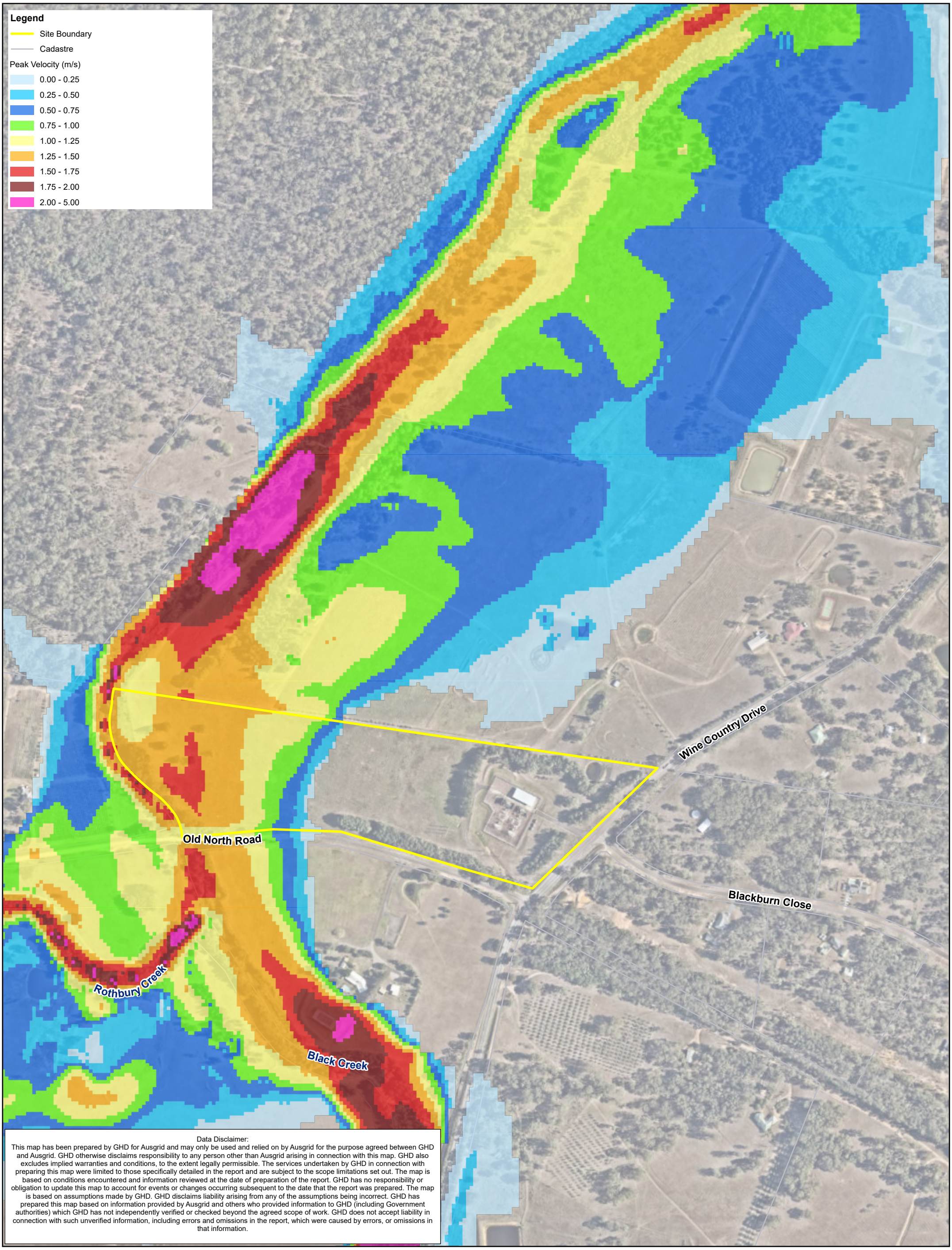
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Flood Extent and Depth
1% AEP 2080 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D007

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Peak Velocity
1% AEP 2080 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D008

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Hydraulic Hazard
1% AEP 2080 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D009

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

Site Boundary

Cadastre

Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

40

40

40

40.5

41

41.5

42

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

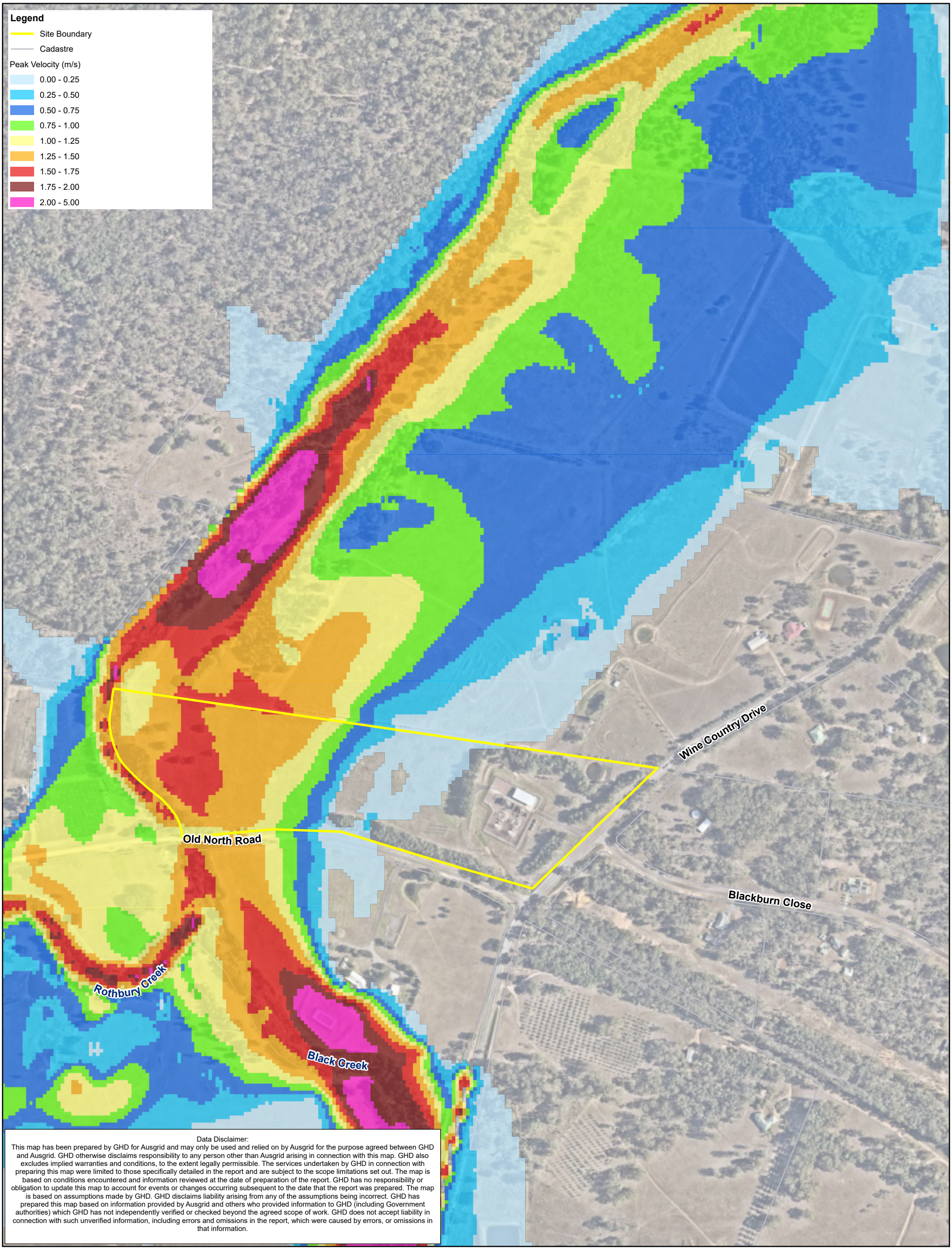
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Flood Extent and Depth
1% AEP 2080 SSP5-8.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D010

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:04

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Peak Velocity
1% AEP 2080 SSP5-8.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D011

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Hydraulic Hazard
1% AEP 2080 SSP5-8.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D012

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

47.5

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

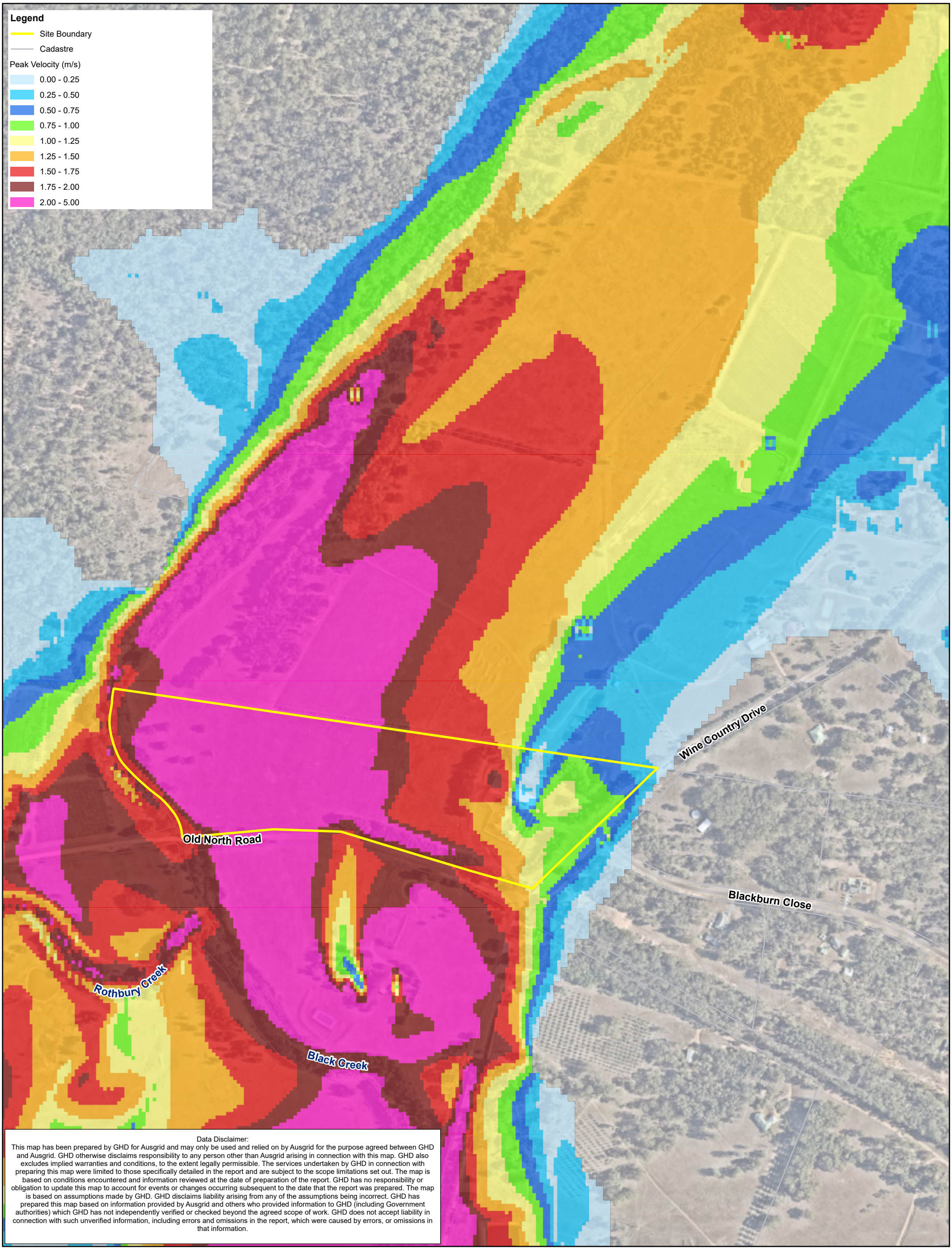
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Flood Extent and Depth
PMF 2080 SSP5-8.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D013

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3
0 60 120
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Peak Velocity
PMF 2080 SSP5-8.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D014

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

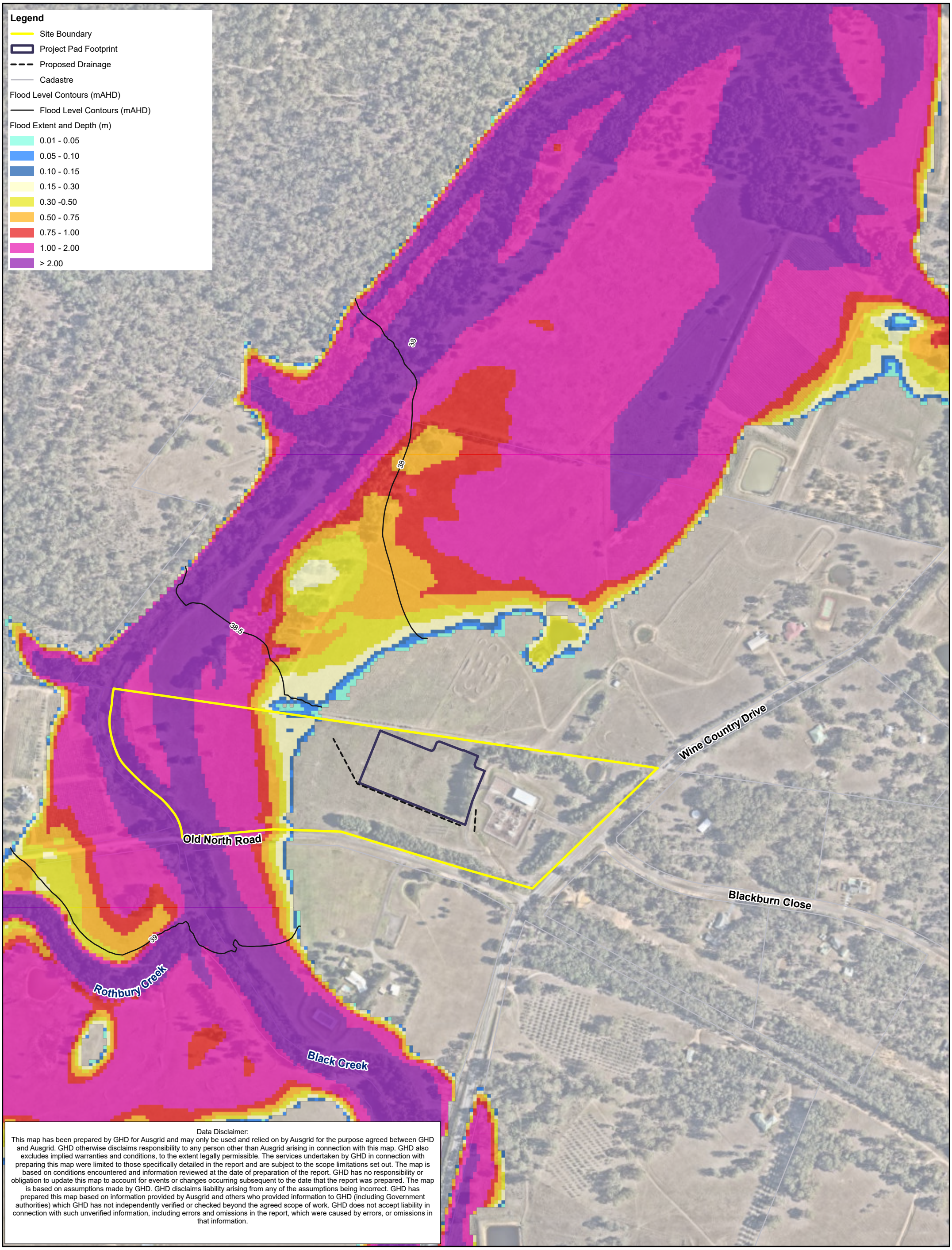
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Pre-Development - Hydraulic Hazard
PMF 2080 SSP5-8.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure D015

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3
0 60 120
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

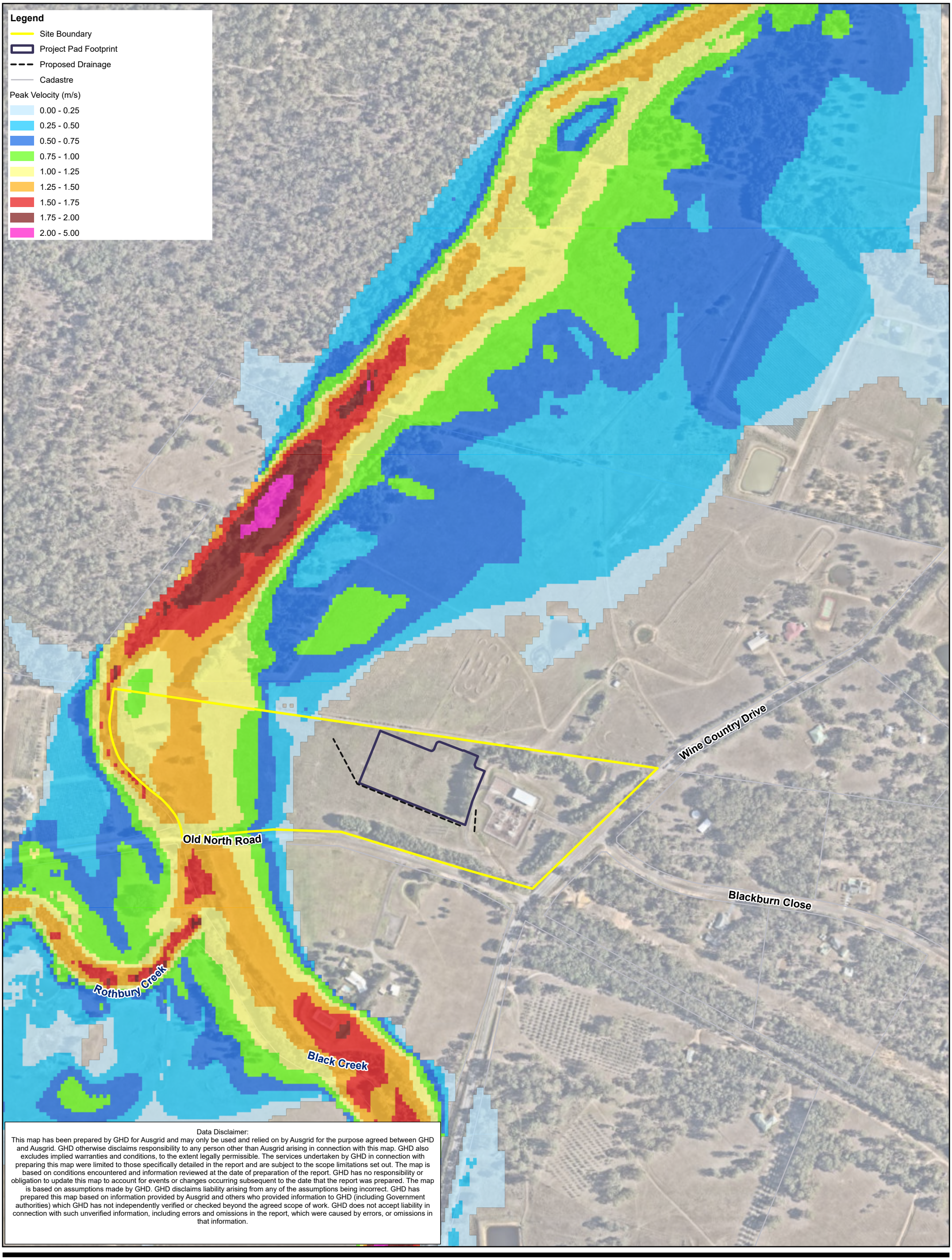
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Flood Extent and Depth
5% AEP 2030 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E001

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3
0 60 120
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

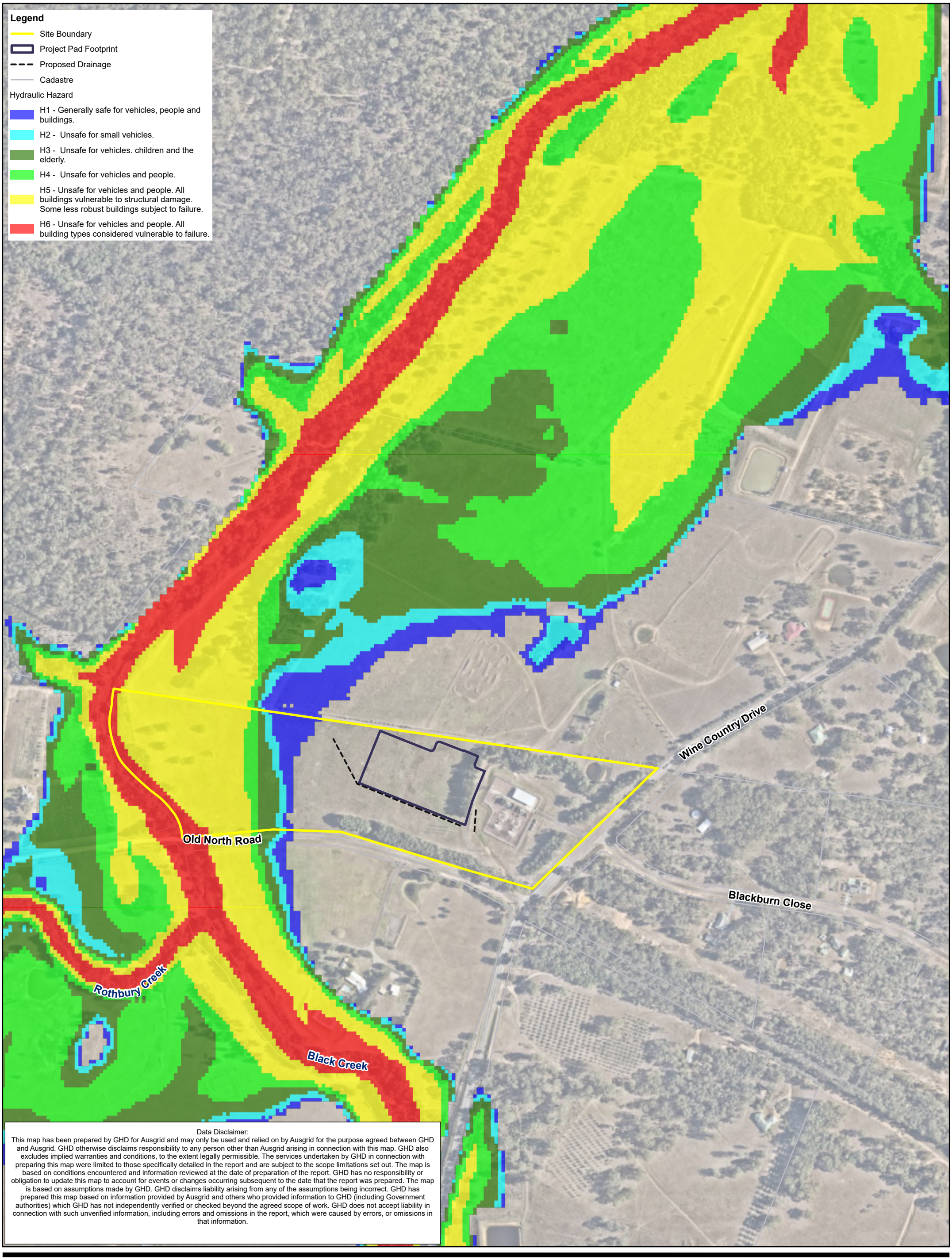
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Peak Velocity
5% AEP 2030 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E002

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Hydraulic Hazard
5% AEP 2030 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E003

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Flood Level Contours (mAHD)

- Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

39

39

39.5

39.5

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

40

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

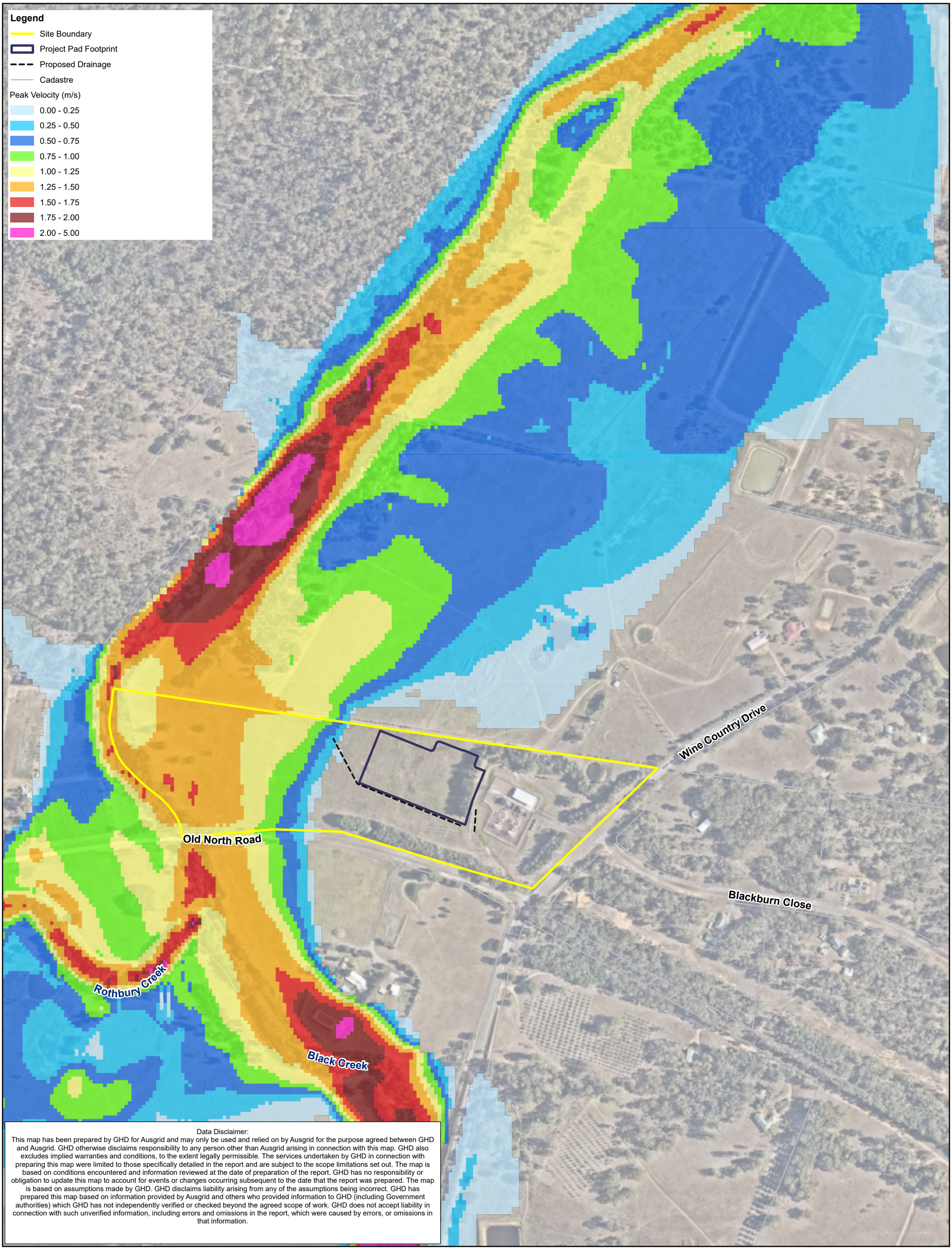
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Flood Extent and Depth
1% AEP 2030 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E004

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Peak Velocity
1% AEP 2030 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E005

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Hydraulic Hazard
1% AEP 2030 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E006

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Flood Level Contours (mAHD)

- Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

39

39

39.5

42

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

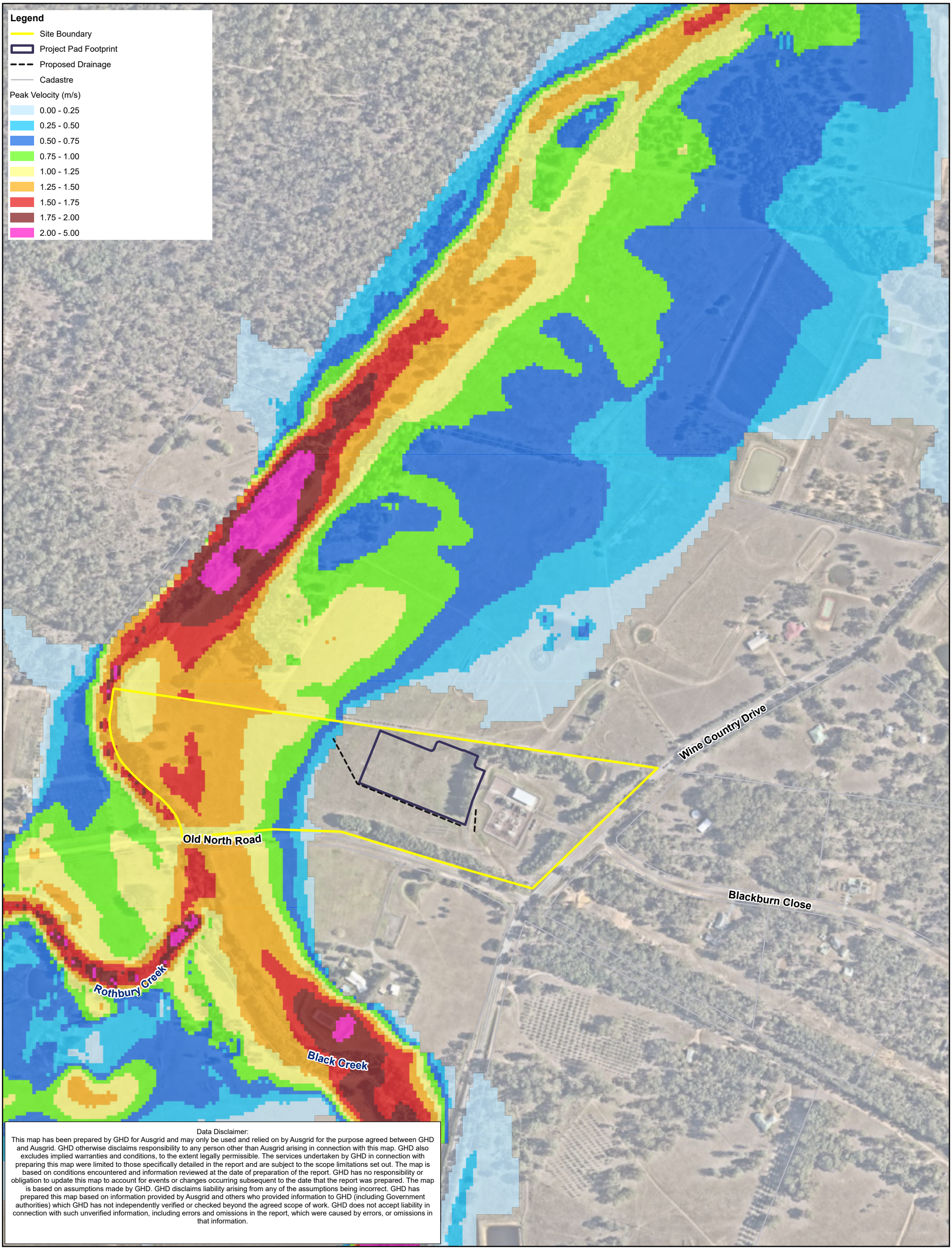
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Flood Extent and Depth
1% AEP 2080 SSP2-4.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E007

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:05

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Peak Velocity
1% AEP 2080 SSP2-4.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E008

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Hydraulic Hazard
1% AEP 2080 SSP2-4.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E009

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Flood Level Contours (mAHD)

- Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

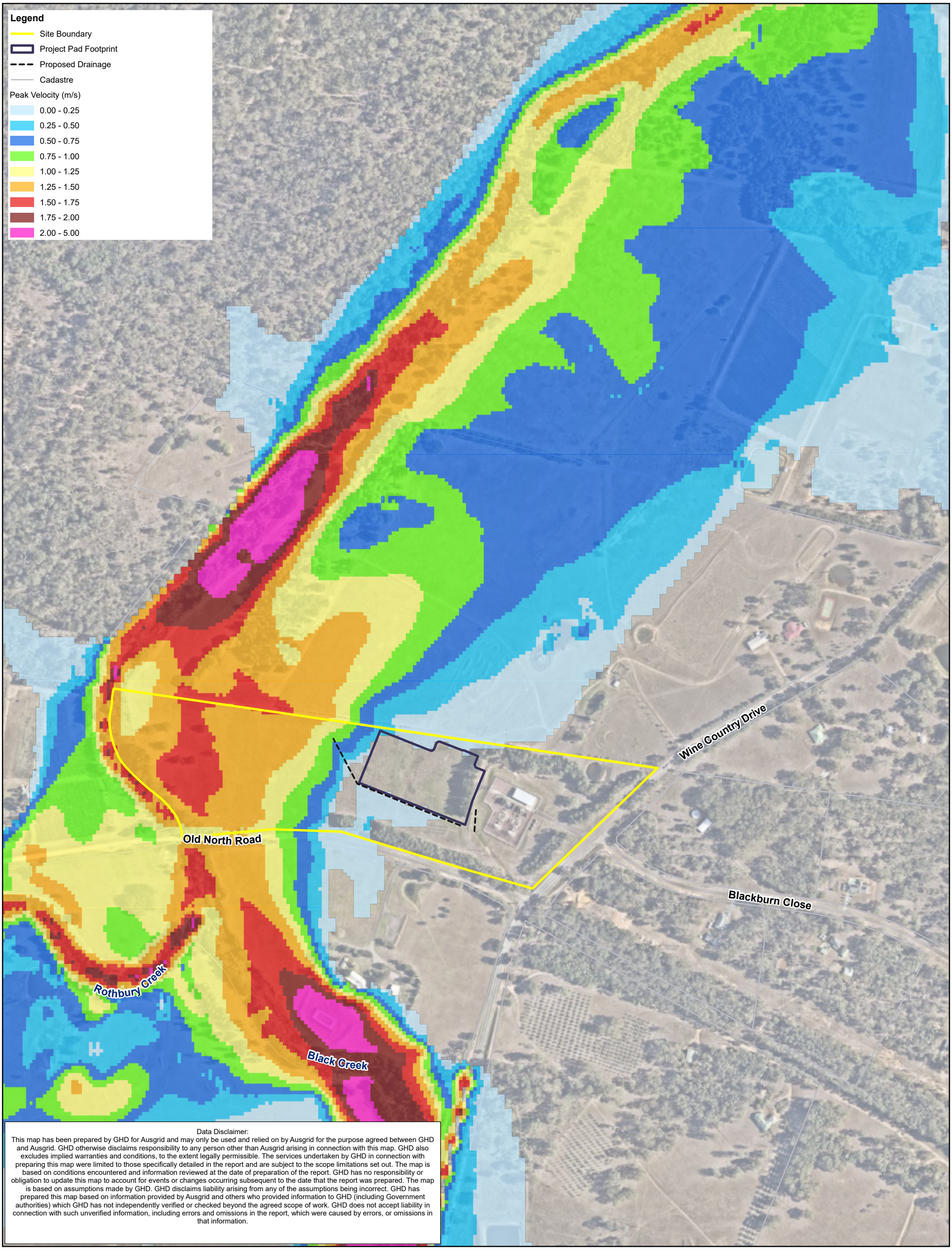
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Flood Extent and Depth
1% AEP 2080 SSP5-8.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E010

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Peak Velocity
1% AEP 2080 SSP5-8.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E011

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Hydraulic Hazard
1% AEP 2080 SSP5-8.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E012

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Flood Level Contours (mAHD)

- Flood Level Contours (mAHD)

Flood Extent and Depth (m)

- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- 0.30 -0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

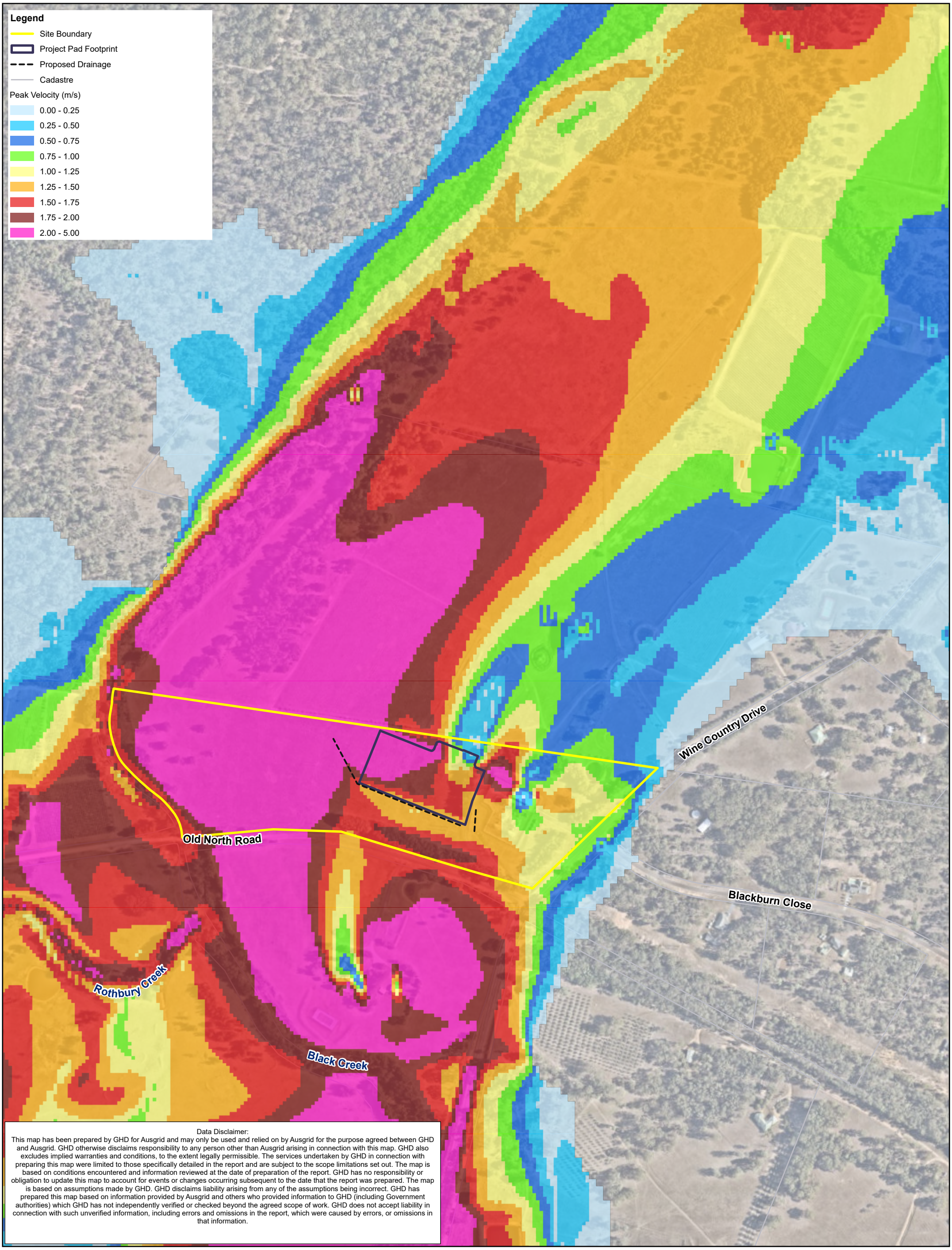
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Flood Extent and Depth
PMF 2080 SSP5-8.5
Flood Extent and Depth

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E013

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Peak Velocity
PMF 2080 SSP5-8.5
Peak Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E014

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Hydraulic Hazard

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles. children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Post-Development - Hydraulic Hazard
PMF 2080 SSP5-8.5
Hydraulic Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure E015

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Flood Level (mm)

- -10 - +10

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Flood Level
5% AEP 2030 SSP2-4.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F001

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Velocity (m/s)

- -0.10 - +0.10

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

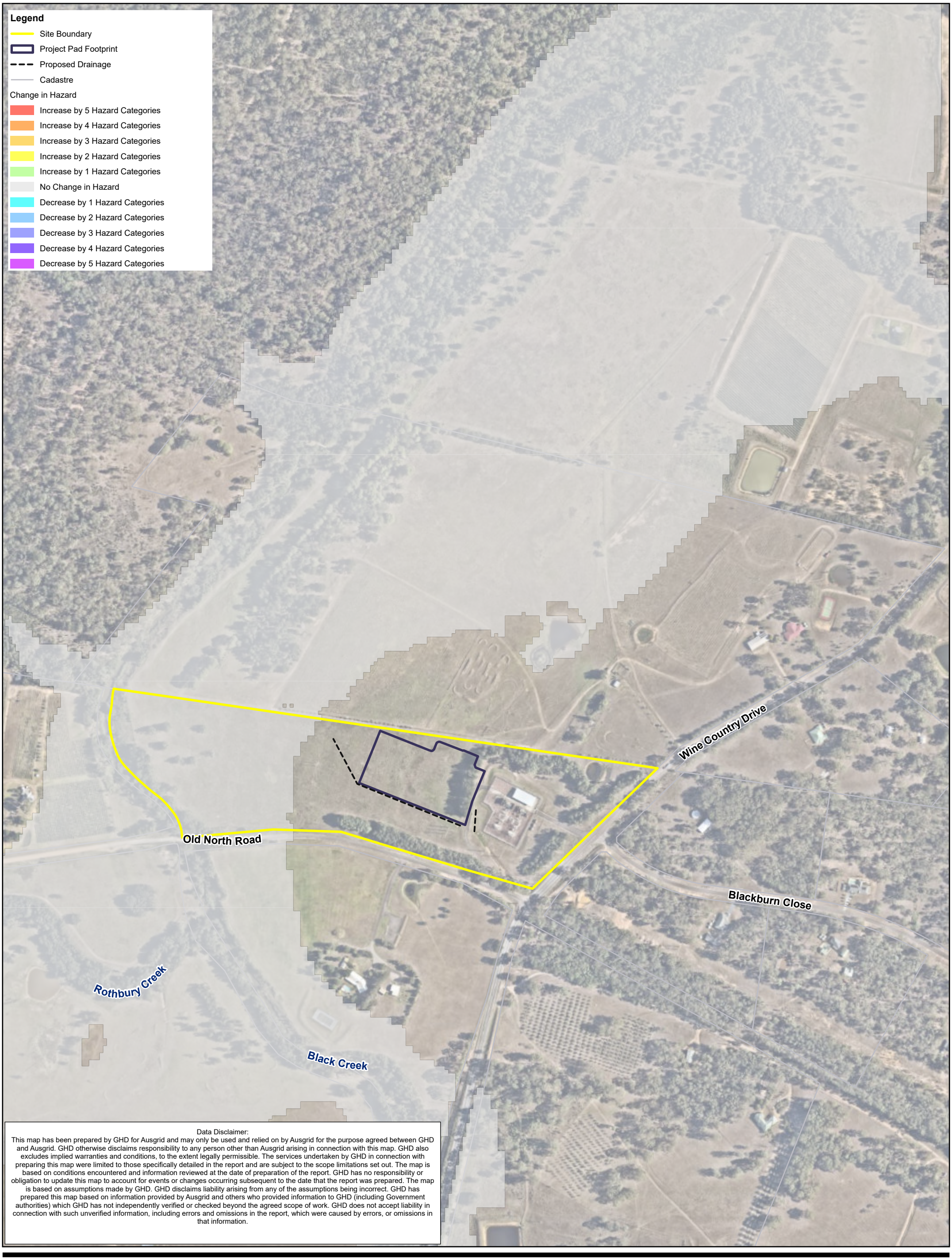
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Velocity
5% AEP 2030 SSP2-4.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F002

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Hazard
5% AEP 2030 SSP2-4.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F003

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Flood Level (mm)

- -10 - +10

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Flood Level
1% AEP 2030 SSP2-4.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F004

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:06

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3
0 60 120
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

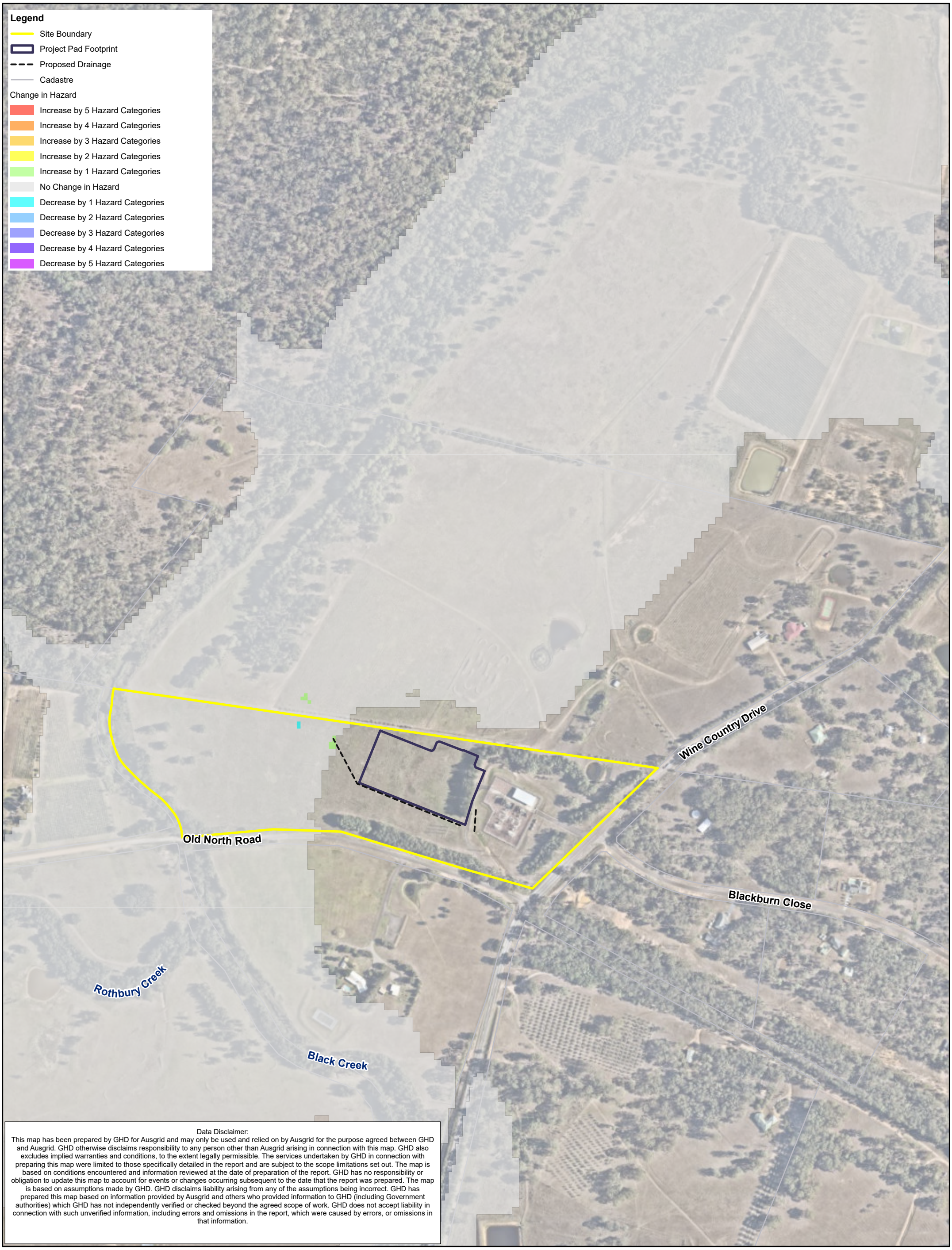
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Velocity
1% AEP 2030 SSP2-4.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F005

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:07

Data source: Nearmap WMS Server: .
Created by: obourke



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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Hazard
1% AEP 2030 SSP2-4.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F006

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:07

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Flood Level (mm)

- -25 - -10
- -10 - +10

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Flood Level
1% AEP 2080 SSP2-4.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F007

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:07

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Velocity (m/s)

- -0.10 - +0.10
- +0.10 - +0.20

Wine Country Drive

Old North Road

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Velocity
1% AEP 2080 SSP2-4.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F008

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:07

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Hazard

- Increase by 5 Hazard Categories
- Increase by 4 Hazard Categories
- Increase by 3 Hazard Categories
- Increase by 2 Hazard Categories
- Increase by 1 Hazard Categories
- No Change in Hazard
- Decrease by 1 Hazard Categories
- Decrease by 2 Hazard Categories
- Decrease by 3 Hazard Categories
- Decrease by 4 Hazard Categories
- Decrease by 5 Hazard Categories

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

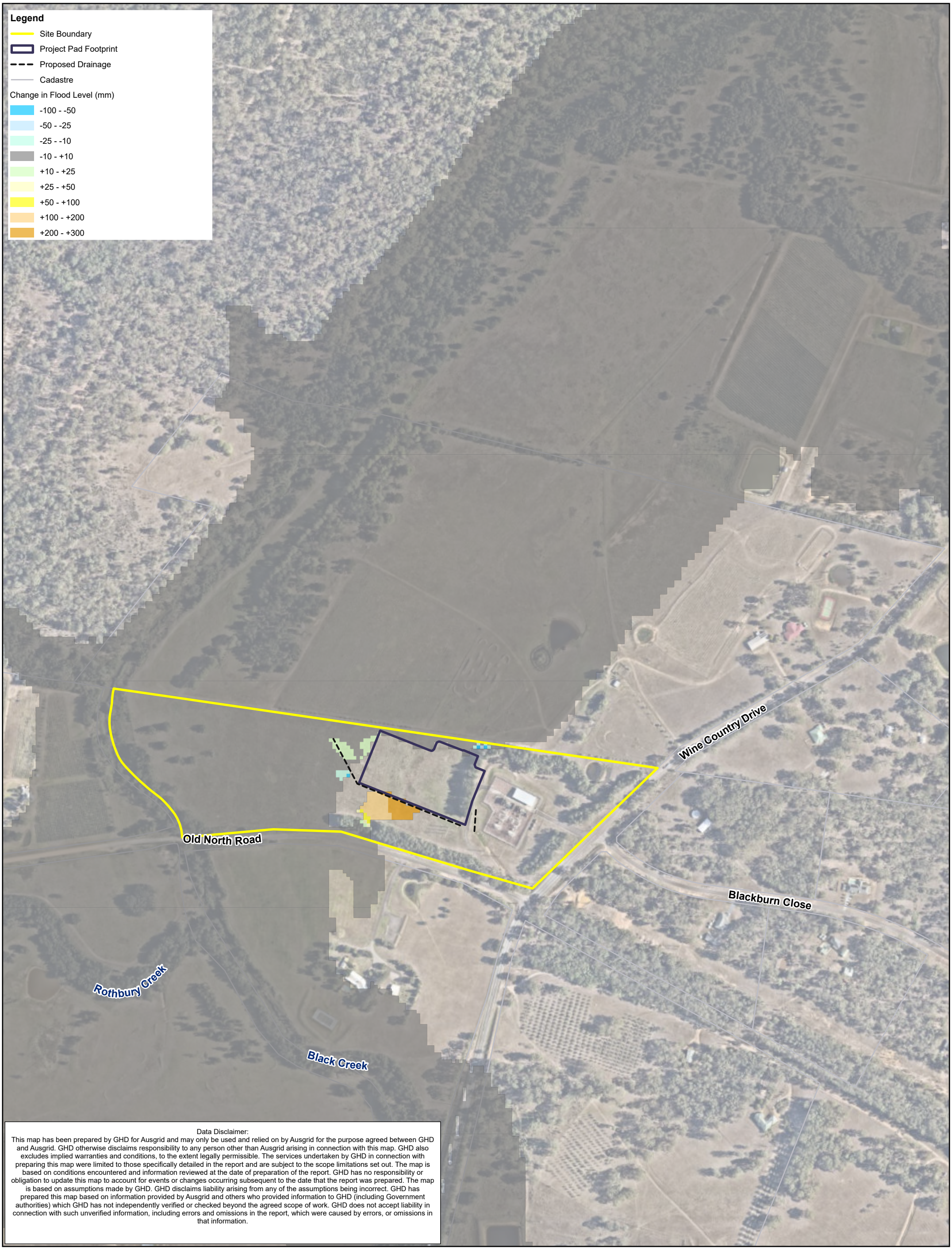
Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Hazard
1% AEP 2080 SSP2-4.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F009

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:07

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Flood Level
1% AEP 2080 SSP5-8.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F010

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
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1:4,750 @ ISO A3
0 60 120
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Velocity
1% AEP 2080 SSP5-8.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F011

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:07

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Hazard

- Increase by 5 Hazard Categories
- Increase by 4 Hazard Categories
- Increase by 3 Hazard Categories
- Increase by 2 Hazard Categories
- Increase by 1 Hazard Categories
- No Change in Hazard
- Decrease by 1 Hazard Categories
- Decrease by 2 Hazard Categories
- Decrease by 3 Hazard Categories
- Decrease by 4 Hazard Categories
- Decrease by 5 Hazard Categories

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Hazard
1% AEP 2080 SSP5-8.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F012

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:07

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Flood Level (mm)

- -200 - -100
- -100 - -50
- -50 - -25
- -25 - -10
- -10 - +10
- +10 - +25
- +25 - +50
- +50 - +100
- +100 - +200
- +200 - +300

Washery Road
Tuckers Lane
Dominicks Creek
Calyptra Circuit
Littlewood Road
Crown Line Drive
Creekside Place
Sawyers Creek
Wine Country Drive
Old North Road
Blackburn Close
Rothbury Creek
Black Creek
Talga Road
Peppertree Drive
Deasys Road
Vintage Drive
Vintage Drive
Wilderness Road
Mcdonalds Road
Casuarina Drive
Palmers Lane
Deadmans Creek
Green Lane
Wills Hill Road
Brickmans Lane
Gillards Road
Mcdonalds Road
First Creek
Broke Road
Teatree Creek
Broke Road
De Beyers Road
Broke Road
Lovedale Road
Lodge Road

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1:28,312 @ ISO A3

0 410 820

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Flood Level
PMF 2080 SSP5-8.5
Change in Flood Level

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F013

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:02

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Velocity (m/s)

- > -1.00
- -1.0 - -0.50
- -0.50 - -0.40
- -0.40 - -0.30
- -0.30 - -0.20
- -0.20 - -0.10
- -0.10 - +0.10
- +0.10 - +0.20
- +0.20 - +0.30
- +0.30 - +0.40
- +0.40 - +0.50
- +0.50 - +1.00
- > +1.00

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Velocity
PMF 2080 SSP5-8.5
Change in Velocity

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F014

N:\AU\Sydney\Projects\21\12655502\GIS\Maps\Deliverables\12655502_Flood.aprx
Print date: 15 Apr 2026 - 21:07

Data source: Nearmap WMS Server: .
Created by: obourke

Legend

- Site Boundary
- Project Pad Footprint
- Proposed Drainage
- Cadastre

Change in Hazard

- Increase by 5 Hazard Categories
- Increase by 4 Hazard Categories
- Increase by 3 Hazard Categories
- Increase by 2 Hazard Categories
- Increase by 1 Hazard Categories
- No Change in Hazard
- Decrease by 1 Hazard Categories
- Decrease by 2 Hazard Categories
- Decrease by 3 Hazard Categories
- Decrease by 4 Hazard Categories
- Decrease by 5 Hazard Categories

Old North Road

Wine Country Drive

Blackburn Close

Rothbury Creek

Black Creek

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1:4,750 @ ISO A3

0 60 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

Ausgrid
Ausgrid BESS Water Impact Assessments
Rothbury BESS, NSW
Regional
Water Impact - Change in Hazard
PMF 2080 SSP5-8.5
Change in Hazard

Project No. **12655502**
Revision No. **0**
Date. **15/04/2026**

Figure F015

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Print date: 15 Apr 2026 - 21:07

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Appendix D

Other agency requirements

Table D.1 Other agency requirements

Agency	Requirements	Section
DCCEEW Water Group	A detailed and consolidated site water balance.	5.5.3
	Description of all works/activities that may intercept, extract, use, divert or receive surface water and/or groundwater. This includes the description of any development, activities or structures that will intercept, interfere with or remove groundwater, both temporary and permanent.	5.2, 5.4
	Details of all water take for the life of the project and post closure where applicable. This is to include water taken directly and indirectly, and the relevant water source where water entitlements are required to account for the water take. If the water is to be taken from an alternative source confirmation should be provided by the supplier that the appropriate volumes can be obtained.	5.5
	Details of Water Access Licences (WALs) held to account for any take of water where required, or demonstration that WALs can be obtained prior to take of water occurring. This should include an assessment of the current market depth where water entitlement is required to be purchased. Any exemptions or exclusions to requiring approvals or licenses under the Water Management Act 2000 should be detailed by the proponent.	No water take proposed.
	A description of groundwater conditions that provides an understanding of groundwater level across the site under a range of wet and dry conditions.	0
	Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, groundwater dependent ecosystems, and ground water levels; including measures proposed to reduce and mitigate these impacts.	0
	Proposed surface and groundwater monitoring activities and methodologies.	6
	Identification and impact assessment of all works/activities located on waterfront land including an assessment against Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).	5.3
	Assessment of project against relevant policies and guidelines.	3
DCCEEW CPHR	The EIS must map the following features relevant to water and soils including: a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map). b. Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method). c. Wetlands as described in s4.2 of the Biodiversity Assessment Method. d. Groundwater. e. Groundwater dependent ecosystems. f. Proposed intake and discharge locations.	4
	The EIS must describe background conditions for any water resource likely to be affected by the development, including: a. Existing surface and groundwater. b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations. c. Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters. d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.	4
	The EIS must assess the impacts of the development on water quality, including: a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction.	5

Agency	Requirements	Section
	b. Identification of proposed monitoring of water quality.	
	The EIS must assess the impact of the development on hydrology, including: a. Water balance including quantity, quality and source. b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas. c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems. d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches). e. Changes to environmental water availability, both regulated/licensed and unregulated/rulesbased sources of such water. f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options. g. Identification of proposed monitoring of hydrological attributes.	5
	The EIS must map the following features relevant to flooding as described in the NSW 2023 Flood Risk Management Manual including: a. Flood prone land. b. Flood planning area, the area below the flood planning level. c. Hydraulic categorisation (floodways and flood storage areas).	Appendix B, Appendix C
	The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.	5.1
	The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios: a. Current flood behaviour for a range of design events as identified in 11 above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.	5.1
	Modelling in the EIS must consider and document: a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood. b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories. c. Relevant provisions of the NSW 2023 Flood Risk Management Manual.	5.1
	The EIS must assess the impacts on the proposed development on flood behaviour, including: a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure. b. Consistency with Council floodplain risk management plans. c. Compatibility with the flood hazard of the land. d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land. e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site. f. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses. g. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council. h. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council.	5.1

Agency	Requirements	Section
	i. Emergency management, evacuation and access, and contingency measures for the development considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES. j. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.	
	The EIS must describe the potential effects of coastal processes and hazards (within the meaning of the Coastal Management Act 2016), including sea level rise and climate change: a. On the proposed development b. Arising from the proposed development.	The site is not within a coastal area.
	The EIS must consider have regard to any certified Coastal Management Program (or Coastal Zone Management Plan) and be consistent with the management objectives described in the Coastal Management Act 2016 and development controls for coastal management areas mapped under the State Environmental Planning Policy (Resilience and Hazards) 2021.	The site is not within a coastal area.
Cessnock City Council	The site is flood prone, and the draft SEARs address flood risks at the 'Water and Soils' section. To further guide the EIS, it is requested that the SEARs identify impacts in a Probable Maximum Flood (PMF) event and include reference to the provisions of the Cessnock Local Environmental Plan 2011, Clauses 5.21 and 5.22. Specifically, the impact of flooding in a major storm event and PMF on the battery units (floating/relocation due to flood waters) should be addressed. If the battery units are raised above PMF, the visual impact assessment should take the increased height into account.	5.1
	Stormwater flows from the development should be addressed in the draft SEARs, possibly under the 'Water and Soils' section. In this regard water quality parameters as set out in Council's Engineering Guidelines for Design and Construction should be referenced, and met.	5.2.2

Appendix E

Soil Loss Hazard

The soil loss hazard was quantified using the Revised Universal Soil Loss Equation (RUSLE):

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

Where, A = computed soil loss (tonnes/ha/yr)

R = rainfall erosivity factor

K = soil erodibility factor

LS = slope length/gradient factor

P = erosion control practice factor

C = ground cover and management factor

Table E.1 Revised Universal Soil Loss Equation Parameters

Parameter	Value	Justification
Soil erodibility (K) factor	0.06	Espade (2024) – maximum K values at the site approximately 0.05, applying a 20% factor for soil dispersibility noted within the Branxton soil landscape
Practice (P)	1.3	Landcom (2004), representing compacted/smooth surfaces
Cover (C)	1.0	Landcom (2004), representing completely stripped surfaces during construction
Rainfall erosivity (R)	1,656	Calculated from $R = 164.74(1.1177)^{S}S^{0.6444}$ Where S = 2-year ARI, 6-hour ARI rainfall event (mm/hr) extracted for the site from BoM Design Rainfall System (8.41 mm/hr)
Slope length/gradient factor (LS)	0.19	Espade (2024) assuming design pad grade of 1% and slope lengths limited to 80m since disturbance area >1000m^2
Total area (ha)	1.38	Maximum potential site disturbance area
Total soil loss (t/year) Total soil loss (m^3/ year)	34.1 t/yr 26.2 m^3/yr	Calculation Assumes 1.3 t/m^3

To inform the staging of the proposed works, the annual soil loss results were extrapolated to a monthly soil loss risk, based on monthly average rainfall. The monthly soil loss hazards are shown in Table D.2.

Table E.2 Monthly soil loss risk hazard

Month	% of R	Soil loss (t/ha/month)	Soil loss (m^3/month)	Hazard
Jan	11.0%	2.7	2.9	very low
Feb	13.4%	3.3	3.5	very low
Mar	11.8%	2.9	3.1	very low
Apr	8.4%	2.1	2.2	very low
May	6.7%	1.6	1.7	very low
Jun	7.1%	1.8	1.9	very low
Jul	5.1%	1.3	1.3	very low
Aug	4.3%	1.1	1.1	very low
Sep	5.7%	1.4	1.5	very low
Oct	7.5%	1.8	1.9	very low
Nov	9.6%	2.4	2.5	very low
Dec	9.3%	2.3	2.4	very low