

Central-West Orana Renewable Energy Zone Transmission project

Amendment Report

Appendix K: Flooding Assessment Addendum

March 2024

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**TECHNICAL NOTE
CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

S1. Summary of Key Findings

The potential flood related impacts of the exhibited project during its construction and operation were assessed in Technical Paper 15 of the Environmental Impact Statement (EIS). The key findings of this assessment were summarised in Chapter 19 (Other Impacts) of the EIS. Additional assessment has been undertaken to identify changes to potential flood related impacts associated with the amended project. The findings of this additional assessment are presented in this technical note.

Assessment approach

The approach that was adopted in carrying out the flood assessment for the amended project was broadly as follows:

- i. The amended project was reviewed against the project that was presented in the EIS to identify the proposed changes and the associated scope of updates that would be required to the flooding assessment presented in the EIS.
- ii. A qualitative assessment was made of the flood related impacts of the changes to construction areas and activities that are proposed under the amended project. For this task, the potential flood risk to the proposed changes to construction areas and activities, as well as their impact on existing flood behaviour were assessed based on an understanding of flood behaviour under pre-project conditions during a 1% AEP event.
- iii. The assessment of flood related impacts of the changes to operational elements that are proposed under the amended project involved:
 - a. A quantitative assessment of flood related impacts associated with the new bridges over the Talbragar River and Laheys Creek (a tributary of Sandy Creek) that are proposed as part of the upgrades of Merotherie Road and Spring Ridge Road. For this task, the Talbragar River and Sandy Creek TUFLOW models that had been developed to define flood behaviour under present day (i.e. pre-project) conditions were adjusted to incorporate details of the proposed new bridge arrangements at Merotherie Road and Spring Ridge Road, respectively.
 - b. For other changes to operational elements that are proposed under the amended project, a qualitative assessment was made of the potential flood related impacts based on an understanding of existing flood behaviour, as well as the general nature of the proposed operational works.
- iv. Based on the assessment of flood related impacts associated with the construction and operation of the amended project, the flood mitigation measures set out in Technical Paper 15 were reviewed to identify whether any additional measures were required in order to mitigate the impact of the amended project on flood behaviour.

Existing environment

While the construction and operational footprints of the amended project have changed in some areas, the increased extent of the amended project still lies within the study area and extent of flood mapping that is presented in Technical Paper 15. The catchment description and description of existing flood behaviour that is presented in Section 4 of Technical Paper 15 is therefore also applicable to the amended project.

Of particular relevance to the upgrades to Merotherie Road and Spring Ridge Road that are proposed as part of the amended project, Section 4.3 of Technical Paper 15 of the EIS (**Technical Paper 15**) contains the following description of existing flood behaviour:

- i. The section of Merotherie Road where it runs between the Golden Highway and the proposed Merotherie Energy Hub is frequently inundated by flow in the Talbragar River and Cainbil Creek. During a 10% AEP event, flooding to Merotherie Road at its crossings of the Talbragar River and Cainbil Creek occurs over a length of about 1,700 metres and a maximum depth of 1 metre, increasing to a length of 1,750 metres and a maximum depth of 2 metres during a 1% AEP event. The depth and velocity of flow along the section of Merotherie Road where it crosses the Talbragar River and Cainbil Creek would be hazardous to vehicles and their occupants during floods more frequent than 10% AEP.¹
- ii. During the PMF, the section of Merotherie Road where it crosses the Talbragar River and Cainbil Creek would be inundated over a length of more than 5,000 metres and to depths of up to 10 metres.
- iii. The section of Spring Ridge Road to the west of the site of the proposed Elong Elong Energy Hub is frequently inundated by flow in Laheys Creek. During a 10% AEP event, flooding to Spring Ridge Road at its crossing of Laheys Creek occurs over a length of about 940 metres and a maximum depth of 3.3 metres, increasing to a length of 970 metres and a maximum depth of 4 metres during a 1% AEP event. The depth and velocity of flow along the section of Spring Ridge Road at its crossing of Laheys Creek would be hazardous to vehicles and their occupants during floods more frequent than 10% AEP.¹
- iv. During the PMF, the section of Spring Ridge Road where it runs along Laheys Creek to the north and south of its intersection with Dapper Road would be inundated over a length of about 10 kilometres and depths of up to 9 metres.

Merotherie Road is also inundated during storms more frequent than 10% AEP due to local overland flow in several drainage lines and minor tributaries of the Talbragar River that cross the road between the proposed Merotherie Energy Hub and the river.

Assessment of potential impacts during construction

Potential flood risk at construction work areas associated with the amended project

Section 5.1 of Technical Paper 15 contains a description of the flood related risks associated with the types of activities that are proposed to construct the project. In addition to the construction activities that are described in Section 5.1 of Technical Paper 15, the amended project would also involve the construction of two new bridges over the Talbragar River and Laheys Creek as part of the proposed upgrades to Merotherie Road and Spring Ridge Road, respectively.

The assessment found that the area required to construct the new bridges over the Talbragar River and Laheys Creek within the Merotherie and Spring Ridge Road construction work areas would be inundated by floodwater during a 10% AEP event to depths and velocities that would be hazardous to construction personnel, plant and material. It will therefore be necessary to implement measures to manage the flood risks associated with the construction of these new bridges. A broader outline of such measures is provided in **Section 6** of this technical note.

¹ Based on the hazard vulnerability classification of flooding set out in *Australian Rainfall and Runoff* (Geoscience Australia, 2019).

Potential impacts of construction activities of the amended project on flood behaviour

The assessment found that, without the implementation of appropriate mitigation measures, the construction activities associated with the amended project would have the potential to:

- i. impact on flood behaviour to a similar degree as the project that was presented in the EIS in regards to the construction of the Merotherie energy hub, switching stations, Neeleys Lane construction work area, and transmission lines within the 330 kV and 500 kV construction works areas
- ii. result in additional impacts on flood behaviour and flood risks to construction personnel and machinery over a small component of the relocated Elong Elong construction compound along its eastern edge that is impacted by mainstream flooding from Laheys Creek. As identified in Section 6 of this technical note, during detailed construction planning the layout of the Elong Elong construction compound would be revised to locate the proposed construction compound outside the area impacted by mainstream flooding from Laheys Creek during a 1% AEP flood.
- iii. result in additional impacts on flood behaviour when compared to the project that was presented in the EIS in regard to the construction of the new bridges over the Talbragar River and Laheys Creek within the Merotherie and Spring Ridge Road construction works areas.

In regards to item iii. above, temporary access roads and working platforms that would be required to construct the new bridges over the Talbragar River and Laheys Creek may need to cross part of the main channel and immediate overbank areas of the creek or river in areas that would be frequently inundated by flow. It would therefore be necessary to design and construct the temporary access roads and working platforms to manage the potential for scour and transport of material into the watercourses, whilst also maintaining a passage for the conveyance of floodwater through the construction site. **Section 6** provides a summary of potential measures to manage these impacts.

Assessment of potential impacts during operation

New Wollar Switching Station, Merotherie Energy Hub and Elong Elong Energy Hub

Under the amended project, there would be no change in the general layout of the New Wollar Switching Station, Merotherie Energy Hub and Elong Elong Energy Hub. It can therefore be concluded that the assessment of flood related impacts that is presented in Sections 6.1.1 to 6.1.3 of Technical Paper 15 would also be applicable to the amended project.

Transmission line corridors and switching stations

The assessment found that while the amended project would involve changes to the alignment and extent of the transmission line corridors and switching stations, there would be no significant change in their overall level of flood affectation. On this basis, the assessment of flood related impacts associated with the transmission line corridors and switching stations that is presented in Section 6.1.4 and 6.1.5 of Technical Paper 15 would also be applicable to the amended project.

Merotherie Road and Spring Ridge Road Upgrades

The amended project would include the upgrade of:

- the section of Merotherie Road where it runs between the Merotherie Energy Hub and the Golden Highway, which would include a new bridge crossing over the Talbragar River (denoted the **Merotherie Road upgrade**)
- the section of Dapper Road and Spring Ridge Road where it runs between the Elong Elong Energy Hub and a location north of Laheys Creek, which would include a new bridge crossing over Laheys Creek (denoted the **Spring Ridge Road upgrade**).

In order to assess the impact that the new bridges over the Talbragar River and Laheys Creek would have on flood behaviour, the structure of the flood models representing pre-project conditions were adjusted to incorporate details of the proposed works. The assessment found that once constructed the new bridges would generally have only a minor impact on flood behaviour in areas outside the road corridor. While the new bridges have the potential to result in localised increases in flow velocities, impacts are confined to the road corridor where scour protection measures would be provided to manage the increase in scour potential.

The change in road footprint and levels associated with the widening and sealing of the sections of road along the remainder of the Merotherie Road and Spring Ridge Road upgrades has the potential to obstruct floodwaters and alter overland flow patterns, which in turn may impact on the extent, duration and depth of inundation as well as flow velocities in areas outside the road corridor. During detailed design, a detailed three-dimensional layout of the proposed road widening and sealing would be developed, which would inform the layout of the associated drainage measures that are aimed at controlling external catchment runoff. These measures would include table drains along the upslope side of the road that would discharge to existing and new transverse drainage structures at drainage line crossings. These detailed layouts of the proposed road widening and sealing would also be used to undertake a detailed assessment of the impact that the proposed road upgrade would have on flooding patterns and to identify the scope of additional drainage measures that would be required to manage any resulting adverse impacts due to changes in the depth, velocity and duration of inundation external to the road corridor. These additional drainage measures may include:

- the augmentation of existing transverse drainage structures where required to offset the impact that raising existing road levels would have on obstructing floodwaters and overland flow
- the provision of additional drainage crossings and level spreaders to manage the impact of the proposed road upgrade on any redistribution of flow discharging to downstream areas
- energy dissipation and scour protection to manage localised increases in flow velocities at the outlets to drainage culverts and channels.

Updated or additional mitigation measures

Table 3 in Section 6 of this technical note sets out the environmental management measures that would be implemented to manage flood related impacts during the construction and operation of the amended project in addition to measures FL01 to FL09 that are set out in the EIS.

1. Introduction

Background

As the existing 330 kilovolt (kV) transmission network in the Central-West Orana region is not capable of transferring the amount of electricity expected to be generated from new renewable energy generation and storage projects in the Central-West Orana REZ, the development of new transmission infrastructure is required to provide additional electricity transfer capacity in the region to connect these projects to the NEM.

EnergyCo is proposing the construction and operation of new electricity transmission infrastructure, new energy hubs and switching stations and ancillary works required to connect new renewable energy generation and storage projects within the Central-West Orana REZ to the NSW transmission network (the project). The project is located within the Warrumbungle, Mid-Western Regional, Dubbo Regional and Upper Hunter local government areas (LGAs) and generally extends north to south from Cassilis to Wollar and east to west from Cassilis to Goolma. An Environmental Impact Statement (EIS) was prepared to support EnergyCo's application for approval of the project in accordance with the requirements of Division 5.2 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act). The EIS was placed on public exhibition by the then NSW Department of Planning and Environment (DPE) (now the NSW Department of Planning, Housing and Infrastructure (DPHI)) for six weeks between 28 September to 8 November 2023. The original 28 day exhibition period was extended by two weeks (to a total of 42 days) to give the community more time to provide feedback.

During the public exhibition period, government agencies, stakeholders and the community had the opportunity to make a written submission to the DPE for consideration in its assessment of the project. Consultation activities were conducted during this time to involve stakeholders and the broader community in exhibition activities, provide guidance on the submissions process, and encourage parties to engage with the information in the EIS and make a submission accordingly. Submissions on the EIS were made directly to DPHI, and were accepted via electronic submission or by post. A Response to Submissions Report (Submissions Report) has been prepared to respond to the submissions received as part of this process.

Project overview

The project would enable 4.5 gigawatts of new network capacity to be unlocked initially. Other transmission infrastructure beyond the scope of the EIS may be required to provide a network capacity beyond 4.5 gigawatts, and would be subject to separate planning approval. It would enable renewable energy generators to access new transmission infrastructure within the Central West Orana REZ to export electricity to the NSW transmission network (as part of the National Electricity Market (NEM)). Importantly, the development of renewable energy generation projects in the Central-West Orana REZ is the responsibility of private generators and subject to separate planning and environmental approvals.

The project (as exhibited)

The project as described in the publicly exhibited EIS (hereafter referred to as the '**exhibited project**') included the following features:

- a new switching station (the New Wollar Switching Station), located at Wollar to connect the project to the existing 500 kilovolts (kV) transmission network

- around 90 kilometres of twin double circuit 500 kV transmission lines and associated infrastructure to connect the two energy hubs to the existing NSW transmission network via the New Wollar Switching Station
- energy hubs at Merotherie and Elong Elong (including a potential battery storage option at the Merotherie Energy Hub) to connect renewable energy generation projects within the Central West Orana REZ to the 500 kV network infrastructure
- around 150 kilometres of single circuit, double circuit and twin double circuit 330 kV transmission lines, to connect renewable energy generation projects within the Central-West Orana REZ to the two energy hubs
- thirteen switching stations along the 330 kV network infrastructure at Cassilis, Coolah, Leadville, Merotherie, Tallawang, Dunedoo, Cobbora and Goolma, to transfer the energy generated from the renewable energy generation projects within the Central-West Orana REZ onto the project's 330 kV network infrastructure
- underground fibre optic communication cables along the 330 kV and 500 kV transmission lines between the energy hubs and switching stations
- construction of microwave repeater sites at locations along the alignment, as well as off the alignment at Botobolar, to provide a communications link between the project and the existing electricity transmission and distribution network
- a maintenance facility within the Merotherie Energy Hub to support the operational requirements of the project
- establishment of new, and upgrade of existing access tracks for transmission lines, energy hubs, switching stations and other ancillary works areas within the construction area (such as temporary waterway crossings, laydown and staging areas, earthwork material sites with crushing, grinding and screening plants, concrete batching plants, brake/winch sites, site offices and workforce accommodation camps)
- property adjustment works to facilitate access to the transmission lines and switching stations. These works include the relocation of existing infrastructure on properties that are impacted by the project
- utility adjustments required for the construction of the transmission network infrastructure, along with other adjustments to existing communications, water and wastewater utilities. This would include adjustments to existing Transgrid and Essential Energy transmission infrastructure. This includes adjustments to Transgrid's 500 kV transmission lines 5A3 (Bayswater to Mount Piper) and 5A5 (Wollar to Mount Piper) to provide a connection to the existing NSW transmission network, including new transmission line towers along the Transgrid network along the frontage of the New Wollar Switching Station, and other locations where there is an interface with Transgrid's network.

The Project (as amended)

In response to community, government and stakeholder engagement, consideration of submissions received during EIS exhibition, and ongoing development of the design and construction methodology for the project, EnergyCo is proposing a number of amendments and refinements to the exhibited project.

The amendments and refinements to the exhibited project also confirm certain elements of the project that were highlighted as options or opportunities in the EIS (hereafter referred to as '**the EIS alignment**'). The proposed amendments would minimise the potential impacts of the project where practicable, particularly in relation to land use and property, traffic and access, and biodiversity.

The proposed amendments to the project as described in the EIS (inclusive of the proposed alignment and other refinements and clarification to the EIS project) are collectively referred to in this report as the '**amended project**'.

The key amendments and refinements to the project include:

- changes to the 500 kV and 330 kV transmission line alignments
- relocating five 330 kV switching stations and providing an additional 330 kV switching station
- inclusion of a lay down area at the construction compound at the Neeleys Lane workforce accommodation camp
- additional brake and winch sites (to facilitate transmission line conductor installation) and changes to the location of previously identified brake and winch sites along the EIS alignment
- confirming the locations of microwave repeater sites
- refining the alignments of access roads at the energy hubs and New Wollar Switching Station
- refining the alignments of access tracks and providing additional access tracks
- refining the alignment of local road, bridge and intersection upgrades, including bridge and drainage works
- removing the option to have one 200 megawatts/400 megawatts per hour battery energy storage system (BESS) at the Merotherie Energy Hub
- an additional crushing, grinding and screening plant at switching station M1
- refining the operation area and construction area.

Further information about the proposed amendments and refinements is provided in the Amendment Report.

Purpose and outline of this technical note

The purpose of this technical note is to assess the potential flood related impacts of the project amendments and refinements. This technical note considers whether the proposed amendments to the project would result in any changes to the flood impacts that are described in the EIS, and whether any changes to the flood related mitigation measures are required.

This report is to be read in conjunction with the EIS for the project and specifically Technical Paper 15 – Flooding (**Technical Paper 15**).

The structure and content of this technical note is as follows:

- **Section 1** provides an introduction to this technical note (this section).
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- **Section 2** provides an overview of the methodology that was adopted in carrying out the additional flood assessment of the changes associated with the amended project.
- **Section 3** describes the existing environment of the amended project as it relates to flooding. This section of the technical note also includes a set of figures showing the extent of the amended project overlaid onto the flood mapping that was presented in Technical Paper 15.
- **Section 4** describes the potential flood risks to the amended project and its impact on flood behaviour during its construction, in comparison to those of the project that were presented in the EIS.
- **Section 5** describes the potential flood risks to the amended project and its impact on flood behaviour during its operation, in comparison to the those of the exhibited project that were presented in the EIS.
- **Section 6** provides recommended mitigation and management measures in addition to those set out in Technical Paper 15 which are aimed at avoiding, minimising and managing any potential flood related risks and impacts associated with the construction and/or operation of the amended project.

2. Assessment methodology

Overview

The flood assessment for the amended project was carried out in accordance with the assessment criteria and standards set out in Section 3.3 of Technical Paper 15.

The approach that was adopted in carrying out the flood assessment for the amended project was broadly as follows:

- i. The amended project was reviewed against the project that was presented in the EIS to identify the proposed changes and the associated scope of updates that would be required to the flooding assessment presented in the EIS.
- ii. A qualitative assessment was made of the flood related impacts of the changes to construction areas and activities that are proposed under the amended project. Consistent with the approach that was adopted in Technical Paper 15, the potential flood risk of the proposed changes to construction areas and activities, as well as their impact on existing flood behaviour were assessed based on an understanding of flood behaviour under pre-project conditions during a 1% AEP event. Consideration was also given to the potential for localised overland flooding to occur in the additional construction areas that are proposed under the amended project.
- iii. Consistent with the current level of design development and the approach that was adopted in Technical Paper 15, the assessment of flood related impacts of the changes to operational elements that are proposed under the amended project involved the following:
 - a. For the new bridges over the Talbragar River and Laheys Creek (a tributary of Sandy Creek) that are proposed as part of the upgrades of Merotherie Road and Spring Ridge Road, a quantitative assessment was made of their impact on mainstream flooding. For this task, the Talbragar River and Sandy Creek TUFLOW models that had been developed to define flood behaviour under present day (i.e. pre-project) conditions were adjusted to incorporate details of the proposed new bridge arrangements at Merotherie Road and Spring Ridge Road, respectively.
 - b. For other changes to operational elements that are proposed under the amended project, a qualitative assessment was made of the potential flood related impacts based on an understanding of existing flood behaviour, as well as the general nature of the proposed operational works.
- iv. Based on the assessment of flood related impacts associated with the construction and operation of the amended project, the flood mitigation measures set out in Technical Paper 15 were reviewed to identify whether any additional measures were required in order to mitigate the impact of the amended project on flood behaviour.

3. Existing environment

Catchment overview

The study area described in Sections 4.1 and 4.2 of Technical Paper 15 covered the following key catchments where the project would have the potential to influence, or be influenced by, flooding:

- Within the Hunter River system:
 - Wollar Creek
 - Goulburn River
 - Murrumbline Creek
 - Four Mile Creek
- Within the Macquarie River system:
 - Talbragar River
 - Collaburragundy River
 - Tucklan Creek
 - Sandy Creek
 - Slapdash Creek

While the construction and operational footprints of the amended project have changed in some areas, the increased extent of the amended project still lies within the study area that is presented in Technical Paper 15. The catchment description that is presented in Sections 4.1 and 4.2 of Technical Paper 15 is therefore also applicable to the amended project.

Description of existing flood behaviour

Section 4.3 of Technical Paper 15 contains a description of the nature of mainstream and local catchment flooding under present day (or pre-project) conditions for floods ranging between 10% and 0.2% Annual Exceedance Probability (AEP), as well as the Probable Maximum Flood (PMF). Mainstream and local catchment flooding have been collectively termed 'flooding' within this technical note.

The following figures show the footprint of the amended project overlaid onto the flood mapping outputs that were produced as part of the flood assessment that is presented in Technical Paper 15:

- **Figures 1, 2 and 3** (6 sheets each) show the indicative extent and depth of inundation for floods with AEPs of 10% and 1%, as well as the PMF event across the full extent of the amended project.
- **Figures 4, 5 and 6** (4 sheets each) show the indicative extent and depth of inundation for floods with AEPs of 10% and 1%, as well as the PMF event in the vicinity of the section of Merotherie Road that is proposed to be upgraded as part of the amended project. Corresponding extents and depths of inundation in the vicinity of the sections of Spring Ridge Road and Dapper Road that are proposed to be upgraded as part of the amended project are provided in **Figures 7, 8 and 9** (2 sheets each).

- **Annexure A** of this technical note contains a series of figures showing maximum flow velocities and durations of inundation in the vicinity of the proposed upgrades to Merotherie Road and Spring Ridge Road for floods with AEPs of 10% and 1%. These data have principally been used to assess the impact that the proposed energy hubs and new substations would have on flow velocities (and hence scour potential) and durations of inundation.

The increased footprint of the amended project still lies within the extent of the flood mapping that is present in Technical Paper 15. The description of existing flood behaviour that is presented in Section 4.3 of Technical Paper 15 is also applicable to the amended project. Of particular relevance to the upgrades to Merotherie Road and Spring Ridge Road that are proposed as part of the amended project, Section 4.3 of Technical Paper 15 contains the following description of existing flood behaviour:

- i. The section of Merotherie Road where it runs between the Golden Highway and the Merotherie Energy Hub is frequently inundated by flow in the Talbragar River and Cainbil Creek. During a 10% AEP event, flooding to Merotherie Road at its crossings of the Talbragar River and Cainbil Creek occurs over a length of about 1,700 metres and a maximum depth of 1 metre, increasing to a length of 1,750 metres and a maximum depth of 2 metres during a 1% AEP event. The depth and velocity of flow along the section of Merotherie Road where it crosses the Talbragar River and Cainbil Creek would be hazardous to vehicles and persons during storms more frequent than 10% AEP.
- ii. During the PMF, the section of Merotherie Road where it crosses the Talbragar River and Cainbil Creek would be inundated over a length of more than 5,000 metres and to depths of up to 10 metres.
- iii. The section of Spring Ridge Road to the west of the site of the proposed Elong Elong Energy Hub is frequently inundated by flow in Laheys Creek. During a 10% AEP event, flooding to Spring Ridge Road at its crossing of Laheys Creek occurs over a length of about 940 metres and a maximum depth of 3.3 metres, increasing to a length of 970 metres and a maximum depth of 4 metres during a 1% AEP event. The depth and velocity of flow along the section of Spring Ridge Road at its crossing of Laheys Creek would be hazardous to vehicles and persons during floods more frequent than 10% AEP.
- iv. During the PMF, the section of Spring Ridge Road where it runs along Laheys Creek to the north and south of its intersection with Dapper Road would be inundated over a length of about 10 kilometres and depths of up to 9 metres.

4. Construction impact assessment

Overview

Section 5 of Technical Paper 15 presented the findings of an assessment of the flood risk associated with the construction of the project, as well as an overview of the potential impacts that the proposed construction activities could have on flood behaviour.

For the purpose of the assessment that was presented in Technical Paper 15, the construction footprint was split into:

- an area of work associated with the construction of the New Wollar Switching Station, including its associated construction compound (referred to as the **New Wollar construction work area**)
- an area of work associated with the construction of the Merotherie Energy Hub including the associated accommodation camp for the construction workforce (denoted the **Merotherie Road workforce accommodation camp**) and construction compound (collectively referred to as the **Merotherie construction work area**).
- an area of work associated with the construction of the Elong Elong Energy Hub, including its associated construction compound (referred to as the **Elong Elong construction work area**)
- areas along the transmission line corridors for the construction of the proposed 500 kV and 330 kV networks and associated access tracks (referred to as the **proposed 500 kV network** and **proposed 330 kV network construction work areas**)
- areas for construction of the 330 kV switching stations (referred to as **switching stations M1 to M9 and E1 to E4 construction work areas**)
- an area adjacent to Neeleys Lane, Cassilis to construct temporary accommodation camps for the construction workforce (referred to in this technical paper as the **Neeleys Lane workforce accommodation and construction compound**).

Under the amended project:

- the extent and proposed activities within the construction areas listed above would be adjusted to suit the revised project footprint and scope of works
- an additional construction work area would be required to construct the additional switching station that would be located about seven kilometres east of the Elong Elong Energy Hub (referred to as **switching station E5 construction work area**)
- the area proposed for the Neeleys Lane workforce accommodation camp in the EIS would include a construction compound in addition to a workforce accommodation camp, as well as upgrades to the intersection of Neeleys Lane and Ulan Road to support vehicle movements (**Neeleys Lane construction work area**).
- additional construction work areas would also be required to construct the upgrade of local roads that service the Merotherie and Elong Elong Energy Hubs (respectively referred to as the **Merotherie Road** and **Spring Ridge Road construction work areas**).

Table 5.1 at the end of Section 5 of Technical Paper 15 provides a summary of the assessed flood risk associated with the proposed construction activities at each construction work area of the project, as well as a qualitative assessment of the potential impacts that they could have on

flood behaviour. **Table 1** at the end of this section provides an update of the assessment that was presented in Table 5.1 of Technical Paper 15 based on the proposed changes to the construction work areas and associated activities under the amended project. **Figure 10** (6 sheets) attached to this technical note shows the extent to which floods of varying magnitude affect each construction work area across the extent of the amended project.

Potential flood risk at construction work areas of the amended project

Section 5.1 of Technical Paper 15 contains a description of the flood related risks associated with the types of activities that are proposed to construct the project.

In addition to the construction activities that are described in Section 5.1 of Technical Paper 15, the amended project would also involve the construction of two new bridges over the Talbragar River and Laheys Creek as part of the proposed upgrades to Merotherie Road and Spring Ridge Road, respectively.

Table 1 shows that the area required to construct the new bridges over the Talbragar River and Laheys Creek within the Merotherie and Spring Ridge Road construction work areas would be inundated by floodwater during a 10% AEP event to depths and velocities that would be hazardous to construction personnel, plant and material. It will therefore be necessary to implement measures to manage the flood risks associated with the construction of these new bridges. A broader outline of such measures is provided in **Section 6** of this technical note.

Potential impacts of construction activities of the amend project on flood behaviour

Section 5.2 of Technical Paper 15 presented the findings of a qualitative assessment of the potential impacts that construction activities associated with the project could have on flood behaviour. **Table 1** shows that, without the implementation of appropriate mitigation measures, the construction activities associated with the amended project would have the potential to:

- i. impact on flood behaviour to a similar degree as the project that was presented in the EIS in regards to the construction of the Merotherie energy hub, switching stations, Neeleys Lane construction work area and transmission lines within the 330 kV and 500 kV construction works areas
- ii. result in additional impacts on flood behaviour and flood risks to construction personnel and machinery over a small component of the relocated Elong Elong construction compound along its eastern edge that is impacted by mainstream flooding from Laheys Creek. During detailed construction planning the layout of the Elong Elong construction compound will be revised to locate the proposed construction compound outside the area impacted by mainstream flooding from Laheys Creek during a 1% AEP flood in accordance with the additional mitigation measures set out in **Section 6** of this technical note
- iii. result in additional impacts on flood behaviour when compared to the project that was presented in the EIS in regard to the construction of the new bridges over the Talbragar River and Laheys Creek within the Merotherie and Spring Ridge Road construction works areas.

In regards to item iii, in order to construct the new bridges over the Talbragar River and Laheys Creek, temporary access roads would be required to move machinery and material to each bridge construction area, while working platforms would be required to support piling rigs and cranes.

The temporary access roads and working platforms may need to cross part of the main channel and immediate overbank areas of the creek or river in areas that would be frequently inundated by flow in the two watercourses. It would therefore be necessary to design and construct the temporary access roads and working platforms to manage the potential for scour and transport of material into the watercourses, whilst also maintaining a passage for the conveyance of floodwater through the construction site.

While the findings of the assessment provides an indication of the potential impacts of the construction activities associated with the new bridges over the Talbragar River and Laheys Creek on flood behaviour, further investigation would need to be undertaken during detailed design, as layouts of temporary access roads and working platforms, and the proposed staging of works are further developed. Consideration would also need to be given to setting an appropriate hydrologic standard for mitigating the impacts of construction activities on flood behaviour, taking into account their temporary nature and therefore the likelihood of a flood of a given AEP occurring during the construction period.

Section 6 of this technical note sets out additional measures which will be implemented as part of the amended project to mitigate the potential impacts of the construction of the new bridges over the Talbragar River and Laheys Creek on flood behaviour.

TABLE 1
SUMMARY OF ASSESSED FLOOD RISKS AND POTENTIAL IMPACTS AT PROPOSED CONSTRUCTION WORK AREAS
OF THE AMENDED PROJECT

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Assessment of Flood Affection of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾	Bridge construction ⁽⁶⁾		
New Wollar construction work area	Construction compound	More frequent than 10% AEP	✓	✓	✓	x	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 2. The level of flood affection would be similar to that presented in Table 5.1 of Technical Paper 15, noting that the footprint of the New Wollar construction work area would be reduced slightly under the amended project. There would be no change to the footprint of the New Wollar construction compound. 	<ul style="list-style-type: none"> The potential for activities within the New Wollar construction work area to impact flood behaviour would be similar to those identified in Table 5.1 of Technical Paper 15.
	Other areas	More frequent than 10% AEP	x	x	✓	✓	x		
Merotherie construction work area	Construction compound	More frequent than 10% AEP	✓	✓	✓	x	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 4. No change to that presented in the Table 5.1 of Technical Paper 15. 	<ul style="list-style-type: none"> No change to that presented in the Table 5.1 of Technical Paper 15.
	Merotherie Road workforce accommodation camp	More frequent than 10% AEP	✓	✓	x	x	x		
	Other areas	More frequent than 10% AEP	x	x	✓	✓	X		

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Assessment of Flood Affection of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾	Bridge construction ⁽⁶⁾		
Elong Elong construction work area	Construction compound	More frequent than 10% AEP	✓	✓	✓	x		<ul style="list-style-type: none"> Refer to Figure 10, sheet 2. While the overall footprint and therefore level of flood affection of the Elong Elong construction work area would not change under the amended project, the construction compound would be relocated further north of its proposed location in the EIS. A small component of the relocated Elong Elong construction compound along its eastern edge would be inundated by mainstream flooding from Laheys Creek during a 1% AEP flood to depths and velocities that would be hazardous to construction personnel and machinery. During detailed design and construction planning the layout of the construction compound will be revised to locate the proposed construction compound outside the area impacted by mainstream flooding from Laheys Creek during a 1% AEP flood. The level of flood affection to the relocated Elong Elong construction compound due to local catchment flooding would be similar to that presented in the EIS. The mitigation measures set out in the EIS for managing 	<ul style="list-style-type: none"> Activities within a small component of the relocated Elong Elong construction compound along its eastern edge have the potential to obstruct the conveyance of flow in Laheys Creek during floods greater than 10% AEP in magnitude. The potential for activities across the remainder of the Elong Elong construction work area to impact flood behaviour would be similar to those identified in Table 5.1 of Technical Paper 15.
	Other areas	More frequent than 10% AEP	x	x	✓	✓	x		

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Bridge construction ⁽⁶⁾	Assessment of Flood Affection of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾				
									local catchment runoff would therefore also apply to the relocated Elong Elong construction compound.	
500 kV network construction work area		More frequent than 10% AEP	x	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheets 2, 3, 4 and 5. The revised footprint of the 500 kV network construction work area under the amended project would have a similar level of flood affection to that described in Table 5.1 of Technical Paper 15. 	<ul style="list-style-type: none"> The potential for activities within the 500 kV network construction work area to impact flood behaviour would be similar to those identified in Table 5.1 of Technical Paper 15. 	
330 kV network construction work area		More frequent than 10% AEP	x	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheets 3, 4, 5 and 6. The revised footprint of the 330 kV network construction work area under the amended project would have a similar level of flood affection to that described in Table 5.1 of Technical Paper 15. 	<ul style="list-style-type: none"> The potential for activities within the 500 kV network construction work area to impact flood behaviour would be similar to those identified in Table 5.1 of Technical Paper 15. 	
Switching station M1		Not flooded	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 6. No change to that presented in the Table 5.1 of Technical Paper 15. 	<ul style="list-style-type: none"> No change to that presented in the Table 5.1 of Technical Paper 15. 	
Switching station M2		More frequent than 10% AEP	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 6. Under the amended project, switching station M2 would be relocated approximately 500 m north of its location in the EIS. A local overland flow path runs through the 	<ul style="list-style-type: none"> Activities within the switching station M2 construction work area would have the potential to alter flooding and drainage patterns in the overland flow path that runs through the western portion of the 	

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Bridge construction ⁽⁶⁾	Assessment of Flood Affection of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾				
									western portion of the relocated site of switching station M2 where depths of inundation are a maximum of 0.16 m during a 10% AEP event, increasing to 0.22 m during a 1% AEP event. The extent of flood affectation is similar to that of the site presented in the EIS. <ul style="list-style-type: none"> The remainder of the site is not impacted by mainstream flooding or major overland flow. 	site. The potential impacts would be similar to that of the site presented in the EIS.
Switching station M3		More frequent than 10% AEP	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 6. Under the amended project, switching station M3 would be relocated approximately 850 m north of its location in the EIS. While the relocated site is not impacted by mainstream flooding or major overland flow, it would be inundated by local catchment runoff from upslope areas to its east. Depths of inundation across the site would typically be less than 0.1 m during a 1% AEP event. 	<ul style="list-style-type: none"> Activities within the site are expected to have only a minor impact on flood behaviour given the minor nature of overland flow that is presently conveyed through the site. 	
Switching station M4		More frequent than 10% AEP	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 4. No change to that presented in the Table 5.1 of Technical Paper 15. 	<ul style="list-style-type: none"> No change to that presented in the Table 5.1 of Technical Paper 15. 	
Switching		More	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 4. 	<ul style="list-style-type: none"> No change to that presented in the 	

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Bridge construction ⁽⁶⁾	Assessment of Flood Affection of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾				
station M5		frequent than 10% AEP							<ul style="list-style-type: none"> No change to that presented in the Table 5.1 of Technical Paper 15. 	Table 5.1 of Technical Paper 15.
Switching station M6		More frequent than 10% AEP	✓	✓	✓	✓	x		<ul style="list-style-type: none"> Refer to Figure 10, sheet 4. No change to that presented in the Table 5.1 of Technical Paper 15. 	<ul style="list-style-type: none"> No change to that presented in the Table 5.1 of Technical Paper 15.
Switching station M7		More frequent than 10% AEP	✓	✓	✓	✓	x		<ul style="list-style-type: none"> Refer to Figure 10, sheet 4. Under the amended project, switching station M7 would be relocated approximately 1,600 m north of its location in the EIS. While the relocated site is not impacted by mainstream flooding or major overland flow, it would be inundated by local catchment runoff from upslope areas to its east. Depths of inundation across the site would typically be less than 0.1 m during a 1% AEP event. The extent of flood affection is less than that of the site presented in the EIS. 	<ul style="list-style-type: none"> Activities within the site are expected to have only a minor impact on flood behaviour given the minor nature of overland flow that is presently conveyed through the site.
Switching station M8		More frequent than 10% AEP	✓	✓	✓	✓	x		<ul style="list-style-type: none"> Refer to Figure 10, sheet 4. No change to that presented in the Table 5.1 of Technical Paper 15. 	<ul style="list-style-type: none"> No change to that presented in the Table 5.1 of Technical Paper 15.
Switching		More	✓	✓	✓	✓	x		<ul style="list-style-type: none"> Refer to Figure 10, sheet 4. 	<ul style="list-style-type: none"> No change to that presented in the

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Bridge construction ⁽⁶⁾	Assessment of Flood Affection of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾				
station M9		frequent than 10% AEP							<ul style="list-style-type: none"> No change to that presented in the Table 5.1 of Technical Paper 15. 	Table 5.1 of Technical Paper 15.
Switching station E1		More frequent than 10% AEP	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 5. Under the amended project, switching station E1 would be relocated approximately 800 m south of its location in the EIS. While the relocated site is not impacted by mainstream flooding, it is presently inundated by flow that is conveyed along a local drainage line that runs through the middle of the site. Depths of flow along the drainage line occurs to a maximum of 0.2 m during a 1% AEP event. The extent of flood affection is similar to that of the site presented in the EIS. 	<ul style="list-style-type: none"> Activities within the relocated switching station E1 construction work area have the potential to obstruct flows and alter flooding and drainage patterns in the local drainage line that runs through the middle of the site. The potential impacts would be similar to that of the site presented in the EIS. 	
Switching station E2		More frequent than 10% AEP	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 5. No change to that presented in the Table 5.1 of Technical Paper 15. 	<ul style="list-style-type: none"> No change to that presented in the Table 5.1 of Technical Paper 15. 	
Switching station E3		More frequent than 10% AEP	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 10, sheet 5. No change to that presented in the Table 5.1 of Technical Paper 15. 	<ul style="list-style-type: none"> No change to that presented in the Table 5.1 of Technical Paper 15. 	

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Bridge construction ⁽⁶⁾	Assessment of Flood Affection of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾				
Switching station E4		More frequent than 10% AEP	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 5.1, sheet 5. Under the amended project, switching station E4 would be relocated approximately 400 m east of its location in the EIS. While the relocated site is not impacted by mainstream flooding, it is presently inundated by flow that is conveyed along two local drainage lines that runs through the northern and southern portions of the site. Depths of flow along the drainage lines occur to a maximum of 0.6 m, but typically less than 0.3 m during a 1% AEP event. The extent of flood affection is slightly greater than that of the site presented in the EIS. 	<ul style="list-style-type: none"> Activities within the relocated switching station E4 construction work area have the potential to obstruct flows and alter flooding and drainage patterns in the local drainage lines that runs through the northern and southern portions of the site. The potential impacts would be slightly greater than that of the site presented in the EIS. 	
Switching station E5		More frequent than 10% AEP	✓	✓	✓	✓	x	<ul style="list-style-type: none"> Refer to Figure 5.1, sheet 5. Under the amended project, an additional switching station E5 would be constructed approximately 3,500 m east of the Elong Elong Energy Hub. While the site of the additional switching station E5 is not impacted by mainstream flooding or major overland flow it would be inundated by local catchment runoff from upslope areas to its east. Depths of inundation across the site would typically be 	<ul style="list-style-type: none"> Activities within the site are expected to have only a minor impact on flood behaviour given the minor nature of overland flow that is presently conveyed through the site. 	

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Assessment of Flood Affection of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾	Bridge construction ⁽⁶⁾		
								less than 0.1 m during a 1% AEP event.	
Neeleys Lane		More frequent than 10% AEP	✓	✓	x	x	x	<ul style="list-style-type: none"> Refer to Figure 5.1, sheet 6. Under the amended project, the construction work area at Neeleys Lane would cover a similar extent to that in the EIS but would include a construction compound in addition to workforce accommodation. The extent of flood affectation and the flood related risks to the activities that are proposed within the construction work area would be similar to that of the Neeleys Lane workforce accommodation camp that was presented in the EIS. 	<ul style="list-style-type: none"> The potential for the activities within the Neeleys Lane workforce accommodation and construction compound to impact on flood behaviour would be similar to that of the Neeleys Lane workforce accommodation camp that was presented in the EIS.
Merotherie Road		More frequent than 10% AEP	x	✓	✓	x	✓	<ul style="list-style-type: none"> Refer to Figure 10, sheets 4 and 6. Under the amended project, construction works would be required to upgrade the section of Merotherie Road where it runs between the Merotherie Energy Hub and the Golden Highway. The Merotherie Road construction work area would be frequently inundated by flow in the Talbragar River and Cainbil Creek, as well as several local drainage lines that cross Merotherie Road to the north and south of 	<ul style="list-style-type: none"> The depth and velocity of flow through the bridge construction area during a 10% AEP event would be hazardous to construction personnel, plant and material. The temporary working platforms to construct the new bridge over the Talbragar River have the potential to obstruct the conveyance of flow in the river during events more frequent than 10% AEP, which in turn could impact on the extent and

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Assessment of Flood Affectation of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾	Bridge construction ⁽⁶⁾		
								<p>the aforementioned watercourses.</p> <ul style="list-style-type: none"> • During a 10% AEP flood, the entire extent of the work area required to construct the new bridge over the Talbragar River would be inundated to depths that exceed 2 m, increasing to more than 3 m during a 1% AEP flood. • During a 10% AEP flood, the areas of work required to upgrade the sections of Merotherie Road to the east and west of the bridge construction area would be inundated over a total length of about 1,600 m and to a maximum depth of more than 1 m, increasing to about 1,650 m and a maximum depth more than 2 m during a 1% AEP flood. 	<p>depth of inundation, as well as flow velocities in the river.</p> <ul style="list-style-type: none"> • Construction activities associated with the upgrade of the sections of Mertherie Road to the north and south of the new bridge also have the potential to obstruct the conveyance of flow in the local drainage lines and tributaries that cross the road corridor. The greatest potential for impacts on flood behaviour during construction is likely to be associated with the replacement or extension of existing transverse drainage structures that control runoff in the local drainage lines and tributaries that cross the road corridor.
Spring Ridge Road		More frequent than 10% AEP	x	✓	✓	x	✓	<ul style="list-style-type: none"> • Refer to Figure 10, sheets 4 and 6. • Under the amended project, construction works would be required to upgrade the section of Spring Ridge Road where it runs between the Elong Elong Energy Hub and a location to the north of Laheys Creek. • The Spring Rodge Road construction work 	<ul style="list-style-type: none"> • The depth and velocity of flow through the bridge construction area during a 10% AEP event would be hazardous to construction personnel, plant and material. • The temporary working platforms to construct the new bridge over

Construction work area	Construction compound / other areas	Threshold of flooding ⁽¹⁾	Proposed construction activities					Assessment of Flood Affectation of the amended project	Potential impacts of construction activities on flood behaviour
			Site facilities ⁽²⁾	Material storage & spoil management ⁽³⁾	Earthworks ⁽⁴⁾	Transmission line construction ⁽⁵⁾	Bridge construction ⁽⁶⁾		
								<p>area would be frequently inundated by flow in Laheys Creek, as well two local drainage lines that cross the road to the north and south of the aforementioned watercourse.</p> <ul style="list-style-type: none"> • During a 10% AEP flood the entire extent of the work area required to construct the new bridge over Laheys Creek would be inundated to depths that exceed 3 m, increasing to more than 4 m during a 1% AEP flood. • During a 10% AEP flood, the areas of work required to upgrade the sections of Spring Ridge Road to the east and west of the bridge construction area would be inundated over a total length of about 2400 m and to a maximum depth of more than 1 m, increasing to about 430 m and a maximum depth of more than 2 m during a 1% AEP flood. 	<p>Laheys Creek have the potential to obstruct the conveyance of flow in the river during events more frequent than 10% AEP, which in turn could impact on the extent and depth of inundation, as well as flow velocities in the creek.</p> <ul style="list-style-type: none"> • Construction activities associated with the upgrade of the sections of Spring Ridge Road to the north and south of the new bridge also have the potential to obstruct the conveyance of flow in the local drainage lines and tributaries that cross the road corridor.

1. The assessed threshold of flooding is based on pre-project conditions. Refer **Figure 10** (6 sheets) for flood extent mapping under pre-project conditions.
2. Site facilities include construction compounds, support facilities and workforce accommodation, which include site offices, staff amenities, storage of materials and parking.
3. Spoil management includes stockpiling and treatment of excavated material.
4. Earthworks includes construction of access roads and tracks, and drainage works.
5. Transmission line construction includes working pads for piling machinery to install the footings of transmission line support towers as well as for machinery at brake and winch sites for the purpose of stringing the transmission lines.
6. Bridge construction includes working pads for support cranes to install various bridge components.

5. Operational impact assessment

Overview

Section 6 of Technical Paper 15 presented the findings of an assessment of the flood risk to the project, as well as the impact it could have on flood behaviour during its operation if appropriate mitigation measures are not incorporated into its design.

For the purpose of the assessment that was presented in Technical Paper 15, the operational related features of the project were divided into the following five components:

- New Wollar Switching Station
- Merotherie Energy Hub
- Elong Elong Energy Hub
- transmission line corridors that would contain the 500 kV and 330 kV networks of the project
- thirteen 330 kV switching stations that would connect the energy generated from renewable energy generation and storage projects onto the 500 kV network infrastructure.

Under the amended project:

- there would be no change in the general layout of the New Wollar Switching Station, Merotherie Energy Hub and Elong Elong Energy Hub
- the alignment and extent of the transmission line corridors that contain the 500 kV and 330 kV networks of the project would be adjusted in some areas
- five of the 330 kV switching stations would be relocated (denoted **switching stations M2, M3, M7, E1 and E4**)
- an additional 330 kV switching station would be provided to the east of the Elong Elong Energy Hub (denoted **switching station E5**)
- the section of Merotherie Road where it runs between the Merotherie Energy Hub and the Golden Highway would be upgraded, which would include a new bridge crossing over the Talbragar River (denoted the **Merotherie Road upgrade**)
- the section of Dapper Road and Spring Ridge Road where it runs between the Elong Elong Energy Hub and a location north of Laheys Creek would be upgraded, which would include a new bridge crossing over Laheys Creek (denoted the **Spring Ridge Road upgrade**).

New Wollar switching station and the energy hubs

The assessment of flood related impacts associated with the New Wollar Switching Station, the Merotherie Energy Hub and the Elong Elong Energy Hub that is presented in Sections 6.1.1 to 6.1.3 of Technical Paper 15 would also be applicable to the amended project.

Transmission line corridors

From inspection of **Figures 1, 2 and 3** (6 sheets each) the proposed changes in the alignment and extent of the transmission line corridors would not significantly change the overall flood affectation when compared to the alignment and extent of corridors that were presented in the EIS. On this basis, the assessment of flood related impacts associated with the transmission line corridors that is presented in Section 6.1.4 of Technical Paper 15 would also be applicable to the amended project.

330 kV switching stations

Table 6.1 at the end of Section 6 of Technical Paper 15 contains a summary of the assessed level of flood risk to each of the thirteen sites where the 330 kV switching stations were proposed to be located as part of the EIS. **Table 2** at the end of this section provides an update of the assessment that was presented in Table 6.1 of Technical Paper 15 based on the proposed relocation of five of the 330 kV switching stations and the inclusion of an additional 330 kV switching station as part of the amended project.

Table 2 shows that the relocation of five of the 300 kV switching stations would not significantly change their level of flood affectation when compared to those that were presented in the EIS, while the proposed location of the additional 330 kV switching station E5 is not impacted by mainstream flooding or major overland flow. On this basis, the assessment of flood related impacts associated with the 330 kV switching stations that is presented in Section 6.1.5 of Technical Paper 15 would also be applicable to the amended project.

Merotherie Road upgrade

Impact of flooding on the Merotherie Road upgrade

As noted in **Section 3** of this technical note, the section of Merotherie Road that is proposed to be upgraded is frequently inundated by flow in the Talbragar River and Cainbil Creek, as well as the local drainage lines and minor tributaries of the Talbragar River that cross the road between the Merotherie Energy Hub and the river.

The Merotherie Road upgrade would be designed such that:

- a) the existing level of flood immunity of the road is maintained or improved
- b) during storm events that result in overtopping of the road, there is no significant increase in the depth and hazardous nature of flooding.

The level of the new bridge over the Talbragar River would be set no lower than the existing bridge, while the existing drainage system along the remainder of the road upgrade would be extended to accommodate the road widening and augmented with additional capacity where required to maintain the same level of flood immunity and minimise increases in the depth and hazardous nature of flooding.

Impact of the Merotherie Road upgrade on flood behaviour

The proposed upgrade of Merotherie Road has the potential to impact on flood behaviour due to:

- i. the new bridge over the Talbragar River, which has the potential to obstruct the conveyance of flow, which in turn may impact on the extent, duration and depth of inundation as well as flow velocities in the river and its overbank areas
- ii. the change in road footprint and levels associated widening and sealing of the existing road along the remainder of the road upgrade, which has the potential to obstruct floodwaters and alter overland flow patterns, which in turn may impact on the extent, duration and depth of inundation as well as flow velocities in areas outside the road corridor.

Impact of new bridge over the Talbragar River on flood behaviour

In order to assess the potential flood impacts of the new bridge over the Talbragar River, the structure of the Talbragar River TUFLOW model representing pre-project conditions was adjusted to reflect post-project conditions based on a concept design of the new bridge. Based on the concept design the new bridge would:

- a) be located 2 metres to the south (upstream) of the existing bridge
- b) have a deck level that is set at the same level as the existing bridge,
- c) be supported by two rows of piers that would be aligned with those of the existing bridge
- d) have a total span that is equal to that of the existing bridge.

For the purpose of this assessment, the existing bridge was maintained under post-project conditions as this is considered to represent the worst case scenario for flood impacts.

The following figures showing flooding patterns and impacts in the vicinity of the new bridge over the Talbragar River under operational conditions should be referred to when reading the following discussion:

- **Figures 11, 12 and 13** show the indicative extent and depth of inundation in the vicinity of the new bridge under post-project conditions for design floods with AEPs of 10% and 1%, as well as the PMF event, respectively.
- **Figures 14, 15 and 16** show the impact that the new bridge would have on flood behaviour in terms of changes in peak flood levels for design floods with AEPs of 10% and 1%, as well as the PMF event, respectively.²
- **Figures A1.5 and A1.6 in Annexure A** show maximum flow velocities under post-project conditions in the vicinity of the new bridge during floods with AEPs of 10% and 1%, while **Figures A1.7 and A1.8 in Annexure A** show the impact that it would have in terms of changes in maximum flow velocities for the same design storm events.
- **Figures A1.9 and A1.10 in Annexure A** show the duration of inundation in the vicinity of the new bridge under post-project conditions during floods with AEPs of 10% and 1%, while **Figures A1.11 and A1.12 in Annexure A** show the impact that it would have in terms of changes in the duration of inundation for the same flood events.

² Changes in peak flood levels are denoted on the figures as “afflux”. An afflux of plus or minus 0.01 metres is considered to be within the order of accuracy of the hydraulic model. The figures also show changes in the extent of inundation that would be caused by the construction of the project. A reduction in the extent of inundation is denoted “Land rendered flood free”, while an increase in the extent of inundation is denoted “Additional area of land flooded” as a result of the amended project.

The key findings of the assessment of the impact that the new bridge over the Talbragar River would have on flood behaviour are summarised below.

Changes in peak flood levels and depths of inundation:

- Peak 10% AEP flood levels immediately south (upstream) of the eastern approach to the new bridge would be increased by a maximum of 0.03 metres on an existing depth of about 0.8 metres, reducing to 0.02 metres on a depth of more than 1.5 metres during a 1% AEP flood. This increase in peak flood levels can be attributed to the raised level of the eastern approach to the new bridge compared to existing road levels. The impacted area comprises cleared pastoral land on the western overbank of the Talbragar River that extends across two RU1 zoned parcels of land.
- There would be either no change or a slight reduction in peak flood levels to the north (downstream) of the road corridor during floods with AEPs of 10% and 1%.
- There would be no change in PMF levels upstream or downstream of the new bridge.

Changes in peak flow velocities:

- During floods with AEPs of 10% and 1%, changes in peak flow velocities would be less than 10 per cent with the exception of the area within the road corridor in the immediate vicinity of the new bridge. Scour protection measures would be provided over the affected area to manage the impact that the increase in flow velocities would have on the scour potential in the river.

Changes in the extent and duration of flooding:

- During floods with AEPs of 10% and 1%, changes in the duration of inundation in areas outside the road corridor would be less than one hour, while there would be no significant change in the extent of flooding.

Impact of proposed works along the remainder of the road upgrade on flood behaviour

During detailed design, a detailed three-dimensional layout of the proposed road widening and sealing would be developed, which would inform the layout of the associated drainage measures that are aimed at controlling external catchment runoff. These measures would include table drains along the upslope side of the road that would discharge to existing and new transverse drainage structures at drainage line crossings. These detailed layouts of the proposed road widening and sealing would also be used to undertake a detailed assessment of the impact that the proposed road upgrade would have on flooding patterns and to identify the scope of additional drainage measures that would be required to manage any resulting adverse impacts on the depth, velocity and duration of inundation external to the road corridor. These additional drainage measures would include:

- a) The augmentation of existing transverse drainage structures where required to offset the impact that raising existing road levels would have on obstructing floodwaters and overland flow.
- b) The provision of additional drainage crossings and level spreaders to manage the impact of the proposed road upgrade on a redistribution of flow discharging to downstream areas.
- c) Energy dissipation and scour protection to manage localised increases in flow velocities at the outlets to drainage culverts and channels.

5.6. Spring Ridge Road upgrade

Impact of flooding on the Spring Ridge Road upgrade

As noted in **Section 3** of this technical note, the section of Spring Ridge Road that is proposed to be upgraded is frequently inundated by flow in Laheys Creek.

The Spring Ridge Road upgrade would be designed such that:

- i. the existing level of flood immunity of the road is maintained or improved
- ii. during storm events that result in overtopping of the road, there is no significant increase in the depth and hazardous nature of flooding.

The existing low level causeway crossing of Laheys Creek would be replaced with a new bridge crossing, while the existing drainage system along the remainder of the road upgrade would be extended to accommodate the road widening and augmented with additional capacity where required to maintain the same level of flood immunity and minimise increases in the depth and hazardous nature of flooding.

Impact of the Merotherie Road upgrade on flood behaviour

The types of potential impacts associated with the Spring Ridge Road upgrade are similar to those described for the Merotherie Road upgrade, namely:

- i. the new bridge over Laheys Creek has the potential to obstruct the conveyance of flow, which in turn may impact on the extent, duration and depth of inundation as well as flow velocities in the river and its overbank areas
- ii. the change in road footprint and levels associated widening and sealing of the existing road along the remainder of the road upgrade has the potential to obstruct floodwaters and alter overland flow patterns, which in turn may impact on the extent, duration and depth of inundation, as well as flow velocities in areas outside the road corridor.

Impact of new bridge over Laheys Creek on flood behaviour

In order to assess the potential flood impacts of the new bridge over Laheys Creek, the structure of the Sandy Creek TUFLOW model representing pre-project conditions was adjusted to reflect post-project conditions based on a concept design of the new bridge. Based on an initial concept design the new bridge would:

- a) be located approximately 4 metres to the west (downstream) of the existing bridge
- b) have a deck level that would be a minimum 1.5 metres above the level of the existing causeway crossing,
- c) be supported by two rows of piers that would be aligned with the direction of flow in the creek,
- d) have a total span of 35 m.

For the purpose of this assessment, the existing causeway crossing was maintained under post-project conditions as this is considered to represent the worst case scenario for flood impacts.

The following figures showing flooding patterns and impacts in the vicinity of the new bridge over Laheys Creek under operational conditions should be referred to when reading the following discussion:

- **Figures 17, 18 and 19** show the indicative extent and depth of inundation in the vicinity of the new bridge under post-project conditions for design floods with AEPs of 10% and 1%, as well as the PMF event, respectively.
- **Figures 20, 21 and 22** show the impact that the new bridge would have on flood behaviour in terms of changes in peak flood levels for design floods with AEPs of 10% and 1%, as well as the PMF event, respectively.
- **Figures A1.13 and A1.14 in Annexure A** show maximum flow velocities under post-project conditions in the vicinity of the new bridge during floods with AEPs of 10% and 1%, while **Figures A1.15 and A1.16 in Annexure A** show the impact that it would have in terms of changes in maximum flow velocities for the same design storm events.
- **Figures A1.17 and A1.18 in Annexure A** show the duration of inundation in the vicinity of the new bridge under post-project conditions during floods with AEPs of 10% and 1%, while **Figures A1.19 and A1.20 in Annexure A** show the impact that it would have in terms of changes in the duration of inundation for the same design flood events.

The key findings of the assessment of the impact that the new bridge over Laheys Creek would have on flood behaviour are summarised below.

Changes in peak flood levels and depths of inundation:

- Peak 10% AEP flood levels immediately west (downstream) of the eastern approach to the new bridge would be increased by a maximum of 0.02 metres on an existing depth of about 0.8 metres. The impacted area is located within a RU1 zoned parcel of land.
- During floods with AEPs of 10% and 1%, there would either be no change or a slight reduction in peak flood to the east (upstream) of the new bridge. This can be attributed to the approaches to the new bridge being in cut, which more than offsets the loss of waterway area attributable to the bridge deck and piers.
- There would be no change in PMF levels upstream or downstream of the new bridge.

Changes in peak flow velocities:

- During floods with AEPs of 10% and 1%, changes in peak flow velocities would be less than 10 per cent with the exception of the area within the road corridor in the immediate vicinity of the new bridge. Scour protection measures would be provided over the affected area to manage the impact that the increase in flow velocities would have on the scour potential within the creek.

Changes in the extent and duration of flooding:

- During floods with AEPs of 10% and 1%, changes in the duration of inundation in areas outside the road corridor would be less than one hour, while there would be no significant change in the extent of flooding.

Impact of proposed works along the remainder of the road upgrade on flood behaviour

Similar to the Merotherie Road upgrade, during detailed design a detailed three-dimensional layout of the proposed road widening and sealing would be developed, which would inform the

layout of the associated drainage measures that are aimed at controlling external catchment runoff. These measures would include table drains along the upslope side of the road that would discharge to existing and new transverse drainage structures at drainage line crossings. These detailed layouts of the proposed road widening and sealing would also be used to undertake a detailed assessment of the impact that the proposed road upgrade would have on flooding patterns and to identify the scope of additional drainage measures that would be required to manage any resulting adverse impacts on the depth, velocity and duration of inundation external to the road corridor. These additional drainage measures would include:

- a) The augmentation of existing transverse drainage structures where required to offset the impact that raising existing road levels would have on obstructing floodwaters and overland flow.
- b) The provision of additional drainage crossings and level spreaders to manage the impact of the proposed road upgrade on a redistribution of flow discharging to downstream areas.
- c) Energy dissipation and scour protection to manage localised increases in flow velocities at the outlets to drainage culverts and channels.

TABLE 2
ASSESSED LEVEL OF FLOOD RISK AT PROPOSED SWITCHING STATION SITES OF THE AMENDED PROJECT

Location	Switching Station Identifier ⁽¹⁾	Threshold of Flooding ⁽²⁾	Assessment of Flood Affection
Cassilis	M1	Not flooded	No change to that presented in Table 6.1 of Technical Paper 15.
Coolah	M2	More frequent than 10% AEP	Under the amended project, switching station M2 would be relocated approximately 500 m north of its location in the EIS. A local overland flow path runs through the western portion of the relocated site of switching station M2 where depths of inundation are a maximum of 0.16 m during a 10% AEP event, increasing to 0.22 m during a 1% AEP event. The remainder of the site is not impacted by mainstream flooding or major overland flow. The extent of flood affection is similar to that of the site presented in the EIS.
Leadville	M3	More frequent than 10% AEP	Under the amended project, switching station M3 would be relocated approximately 850 m north of its location in the EIS. While the relocated site is not impacted by mainstream flooding or major overland flow it would be inundated by local catchment runoff from upslope areas to its east. Depths of inundation across the site would typically be less than 0.1 m during a 1% AEP event.
Merotherie	M4	More frequent than 10% AEP	No change to that presented in Table 6.1 of Technical Paper 15.
	M5	More frequent than 10% AEP	No change to that presented in Table 6.1 of Technical Paper 15.
Tallawang	M6	More frequent than 10% AEP	No change to that presented in Table 6.1 of Technical Paper 15.
Dunedoo	M7	More frequent than 10% AEP	Under the amended project, switching station M7 would be relocated approximately 1,600 m north of its location in the EIS. While the relocated site is not impacted by mainstream flooding or major overland flow, it would be inundated by local catchment runoff from upslope areas to its east. Depths of inundation across the site would typically be less than 0.1 m during a 1% AEP event. The extent of flood affection is less than that of the site presented in the EIS.
Tallawang	M8	More frequent than 10% AEP	No change to that presented in Table 6.1 of Technical Paper 15.
Tallawang	M9	More frequent than 10% AEP	No change to that presented in Table 6.1 of Technical Paper 15.
Cobbora	E1	More frequent than 10% AEP	Under the amended project, switching station E1 would be relocated approximately 800 m south of its location in the EIS. While the relocated site is not impacted by mainstream

Location	Switching Station Identifier ⁽¹⁾	Threshold of Flooding ⁽²⁾	Assessment of Flood Affection
			flooding it is presently inundated by flow that is conveyed along a local drainage line that runs through the middle of the site. Depths of flow along the drainage line occurs to a maximum of 0.2 m during a 1% AEP event. The extent of flood affection is similar to that of the site presented in the EIS.
	E2	More frequent than 10% AEP	No change to that presented in Table 6.1 of Technical Paper 15.
	E3	More frequent than 10% AEP	No change to that presented in Table 6.1 of Technical Paper 15.
Goolma	E4	More frequent than 10% AEP	<p>Under the amended project, switching station E4 would be relocated approximately 400 m east of its location in the EIS.</p> <p>While the relocated site is not impacted by mainstream flooding it is presently inundated by flow that is conveyed along two local drainage lines that runs through the northern and southern portions of the site. Depths of flow along the drainage lines occur to a maximum of 0.6 m, but typically less than 0.3 m during a 1% AEP event. The extent of flood affection is slightly greater than that of the site presented in the EIS.</p>
Dunedoo	E5	More frequent than 10% AEP	<p>Under the amended project, an additional switching station E5 would be constructed approximately 3,500 m east of the Elong Elong Energy Hub.</p> <p>While the site of the new switching station E5 is not impacted by mainstream flooding or major overland flow it would be inundated by local catchment runoff from upslope areas to its east. Depths of inundation across the site would typically be less than 0.1 m during a 1% AEP event.</p>

1. Refer to **Figures 1, 2 and 3** (6 sheets each) for locations of switching station identifiers.
2. The assessed threshold of flooding is based on pre-project conditions. Refer **Figures 1, 2 and 3** (6 sheets each) for flood extent mapping under pre-project conditions.

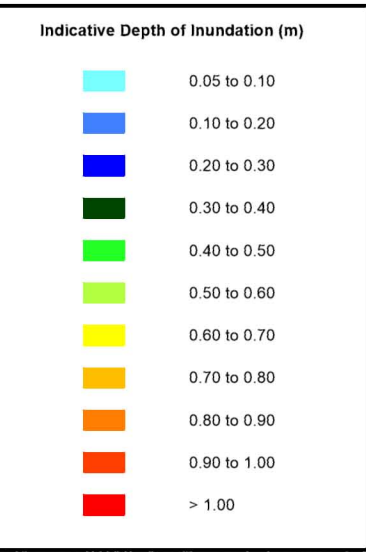
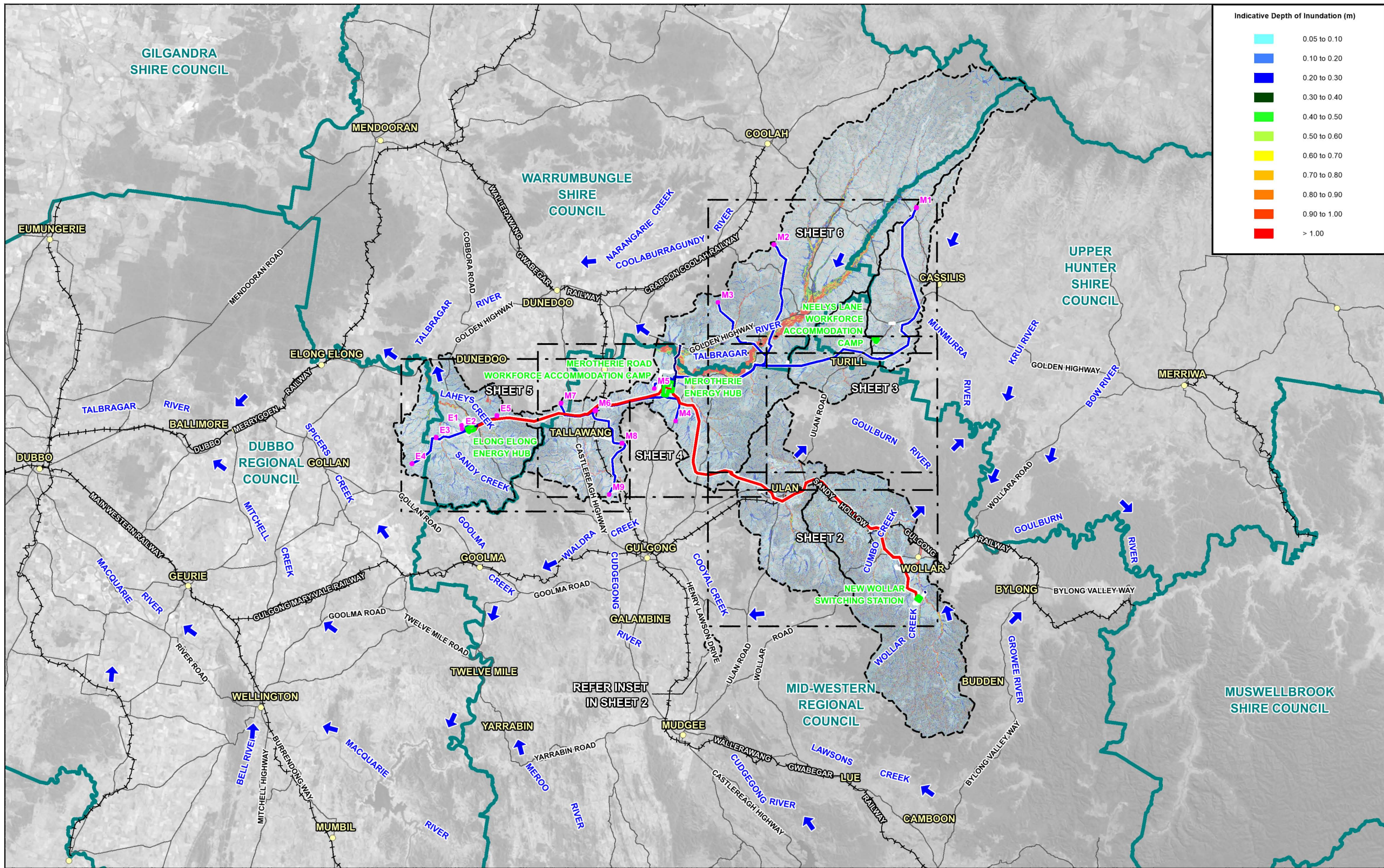
6. Management of impacts



Table 3 sets out the environmental management measures that would be implemented to manage flood related impacts during the construction and operation of the amended project in addition to measures FL01 to FL09 that are set out in the EIS.

**TABLE 3
FLOODING RELATED MITIGATION AND MANAGEMENT MEASURES**

ID	Mitigation and management measure	Applicable area
Construction – flooding		
FL10	<p>Detailed construction planning would consider flood risk associated with the construction of the new bridges over the Talbragar River and Laheys Creek, including the following:</p> <ul style="list-style-type: none"> • Flood emergency management procedures for the construction of the new bridges would be prepared and incorporated into the relevant environmental and/or safety management documentation, and would include: <ul style="list-style-type: none"> ○ procedures to monitor accurate and timely weather data, and disseminate warnings to construction personnel of impending flood producing rain, and ○ procedures for the safe evacuation of construction personnel and machinery following the dissemination of flood warnings. • Temporary working platforms that would be required to construct the new bridges would be constructed using clean rock fill and installed in a manner that minimises their impact on the inbank area of the watercourses. • The layout of temporary access roads, working platforms and other temporary works required to construct the bridges will be designed and staged in order to manage their impact on flood behaviour. 	Upgrade of local roads that service the Merotherie and Elong Elong Energy Hubs
FL11	During detailed construction planning, the layout of the Elong Elong construction compound would be revised to locate it outside areas of high hazard during a 1% AEP flood, and, where feasible, outside areas impacted by mainstream flooding from Laheys Creek during a 1% AEP flood.	Elong Elong Energy Hub
Operation – flooding		
FL12	Localised increases in flow velocities at the new bridges over the Talbragar River and Laheys Creek would be mitigated through design measures such as the provision of scour protection to affected areas.	Upgrade of local roads that service the Merotherie and Elong Elong Energy Hubs
FL13	<p>The upgrades to the local roads that service the Merotherie and Elong Elong Energy Hubs would be designed such that:</p> <ol style="list-style-type: none"> i. the existing level of flood immunity of the road is maintained or improved, and ii. during storm events that result in overtopping of the road, there is no significant increase in the depth and hazardous nature of flooding. 	Upgrade of local roads that service the Merotherie and Elong Elong Energy Hubs
FL14	A detailed flood assessment would be carried out of the upgrades to the local roads that service the Merotherie and Elong Elong Energy Hubs to inform the scope of drainage measures to be incorporated into their design in order to manage any adverse impacts on the depth, velocity and duration of inundation external to the road corridors.	Upgrade of local roads that service the Merotherie and Elong Elong Energy Hubs

FIGURES




 5000 0 5000 10000 15000 m
 Scale: 1:500,000


PROJECT ELEMENTS

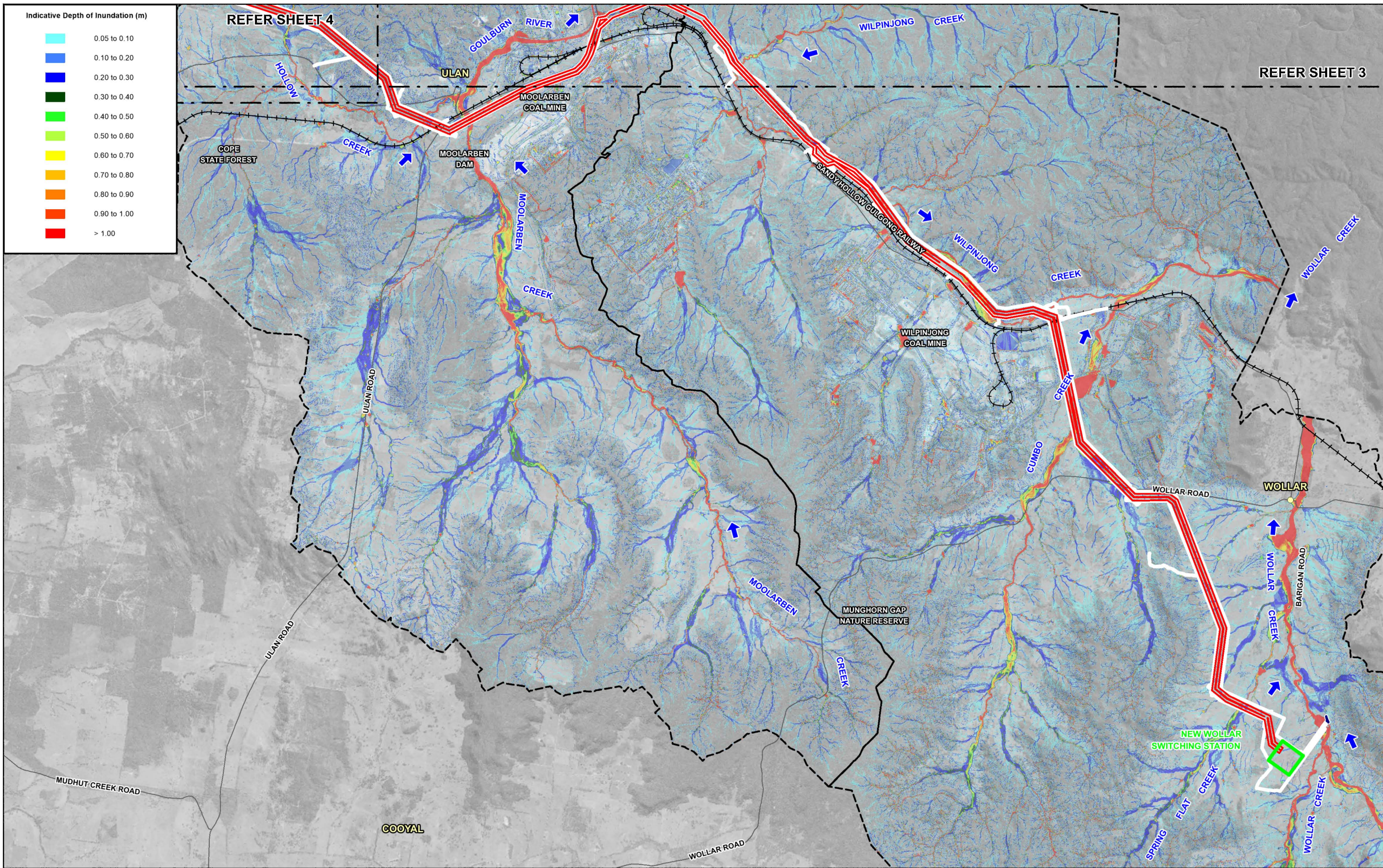
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- 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

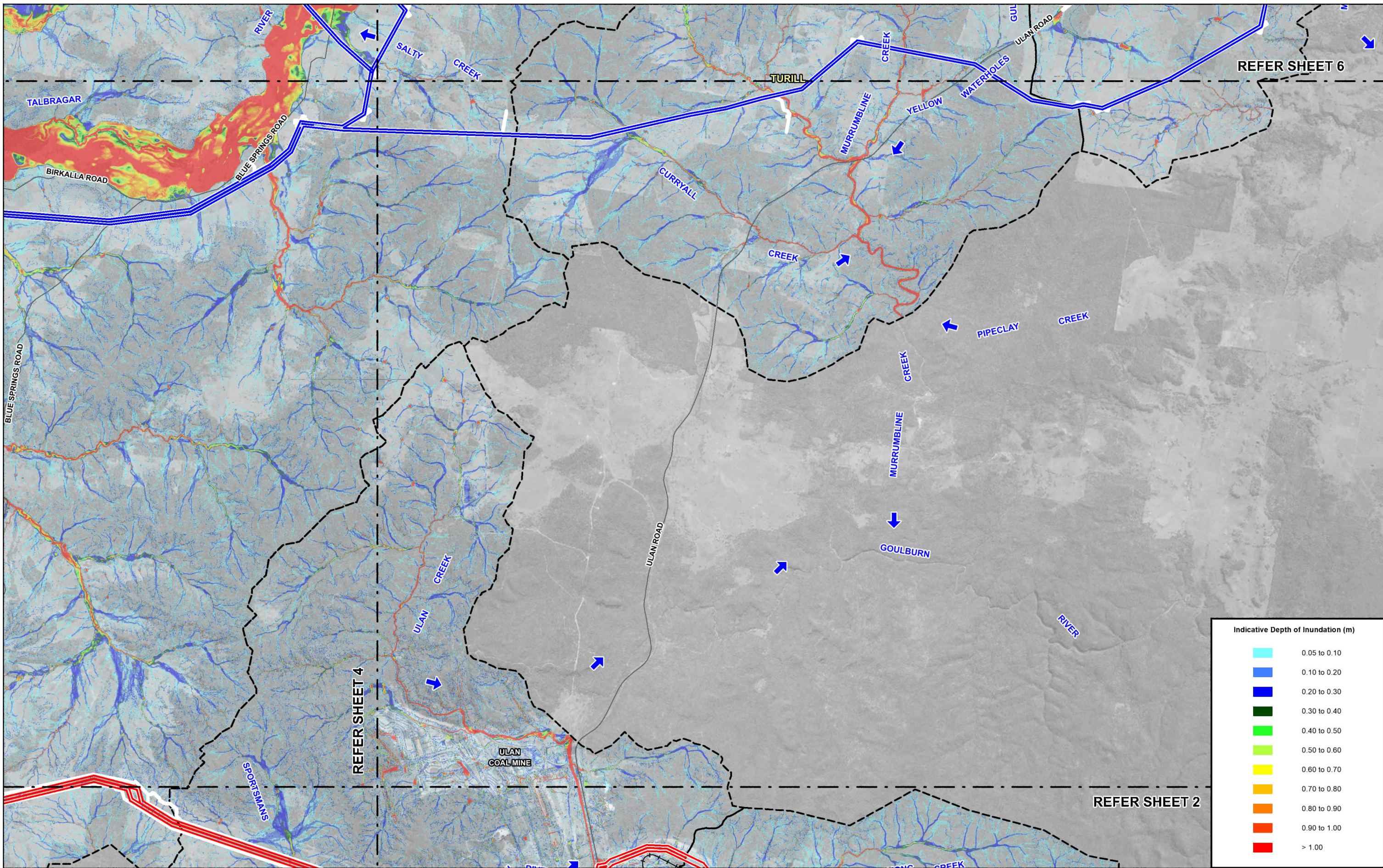
LEGEND

- Local Government Area (LGA) Boundary
- Two-Dimensional Model Boundary
- Extent of Local Road Upgrade
- Rail Lines
- Roads

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 1
 (Sheet 1 of 6)
 FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
 10% AEP





Indicative Depth of Inundation (m)	
■	0.05 to 0.10
■	0.10 to 0.20
■	0.20 to 0.30
■	0.30 to 0.40
■	0.40 to 0.50
■	0.50 to 0.60
■	0.60 to 0.70
■	0.70 to 0.80
■	0.80 to 0.90
■	0.90 to 1.00
■	> 1.00

Scale: 1:80,000

PROJECT ELEMENTS

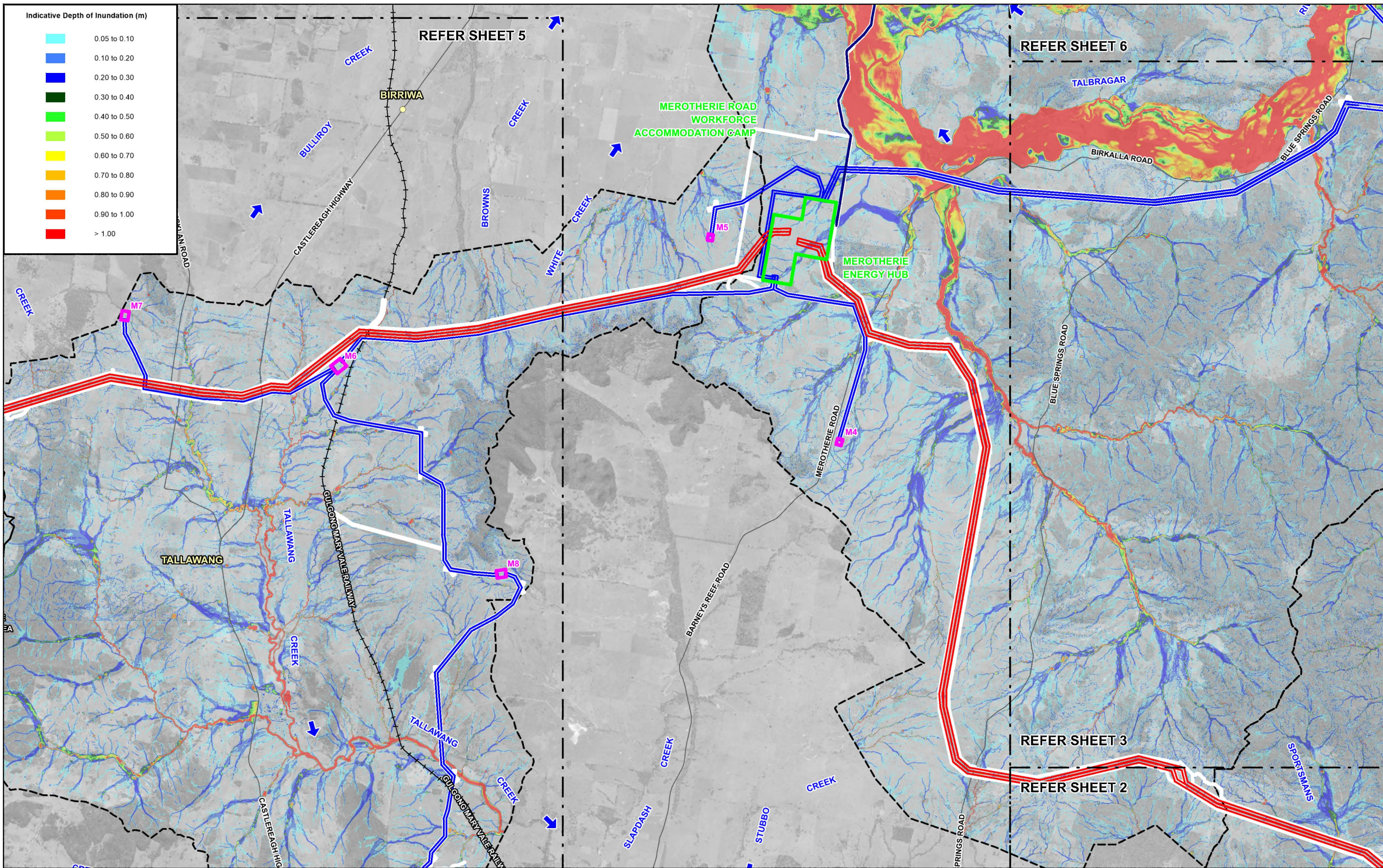
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

LEGEND

- Two-Dimensional Model Boundary
- Extent of Local Road Upgrade
- Rail Lines
- Roads

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 1
 (Sheet 3 of 6)
 FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
 10% AEP



Indicative Depth of Inundation (m)

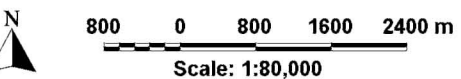


REFER SHEET 5

REFER SHEET 6

REFER SHEET 3

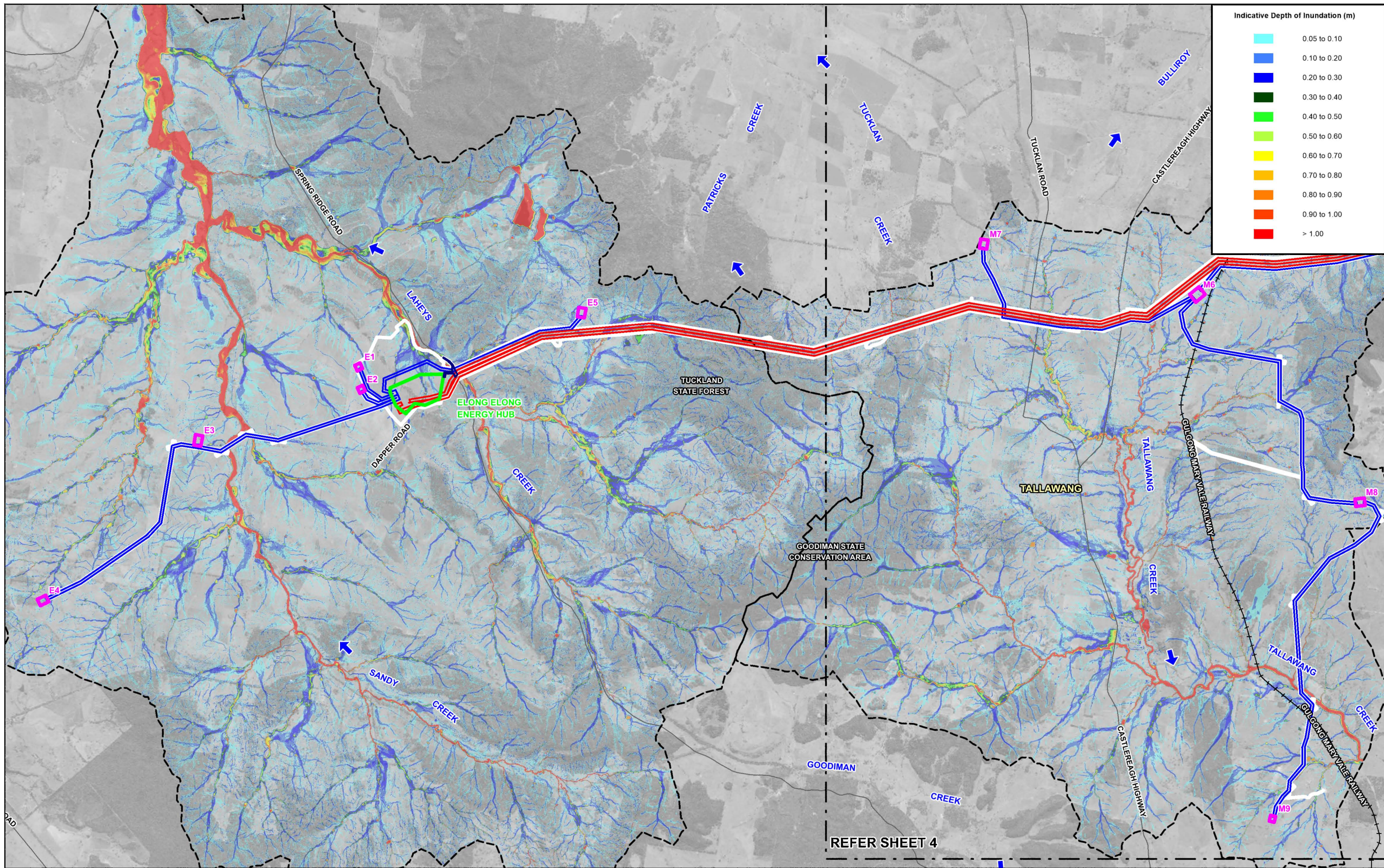
REFER SHEET 2





- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor





- LEGEND**
- Two-Dimensional Model Boundary
 - Extent of Local Road Upgrade
 - Rail Lines
 - Roads



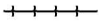

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**



Indicative Depth of Inundation (m)	
Light Blue	0.05 to 0.10
Blue	0.10 to 0.20
Dark Blue	0.20 to 0.30
Dark Green	0.30 to 0.40
Light Green	0.40 to 0.50
Yellow-Green	0.50 to 0.60
Yellow	0.60 to 0.70
Orange	0.70 to 0.80
Red-Orange	0.80 to 0.90
Red	0.90 to 1.00
Dark Red	> 1.00

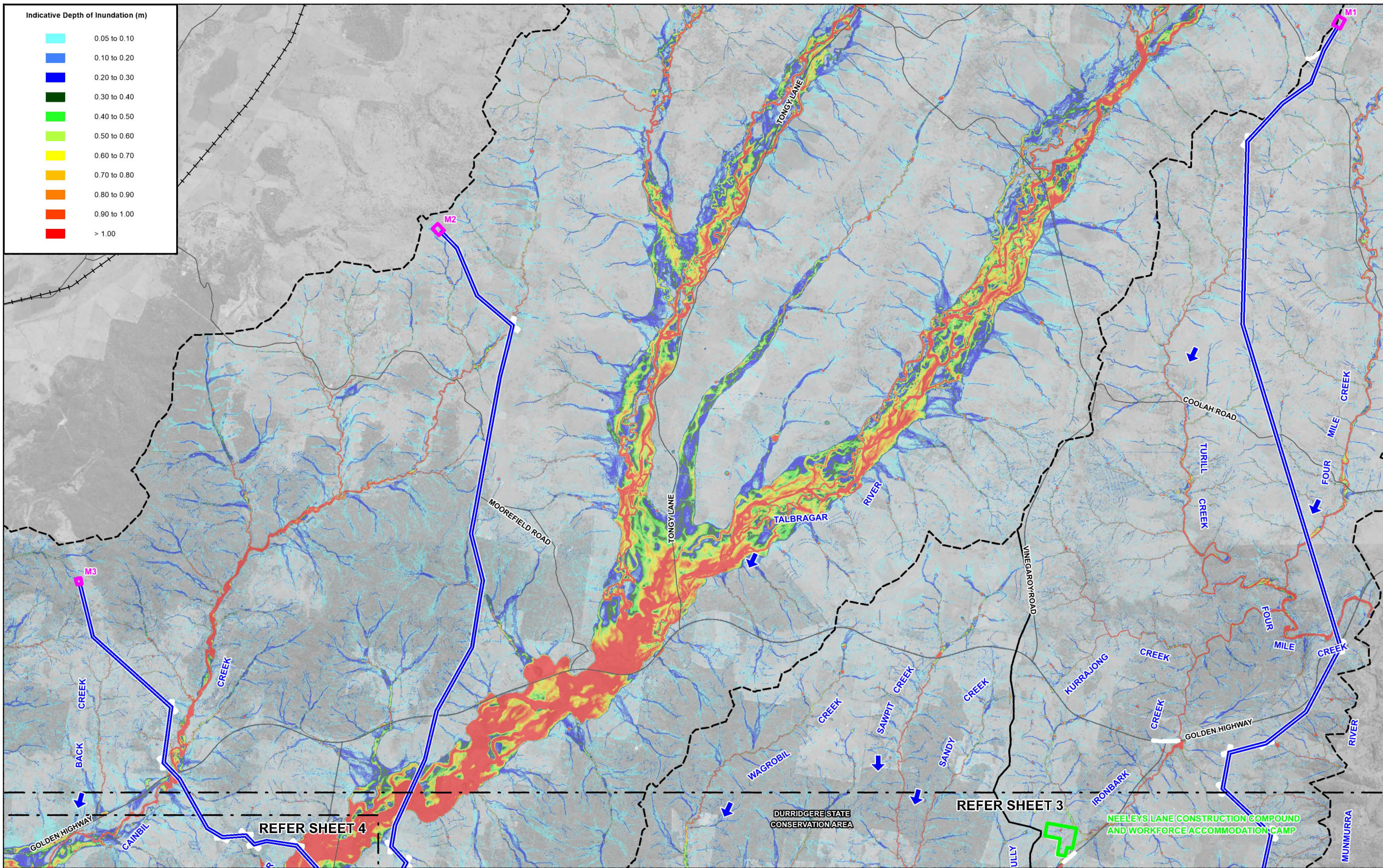

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- PROJECT ELEMENTS**
-  Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 -  330kV Switching Stations and Identifier
 -  500kV Transmission Line Corridor
 -  330kV Transmission Line Corridor

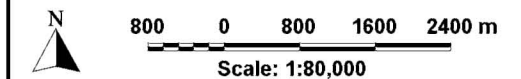
- LEGEND**
-  Two-Dimensional Model Boundary
 -  Extent of Local Road Upgrade
 -  Rail Lines
 -  Roads

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 1
 (Sheet 5 of 6)
 FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
 10% AEP



Indicative Depth of Inundation (m)

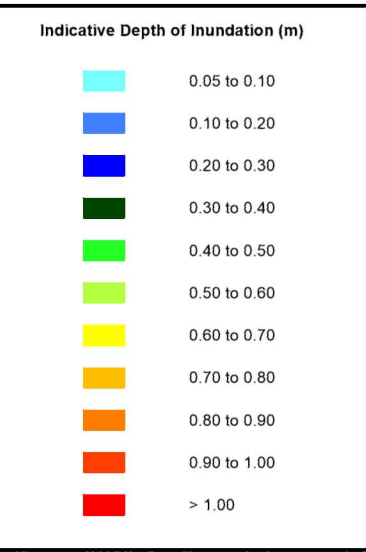
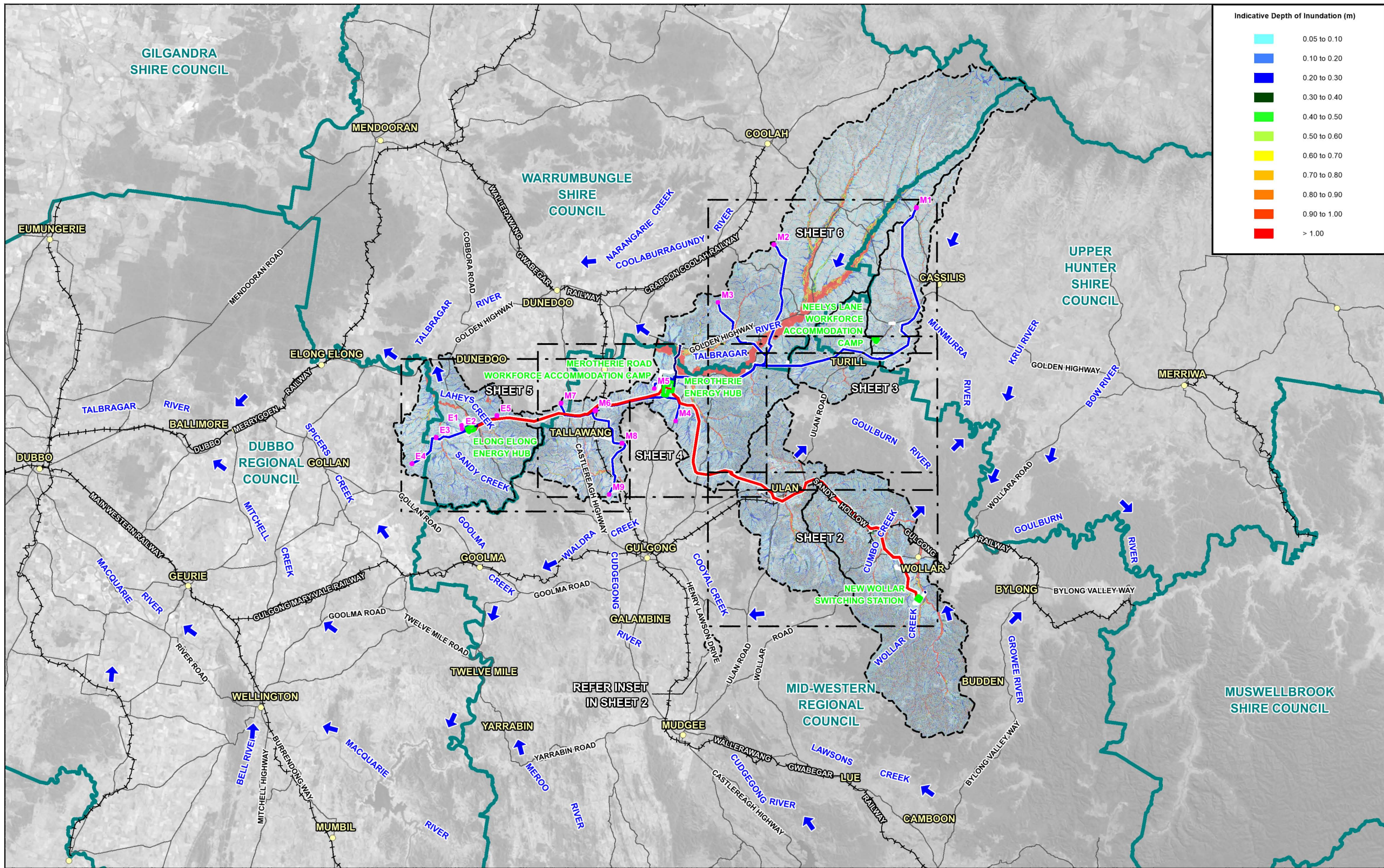


- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Two-Dimensional Model Boundary
 - Extent of Local Road Upgrade
 - Rail Lines
 - Roads

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 1
(Sheet 6 of 6)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
10% AEP



5000 0 5000 10000 15000 m

 Scale: 1:500,000

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PROJECT ELEMENTS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

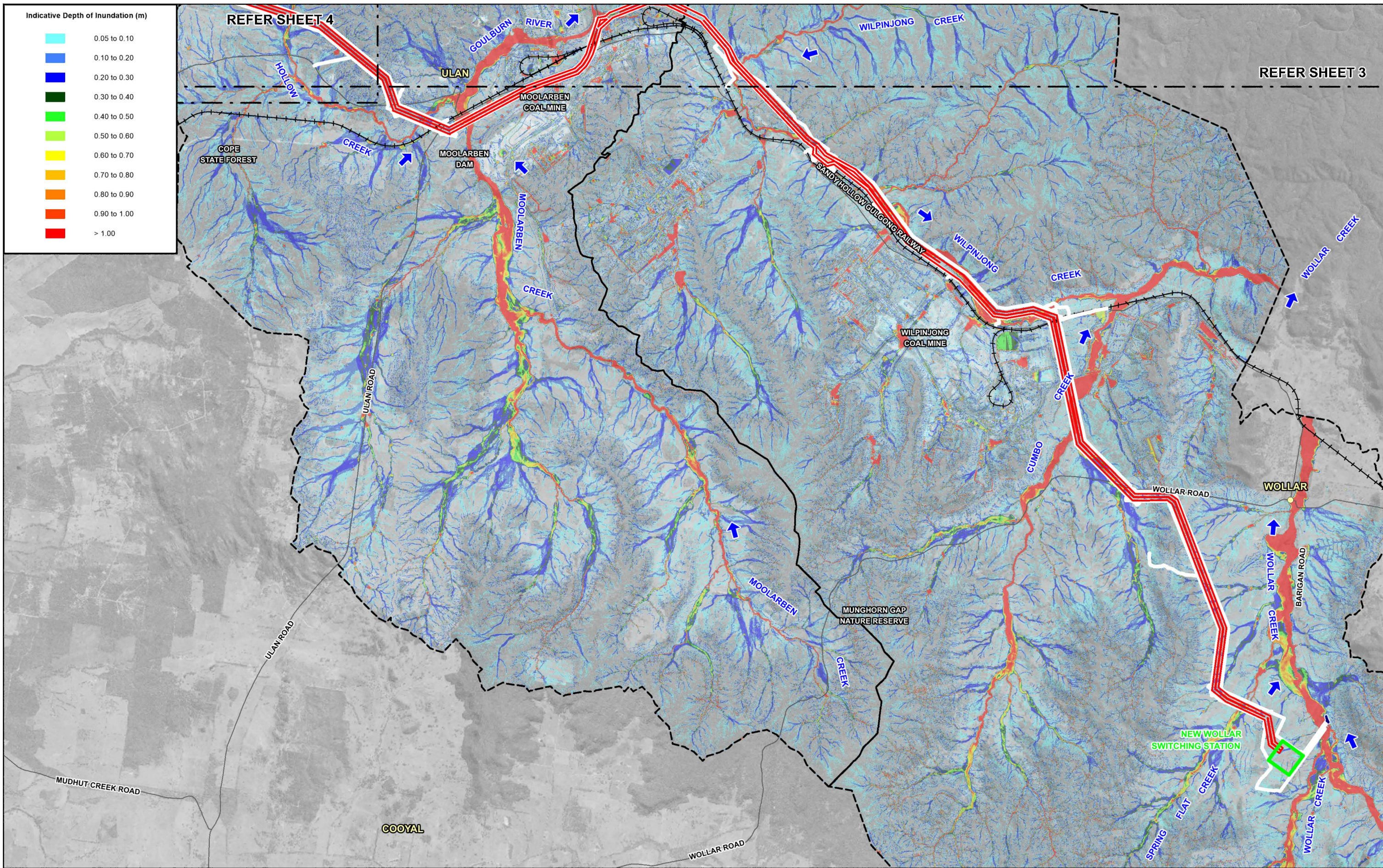
LEGEND

- Local Government Area (LGA) Boundary
- Two-Dimensional Model Boundary
- Extent of Local Road Upgrade

- Rail Lines
- Roads

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 2
 (Sheet 1 of 6)
 FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
 1% AEP

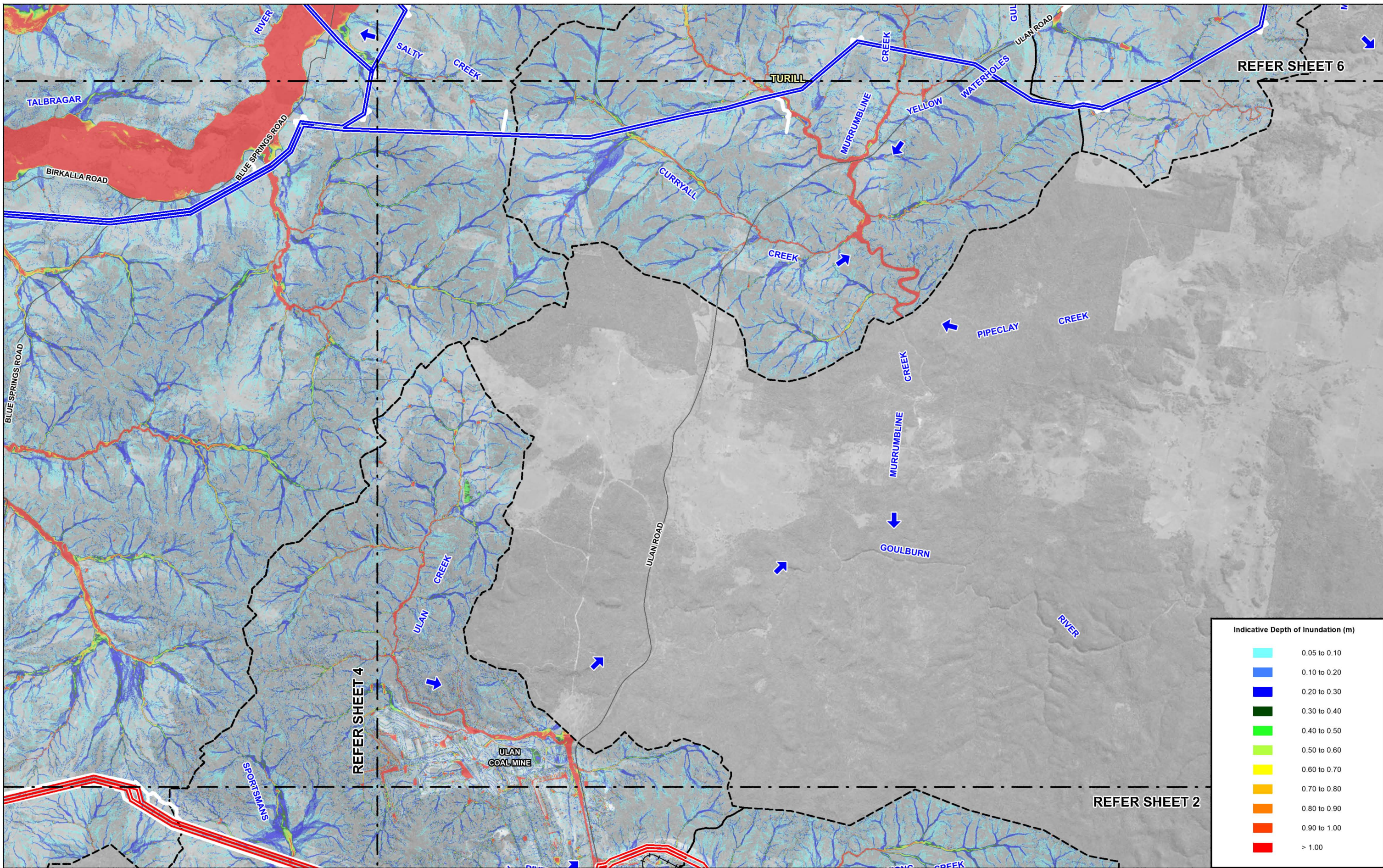


Scale: 1:80,000

800 0 800 1600 2400 m

Lyall & Associates

Figure 2
(Sheet 2 of 6)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
1% AEP



Indicative Depth of Inundation (m)	
■	0.05 to 0.10
■	0.10 to 0.20
■	0.20 to 0.30
■	0.30 to 0.40
■	0.40 to 0.50
■	0.50 to 0.60
■	0.60 to 0.70
■	0.70 to 0.80
■	0.80 to 0.90
■	0.90 to 1.00
■	> 1.00

Scale: 1:80,000

800 0 800 1600 2400 m

PROJECT ELEMENTS

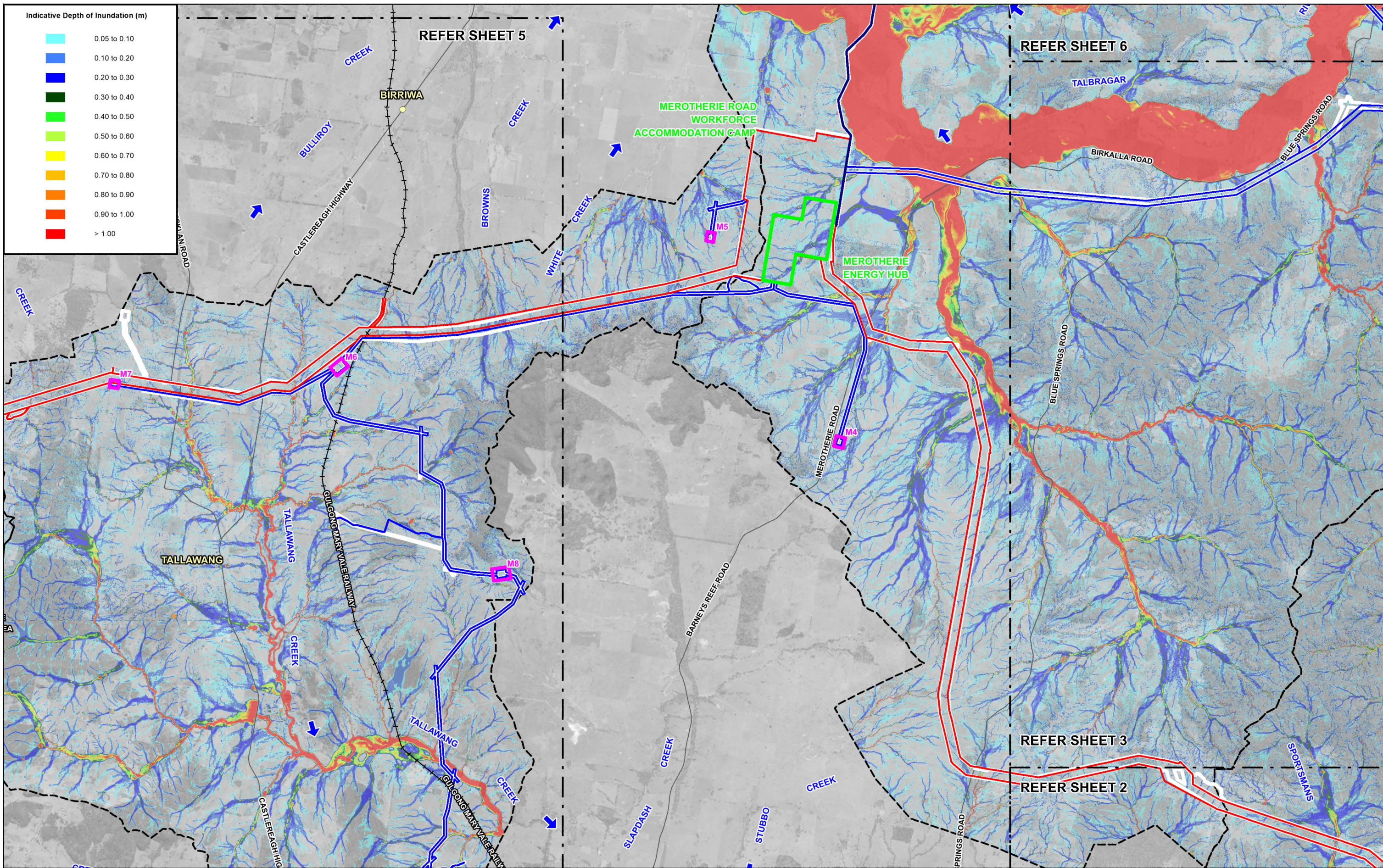
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

LEGEND

- Two-Dimensional Model Boundary
- Extent of Local Road Upgrade
- Rail Lines
- Roads

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 2
 (Sheet 3 of 6)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
 1% AEP



Indicative Depth of Inundation (m)

- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

PROJECT ELEMENTS

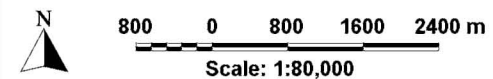
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- M1 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

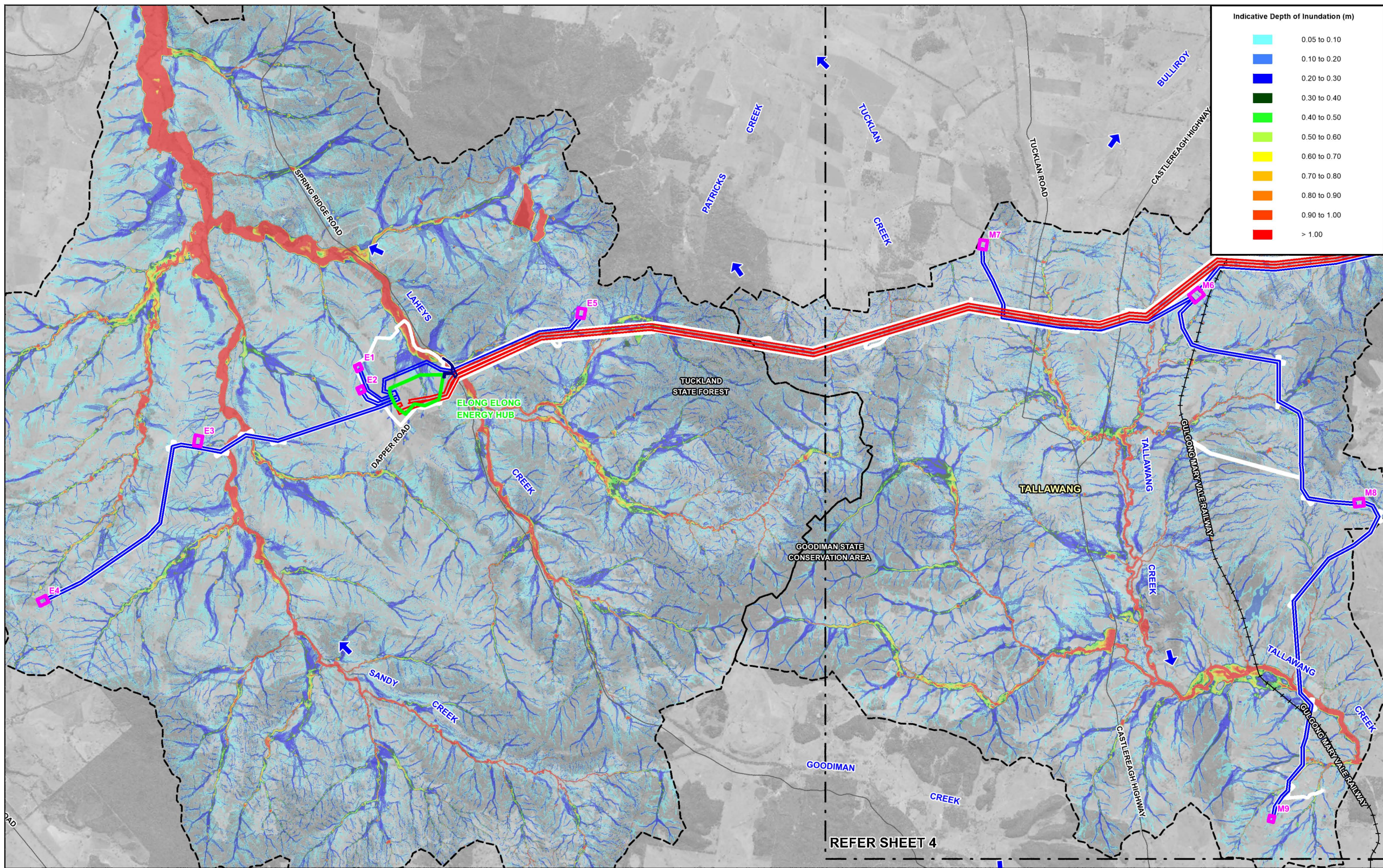
LEGEND

- Two-Dimensional Model Boundary
- Extent of Local Road Upgrade
- Rail Lines
- Roads

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 2
(Sheet 4 of 6)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
1% AEP





Indicative Depth of Inundation (m)	
Light Cyan	0.05 to 0.10
Blue	0.10 to 0.20
Dark Blue	0.20 to 0.30
Dark Green	0.30 to 0.40
Light Green	0.40 to 0.50
Yellow-Green	0.50 to 0.60
Yellow	0.60 to 0.70
Orange	0.70 to 0.80
Red-Orange	0.80 to 0.90
Red	0.90 to 1.00
Dark Red	> 1.00

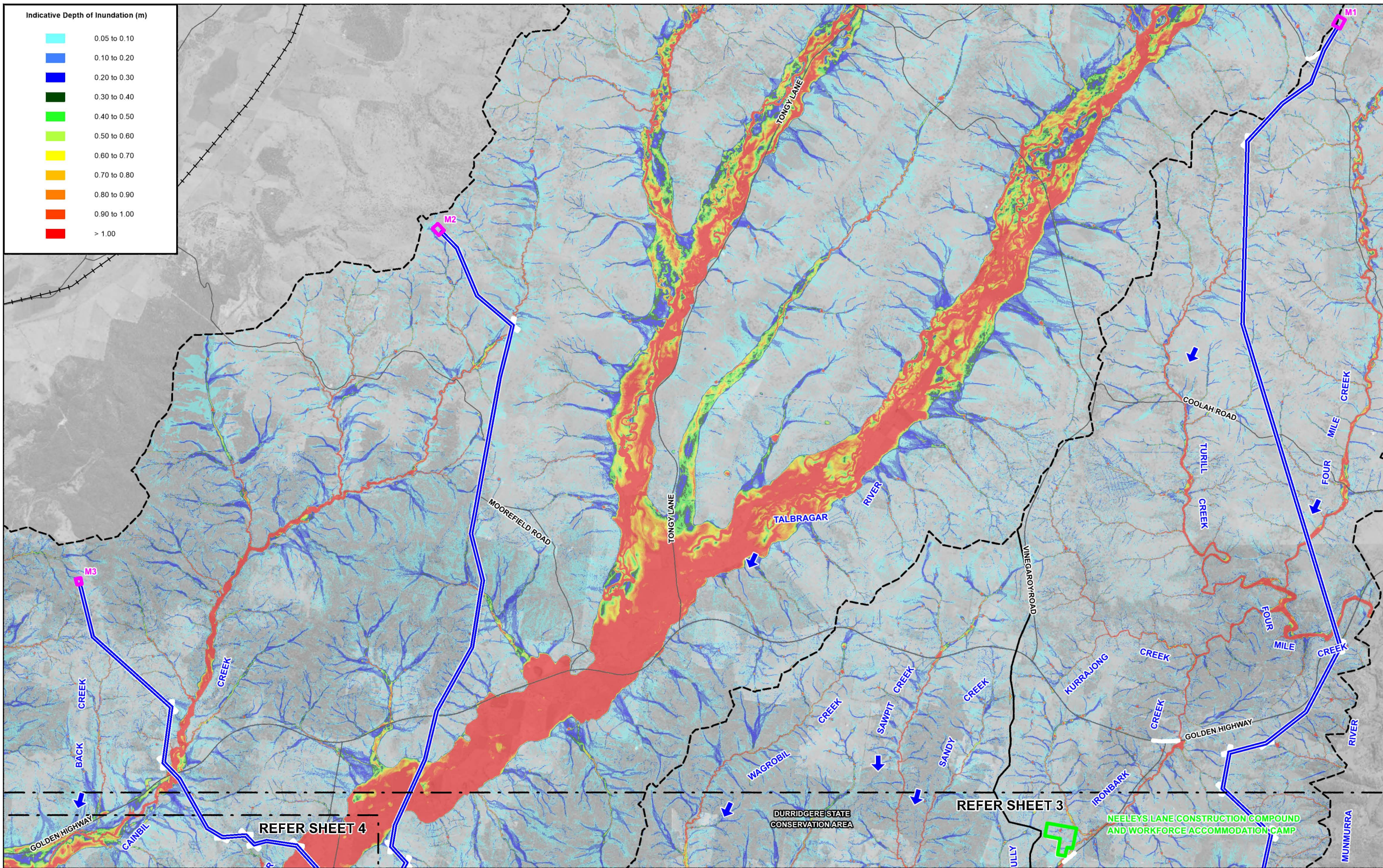
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- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

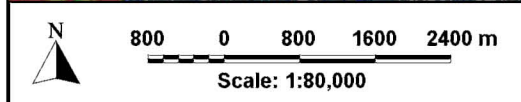
- LEGEND**
- Two-Dimensional Model Boundary
 - Extent of Local Road Upgrade
 - Rail Lines
 - Roads

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 2
 (Sheet 5 of 6)
 FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
 1% AEP



Indicative Depth of Inundation (m)



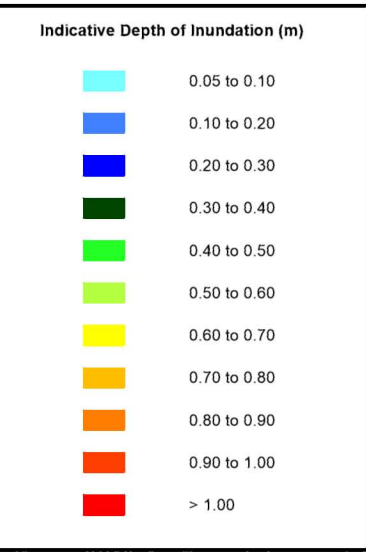
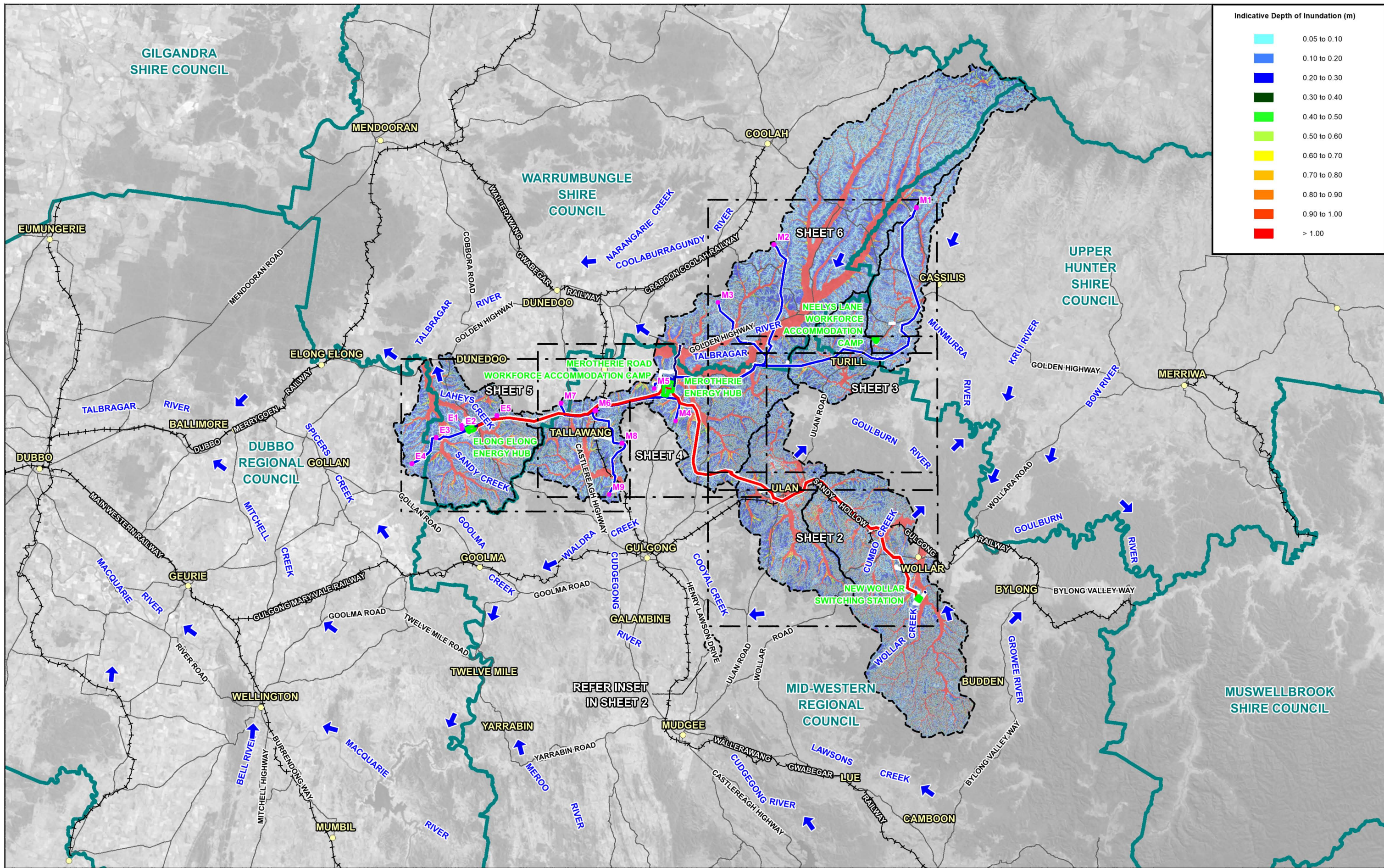
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Two-Dimensional Model Boundary
 - Extent of Local Road Upgrade
 - Rail Lines
 - Roads

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 2
(Sheet 6 of 6)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
1% AEP





5000 0 5000 10000 15000 m

 Scale: 1:500,000

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PROJECT ELEMENTS

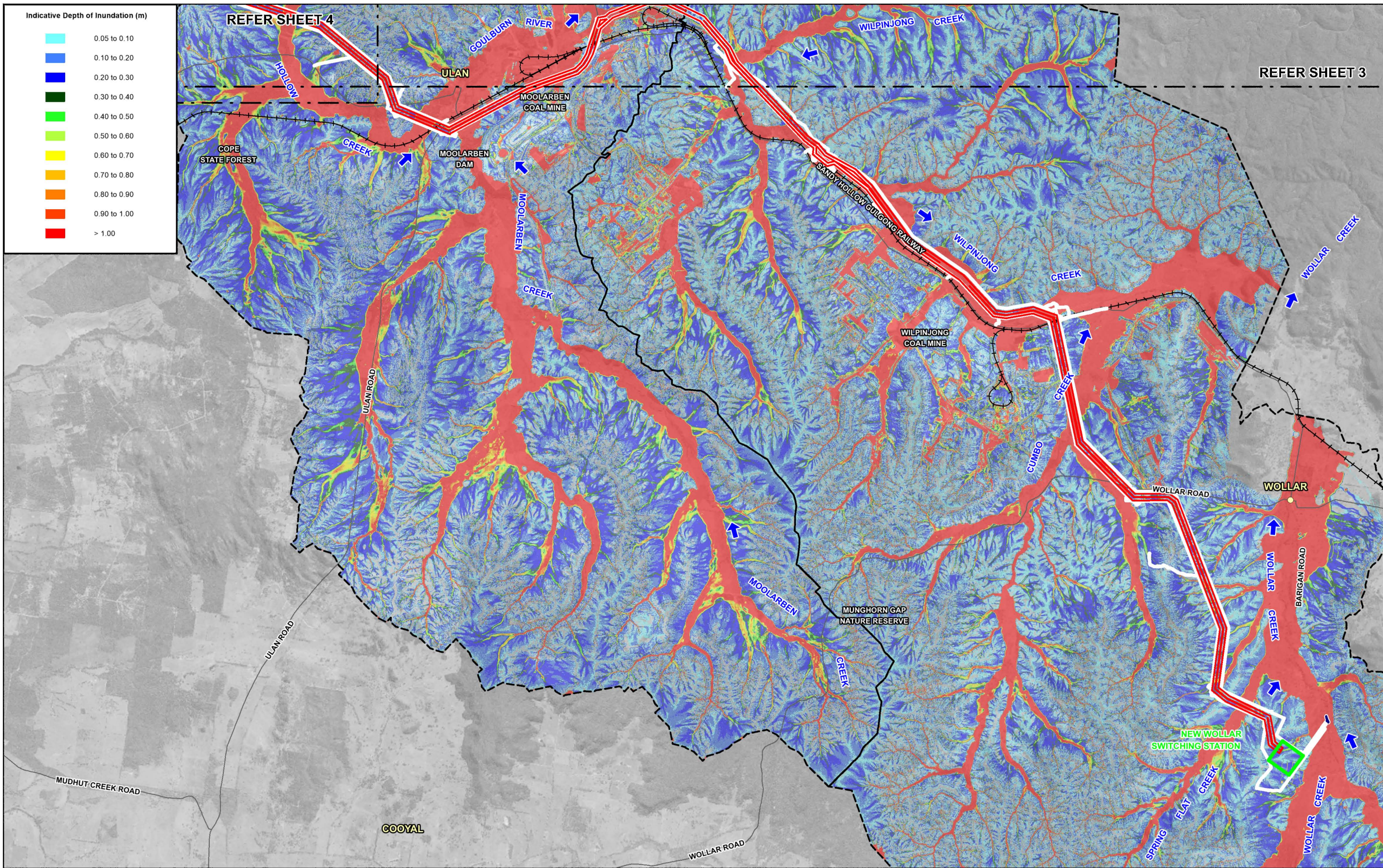
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
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- 330kV Transmission Line Corridor

LEGEND

- Local Government Area (LGA) Boundary
- Two-Dimensional Model Boundary
- Extent of Local Road Upgrade
- Rail Lines
- Roads

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 3
 (Sheet 1 of 6)
 FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
 PMF



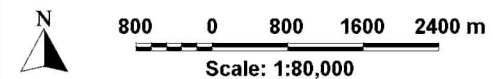
Indicative Depth of Inundation (m)

- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

REFER SHEET 4

REFER SHEET 3

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

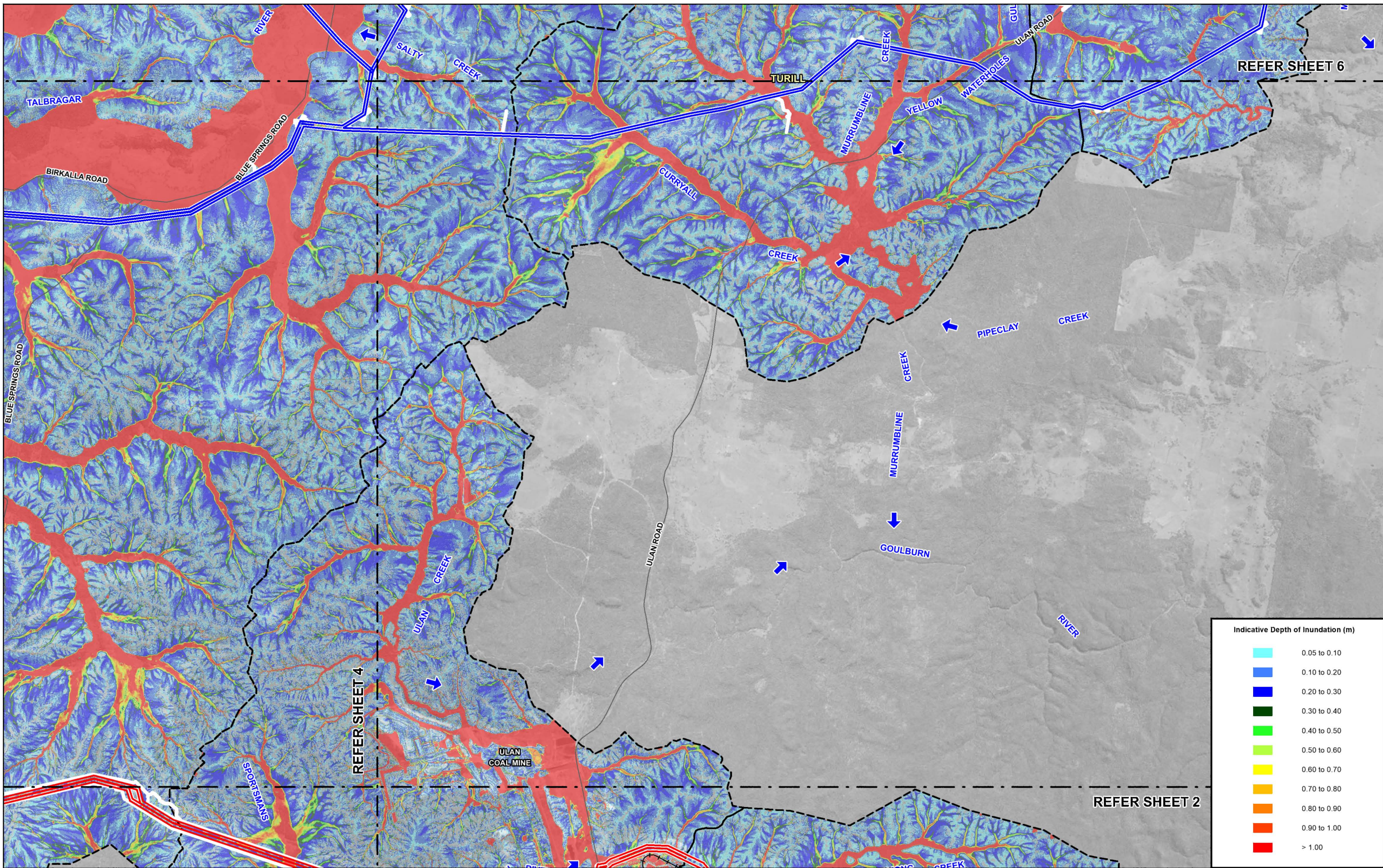


- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Two-Dimensional Model Boundary
 - Extent of Local Road Upgrade
 - Rail Lines
 - Roads



Figure 3
(Sheet 2 of 6)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
PMF



Indicative Depth of Inundation (m)	
■	0.05 to 0.10
■	0.10 to 0.20
■	0.20 to 0.30
■	0.30 to 0.40
■	0.40 to 0.50
■	0.50 to 0.60
■	0.60 to 0.70
■	0.70 to 0.80
■	0.80 to 0.90
■	0.90 to 1.00
■	> 1.00

Scale: 1:80,000

800 0 800 1600 2400 m

PROJECT ELEMENTS

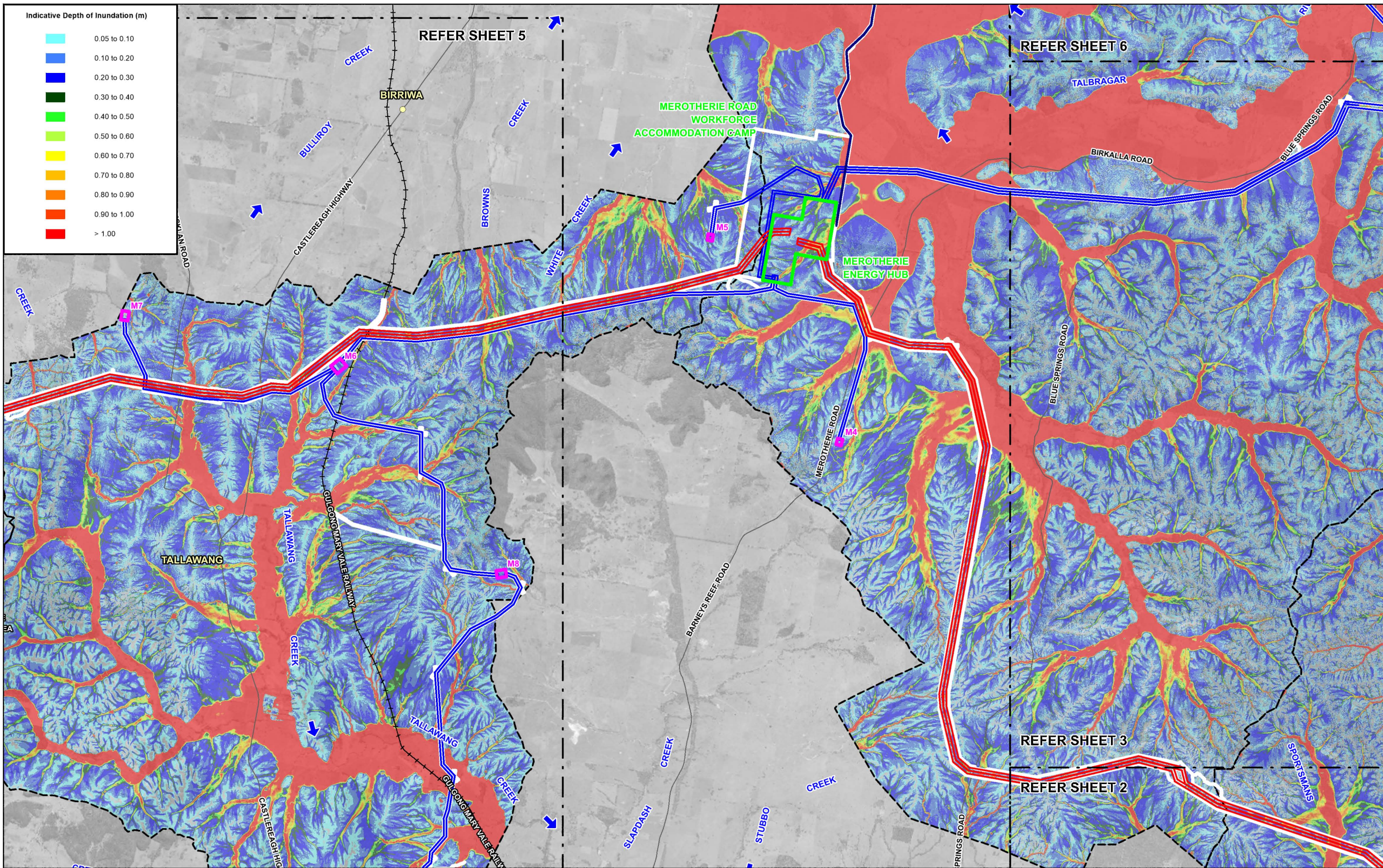
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

LEGEND

- Two-Dimensional Model Boundary
- Extent of Local Road Upgrade
- Rail Lines
- Roads

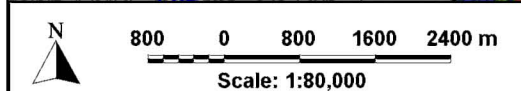
CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 3
 (Sheet 3 of 6)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
 PMF



Indicative Depth of Inundation (m)

0.05 to 0.10
0.10 to 0.20
0.20 to 0.30
0.30 to 0.40
0.40 to 0.50
0.50 to 0.60
0.60 to 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 1.00
> 1.00



PROJECT ELEMENTS

	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
	330kV Switching Stations and Identifier
	500kV Transmission Line Corridor
	330kV Transmission Line Corridor

LEGEND

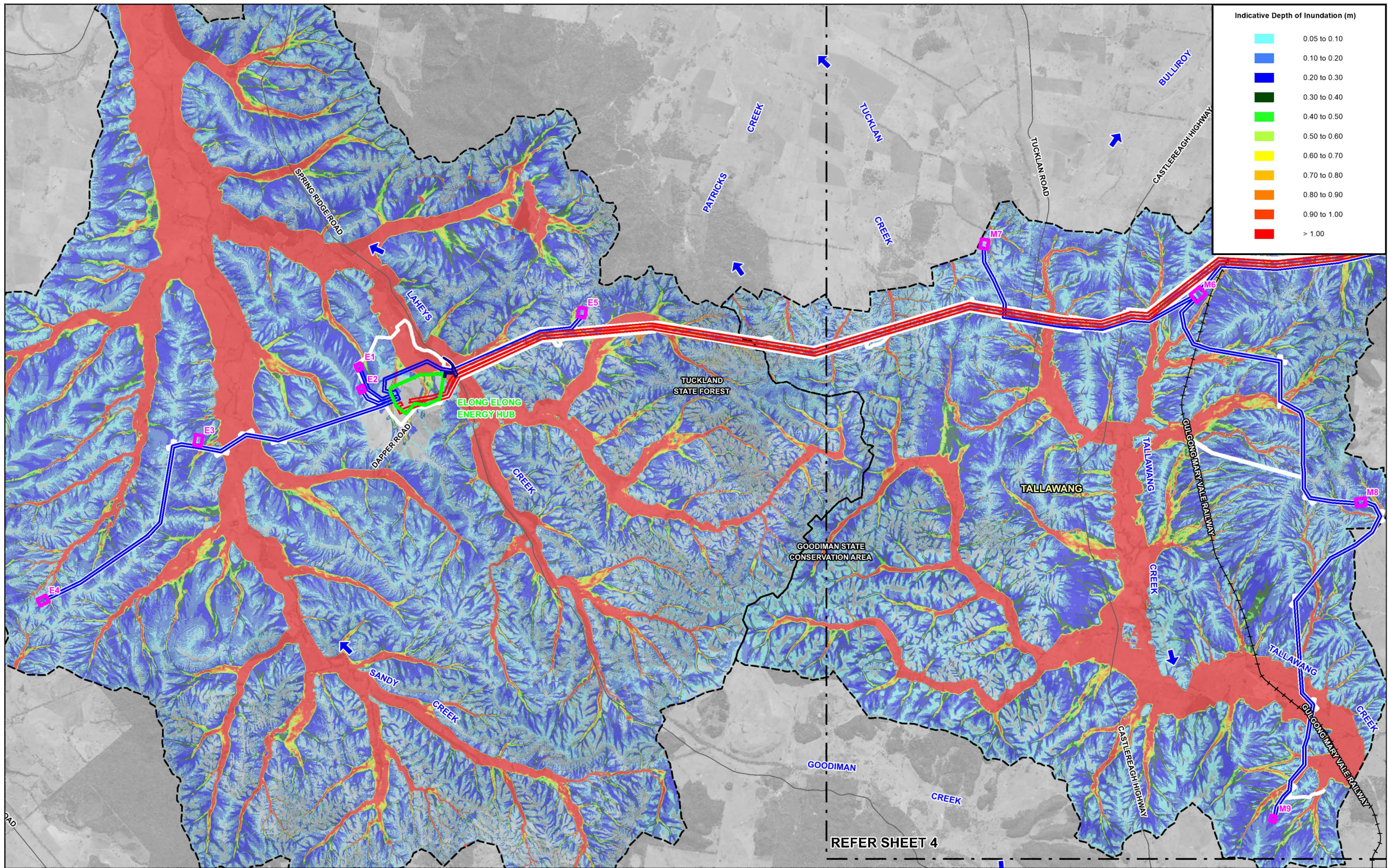
	Two-Dimensional Model Boundary
	Extent of Local Road Upgrade
	Rail Lines
	Roads

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

	Rail Lines
	Roads

Lyal & Associates

Figure 3
(Sheet 4 of 6)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
PMF



Indicative Depth of Inundation (m)	
■	0.05 to 0.10
■	0.10 to 0.20
■	0.20 to 0.30
■	0.30 to 0.40
■	0.40 to 0.50
■	0.50 to 0.60
■	0.60 to 0.70
■	0.70 to 0.80
■	0.80 to 0.90
■	0.90 to 1.00
■	> 1.00

800 0 800 1600 2400 m
 Scale: 1:80,000

- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

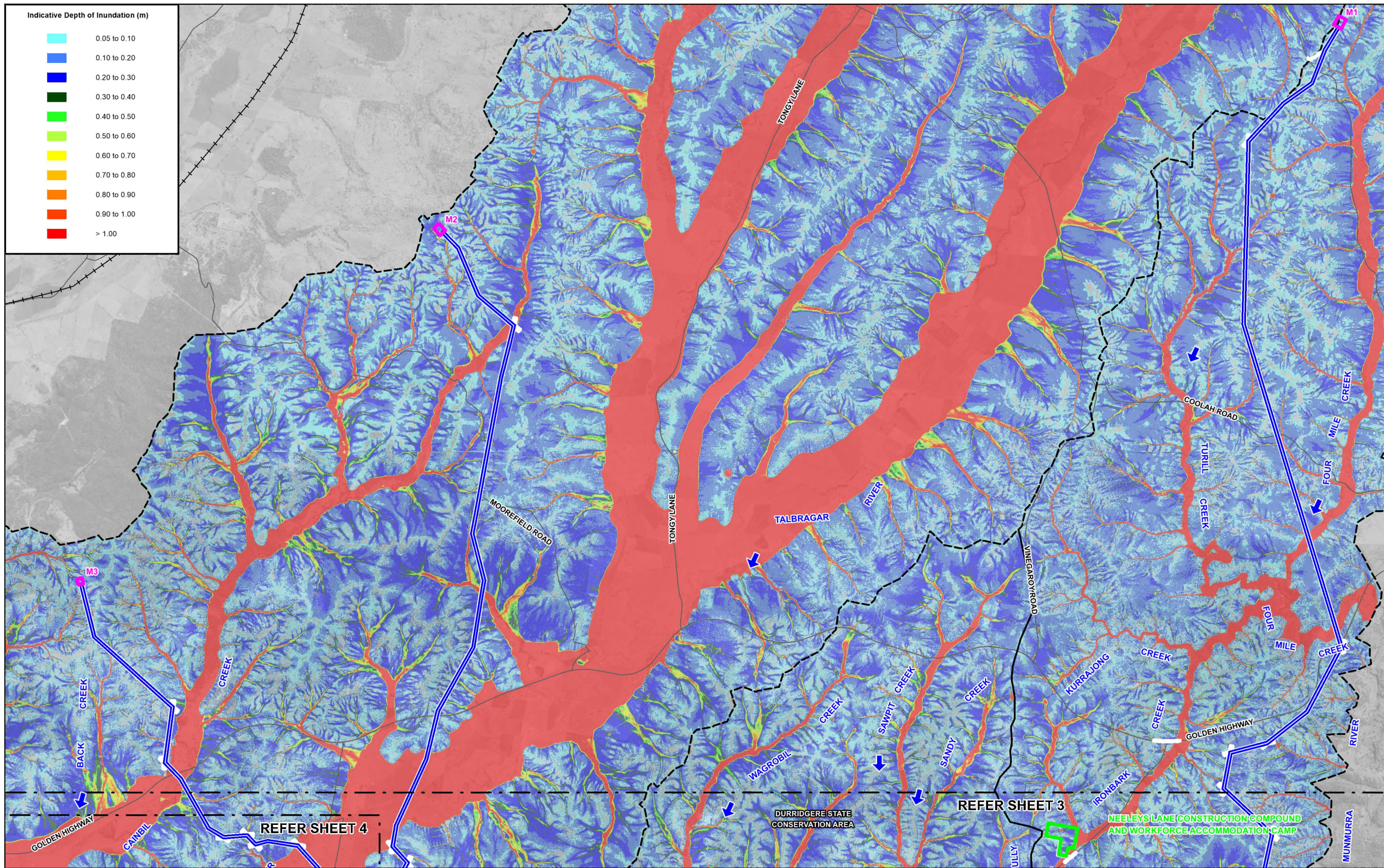
- LEGEND**
- Two-Dimensional Model Boundary
 - Extent of Local Road Upgrade

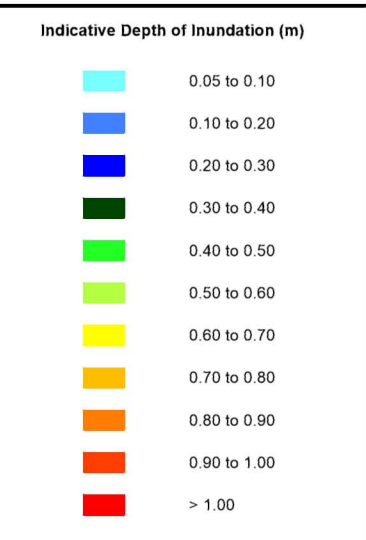
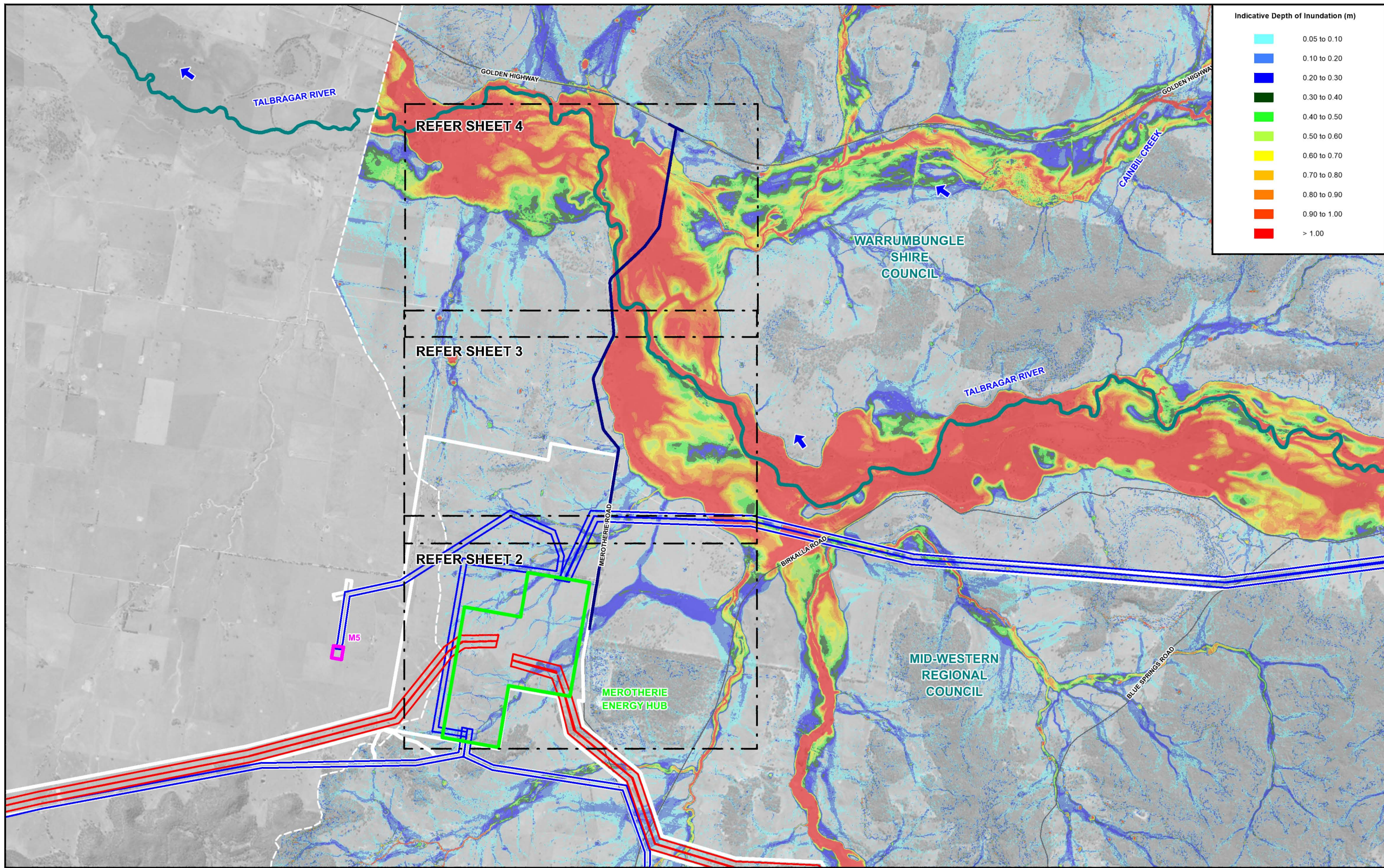
- Rail Lines
- Roads



REFER SHEET 4

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**




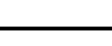
Figure 3
(Sheet 5 of 6)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS
PMF






 400 0 400 800 1200 m
 Scale: 1:40,000


PROJECT ELEMENTS

-  Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
-  M1 330kV Switching Stations and Identifier
-  500kV Transmission Line Corridor
-  330kV Transmission Line Corridor

LEGEND

-  Local Government Area (LGA) Boundary
-  Extent of Local Road Upgrade

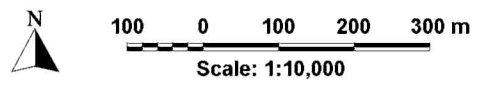
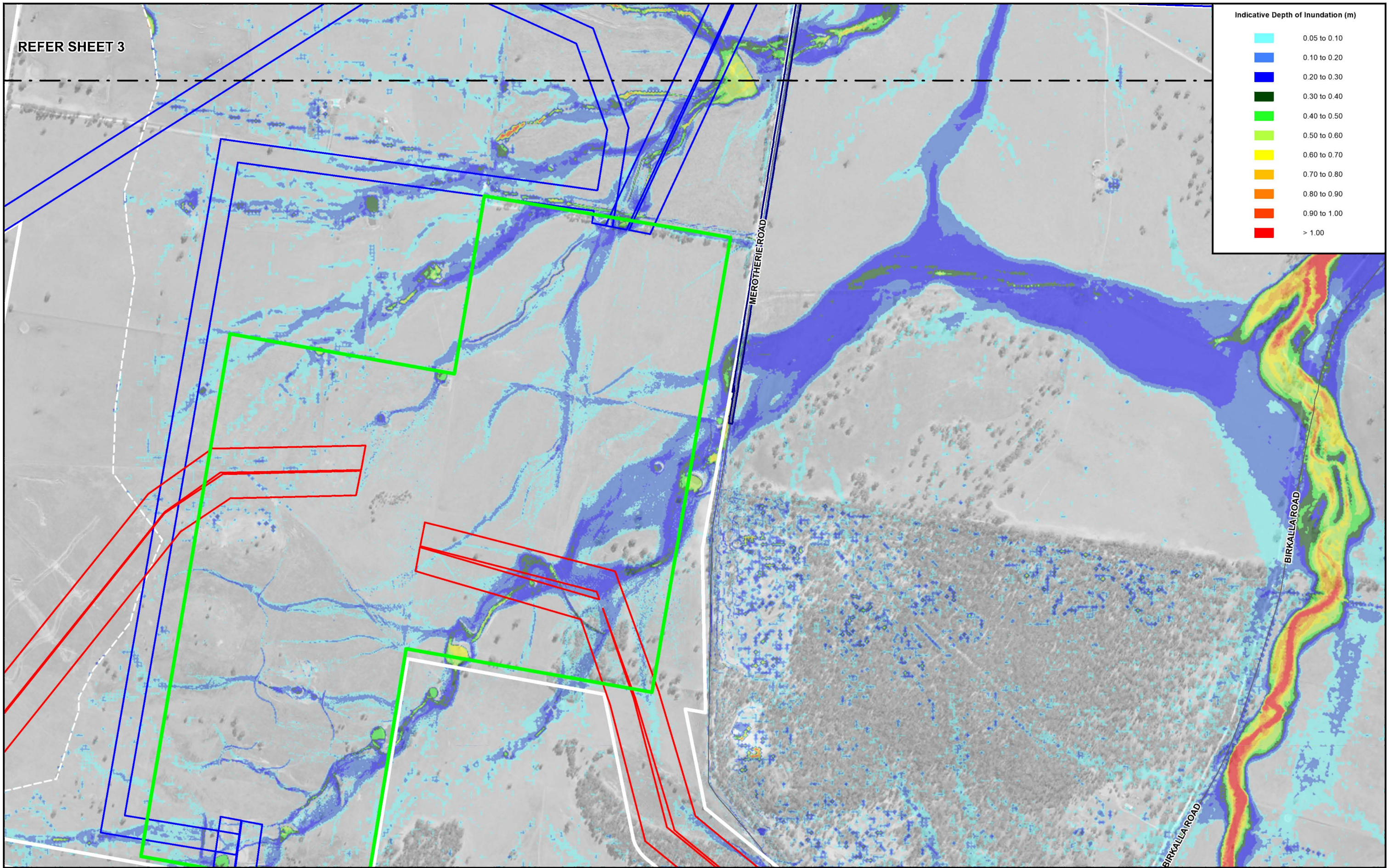
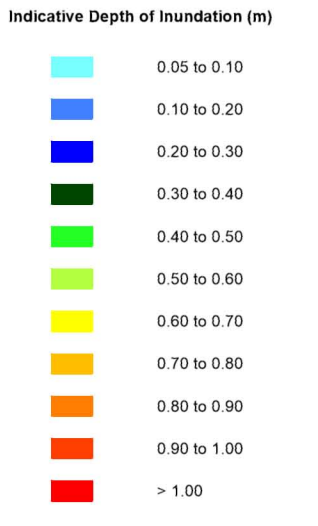
-  Roads
-  Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
10% AEP

Figure 4
(Sheet 1 of 4)

REFER SHEET 3



Lyall & Associates

- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

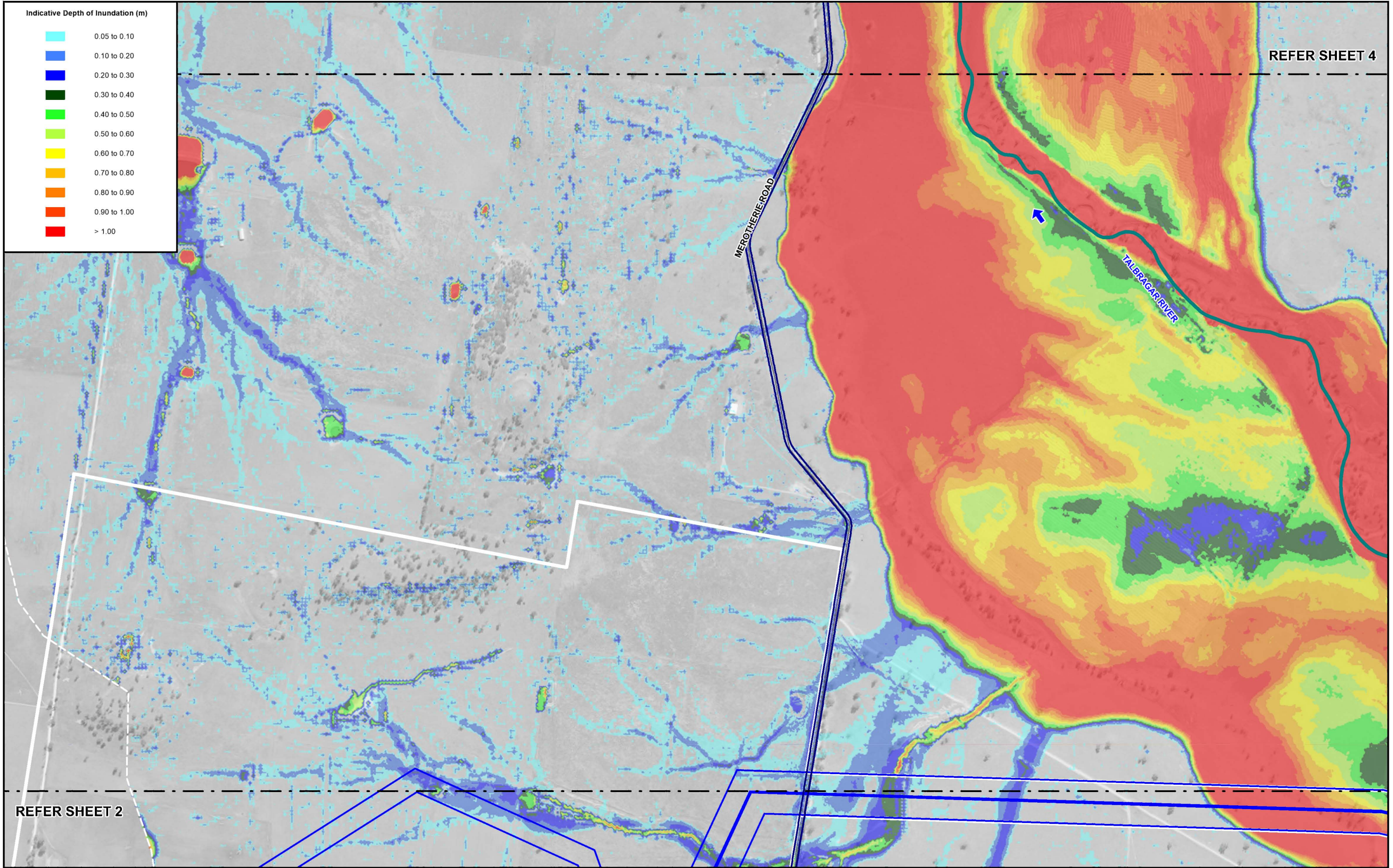
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
10% AEP

Figure 4
(Sheet 2 of 4)

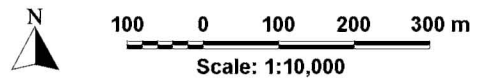
Indicative Depth of Inundation (m)



REFER SHEET 4



REFER SHEET 2



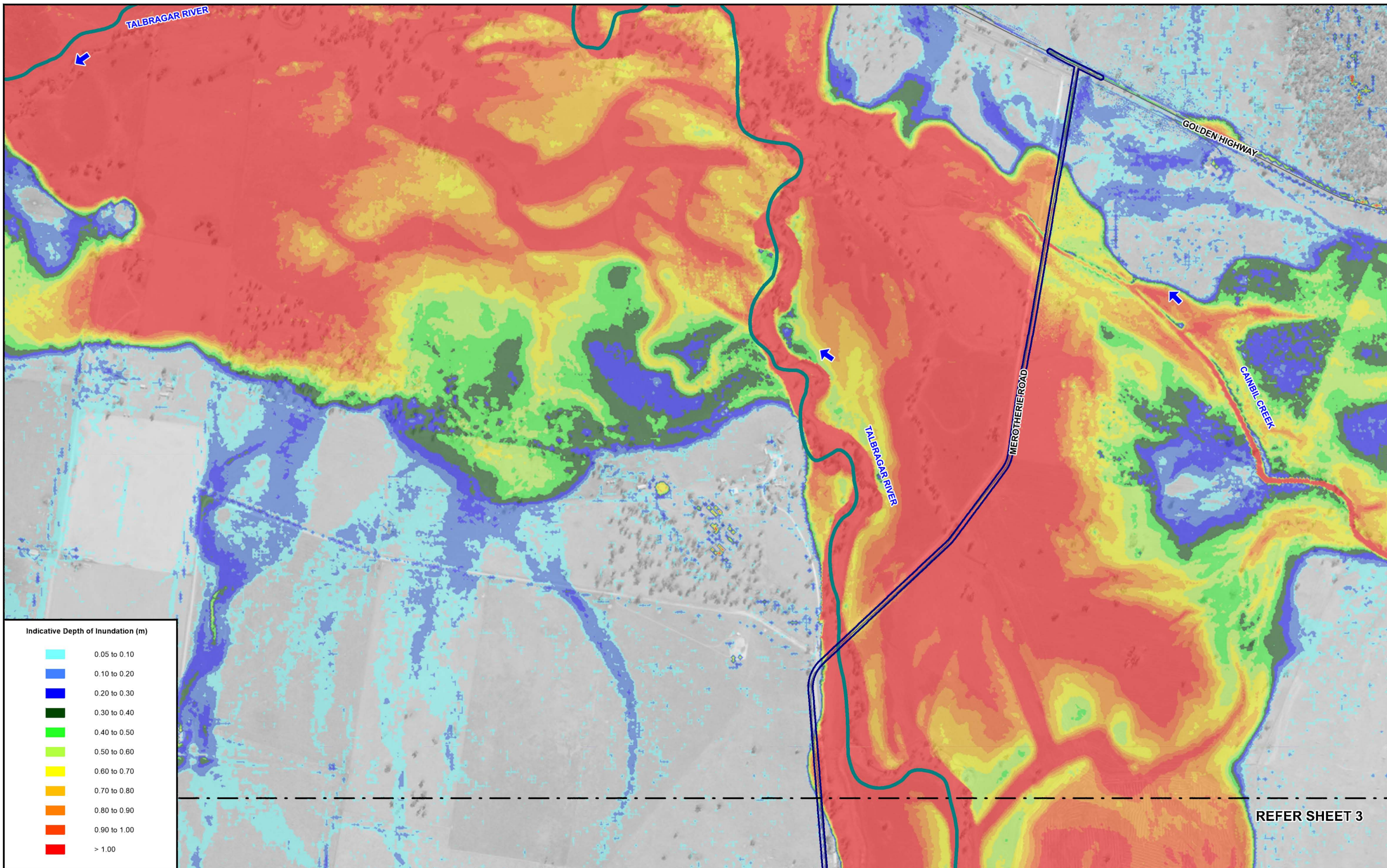
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
 EIS AMENDMENT REPORT - FLOODING**

FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROOTHERIE ROAD UPGRADE
 10% AEP

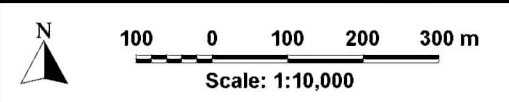
Figure 4
 (Sheet 3 of 4)



Indicative Depth of Inundation (m)

Light Blue	0.05 to 0.10
Blue	0.10 to 0.20
Dark Blue	0.20 to 0.30
Green	0.30 to 0.40
Light Green	0.40 to 0.50
Yellow-Green	0.50 to 0.60
Yellow	0.60 to 0.70
Orange	0.70 to 0.80
Red-Orange	0.80 to 0.90
Red	0.90 to 1.00
Dark Red	> 1.00

REFER SHEET 3



PROJECT ELEMENTS

Green rectangle	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
Purple square with M1	330kV Switching Stations and Identifier
Red rectangle	500kV Transmission Line Corridor
Blue rectangle	330kV Transmission Line Corridor

LEGEND

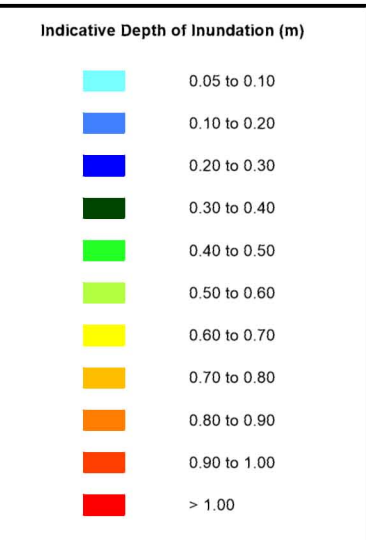
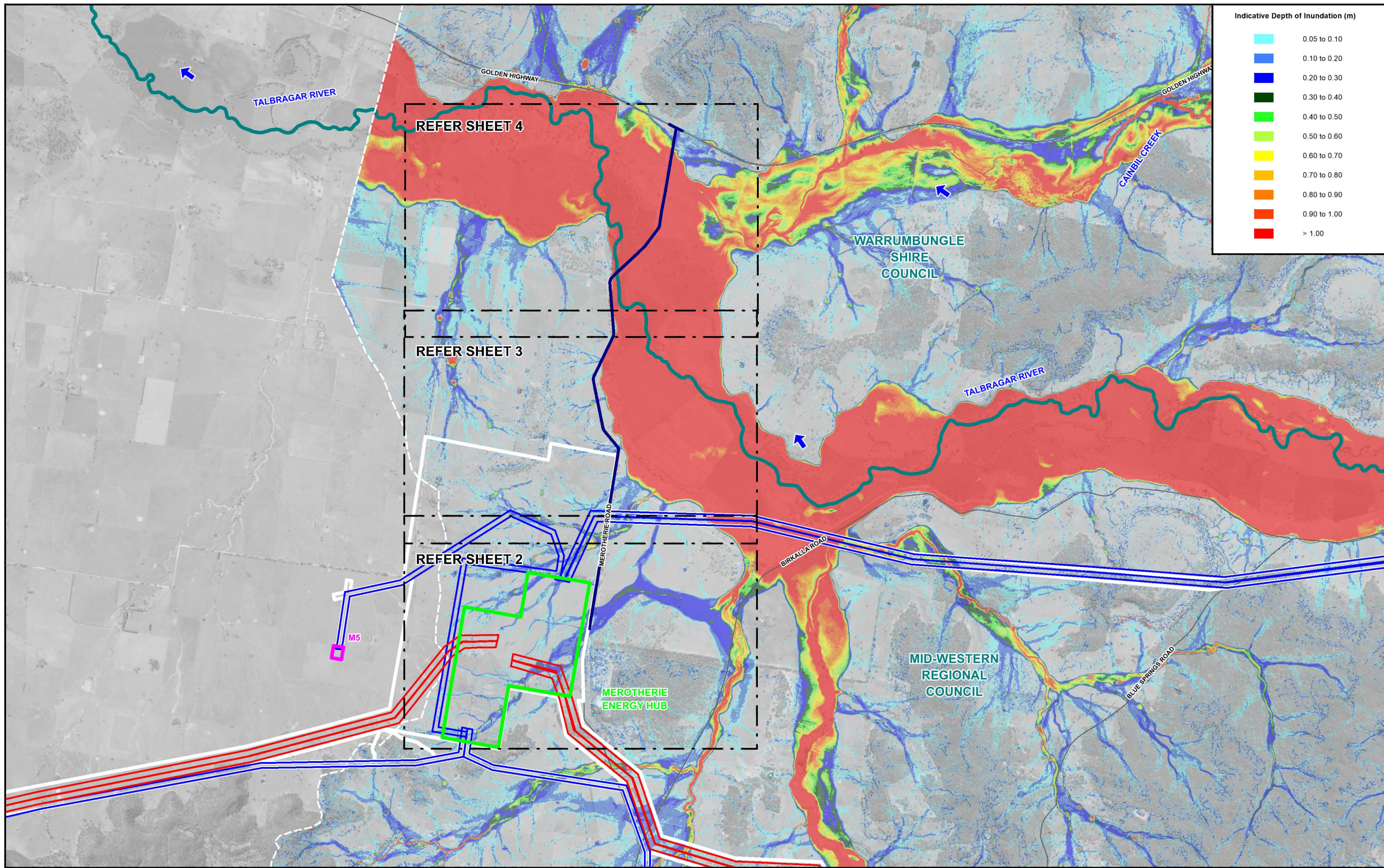
Blue line	Local Government Area (LGA) Boundary
White rectangle with blue border	Extent of Local Road Upgrade
Grey line	Roads
Dashed grey line	Two-Dimensional Model Boundary



**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**







FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
10% AEP

Figure 4
(Sheet 4 of 4)




 400 0 400 800 1200 m
 Scale: 1:40,000


- PROJECT ELEMENTS**
-  Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 -  330kV Switching Stations and Identifier
 -  500kV Transmission Line Corridor
 -  330kV Transmission Line Corridor

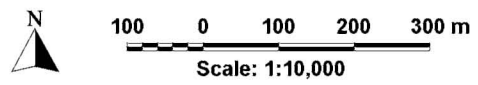
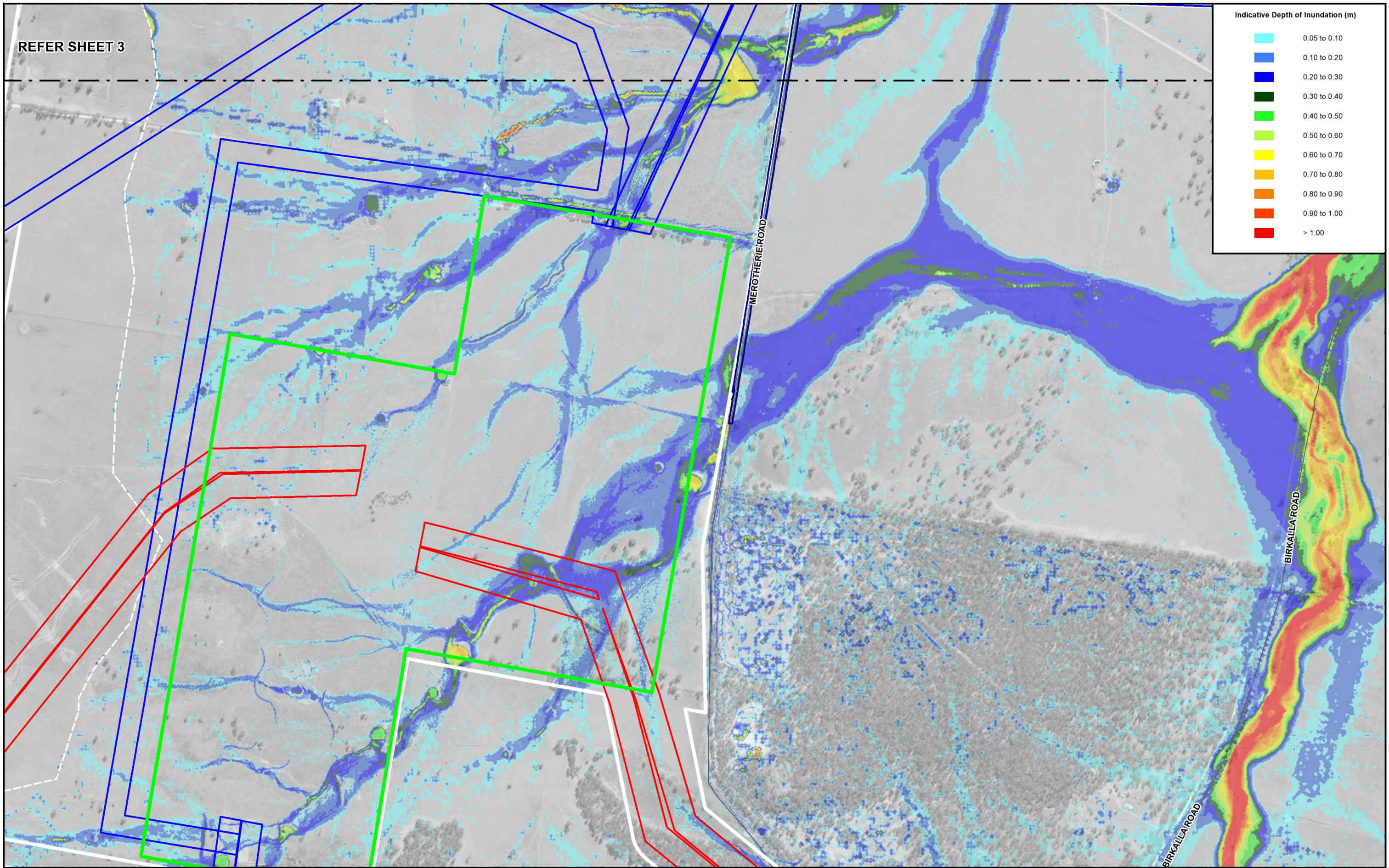
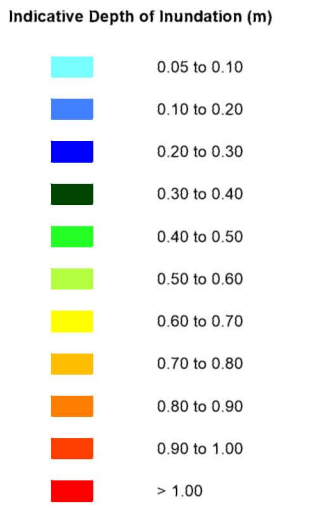
- LEGEND**
-  Local Government Area (LGA) Boundary
 -  Extent of Local Road Upgrade
 -  Roads
 -  Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
1% AEP

Figure 5
 (Sheet 1 of 4)

REFER SHEET 3



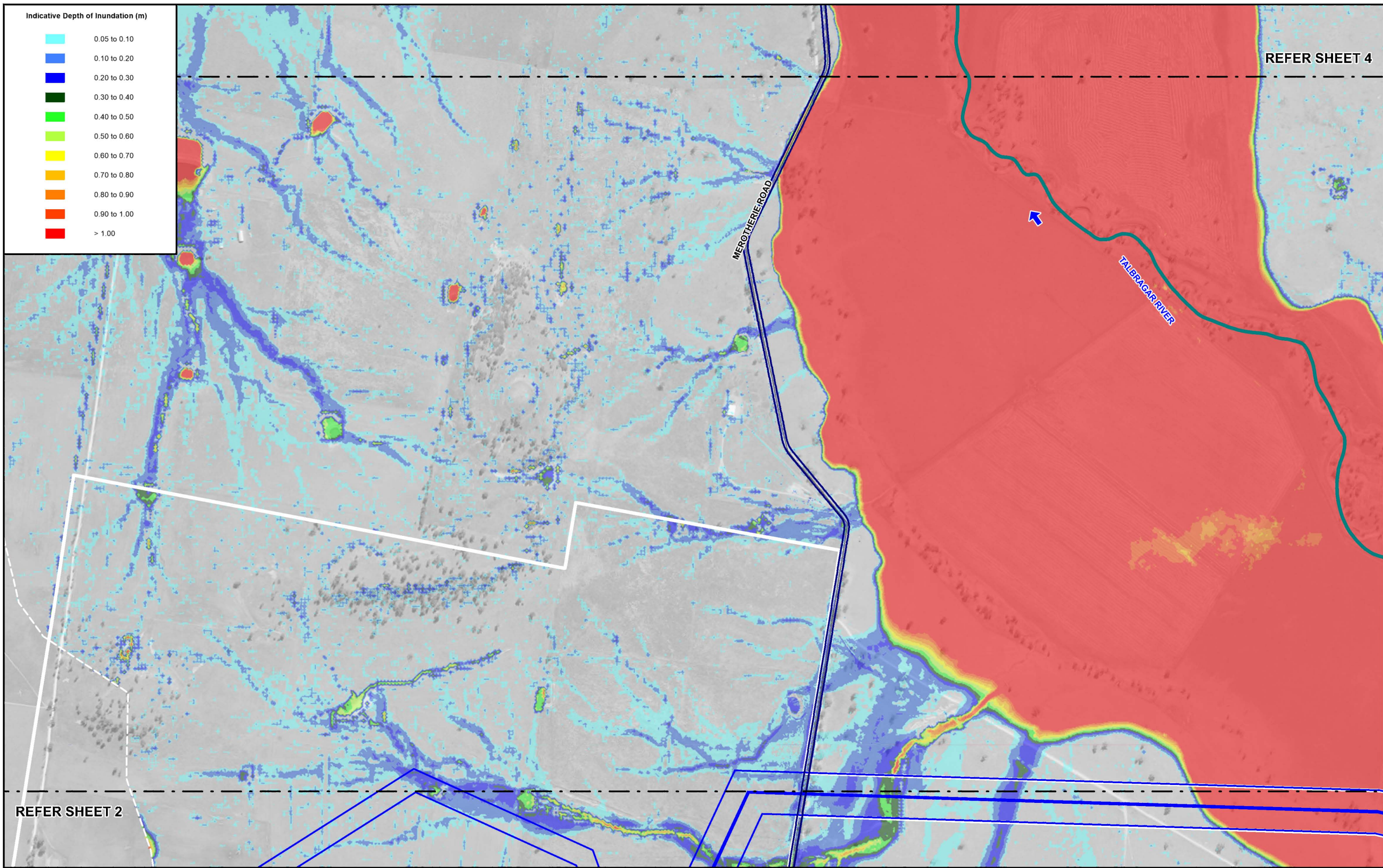
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor
 - M1

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Lyall & Associates

FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
1% AEP

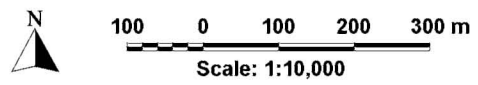


Indicative Depth of Inundation (m)

- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

REFER SHEET 4

REFER SHEET 2



Lyall & Associates

- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

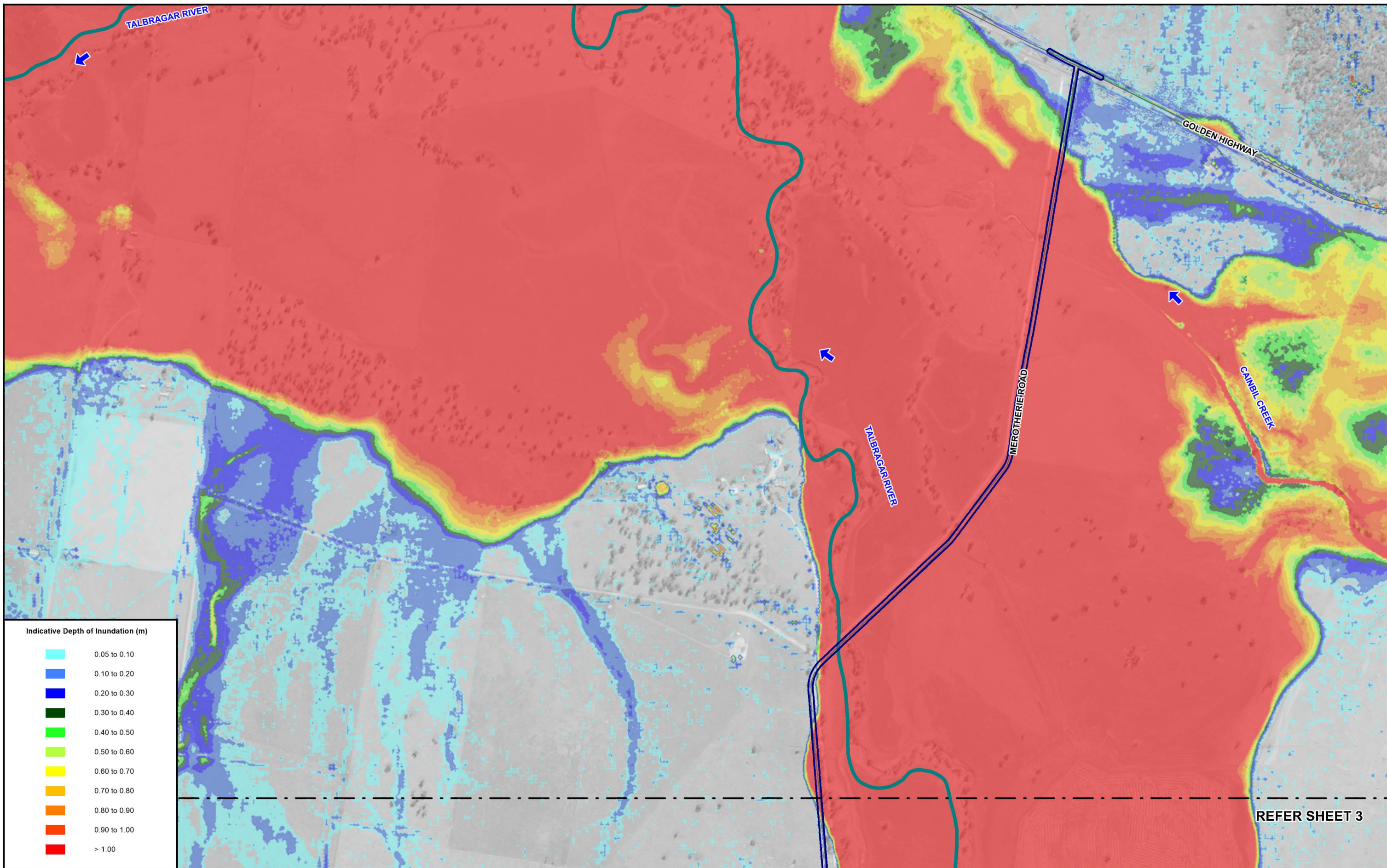
LEGEND

- Local Government Area (LGA) Boundary
- Extent of Local Road Upgrade
- Roads
- Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
1% AEP

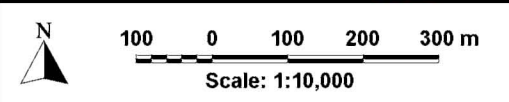
Figure 5
(Sheet 3 of 4)



Indicative Depth of Inundation (m)

Light Blue	0.05 to 0.10
Blue	0.10 to 0.20
Dark Blue	0.20 to 0.30
Green	0.30 to 0.40
Light Green	0.40 to 0.50
Yellow-Green	0.50 to 0.60
Yellow	0.60 to 0.70
Orange	0.70 to 0.80
Red-Orange	0.80 to 0.90
Red	0.90 to 1.00
Dark Red	> 1.00

REFER SHEET 3



- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

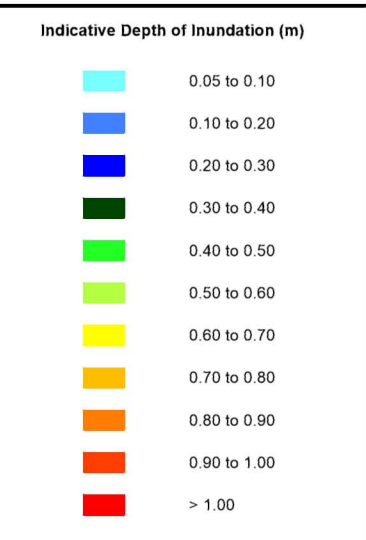
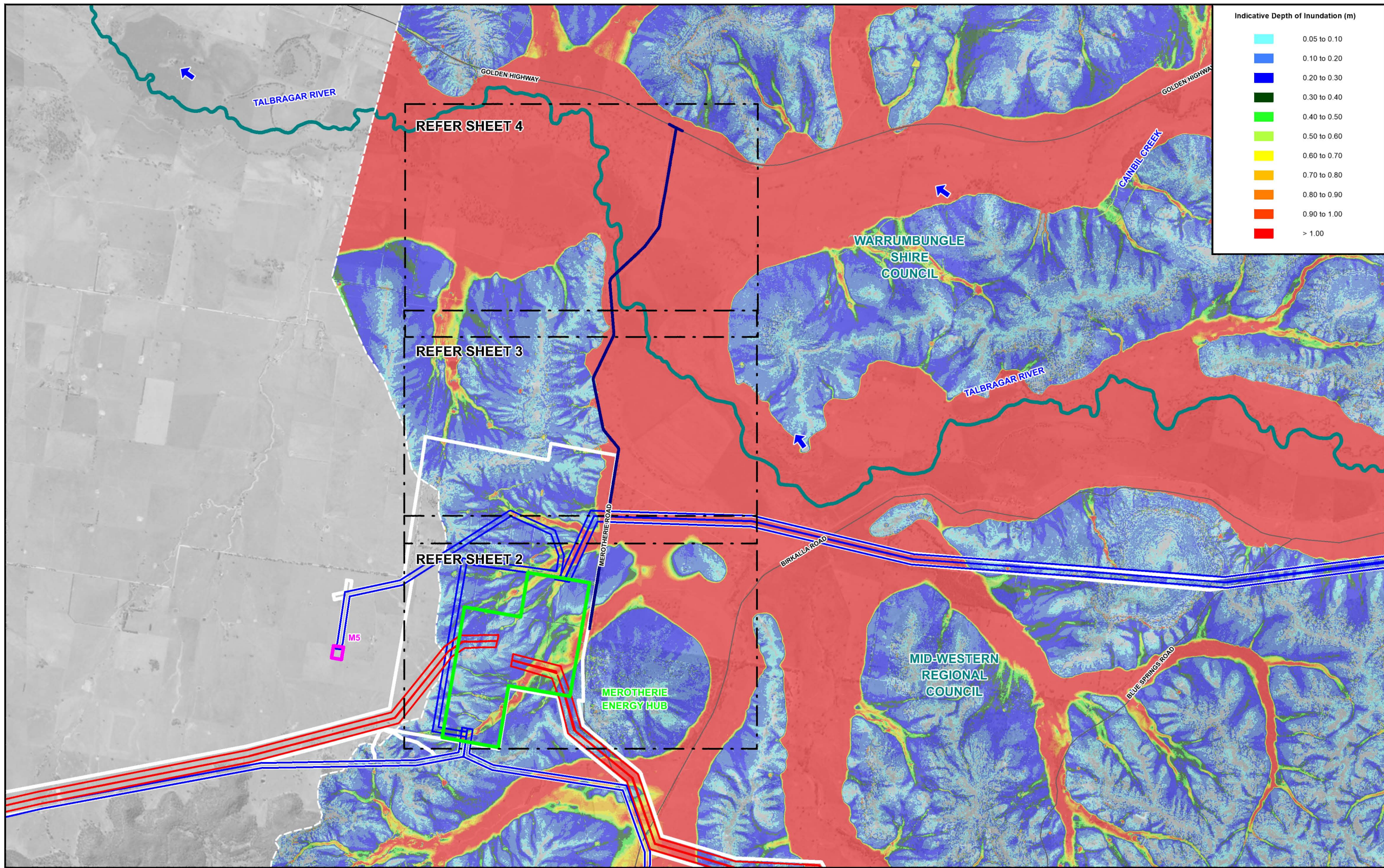
- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**



FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
1% AEP

Figure 5
(Sheet 4 of 4)



400 0 400 800 1200 m

 Scale: 1:40,000

PROJECT ELEMENTS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- M1 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

LEGEND

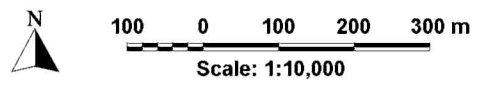
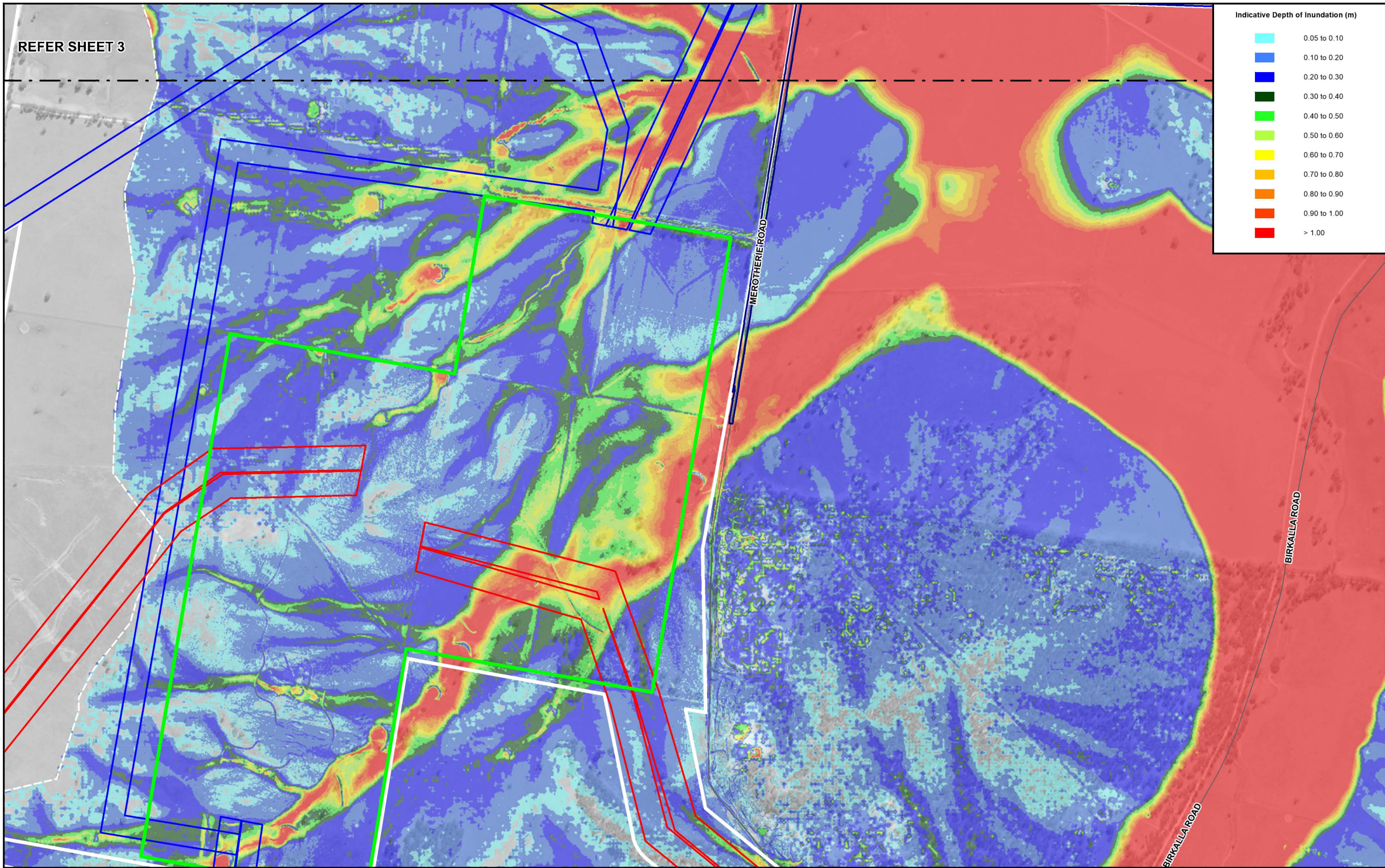
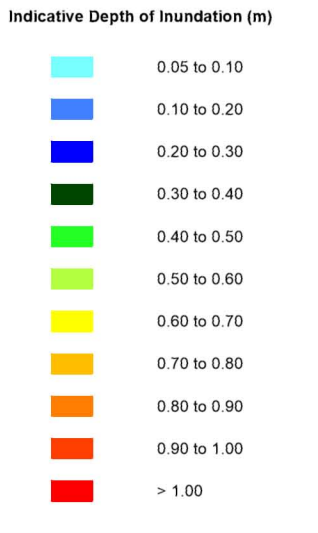
- Local Government Area (LGA) Boundary
- Extent of Local Road Upgrade

- Roads
- Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 6
 (Sheet 1 of 4)
 MEROTHERIE ENERGY HUB
 TUFLOW MODEL RESULTS - PMF

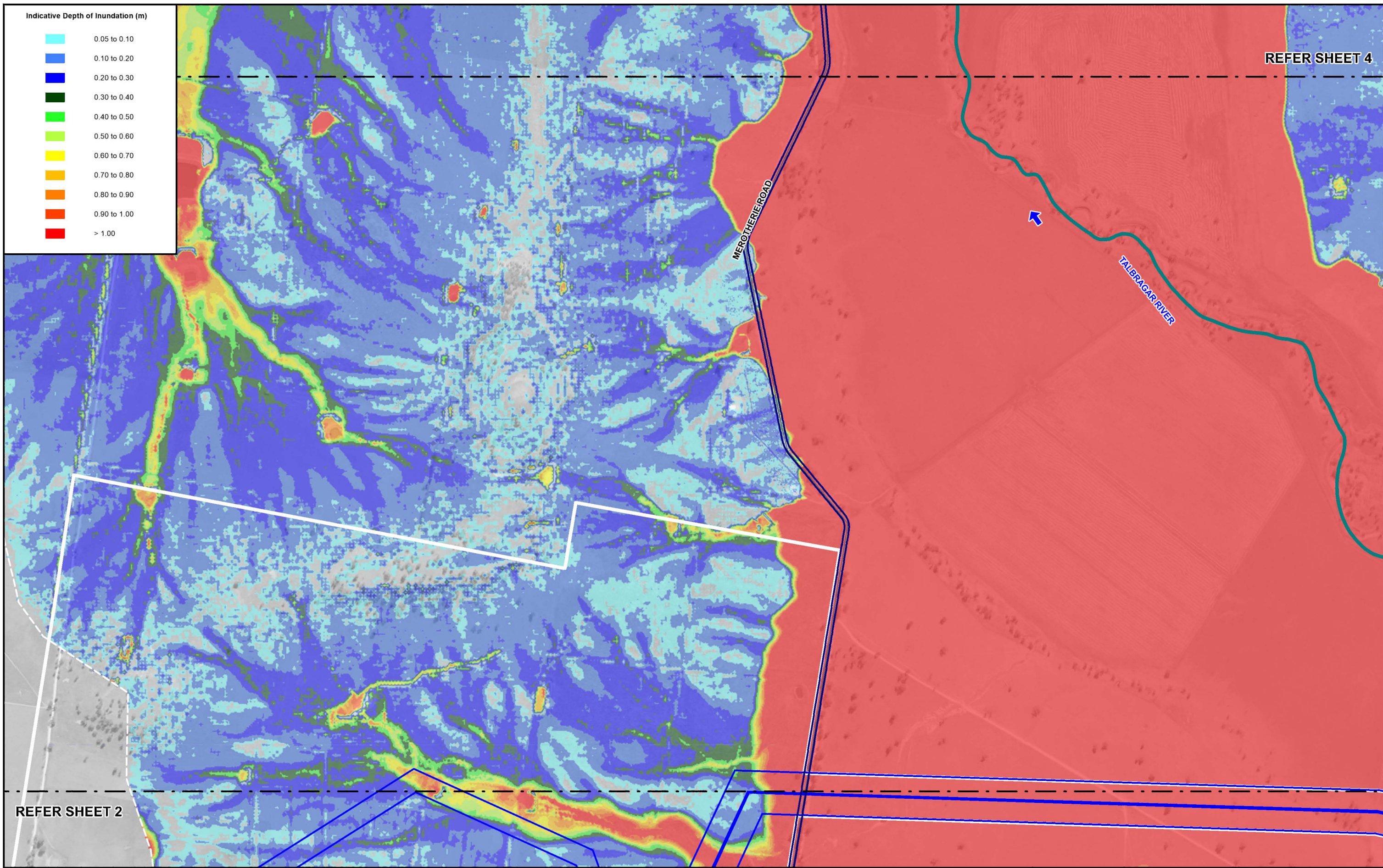
REFER SHEET 3



- PROJECT ELEMENTS**
- ▭ Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - ▭ M1 330kV Switching Stations and Identifier
 - ▭ 500kV Transmission Line Corridor
 - ▭ 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - ▭ Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

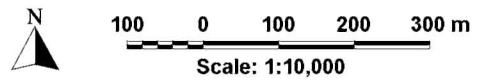


Indicative Depth of Inundation (m)

0.05 to 0.10
0.10 to 0.20
0.20 to 0.30
0.30 to 0.40
0.40 to 0.50
0.50 to 0.60
0.60 to 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 1.00
> 1.00

REFER SHEET 4

REFER SHEET 2



Lyall & Associates

PROJECT ELEMENTS

	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
	330kV Switching Stations and Identifier
	500kV Transmission Line Corridor
	330kV Transmission Line Corridor

LEGEND

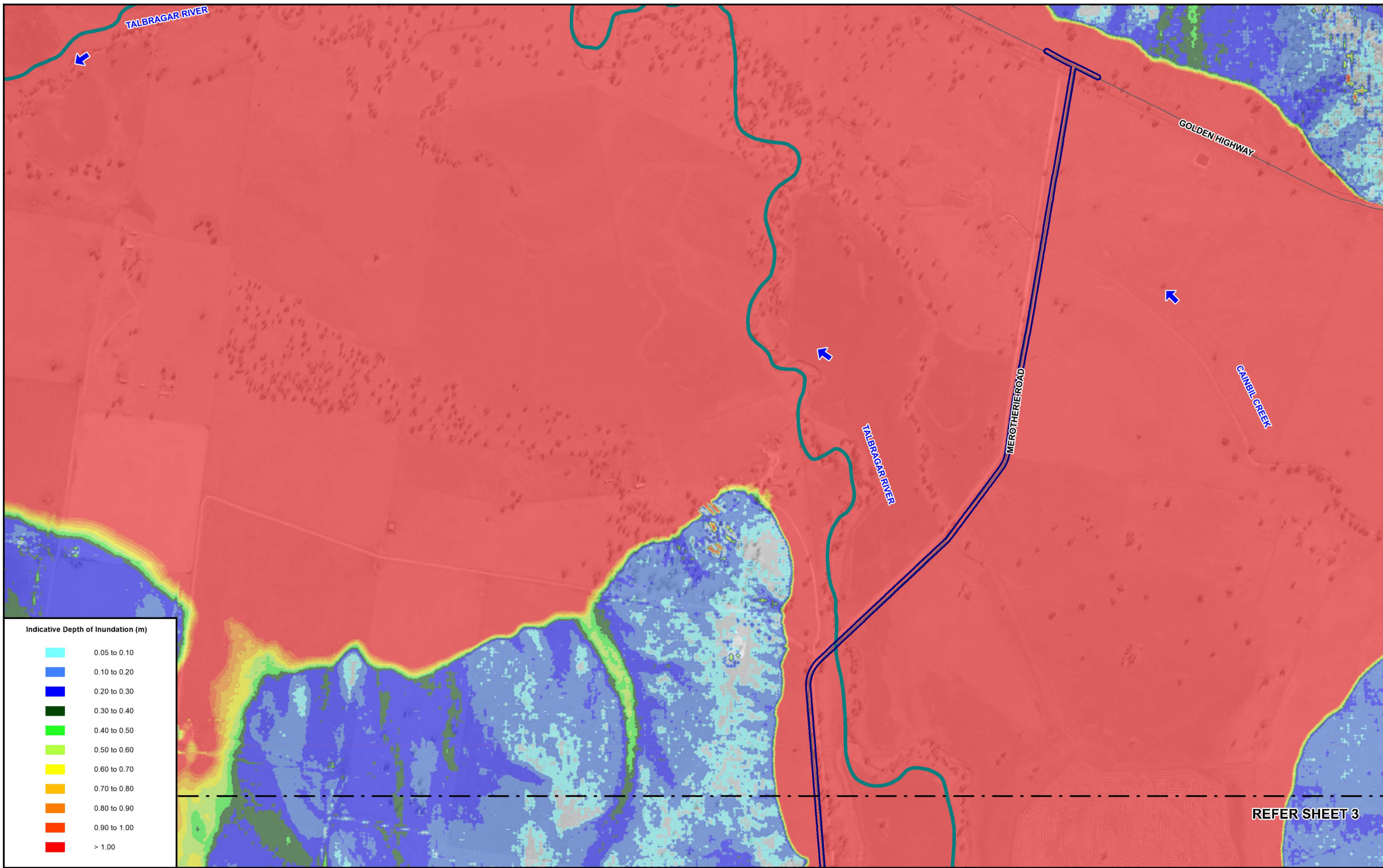
	Local Government Area (LGA) Boundary
	Extent of Local Road Upgrade

	Roads
	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
PMF

Figure 6
(Sheet 3 of 4)



N

100 0 100 200 300 m

Scale: 1:10,000

Lyall & Associates

PROJECT ELEMENTS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- M1 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

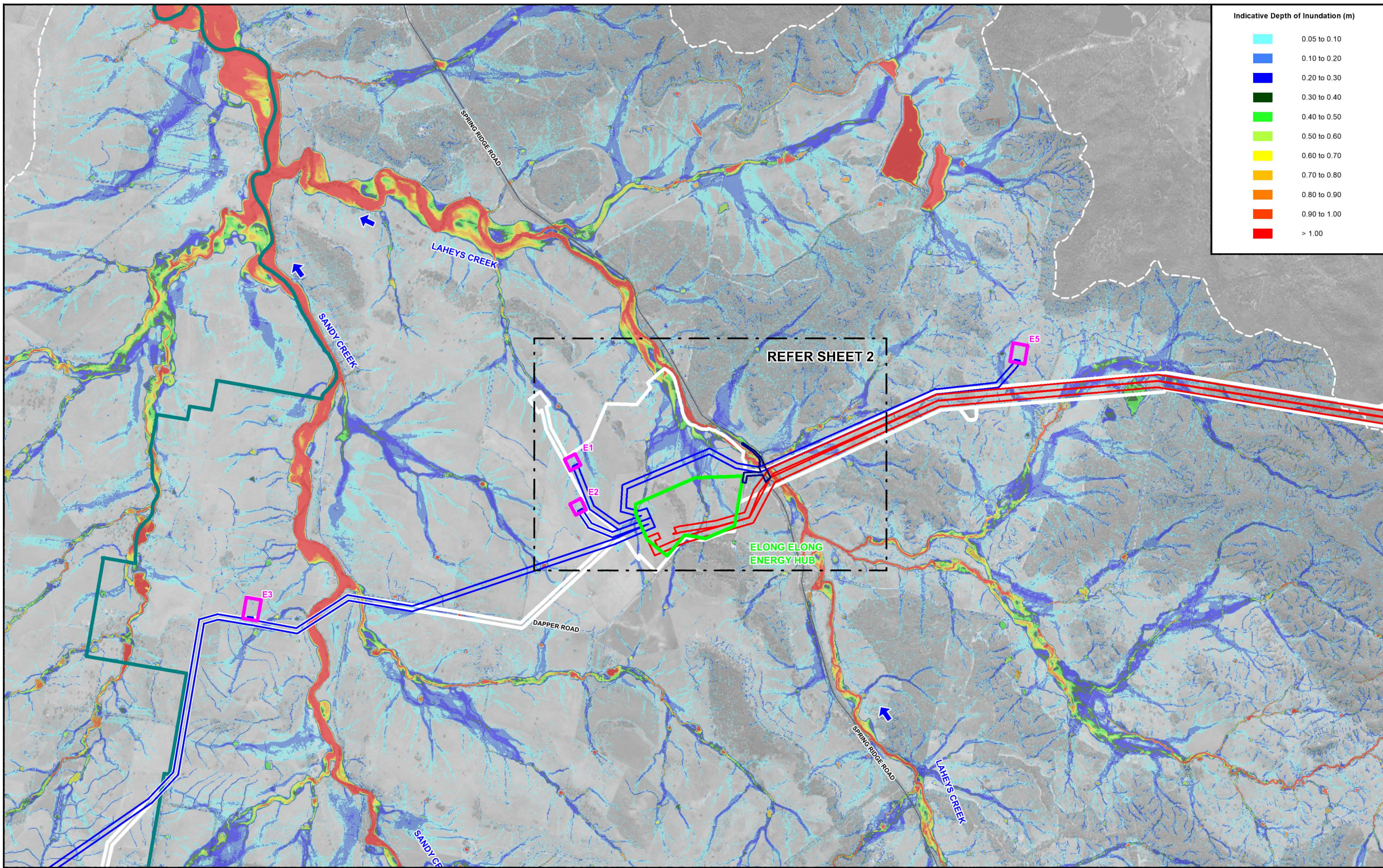
LEGEND

- Local Government Area (LGA) Boundary
- Extent of Local Road Upgrade
- Roads
- Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

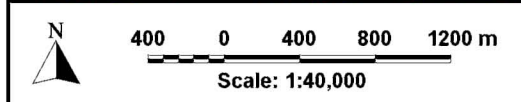
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE PMF

REFER SHEET 3



Indicative Depth of Inundation (m)

Light Blue	0.05 to 0.10
Blue	0.10 to 0.20
Dark Blue	0.20 to 0.30
Green	0.30 to 0.40
Light Green	0.40 to 0.50
Yellow-Green	0.50 to 0.60
Yellow	0.60 to 0.70
Orange	0.70 to 0.80
Red-Orange	0.80 to 0.90
Red	0.90 to 1.00
Dark Red	> 1.00



PROJECT ELEMENTS

Green outline	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
Pink square with M1	330kV Switching Stations and Identifier
Red outline	500kV Transmission Line Corridor
Blue outline	330kV Transmission Line Corridor

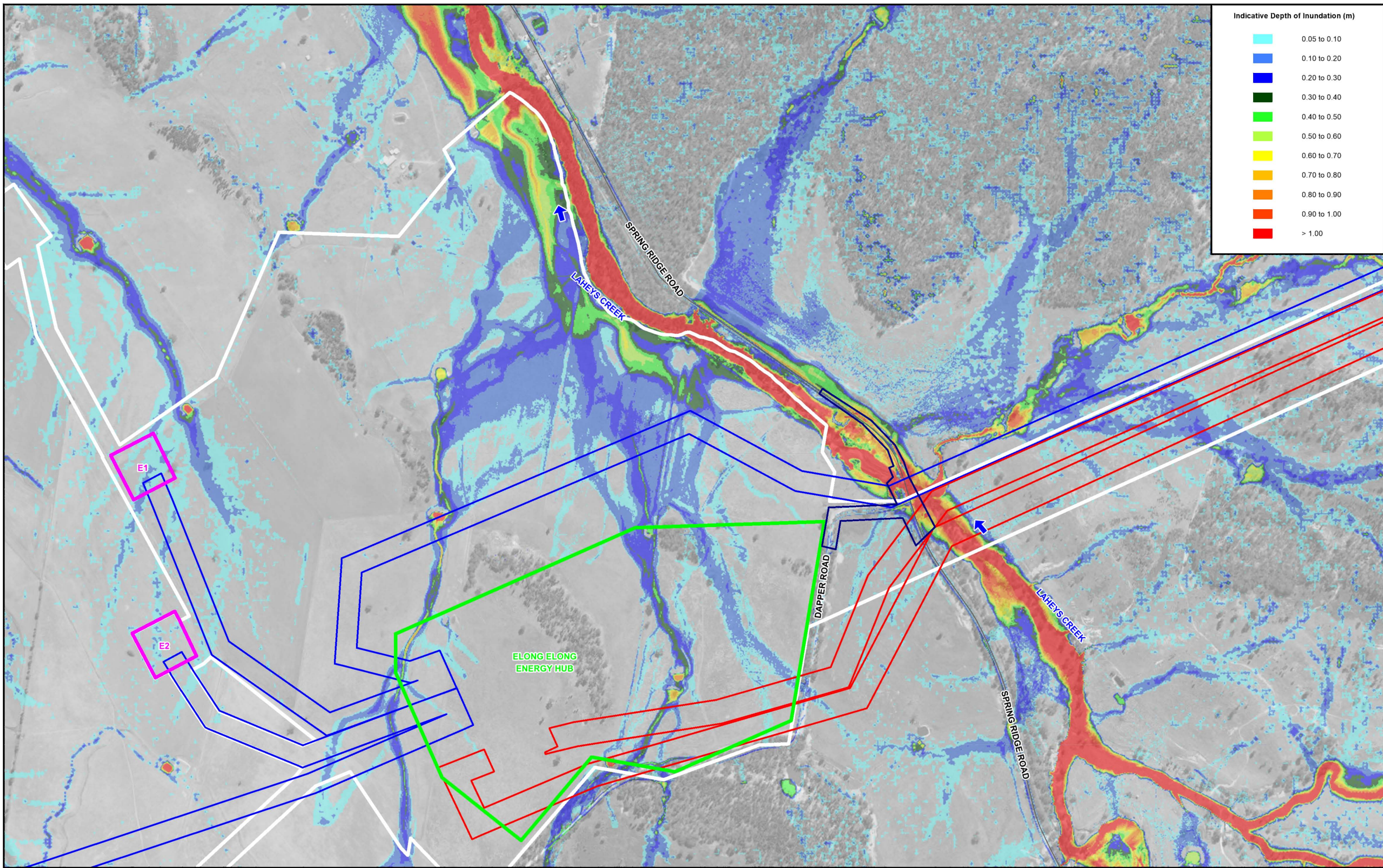
LEGEND

Green line	Local Government Area (LGA) Boundary
Blue line	Extent of Local Road Upgrade
Grey line	Roads
Dashed grey line	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

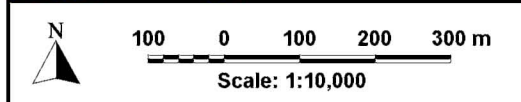


Figure 7
(Sheet 1 of 2)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
10% AEP



Indicative Depth of Inundation (m)

0.05 to 0.10
0.10 to 0.20
0.20 to 0.30
0.30 to 0.40
0.40 to 0.50
0.50 to 0.60
0.60 to 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 1.00
> 1.00



PROJECT ELEMENTS

	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
	330kV Switching Stations and Identifier
	500kV Transmission Line Corridor
	330kV Transmission Line Corridor

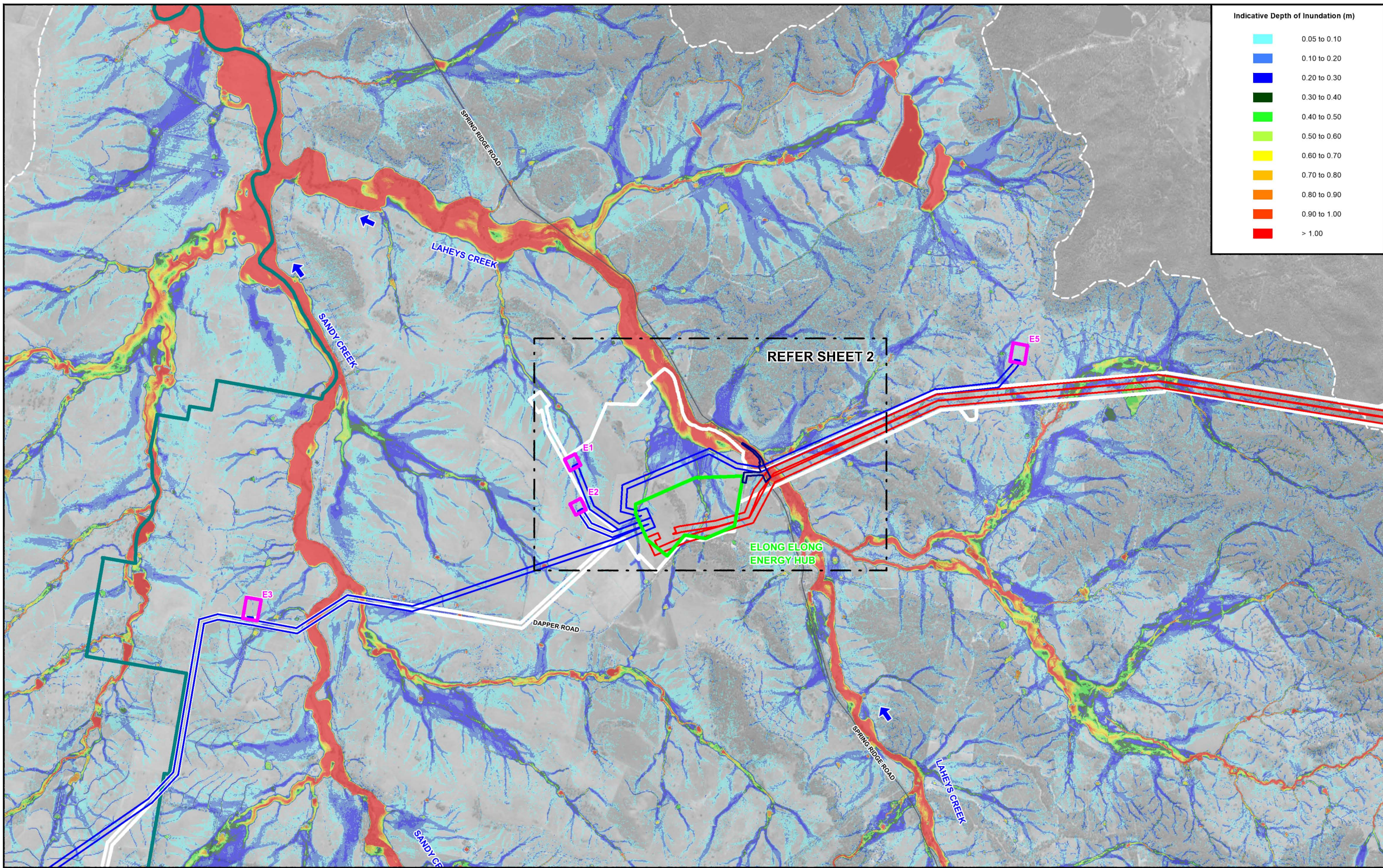
LEGEND

	Local Government Area (LGA) Boundary
	Extent of Local Road Upgrade
	Roads
	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**



FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
10% AEP



Indicative Depth of Inundation (m)

0.05 to 0.10
0.10 to 0.20
0.20 to 0.30
0.30 to 0.40
0.40 to 0.50
0.50 to 0.60
0.60 to 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 1.00
> 1.00

400 0 400 800 1200 m

 Scale: 1:40,000

PROJECT ELEMENTS

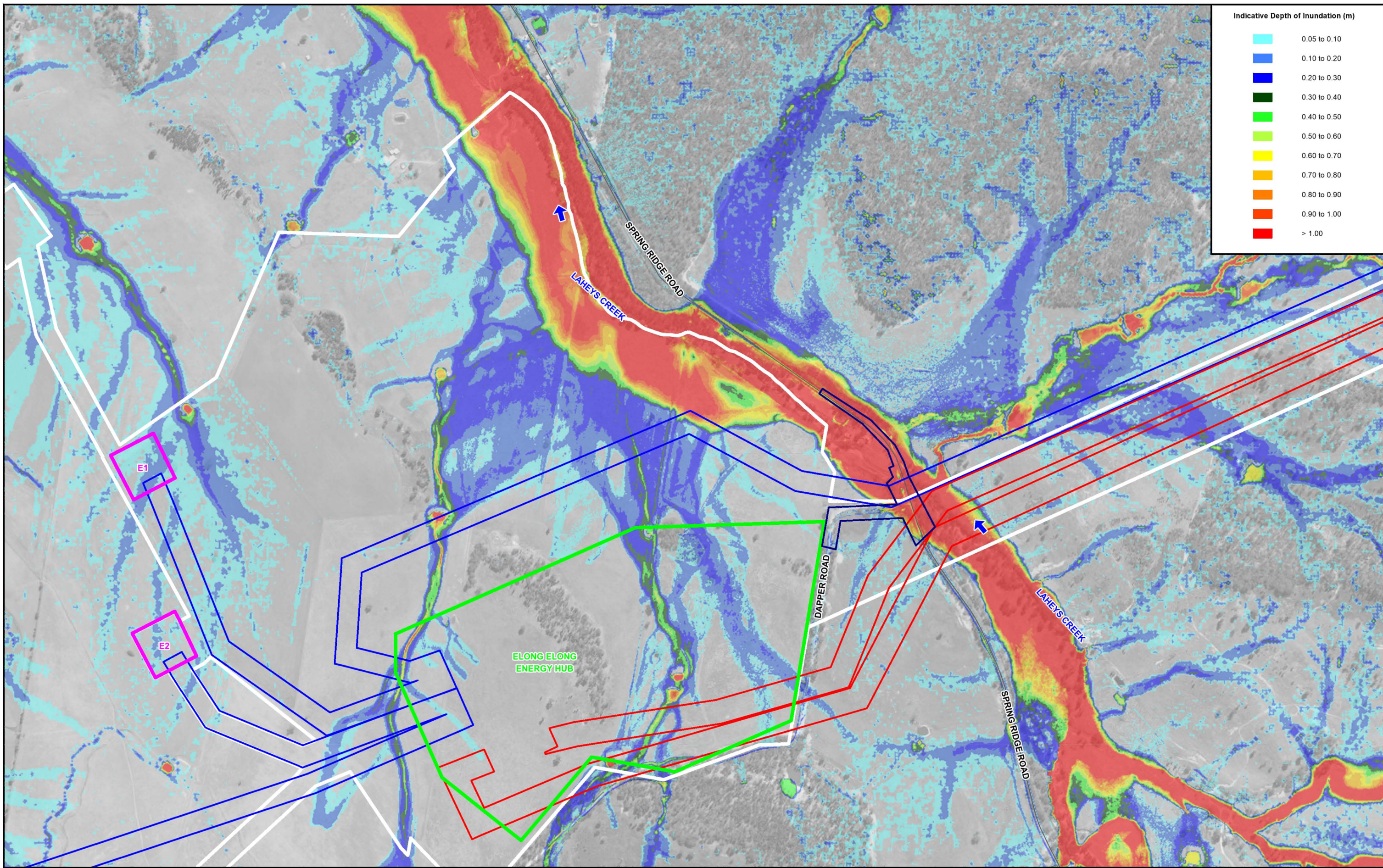
	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
	330kV Switching Stations and Identifier
	500kV Transmission Line Corridor
	330kV Transmission Line Corridor

LEGEND

	Local Government Area (LGA) Boundary
	Extent of Local Road Upgrade
	Roads
	Two-Dimensional Model Boundary

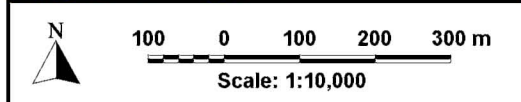
**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 8
 (Sheet 1 of 2)
**FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
 1% AEP**



Indicative Depth of Inundation (m)

Light Blue	0.05 to 0.10
Blue	0.10 to 0.20
Dark Blue	0.20 to 0.30
Green	0.30 to 0.40
Light Green	0.40 to 0.50
Yellow	0.50 to 0.60
Orange	0.60 to 0.70
Red-Orange	0.70 to 0.80
Red	0.80 to 0.90
Dark Red	0.90 to 1.00
Black	> 1.00



PROJECT ELEMENTS

Green outline	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
Pink square M1	330kV Switching Stations and Identifier
Red outline	500kV Transmission Line Corridor
Blue outline	330kV Transmission Line Corridor

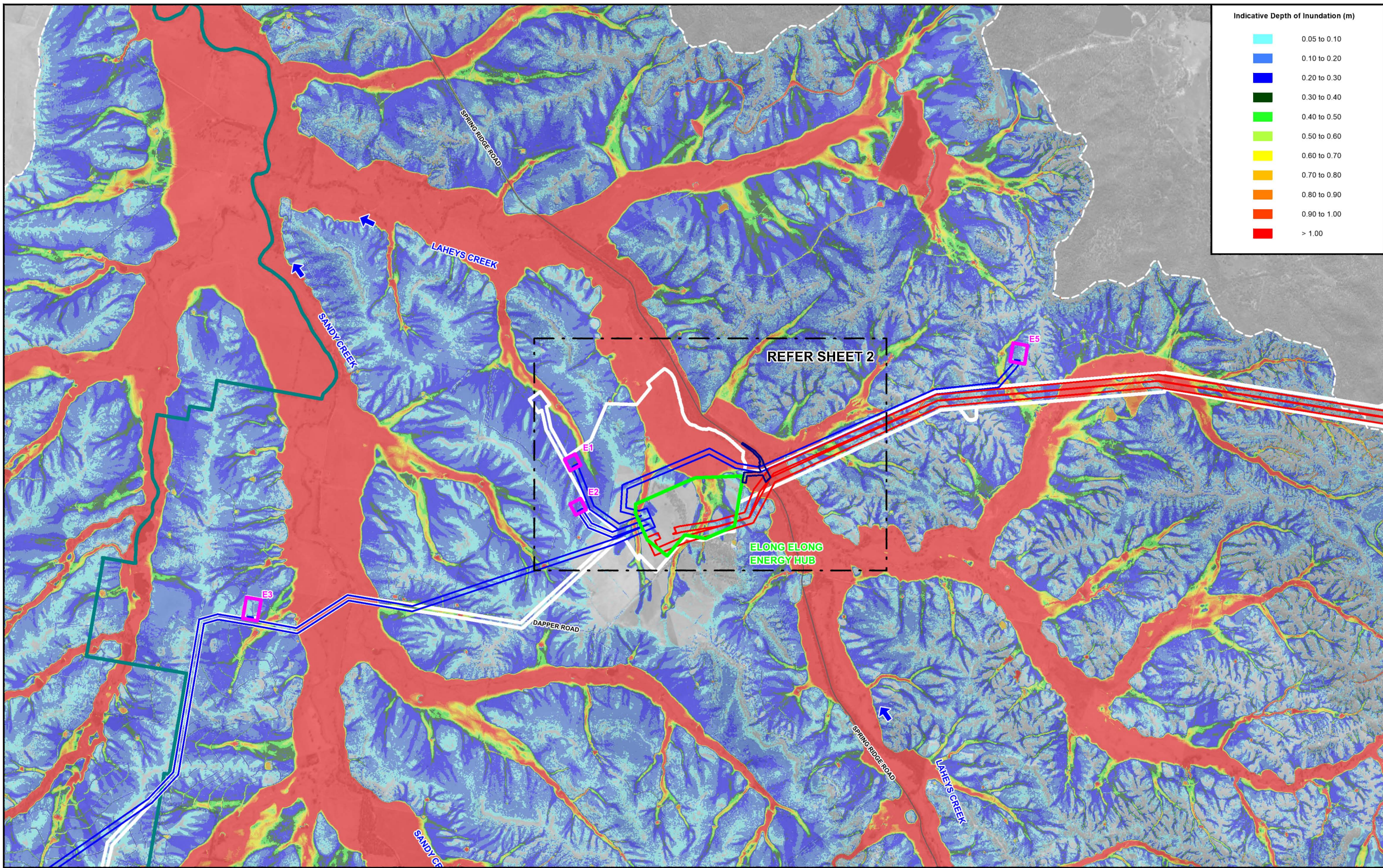
LEGEND

Thick blue line	Local Government Area (LGA) Boundary
Thin blue line	Extent of Local Road Upgrade
Thin grey line	Roads
Dashed grey line	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

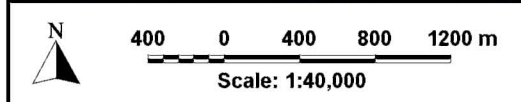


FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
1% AEP



Indicative Depth of Inundation (m)

0.05 to 0.10
0.10 to 0.20
0.20 to 0.30
0.30 to 0.40
0.40 to 0.50
0.50 to 0.60
0.60 to 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 1.00
> 1.00



PROJECT ELEMENTS

	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
	330kV Switching Stations and Identifier
	500kV Transmission Line Corridor
	330kV Transmission Line Corridor

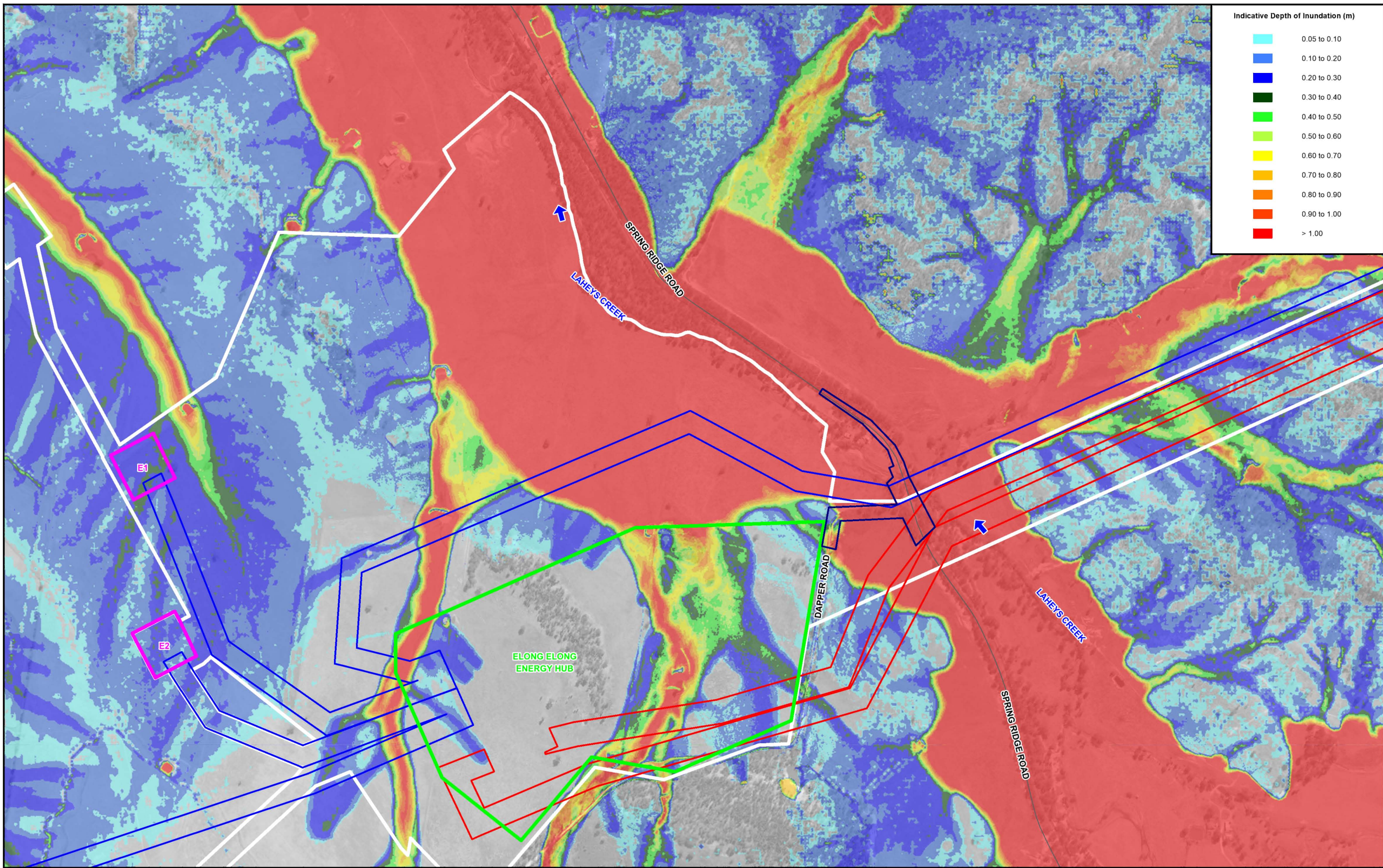
LEGEND

	Local Government Area (LGA) Boundary
	Extent of Local Road Upgrade
	Roads
	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

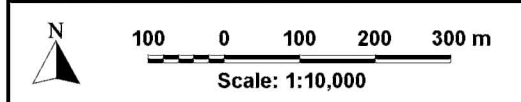


Figure 9
(Sheet 1 of 2)
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
PMF



Indicative Depth of Inundation (m)

0.05 to 0.10
0.10 to 0.20
0.20 to 0.30
0.30 to 0.40
0.40 to 0.50
0.50 to 0.60
0.60 to 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 1.00
> 1.00



PROJECT ELEMENTS

	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
	330kV Switching Stations and Identifier
	500kV Transmission Line Corridor
	330kV Transmission Line Corridor

LEGEND

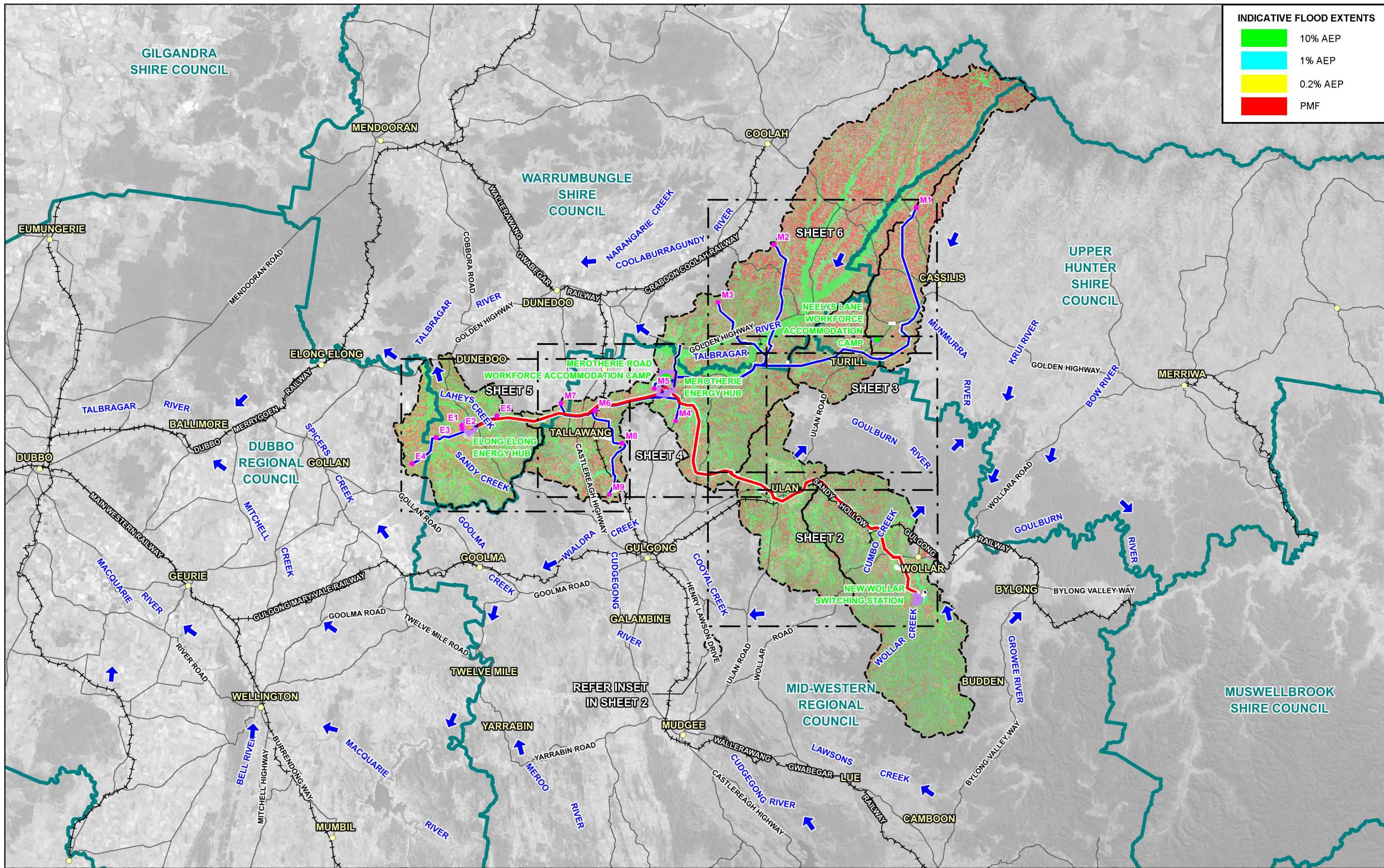
	Local Government Area (LGA) Boundary
	Extent of Local Road Upgrade
	Roads
	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**



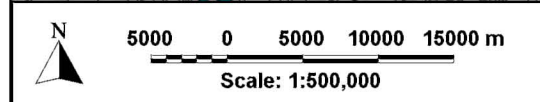
FLOODING AND DRAINAGE PATTERNS UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE PMF

Figure 9
(Sheet 2 of 2)



INDICATIVE FLOOD EXTENTS

- 10% AEP
- 1% AEP
- 0.2% AEP
- PMF



CONSTRUCTION WORK AREAS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane
- 500kV Network
- 330kV Network
- Extent of Local Road Upgrade

LEGEND

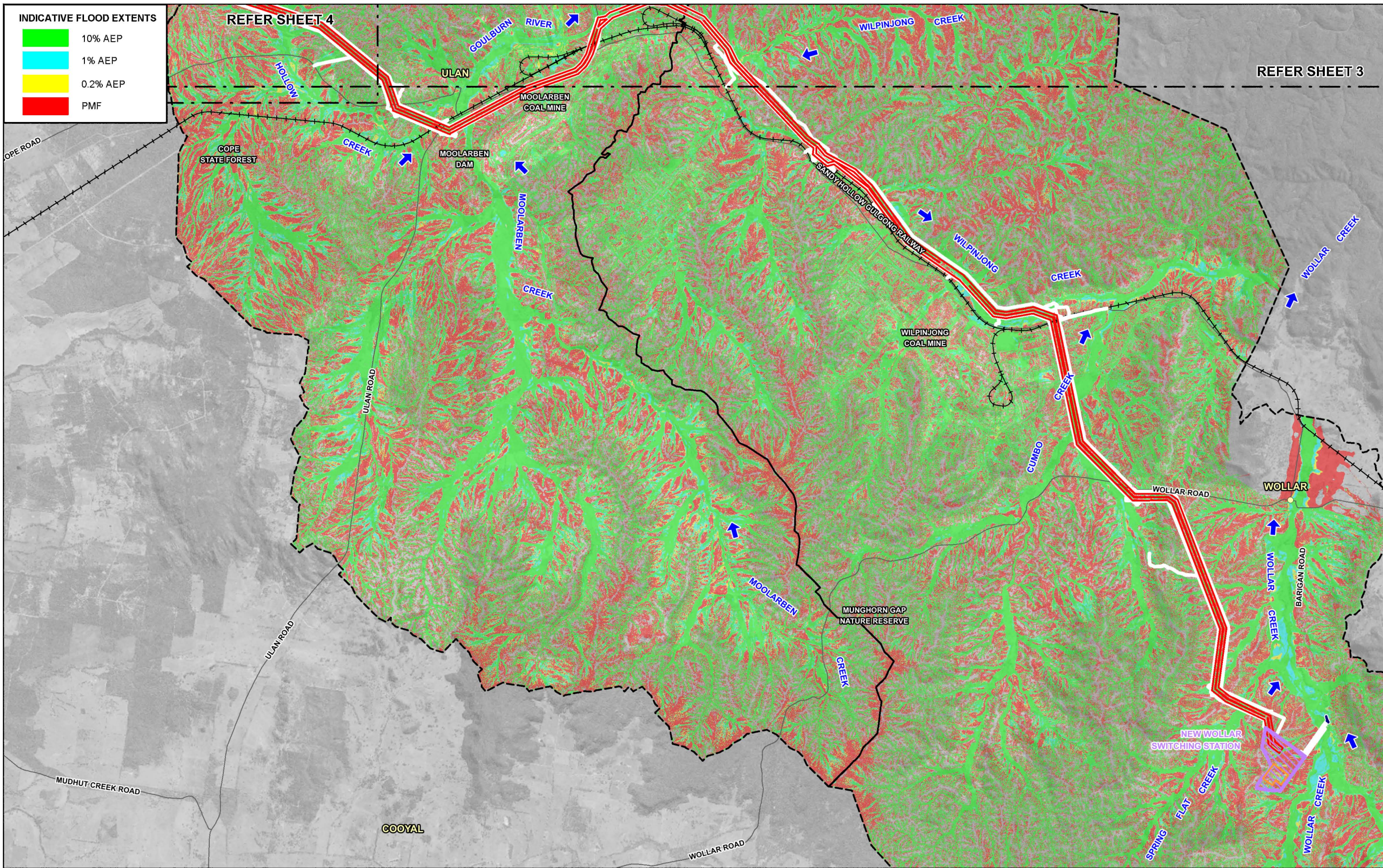
- M1 330kV Switching Station and Identifier
- Workforce Accommodation Camp
- Construction Compound
- Rail Lines
- Roads
- Two-Dimensional Model Boundary
- Local Government Area (LGA) Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 10
(Sheet 1 of 6)

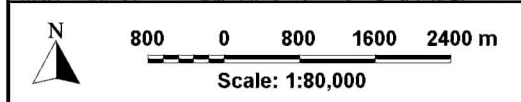
INDICATIVE FLOOD EXTENTS IN VICINITY OF PROPOSED CONSTRUCTION WORK AREAS





INDICATIVE FLOOD EXTENTS

- 10% AEP
- 1% AEP
- 0.2% AEP
- PMF



CONSTRUCTION WORK AREAS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane
- 500kV Network
- 330kV Network
- Extent of Local Road Upgrade

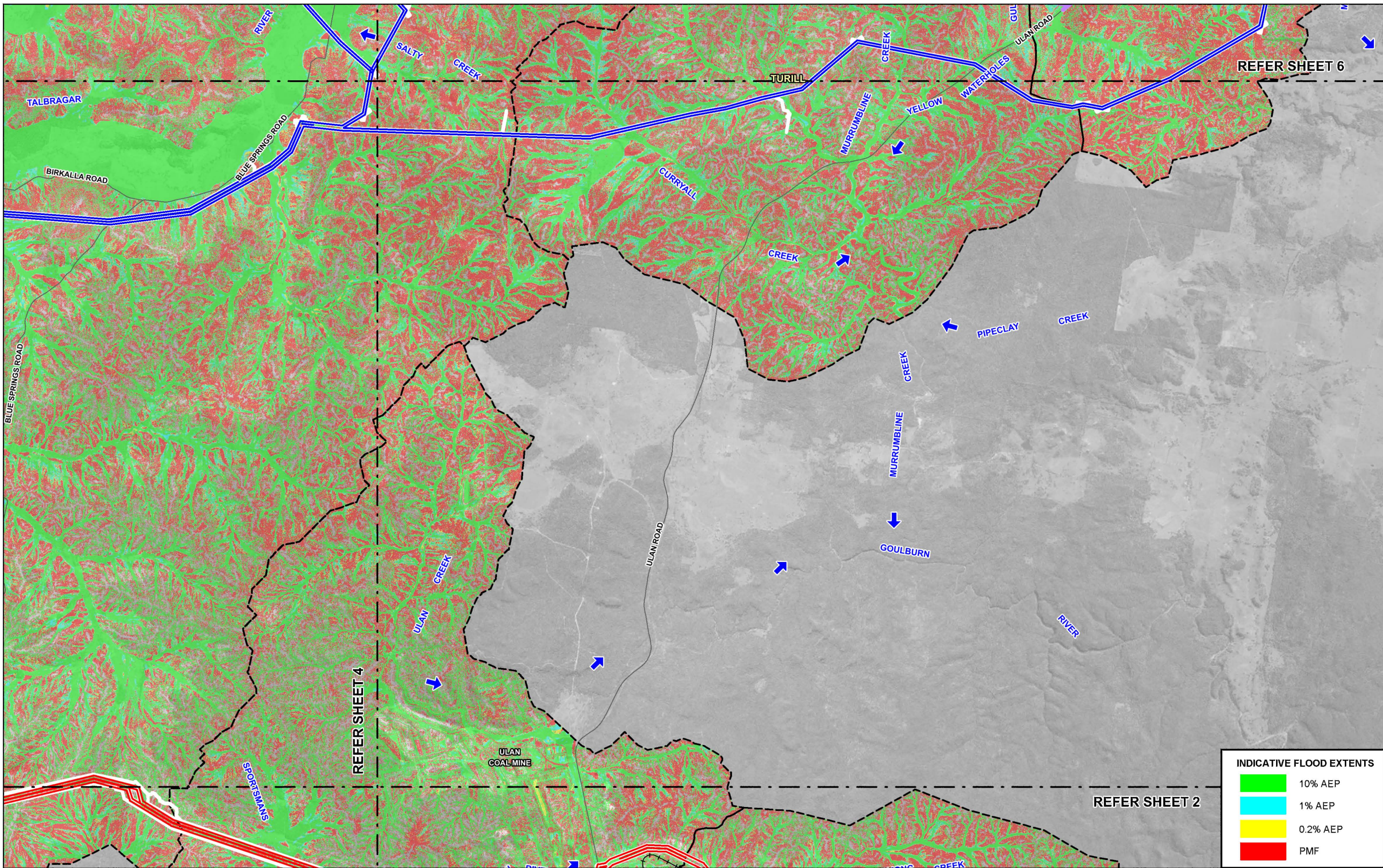
LEGEND

- M1 Workforce Accommodation Camp
- Construction Compound
- 330kV Switching Station and Identifier
- Roads
- Rail Lines
- Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 10
(Sheet 2 of 6)

INDICATIVE FLOOD EXTENTS IN VICINITY OF PROPOSED CONSTRUCTION WORK AREAS



INDICATIVE FLOOD EXTENTS	
■	10% AEP
■	1% AEP
■	0.2% AEP
■	PMF

Scale: 1:80,000

800 0 800 1600 2400 m

CONSTRUCTION WORK AREAS

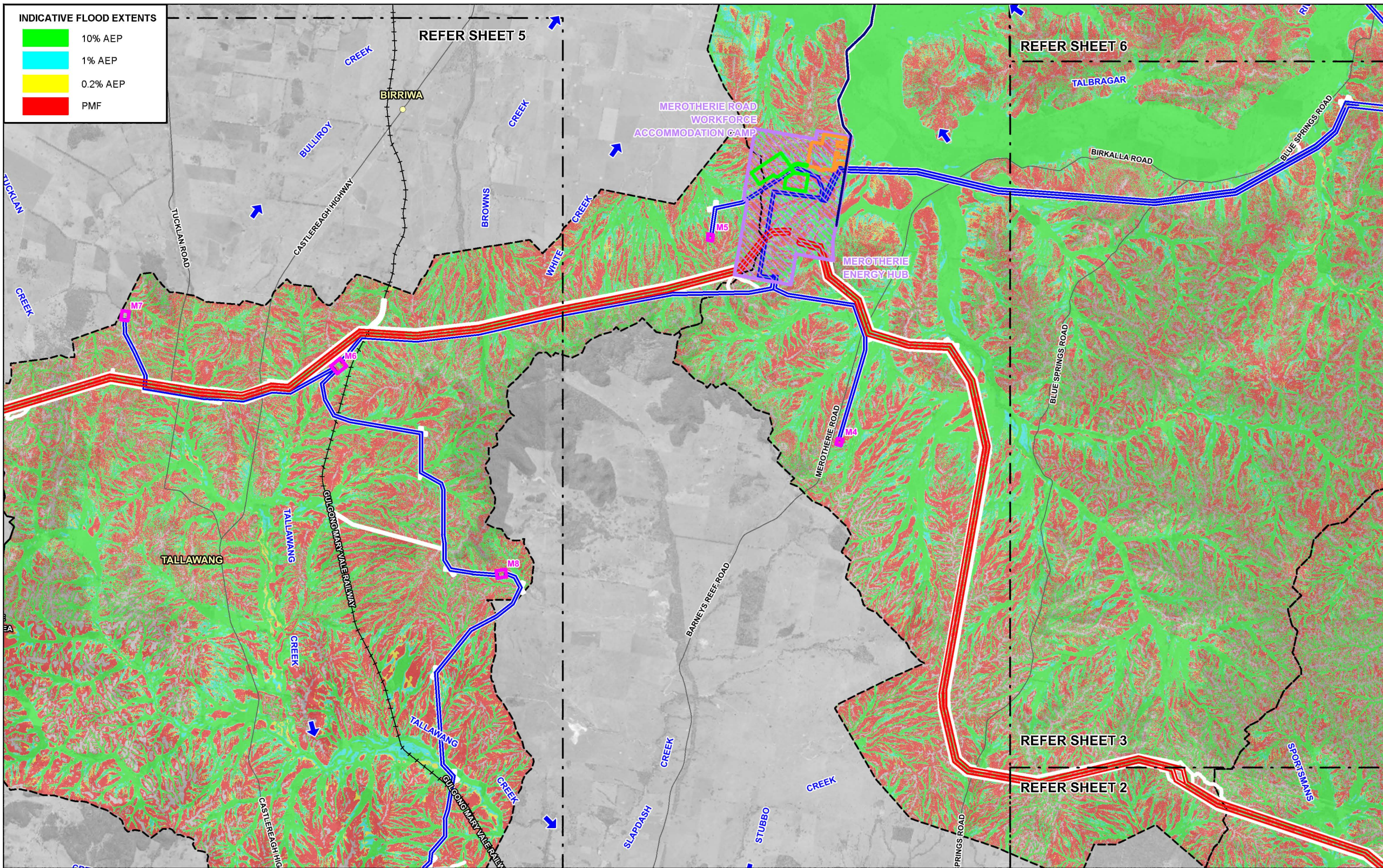
 	Energy Hubs, New Wollar Switching Station and Neeleys Lane
 	500kV Network
 	330kV Network
 	Extent of Local Road Upgrade

LEGEND

 	330kV Switching Station and Identifier		Rail Lines
 	Workforce Accommodation Camp		Roads
 	Construction Compound		Two-Dimensional Model Boundary

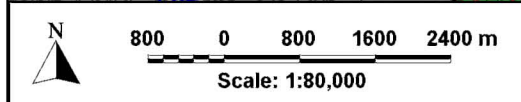
CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 10
(Sheet 3 of 6)



INDICATIVE FLOOD EXTENTS

- 10% AEP
- 1% AEP
- 0.2% AEP
- PMF



CONSTRUCTION WORK AREAS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane
- 500kV Network
- 330kV Network
- Extent of Local Road Upgrade

LEGEND

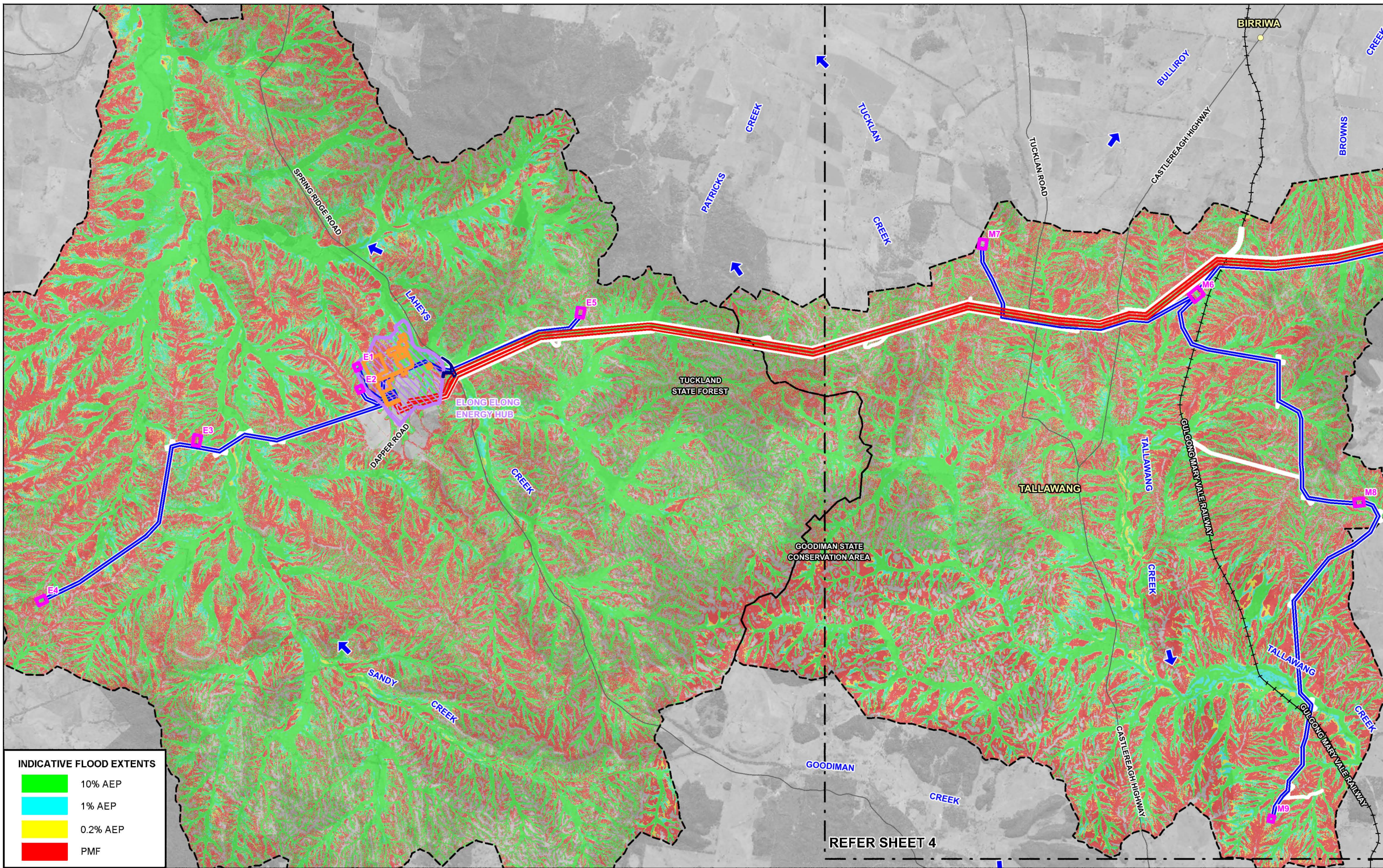
- M1 330kV Switching Station and Identifier
- Workforce Accommodation Camp
- Construction Compound

- Rail Lines
- Roads
- Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 10
(Sheet 4 of 6)

INDICATIVE FLOOD EXTENTS IN VICINITY OF PROPOSED CONSTRUCTION WORK AREAS



INDICATIVE FLOOD EXTENTS

- 10% AEP
- 1% AEP
- 0.2% AEP
- PMF

Scale: 1:80,000

800 0 800 1600 2400 m



CONSTRUCTION WORK AREAS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane
- 500kV Network
- 330kV Network
- Extent of Local Road Upgrade

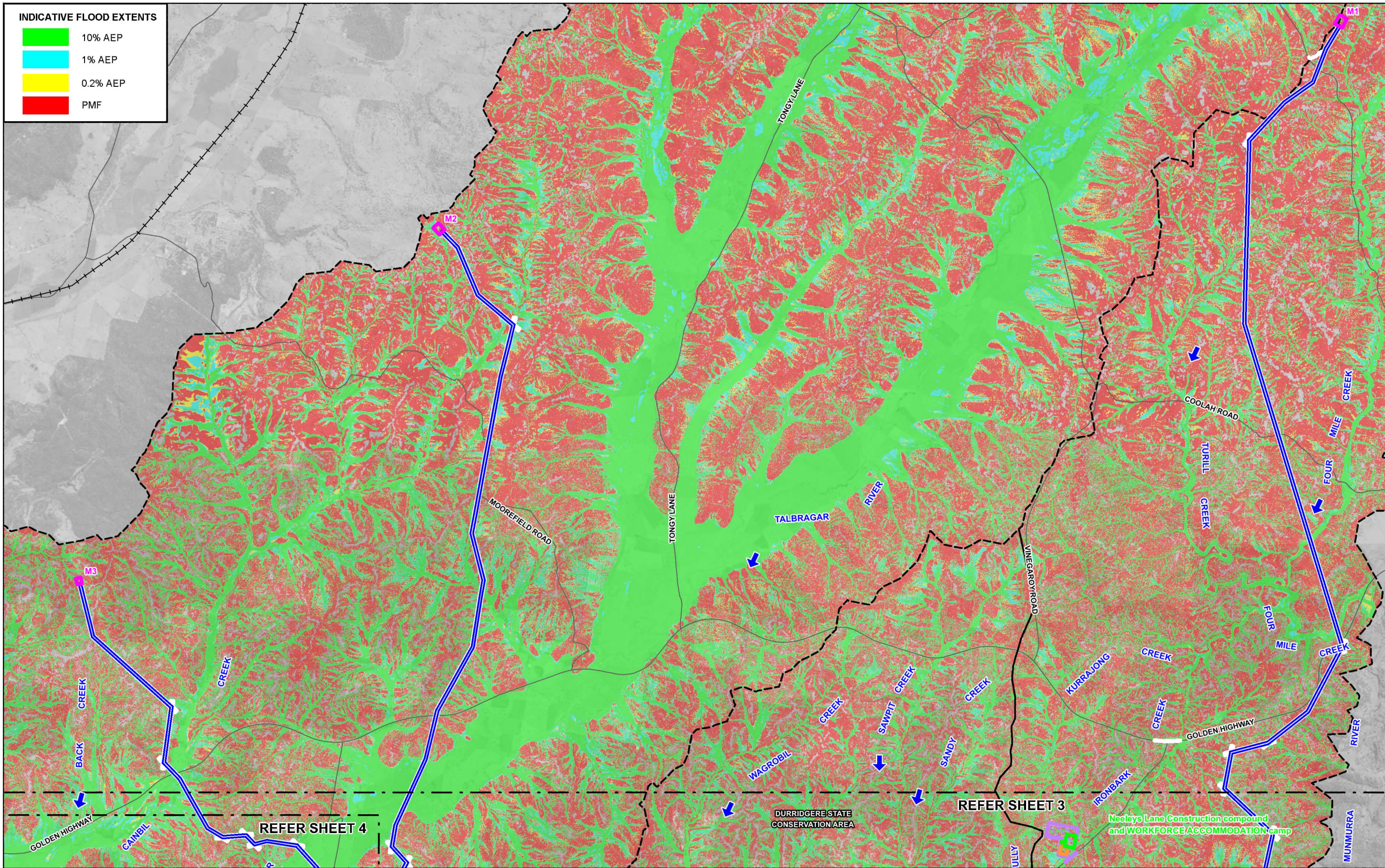
LEGEND

- M1 330kV Switching Station and Identifier
- Workforce Accommodation Camp
- Construction Compound
- Rail Lines
- Roads
- Two-Dimensional Model Boundary

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure 10
(Sheet 5 of 6)

INDICATIVE FLOOD EXTENTS IN VICINITY OF PROPOSED CONSTRUCTION WORK AREAS



INDICATIVE FLOOD EXTENTS

■	10% AEP
■	1% AEP
■	0.2% AEP
■	PMF



CONSTRUCTION WORK AREAS

	Energy Hubs, New Wollar Switching Station and Neeleys Lane
	500kV Network
	330kV Network
	Extent of Local Road Upgrade

LEGEND

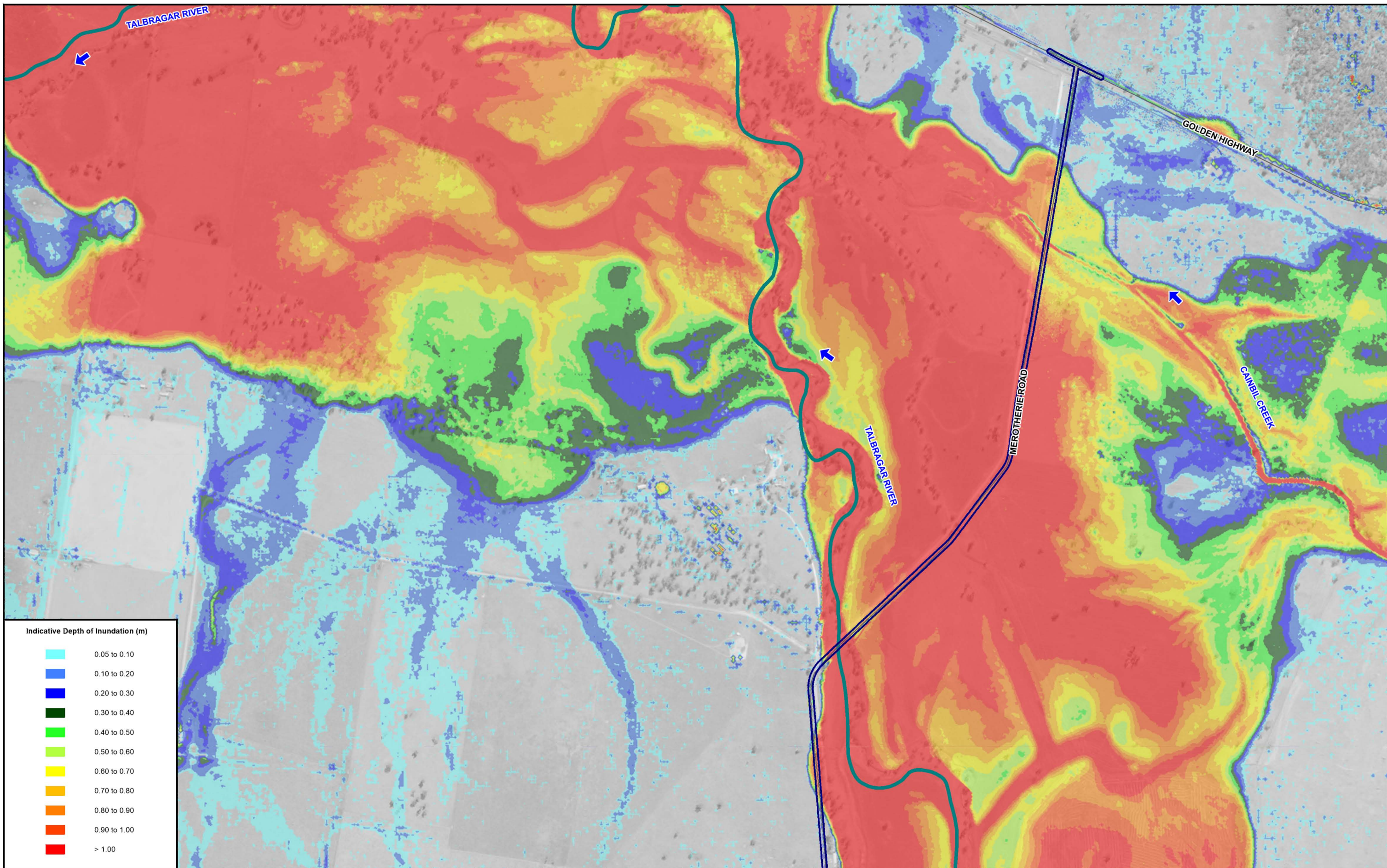
	330kV Switching Station and Identifier
	Workforce Accommodation Camp
	Construction Compound
	Rail Lines
	Roads
	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 10
(Sheet 6 of 6)

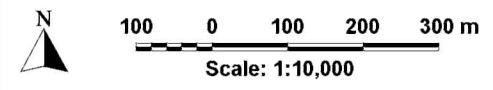
INDICATIVE FLOOD EXTENTS IN VICINITY OF PROPOSED CONSTRUCTION WORK AREAS





Indicative Depth of Inundation (m)

Light Blue	0.05 to 0.10
Blue	0.10 to 0.20
Dark Blue	0.20 to 0.30
Green	0.30 to 0.40
Light Green	0.40 to 0.50
Yellow-Green	0.50 to 0.60
Yellow	0.60 to 0.70
Orange	0.70 to 0.80
Red-Orange	0.80 to 0.90
Red	0.90 to 1.00
Dark Red	> 1.00



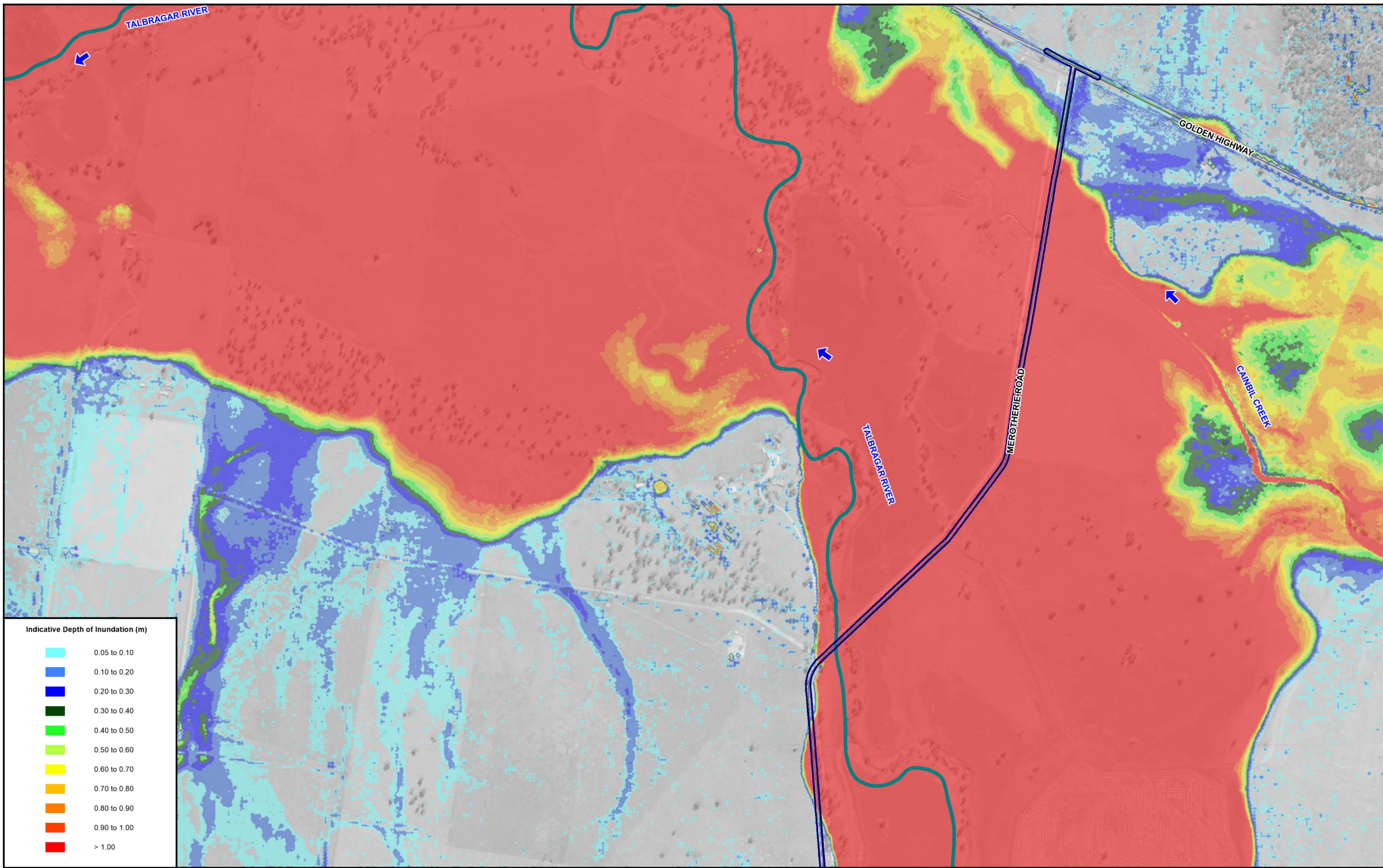
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade

- Roads
- Two-Dimensional Model Boundary

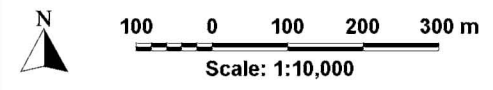
**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 11



Indicative Depth of Inundation (m)

Light Blue	0.05 to 0.10
Blue	0.10 to 0.20
Dark Blue	0.20 to 0.30
Green	0.30 to 0.40
Light Green	0.40 to 0.50
Yellow-Green	0.50 to 0.60
Yellow	0.60 to 0.70
Orange	0.70 to 0.80
Red-Orange	0.80 to 0.90
Red	0.90 to 1.00
Dark Red	> 1.00



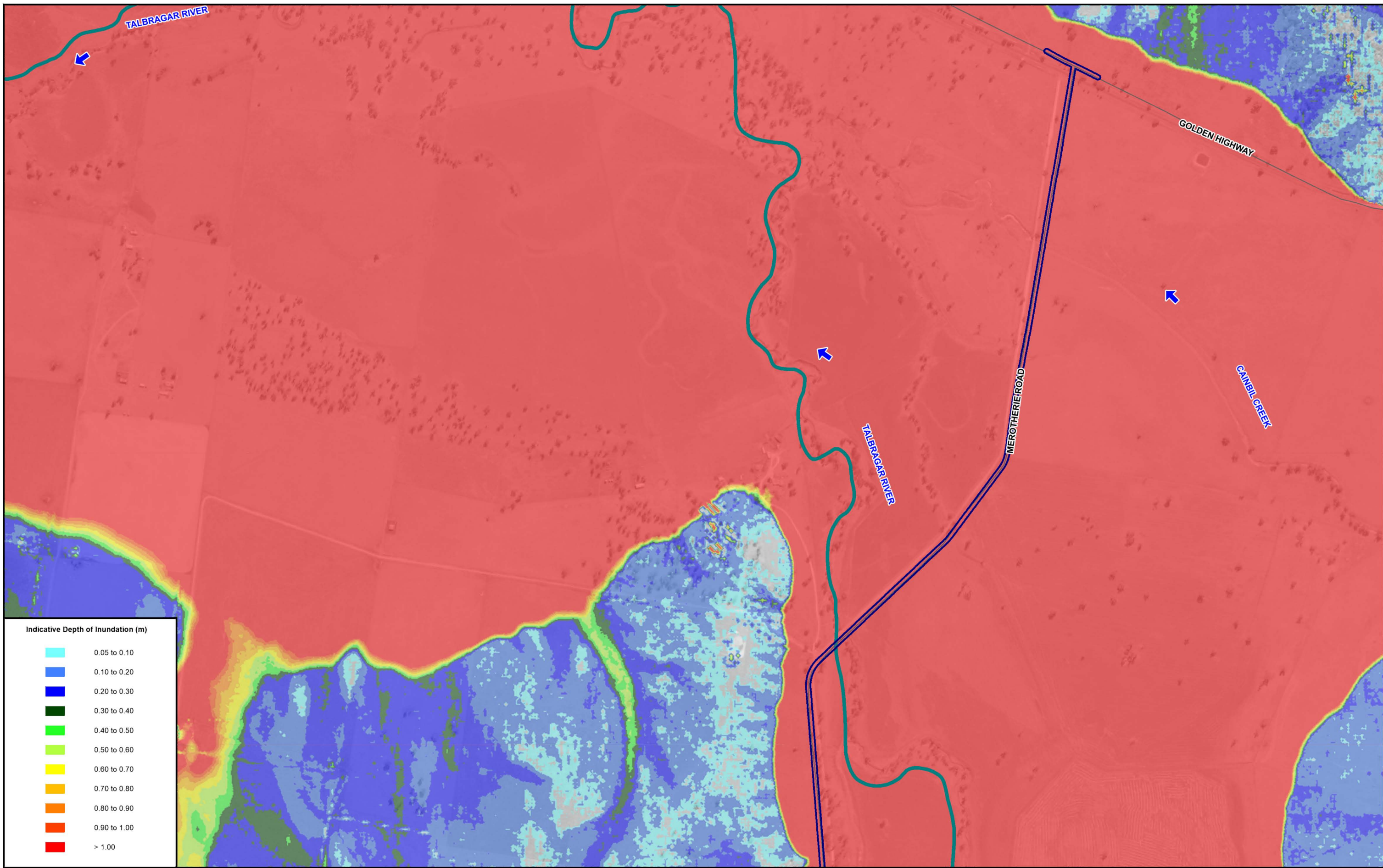
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

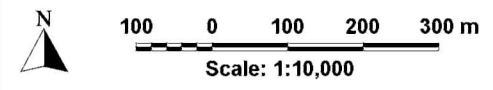
Figure 12

FLOODING AND DRAINAGE PATTERNS UNDER POST-PROJECT CONDITIONS IN VICINITY OF PROPOSED BRIDGE OVER THE TALBRAGAR RIVER AT MEROTHERIE ROAD - 1% AEP



Indicative Depth of Inundation (m)

Light Blue	0.05 to 0.10
Blue	0.10 to 0.20
Dark Blue	0.20 to 0.30
Green	0.30 to 0.40
Light Green	0.40 to 0.50
Yellow-Green	0.50 to 0.60
Yellow	0.60 to 0.70
Orange	0.70 to 0.80
Red-Orange	0.80 to 0.90
Red	0.90 to 1.00
Dark Red	> 1.00



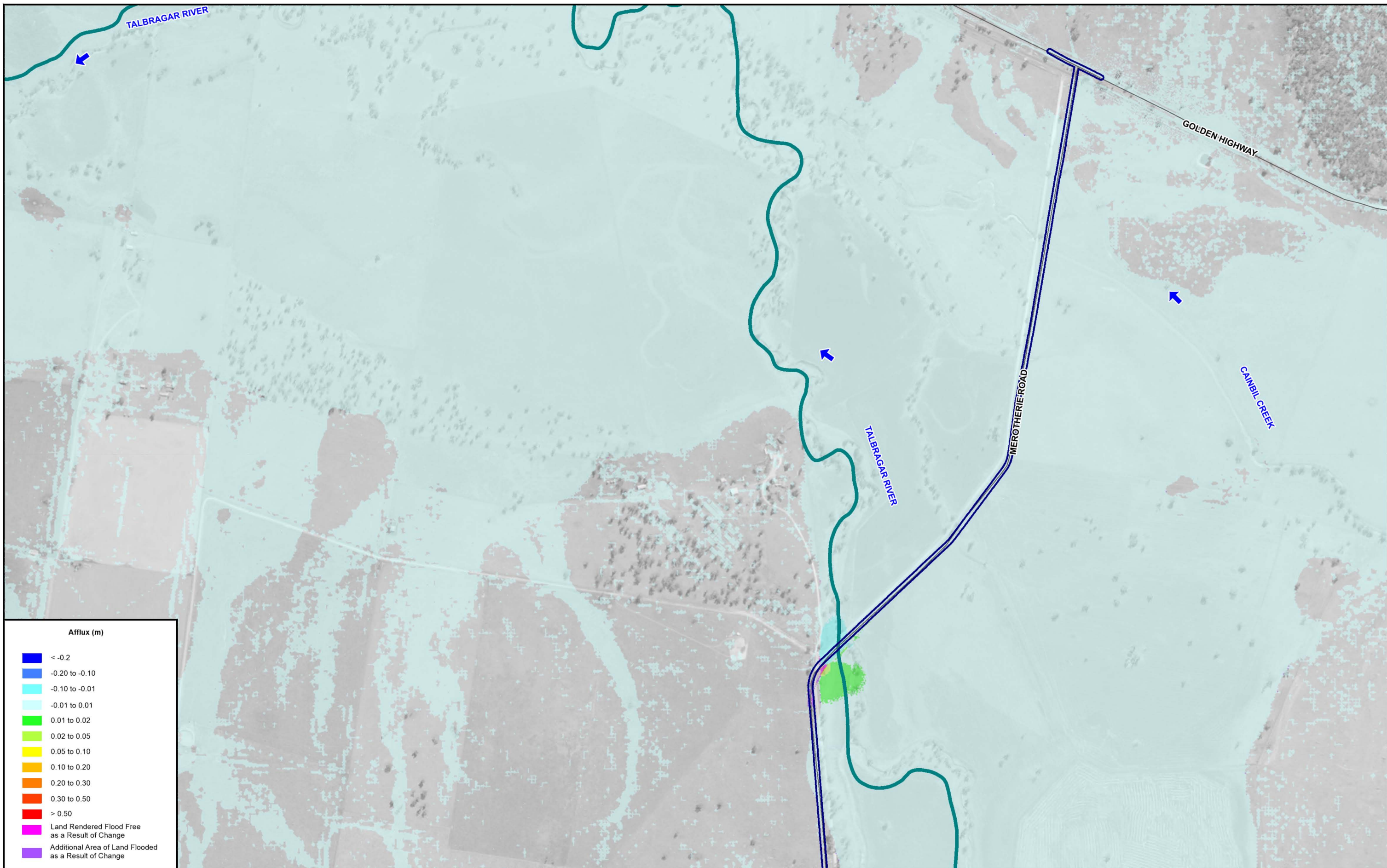
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade

- Roads
- Two-Dimensional Model Boundary


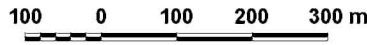
**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 13




Afflux (m)

Dark Blue	< -0.2
Blue	-0.20 to -0.10
Cyan	-0.10 to -0.01
Light Cyan	-0.01 to 0.01
Light Green	0.01 to 0.02
Green	0.02 to 0.05
Yellow-Green	0.05 to 0.10
Yellow	0.10 to 0.20
Orange	0.20 to 0.30
Red-Orange	0.30 to 0.50
Red	> 0.50
Pink	Land Rendered Flood Free as a Result of Change
Purple	Additional Area of Land Flooded as a Result of Change

 Scale: 1:10,000



PROJECT ELEMENTS

Green outline	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
Pink square with M1	330kV Switching Stations and Identifier
Red outline	500kV Transmission Line Corridor
Blue outline	330kV Transmission Line Corridor

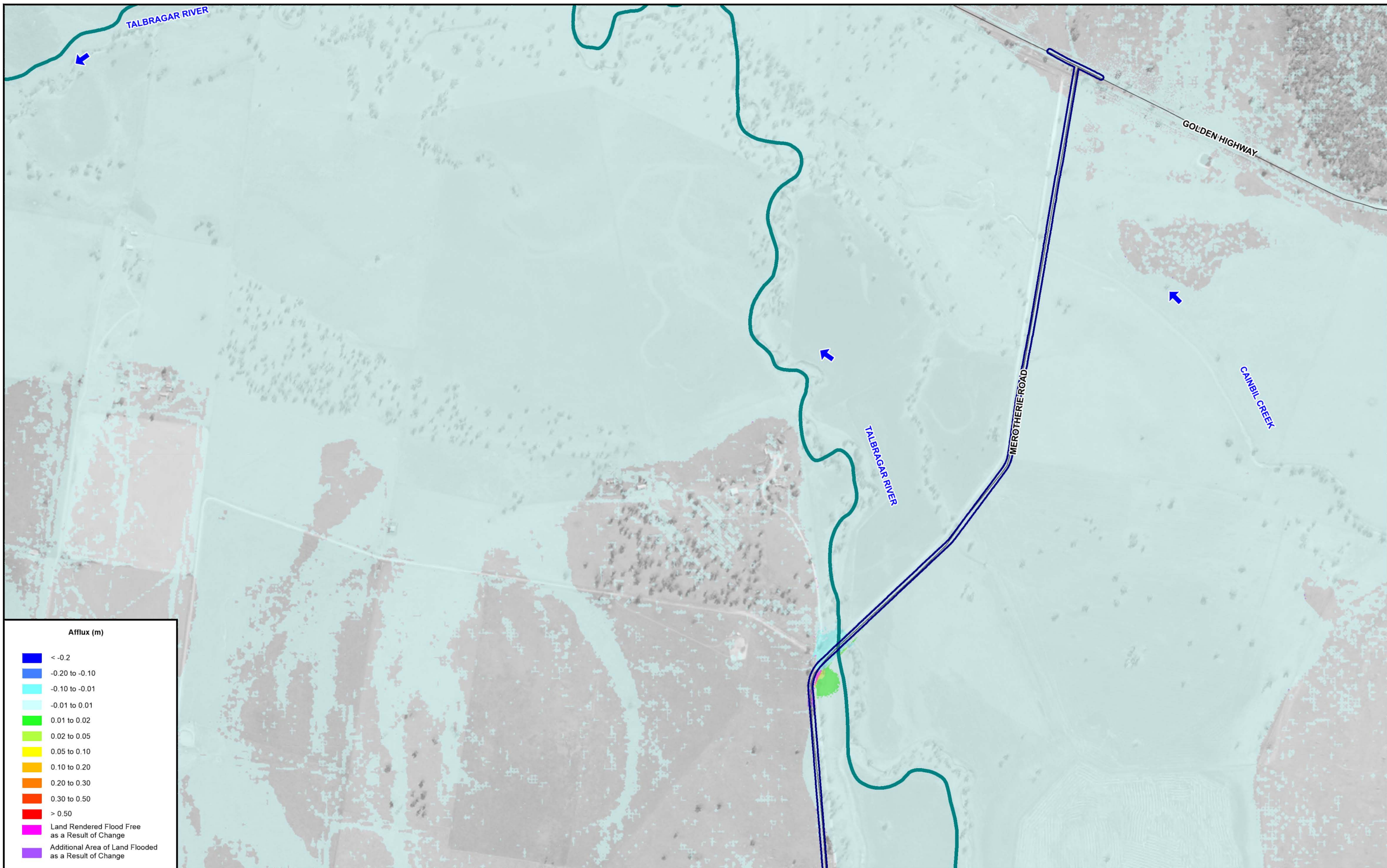
LEGEND

Teal line	Local Government Area (LGA) Boundary
Blue outline	Extent of Local Road Upgrade
Grey line	Roads
Dashed grey line	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

IMPACT OF PROPOSED BRIDGE OVER THE TALBRAGAR RIVER AT MEROTHERIE ROAD ON FLOODING AND DRAINAGE PATTERNS 10% AEP

Figure 14



Afflux (m)

Blue	< -0.2
Dark Blue	-0.20 to -0.10
Cyan	-0.10 to -0.01
Light Cyan	-0.01 to 0.01
Green	0.01 to 0.02
Light Green	0.02 to 0.05
Yellow	0.05 to 0.10
Orange	0.10 to 0.20
Dark Orange	0.20 to 0.30
Red-Orange	0.30 to 0.50
Red	> 0.50
Pink	Land Rendered Flood Free as a Result of Change
Purple	Additional Area of Land Flooded as a Result of Change

N

100 0 100 200 300 m

Scale: 1:10,000

PROJECT ELEMENTS

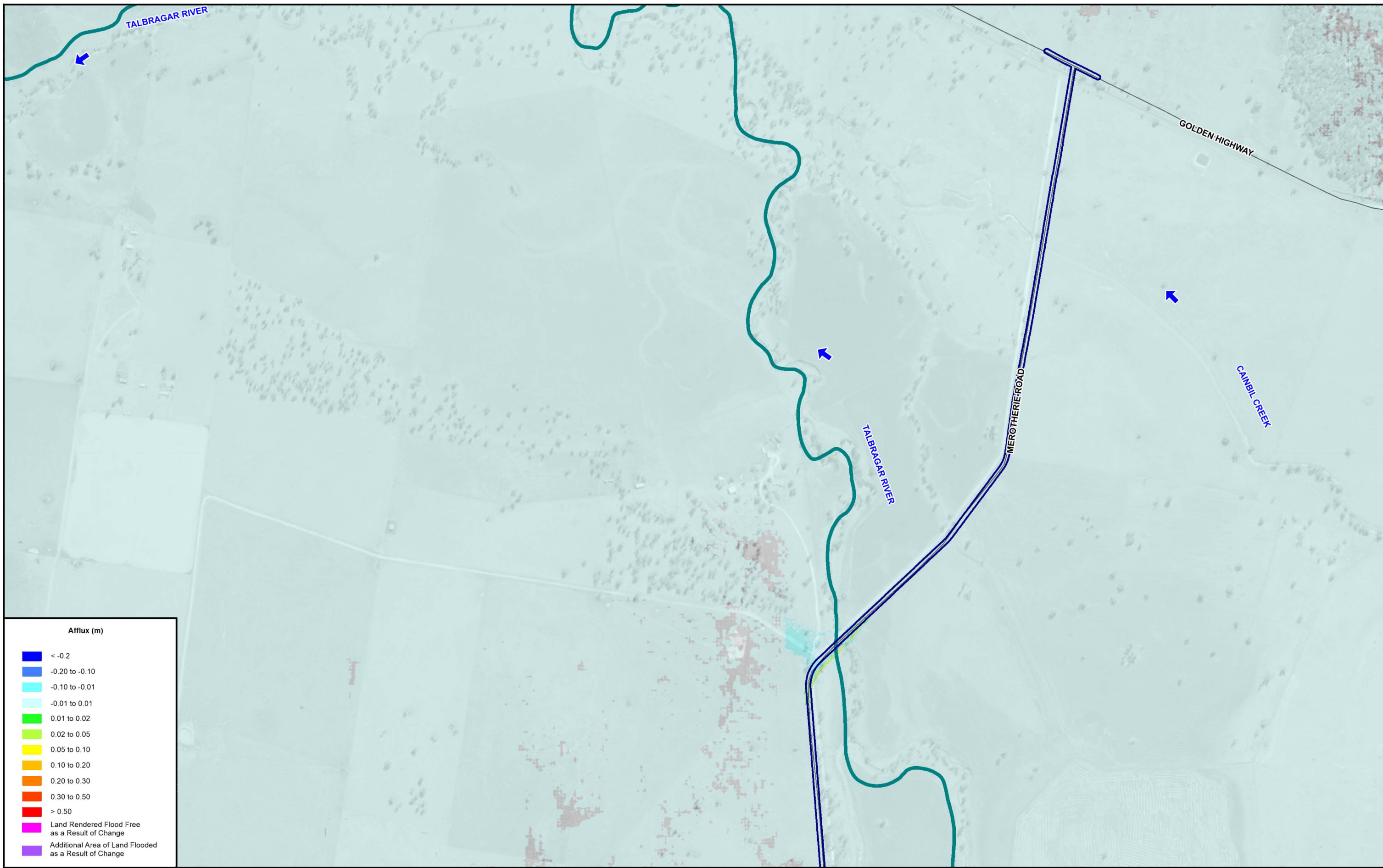
Green outline	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
Pink square with M1	330kV Switching Stations and Identifier
Red outline	500kV Transmission Line Corridor
Blue outline	330kV Transmission Line Corridor

LEGEND

Teal line	Local Government Area (LGA) Boundary
Blue double line	Extent of Local Road Upgrade
Grey line	Roads
Grey dashed line	Two-Dimensional Model Boundary

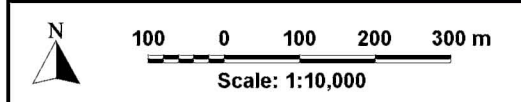
CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
 EIS AMENDMENT REPORT - FLOODING
 IMPACT OF PROPOSED BRIDGE OVER THE TALBRAGAR RIVER AT MEROTHERIE ROAD ON FLOODING AND DRAINAGE PATTERNS
 1% AEP

Figure 15



Afflux (m)

Dark Blue	< -0.2
Blue	-0.20 to -0.10
Cyan	-0.10 to -0.01
Light Cyan	-0.01 to 0.01
Light Green	0.01 to 0.02
Green	0.02 to 0.05
Yellow-Green	0.05 to 0.10
Yellow	0.10 to 0.20
Orange	0.20 to 0.30
Red-Orange	0.30 to 0.50
Red	> 0.50
Magenta	Land Rendered Flood Free as a Result of Change
Purple	Additional Area of Land Flooded as a Result of Change



PROJECT ELEMENTS

Green outline	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
Purple square with M1	330kV Switching Stations and Identifier
Red outline	500kV Transmission Line Corridor
Blue outline	330kV Transmission Line Corridor

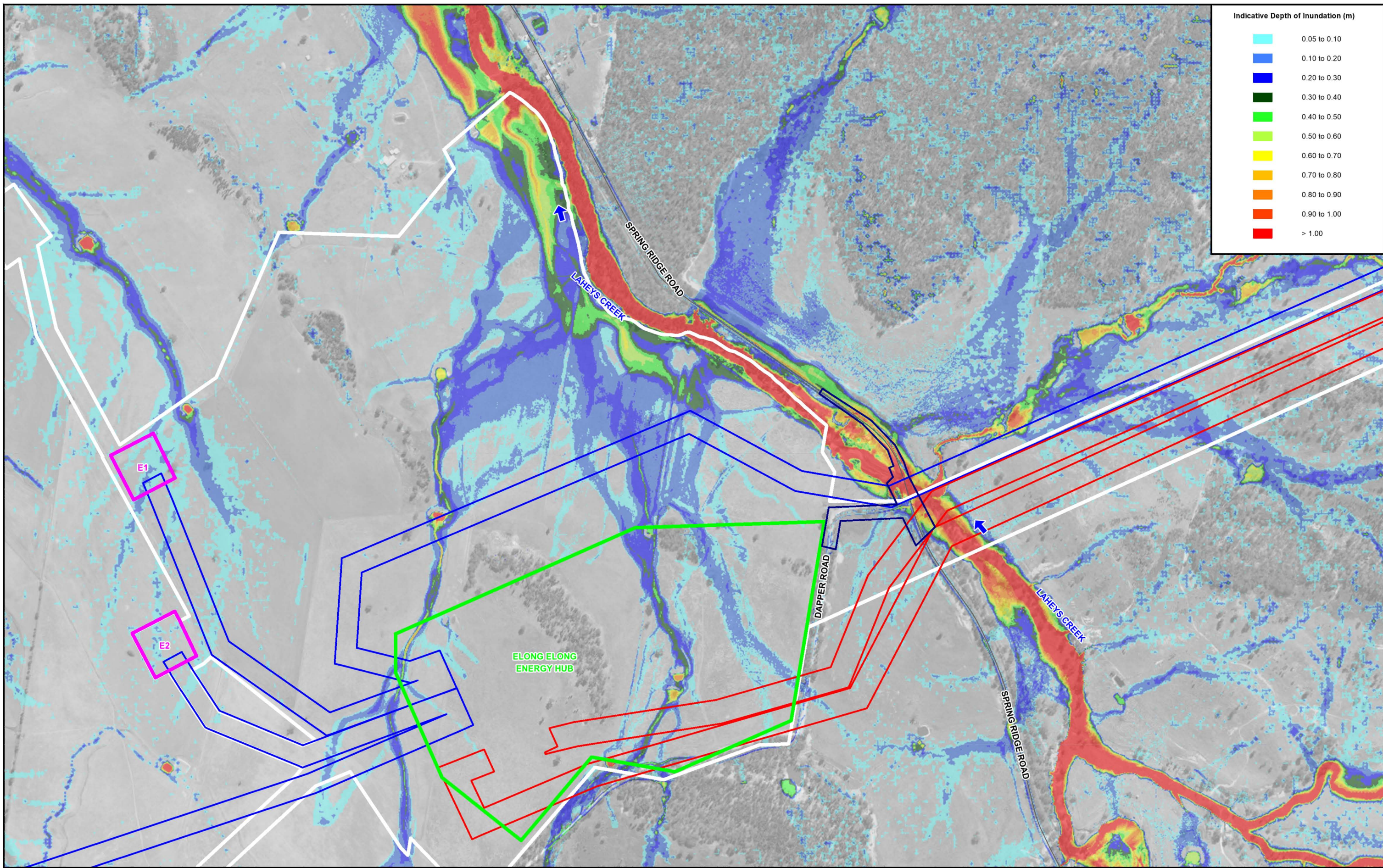
LEGEND

Teal line	Local Government Area (LGA) Boundary
Blue outline	Extent of Local Road Upgrade
Grey line	Roads
Grey dashed line	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

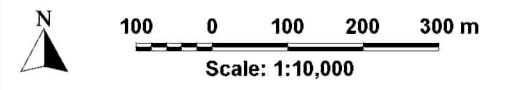


Figure 16



Indicative Depth of Inundation (m)

0.05 to 0.10
0.10 to 0.20
0.20 to 0.30
0.30 to 0.40
0.40 to 0.50
0.50 to 0.60
0.60 to 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 1.00
> 1.00



PROJECT ELEMENTS

	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
	330kV Switching Stations and Identifier
	500kV Transmission Line Corridor
	330kV Transmission Line Corridor

LEGEND

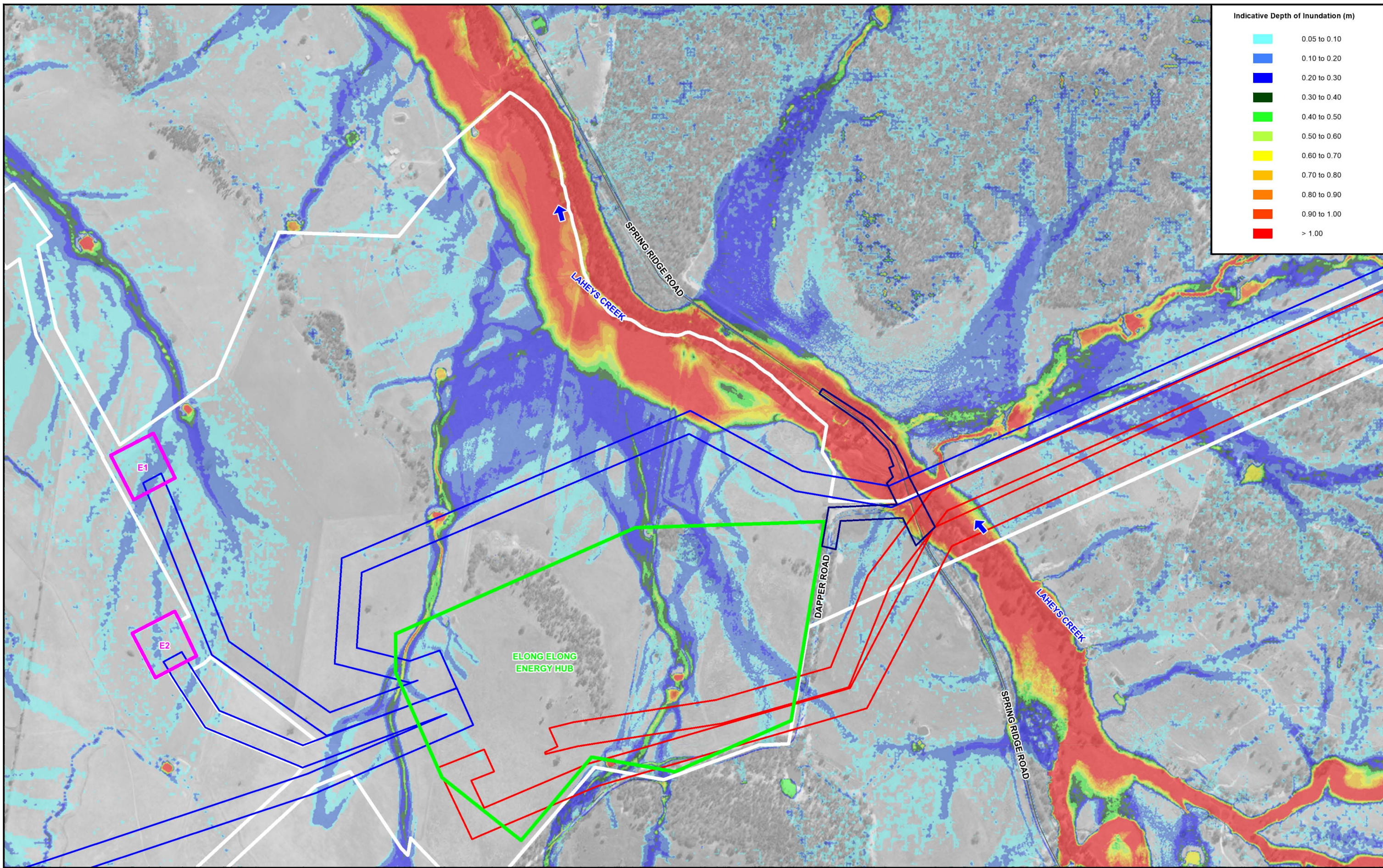
	Local Government Area (LGA) Boundary
	Extent of Local Road Upgrade
	Roads
	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 17

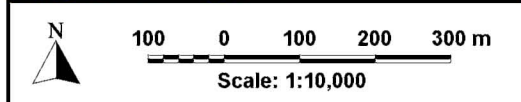


FLOODING AND DRAINAGE PATTERNS UNDER POST-PROJECT CONDITIONS IN VICINITY OF PROPOSED BRIDGE OVER LAHEYS CREEK AT SPRING RIDGE ROAD - 10% AEP



Indicative Depth of Inundation (m)

0.05 to 0.10
0.10 to 0.20
0.20 to 0.30
0.30 to 0.40
0.40 to 0.50
0.50 to 0.60
0.60 to 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 1.00
> 1.00



PROJECT ELEMENTS

	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
	330kV Switching Stations and Identifier
	500kV Transmission Line Corridor
	330kV Transmission Line Corridor

LEGEND

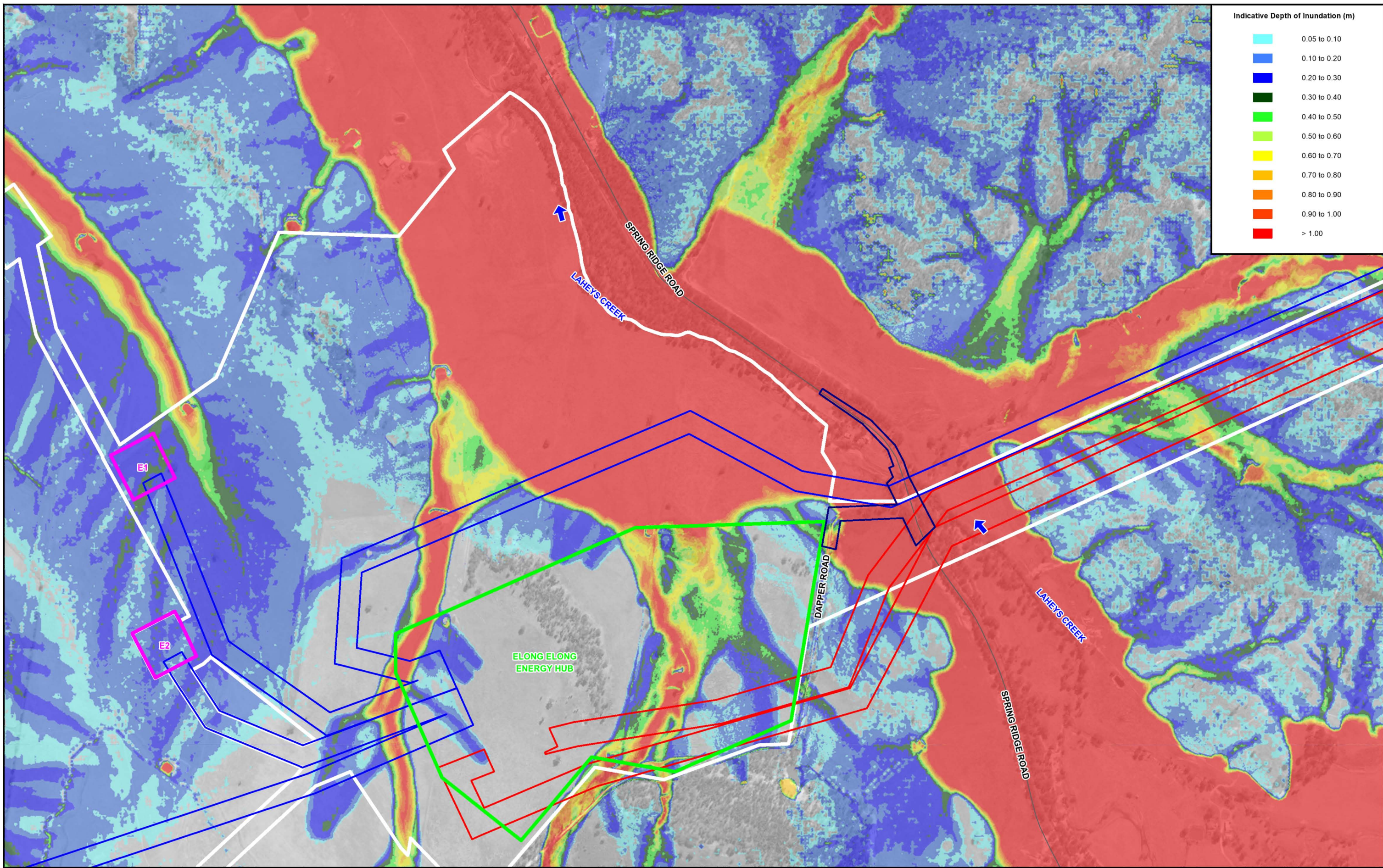
	Local Government Area (LGA) Boundary
	Extent of Local Road Upgrade
	Roads
	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 18

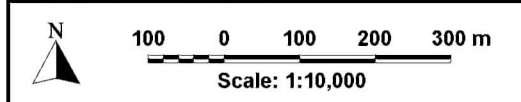


FLOODING AND DRAINAGE PATTERNS UNDER POST-PROJECT CONDITIONS IN VICINITY OF PROPOSED BRIDGE OVER LAHEYS CREEK AT SPRING RIDGE ROAD -1% AEP



Indicative Depth of Inundation (m)

0.05 to 0.10
0.10 to 0.20
0.20 to 0.30
0.30 to 0.40
0.40 to 0.50
0.50 to 0.60
0.60 to 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 1.00
> 1.00



PROJECT ELEMENTS

	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
	330kV Switching Stations and Identifier
	500kV Transmission Line Corridor
	330kV Transmission Line Corridor

LEGEND

	Local Government Area (LGA) Boundary
	Extent of Local Road Upgrade

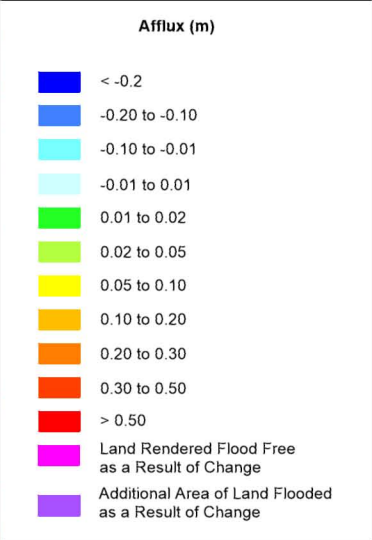
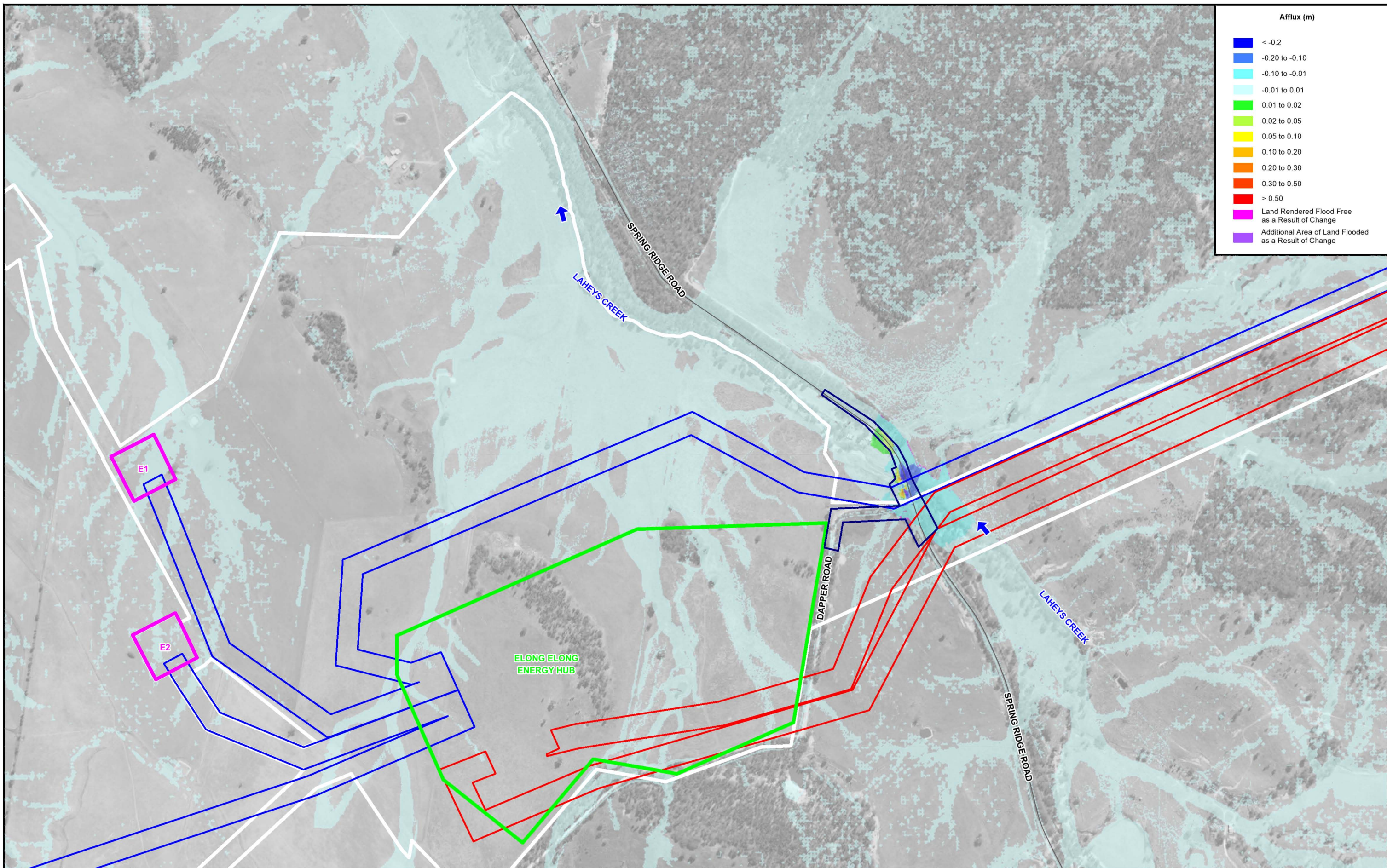
	Roads
	Two-Dimensional Model Boundary



**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 19







FLOODING AND DRAINAGE PATTERNS UNDER POST-PROJECT CONDITIONS IN VICINITY OF PROPOSED BRIDGE OVER LAHEYS CREEK AT SPRING RIDGE ROAD -PMF








 100 0 100 200 300 m
 Scale: 1:10,000


PROJECT ELEMENTS

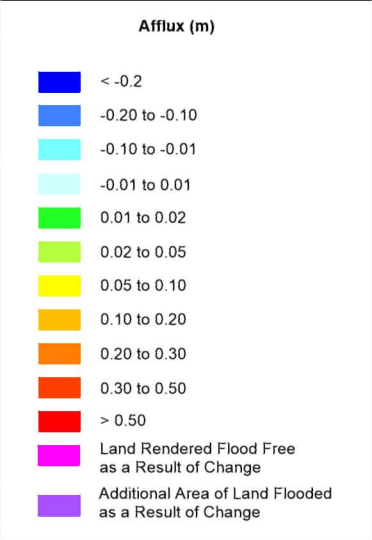
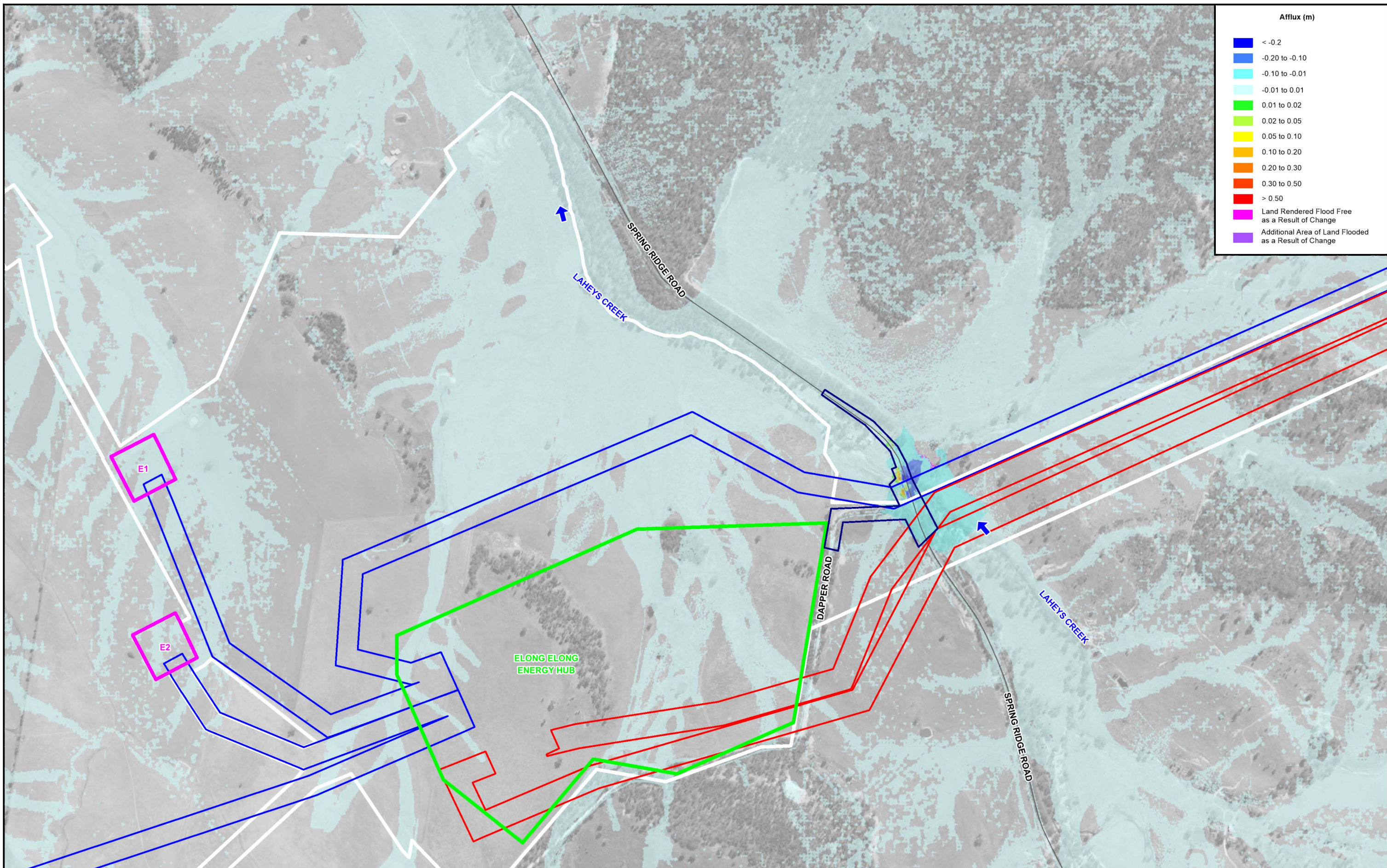
-  Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
-  M1 330kV Switching Stations and Identifier
-  500kV Transmission Line Corridor
-  330kV Transmission Line Corridor



LEGEND

-  Local Government Area (LGA) Boundary
-  Extent of Local Road Upgrade
-  Roads
-  Two-Dimensional Model Boundary





**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure 20
**IMPACT OF PROPOSED BRIDGE OVER LAHEYS CREEK AT SPRING RIDGE ROAD ON FLOODING AND DRAINAGE PATTERNS
 10% AEP**








 100 0 100 200 300 m
 Scale: 1:10,000


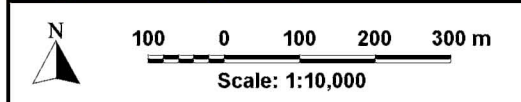
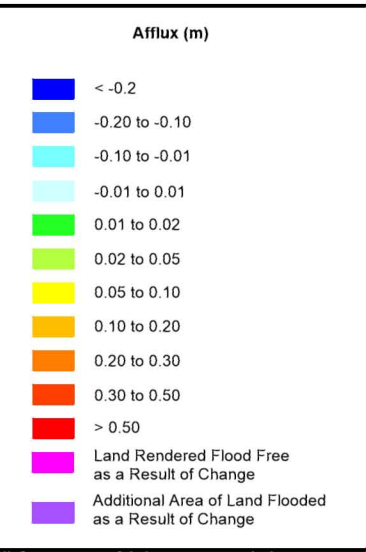
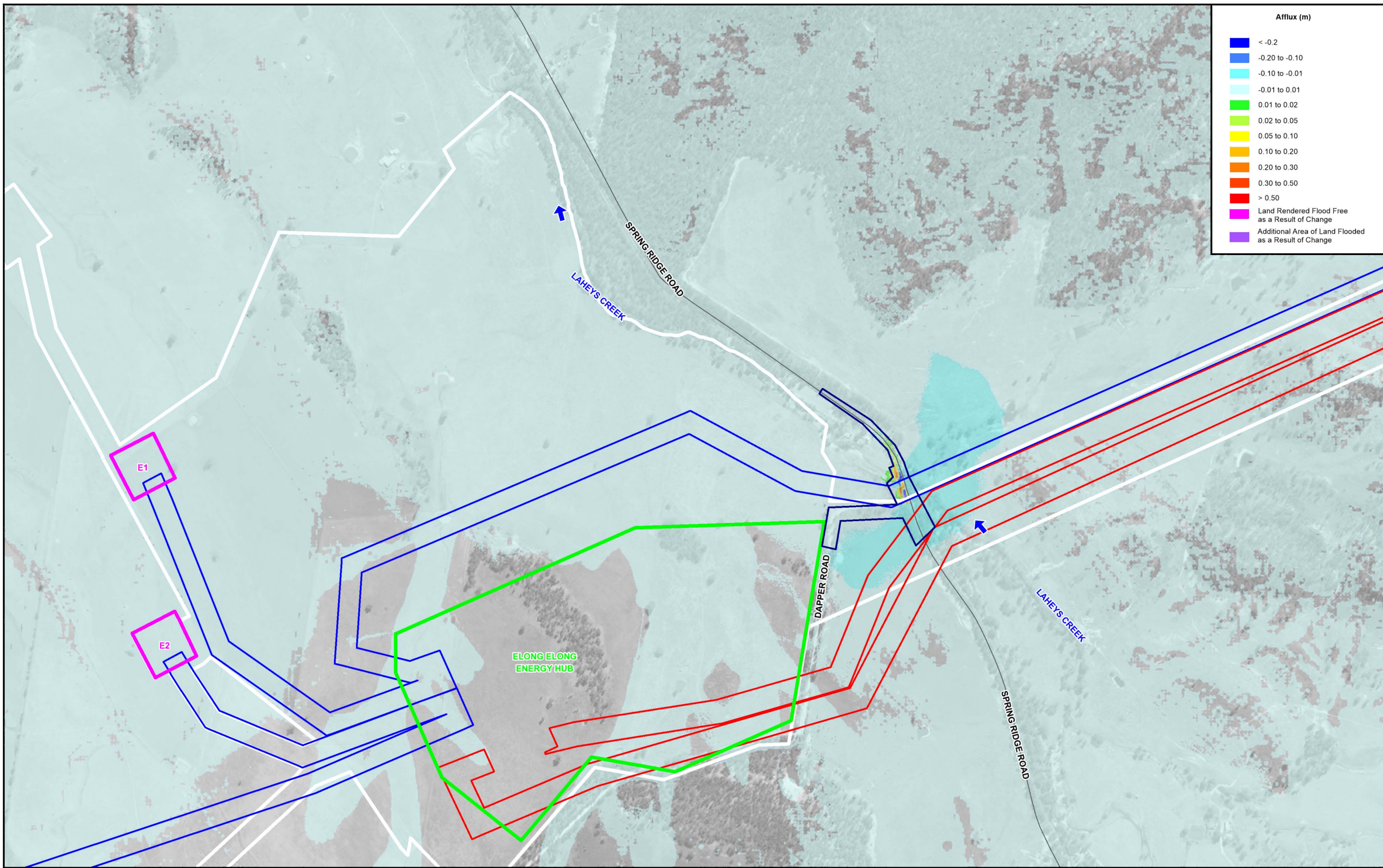
PROJECT ELEMENTS

-  Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
-  M1 330kV Switching Stations and Identifier
-  500kV Transmission Line Corridor
-  330kV Transmission Line Corridor

LEGEND

-  Local Government Area (LGA) Boundary
-  Extent of Local Road Upgrade
-  Roads
-  Two-Dimensional Model Boundary

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING
 Figure 21
 IMPACT OF PROPOSED BRIDGE OVER LAHEYS CREEK AT SPRING RIDGE ROAD ON FLOODING AND DRAINAGE PATTERNS
 1% AEP

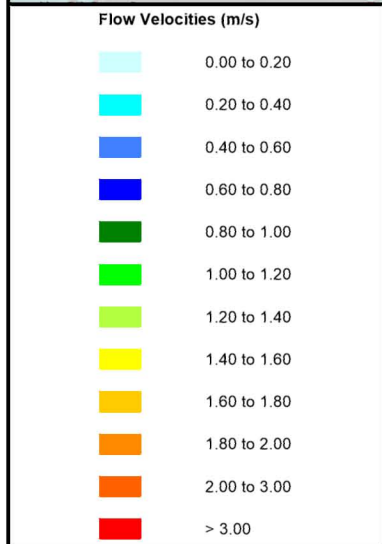
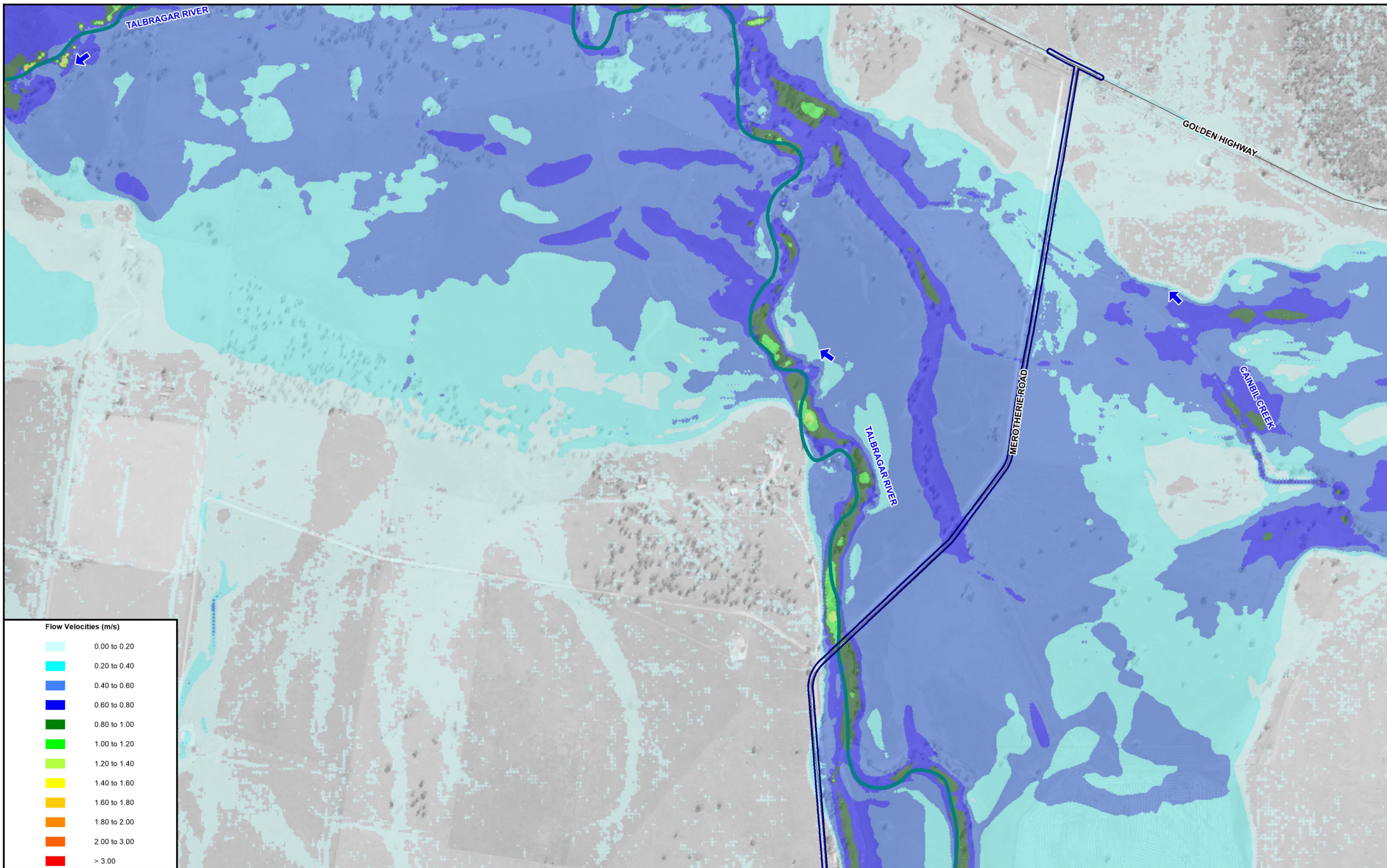



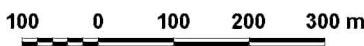
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor


- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**





ANNEXURE A







 Scale: 1:10,000





PROJECT ELEMENTS

-  Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
-  330kV Switching Stations and Identifier
-  500kV Transmission Line Corridor
-  330kV Transmission Line Corridor

LEGEND

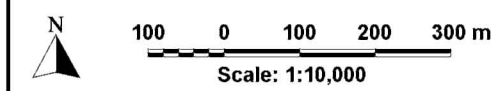
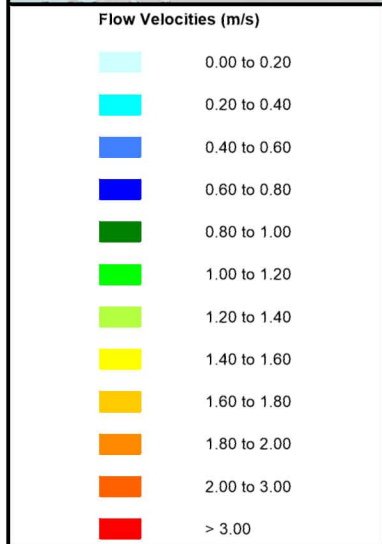
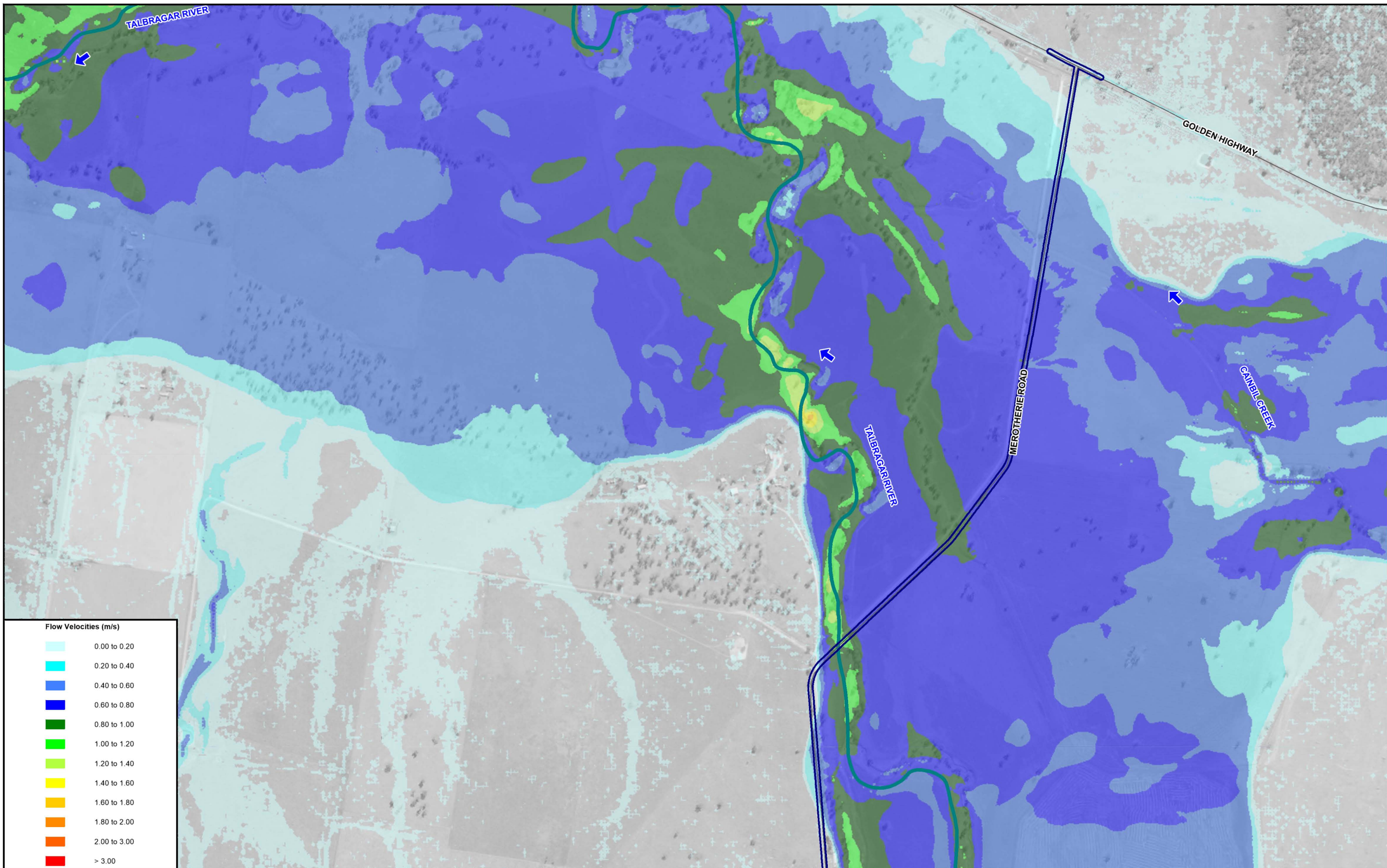
-  Local Government Area (LGA) Boundary
-  Extent of Local Road Upgrade

-  Roads
-  Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.01

MAXIMUM FLOW VELOCITIES UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
10% AEP



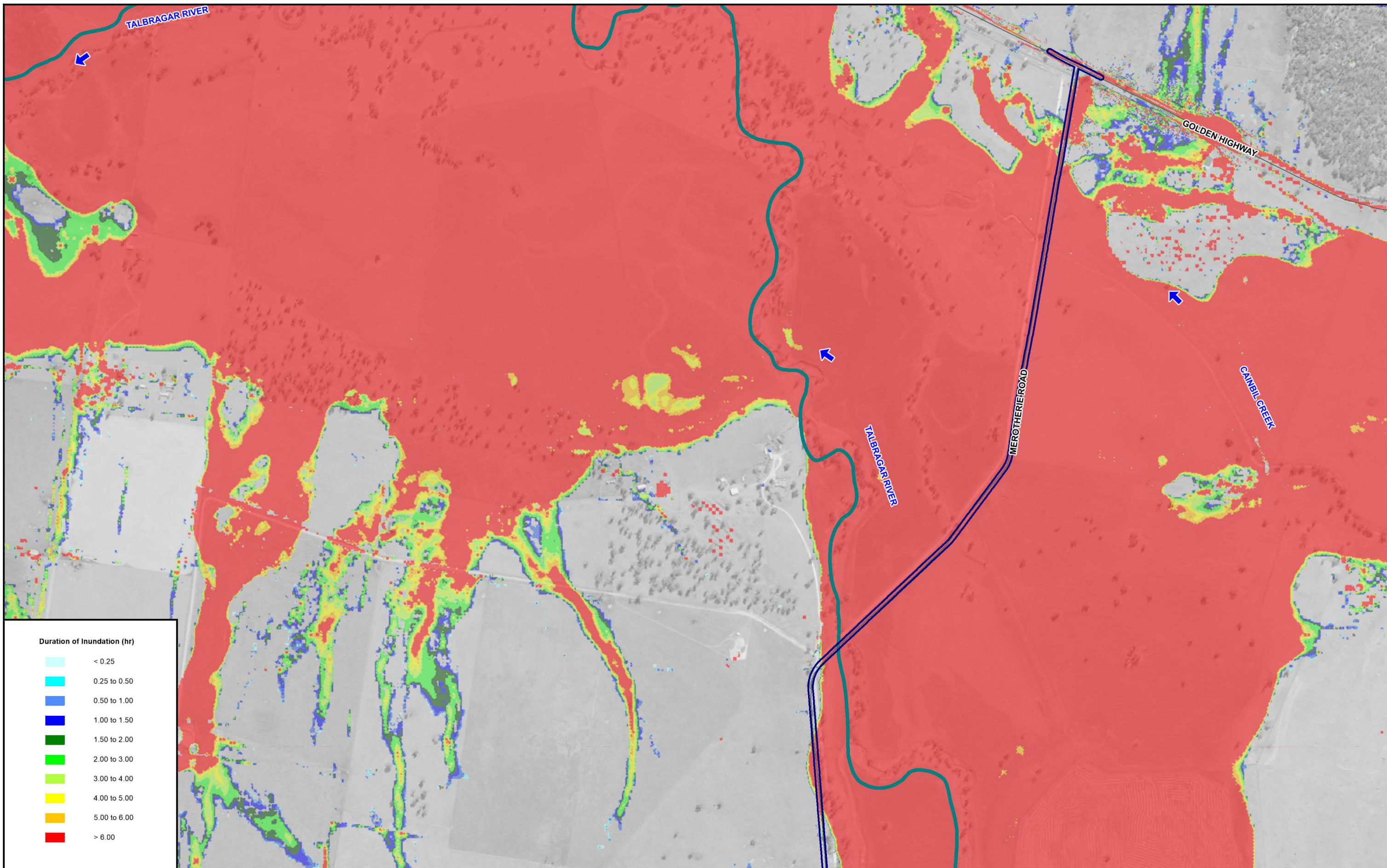
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.02

MAXIMUM FLOW VELOCITIES UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
1% AEP



Duration of Inundation (hr)

- < 0.25
- 0.25 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 3.00
- 3.00 to 4.00
- 4.00 to 5.00
- 5.00 to 6.00
- > 6.00



100 0 100 200 300 m

Scale: 1:10,000

PROJECT ELEMENTS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- M1 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

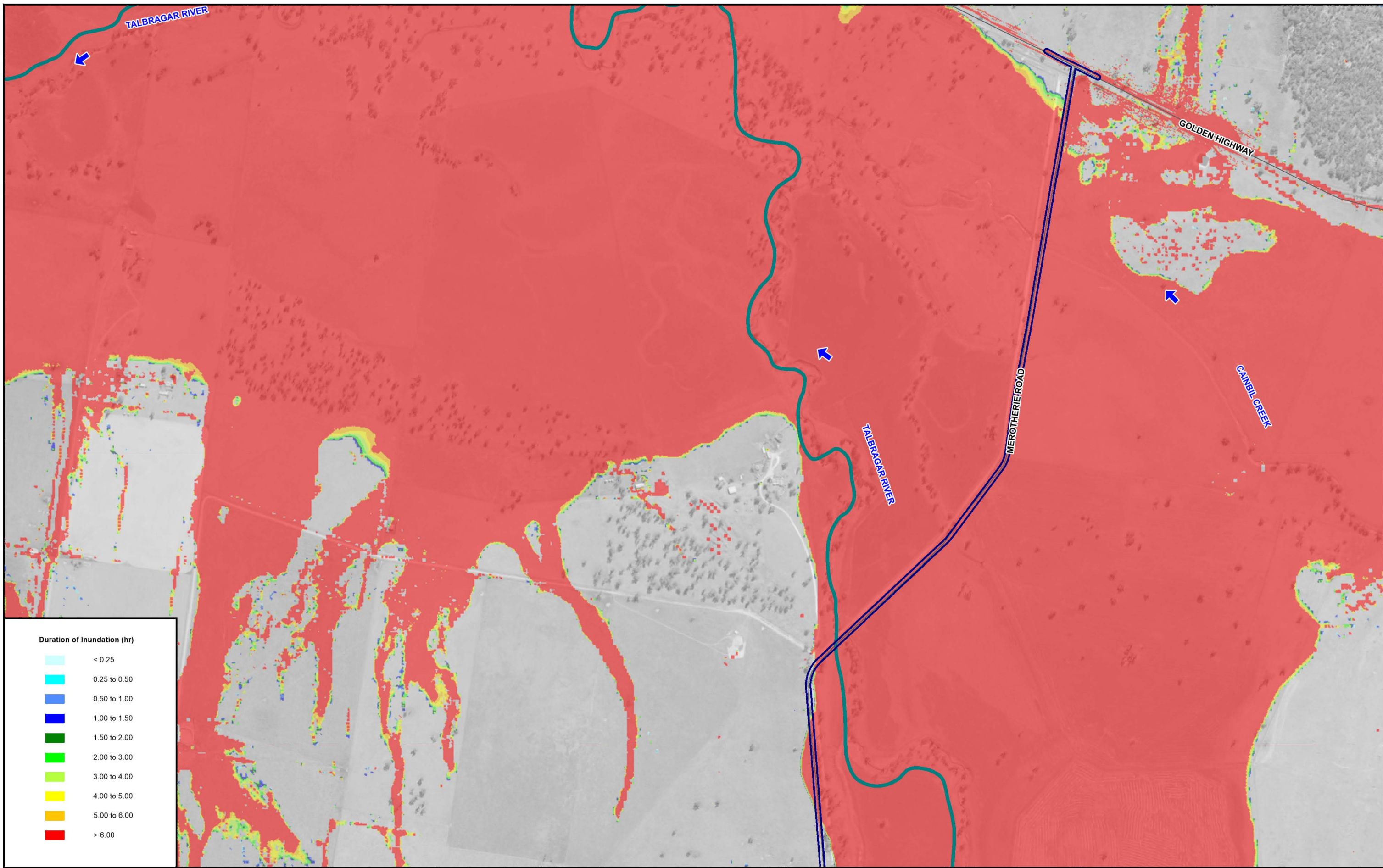
LEGEND

- Local Government Area (LGA) Boundary
- Extent of Local Road Upgrade
- Roads
- Two-Dimensional Model Boundary

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

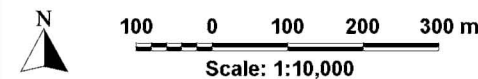
Figure A.03

DURATION OF INUNDATION UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
10% AEP



Duration of Inundation (hr)

- < 0.25
- 0.25 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 3.00
- 3.00 to 4.00
- 4.00 to 5.00
- 5.00 to 6.00
- > 6.00



PROJECT ELEMENTS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- M1 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

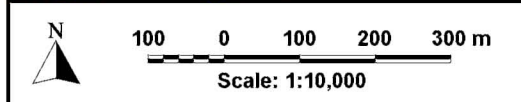
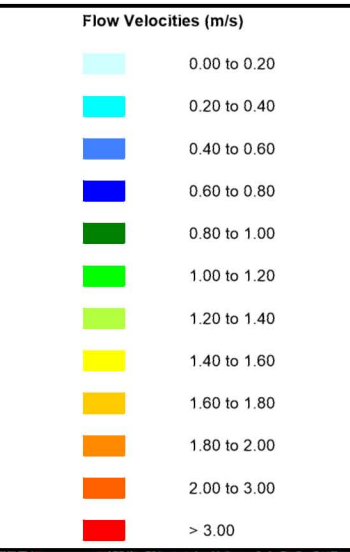
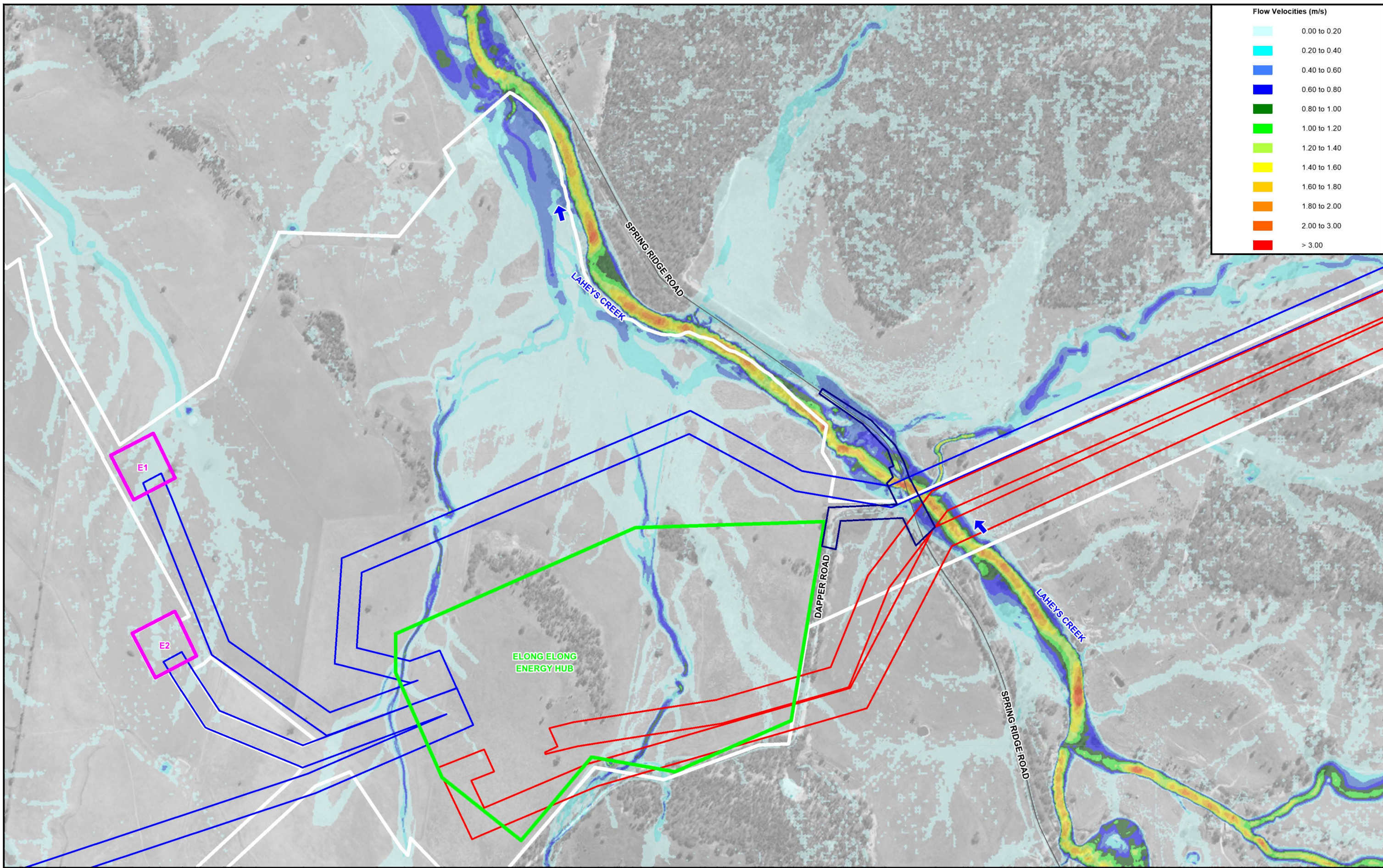
LEGEND

- Local Government Area (LGA) Boundary
- Extent of Local Road Upgrade
- Roads
- Two-Dimensional Model Boundary

CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING

Figure A.04

DURATION OF INUNDATION UNDER PRE-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
1% AEP



- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

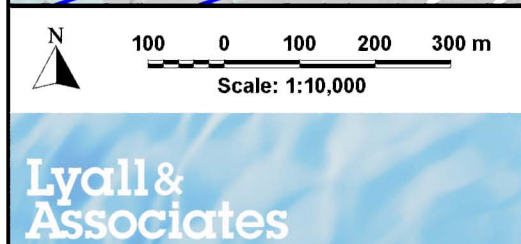
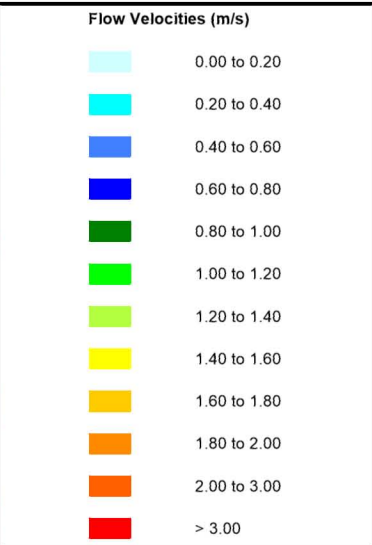
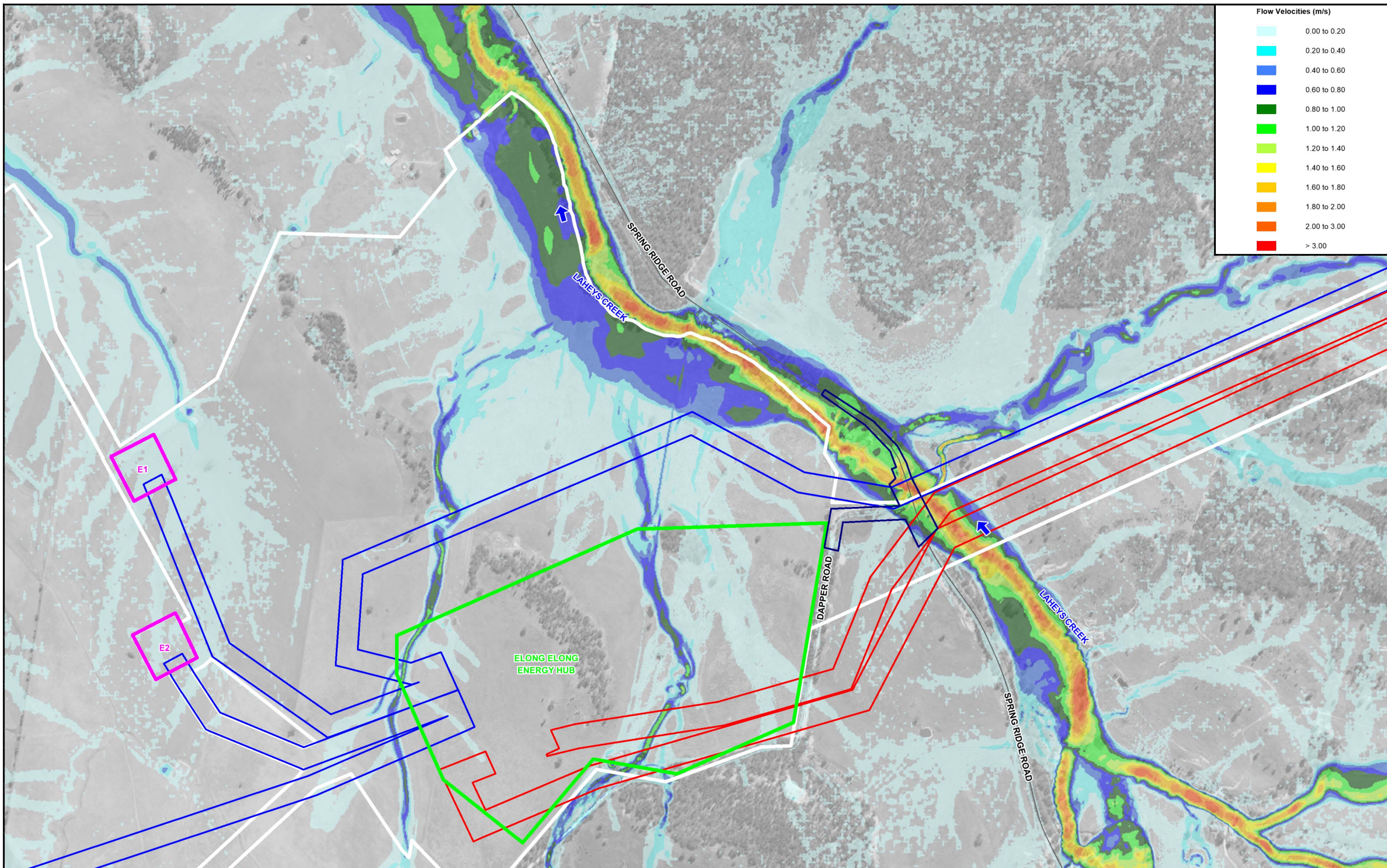
- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**



MAXIMUM FLOW VELOCITIES UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
10% AEP

Figure A.05



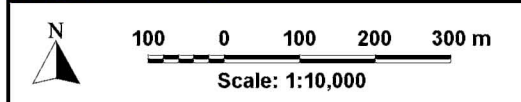
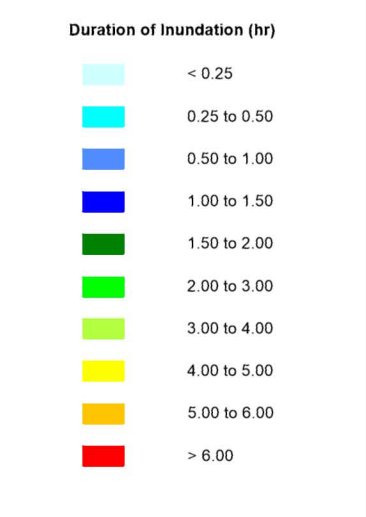
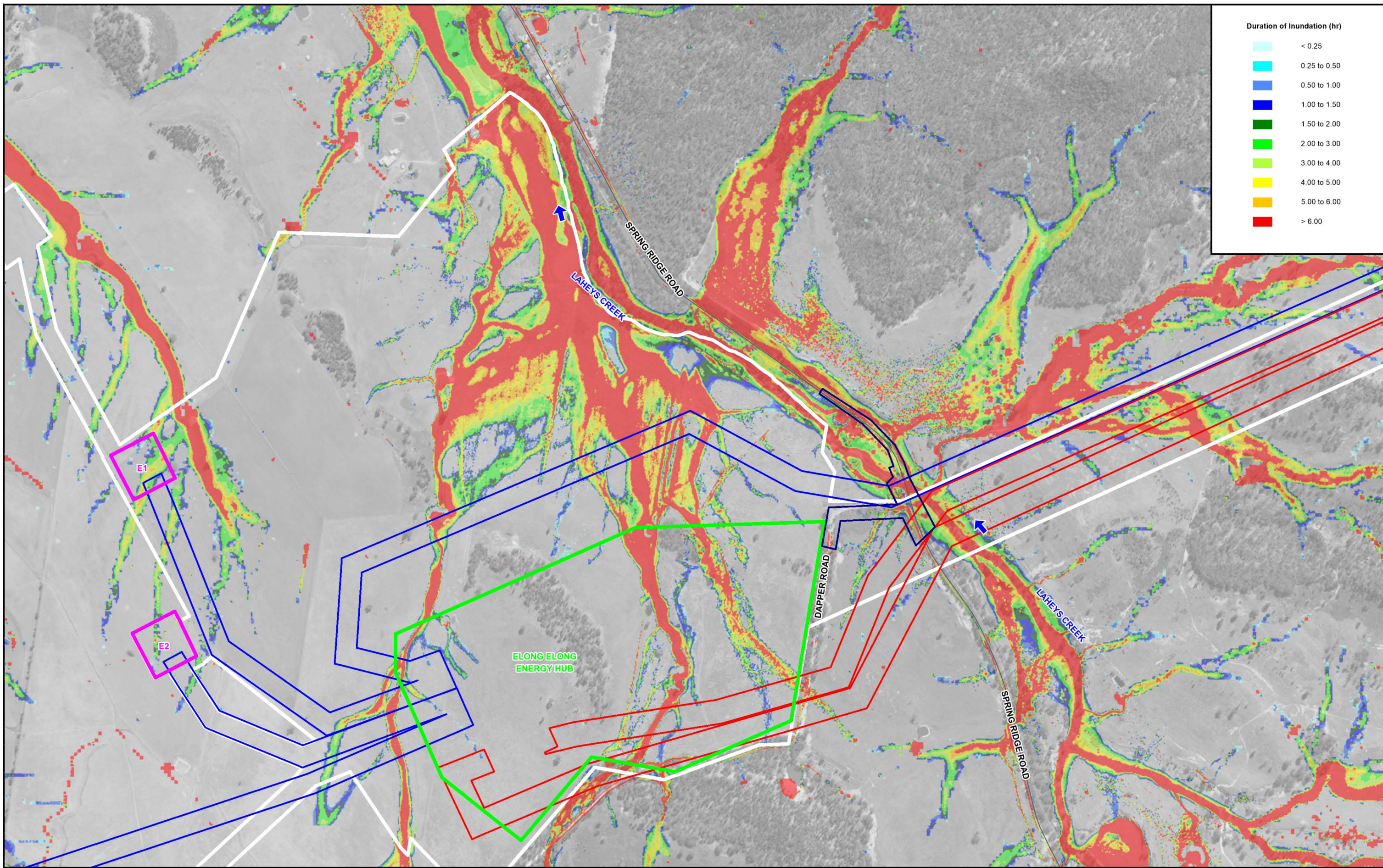
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.06

**MAXIMUM FLOW VELOCITIES UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
1% AEP**



- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

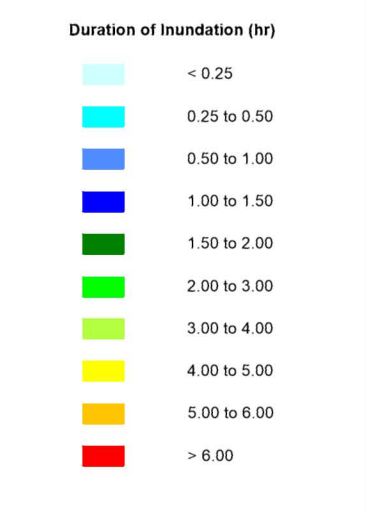
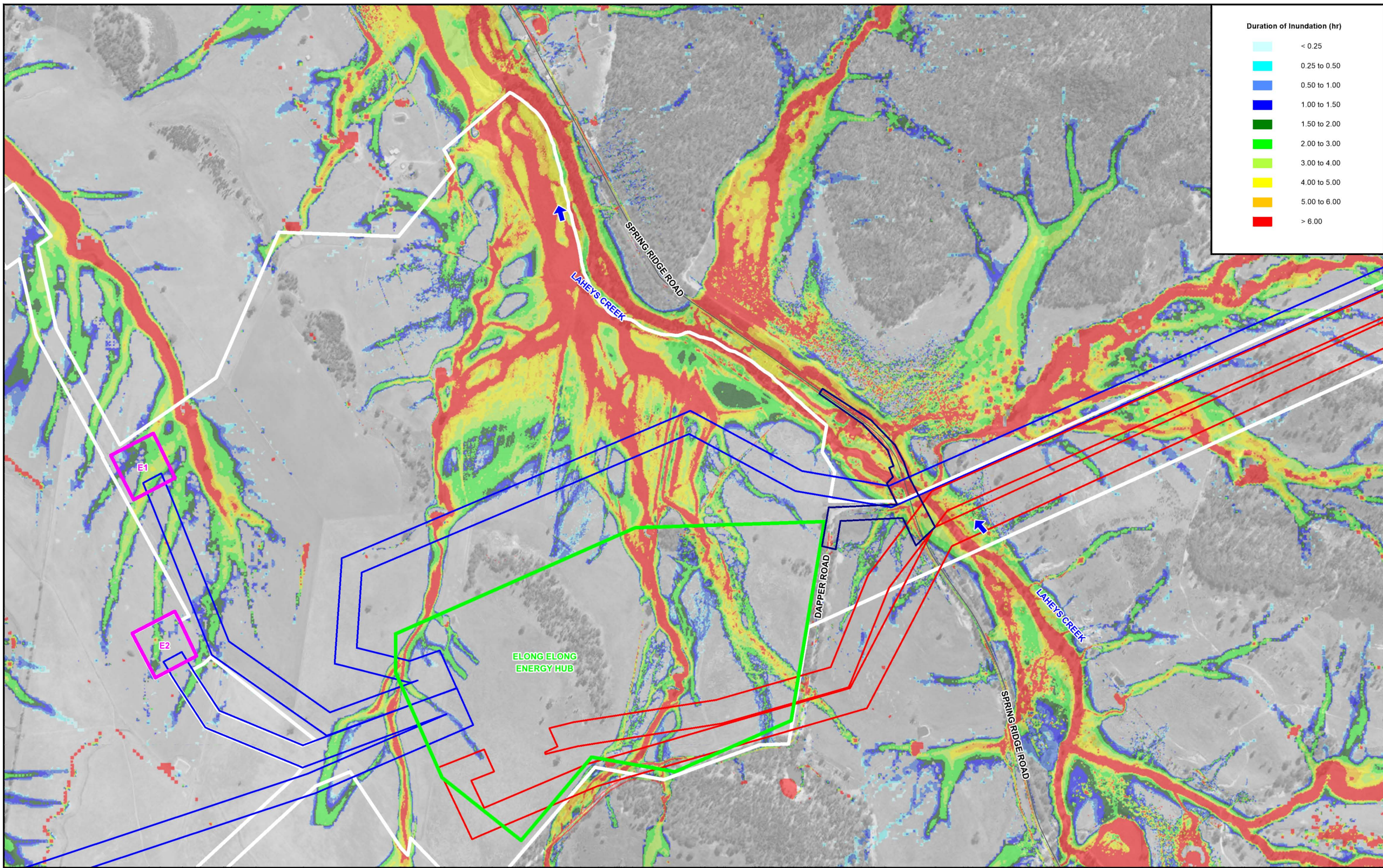
- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary


**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**



DURATION OF INUNDATION UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
10% AEP


Figure A.07




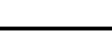




 100 0 100 200 300 m

 Scale: 1:10,000



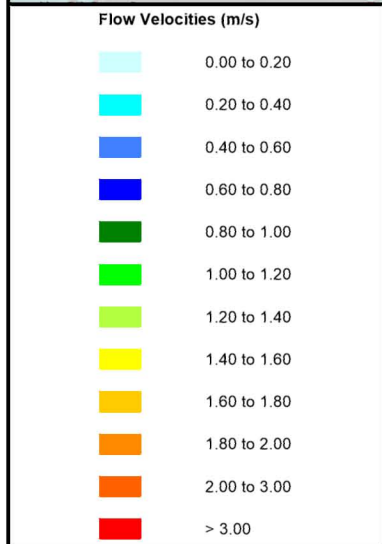
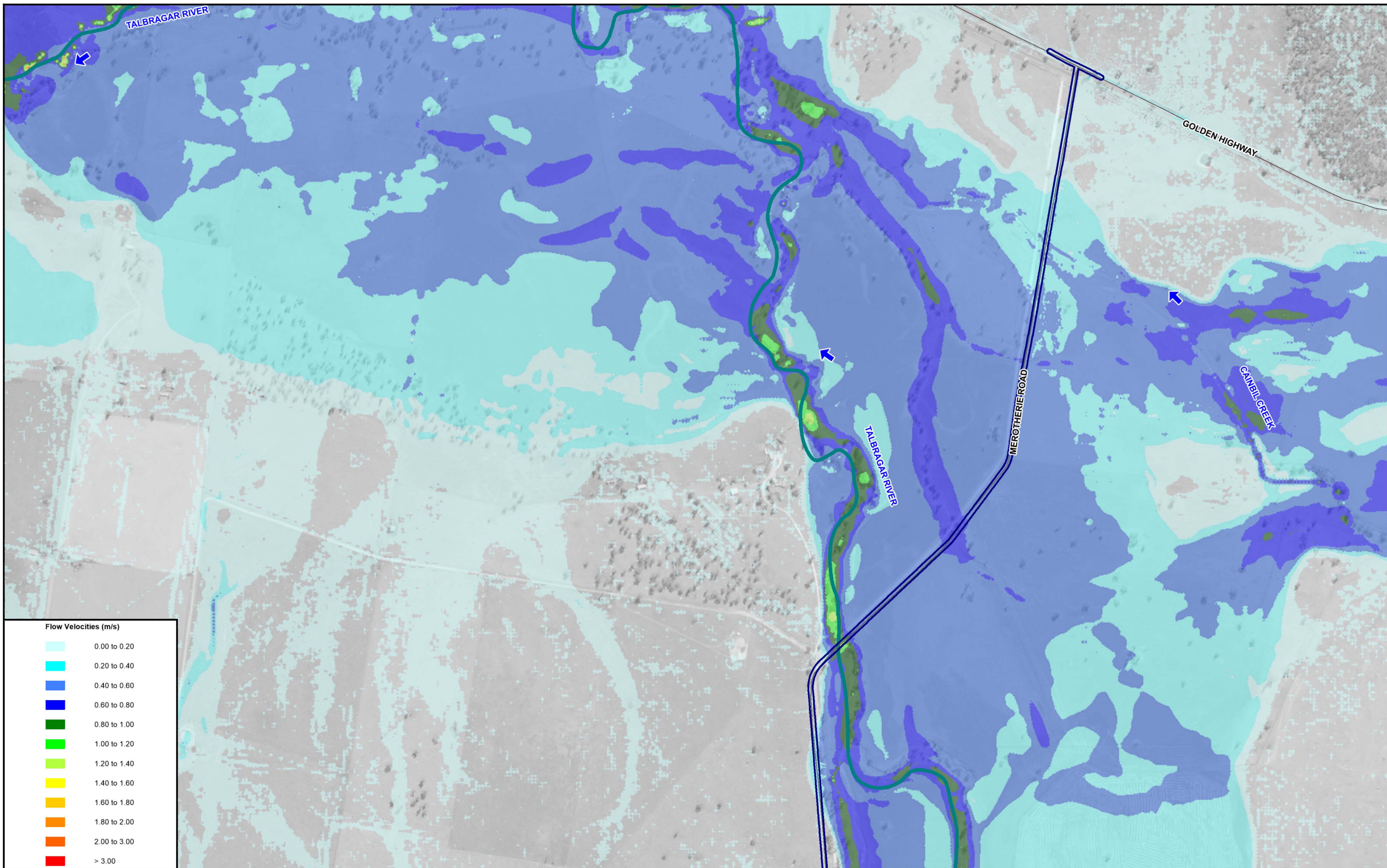
- PROJECT ELEMENTS**
-  Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 -  330kV Switching Stations and Identifier
 -  500kV Transmission Line Corridor
 -  330kV Transmission Line Corridor



- LEGEND**
-  Local Government Area (LGA) Boundary
 -  Extent of Local Road Upgrade
 -  Roads
 -  Two-Dimensional Model Boundary


**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.08





DURATION OF INUNDATION UNDER PRE-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
1% AEP







 Scale: 1:10,000





PROJECT ELEMENTS

-  Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
-  330kV Switching Stations and Identifier
-  500kV Transmission Line Corridor
-  330kV Transmission Line Corridor

LEGEND

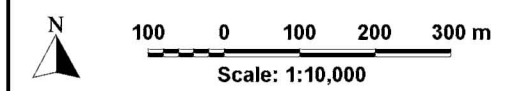
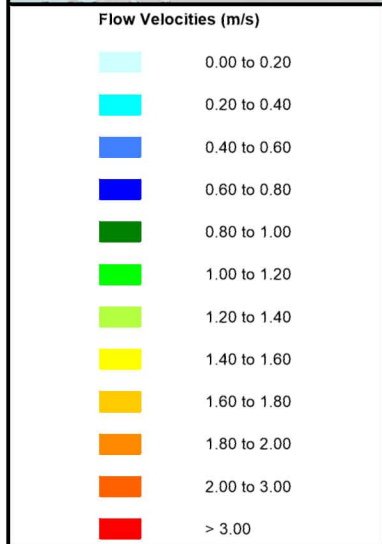
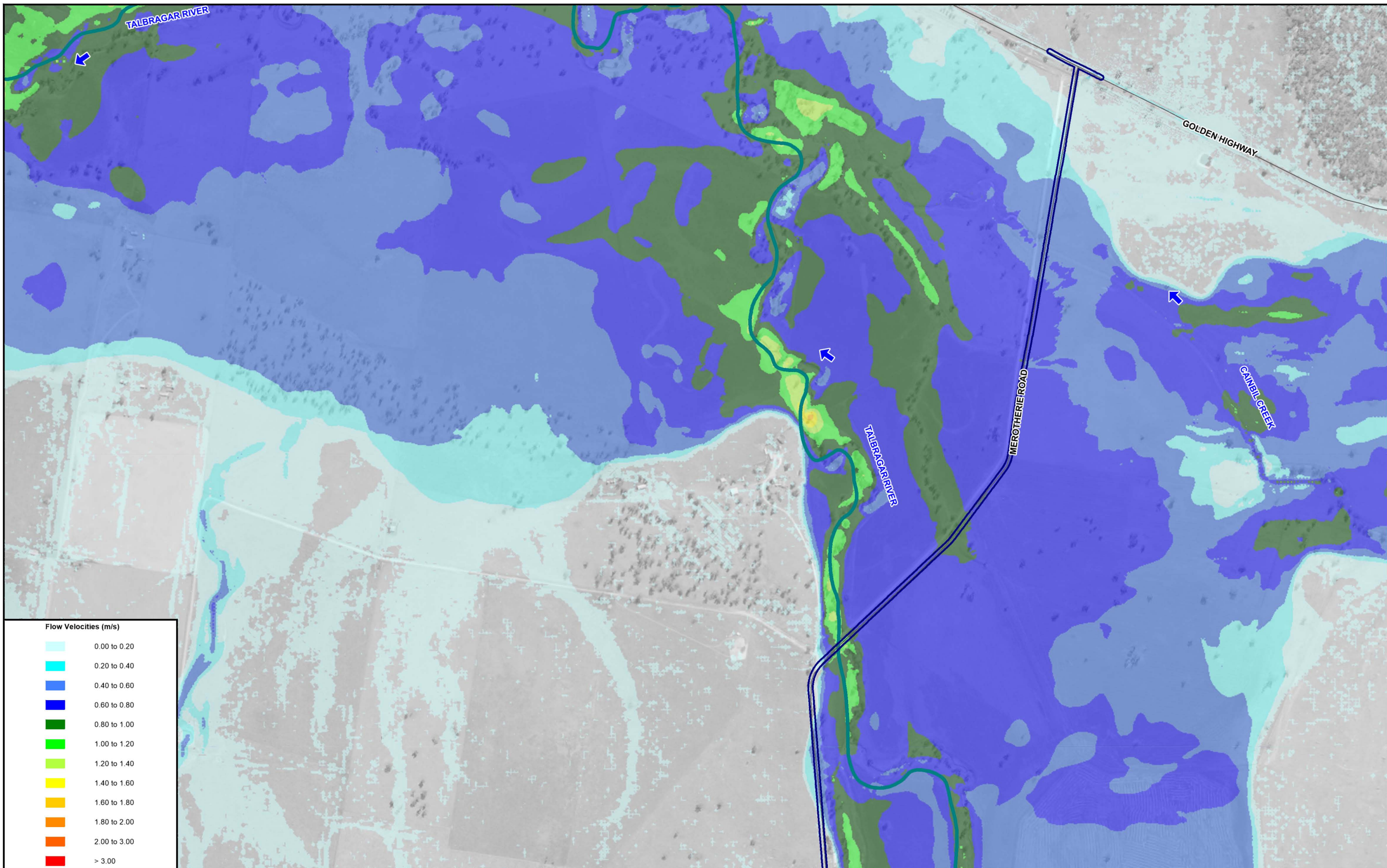
-  Local Government Area (LGA) Boundary
-  Extent of Local Road Upgrade

-  Roads
-  Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.09

MAXIMUM FLOW VELOCITIES UNDER POST-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
10% AEP



- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

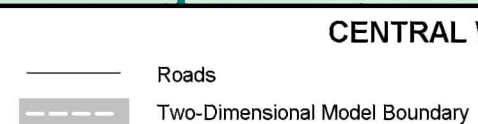
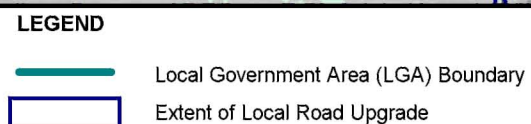
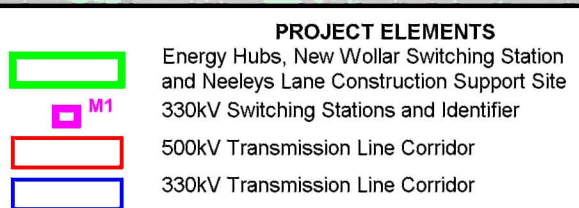
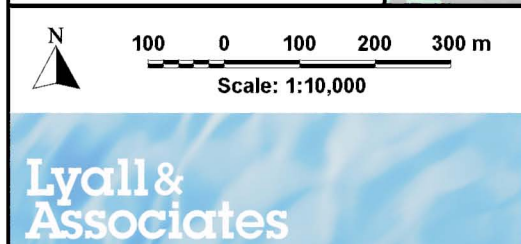
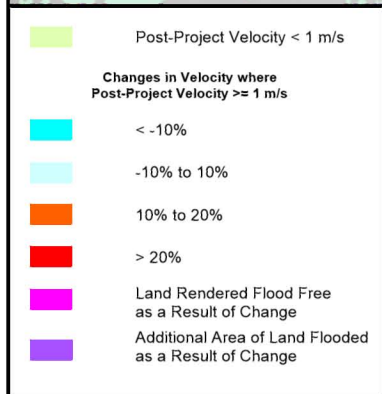
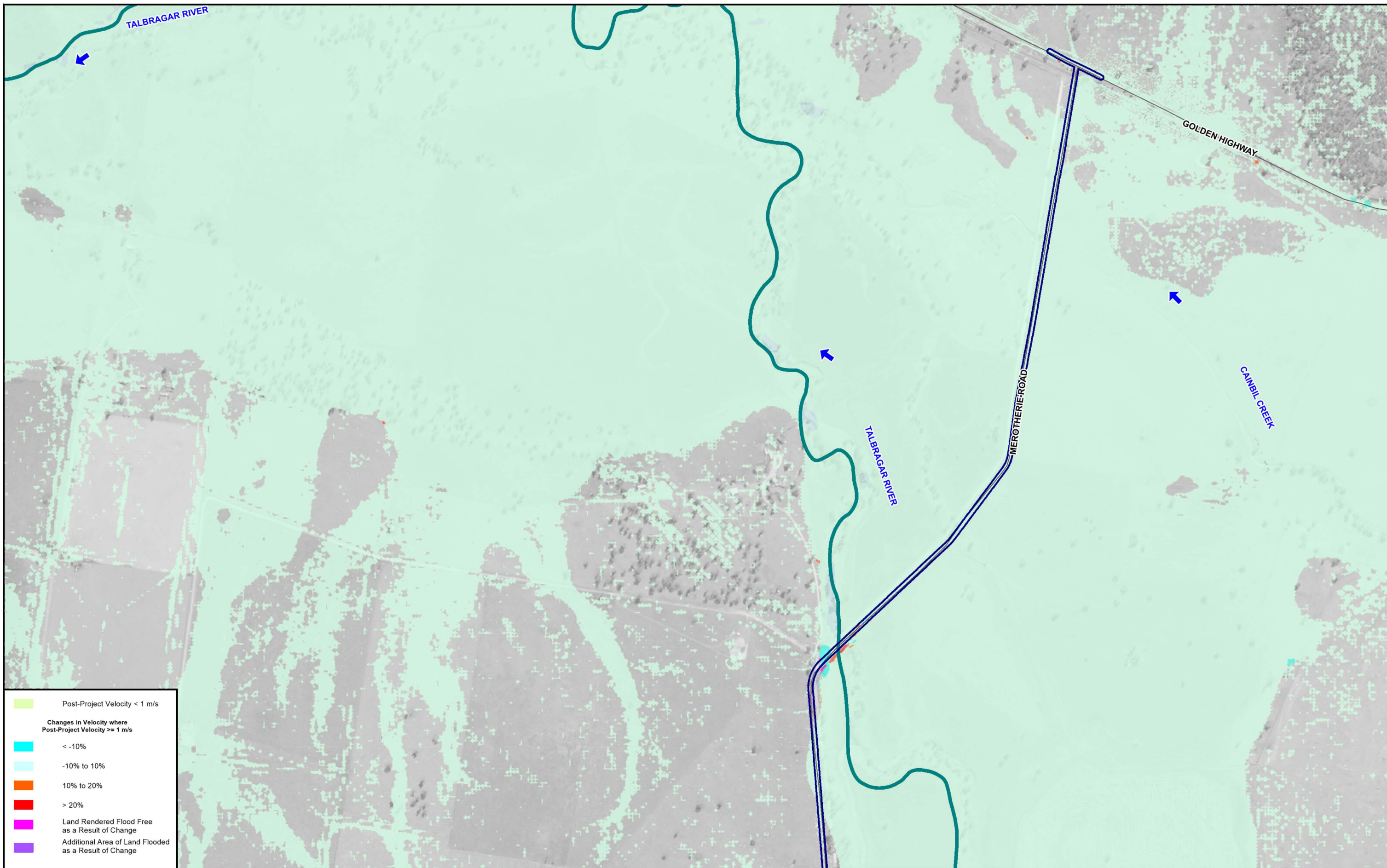
- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.10



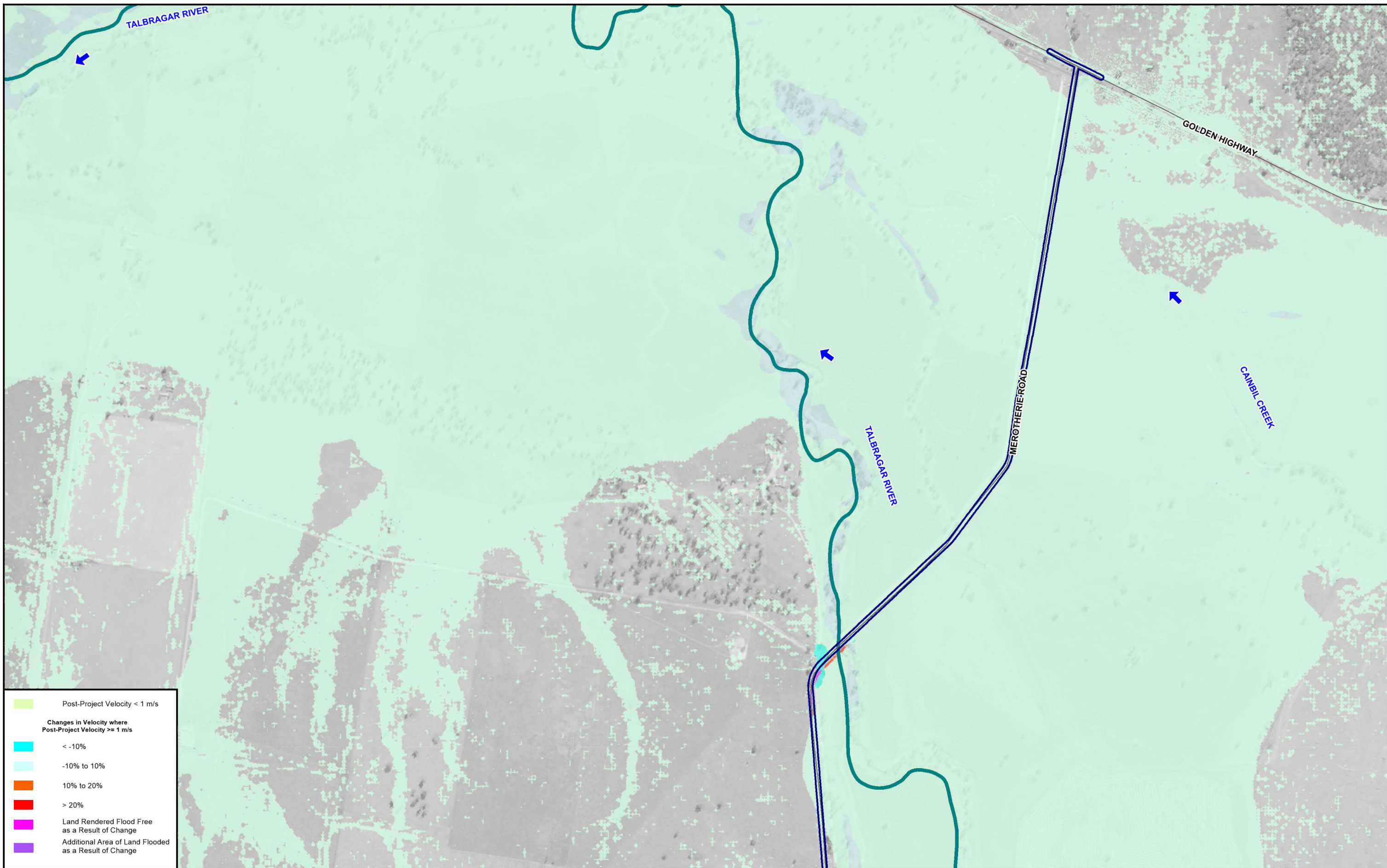
**MAXIMUM FLOW VELOCITIES UNDER POST-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
1% AEP**



**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
 EIS AMENDMENT REPORT - FLOODING**

Figure A.11

IMPACT OF PROPOSED BRIDGE OVER THE TALBRAGAR RIVER AT MEROTHERIE ROAD ON MAXIMUM FLOW VELOCITIES
 10% AEP



Scale: 1:10,000

PROJECT ELEMENTS

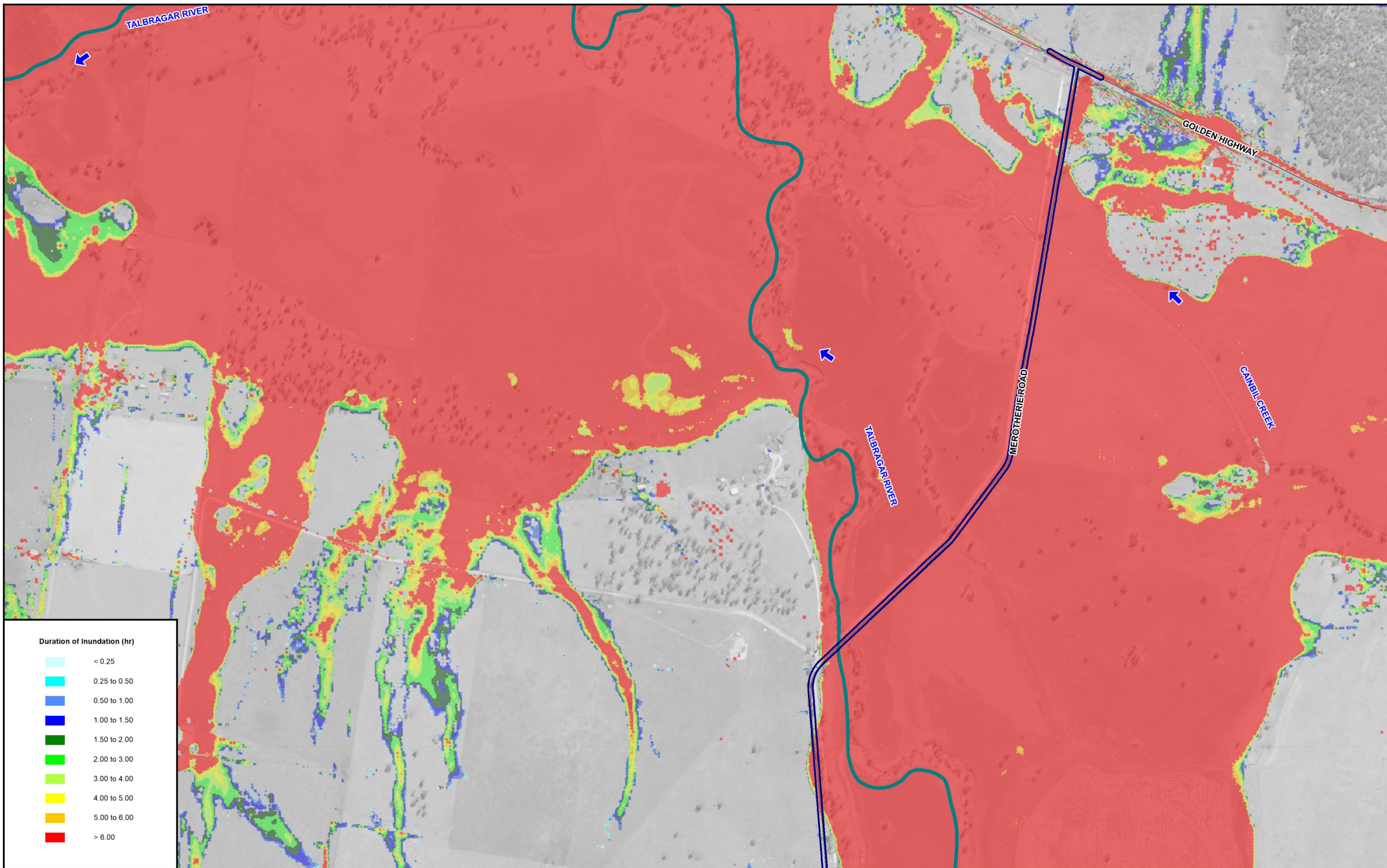
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- 330kV Switching Stations and Identifier
- M1
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

LEGEND

- Local Government Area (LGA) Boundary
- Extent of Local Road Upgrade
- Roads
- Two-Dimensional Model Boundary

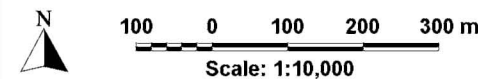
**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.12
 IMPACT OF PROPOSED BRIDGE OVER THE TALBRAGAR RIVER AT MEROTHERIE ROAD ON MAXIMUM FLOW VELOCITIES
 1% AEP



Duration of Inundation (hr)

- < 0.25
- 0.25 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 3.00
- 3.00 to 4.00
- 4.00 to 5.00
- 5.00 to 6.00
- > 6.00



- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

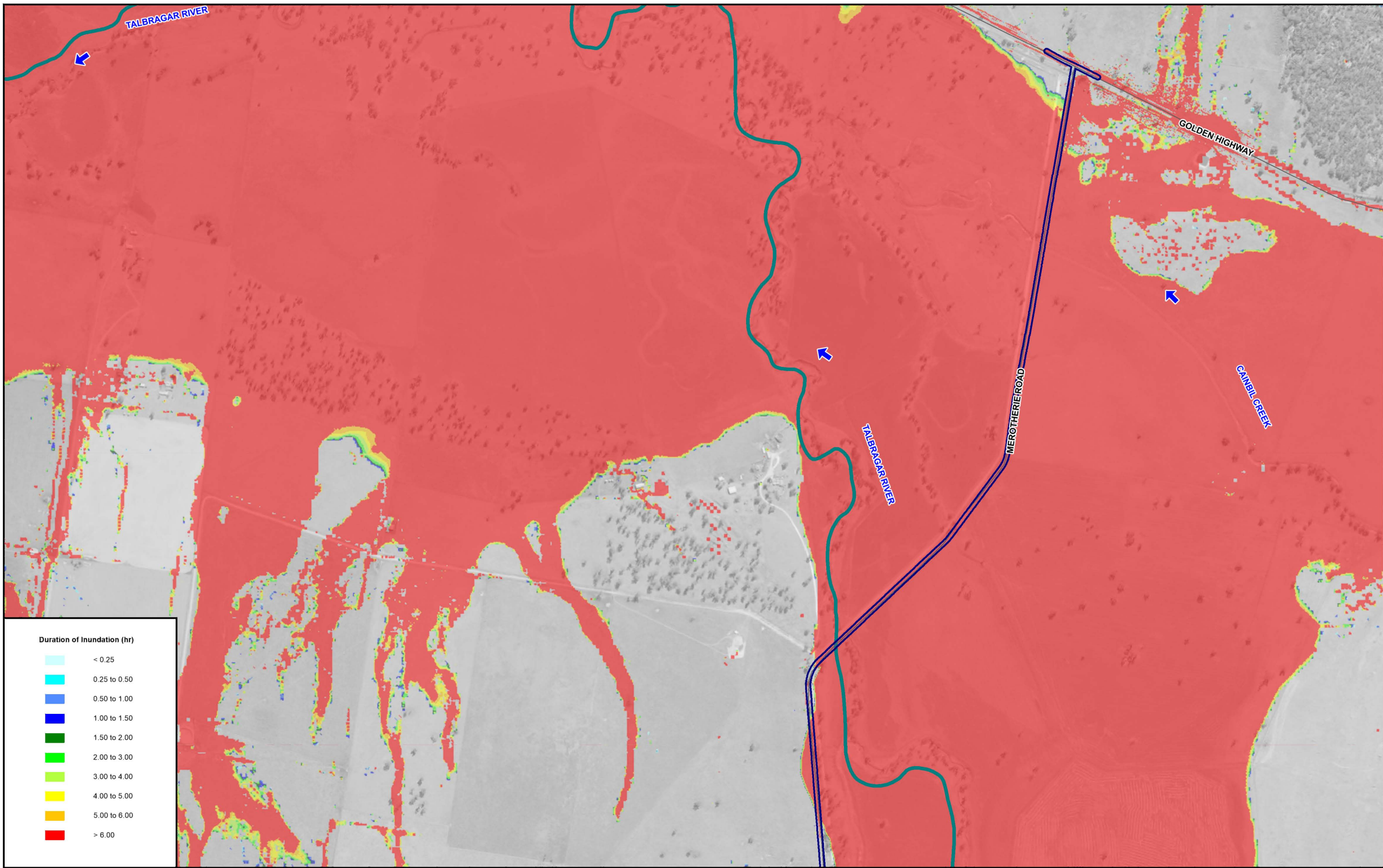
- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

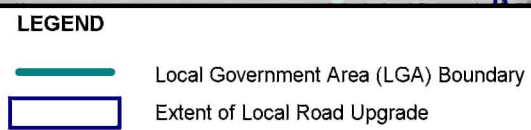
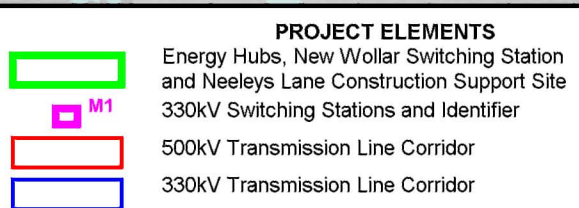
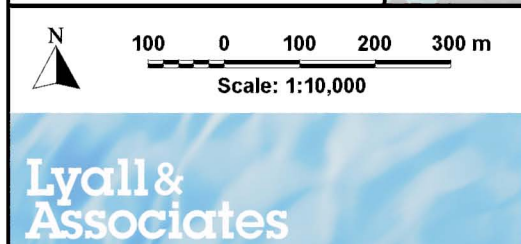
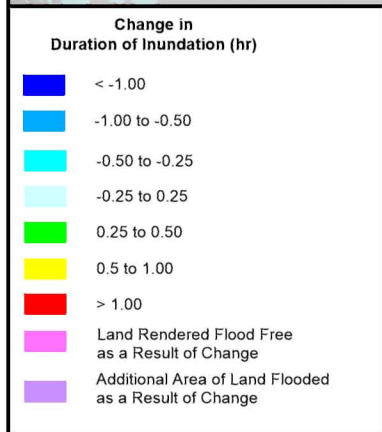
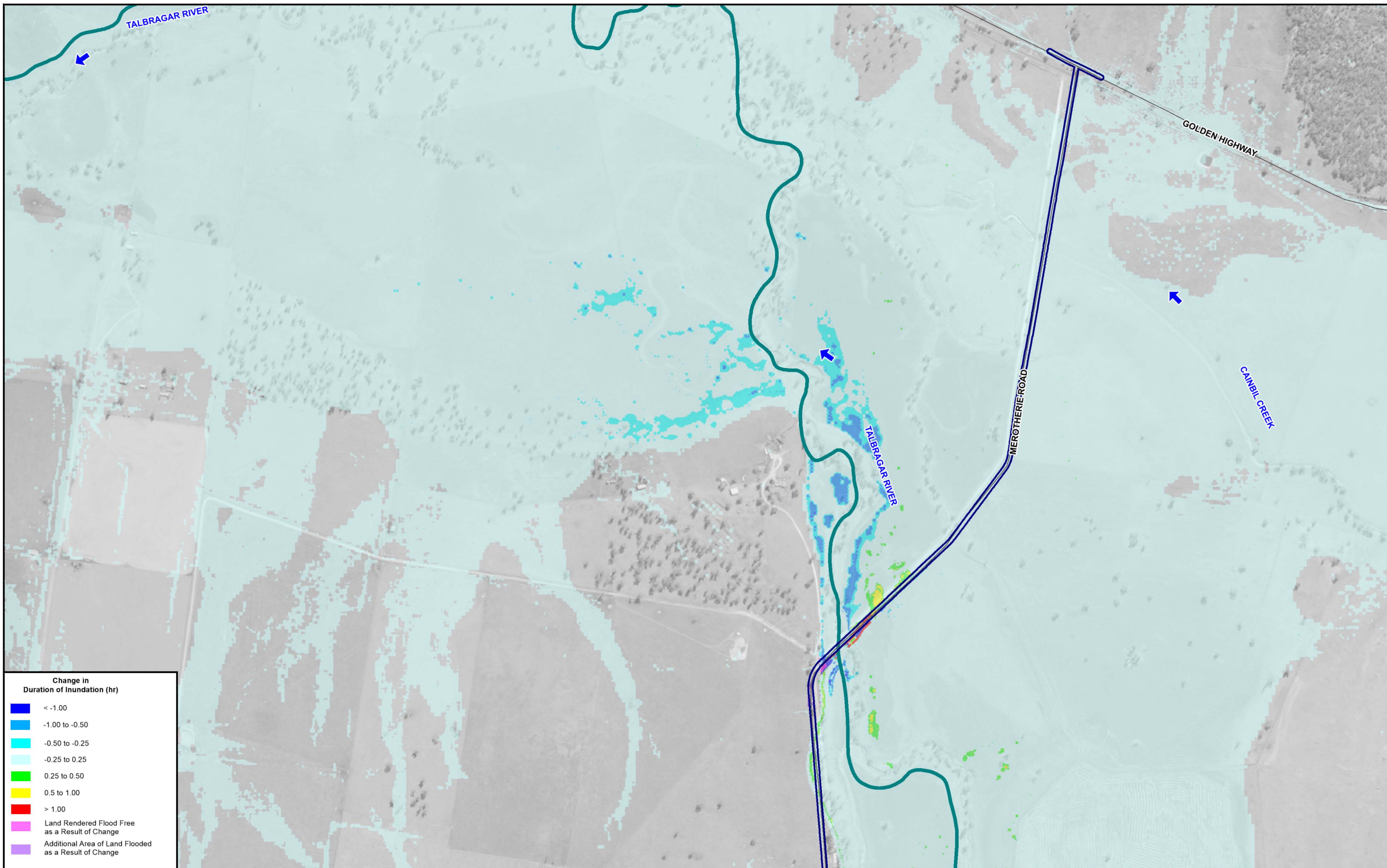
**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**



DURATION OF INUNDATION UNDER POST-PROJECT CONDITIONS IN VICINITY OF MEROTHERIE ROAD UPGRADE
10% AEP

Figure A.13

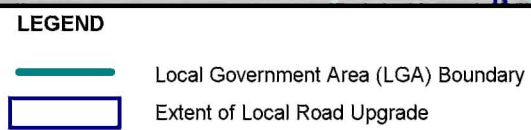
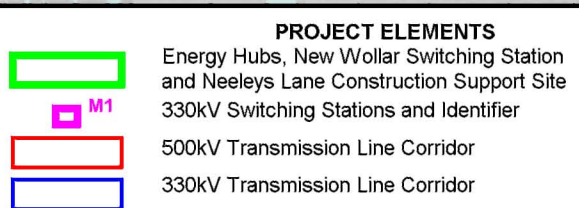
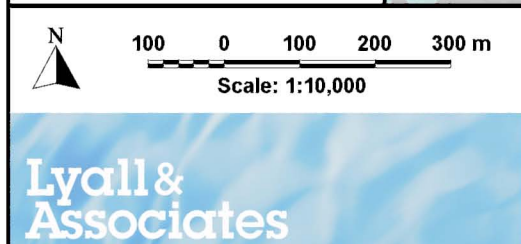
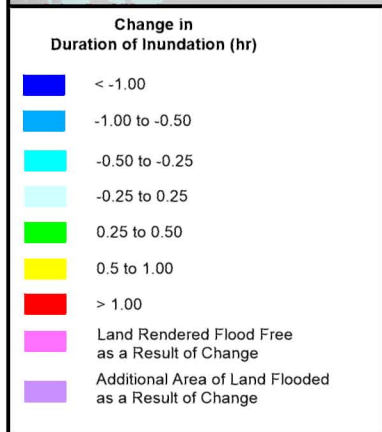
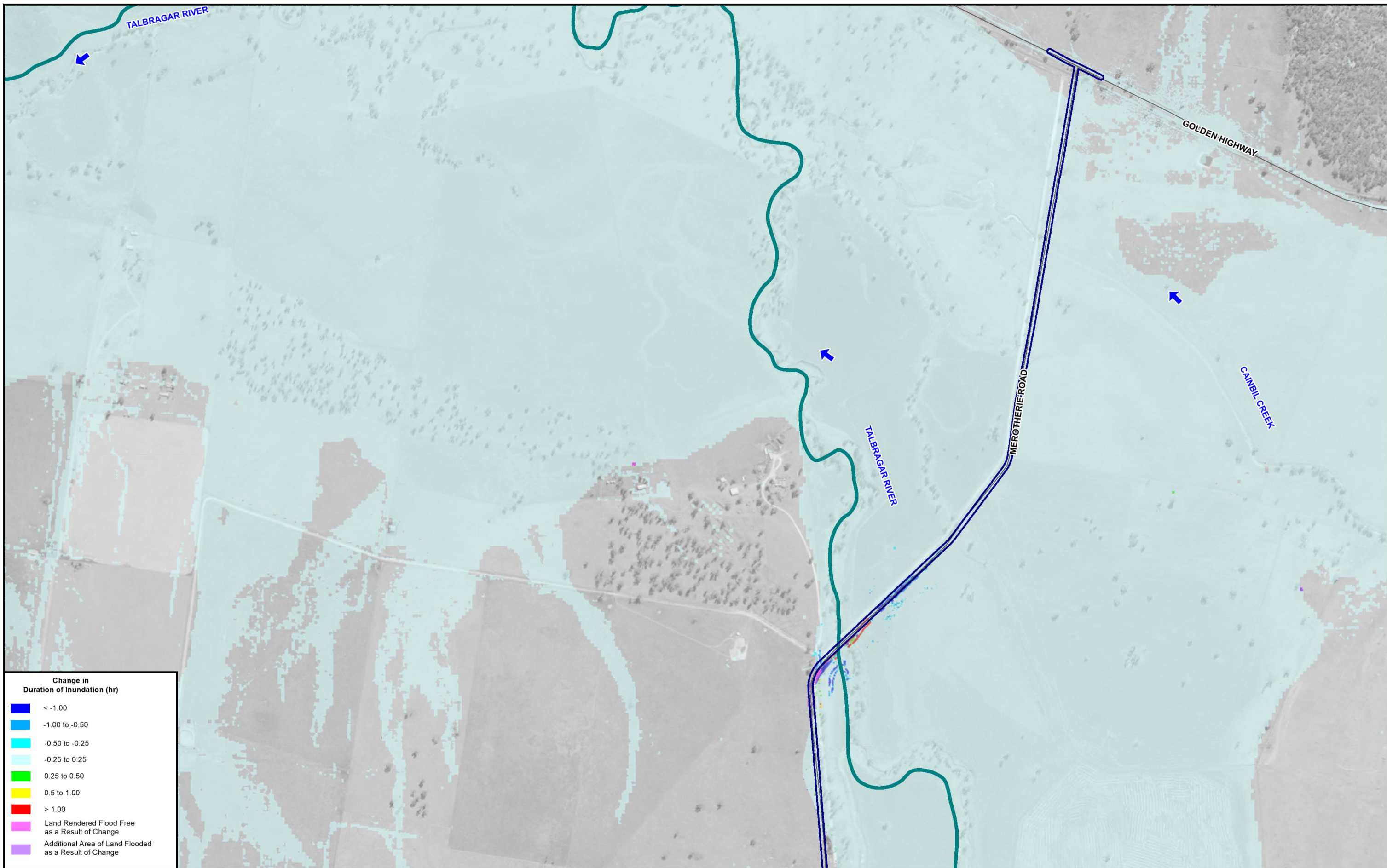




**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.15

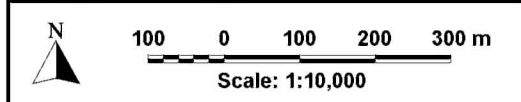
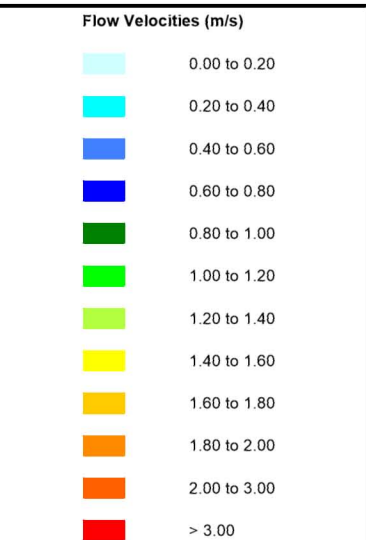
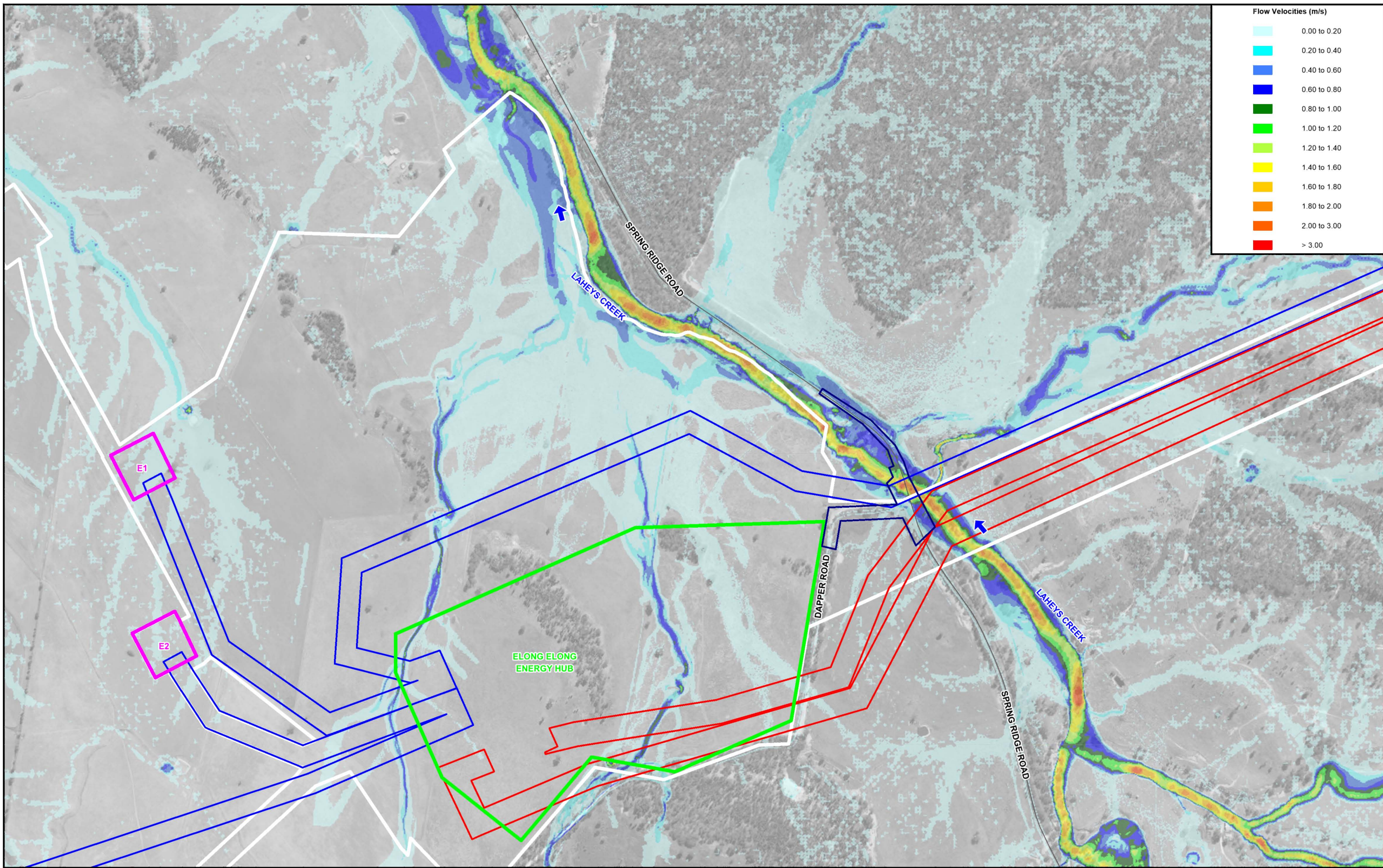
**IMPACT OF PROPOSED BRIDGE OVER THE TALBRAGAR RIVER AT MEROTHERIE ROAD ON DURATION OF INUNDATION
10% AEP**



**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.16

**IMPACT OF PROPOSED BRIDGE OVER THE TALBRAGAR RIVER AT MEROTHERIE ROAD ON DURATION OF INUNDATION
1% AEP**



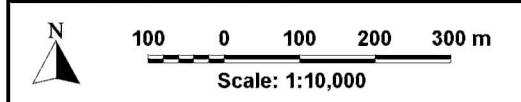
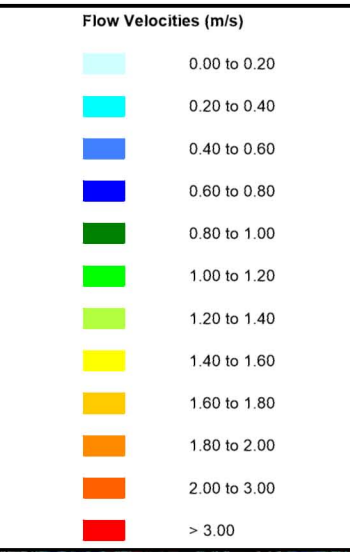
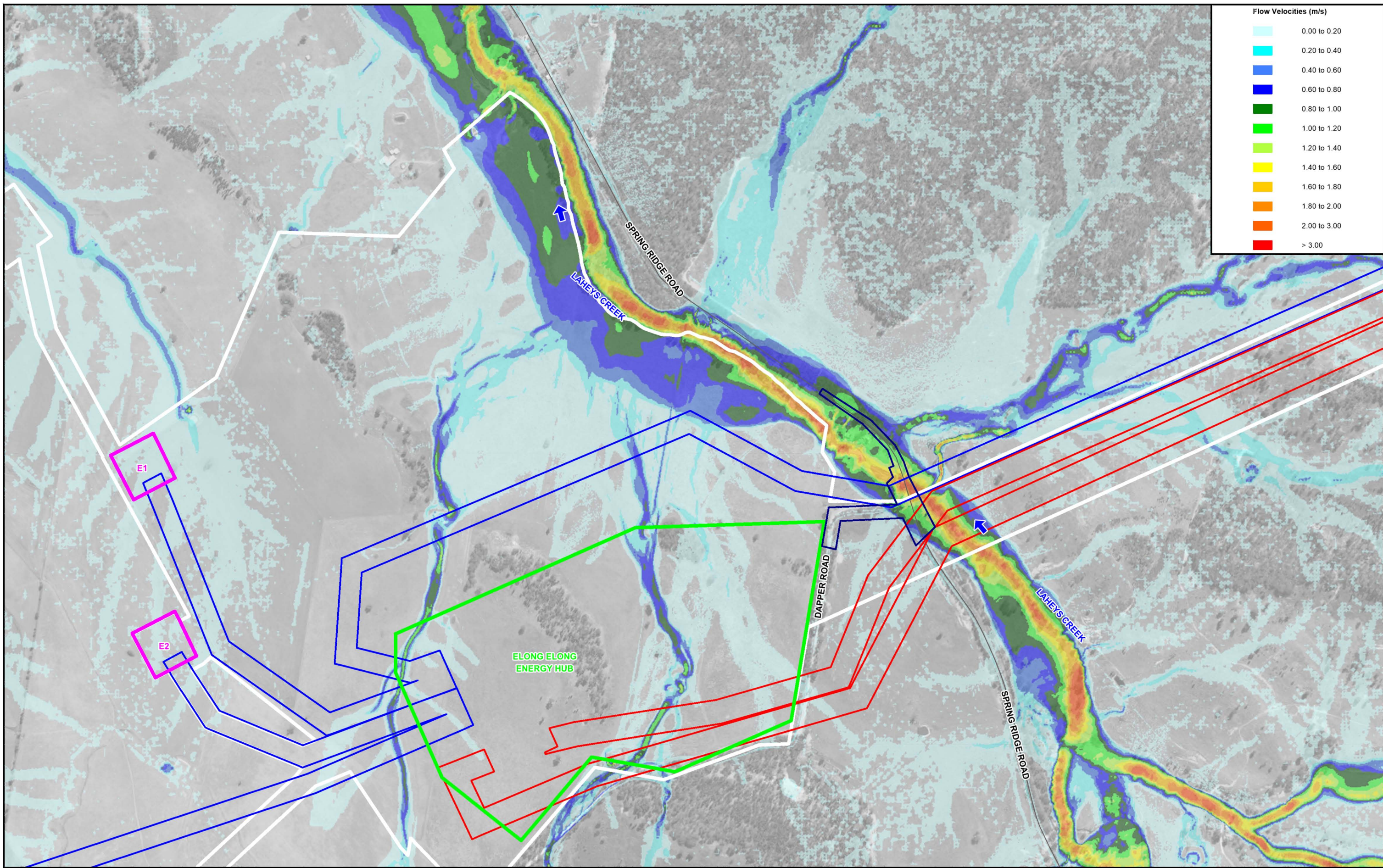
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.17

MAXIMUM FLOW VELOCITIES UNDER POST-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
10% AEP



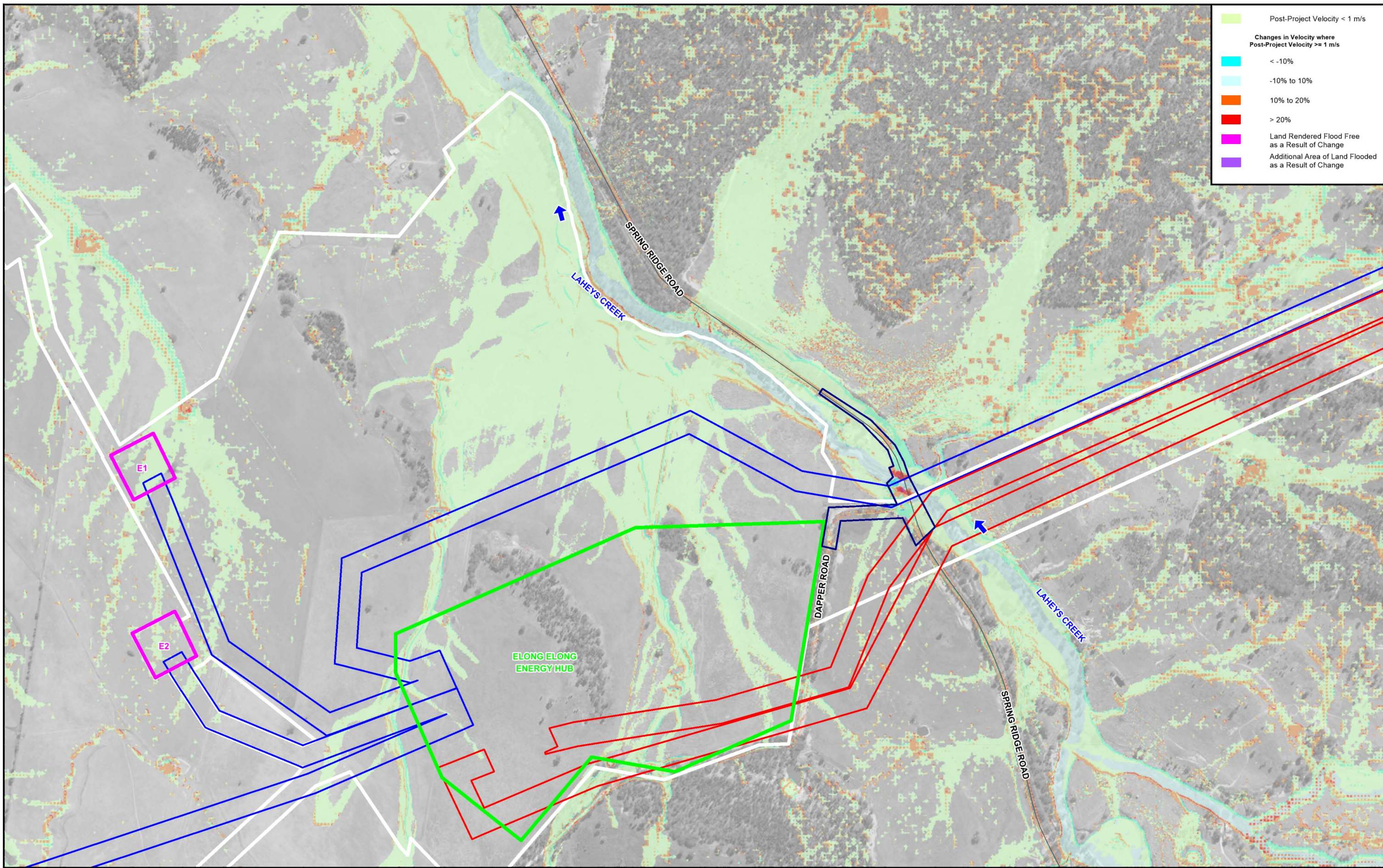
- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.18

MAXIMUM FLOW VELOCITIES UNDER POST-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
1% AEP



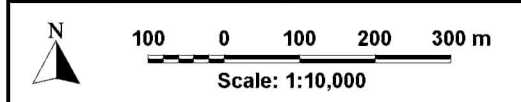
Post-Project Velocity < 1 m/s

Changes in Velocity where Post-Project Velocity \geq 1 m/s

- < -10%
- 10% to 10%
- 10% to 20%
- > 20%

Land Rendered Flood Free as a Result of Change

Additional Area of Land Flooded as a Result of Change



PROJECT ELEMENTS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- M1 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

LEGEND

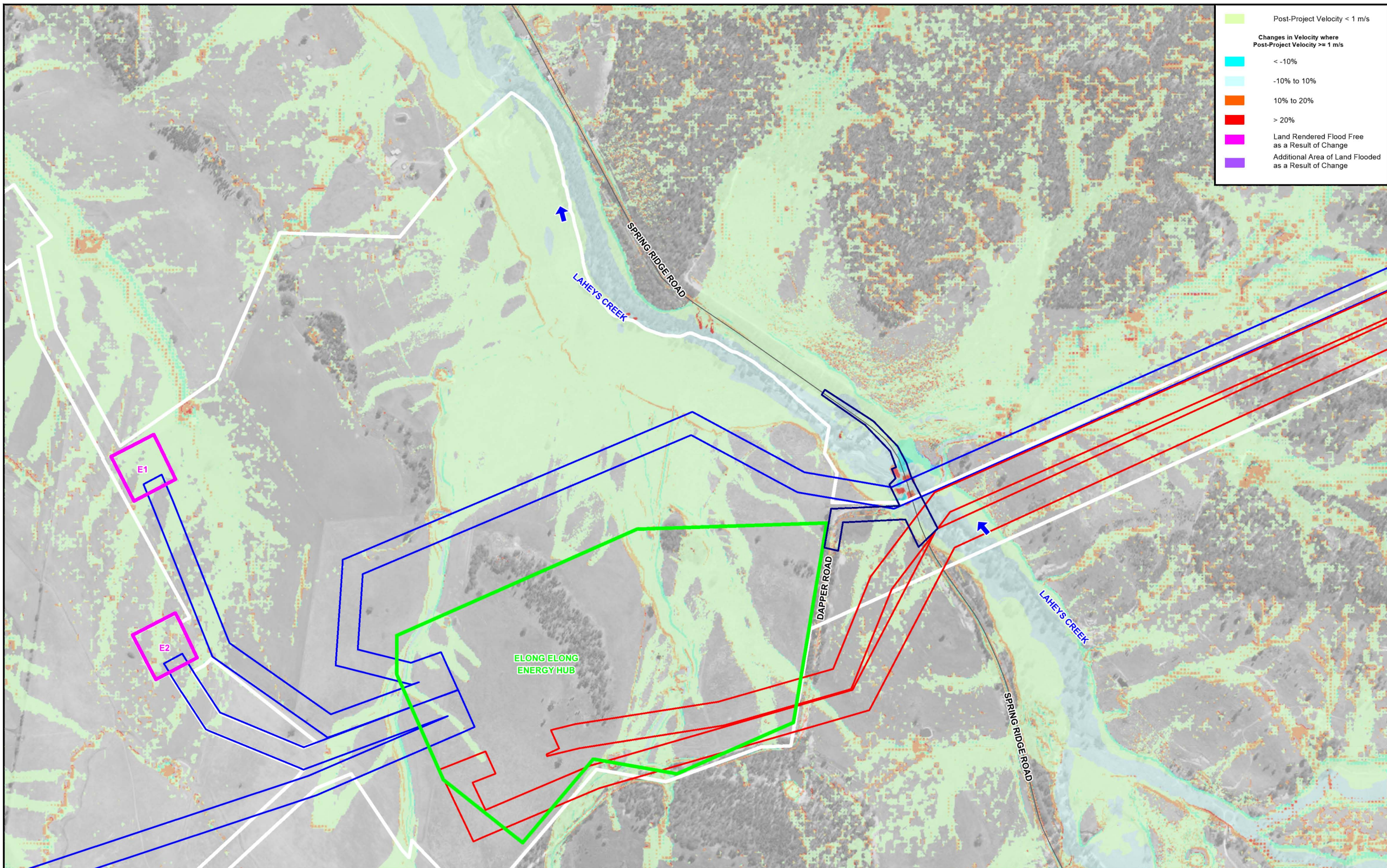
- Local Government Area (LGA) Boundary
- Extent of Local Road Upgrade
- Roads
- Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.19



IMPACT OF PROPOSED BRIDGE OVER LAHEYS CREEK AT SPRING RIDGE ROAD ON MAXIMUM FLOW VELOCITIES
10% AEP



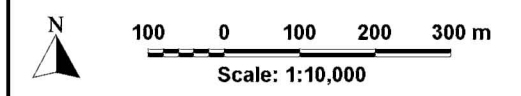
Post-Project Velocity < 1 m/s

Changes in Velocity where Post-Project Velocity \geq 1 m/s

- < -10%
- 10% to 10%
- 10% to 20%
- > 20%

Land Rendered Flood Free as a Result of Change

Additional Area of Land Flooded as a Result of Change



PROJECT ELEMENTS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- M1 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

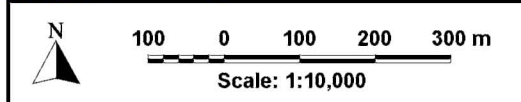
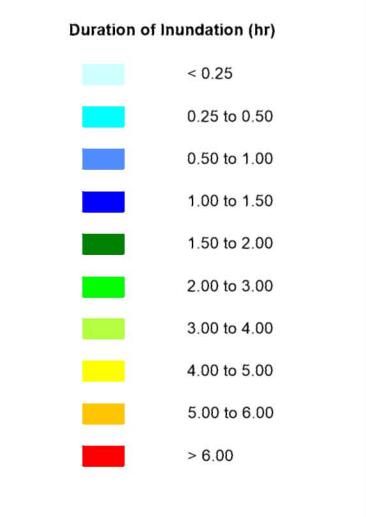
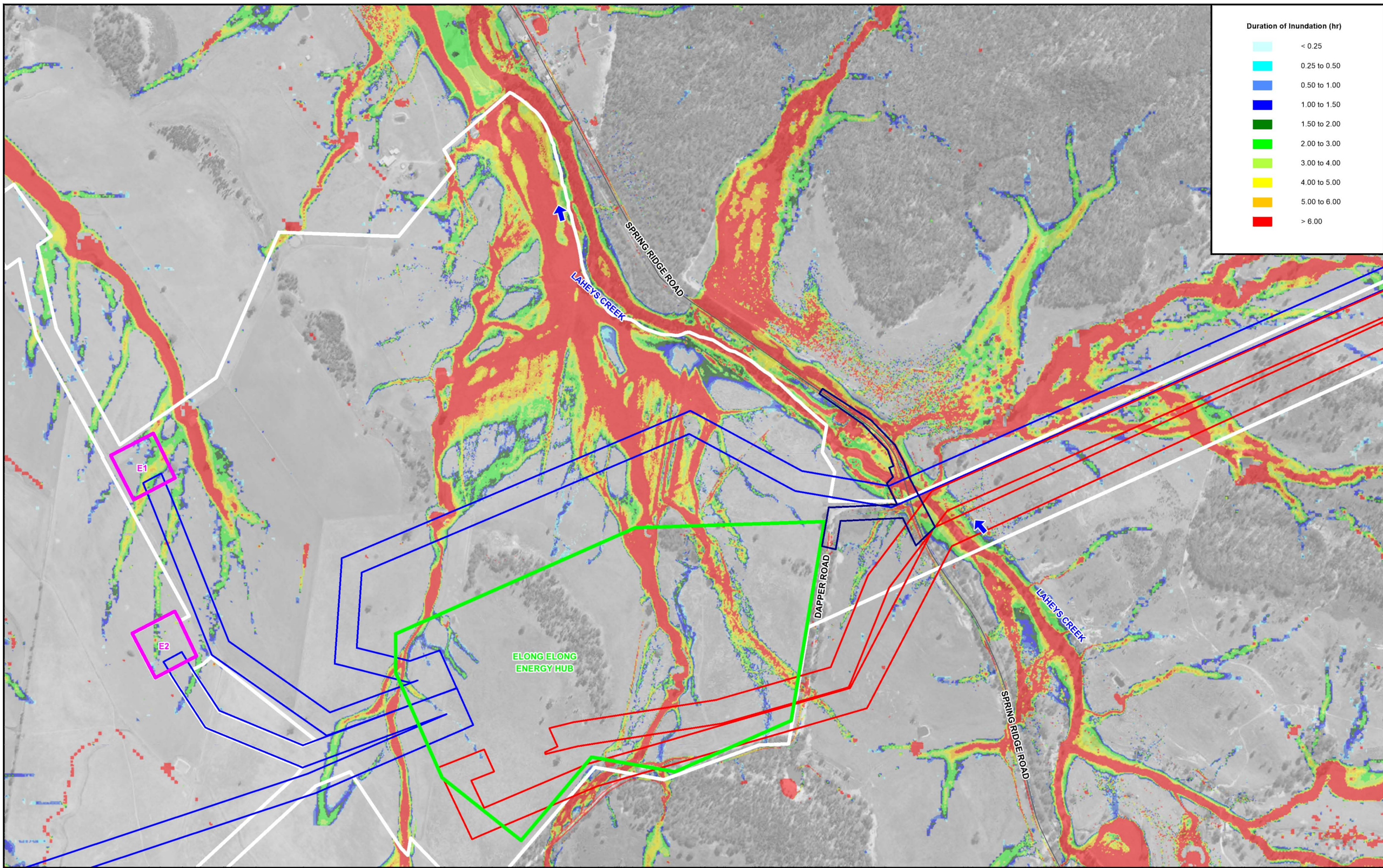
LEGEND

- Local Government Area (LGA) Boundary
- Extent of Local Road Upgrade
- Roads
- Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.20

IMPACT OF PROPOSED BRIDGE OVER LAHEYS CREEK AT SPRING RIDGE ROAD ON MAXIMUM FLOW VELOCITIES
1% AEP



- PROJECT ELEMENTS**
- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 - M1 330kV Switching Stations and Identifier
 - 500kV Transmission Line Corridor
 - 330kV Transmission Line Corridor

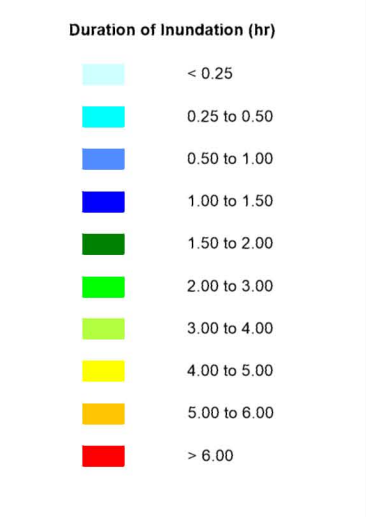
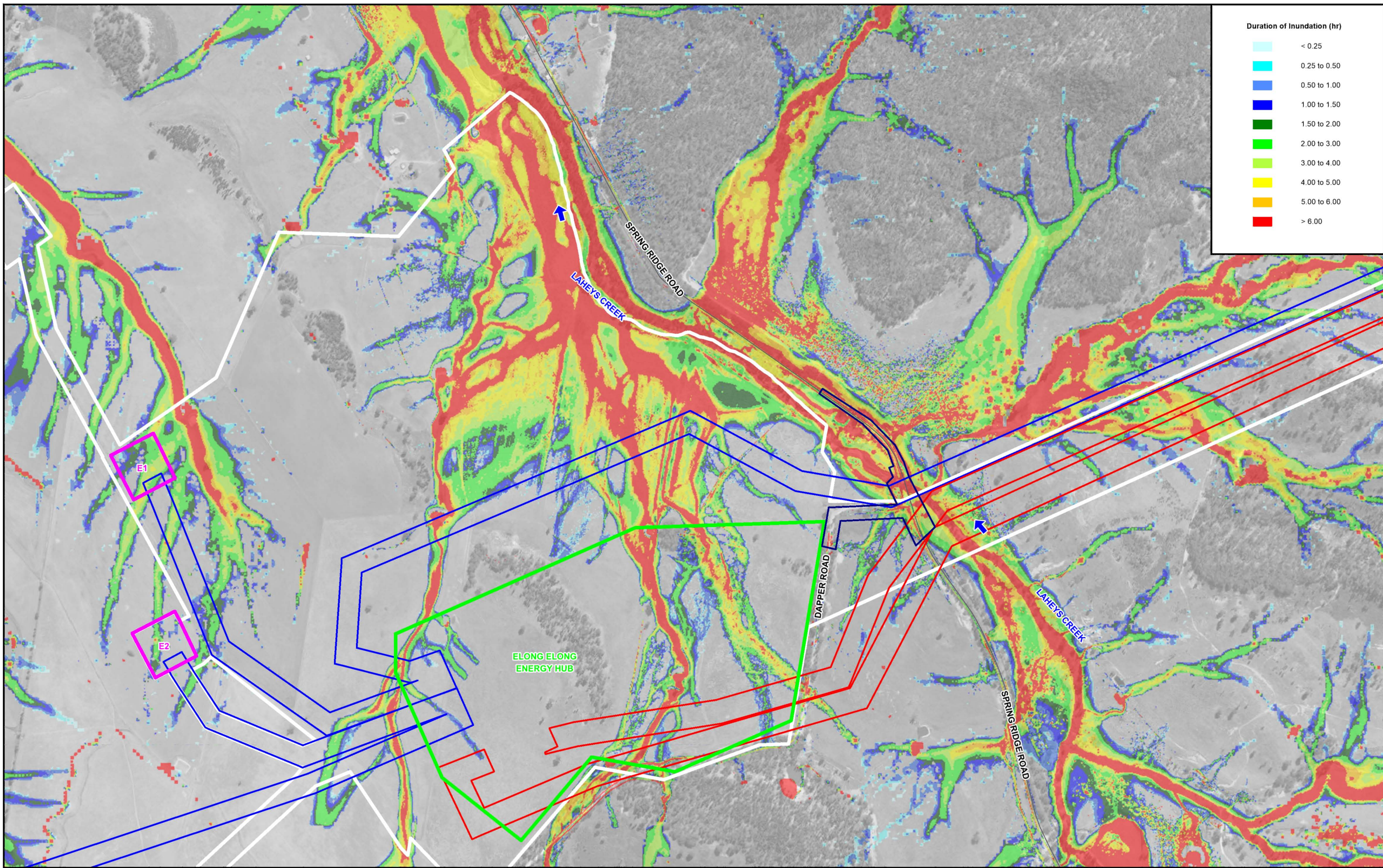
- LEGEND**
- Local Government Area (LGA) Boundary
 - Extent of Local Road Upgrade
 - Roads
 - Two-Dimensional Model Boundary


**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**



DURATION OF INUNDATION UNDER POST-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
10% AEP


Figure A.21




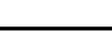




 100 0 100 200 300 m

 Scale: 1:10,000



- PROJECT ELEMENTS**
-  Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
 -  330kV Switching Stations and Identifier
 -  500kV Transmission Line Corridor
 -  330kV Transmission Line Corridor

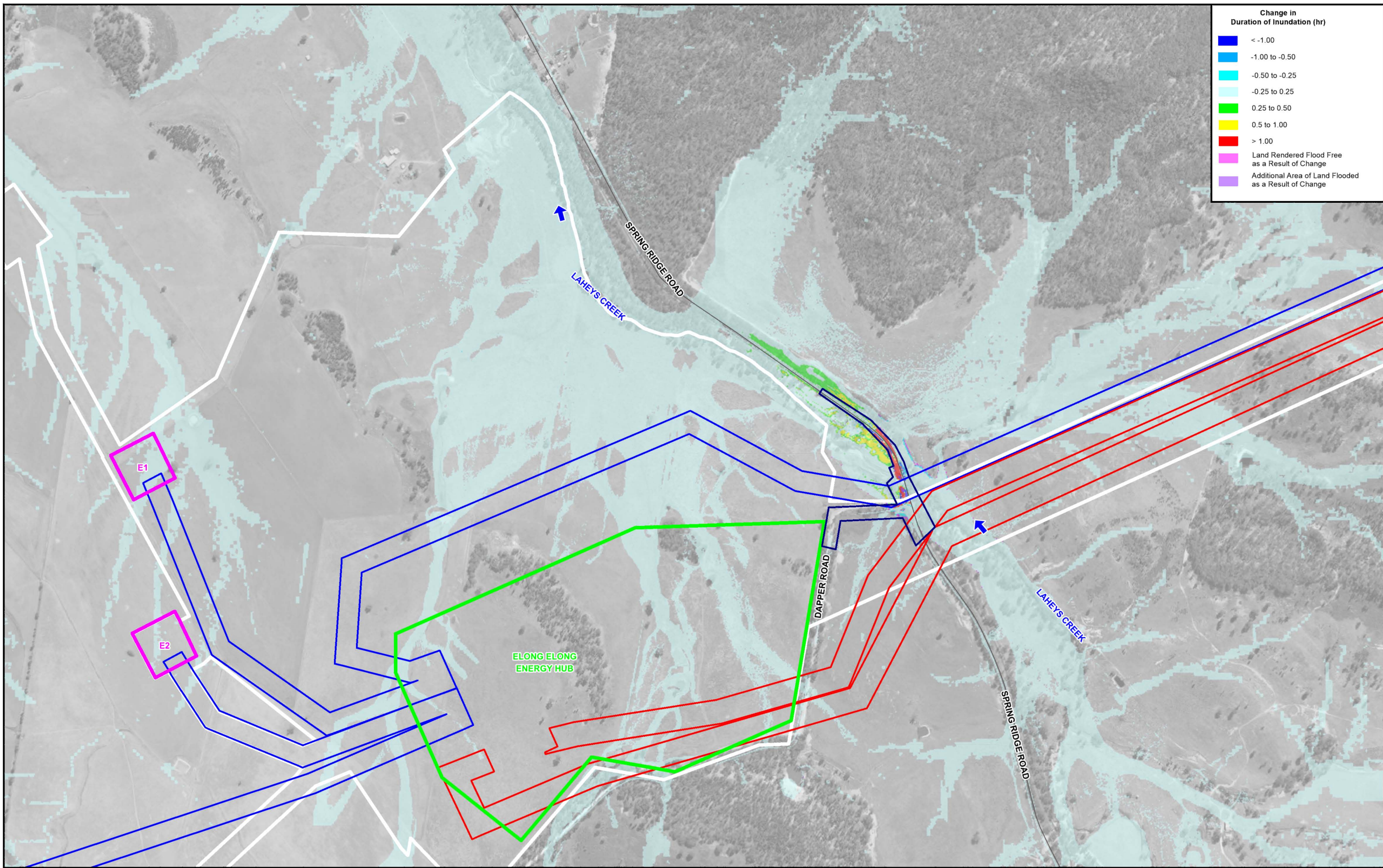
- LEGEND**
-  Local Government Area (LGA) Boundary
 -  Extent of Local Road Upgrade

-  Roads
-  Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.22

DURATION OF INUNDATION UNDER POST-PROJECT CONDITIONS IN VICINITY OF SPRING RIDGE ROAD UPGRADE
1% AEP



Change in Duration of Inundation (hr)	
Dark Blue	< -1.00
Light Blue	-1.00 to -0.50
Cyan	-0.50 to -0.25
Light Green	-0.25 to 0.25
Green	0.25 to 0.50
Yellow	0.5 to 1.00
Red	> 1.00
Pink	Land Rendered Flood Free as a Result of Change
Purple	Additional Area of Land Flooded as a Result of Change

Scale: 1:10,000

PROJECT ELEMENTS

- Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
- M1 330kV Switching Stations and Identifier
- 500kV Transmission Line Corridor
- 330kV Transmission Line Corridor

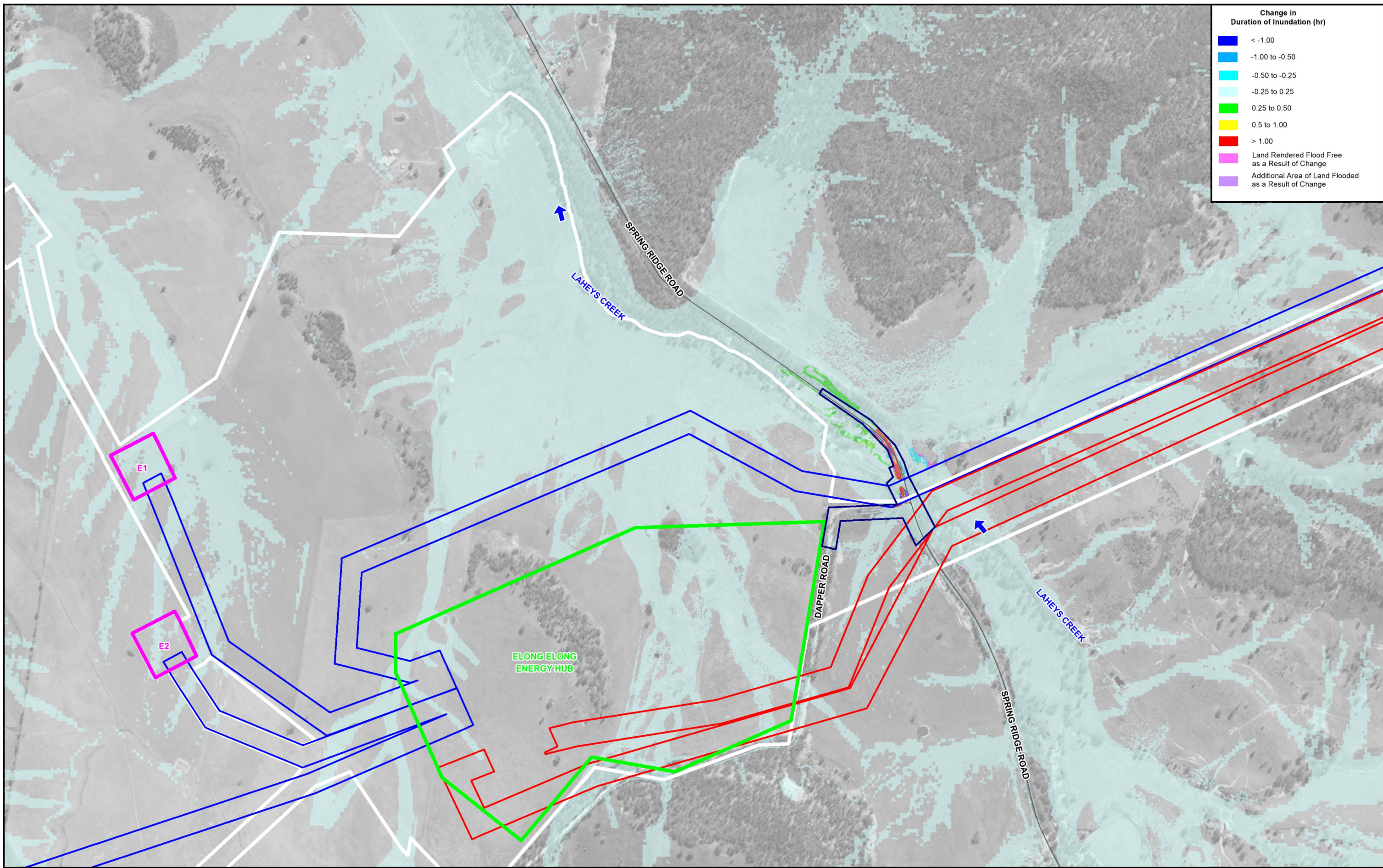
LEGEND

- Local Government Area (LGA) Boundary
- Extent of Local Road Upgrade
- Roads
- Two-Dimensional Model Boundary

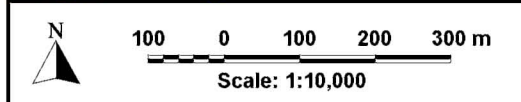
**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.23

IMPACT OF PROPOSED BRIDGE OVER LAHEYS CREEK AT SPRING RIDGE ROAD ON DURATION OF INUNDATION
10% AEP



Change in Duration of Inundation (hr)	
Dark Blue	< -1.00
Blue	-1.00 to -0.50
Cyan	-0.50 to -0.25
Light Cyan	-0.25 to 0.25
Green	0.25 to 0.50
Yellow	0.5 to 1.00
Red	> 1.00
Pink	Land Rendered Flood Free as a Result of Change
Purple	Additional Area of Land Flooded as a Result of Change



PROJECT ELEMENTS	
Green outline	Energy Hubs, New Wollar Switching Station and Neeleys Lane Construction Support Site
Pink square M1	330kV Switching Stations and Identifier
Red outline	500kV Transmission Line Corridor
Blue outline	330kV Transmission Line Corridor

LEGEND	
Thick blue line	Local Government Area (LGA) Boundary
Thin blue line	Extent of Local Road Upgrade
Thin grey line	Roads
Dashed grey line	Two-Dimensional Model Boundary

**CENTRAL WEST ORANA RENEWABLE ENERGY ZONE
EIS AMENDMENT REPORT - FLOODING**

Figure A.24



**IMPACT OF PROPOSED BRIDGE OVER LAHEYS CREEK AT SPRING RIDGE ROAD ON DURATION OF INUNDATION
1% AEP**