



**FLOOD IMPACT ASSESSMENT
ADDENDUM TECHNICAL REPORT**

**HUNTER TRANSMISSION PROJECT
AMENDMENT REPORT**

February 2026

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TABLE OF CONTENTS

	Page No.
SUMMARY	S1
1 INTRODUCTION	1
1.1 Background	1
1.2 The project (as exhibited)	1
1.3 The project (as amended)	2
1.4 Purpose and structure of this report	7
2 DESCRIPTIONS OF AMENDMENTS AND REFINEMENTS	8
3 ASSESSMENT METHODOLOGY	16
3.1 Assessment of the amended project	16
3.2 Updates to the assessment presented in the EIS based on additional information	16
4 EXISTING ENVIRONMENT	21
4.1 Catchment overview	21
4.2 Description of existing flood behaviour	22
5 CONSTRUCTION IMPACT ASSESSMENT	25
5.1 Potential flood risk at construction work areas of the amended project	25
5.1.1 Temporary worker accommodation	25
5.1.2 Underground cabling	26
5.1.3 Construction ancillary facilities	30
5.1.4 New transmission line construction	30
5.1.5 Construction of new and upgraded access tracks	30
5.1.6 Local road upgrades	31
5.2 Potential impacts of construction activities on flood behaviour	32
6 OPERATIONAL IMPACT ASSESSMENT	69
6.1 Potential flood risk to the project and its impact on flood behaviour	69
6.1.1 Updated flood impact assessment for the Eraring substation extension	70
6.1.2 New 500 kV transmission line corridor	73
7 MANAGEMENT OF IMPACTS	80
7.1 Environmental management	80
7.2 Mitigation measures	80
8 REFERENCES	85

LIST OF FIGURES

Figure 2.1	Project overview
Figure 2.2	Key project elements
Figure 4.1 (6 sheets)	Catchment plan and existing drainage features

Continued over page

LIST OF FIGURES (cont'd)

Figure 4.2 (6 sheets)	Flooding and drainage patterns - Pre-project conditions – 10% AEP
Figure 4.3 (6 sheets)	Flooding and drainage patterns - Pre-project conditions – 1% AEP
Figure 4.4 (6 sheets)	Flooding and drainage patterns - Pre-project conditions – PMF
Figure 4.5a	Flooding and drainage patterns - Pre-project conditions – Bayswater South switching station – 10% AEP
Figure 4.5b	Flooding and drainage patterns - Pre-project conditions – Bayswater South switching station – 1% AEP
Figure 4.5c	Flooding and drainage patterns - Pre-project conditions – Bayswater South switching station – PMF
Figure 4.6a	Flooding and drainage patterns - Pre-project conditions – Olney switching station – 10% AEP
Figure 4.6b	Flooding and drainage patterns - Pre-project conditions – Olney switching station – 1% AEP
Figure 4.6c	Flooding and drainage patterns - Pre-project conditions – Olney switching station – PMF
Figure 4.7a	Flooding and drainage patterns - Pre-project conditions – Eraring substation extension – 10% AEP
Figure 4.7b	Flooding and drainage patterns - Pre-project conditions – Eraring substation extension – 1% AEP
Figure 4.7c	Flooding and drainage patterns - Pre-project conditions – Eraring substation extension – PMF
Figure 5.1 (6 sheets)	Indicative flood extents in vicinity of proposed construction work areas
Figure 6.1a	Flooding and drainage patterns - Post-project conditions – Eraring substation extension – 10% AEP
Figure 6.1b	Flooding and drainage patterns - Post-project conditions – Eraring substation extension – 1% AEP
Figure 6.1c	Flooding and drainage patterns - Post-project conditions – Eraring substation extension – PMF
Figure 6.2a	Impact of project on flooding and drainage patterns in vicinity of Eraring substation extension – 10% AEP
Figure 6.2b	Impact of project on flooding and drainage patterns in vicinity of Eraring substation extension – 1% AEP
Figure 6.2c	Impact of project on flooding and drainage patterns in vicinity of Eraring substation extension – PMF

ANNEXURES

- A. Figures showing the layout of the hydrologic and hydraulic models
- B. Figures showing the indicative extent and depth of inundation across the project during 0.2% and 0.05% AEP events
- C. Figures showing the indicative extent and depth of inundation in the vicinity of the Bayswater South switching station, Olney switching station and Eraring substation extension during 0.2% and 0.05% AEP event
- D. Figures showing maximum flow velocities and durations of inundation in the vicinity of the Bayswater South switching station, Olney switching station and Eraring substation extension during 10% and 1% AEP events
- E. Figures showing the hazard vulnerability classification and hydraulic categorisation of flooding along the project impact area, and in the vicinity of the Bayswater South switching station, Olney switching station and Eraring substation extension during a 1% AEP event

NOTE ON FLOOD FREQUENCY TERMINOLOGY

The frequency of flood events is generally referred to in terms of their Annual Exceedance Probability (AEP) or Average Recurrence Interval (ARI). For example, for a flood magnitude having five per cent AEP, there is a five per cent probability (or 1 in 20 chance) that there would be floods of greater magnitude each year. As another example, for a flood having a 20 year ARI, there would be floods of equal or greater magnitude once in twenty years on average. The approximate correspondence between these two systems is:

Annual Exceedance Probability (AEP) per cent	Average Recurrence Interval (ARI) years
0.05	2,000
0.1	1,000
0.2	500
0.5	200
1	100
5	20
10	10
20	5
50	2
1 EY ⁽¹⁾	1
2 EY ⁽¹⁾	0.5

1. Floods more frequent than 50% AEP are expressed in terms of the number of exceedances per year (EY).

In this report, the frequency of flood events generated by runoff from the catchments within the study area (i.e. catchment flooding) is referred to in terms of their AEP, for example a 1% AEP flood.

This report also refers to the Probable Maximum Flood (PMF). This flood occurs as a result of the Probable Maximum Precipitation (PMP) on the catchments within the study area. The PMP is the result of the optimum combination of the available moisture in the atmosphere and the efficiency of the storm mechanism as regards rainfall production. The PMP is used to estimate PMF discharges using a catchment hydrologic model that simulates the conversion of rainfall to runoff. The PMF is defined as the upper limiting value of floods that could reasonably be expected to occur and defines the extent of flood prone land (i.e. the floodplain).

GLOSSARY OF TERMS AND ABBREVIATIONS

Term	Meaning
Access roads	Permanent access roads to substations and switching stations.
Access tracks	Temporary and permanent tracks used to access the project. Refer to <i>Appendix A (Updated project description)</i> of the amendment report for further details.
AEP	Annual exceedance probability. The chance of a rainfall or a flood event exceeding a nominated level in any one year, usually expressed as a percentage. For example, if a peak flood level has an AEP of five per cent, it means that there is a five per cent chance (that is one-in-20 chance) of being exceeded in any one year. The frequency of floods is generally referred to in terms of their AEP or ARI. In this report the frequency of floods generated by runoff from the study catchments is referred to in terms of their AEP, for example a 1% AEP flood.
Afflux	Increase/decrease in water level resulting from a change in conditions. The change may relate to the watercourse, floodplain, flow rate, tailwater level, etc.
AHD	Australian height datum. A common national surface level datum approximately corresponding to mean sea level.
Amended project	The amendments and refinements to the project as described in the EIS (inclusive of clarifications for the exhibited project). The amendments to the project include: • realignment of the transmission line at Mount Thorley • realignment of the transmission line at Gouldsville • localised easement widening for conductor swing • changes to substation infrastructure at Eraring • changes to access track locations • minor adjustments to the project impact area for intersection upgrades • adjustments to the proposed access routes for construction • reconfiguration of the construction support sites and worker accommodation facilities • changes to the location of laydown areas within State forests • reconfiguration of the Flick Road emergency helicopter landing area • removal of a stringing site in Olney State Forest • changes to construction plant and equipment types and locations of use. Refinements to the project include: • minor changes at Bayswater substation • changes to the disturbance area at Olney.
Amendment	Change(s) to the project description as included in the exhibited project. As a result, changes to what the proponent is seeking approval for are required, along with an amendment to the CSSI application for the project.
Anabranh	An anabranh is a channel that branches off a watercourse and rejoins it further downstream. Anabranhcs are often referred to as 'floodrunners' or 'breakouts'.

Term	Meaning
ARI	Average recurrence interval. An indicator used to describe the frequency of a rainfall or a flood event, expressed as an average interval in years between events of a given magnitude. For example, over a long period of say 200 years, a flood equivalent to or greater than a 20 year ARI event would occur 10 times. A 20 year ARI flood has a one-in-5 chance of occurrence in any one year. See also AEP.
ARR 1987	Australian Rainfall and Runoff (Institute of Engineers Australia (IEAust) 1987).
ARR 2019	Australian Rainfall and Runoff (Geosciences Australia (GA) 2019).
Asset protection zone	A bushfire protection measure, providing a buffer around assets. Asset protection zones are designed and maintained to reduce fuel near assets, and to reduce the potential for damage from direct flame contact, smoke, radiant heat, and ember attack. The dimensions for asset protection zones are designed in line with Planning for Bush Fire Protection: A guide for councils, planners, fire authorities and developers (NSW RFS, 2019), and are determined by surrounding vegetation type, slope, and the type of asset/development.
Bayswater Power Station	Existing power station at Bayswater owned by AGL.
Bayswater South switching station	A new switching station that would be constructed south of Bayswater Power Station.
BoM	Bureau of Meteorology.
Box culvert	A culvert of rectangular cross section.
Catchment	The land area draining through the mainstream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
CEMP	Construction environmental management plan
Clearing area	The area where vegetation would be cleared by the project.
Climate change	A change in the state of the climate that can be identified (for example by statistical tests) by changes in the mean and/or variability of its properties, and that persists for an extended period of time, typically decades or longer (IPCC 2007).
Clarification	Additional information developed as a result of ongoing design and construction methodology development, submissions received during exhibition of the EIS, minor errors identified in the EIS, or further assessment that has been undertaken since exhibition of the EIS. Clarifications for the project include: - assessment of impacts from use of Pokolbin Mountains Road - assessment of potential contamination impacts at Eraring Power Station - description of intersection upgrades in the EIS.
Climate projection	A climate projection is the simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases and aerosols, generally derived using climate models. Climate projections are distinguished from climate predictions by their dependence on the emission/concentration/radiative forcing scenario used, which in turn is based on assumptions concerning, for example, future socio-economic and technological developments that may or may not be realised (IPCC 2007).
Construction impact area	The area that would be directly impacted by the construction of the project, including (but not limited to) transmission towers and lines, stringing sites, access roads, access tracks, substations, switching stations, adjustments and upgrades to existing lines, communications infrastructure, temporary worker accommodation, construction support sites, laydown areas and utility adjustments.

Term	Meaning
Construction access routes	Roads used by construction vehicles (light and heavy).
Construction support site	An area used as the base for construction activities, usually for the storage of plant/equipment and materials, processing facilities (concrete batching, aggregate crushing, grinding and screening), maintenance facilities/workshops, staff facilities, firefighting equipment, helicopter landing pad and support facilities, access and parking, and wastewater treatment. Some construction support sites would also include temporary worker accommodation. Construction support sites are discussed in section A3.5 of <i>Appendix A (Updated project description)</i> of the amendment report.
Critical State significant infrastructure (CSSI)	Infrastructure that is declared to be critical State significant infrastructure under section 5.13 of the EP&A Act.
Critical State significant infrastructure (CSSI) application area	The critical State significant infrastructure (CSSI) application for the HTP covers 5 local government areas (Muswellbrook, Singleton, Cessnock, Central Coast and Lake Macquarie).
Cumulative impact	The combined impacts of the project on a matter with other relevant future projects.
DCP	Development control plan.
DCCEEW	Department of Climate Change, Energy, the Environment and Water.
DECC	Department of Environment and Climate Change (now DCCEEW).
DECCW	Department of Environment, Climate Change and Water (now DCCEEW).
Detailed design	The detailed design of the project, including construction methodology. This term represents the next phase of project development and will further develop the design and construction methodology of the project considering: - the performance outcomes as recommended in the EIS - mitigation measures as recommended in the EIS - any conditions of approval.
DIPNR	Department of Infrastructure, Planning and Natural Resources (now DCCEEW).
Discharge	The rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m ³ /s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving (e.g. metres per second [m/s]).
Disturbance area	This is a subset of the project impact area and is used primarily to assess potential impacts on biodiversity values in Technical Report 1 (Biodiversity development assessment report) of the EIS. Includes the following categories: - Disturbance area A - Disturbance area A (centreline) - Disturbance area B - Disturbance area HZ
DPE EES	Department of Planning and Environment – Environment Energy and Science (now DCCEEW).

Term	Meaning
Drainage	Natural or artificial means for the interception and removal of surface or subsurface water.
DRAINS	A computer simulation program which converts rainfall patterns to stormwater runoff and generates discharge hydrographs. These hydrographs can then be routed through networks of piped drainage systems, culverts, storages and open channels using the DRAINS software to calculate hydraulic grade lines and analyse the magnitude of overflows. Alternatively, discharge hydrographs generated by DRAINS can be used as inflows to alternative hydraulic models (such as the TUFLOW two-dimensional hydraulic modelling software) to calculate water surface levels and flooding patterns.
Earthworks	All operations involving the loosening, excavating, placing, shaping and compacting of soil or rock.
EIS	Environmental Impact Statement.
Embankment	An earthen structure where the road (or other infrastructure) is located above the natural surface.
Emergency management	A range of measures to manage risks to communities and the environment. In the flood context it may include measures to prevent, prepare for, respond to and recover from flooding.
EMS	Environmental Management Strategy.
EnergyCo	The Energy Corporation of New South Wales constituted by section 7 of the NSW <i>Energy and Utilities Administration Act 1987</i> as the NSW Government-controlled statutory authority appointed as the infrastructure planner under the NSW <i>Electricity Infrastructure Investment Act 2020</i> responsible for the delivery of NSW's REZs. The proponent for the HTP.
Eraring Power Station	Existing power station at Eraring operated by Origin Energy.
Eraring substation extension	Proposed extension of the existing substation to the west of the Eraring Power Station that is operated by Transgrid.
Erosion	A natural process where wind or water detaches a soil particle and provides energy to move the particle.
Exclusion zone	A safe clearance area around the transmission line and towers to protect public safety, the network and to maintain access to the asset. It delineates the area where most land use activities are prohibited. The zone is located within the easement and is defined according to the operational voltage and design of the infrastructure.
Exhibited project	The project as described in the publicly exhibited EIS.
Flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunamis.
Flood affectation	The extent to which a property or area of land is affected by flooding.
Flood fringe area	The remaining area of flood prone land after floodway and flood storage areas have been defined.
Flood immunity	Relates to the level at which a particular structure would be clear of a certain flood event.
Flood prone land	Land susceptible to flooding by the Probable Maximum Flood. Note that the flood prone land is synonymous with flood liable land.

Term	Meaning
Flood storage area	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas.
Floodplain	Area of land which is subject to inundation by floods up to and including the probable maximum flood event (i.e. flood prone land).
Floodplain Risk Management Plan	A management plan developed in accordance with the principles and guidelines in the <i>Floodplain Development Manual</i> (FDM), (DIPNR 2005). Usually includes both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defined objectives.
Floodway area	Those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.
Flow velocity	A measure of how fast how fast water is moving, for example, metres per second (m/s).
FPA	Flood Planning Area. The area of land below the Flood Planning Level and thus subject to flood planning controls.
FPLs	Flood Planning Levels. The combination of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans.
FRMM	<i>Floodplain Risk Management Manual</i> (Department of Planning and Environment (DPE) 2023).
Freeboard	A factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. It is usually expressed as the difference in height between the adopted Flood Planning Level and the peak height of the flood used to determine the Flood Planning Level. Freeboard provides a factor of safety to compensate for uncertainties in the estimation of flood levels across the floodplain, such as wave action, localised hydraulic behaviour and impacts that are specific event related, such as levee and embankment settlement, and other effects such as future climate change. Freeboard is included in the Flood Planning Level.
GSDM	Generalised Short Duration Method. A method prescribed by BoM for estimating the Probable Maximum Precipitation for catchments up to 1,000 square kilometres in area.
Hazard	A source of potential harm or a situation with a potential to cause loss. In relation to the <i>NSW Floodplain Development Manual</i> (FDM), (DIPNR 2005) the hazard is flooding which has the potential to cause damage to the community.
Hunter Transmission Project (HTP) or project	The HTP as described in <i>Appendix A (Updated project description)</i> of the amendment report and identified in the overview figures of the amendment report.

Term	Meaning
HTP corridor	Comprises: - the transmission line corridor connecting the Bayswater South switching station to the Olney switching station - the transmission line corridor connecting the Bayswater South switching station to the existing 500 kV transmission line near Bayswater Power Station - the transmission line corridor connecting the Olney switching station to the existing 500 kV transmission line between Eraring and Kemps Creek The HTP corridor is around 140 metres wide. Both the construction impact area and operation impact area are within the HTP corridor.
HTP northern section	Section of the project impact area between Bayswater and Broke, including the Bayswater Power Station, as well as the section of project impact area that runs through the major coal mining complexes in the Upper Hunter Valley, the Mount Thorley Industrial Estate, Singleton Military Area, as well as several rural properties generally on the alluvial floodplains of the Hunter River.
HTP central section	Section of the project impact area between Pokolbin and Corrabare, including the section where it runs through the Pokolbin and Corrabare State Forests and the rural residential areas between these forests at Cedar Creek, Millfield and Laguna.
HTP southern section	Section of the project impact area between Olney and Eraring including the section where it runs through the Watagan and Olney State Forests, the Watagans National Park, the residential areas in Martinsville and Cooranbong, as well as the Eraring Power Station
Hydraulics	The term given to the study of water flow in waterways, in particular the evaluation of flow parameters such as water level and velocity.
Hydrograph	A graph which shows how the discharge or stage/flood level at any particular location varies with time during a flood.
Hydrology	The term given to the study of the rainfall and runoff process; in particular, the evaluation of peak flows, flow volumes and the derivation of discharge hydrographs for a range of floods.
Hyetograph	A graph which shows how rainfall intensities or depths vary with time during a storm burst. A design hyetograph shows the distribution of rainfall over a design storm burst.
IFD	Intensity-Frequency-Duration.
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
Inbank area	The area of a creek or watercourse below its top of bank levels.
Inundation	The spreading of a flood over an area.
IPCC	Intergovernmental Panel on Climate Change.
Laydown areas	Established to allow for flexibility in construction and to minimise the need for vehicle movements to and from the construction support sites. These would act as temporary staging, storage, and complex plant/equipment setup areas. They would also act as traffic control nodes during construction of the HTP.
LGA	Local government area.
LIDAR	Light detection and ranging. A form of aerial survey used to measure ground elevations.
Local drainage	Smaller scale drainage systems in urban areas. Commonly defined as areas where the depth of inundation along overland flow paths is less than 150 millimetres during a 1% AEP storm.

Term	Meaning
m	Metres. Used to define a length.
m AHD	Metres above Australian Height Datum. Used to define an elevation above Australian Height Datum.
m ²	Square metres. Used to define an area.
m ³	Cubic metres. Used to define a volume.
m ³ /s	Cubic metres per second. Used to quantify a flowrate.
Mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.
Major overland flow	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam. Also referred to as overland flooding.
Mathematical/ computer models	The mathematical representation of the physical processes involved in runoff generation and stream flow. These models are often run on computers due to the complexity of the mathematical relationships between runoff, stream flow and the distribution of flows across the floodplain.
Merits based approach	The merits based approach weighs social, economic and environmental impacts of land use options for different flood prone areas together with flood damage, hazard and behaviour implications, and environmental protection and well-being of rivers and floodplains.
Normal depth flow conditions	Normal depth is the depth at which uniform flow will occur in an open channel, assuming a uniform channel profile of constant grade.
Olney switching station	A new switching station that would be constructed in the Olney State Forest.
Operation impact area	The area that would be occupied by permanent components of the project and/or maintained, including transmission line easements, transmission lines and towers, substations, switching stations, communications infrastructure, maintenance facilities, permanent access roads to substations and switching stations and access tracks to the transmission line easement.
Overland flooding	Refer major overland flow.
Peak discharge	The maximum discharge occurring during a flood event.
Peak flood level	The maximum water level occurring during a flood event.
Permanent operational infrastructure	Refers to the areas where the physical infrastructure would be located and the areas where the operational activities would occur. This includes all proposed infrastructure elements such as the proposed transmission line (overhead) and structures, any new switching stations and substation infrastructure or permanent access tracks. For the transmission line, this would also comprise the easements.
PMF	Probable maximum flood. The flood that occurs as a result of the Probable Maximum Precipitation (PMP) on a study catchment. The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically feasible to provide complete protection against this event. The PMF defines the extent of flood prone land (i.e. the floodplain).

Term	Meaning
PMP	Probable maximum precipitation. The PMP is the result of the optimum combination of the available moisture in the atmosphere and the efficiency of the storm mechanism as regards rainfall production. The PMP is used to estimate PMF discharges using a catchment hydrologic model which simulates the conversion of rainfall to runoff.
Pre-construction minor works	Activities with a low potential to impact the environment that may be permissible in advance of construction and without the requirement for an approved construction environmental management plan (CEMP).
Pre-project conditions	Conditions (within the study area) prior to the construction of the Hunter Transmission Project (HTP). This includes details of projects that are presently under construction or will be constructed prior to the Hunter Transmission Project.
Project	The construction and operation of the overall Hunter Transmission Project inclusive of all activities impacting areas within the project impact area.
Project impact area	The area that has been assumed for the purpose of the EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation.
(the) proponent	The Energy Corporation of NSW (EnergyCo)
PRM	Probabilistic rational method.
Probability	A statistical measure of the expected chance of flooding (see annual exceedance probability).
Renewable Energy Zone (REZ)	A geographic area identified and declared by the NSW Government as a Renewable Energy Zone.
RFFEM	Regional flood frequency estimation model.
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of the <i>NSW Floodplain Development Manual</i> (DIPNR 2005) it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
Riverine flooding	Flooding that occurs when flow in a river surcharges its banks and inundates its overbank areas. In the context of this report, riverine flooding refers to flooding from the Hunter River.
Runoff	The amount of rainfall which actually ends up as stream flow, also known as rainfall excess.
Scour	The erosion of material by the action of flowing water.
SEARs	Secretary's Environmental Assessment Requirements and specifications for an environmental assessment prepared by the Secretary of the NSW Department of Planning and Environment under Division 4.1 of the Environmental Planning and Assessment Act 1979 (NSW).
NSW SES	NSW State Emergency Services.
Spoil	Surplus excavated material.
SSP	Shared Socioeconomic Pathway. SSPs are climate change scenarios of projected socioeconomic global changes. The SSPs are named according to the radiative forcing values (W m ⁻²) in the year 2100 relative to pre-industrial values.

Term	Meaning
Stockpile	Temporarily stored materials such as soil, sand, gravel and spoil/waste.
Stringing sites	Used for the preparation, assembly and operation of stringing equipment to connect the transmission line to the towers. Stringing sites would be positioned along the construction impact area. On other transmission projects, they may be referred to as 'brake and winch' sites.
Substation	A facility used to increase or decrease voltages between incoming and outgoing lines (e.g. 330 kV to 500 kV)
Surcharge	Overflow from a creek, waterbody, overland flow or drainage system.
Surface water	Water flowing or held in streams, rivers and other water bodies in the landscape.
Switching station	A facility used to connect two or more distinct transmission lines of the same designated voltage.
Temporary worker accommodation	Temporary accommodation that would be erected and used during construction to house the construction workforce. Worker accommodation would be located at some construction support sites.
Transgrid	Preferred network operator of the HTP.
Transmission line easement	An area surrounding and including the transmission lines which is a legal proprietary right and allows for ongoing access and maintenance of the lines. Landowners can typically continue to use most of the land within transmission line easements, subject to some restrictions for safety and operational reasons.
Transmission tower	For 500kV transmission lines, this is typically a free-standing steel lattice tower structure (suspension or tension tower). Transmission towers for the HTP would generally be up to 85 metres high.

SUMMARY

S1 Overview

The potential flood related impacts of the exhibited project during its construction and operation were assessed in Technical Report 12 of the Environmental Impact Statement (EIS). The key findings of this assessment were summarised in Chapter 19 (Flooding) 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 addendum flood impact assessment report.

S2 Assessment approach

The flood impact assessment (FIA) for the amended project was carried out in accordance with the assessment criteria and standards set out in Section 3.3 of Technical Report 12 of the EIS. The approach to defining flood behaviour under pre-project conditions and to assess each of the proposed amendments followed the same approach adopted for the FIA of the exhibited project that is set out in Section 3.4 of Technical Report 12 of the EIS.

Subsequent to the preparation of the FIA for the EIS, Origin Energy provided details of the piped drainage network that controls runoff from areas draining to and through the Eraring Power Station. These details have been used to update the flood models that have been used to define flood behaviour in the vicinity of the Eraring substation under pre- and post-project conditions and to assess the impact of the proposed Eraring substation extension on flood behaviour. The assessment of flood behaviour under post-project conditions was based on a concept design of the Eraring substation extension that was prepared by Transgrid (the operators of the existing Eraring substation) and presented in the EIS.

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 exhibited project that was presented in the EIS to identify the proposed changes and the associated scope of updates that would be required to the FIA presented in the EIS. **Table 3.1** provides a summary of this review along with the approach that was adopted to assess the flood related impacts of each of the proposed amendments to the project. **Table 3.1** also identifies the proposed amendments where no further assessment was considered necessary on the basis that they would have no material impact on the FIA presented in the EIS for the exhibited project.
- ii. A review was carried out to confirm whether any changes were necessary to the definition of flood behaviour under present day (ie. pre-project conditions) to cover the scope of the proposed changes. **Section 4** of this addendum technical report provides an overview of flood behaviour under pre-project conditions as it relates to the amended project.
- iii. The potential impacts of the amended project during its construction and operation were assessed and compared against those based on the exhibited project. **Sections 5 and 6** of this addendum technical report present the findings of the assessment of construction and operational related flood impacts of the amended project, respectively).
- iv. The flood mitigation measures set out in Technical Report 12 of the EIS were reviewed to identify whether any additional measures were required in order to mitigate the impact of the amended project on flood behaviour. An updated set of mitigation measures are presented in **Section 7** of this addendum technical report.

S3 Existing environment

While the construction and operational footprints of the amended project have changed in some areas, the extent of the amended project still lies within the study area that is presented in Technical Report 12 of the EIS. The catchment description that is presented in Sections 4.1 and 4.2 of Technical Report 12 is therefore also applicable to the amended project.

As a result of the change in alignment of the transmission line corridor and associated access roads at Mount Thorley, the amended project now crosses Doctors Creek at three locations where it runs along the southern overbank of the Hunter River immediately to the west (upstream) of its confluence with Loder Creek. As noted in Technical Report 12 of the EIS, Doctors Creek is a tributary of Loder Creek, which in turn drains to the Hunter River.

S4 Assessment of potential impacts during construction

Potential flood risk to construction activities under the amended project

In addition to the construction activities that are described in Section 5.1 of Technical Report 12 of the EIS, the amended project would also include:

- The reconfiguration of the Wollombi Road construction support site to include temporary worker accommodation, in addition to those proposed at the Hebden Road and Freemans Drive construction support sites. Under the amended project it is no longer proposed to include temporary worker accommodation at the Gouldsville Road construction support site.
- Areas within the construction impact area of the exhibited project in the vicinity of the Bayswater Switching Station and Eraring Substation Extension where trenching would be required to install optical ground wire and communications cable.

Temporary worker accommodation

Compared to offices and staff amenities, temporary worker accommodation located on the floodplain has the added risk to workers should a flood occur overnight. To manage this risk, the temporary buildings for worker accommodation would be located a minimum 0.5 metres above the peak 1% Annual Exceedance Probability (AEP) flood level, which is consistent with the Flood Planning Levels (FPLs) set out in the Development Control Plans of the relevant councils (being Muswellbrook, Cessnock and Lake Macquarie).

Plates 5.1, 5.2 and 5.3 in Section 5.1 of this report show that there is land at each of the four construction support sites where temporary worker accommodation is proposed that lies outside the 1% AEP flood extent and which would be suitable for the provision of temporary buildings for accommodation.

Detailed planning of the layout of the construction support sites and temporary worker accommodation will also need to consider how safe evacuation routes are provided for construction workers during a flood event.

Measures aimed at managing the risk of flooding to construction support sites and temporary worker accommodation, including flood emergency response procedures are provided in **Chapter 7**.

Underground cabling

While the activities that were identified in the EIS include trenching for the installation of cables, no specific areas were identified. Under the amended project, the following three areas have been identified where trenching would be required to install optical ground wire and communications cable:

- Between the Bayswater South Switching Station and Bayswater Substation for the installation of communications cable (Bayswater underground cabling area).
- Between existing 500kV transmission towers at a location approximately 2 kilometres to the west of the Eraring substation (Eraring west underground cabling area).
- Between existing 500kV transmission towers at a location immediately adjacent to the Eraring substation (Eraring east underground cabling area).

The assessment presented in **Section 5.1** of this report found that all three underground cabling areas cross drainage lines and channels that would be inundated during rainfall events. The installation of cabling across these drainage lines and channels would be staged and timed to manage the conveyance of flow through and around the work area, whilst also managing the release of sediments into the receiving drainage lines.

The risk of inundation to the work area and the release of sediments would be managed in accordance with the erosion and sediment control measures set out in Technical Report 10 (Surface water impact assessment) of the EIS.

Construction ancillary facilities

The assessment found that:

- i. the flood affectation to the five construction support sites would be the same as the exhibited project
- ii. of the two laydown areas that would be relocated under the amended project:
 - a. laydown area L10a (Trig Road and Flick Road) is not impacted by mainstream flooding or major overland flow, but would be inundated by local catchment runoff from upslope areas to its east during frequent rainfall events. Depths of inundation across the site would typically be less than 0.1 m during a 1% AEP event and could therefore be managed through the implementation of standard drainage controls, such as diversion drains around the laydown area.
 - b. laydown area L12a (Wollombi Forest Road and Burma Road) is located on a ridge and is therefore not impacted by mainstream or local catchment flooding.
- iii. of the two helipad sites that would be relocated under the amended project:
 - a. helipad site H1a (Trig Road and Flick Road) is not impacted by mainstream flooding or major overland flow, but would be inundated by local catchment runoff from upslope areas to its east during frequent rainfall events. Depths of inundation across the site would typically be less than 0.1 m during a 1% AEP event and could therefore be managed through the implementation of standard drainage controls, such as diversion drains around the helipad site.
 - b. Helipad site H2a (Wollombi Forest Road and Burma Road) is located on a ridge and is therefore not impacted by mainstream or local catchment flooding.

The above summary shows that the flood affectation of the construction ancillary facilities under the amended project is not significantly different to the exhibited project.

New transmission line construction

Under the amended project, the HTP northern transmission line work area would be adjusted to suit the proposed realignment of the new transmission line at Gouldsville and Mount Thorley.

The assessment presented in **Section 5.1** of this report found that the proposed realignment of the new transmission line corridor at Gouldsville and Mount Thorley would not significantly alter the flood affectation and therefore the flood risks associated with the construction of the new transmission line compared to the exhibited project.

Construction of new and upgraded access tracks

Under the amended project, the alignment and extent of upgraded and new tracks that are proposed to access the construction impact area would be revised.

The assessment that is presented in **Section 5.1** of this report found that there would be a slight reduction in the total length of track that would be inundated by floodwater, while there would also be one less creek crossing due to the removal of the proposed crossing of Saddlers Creek. The extent and depth of inundation to access tracks due to a 1% AEP Hunter River flood would be similar to the exhibited project. On this basis, the measures that are set out Section 7 of Technical Report 12 of the EIS to manage the flood related impacts of the new and upgraded access tracks would also be applicable to the amended project and have therefore been incorporated into the revised set of environmental management measures set out in **Section Error! Reference source not found.** of this report.

Local road upgrades

The assessment found that the change in footprint associated with the revisions to intersection upgrades would have no significant effect on the level of flood affectation when compared to the exhibited project. Consistent with the exhibited project, all locations identified for local road upgrades under the amended project have the potential to be inundated by floodwater to varying degrees. As identified in Technical Report 12 of the EIS, further flood assessment would be undertaken during detailed design, the scope of which would be informed by the potential flood affectation, as well as the nature and extent of the upgrades at each location, once confirmed.

As there is no change in the scope of local road upgrades under the amended project, the potential impacts of the local road upgrades that are described in Section 5.1.8 of Technical Report 12 of the EIS would also be applicable to the amended project. The measures that are set out in the EIS to manage the flood related impacts of the local road upgrades project have therefore been incorporated into the revised set of environmental management measures set out in **Section Error! Reference source not found.** of this report.

Potential flood risk to construction activities under the amended project

The assessment that is presented in **Section 5.2** of this report found that, based on the amended project:

- i. the potential flood impacts at the five construction support sites would be the same as the exhibited project.
- ii. potential impacts of the twelve laydown areas would be similar to the exhibited project

- iii. construction activities within the newly proposed locations for helipad sites within the Trig Road and Flick Road laydown area and the Wollombi Forest Road and Burma Road laydown area would have only a minor impact on flood behaviour given the minor nature of overland flow that is presently conveyed through these sites
- iv. construction activities associated with the Bayswater South and Olney switching stations and the Eraring substation extension all have the potential to impact on local catchment flooding in the various overland flowpaths and drainage lines that they cross, which would be similar to the exhibited project
- v. construction activities along the new and existing transmission line corridors have the potential to obstruct the conveyance of flow in the various creeks, watercourses and local drainage lines that they cross, which would be similar to the exhibited project
- vi. the crossing of watercourses by access tracks that would be required to construct the new 500 kV transmission lines or upgrade and realign the existing transmission lines have the potential to obstruct the conveyance of flow, which in turn may impact on the extent and depth of inundation and flow velocities in the watercourses and their overbank areas. Potential impacts would be similar to the exhibited project.

Based on the above findings, the measures that are set out Section 7 of Technical Report 12 of the EIS to manage the impact of construction activities on flood behaviour would also be applicable to the amended project.

S5 Assessment of potential impacts during operation

Under the amended project:

- there would be no change in the general layout of:
 - the Bayswater South and Olney switching stations, as well as the Eraring substation extension
 - the sections of existing 500 kV transmission line corridor to the north and south of the new 500 kV transmission line
 - the sections of existing 330 kV transmission line corridor to the east of the Bayswater South switching station and within the western portion of the Singleton Military Area
- there would be changes to the configuration of towers and access roads along sections of the new 500 kV transmission line corridor at Olney, Mount Thorley and Gouldsville.

The following sections provides a summary of the key findings of:

- an updated flood impact assessment for the Eraring substation extension based on additional details that were provided by Origin Energy on the drainage system in the vicinity of the Eraring Power Station
- a flood impact assessment of the proposed changes to the configuration of towers and access roads along the sections of the new 500 k V transmission line corridor at Olney, Mount Thorley and Gouldsville.

Updated flood impact assessment for the Eraring substation extension

The updated assessment that is presented in **Section 6.1.1** of this report found that:

- for design storms up to 1% Annual Exceedance Probability (AEP) in intensity, the impact of the proposed Eraring substation extension on flood behaviour would be similar to or less than those presented in Technical Report 12 of the EIS
- during the Probable Maximum Flood (PMF), while impacts are similar to or less than those based on the assessment that was presented in Technical Report 12 of the EIS, there would still be an increase in the depth of inundation along an overland flowpath where it runs immediately adjacent to the north western corner of the Eraring Power Station.

As noted in the EIS, consultation would continue to be undertaken with Origin Energy during the development of the detailed design to confirm the impact that an increase in the depth of inundation could have on the operation of the Eraring Power Station and to inform the scope of mitigation measures that may be required

New 500 kV transmission line corridor

Permanent infrastructure located within the new 500kV transmission line corridor would comprise the transmission lines supported on a series of transmission line towers, as well as existing and new access tracks that would be used to access the towers for routine inspection and maintenance of the transmission line infrastructure. The findings of the assessment of changes to the alignment of access roads under the amended project are presented in **Section 5.2** of this report and summarised in **Section S4**.

The flood mapping that is presented in Section 4.3 of Technical Report 12 of the EIS was used to inform the selection of the route of the new transmission line corridor, as well as the locations of transmission line towers of the exhibited project. This flood mapping has also been used to inform the changes in the alignment of the new transmission line corridor and locations of transmission line towers as part of the amended project.

The assessment that is presented in **Section 6.1.2** of this report found that as a result of the proposed changes in tower locations:

- at Olney and Gouldsville, the depth and velocity of flooding at tower locations would be similar to the exhibited project
- at Mount Thorley:
 - the number of towers impacted by Hunter River flooding would be the same as the exhibited project
 - the overall level of flooding would be similar, with increases in flooding occurring at some towers (such as towers T120, T121 and T124) and decreases in flooding occurring at others (such as towers T119 and T122).

Consistent with the exhibited project, the assessment also found that there is a significant difference in the depth and velocity of Hunter River flooding at Mount Thorley during a 1% AEP and the PMF, which highlights the need to consider floods larger than the 1% AEP flood when assessing the impact of flooding on the new 500kV transmission line and the consequences of damage to the tower structures. On this basis the following measures set out in Technical Report 12 of the EIS would still be applicable to the amended project:

- Scour protection would be provided at towers where there is a potential for scour to occur during a 1% AEP flood.
- Towers located on the floodplain (i.e. within the PMF) would be structurally designed to manage the risk of failure of the transmission line network due to damage from flooding.

S6 Revised management measures based on the amended project

Table 7.1 in **Section 7** of this report sets out the revised environmental management measures that would be implemented to manage flood related impacts during the construction and operation of the amended project.

1 INTRODUCTION

1.1 Background

The Hunter Transmission Project (HTP, the project) involves the construction of a new overhead 500 kilovolt (kV) transmission line of around 110 kilometres connecting the existing 500 kV transmission line at Bayswater to the existing 500 kV transmission line in the Olney State Forest near Eraring in the Hunter region of New South Wales (NSW).

Due to its strategic importance, the NSW Minister for Planning and Public Spaces has declared the project to be critical State significant infrastructure (CSSI) under the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act).

An EIS was prepared in accordance with the requirements of Part 5, Division 5.2 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act). The EIS was placed on public exhibition by the NSW Department of Planning, Housing and Infrastructure (DPHI) for a period of 28 days, between 27 August 2025 and 24 September 2025.

EnergyCo has proposed amendments and refinements to the exhibited project. The amendments and refinements respond to stakeholder and contractor feedback on the project, as well as provide functional improvements to the design and construction methodology of the project. The proposed amendments and refinements take into account submissions received during the public exhibition of the EIS and ongoing design and construction methodology development since the EIS was exhibited. These amendments and refinements have been described and considered in relevant impact assessments.

1.2 The project (as exhibited)

The key elements of the project, as exhibited in the EIS, include:

- a new overhead 500 kV double circuit transmission line of around 110 kilometres
- two new switching stations (Bayswater South and Olney)
- upgrades to the existing Bayswater and Eraring substations
- adjustments and upgrades to existing transmission lines
- property adjustment works to facilitate access to the transmission lines and switching stations
- utility adjustments required for the construction of the transmission network infrastructure
- ancillary works to support construction including road upgrades, establishment of new access tracks and upgrades to existing access tracks, construction support sites (some with temporary worker accommodation), and other construction facilities such as laydown areas.

The HTP corridor runs mostly through power station, mining and government land between Bayswater and Broke. It then traverses the Pokolbin, Corrabare, Watagan and Olney State forests where it joins the existing 500 kV transmission line running between Eraring and Kemps Creek in western Sydney.

The project exhibited in the EIS is referred to in this addendum technical report as the 'exhibited project'.

1.3 The project (as amended)

The proposed amendments and refinements to the exhibited project are collectively referred to in this addendum technical report as the ‘amended project’.

The key proposed amendments include:

- realignment of the transmission line at Mount Thorley
- realignment of the transmission line at Gouldsville
- localised easement widening for conductor swing
- changes at Eraring substation
- changes to access tracks
- minor adjustments to the project impact area for intersection upgrades
- adjustments to the proposed access routes for construction
- reconfiguration of construction support sites and temporary worker accommodation facilities
- changes to laydown areas within State forests
- reconfiguration of the Flick Road emergency helicopter landing area
- removal of stringing site in Olney State Forest
- changes to construction plant and equipment types and locations

The key refinements include:

- minor changes at Bayswater substation
- changes to the disturbance area at Olney.

These amendments are further outlined in **Figure 1.1**, and descriptions of the amendments are included in *Chapter 2 (Description of amendments and refinements)*.

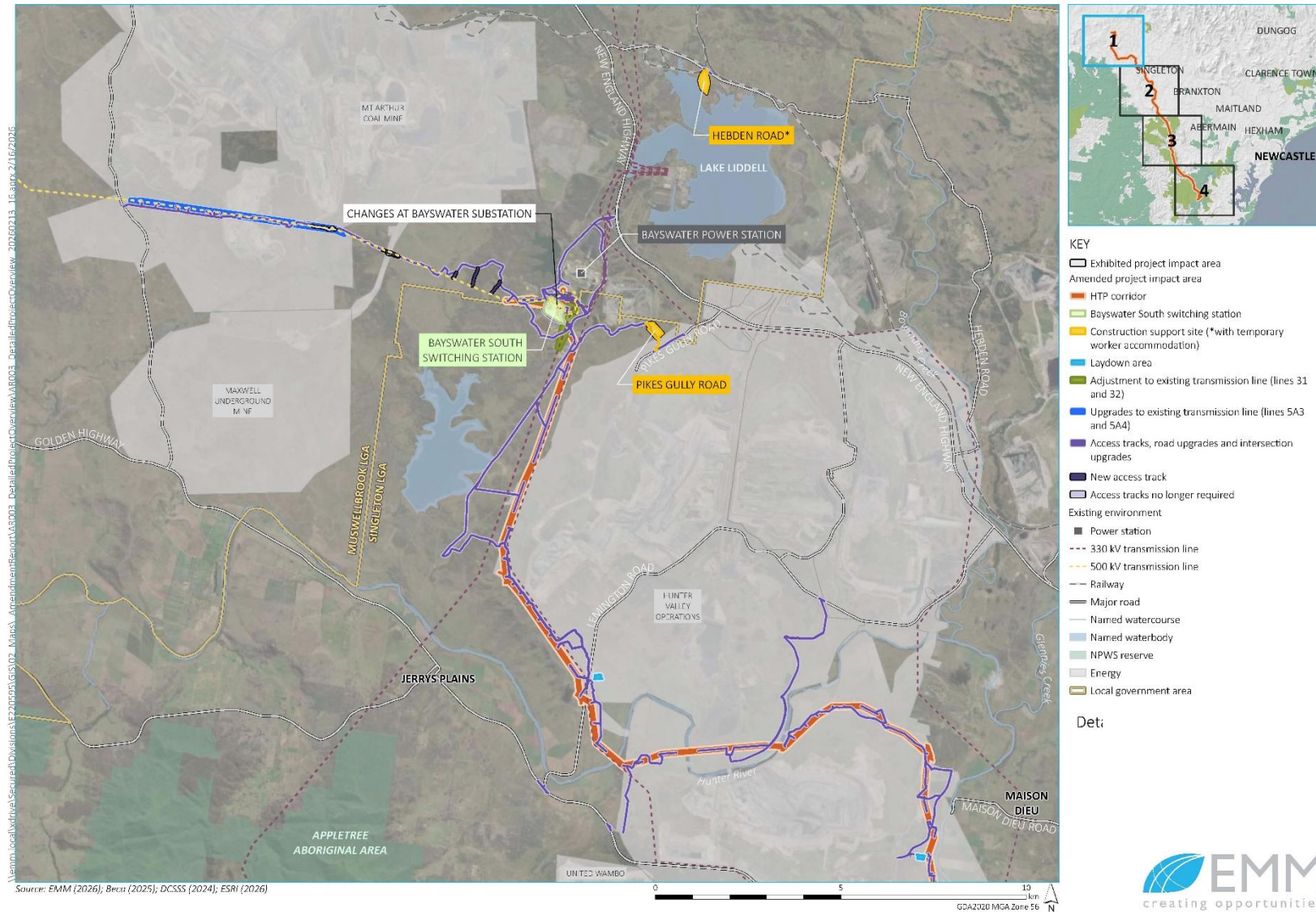


Figure 1.1 – Detailed amended project overview – Map 1 of 4

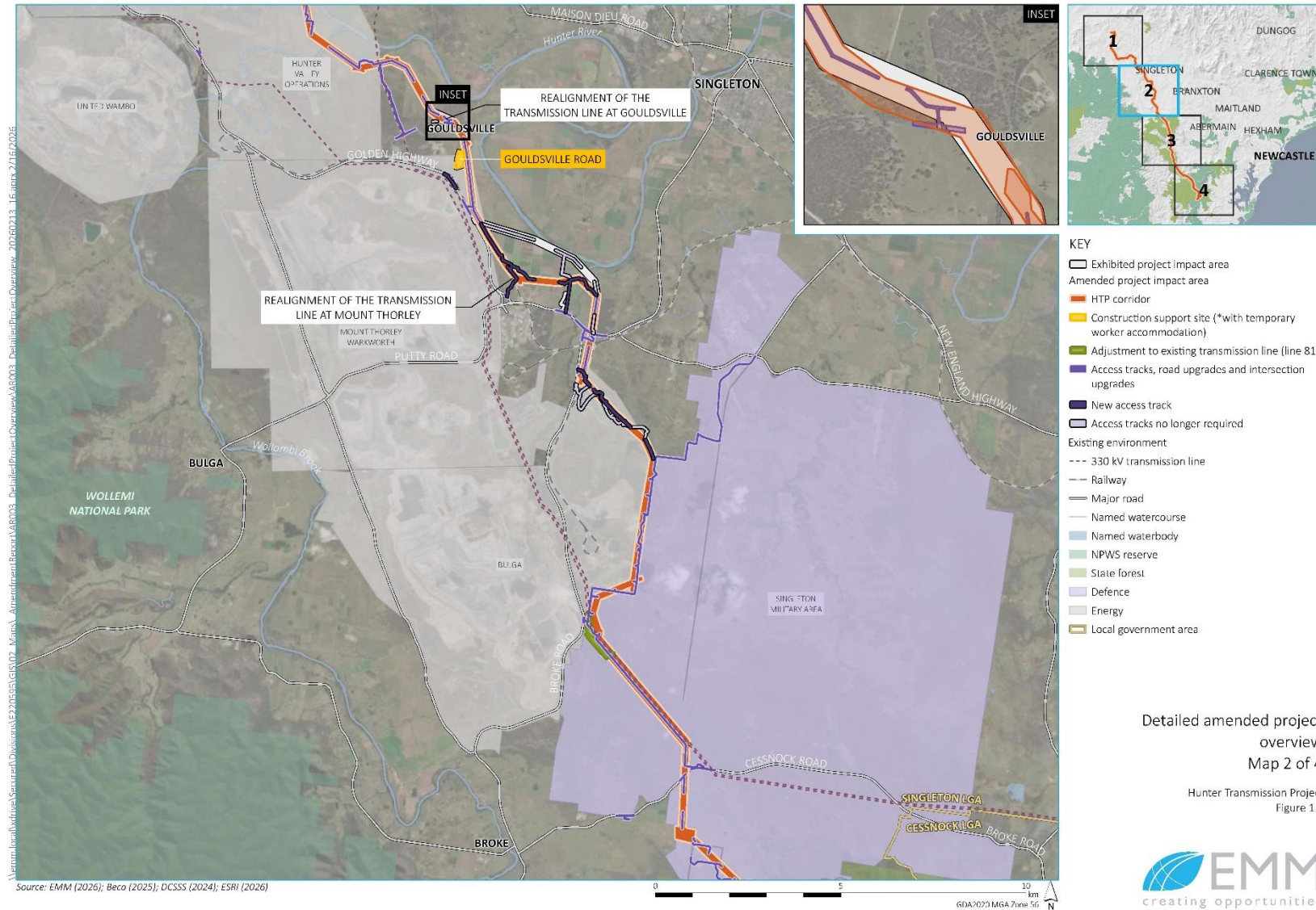


Figure 1.1 – Detailed amended project overview – Map 2 of 4

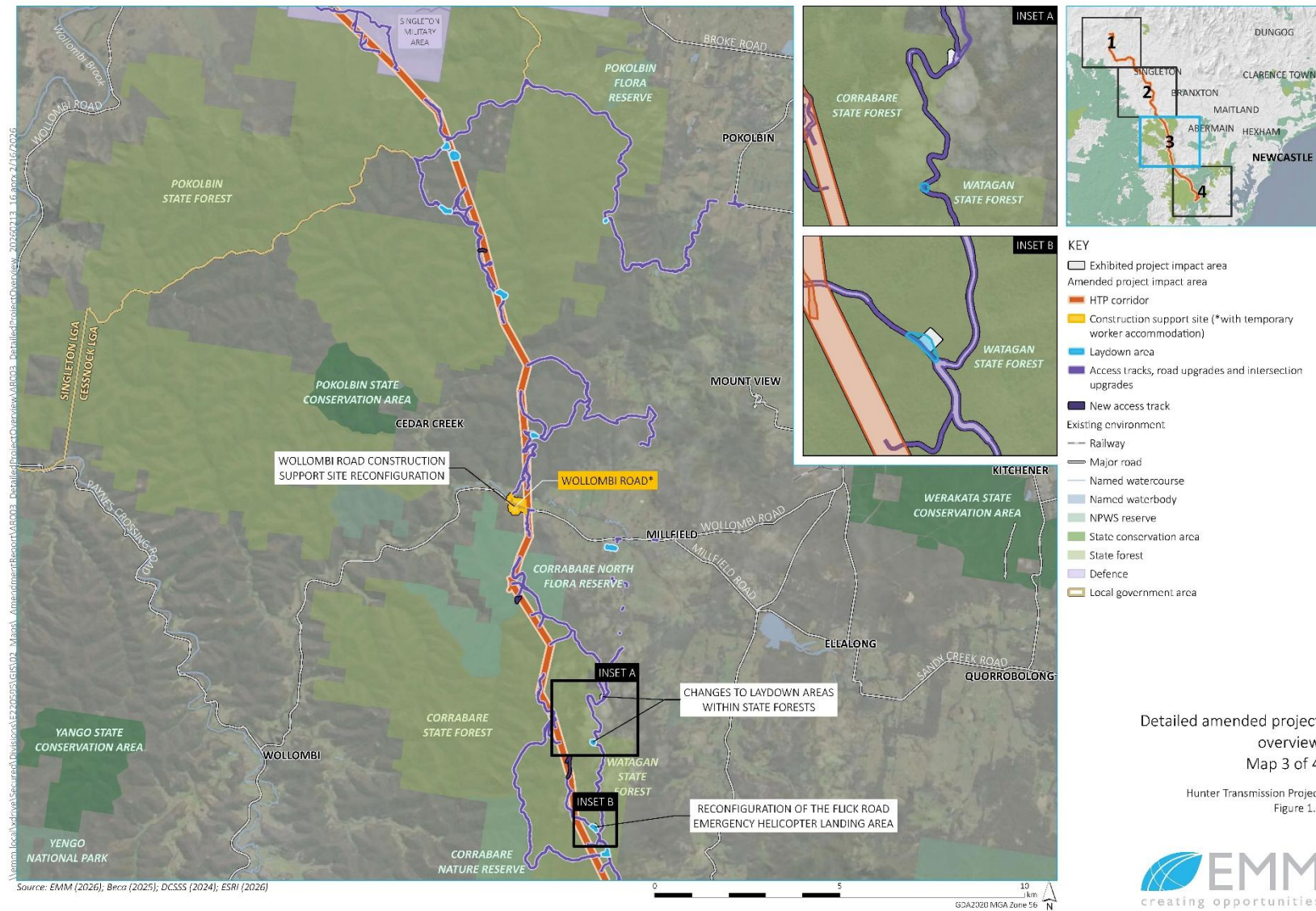


Figure 1.1 – Detailed amended project overview – Map 3 of 4

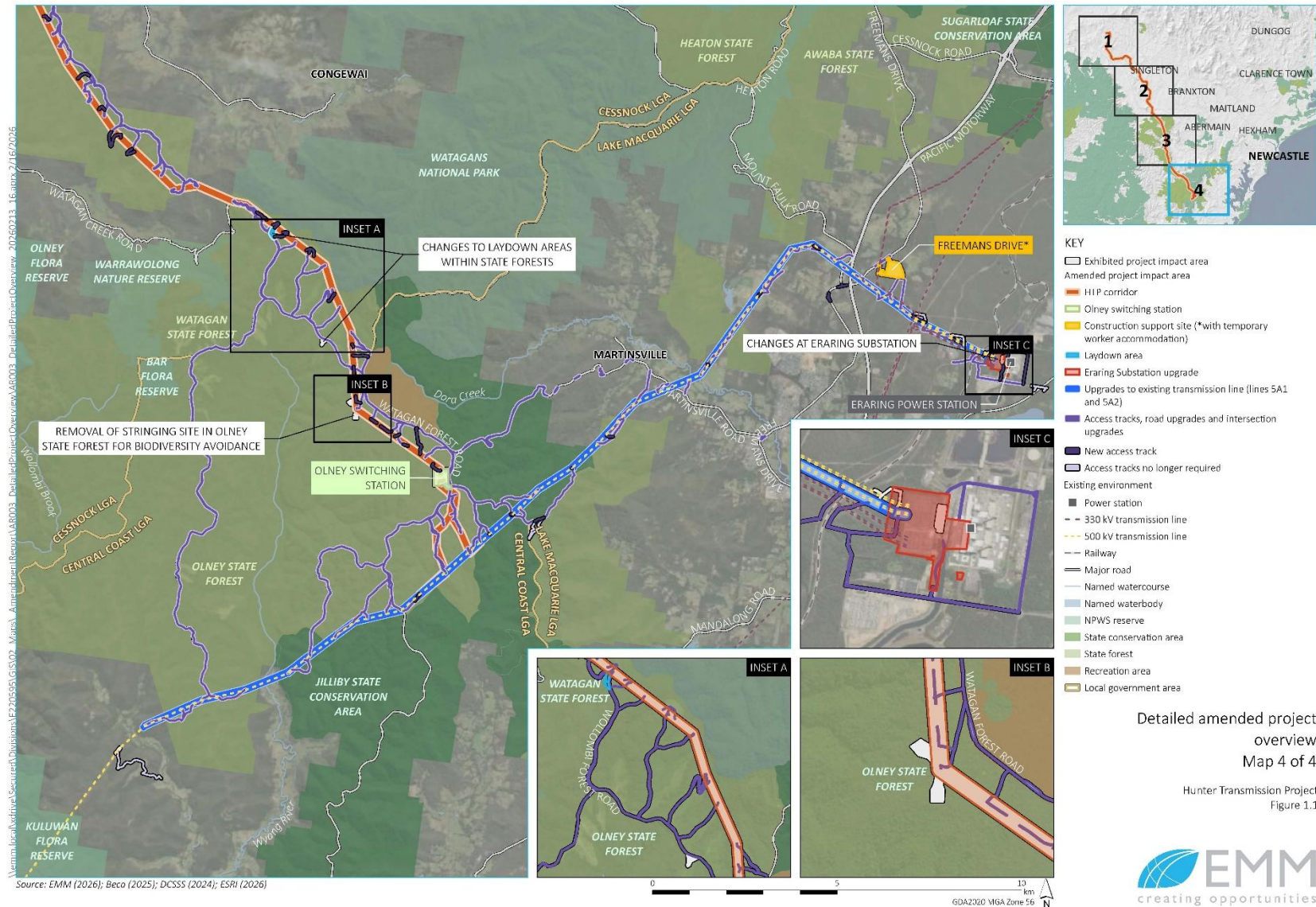


Figure 1.1 – Detailed amended project overview – Map 4 of 4

1.4 Purpose and structure of this report

The purpose of this addendum technical report is to support the Hunter Transmission Project Amendment Report through assessment of the potential flood impacts of the amended project. This addendum technical report considers whether the proposed amendments and refinements would result in any changes to the predicted flood impacts described in the EIS for the exhibited project, and whether any changes to mitigation measures are required.

This addendum technical report is to be read in conjunction with the EIS for the exhibited project and the exhibited *Technical Report 12 (Flood impact assessment)*.

The structure and content of this addendum technical report is as follows:

- **Chapter 1** (Introduction): provides an introduction to this addendum technical report
- **Chapter 2** (Description of amendments and refinements): includes an overview of the proposed amendments and refinements compared to the description of project features as part of the exhibited project
- **Chapter 3** (Assessment methodology): outlines the methodology used for the preparation of this addendum technical report
- **Chapter 4** (Existing environment): describes the existing environmental context for the amended project, including any changes compared to the existing environment described as part of the exhibited project
- **Chapter 5** (Construction impact assessment): includes an assessment of the potential flood related impacts during the construction of the amended project compared to those described as part of the exhibited project, and identifies where the impacts of the proposed amendments and refinements would be consistent with those described as part of the exhibited project
- **Chapter 6** (Operational impact assessment): includes an assessment of the potential flood related impacts during the operation of the amended project compared to those described as part of the exhibited project, and identifies where the impacts of the proposed amendments and refinements would be consistent with those described as part of the exhibited project
- **Chapter 7** (Management of impacts): includes the proposed environmental management framework and mitigation measures for the [technical area] impacts of the amended project, including any changes to the mitigation measures presented as part of the exhibited project
- **Chapter 8** (References): identifies the key reports and documents used to generate this addendum technical report.

The figures that are referred to in **Chapters 4, 5 and 6** are located after **Chapter 8** of this addendum technical report.

2 DESCRIPTIONS OF AMENDMENTS AND REFINEMENTS

This section provides a description of the proposed amendments and refinements compared to the exhibited project. These amendments and refinements have been made in response to stakeholder and contractor feedback, as well as feedback received from community submissions on the exhibited project. The design and construction methodology for the project would continue to be refined and confirmed during detailed design. An updated description of the project incorporating the proposed amendments and refinements is included in *Appendix A (Updated project description)* of the amendment report.

The amendments and refinements to the exhibited project (inclusive of the additional information and clarifications for the exhibited project) are collectively referred to in this report as the ‘amended project’.

Descriptions of the proposed amendments and refinements as part of the amended project are included in **Table 2.1**.

TABLE 2.1
DESCRIPTION OF PROPOSED AMENDMENTS AND REFINEMENTS COMPARED TO THE EXHIBITED PROJECT

Project feature	Amendment / refinement	Summary of exhibited project	Summary of amendment/refinement
Amendments			
Changes to 500 kV transmission line infrastructure	Realignment of the transmission line at Mount Thorley	The transmission line alignment between Bulga and Mount Thorley was designed to utilise mining-owned land wherever feasible and avoid the designated conservation offset area associated with the Bulga mining complex. To address safety concerns related to major hazardous facilities, the transmission line alignment has been developed to establish a safe minimum distance from facilities (Enaex and Dyno Nobel) in Mount Thorley Industrial Estate. Further refinements within Mount Thorley-Warkworth mining complex land, adjacent to the Golden Highway, shifted the transmission line alignment away from the Hunter River, further west. This adjustment allowed tower foundations to be sited in areas with reduced peak flood depths and velocities, improving resilience during flood events.	Around four kilometres of the new 500 kV double circuit transmission line at Mount Thorley would be realigned, moving it up to around 900 m further south and away from the Hunter River. This proposed realignment of the transmission line at Mount Thorley as part of the amended project has been developed with input from the directly impacted landowners and stakeholders and would involve the transmission line continuing south adjacent to the Whittingham to Mount Thorley rail line before deviating in an eastward direction to join the exhibited HTP corridor north of the Putty Road / Broke Road intersection.
	Realignment of the transmission line at Gouldsville	The transmission line alignment in Gouldsville was designed to avoid impacts on high-quality remnant Warkworth Sands Woodland threatened ecological communities through co-location with existing electrical infrastructure easements and access tracks.	Around one kilometre of the new 500 kV double circuit transmission line at Gouldsville would be realigned, moving it slightly south towards Long Point Road West and Gouldsville Road. This proposed realignment has been developed to further minimise impacts to threatened ecological communities, including the Central Hunter Grey Box – Ironbark Woodland threatened ecological community, listed as endangered under the <i>NSW Biodiversity Conservation Act 2016</i> .
	Localised easement widening for conductor swing	Section 4.5.1 of the EIS outlines that the operation of the transmission line would occur in a permanent 70 m wide easement.	Further development of the project design has identified localised areas of the transmission line easement where the span of conductors between transmission towers would 'swing' during periods of high wind, to a point where there is the potential that during these situations the conductors would extend outside of the 70-metre-wide operational easement. In consultation with Transgrid (as the preferred network operator for the project), the exhibited 70-metre-wide transmission line easement would be

Project feature	Amendment / refinement	Summary of exhibited project	Summary of amendment/refinement
			widened to be between 80 and 140 m wide in certain locations so that the transmission line assets stay wholly within the operational easement for the project.
Changes to substation infrastructure	Changes at Eraring substation	Section 4.2.3 in the EIS provides a general overview of the proposed upgrades at Eraring substation, which include: • expansion of the substation to accommodate the installation of new transformers • relocating generator connections from Eraring Power Station and installation/replacement of associated switchgear as required • relocation of the existing transformer spare unit • installation of new 500 kV/330 kV transformer units, augmentation of 500 kV/330 kV bays and associated switchgear and connections • adjustments to existing utilities and drainage infrastructure to accommodate the proposed substation expansion.	At Eraring substation, the amended project proposes to include: • a larger footprint for constructability, including for parking and the adjustment of utilities • substation generator connections on the existing hardstand area • modification works on the existing bench • new poles and adjustment of the existing generator connections into Eraring Power Station • localised undergrounding of the optical ground wire route by trenching between existing transmission towers.
Changes to intersections, access roads and access tracks	Changes to access tracks	Access requirements for construction and operation of the project were described in section 4.3.5 of the EIS. Based on the concept design and early construction planning, potential access routes, including access roads and access tracks, were identified and are listed in Table 4-7 and shown in Figure 4-10 of the EIS.	The amended project includes changes to access tracks proposed for use during construction and operation of the project, which have been identified through ongoing development of the project design and feedback received through consultation with landowners, stakeholders and government agencies. Construction of additional/changed sections of access tracks would be consistent with the construction methodology outlined in section 4.3.5 of the EIS. Changes to access tracks would be: • within State forests to provide a more suitable route for construction vehicles, improve access to the HTP corridor for clearing, and avoid the need to cross riparian zones

Project feature	Amendment / refinement	Summary of exhibited project	Summary of amendment/refinement
Changes to intersections, access roads and access tracks			• within Olney State Forest to minimise impacts to a number of threatened amphibian species and their habitat • on land that forms part of the Bulga mining complex to avoid a clean water diversion, keep access for the project separate from access to the mining complex, and avoid direct impacts to existing biodiversity offset areas • for the upgrades to existing transmission lines and towers to ensure access tracks are fit for purpose and to reduce impacts to landowners • off Putty Road to access the proposed realignment of the transmission line at Mount Thorley.
	Minor adjustments to the project impact area for intersection upgrades	Section 4.3.5 of the EIS noted that the project would rely on the use of existing public roads during construction and operation of the project. In several locations along the construction routes, upgrade works would be required, including at several intersections (which were listed in Table 4-10 of the EIS), to cater safely for the proposed construction traffic volumes and delivery of oversized equipment or construction material and ensure public road safety.	The assessment of the amended project as part of the revised traffic and transport impact assessment identified the need for an additional intersection upgrade at Jerrys Plains Road southbound off ramp / existing access track at Mount Thorley, as a result of the changes to access tracks associated with the change to transmission line alignment at Mount Thorley. In addition, revised turn warrant assessments were completed for the intersections required to be used for the construction of the project, which identified the need for different intersection treatments than what was included in the EIS for five intersections. This includes: • Freemans Drive / Martinsville Road (intersection ID I-23) – additional land acquisition to accommodate turning vehicle movements • Putty Road / existing access track (intersection ID I-31) – an eastbound merge lane along Putty Road • Cessnock Road / new access track (intersection ID I-37) – widening on Cessnock Road for acceleration and deceleration lanes • Golden Highway / Gouldsville Road (intersection ID I-07), to incorporate a channelised right hand turn.

Project feature	Amendment / refinement	Summary of exhibited project	Summary of amendment/refinement
Changes to intersections, access roads and access tracks			The need for different intersection treatments has resulted in minor adjustments to the project impact area.
	Adjustments to the proposed access routes for construction	Table 4-7 of the EIS provided a summary of the proposed access routes to be used for construction of the project. This list was based on the concept design for the project and early construction planning.	Adjustments to the proposed access routes to be used for construction have been made following a review of the proposed construction methodology for the project. This included the addition of some construction routes now required and the removal of some construction routes no longer required. The complete list of proposed access routes for construction is provided in Table A-7 of the updated project description (refer to <i>Appendix A (Updated project description)</i> of the amendment report.
Changes to construction methods and facilities	Reconfiguration of construction support sites and temporary worker accommodation	Sections 4.3.6 and 4.3.7 of the EIS describes the construction support sites and temporary worker accommodation that would be established to support the construction of the HTP. The EIS assumed a peak construction workforce of 830 workers, with allowance for 780 workers to be housed in temporary worker accommodation at the Hebden Road, Gouldsville Road and Freemans Drive construction support sites. The exhibited EIS did not include worker accommodation at the Wollombi Road construction support site.	Further consideration of the construction methodology for the project along with feedback received during the exhibition of the EIS has identified the need to: - remove provisions for temporary worker accommodation facilities at the Gouldsville Road construction support site - reconfigure the Wollombi Road construction support site to include a temporary worker accommodation facility with capacity to house up to 300 workers. Consistent with other temporary worker accommodation facilities for the project, the temporary worker accommodation at Wollombi Road would be operational 24 hours per day 7 days per week. The amended project would therefore include a change in construction activities proposed to be carried out both the Gouldsville Road construction support site and at the Wollombi Road construction support site. At Gouldsville Road, this would include a decrease in light vehicle movements in and out of the construction support site and reduced operating hours. At Wollombi Road construction support site, this would include an increase in light vehicle movements in and out of the construction support site and extended operating hours at the construction support site, resulting in potential changes to amenity impacts.

Project feature	Amendment / refinement	Summary of exhibited project	Summary of amendment/refinement
Changes to construction methods and facilities			This amendment would not change the assumed peak construction workforce.
	Changes to laydown areas within State forests	Figure 4-2 of the EIS shows the locations of laydown areas located outside the HTP corridor. Laydown areas identified in the EIS as being located within the State forests include: • Broken Back Road in Cedar Creek • Campbell Spring Trail in Cedar Creek • Trig Road/Mf1 Road in Corrabare • Trig Road/Crumps Road in Corrabare • Wollombi Forest Road in Ravensdale.	Feedback received from the Forestry Corporation of NSW during continued development of the project design identified an alternative arrangement of laydown areas for construction within the State forests. As a result, the amended project includes: • removal of the laydown areas included in the EIS near: ○ the intersection of Trig Road / Mf1 Road in Corrabare ○ Wollombi Forest Road in Ravensdale • inclusion of two new laydown areas within the State Forests, located near: ○ the Trig Road / Flick Road intersection in Corrabare ○ the Watagan Creek Road / Wollombi Forest Road / Burma Road intersection in Olney. These new laydown areas would perform the same functions as laydown areas described in the EIS. However, they would result in changes to the project impact area and disturbance area compared to the EIS. Laydown areas would remain as included in the exhibited EIS at: • Broken Back Road in Cedar Creek • Campbell Spring Trail in Cedar Creek • Wollombi Forest Road in Ravensdale.
	Reconfiguration of the Flick Road emergency helicopter landing area in response to feedback from	The construction methodology described in the exhibited EIS noted the project would include the provision of emergency helipads at laydown areas on Wollombi Forest Road and Flick Road for helicopters to land in the event of an emergency.	Continued construction planning and consultation with Forestry Corporation of NSW identified that the arrangement of the emergency helicopter landing site along Flick Road would need to be reconfigured so that its design complements the natural site topography and terrain. As such, the amended project would include the reconfiguration of the emergency helicopter landing

Project feature	Amendment / refinement	Summary of exhibited project	Summary of amendment/refinement
Changes to construction methods and facilities	Forestry Corporation of NSW		site at Flick Road. The amended Flick Road emergency helicopter landing site would result in a change in the disturbance area and project impact area.
	Removal of stringing site in Olney State Forest to minimise impacts to threatened amphibian species	Section 4.3.2 of the EIS outlines the work that would be carried out within the HTP corridor, which includes stringing sites. It is noted that stringing sites would be used for the preparation, assembly and operation of stringing equipment to connect the transmission line to the towers. Stringing sites would be positioned along the HTP corridor at various locations, including in the Olney State Forest north of the Olney switching station.	In response to consultation carried out with species experts and regulators for the biodiversity assessment of the project, refinements to the project to reduce the extent of vegetation clearing have been made within the exhibited HTP corridor in the Olney State Forest to the north of the proposed Olney switching station. These changes have been made to minimise impacts to threatened species, particularly frog species such as the Littlejohn's Tree Frog, within the Olney State Forest. As a result of these changes, the proposed stringing site to the north of the Olney switching station has been removed to minimise disturbance in this location. Alternative construction methodologies would be implemented to connect the transmission line to the towers at this location.
	Changes to construction plant and equipment types and locations	Section 4.4.2 of the EIS outlines the plant and equipment required as part of construction for the project.	It is proposed to amend the list of plant and equipment required during construction of the project to also include the following: • diesel generators located at construction support sites and laydown areas • crushing and screening plant located at construction support sites and at laydown areas within State forests • washdown facilities located at construction support sites • wastewater treatment plants at construction support sites. These additional plant and equipment have been added to the proposed list to be used during construction in response to feedback from potential construction contractors.
Refinements			
Changes to substation infrastructure	Changes at Bayswater substation	Section 4.2.3 of the exhibited EIS includes a general overview of the proposed upgrades to the Bayswater substation as part of the project, including:	Based on continued development of the project design, it has been identified that the project is required to include an underground fibre optic communication connection between the Bayswater

Project feature	Amendment / refinement	Summary of exhibited project	Summary of amendment/refinement
		- works within the substation to trench and connect communications infrastructure to Bayswater South switching station via underground fibre cable - modifications and upgrades to protection, control, automation and communication equipment. Section 4.2.3 of the exhibited EIS also includes a general overview of the proposed construction of Bayswater South switching station. Space would be provided at Bayswater South switching station to allow for additional switching station infrastructure, such as additional line shunt reactors and switching station bays, and connections for additional transmission lines in the future.	substation and the Bayswater South switching station. As part of the amended project, this underground fibre optic connection would be located in a trench within the exhibited HTP corridor. The trench would require excavation of about 200 metres in length and would be around 600 millimetres wide and one metre deep. Changes would also include the fitout of two additional switching bays at Bayswater South switching station. This would occur within the exhibited footprint of the Bayswater South switching station.
Changes to construction methods and facilities	Changes to the disturbance area at Olney	As described in section 7.3 of the EIS, the assessment of biodiversity impacts includes a disturbance area within the project impact area to provide a more accurate estimation of the likely magnitude of vegetation clearance required, and any associated biodiversity impacts. The disturbance area takes a more precise approach than the project impact area and represents areas of direct impacts such as full clearing at transmission towers and partial clearing within the transmission line easement. This approach was adopted to avoid a substantial overestimation of the likely biodiversity impacts and the associated quantity of biodiversity offsets required.	In response to consultation carried out with species experts and regulators for the biodiversity assessment of the project, refinements to the project to reduce to the extent of vegetation clearing have been made within the exhibited HTP corridor in the Olney State Forest to the north of the proposed Olney switching station. These changes have been made to minimise impacts to threatened species and their habitat, particularly a number of amphibian species within the Olney State Forest, including the Littlejohn's Tree Frog. These refinements within Olney State Forest have included adjustments to the disturbance area used to assess the potential impacts to biodiversity. While changes have been made to the disturbance area at this location, the HTP corridor would remain the same within the Olney State Forest as the EIS, and the same approach to vegetation management in the disturbance area as the EIS would apply.

3 ASSESSMENT METHODOLOGY

This section describes the methodology used to assess the potential flood related impacts of the proposed amendments. This section notes where the methodology used to assess these impacts is consistent with that used in the EIS. This section also describes updates that have been made to the flood impact assessment (FIA) based on additional information made available subsequent to the preparation of the FIA for the EIS.

3.1 Assessment of the amended project

The FIA for the amended project was carried out in accordance with the assessment criteria and standards set out in Section 3.3 of Technical Report 12 of the EIS.

The approach to defining flood behaviour under pre-project conditions and to assess each of the proposed amendments followed the same approach adopted for the FIA of the exhibited project that is set out in Section 3.4 of Technical Report 12 of the EIS. **Annexure A** of this report contains a series of figures that show the layout and extent of the flood models that were used to define flood behaviour under pre-project conditions and to assess each of the proposed amendments.

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

- i. The amended project was reviewed against the exhibited project to identify the proposed changes and the associated scope of updates that would be required to the FIA presented in the EIS. **Table 3.1** provides a summary of this review along with the approach that was adopted to assess the flood related impacts of each of the proposed amendments to the project. **Table 3.1** also identifies the proposed amendments where no further assessment was considered necessary on the basis that they would have no material impact on the FIA presented in the EIS for the exhibited project.
- ii. A review was carried out to confirm whether any changes were necessary to the definition of flood behaviour under present day (ie. pre-project conditions) to cover the scope of the proposed changes. **Section 4** of this addendum technical report provides an overview of flood behaviour under pre-project conditions as it relates to the amended project.
- iii. The potential impacts of the amended project during its construction and operation were assessed and compared against those based on the exhibited project. **Sections 5 and 6** of this addendum technical report present the findings of the assessment of construction and operational related flood impacts of the amended project, respectively.
- iv. The flood mitigation measures set out in Technical Report 12 of the EIS were reviewed to identify whether any additional measures were required in order to mitigate the impact of the amended project on flood behaviour. An updated set of mitigation measures are presented in **Section 7** of this addendum technical report.

3.2 Updates to the assessment presented in the EIS based on additional information

Subsequent to the preparation of the FIA for the EIS, Origin Energy provided details of the piped drainage network that controls runoff from areas draining to and through the Eraring Power Station. These details have been used to update the Eraring TUFLOW Model which is described in Section 3.4.2 of Technical Report 12 of the EIS (referred to in this report as the “updated Eraring TUFLOW Model”). **Figure A.7** (2 sheets) in **Annexure A** of this report shows the layout of the updated Eraring TUFLOW Model incorporating the piped drainage network that was provided by from Origin Energy

The updated Eraring TUFLOW Model was used to update the definition of flood behaviour in the vicinity of the Eraring substation under pre- and post-project conditions, and to assess the impact of the proposed Eraring substation extension on flood behaviour. The assessment of flood behaviour under post-project conditions was based on a concept design of the Eraring substation extension that was prepared by Transgrid (operator of the existing Eraring substation) and presented in the EIS. As noted in the EIS, the assessed design of the Eraring substation extension would be further developed during detailed design, including the incorporation of mitigation measures that are set out in the EIS and amendment report where required.

TABLE 3.1
ASSESSMENT APPROACH

Amendment / refinement	Relevance to the FIA	Assessment approach for Amendment Report
Amendments		
Realignment of the transmission line at Mount Thorley	The realignment of the new 500 kV transmission line has the potential to alter its level of flood affectation and associated flood impacts and risks.	The flood mapping that is presented in Section 4.3 of Technical Report 12 of the EIS was used to inform the realignment of the transmission line corridor at Mount Thorley. The flood mapping was also used to assess the flood behaviour at each tower along the realigned section of transmission line corridor.
Realignment of the transmission line at Gouldsville	The realignment of the new 500 kV transmission line has the potential to alter its level of flood affectation and associated flood impacts and risks.	The flood mapping that is presented in Section 4.3 of Technical Report 12 of the EIS was used to inform the realignment of the transmission line corridor at Gouldsville. The flood mapping was also used to assess the flood behaviour at each tower along the realigned section of transmission line corridor.
Localised easement widening for conductor swing	Localised widening of the easement for the 500 kV transmission line corridor would have no material change to the FIA presented in the EIS.	No further assessment.
Changes at Bayswater substation involving the fitout of two additional switching bays at Bayswater South switching station	The fitout of two additional switching bays at Bayswater South switching station would have no material change to the FIA presented in the EIS given that the works would occur within the exhibited footprint of the Bayswater South switching station.	No further assessment.
Changes at Eraring substation to provide a larger footprint for construction	An increase in the construction footprint at the Eraring substation has the potential to alter its level of flood affectation and associated flood impacts and risks.	A qualitative assessment was carried out of the potential flood related impacts associated with the increase in the construction footprint at the Eraring substation. The proposed construction footprint was overlaid onto the indicative flood extents for events with AEPs of 10%, 1% and 0.2%, as well as the PMF to provide an understanding

Amendment / refinement	Relevance to the FIA	Assessment approach for Amendment Report
		of the likelihood that flooding could occur in the vicinity of the construction activities. The potential flood risks and impacts associated with the increased construction footprint were assessed based on an understanding of flood behaviour under pre-project conditions during a 1% AEP event.
Changes at Eraring substation involving substation generator connections and modification works on the existing bench of the substation	The additional connections and modifications at the Eraring substation would have no material change to the FIA presented in the EIS given that they are located within the existing footprint of the Bayswater South switching station.	No further assessment.
Changes at Eraring Power Station involving adjustments to existing generator connections	The adjustments to existing generator connections at the Eraring Power Station would have no material change to the FIA presented in the EIS given that they are located within the existing footprint of the Eraring Power Station.	No further assessment.
Changes at Eraring substation involving the provision of new poles to the east of the proposed substation extension	The additional connections and modifications at the Eraring substation and Eraring Power Station would have no material change to the FIA presented in the EIS given that they are located within the existing footprint of the Bayswater South switching station and Eraring Power Station.	The flood mapping that is presented in Section 4.3 of Technical Report 12 of the EIS was used to assess the flood behaviour at the proposed location of the new poles.
Changes at Eraring substation involving the installation of underground ground wire routes at two locations by trenching between existing transmission towers	Trenching to install the two underground ground wire routes have the potential for flood related impacts that were not assessed in the FIA for the exhibited project.	A qualitative assessment was carried out of the potential flood related impacts associated with the trenching to install the underground ground wire routes. The locations of the proposed trenching were overlaid onto the indicative flood extents for events with AEPs of 10%, 1% and 0.2%, as well as the PMF to provide an understanding of the likelihood that flooding could occur during the installation of the underground ground wire routes. The potential flood risks and impacts associated with the trenching to install the underground ground wire routes were assessed based on an understanding of flood behaviour under pre-project conditions during a 1% AEP event.

Amendment / refinement	Relevance to the FIA	Assessment approach for Amendment Report
Changes to access tracks	The change in extent of access tracks within State forests has the potential to alter their level of flood affectation and associated flood impacts and risks.	The flood mapping that is presented in Section 4.3 of Technical Report 12 of the EIS was used to assess the level of flood affectation of the revised extent of access tracks and to identify locations of significant waterway crossings.
Minor adjustments to the project impact area for intersection upgrades	The change in extent of intersection upgrades has the potential to alter their level of flood affectation and associated flood impacts and risks	The flood mapping that is presented in Section 4.3 of Technical Report 12 of the EIS was used to assess the level of flood affectation of the revised extent of intersection upgrades and to identify locations of significant waterway crossings.
Adjustments to the proposed access routes for construction	While the proposed access routes for construction would change under the amended project, there is no change in the scope of upgrades to these access roads to accommodate construction vehicles.	No further assessment.
Reconfiguration of construction support site and temporary worker accommodation	The change in configuration of the Wollombi Road construction support site to include a temporary worker accommodation facility changes its flood risks.	The flood assessment of the Wollombi Road construction support site that was carried out for the exhibited project was updated to assess the flood risks associated with the provision of a temporary worker accommodation facility.
Changes to laydown areas within State forests	The change in the location of laydown areas in the State forests has the potential to alter their level of flood affectation and associated flood impacts and risks.	The flood assessment of the laydown areas that was carried out for the exhibited project was updated to assess the proposed change in locations as part of the amended project.
Reconfiguration of the Flick Road emergency helicopter landing area in response to feedback received from Forestry Corporation of NSW	The change in the layout of the Flick Road emergency helicopter landing area has the potential to alter its level of flood affectation and associated flood impacts and risks.	The flood assessment of the Flick Road emergency helicopter landing area that was carried out for the exhibited project was updated to assess the proposed change in configuration as part of the amended project.
Tower location changes and removal of stringing site in Olney State Forest to minimise impacts to threatened amphibian species	The changes in the location of transmission line towers to accommodate the removal of stringing site in Olney State Forest has the potential to alter their level of flood affectation and associated flood impacts and risks.	The flood assessment of the transmission line towers that was carried out for the exhibited project was updated to assess the proposed change in location of towers in Olney State Forest as part of the amended project.
Changes to construction plant and equipment types and locations	The changes to construction plant and equipment types would have no material change to the FIA presented in the EIS.	No further assessment.

Amendment / refinement	Relevance to the FIA	Assessment approach for Amendment Report
Refinements		
Minor changes at Bayswater substation involving the installation of an underground fibre optic communication connection between the Bayswater substation and the Bayswater South switching station	Trenching to install an underground fibre optic communication connection between the Bayswater substation and the Bayswater South switching station has the potential for flood related impacts that were not assessed in the FIA for the exhibited project.	A qualitative assessment was carried out of the potential flood related impacts associated with the trenching to install the proposed underground fibre optic communication connection. The location of the proposed trenching was overlaid onto the indicative flood extents for events with Annual Exceedance Probabilities (AEPs) of 10%, 1% and 0.2%, as well as the PMF to provide an understanding of the likelihood that flooding could occur during the proposed trenching to install the underground cabling. The potential flood risks and impacts associated with the proposed trenching to install the underground cabling were assessed based on an understanding of flood behaviour under pre-project conditions during a 1% AEP event.
Minor changes at Bayswater substation involving the fitout of two additional switching bays at Bayswater South switching station	The fitout of two additional switching bays at Bayswater South switching station would have no material change to the FIA presented in the EIS given that the works would occur within the exhibited footprint of the Bayswater South switching station.	No further assessment.
Changes to the disturbance area at Olney	Changes to the disturbance area at Olney would not alter the HTP corridor within the Olney State Forest and therefore its level of flood affectation.	No further assessment.

4 EXISTING ENVIRONMENT

The existing environment described in Section 19 of the EIS and Section 4 of Technical Report 12 of the EIS is still applicable to the amended project. Where there are updates to the existing environment resulting from changes to the project impact area, these are described in this section.

4.1 Catchment overview

The study area described in Sections 4.1 and 4.2 of Technical Report 12 of the EIS covered the following key catchments where the project would have the potential to influence, or be influenced by, flooding:

- Within the Hunter River system:
 - Wollombi Brook (including its tributaries and sub-tributaries Monkey Place Creek, Peach Tree Creek, Potholes Gully, Cedar Creek, Deep Creek, Congewai Creek, Sweetmans Creek, Peach Tree Gully and Watagan Creek)
 - Sandy Hollow Creek
 - Loder Creek (including its tributaries Doctors Creek and Nine Mile Creek)
 - Mudies Creek
 - Black Creek (including its tributaries and sub-tributaries Pokolbin Creek and Muggyrang Creek)
 - Bayswater Creek (including its tributaries Pikes Creek and Maidswater Creek)
 - Farrells Creek
 - Parnells Creek
 - Saltwater Creek (including its tributary Wisemans Creek)
 - Saddlers Creek
- Within the Lake Macquarie system:
 - Dora Creek (including its tributaries Jigadee Creek, Blarney Creek, Merchants Creek and Felled Timber Creek)
 - Lake Eraring (including its tributary Muddy Lake)
- Within the Tuggerah Lake system:
 - Wyong River (including its tributaries Cedar Brush Creek and Jilliby Jilliby Creek)

Figure 4.1 (6 sheets) of this report shows the extent of each of the catchments listed above, as well as the footprint of the amended project.

While the construction and operational footprints of the amended project have changed in some areas, the extent of the amended project still lies within the study area that is presented in Technical Report 12 of the EIS. The catchment description that is presented in Sections 4.1 and 4.2 of Technical Report 12 is therefore also applicable to the amended project.

Figure 4.1, sheet 3 shows that as a result of the change in alignment of the transmission line corridor and associated access roads at Mount Thorley, the amended project now crosses Doctors Creek at three locations where it runs along the southern overbank of the Hunter River immediately to the west (upstream) of its confluence with Loder Creek. As noted in Technical Report 12 of the EIS, Doctors Creek is a tributary of Loder Creek, which in turn drains to the Hunter River.

4.2 Description of existing flood behaviour

Section 4.3 of Technical Report 12 of the EIS 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 addendum technical report.

The following figures that are presented in this report 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 Report 12 of the EIS:

- **Figures 4.2, 4.3 and 4.4** (6 sheets each) show the indicative extent and depth of inundation in the vicinity of the project impact area for a 10% and 1% AEP design storm, as well as the PMF event, respectively.
- **Figures 4.5a, 4.5b and 4.5c** show the indicative extent and depth of inundation in the vicinity of the Bayswater South switching station for a 10% and 1% AEP design storm, as well as the PMF event, respectively. Corresponding extents and depths of inundation in the vicinity of the Olney switching station are provided in **Figures 4.6a, 4.6b and 4.6c**, while corresponding extents and depths of inundation in the vicinity of the Eraring substation extension are provided in **Figures 4.7a, 4.7b and 4.7c**.
- **Annexure B** contains a series of figures that show the indicative extent and depth of inundation in the vicinity of the project impact area for design storms with AEPs of 0.5%, 0.2% and 0.05%.
- **Annexure C** contains a series of figures showing the indicative extent and depth of inundation in the vicinity of the Bayswater South switching station, Olney switching station and Eraring substation extension for design storms with AEPs of 0.2% and 0.05%.
- **Annexure D** contains a series of figures showing maximum flow velocities and durations of inundation in the vicinity of the Bayswater South switching station, Olney switching station and Eraring substation extension for design storms with AEPs of 10% and 1%. These have principally been used to assess the impact that the proposed switching stations and substation extension would have on flow velocities (and hence scour potential) and durations of inundation.
- **Annexure E** contains a series of figures that show the hazard vulnerability classification and hydraulic categorisation of flooding in the project impact area, as well as in the vicinity of the Bayswater South switching station, Olney switching station and Eraring substation extension for a 1% AEP storm event.

The change in footprint of the amended project still lies within the extent of the flood mapping that is presented in Technical Report 12 of the EIS. The description of existing flood behaviour that is presented in Section 4.3 of Technical Report 12 of the EIS is also applicable to the amended project.

Tables 4.2, 4.3 and 4.4 in Technical Report 12 of the EIS show a summary of mainstream flooding along the project impact area where it crosses named watercourses. The information presented in the aforementioned tables in Technical Report 12 of the EIS is generally also applicable to the amended project, except for the change in alignment of the transmission line corridor and associated access roads at Mount Thorley. Based on the amended project, the transmission line corridor and associated access roads now cross Doctors Creek and Loder Creek on the southern overbank of the Hunter River, whereas the exhibited project only crossed Loder Creek. **Table 4.1** provides an update of the information presented in Technical Report 12 of the EIS to reflect the change in alignment of the transmission line corridor and associated access roads at Mount Thorley based on the amended project.

TABLE 4.1
SUMMARY OF FLOOD BEHAVIOUR IN NAMED WATERCOURSES CROSSED BY THE EXHIBITED AND AMENDED PROJECTS AT MOUNT THORLEY

Named Watercourse	Sheet Reference ⁽¹⁾	10% AEP			1% AEP			PMF		
		Maximum Depth (m)	Width (m)	Critical Duration (hours)	Maximum Depth (m)	Width (m)	Critical Duration (hours)	Maximum Depth (m)	Width (m)	Critical Duration (hours)
Exhibited project										
Loder Creek	Sheet 3	2.0	75	18	5.6 ⁽³⁾	3,200 ⁽³⁾	72 ^(2,3)	9.7 ⁽³⁾	3,600 ⁽³⁾	72 ^(2,3)
Amended project										
Doctors Creek	Sheet 3	2.1	1,540	18	5.7 ⁽³⁾	2,200 ⁽³⁾	72 ^(2,3)	10.2 ⁽³⁾	2,900 ⁽³⁾	72 ^(2,3)
Loder Creek	Sheet 3	2.2	80	18	5.6 ⁽³⁾	210 ⁽³⁾	72 ^(2,3)	9.6 ⁽³⁾	670 ⁽³⁾	72 ^(2,3)

1. Provides the sheet reference of **Figures 4.2, 4.3 and 4.4** (6 sheets each), which respectively show the indicative depth and extent of inundation in the vicinity of the project impact area for storms with AEPs of 10% and 1%, as well as the PMF.
2. Estimate of the critical storm duration in the Hunter River is based on review of historical flood events presented in the *Singleton Floodplain Risk Management Study and Plan* (BMT, 2023).
3. Flood behaviour is influenced by backwater flooding from the Hunter River.

5 CONSTRUCTION IMPACT ASSESSMENT

This chapter outlines the potential flood related impacts resulting from the construction of the amended project and notes where the impacts from the proposed amendments and refinements are consistent with the construction impacts assessed as part of the exhibited project.

Section 5 of Technical Report 12 of the EIS presents the findings of an assessment of the flood related risks and impacts associated with the construction of the project. **Table 5.1** shows how the construction impact area was split into a series of work areas for the purpose of the flood impact assessment that is presented in Technical Report 12 of the EIS, as well as the changes to these work areas under the amended project.

Table 5.1 in Section 5 of Technical Report 12 of the EIS 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 5.2** of this report provides an update of the assessment that is presented in Table 5.1 of Technical Report 12 of the EIS based on the proposed changes to the construction work areas and associated activities under the amended project. **Figure 5.1** (6 sheets) shows the extent to which floods of varying magnitude affect each construction work area across the extent of the amended project.

5.1 Potential flood risk at construction work areas of the amended project

Section 5.1 of Technical Report 12 of the EIS 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 Report 12 of the EIS, the amended project would also include:

- The reconfiguration of the Wollombi Road construction support site to include temporary worker accommodation, in addition to those proposed at the Hebden Road, Gouldsville Road and Freemans Drive construction support sites.
- Areas within the construction impact area of the exhibited project in the vicinity of the Bayswater Switching Station and Eraring Substation Extension where trenching would be required to install optical ground wire and communications cable.

5.1.1 Temporary worker accommodation

To allow for the projected number of workers that would be required to construction the project, temporary worker accommodation is proposed at the Hebden Road, Wollombi Road and Freemans Drive construction support sites.

Compared to offices and staff amenities, temporary worker accommodation located on the floodplain has the added risk to workers should a flood occur overnight. To manage this risk, the temporary buildings for worker accommodation would be located a minimum 0.5 metres above the peak 1% AEP flood level, which is consistent with the Flood Planning Levels (FPLs) that are set out in the Development Control Plans of the relevant councils (being Muswellbrook, Cessnock and Lake Macquarie).

Plates 5.1, 5.2 and 5.3 show the indicative depth and extent of inundation during a 1% AEP flood in the vicinity of the Hebden Road, Wollombi Road³ and Freemans Drive construction support sites, respectively. **Plates 5.1, 5.2 and 5.3** show that there is land at all three construction support sites that lies outside the 1% AEP flood extent, which would be suitable for the provision of temporary buildings for worker accommodation with floor levels at or above the FPL.

Detailed planning of the layout of the construction support sites and temporary worker accommodation would consider how safe evacuation routes are provided for construction workers during times of flood.

Measures aimed at managing the risk of flooding to construction support sites and temporary worker accommodation, including flood emergency response procedures are provided in **Chapter 7**.

5.1.2 Underground cabling

While the activities that were identified in the EIS include trenching for the installation of cables, no specific areas were identified. Under the amended project, the following three areas have been identified where trenching would be required to install optical ground wire and communications cable:

- Between the Bayswater South Switching Station and Bayswater Substation for the installation of communications cable (Bayswater underground cabling area).
- Between existing 500kV transmission towers at a location approximately 2 kilometres to the west of the Eraring substation (Eraring west underground cabling area).
- Between existing 500kV transmission towers at a location immediately adjacent to the Eraring substation (Eraring east underground cabling area).

Table 5.1 shows that all three underground cabling areas cross drainage lines and channels that would be inundated during rainfall events. The installation of cabling across these drainage lines and channels would be staged and timed to manage the conveyance of flow through and around the work area, whilst also managing the release of sediments from the work area into the receiving drainage lines.

The risk of inundation to the work area and the release of sediments would be managed in accordance with the erosion and sediment control measures that are set out in Technical Report 10 (Surface water impact assessment) of the EIS, which are incorporated into the consolidated environmental management measures in Appendix E of the Amendment Report.

³ For the purpose of the flood impact assessment presented in Technical Report 12 of the EIS, the Wollombi Road construction support site has been split into a north and south component located either side of Wollombi Road (denoted construction support sites C4a and C4b, respectively).

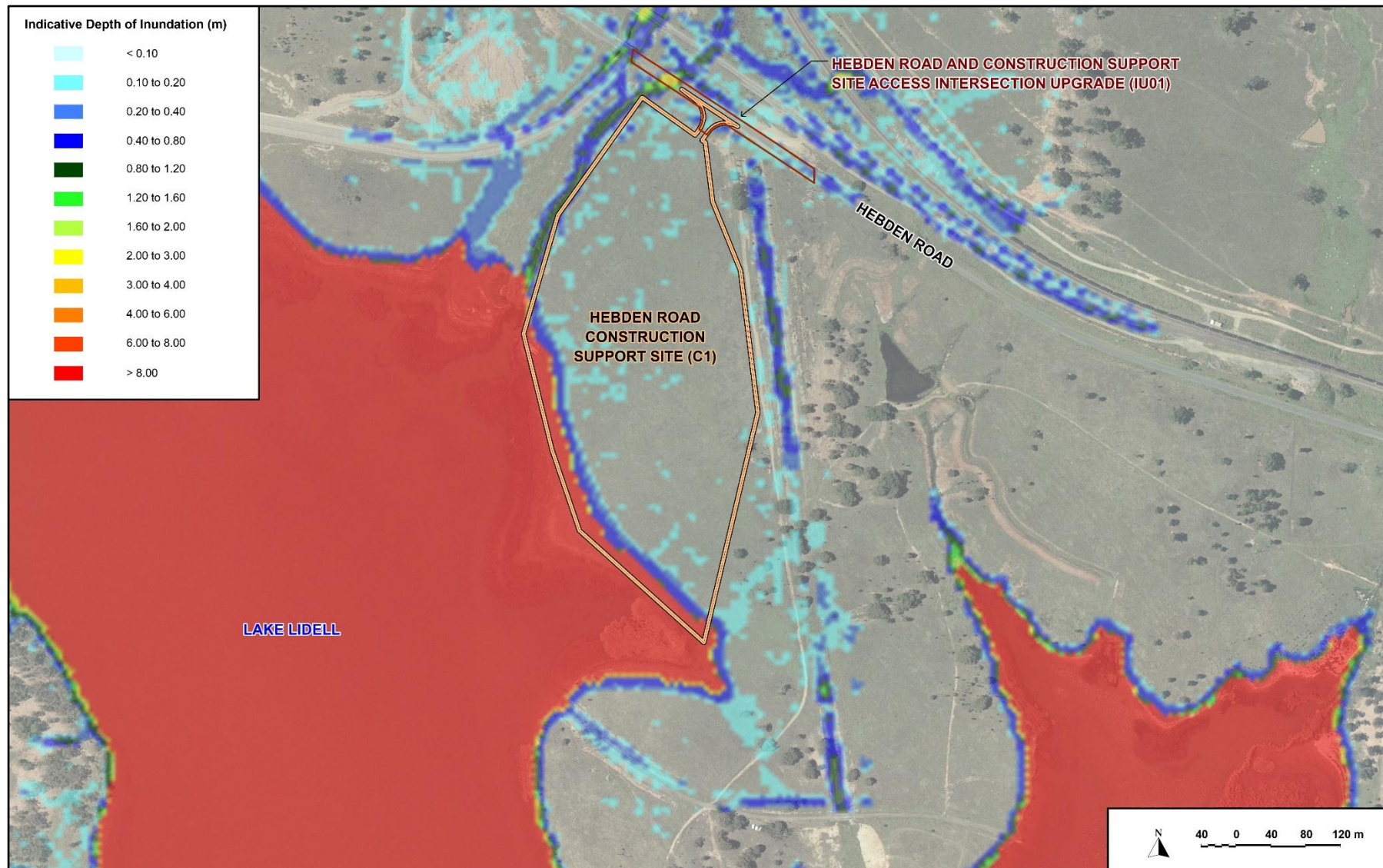


Plate 5.1 – Indicative depth and extent of inundation in the vicinity of the Hebden Road construction support site – 1% AEP event

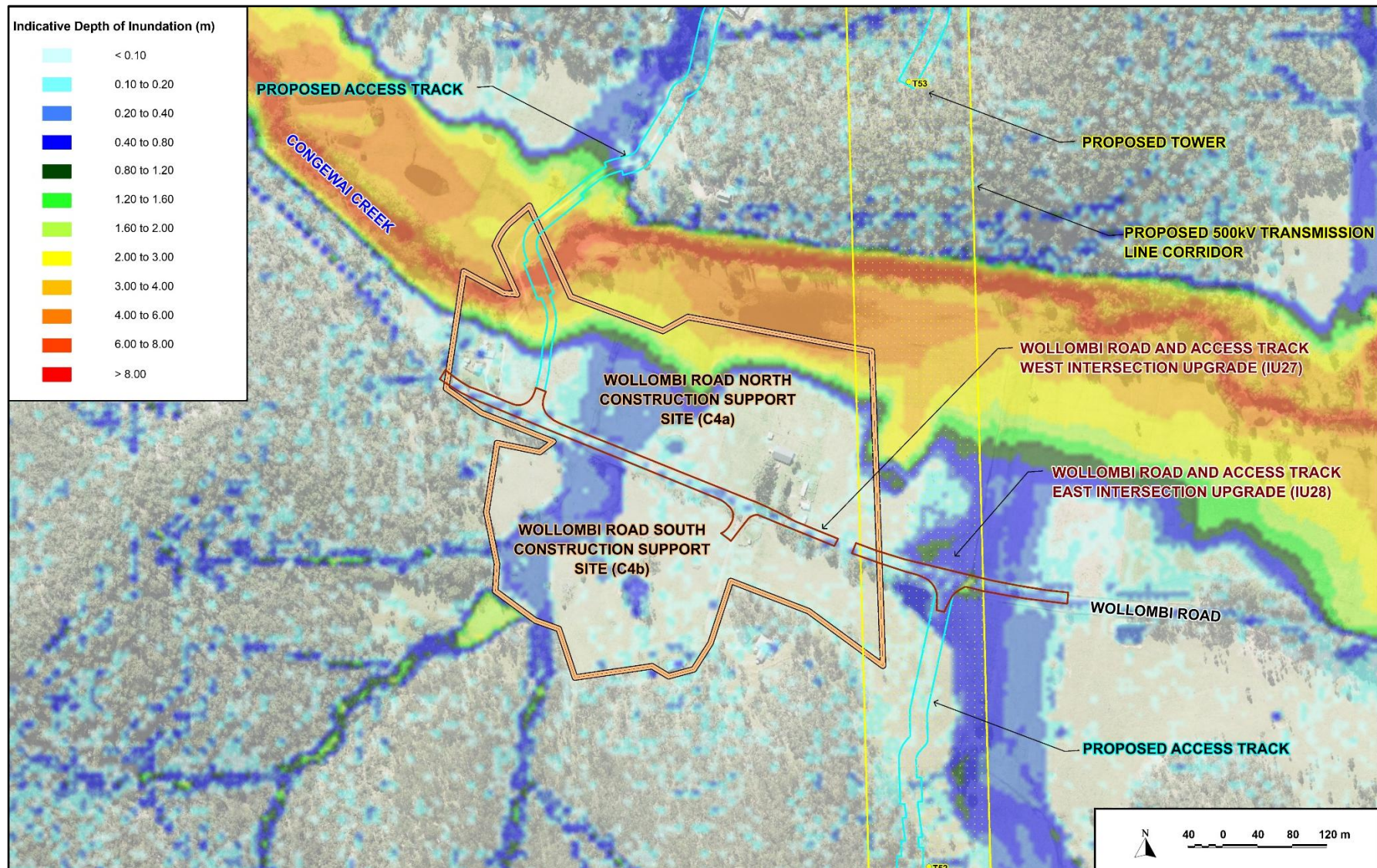


Plate 5.2 – Indicative depth and extent of inundation in the vicinity of the Wollombi Road construction support site – 1% AEP event

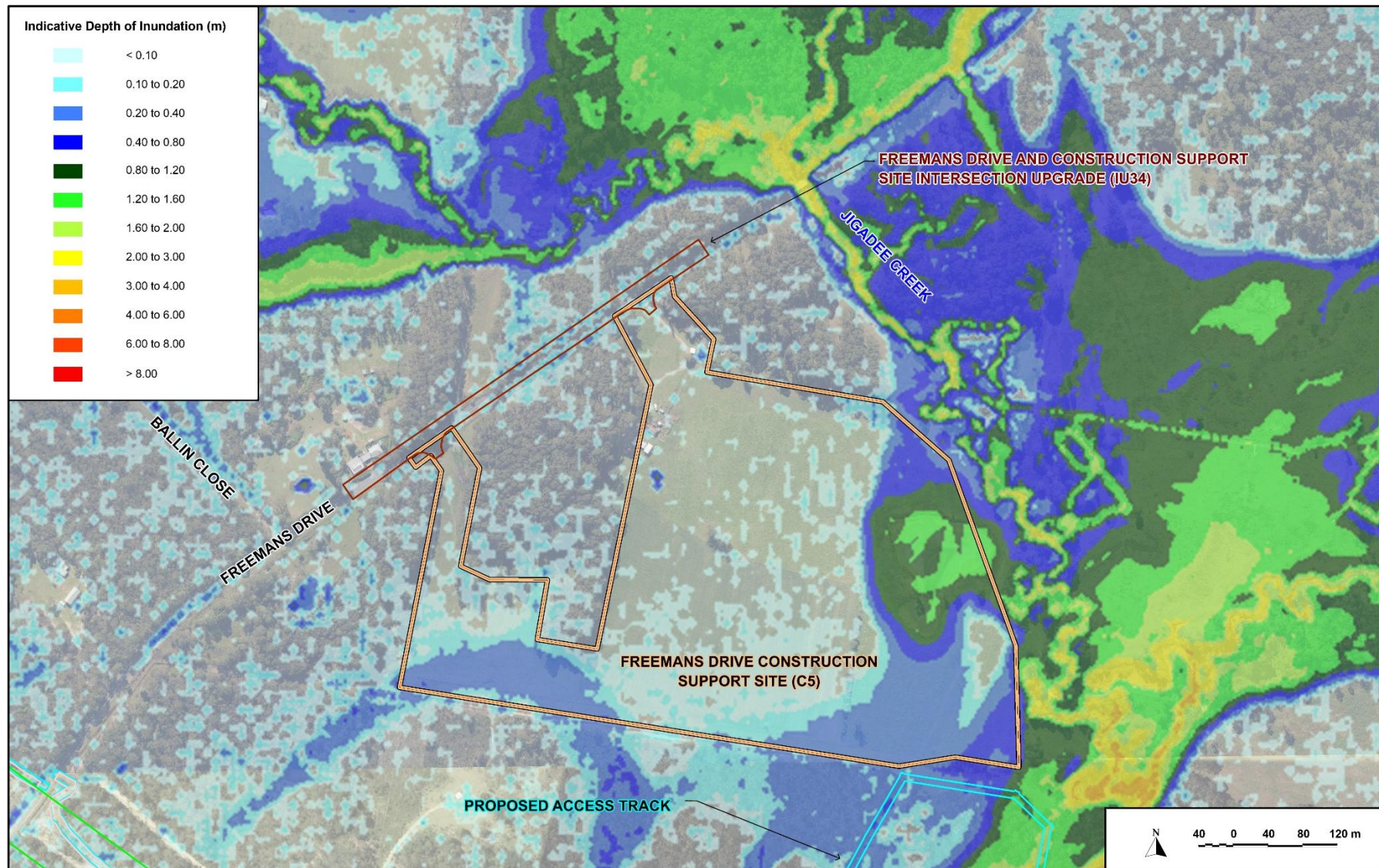


Plate 5.3 – Indicative depth and extent of inundation in the vicinity of the Freemans Drive construction support site – 1% AEP event

5.1.3 Construction ancillary facilities

Table 5.2 lists the construction ancillary facilities, together with a summary of their potential flood affectation in comparison to the exhibited project. For the 1% AEP design storm, the assessment found that:

- i. the flood affectation to the five construction support sites would be the same as the exhibited project
- ii. of the two laydown areas that would be relocated under the amended project:
 - a. laydown area L10a (Trig Road and Flick Road) is not impacted by mainstream flooding or major overland flow, but 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 and could therefore be managed through the implementation of standard drainage controls, such as diversion drains around the laydown area.
 - b. laydown area L12a (Wollombi Forest Road and Burma Road) is located on a ridge and is therefore not impacted by mainstream or local catchment flooding.
- iii. of the proposed location of the two helipad sites under the amended project:
 - a. the Trig Road and Flick Road helipad site (H1a) is not impacted by mainstream flooding or major overland flow, but 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 and could therefore be managed through the implementation of standard drainage controls, such as diversion drains around the helipad site
 - b. the Wollombi Forest Road and Burma Road helipad site (H2a) is located on a ridge and is therefore not impacted by mainstream or local catchment flooding.

The above summary of findings shows that the flood affectation of the construction ancillary facilities under the amended project is not significantly different to the exhibited project.

5.1.4 New transmission line construction

Under the amended project, the HTP northern transmission line work area would be adjusted to suit the proposed realignment of the new transmission line at Gouldsville and Mount Thorley.

The assessment presented in **Table 5.2** shows that the proposed realignment of the new transmission line corridor at Gouldsville and Mount Thorley would not significantly alter the flood affectation and therefore the flood risks associated with the construction of the new transmission line compared to the exhibited project.

5.1.5 Construction of new and upgraded access tracks

Under the amended project, the alignment and extent of upgraded and new tracks that are proposed to access the construction impact area would be revised. The layout and extent of the revised access tracks under the amended project are shown on **Figures 4.2 to 4.4** (6 sheets each) and have been divided into the following categories that were adopted in the exhibited project:

- Minor works to existing access tracks, including activities such as maintenance activities or resurfacing

- Upgrades to existing access tracks that would require more substantial work to make them suitable for use, such as widening the formation, regrading to make them suitable for construction and/or maintenance vehicles or upgrades to waterway crossings
- New access tracks that would be required to service the new transmission line. The alignment of new tracks has generally been developed in consultation with affected property owners to minimise property impacts, and where practical minimising the number of crossings of significant waterways. The new tracks would typically be up to 6 metres wide.

Table 5.3 provides a summary of the length of access track that would be inundated during storms with AEPs of 10% and 1% based on the exhibited project and the amended project.

Table 5.3 shows that under the amended project there would be a slight reduction in the total length of track that would be inundated, while there would also be one less creek crossing due to the removal of the proposed crossing of Saddlers Creek. The extent and depth of inundation to access tracks due to a 1% AEP Hunter River flood would be similar to the exhibited project. On this basis, the measures that are set out in Technical Report 12 of the EIS to manage the flood related impacts of the new and upgraded access tracks would also be applicable to the amended project, and have therefore been incorporated into the revised set of flood related management measures that are set out in **Section 7.2** of this report.

5.1.6 Local road upgrades

In the EIS, it was identified that sections of the existing road network would need to be upgraded to accommodate the types of vehicles that are required to construct the project. The nature and extent of the upgrades to the existing road network would be subject to further design development but are likely to involve the upgrade and widening of the existing road pavements to accommodate the size and load of construction vehicles. A number of intersections would also need to be upgraded, which are likely to involve localised widening of the road pavement to accommodate the turning paths of construction vehicles.

Table 5.3 in Technical Report 12 of the EIS contains a list of roads and intersections that are likely to require upgrading based on the exhibited project and provides an initial assessment of the potential flood affectation at each location.

Table 5.4 at the end of this chapter provides an update of the assessment that is presented in Table 5.3 of Technical Report 12 of the EIS based on the changes to local road and intersection upgrades under the amended project. These changes are listed in **Table 5.1** and include an increase in footprint of two of the intersection upgrades (intersection upgrades IU15 and IU17 in **Table 5.4**), as well as the inclusion of one additional intersection upgrade (intersection upgrade IU36 in **Table 5.4**).

The updated assessment that is presented in **Table 5.4** shows that, consistent with the exhibited project, all locations identified for local road upgrades have the potential to be inundated by floodwater to varying degrees. As identified in Technical Report 12 of the EIS, further flood assessment would be undertaken during detailed design, the scope of which would be informed by the potential flood affectation, as well as the nature and extent of the upgrades at each location, once confirmed.

The potential impacts of the local road upgrades that are described in Section 5.1.8 of Technical Report 12 of the EIS would also be applicable to the amended project. The measures that are set out in Technical Report 12 of the EIS to manage the flood related impacts of the local road upgrades would also be applicable to the amended project, and have therefore been incorporated into the revised set of flood related management measures that are set out in **Section 7.2** of this report

5.2 Potential impacts of construction activities on flood behaviour

As noted in Technical Report 12 of the EIS, construction activities have the potential to exacerbate flooding conditions when compared to both existing and operational conditions. This is because construction activities typically impose a larger footprint on the floodplain due to the need to provide temporary structures, such as ancillary sites, outside the operational footprint. These ancillary sites would be removed following the completion of construction activities.

Table 5.1 of Technical Report 12 of the EIS presents the findings of a qualitative assessment of the potential impacts that construction activities associated with the project could have on flood behaviour. **Table 5.2** provides an update of the assessment presented in Table 5.1 of Technical Report 12 of the EIS based on the amended project.

The assessment presented in **Table 5.2** shows that based on the amended project:

- i. the potential flood impacts at the five construction support sites would be the same as the exhibited project:
 - a. construction activities within the Hebden Road (C1), Pikes Gully Road (C2) and Gouldsville Road (C3) construction support sites would generally have a minimal effect on flood behaviour for design storms up to 1% AEP in intensity
 - b. construction activities within the northern portion of the Wollombi Road North (C4a) construction support site have the potential to obstruct the conveyance of flow in Congewai Creek during storms greater than 10% AEP in intensity, while activities across the western portion of the site have the potential to impact on major overland flow due to local catchment runoff
 - c. construction activities within the western portion of the Wollombi Road South (C4b) construction support site have the potential to impact on local catchment flooding by obstructing and diverting overland flow, leading to a redistribution of flow in surrounding areas
 - d. construction activities within the eastern portion of the Freemans Drive (C5) construction support site have the potential to obstruct the conveyance of flow in Jigadee Creek during storms greater than 10% AEP in intensity, while activities across the southwestern portion of the site have the potential to impact on major overland flow due to local catchment runoff
- ii. potential impacts of the twelve laydown areas would be similar to the exhibited project:
 - a. construction activities within laydown areas L1, L2, L10a and L11 are expected to have only a minor impact on flood behaviour given the minor nature of overland flow that is presently conveyed through these areas
 - b. construction activities within laydown areas L3, L4, L5, L6, L7, L8 and L12a would have no impact on flood behaviour

- c. construction activities within the western portion of laydown area L9 have the potential to obstruct the conveyance of flow in a drainage line that presently runs through the site
- iii. construction activities within the newly proposed locations for helipad sites within the Trig Road and Flick Road laydown area and the Wollombi Forest Road and Burma Road laydown area would have only a minor impact on flood behaviour given the minor nature of overland flow that is presently conveyed through these sites
- iv. construction activities within the Bayswater South, Olney and Eraring construction work areas all have the potential to impact on local catchment flooding in the various overland flowpaths and drainage lines that they cross, which would be similar to the exhibited project
- v. construction activities along the new and existing transmission line corridors have the potential to obstruct the conveyance of flow in the various creeks, watercourses and local drainage lines that they cross, which would be similar to the exhibited project
- vi. the crossing of watercourses by access tracks that would be required to construct the new 500 kV transmission lines or upgrade and realign the existing transmission lines have the potential to obstruct the conveyance of flow, which in turn may impact on the extent and depth of inundation and flow velocities in the watercourses and their overbank areas. Potential impacts would be similar to the exhibited project.

Based on the above findings, the measures that are set out Section 7 of Technical Report 12 of the EIS to manage the impact of construction activities on flood behaviour would also be applicable to the amended project and have therefore been incorporated into the revised set of management measures in **Section** Error! Reference source not found. of this report .

TABLE 5.1
BREAKDOWN OF WORK AREAS FOR THE PURPOSE OF THE FLOOD IMPACT ASSESSMENT

Work Areas	Exhibited project	Amended project
Construction support sites	Five construction support sites that would contain a range of facilities such as storage areas, processing facilities, workshops, staff facilities and (in some cases) helicopter landing pads and temporary worker accommodation. The five sites were referred to as: • Hebden Road construction support site (C1) • Pikes Gully Road construction support site (C2) • Gouldsville Road construction support site (C3) • Wollombi Road construction support site (C4) • Freemans Drive construction support site (C5).	Of the five construction support sites in the exhibited project: • There would be no change to the Hebden Road, Pikes Gully Road and Freemans Drive construction support sites (C1, C2 and C5) • While the extent of the Gouldsville Road construction support site (C3) would be unchanged, it would be reconfigured to no longer include a temporary worker accommodation facility • While the extent of the Wollombi Road construction support site (C4) would be unchanged, it would be reconfigured to include a temporary worker accommodation facility.
Laydown areas	Twelve laydown areas that would be located outside the construction support sites that would be used for the temporary storage of plant and materials. The laydown areas were referred to as: • Old Lemington Road laydown area (L1) • Archerfield Road laydown area (L2) • Broken Back Trial North laydown area (L3) • Broken Back Trial South laydown area (L4) • Cedar Creek North laydown area (L5) • Cedar Creek South laydown area (L6) • Cedar Creek East laydown area (L7) • Mount Baker laydown area (L8) • Hayes Road laydown area (L9) • North Road laydown area (L10) • Trig Road laydown area (L11)	Of the twelve laydown areas in the exhibited project: • There would be no change at ten of the laydown areas (laydown areas L1, L2, L3, L4, L5, L6, L7, L8, L9 and L11) • The North Road laydown area (L10) and Wollombi Forest Road laydown area (L12) would be removed • Additional laydown areas would be provided at: ○ the intersection of Trig Road and Flick Road in Corrabare (referred to in this report as the Trig Road and Flick Road laydown area (L10a)) ○ the intersection of Watagan Road/Wollombi Forest Road and Burma Road (referred to in this report as the Wollombi Forest Road and Burma Road laydown area L12a).

Work Areas	Exhibited project	Amended project
	Wollombi Forest Road laydown area (L12)	
Temporary helicopter landing pad sites	Two temporary helicopter landing pad sites at laydown areas on Flick Road and Wollombi Forest Road (helipad sites H1 and H2).	Of the two temporary helicopter landing pad sites in the exhibited project: - The temporary helicopter landing pad at Flick Road would be relocated to the Trig Road and Flick Road laydown area (L10a) (referred to in this report as the Trig Road and Flick Road helipad site (H1a)). - The temporary helicopter landing pad at the Wollombi Forest Road laydown area (L12) would be relocated to the Wollombi Forest Road and Burma Road laydown area (L12a) (referred to in this report as the Wollombi Forest Road and Burma Road helipad site (H2a)).
Bayswater South construction work area	An area of work associated with the construction of the Bayswater South switching station, including its associated ancillary facilities.	There would be no change to the Bayswater South construction work area.
Olney construction work area	An area of work associated with the construction of the Olney switching station, including its associated ancillary facilities.	There would be no change to the Olney construction work area.
Eraring construction work area	An area of work associated with the construction of the Eraring substation extension, including its associated ancillary facilities.	There would be no change to the Eraring construction work area.
Underground cabling work areas	While the activities identified in the EIS include trenching for the installation of cables, no specific areas were identified.	Under the amended project, three areas have been identified within the construction impact area of the exhibited project in the vicinity of the Bayswater Switching Station and Eraring Substation Extension, where trenching would be required to install optical ground wire and communications cable. The three areas of underground cabling are: - Between the Bayswater South Switching Station and Bayswater Substation for the installation of communications cable (Bayswater underground cabling area). - Between existing 500kV transmission towers at a location approximately 2 kilometres to the west of the Eraring substation (Eraring west underground cabling area).

Work Areas	Exhibited project	Amended project
		Between existing 500kV transmission towers at a location immediately adjacent to the Eraring substation (Eraring east underground cabling area).
Transmission line corridor	Areas along the transmission line corridor for the construction of the proposed 500 kV transmission line that would include working pads to construct transmission towers and stringing sites to install the transmission lines between the towers. For the purpose of the flood assessment for the EIS, the transmission line corridor construction impact area was separated into the HTP northern, central and southern sections.	Under the amended project, the HTP northern transmission line corridor construction impact area would be revised to suit the realignment for the new 500 kV transmission line corridor at Mount Thorley and Gouldsville. For the purpose of the flood impact assessment, there would be no change to the HTP central and HTP southern transmission line corridor construction impact areas.
Access tracks to service the new and existing transmission lines	Areas for the construction of new access tracks or upgrades to existing access tracks to facilitate the construction of the new 500 kV transmission line, as well as upgrades to the existing 500 kV transmission lines to the north and south. For the purpose of the flood assessment for the EIS, the areas for the construction of the upgraded and new access tracks were separated into the HTP northern, central and southern sections.	Under the amended project, the construction impact area would be revised to suit the changes in the extent of new access tracks and upgrades to existing access tracks under the amended project. These revisions apply to the HTP northern, central and southern sections of the access track construction work areas.
Upgrades to the existing road network	Areas for the construction of upgrades to the existing road network to accommodate construction and operation traffic. For the purpose of the flood assessment for the EIS, the upgrades were separated into seven local road upgrades (denoted RU1 to RU7 in Technical Report 12 of the EIS) and thirty five intersection upgrades (denoted IU1 to IU35 in Technical Report 12 of the EIS).	Under the amended project: - there would be no change to the seven local road upgrades identified in the EIS - there would be an increase in the footprint of the intersection upgrade at the Golden Highway (Jerrys Plains Road) and Gouldsville Road (intersection upgrade IU15 in Table 5.3 of Technical Report 12 of the EIS) - there would be an increase in the footprint of the intersection upgrade at Putty Road and an existing access track (intersection upgrade IU17 in Table 5.3 of Technical Report 12 of the EIS) - there would be a change in scope of works but no change in the footprint of the intersection upgrades at Cessnock Road and an existing access track (intersection upgrade IU23 in Table 5.3 of

Work Areas	Exhibited project	Amended project
		Technical Report 12 of the EIS) and Martinsville Road and Freemans Drive (intersection upgrade IU35 in Table 5.3 of Technical Report 12 of the EIS) • there would be an additional intersection upgrade at McDonalds Road, Pokolbin Mountains Road and Oaky Creek Road in Pokolbin (referred to in this report as intersection upgrade intersection upgrade IU26) • there would be an additional intersection upgrade at Jerrys Plains Road and an existing access track (referred to in this report as intersection upgrade IU36) • an upgrade would no longer be required to the intersection of Long Point Road and an existing access track (intersection upgrade IU12 in Table 5.3 of Technical Report 12 of the EIS) • an upgrade would no longer be required to the intersection of Broke Road and an existing access track (intersection upgrade IU21 in Table 5.3 of Technical Report 12 of the EIS).
Upgrades to existing 500kV transmission lines	Areas along the existing transmission line easements to the north and south of the new 500 kV transmission line that would be used to upgrade the earth wire and communication systems along the existing 500 kV transmission lines (northern and southern transmission line upgrade construction work areas).	There would be no change to the northern and southern transmission line upgrade construction work areas.
Realignment of existing 300kV transmission lines	An area to the west of the Bayswater South switching station, as well as an area within the Singleton Military Area that would be used to realign existing 330 kV transmission lines around the new 500 kV transmission line (Bayswater South and Singleton Military Area transmission line realignment construction work areas).	There would be no change to the Bayswater South and Singleton Military Area transmission line realignment construction work areas.

TABLE 5.2
SUMMARY OF ASSESSED FLOOD RISKS AND POTENTIAL IMPACTS AT PROPOSED CONSTRUCTION WORK AREAS OF THE AMENDED PROJECT

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Hebden Road construction support site (C1)	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheet 2. - No change in the level of flood affectation compared to the exhibited project. - The western fringe of the Hebden Road construction support site is inundated when water levels in Lake Lidell overtop the spillway on the outlet to the man-made lake. - During a 10% AEP design storm, depths of inundation along the western fringe of the construction support site would be inundated to a maximum depth of 1 m but would be confined to an asset protection zone that would be provided around the site to manage the risk of bushfires. During a 1% AEP design storm, the extent of inundation would extend beyond the asset protection zone by about 10 m into an area proposed for a perimeter road. Depths of inundation during a 1% AEP design storm would occur to a maximum of 1.4 m within the asset protection zone and 0.4 m within the area proposed for a perimeter road.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within the construction support site would have a minimal effect on flood behaviour.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Pikes Gully Road construction support site (C2)	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheet 2. - No change in the level of flood affectation compared to the exhibited project. - A local overland flow path runs along the northern and eastern boundaries of the Pikes Gully Road construction support site where depths of inundation are a maximum of 0.4 m during a 10% AEP event, increasing to 0.5 m during a 1% AEP event. The extent of inundation is mainly confined to the asset protection zone that is to surround the site, with the exception of some localised areas in the northern portion of the site that is proposed for a perimeter road where depths of inundation are less than 0.1 m during a 1% AEP design storm. - The access track that is proposed between the construction support site and Pikes Gully Road crosses a tributary of Pikes Creek where depths of inundation occur to a maximum of 0.7 m and over a width of about 25 m during a 10% AEP design storm, increasing to a maximum depth of 0.8 m and over a width of about 30 m during a 1% AEP design storm.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Provided that a suitable culvert crossing is incorporated into the design of the access track where it crosses a tributary of Pikes Creek, it is expected to have only a minor impact on flood behaviour. - Activities within the construction support site would have minimal effect on flood behaviour.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Gouldsville Road construction support site (C3)	More frequent than 10% AEP	✓	✓	✓	✓	x	- Refer to Figure 5.1, sheet 3. - No change in the level of flood affectation compared to the exhibited project. - While the eastern portion of the site is impacted by mainstream flooding from the Hunter River during a 1% AEP flood, the affected area is confined to the asset protection zone that is to surround the site where depths would occur to a maximum of 0.5 m. - A minor tributary of the Hunter River runs across the southern portion of the Gouldsville Road construction support site where depths of inundation are a maximum of 0.6 m during a 10% AEP event, increasing to 0.7 m during a 1% AEP event. The extent of inundation is mainly confined to the asset protection zone that surrounds the site, with the exception of some localised areas in the northern portion of the site that is proposed for a perimeter road where depths of inundation are less than 0.2 m during a 1% AEP design storm.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - 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 those portions of the site that are not within the asset protection zone.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Wollombi Road North construction support site (C4a)	More frequent than 10% AEP	✓	✓	✓	✓	x	- Refer to Figure 5.1, sheet 5. - No change in the level of flood affectation compared to the exhibited project. - While the northern portion of the construction support site is impacted by mainstream flooding from Congewai Creek during a 10% AEP design storm, the affected area is mainly confined to the proposed asset protection zone. During a 1% AEP design storm, mainstream flooding from Congewai Creek would impact an area of the site up to 80 m beyond the asset protection zone to depths up to 3 m, which would be hazardous to construction personnel and machinery. - The construction support site would be inundated by local catchment runoff that is conveyed along a number of drainage lines that run through the western portion of the site. During a 10% AEP design storm, the western portion of the site would be inundated over a width of 120 m and to a maximum depth of 0.4 m, increasing to a width of 150 m and to a maximum depth of 0.5 m during a 1% AEP design storm.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within the northern portion of the site have the potential to obstruct the conveyance of flow in Congewai Creek during storms greater than 10% AEP in intensity. Activities across the remainder of the site have the potential to alter flooding and drainage patterns in the drainage lines that presently run through it.
Wollombi Road South construction support site (C4b)	More frequent than 10% AEP	✓	✓	✓	✓	x	- Refer to Figure 5.1, sheet 5. - No change in the level of flood affectation compared to the exhibited project. - The construction support site would be inundated by local catchment runoff that is conveyed along a number of drainage lines that run through the western portion of the	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within the western portion of the site have the

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							site. During a 10% AEP design storm, the western portion of the site would be inundated over a width of 70 m and to a maximum depth of 0.3 m, increasing to a width of 90 m and to a maximum depth of 0.6 m during a 1% AEP design storm.	potential to alter flooding and drainage patterns in the drainage lines that presently run through it.
Freemans Drive construction support site (C5)	More frequent than 10% AEP	✓	✓	✓	✓	x	- Refer to Figure 5.1, sheet 6. - No change in the level of flood affectation compared to the exhibited project. - While the eastern portion of the construction support site is impacted by flow that originates from Jigadee Creek during a 10% AEP design storm, the affected area is mainly confined to the proposed asset protection zone. During a 1% AEP design storm, floodwaters originating from Jigadee Creek would impact an area of the site that extends between 20 m and 100 m to the west of the asset protection zone. Depths of inundation within the site would occur to a maximum of 1 m, which would be hazardous to construction personnel and machinery. - The site would be inundated by local catchment runoff that is conveyed along a drainage line that runs through the south-western portion of the site. During a 10% AEP design storm, the south-western portion of the site would be inundated over width of 180 m and to a maximum depth of 0.2 m, increasing to a width of 200 m and to a maximum depth of 0.3 m during a 1% AEP design storm.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within the eastern portion of the site have the potential to obstruct the conveyance of flow that originates from Jigadee Creek during storms greater than 10% AEP in intensity. - Activities within the south-western portion of the site have the potential to obstruct the conveyance of flow in the drainage line that presently runs through it.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Old Lemington Road laydown area (L1)	More frequent than 10% AEP	✓	✓		x	x	- Refer to Figure 5.1, sheet 3. - No change in the level of flood affectation compared to the exhibited project. - While the laydown area 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.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within laydown area L1 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.
Archerfield Road laydown area (L2)	More frequent than 10% AEP	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 3. - No change in the level of flood affectation compared to the exhibited project. - While the laydown area is not impacted by mainstream flooding or major overland flow, it would be inundated by local catchment runoff from upslope areas to its north. Depths of inundation across the site would typically be less than 0.1 m during a 1% AEP event.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within laydown area L2 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 ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Broken Back Trial North laydown area (L3)	Not flooded	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 4. - No change in the level of flood affectation compared to the exhibited project. - Laydown area L3 is located on a ridge line and is therefore not impacted by mainstream flooding or major overland flow.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within laydown area L3 would have no impact on mainstream flooding or major overland flow during storms up to 1% AEP in magnitude.
Broken Back Trial South laydown area (L4)	Not flooded	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 4. - No change in the level of flood affectation compared to the exhibited project. - Laydown area L4 is located on a ridge line and is therefore not impacted by mainstream flooding or major overland flow.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within laydown area L4 would have no impact on mainstream flooding or major overland flow during storms up to 1% AEP in magnitude.
Cedar Creek North laydown area (L5)	Not flooded	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 4. - No change in the level of flood affectation compared to the exhibited project. - Laydown area L5 is located on a ridge line and is therefore not impacted by mainstream flooding or major overland flow.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within laydown area L5 would have no impact on

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
								mainstream flooding or major overland flow during storms up to 1% AEP in intensity.
Cedar Creek South laydown area (L6)	Not flooded	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 4. - No change in the level of flood affectation compared to the exhibited project. - Laydown area L6 is located on a ridge line and is therefore not impacted by mainstream flooding or major overland flow.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within laydown area L6 would have no impact on mainstream flooding or major overland flow during storms up to 1% AEP in intensity.
Cedar Creek East laydown area (L7)	Not flooded	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 4. - No change in the level of flood affectation compared to the exhibited project. - Laydown area L7 is located on a ridge line and is therefore not impacted by mainstream flooding or major overland flow.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within laydown area L7 would have no impact on mainstream flooding or major overland flow during storms up to 1% AEP in intensity.
Mount Baker laydown area (L8)	Not flooded	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 5. - No change in the level of flood affectation compared to the exhibited project.	No change in the potential impacts of construction activities

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							Laydown area L8 is located on a ridge line and is therefore not impacted by mainstream flooding or major overland flow.	- on flood behaviour compared to the exhibited project. - Activities within laydown area L8 would have no impact on mainstream flooding or major overland flow during storms up to 1% AEP in intensity.
Hayes Road laydown area (L9)	More frequent than 10% AEP	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 5. - No change in the level of flood affectation compared to the exhibited project. - Laydown area L9 would be inundated by local catchment runoff that is conveyed along a drainage line that runs through the western portion of the site. During a 10% AEP design storm, the western portion of the site would be inundated over a width of 35 m and to a maximum depth of 0.4 m, increasing to a width of 40 m and to a maximum depth of 0.5 m during a 1% AEP design storm.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within the western portion of laydown area L9 have the potential to obstruct the conveyance of flow in the drainage line that presently runs through the site.
Trig Road and Flick Road laydown area (L10a)	More frequent than 10% AEP	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 5. - Replaces the North Road laydown area in the exhibited EIS. - While the laydown area 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	- Similar potential for impacts on flood behaviour to the North Road laydown area in the exhibited EIS that it replaces. - Activities within laydown area L10a are expected to have only a minor impact on flood behaviour

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							m but would reach a maximum of 0.3 m during a 1% AEP event.	given the minor nature of overland flow that is presently conveyed through the site.
Trig Road laydown area (L11)	More frequent than 10% AEP	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 5. - No change in the level of flood affectation compared to the exhibited project. - While the laydown area is not impacted by mainstream flooding or major overland flow, it would be inundated by local catchment runoff from upslope areas to its south. Depths of inundation across the site would typically be less than 0.1 m during a 1% AEP event.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within laydown area L11 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.
Wollombi Forest Road and Burma Road laydown area (L12a)	More frequent than 10% AEP	✓	✓	x	x	x	- Refer to Figure 5.1, sheet 6. - Replaces the Wollombi Forest Road laydown area in the exhibited project. - Laydown area L12a is located on a ridge line and is therefore not impacted by mainstream flooding or major overland flow.	Activities within laydown area L12a would have no impact on mainstream flooding or major overland flow during storms up to 1% AEP in magnitude.
Trig Road and Flick Road helipad site (H1a)	Not flooded	✓	x	x	x	x	- Refer to Figure 5.1, sheet 5. - Replaces the Flick Road helipad site in the exhibited project. - While the helipad 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	Activities within the helipad 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 ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							of inundation across the site would typically be less than 0.1 m during a 1% AEP event.	
Wollombi Forest Road and Burma Road helipad site (H2a)	Not flooded	✓	x	x	x	x	- Refer to Figure 5.1, sheet 5. - Replaces the Wollombi Forest Road helipad site in the exhibited project. - The helipad site is located on a ridge line and is therefore not impacted by mainstream flooding or major overland flow.	Activities within the helipad site would have no impact on mainstream flooding or major overland flow during storms up to 1% AEP in magnitude.
Bayswater South switching station construction work area	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheet 2. - No change in the level of flood affectation compared to the exhibited project. - The Bayswater South construction work area would be inundated by flow that is conveyed along a tributary of Saltwater Creek that runs in a westerly direction through its middle portion. Flow in the tributary will pond at the inlet of a culvert that is located under an existing access track that runs through the western portion of the work area to a maximum depth of 1.8 m during a 10% AEP design storm, increasing to 2.5 m during a 1% AEP design storm. Depths of flow along the remainder to the tributary where it runs through the work area are typically between 0.2 m and 0.5 m during a 10% AEP design storm, increasing to between 0.3 m and 0.6 m during a 1% AEP design storm. - The work area would also be inundated by local catchment runoff that is conveyed along a number of drainage lines that	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within western portion of the work area have the potential to displace floodwater that presently ponds at the inlet to the culvert that is located under the existing access track. - Activities within the central and northern portions of the work area have the potential to obstruct the conveyance of flow in the drainage lines that presently run through the work area.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							drain to the aforementioned tributary of Saltwater Creek, the largest of which runs through its northern portion where depths of inundation are typically between 0.2 m and 0.4 m during a 10% AEP design storm, increasing to between 0.3 m and 0.5 m during a 1% AEP design storm.	
Olney switching station construction work area	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheet 6. - No change in the level of flood affectation compared to the exhibited project. - The work area would be inundated by local catchment runoff that is conveyed along a number of drainage lines that run in a westerly direction through the site. Two of the larger drainage lines run through the northern and southern portions of the work area where depths of overland flow occur to a maximum of 0.5 m, but are typically less than 0.2 m during a 10% AEP design storm. During a 1% AEP design storm, depths of overland flow occur to a maximum of 0.8 m but are typically less than 0.3 m. Widths of flow along the drainage lines are typically between 10 m and 20 m during storms up to 1% AEP in intensity.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within the work area have the potential to alter flooding and drainage patterns in the drainage lines that run through the site.
Eraring substation extension construction work area	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheet 6. - The increase in the extent of the Eraring construction work area under the amended project would have the following additional areas of flood affectation compared to the exhibited project:	Similar to the exhibited project, activities within the Eraring construction work area of the amended project have the potential to obstruct the conveyance of flow in the

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							○ Along a drainage line that runs in a southerly direction through the western portion of the work area, where overland flow would occur to a depth of between 0.1 m and 0.3 m during a 1% AEP design storm. ○ Along a catch drain that runs in a southerly direction to the west of the Eraring substation where depths of inundation occur to a maximum of 1.4 m during a 10% AEP design storm, increasing to a maximum of 1.8 m during a 1% AEP design storm. ● Based on the updated Eraring TUFLOW model, the definition of flood behaviour within the Eraring construction work area would be the same or slightly less than that presented in the EIS in the following areas: ○ Along a drainage channel that runs in a southerly direction through its eastern portion, where overland flow would occur to a depth of between 0.4 m and 0.7 m during a 10% AEP design storm (same as that presented in the EIS), increasing to between 0.5 m and 0.9 m during a 1% AEP design storm (0.2 m less than that presented in the EIS). ○ Along a catch drain that runs in a southerly direction to the east of the Eraring substation, where depths of inundation occur to a maximum of 0.4 m during a 10% AEP design storm, increasing to a maximum of	drainage channels and catch drains that presently run through the site.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							0.5 m during a 1% AEP design storm (same as that presented in the EIS).	
Bayswater underground cabling area	More frequent than 10% AEP	x	✓	x	✓	x	- Refer to Figure 5.1, sheet 2. - The underground cabling area that is proposed under the amended project would be inundated by flow that is conveyed along a drainage line that runs in a westerly direction through its southern portion, where depths of inundation would occur to a maximum of 0.2 m during a 1% AEP design storm. - The underground cabling area also crosses: - a catch drain that controls runoff from an area to the south of the Bayswater substation, where depths of inundation would occur to a maximum of 0.4 m during a 1% AEP design storm - a channel that runs in a westerly direction approximately 180 m to the south of the Bayswater substation, where depths of inundation would occur to a maximum of 1.4 m during a 1% AEP design storm. The channel conveys flows between water storage dams that are located to the east and west of the Bayswater substation.	Trenching within the underground cabling area has the potential to obstruct or divert the conveyance of flow in the drainage line, catch drain and channel that it crosses.
Eraring west underground cabling area	More frequent than 10% AEP	x	✓	x	✓	x	- Refer to Figure 5.1, sheet 6. - The underground cabling area that is proposed under the amended project would be inundated by flow that is	Trenching within the underground cabling area has the potential to obstruct or divert the conveyance

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							conveyed along a drainage line that runs in a westerly direction through its middle portion, where depths of inundation would occur to a maximum of 0.3 m during a 1% AEP design storm.	of flow in the drainage line that it crosses.
Eraring east underground cabling area	More frequent than 10% AEP	x	✓	x	✓	x	- Refer to Figure 5.1, sheet 6. - The underground cabling area that is proposed under the amended project would be inundated by flow that surcharges a culvert that controls flow in a drainage channel that runs in a southerly direction to the east of the Eraring substation. During a 1% AEP design storm, flow that surcharges the aforementioned culvert would inundate the underground cabling area to a maximum depth of 0.2 m.	Trenching within the underground cabling area has the potential to obstruct or divert the conveyance of flow that surcharges the inlet to the culvert that it crosses.
HTP northern section transmission line construction work area	More frequent than 10% AEP	x	✓	x	✓	✓	- Refer to Figure 5.1, sheets 2, 3 and 4. - Similar to the exhibited project, the HTP northern section transmission line construction work area under the amended project crosses a number of perennial and non-perennial creeks, watercourses and local drainage lines, including the main arm of the Hunter River at three locations. The construction work area would be inundated by runoff that is conveyed in these watercourses and local drainage lines during frequent rainfall events. - The change in the alignment of the transmission line corridor at Gouldsville under the amended project would result in no significant change in the level of flood affectation.	- Similar potential for impacts on flood behaviour compared to the exhibited project. - Construction activities along the work area have the potential to obstruct the conveyance of flow in the creeks, watercourses and local drainage lines that cross the corridor.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							- The change in the alignment of the transmission line corridor at Mount Thorley would result in the following changes in the level of flood affectation during a 1% AEP event compared to the exhibited project: - Under the exhibited project, the work area would be inundated by Hunter River flooding where it runs along the southern overbank of the river at its confluence with Loder Creek over a length of 3,200 m and to a maximum depth of 6 m. - Under the amended project, the work area would be inundated by Hunter River flooding at the two following two locations: - Where it crosses Loder Creek to the south of its confluence with the Hunter River over a length of 360 m and to a maximum depth of 6 m - Where it crosses Doctors Creek along the southern overbank of the Hunter River to the west of Loder Creek over a length of 2,200 m and to a maximum depth of 6 m. - For the remainder of the work area, the level of flood affectation would be the same as that under the exhibited project. This would include the following locations where the new transmission line construction work area would be inundated by floodwater during a 1% AEP event:	

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							- over a length of about 30 m and to a maximum depth of about 1 m where it crosses Wisemans Creek - over a length of about 40 m and to a maximum depth of about 2 m where it crosses Parnells Creek - over lengths of between 500 m and 1,100 m and to a maximum depth of 15 m where it crosses the Hunter River at three locations in Jerrys Plains, Lemington and Warkworth - over a length of about 1,800 m and to a maximum depth of about 15 m where it crosses Wollombi Brook upstream of its confluence with the Hunter River - over a length of about 350 m and to a maximum depth of about 5 m where it crosses Sandy Hollow Creek upstream of its confluence with the Hunter River - over a length of about 1,300 m and to a maximum depth of about 3 m where it crosses the western bank of the Hunter River at Gouldsville - over a length of about 130 m and to a maximum depth of about 1 m where it crosses Nine Mile Creek - over a length of about 780 m and to a maximum depth of about 1 m where it crosses Monkey Place Creek and a number of its unnamed tributaries - over a length of about 110 m and to a maximum depth of about 2 m where it crosses Potholes Gully at its confluence with Monkey Place Creek	

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							over a length of about 70 m and to a maximum depth of about 2.5 m where it crosses Monkey Place Creek upstream of its confluence with Potholes Gully.	
HTP central section transmission line construction work area	More frequent than 10% AEP	x	✓	x	✓	✓	- Refer to Figure 5.1, sheets 4, 5 and 6. - No change in the level of flood affectation compared to the exhibited project. - The work area crosses a number of perennial and non-perennial creeks, watercourses and local drainage lines that are tributaries and sub-tributaries of Wollombi Brook. The construction work area would be inundated by flow that is conveyed in these creeks, watercourses and local drainage lines during frequent rainfall events. - During a 1% AEP event, the work area would be inundated by floodwater at a number of locations, including: - over a length of about 70 m and to a maximum depth of about 5 m where it crosses Deep Creek upstream of its confluence with Cedar Creek - over a length of about 80 m and to a maximum depth of about 5 m where it crosses Cedar Creek upstream of its confluence with Deep Creek - over a length of about 240 m and to a maximum depth of about 7 m where it crosses Congewai Creek - over a length of about 50 m and to a maximum depth of about 4 m where it crosses Sweetmans Creek.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Construction activities along the work area have the potential to obstruct the conveyance of flow in the creeks, watercourses and local drainage lines that cross the corridor.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
HTP southern section transmission line construction work area	More frequent than 10% AEP	x	✓	x	✓	✓	- Refer to Figure 5.1, sheet 6. - No change in the level of flood affectation compared to the exhibited project. - The work area crosses a number of perennial and non-perennial watercourses and local drainage lines, the largest of which is Watagan Creek. The construction work area would be inundated by runoff that is conveyed in these creeks, watercourses and local drainage lines during frequent rainfall events. - During a 1% AEP event, the new transmission line construction work area would be inundated by floodwater at a number of locations, including over a length of about 50 m and to a maximum depth of about 3 m where it crosses Watagan Creek.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Construction activities along the work area have the potential to obstruct the conveyance of flow in the creeks, watercourses and local drainage lines that cross the corridor.
HTP northern section access track construction work area	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheets 2, 3 and 4. - Similar to the exhibited project, the access track construction work area crosses a number of non-perennial creeks, watercourses and local drainage lines. The construction work area would be inundated by runoff that is conveyed in these creeks, watercourses and local drainage lines during frequent rainfall events. - As a result of the changes in the extent of access tracks under the amended project, the construction work area would:	Construction activities along the work area have the potential to obstruct the conveyance of flow in the creeks, watercourses and local drainage lines that cross the corridor.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							○ no longer cross Saddlers Creek ○ cross Doctors Creek at a different location to the exhibited project. The crossing under the amended project would be inundated by backwater flooding from the Hunter River during a 1% AEP event to a maximum depth of 4 m, compared to 6 m based on the crossing location in the exhibited project. ○ cross Loder Creek to the south of its confluence with the Hunter River, where the depth of inundation would occur to a maximum of 6 m during a 1% AEP event due to backwater flooding from the river. • For the remainder of the construction work area, the level of flood affectation would be the same as that under the exhibited project. This would include the following locations where the access track construction work area would be inundated by floodwater during a 1% AEP event: ○ over a length of about 50 m and to a maximum depth of about 3.4 m where it crosses Saddlers Creek ○ over a length of about 40 m and to a maximum depth of about 0.4 m where it crosses Pikes Creek ○ over a length of about 30 m and to a maximum depth of about 1.2 m where it crosses Parnells Creek within the new transmission line corridor	

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							- over a length of about 70 m and to a maximum depth of about 2 m where it crosses Parnells Creek to the east (downstream) of the new transmission line corridor - over a length of about 50 m and to a maximum depth of about 1.5 m where it crosses Sandy Hollow Creek - over a length of about 130 m and to a maximum depth of about 1.0 m where it crosses Nine Mile Creek - over a length of about 140 m and to a maximum depth of about 2.5 m where it crosses Monkey Place Creek - over a length of about 50 m and to a maximum depth of about 2 m where it crosses Peach Tree Creek.	
HTP central section access track construction work area	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheets 4, 5 and 6. - No change in the level of flood affectation compared to the exhibited project. - While significant lengths of the work area run along ridgelines, there are sections that cross a number of perennial and non-perennial creeks, watercourses and local drainage lines, the largest of which is Congewai Creek. The construction work area would be inundated by flow that is conveyed in these creeks, watercourses and local drainage lines during frequent rainfall events. - During a 1% AEP event, the access track construction work area would be inundated by floodwater at a number of locations, including: over a length of about 340 m and to a	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Construction activities along the work area have the potential to obstruct the conveyance of flow in the creeks, watercourses and local drainage lines that cross the corridor.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
							maximum depth of about 7 m where it crosses Congewai Creek.	
HTP southern section access track construction work area	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheet 6. - No change in the level of flood affectation compared to the exhibited project. - The access track construction work area crosses a number of perennial and non-perennial creeks, watercourses and local drainage lines, the largest of which are Felled Timber Creek and Jigadee Creek. The construction work area would be inundated by flow that is conveyed in these creeks, watercourses and local drainage lines during frequent rainfall events. - During a 1% AEP event, the access track construction work area would be inundated by floodwater at a number of locations, including: - over a length of about 180 m and to a maximum depth of about 2.5 m where it crosses Felled Timber Creek to the north of Martinsville Hill Road - over a length of about 1,400 m and to a maximum depth of about 4 m where it crosses Jigadee Creek and one of its anabranches to the east of Freemans Drive.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Construction activities along the work area have the potential to obstruct the conveyance of flow in the creeks, watercourses and local drainage lines that cross the corridor.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Northern transmission line upgrade construction work area	More frequent than 10% AEP	x	✓	x	✓	✓	- Refer to Figure 5.1, sheet 2. - No change in the level of flood affectation compared to the exhibited project. - The work area crosses a number of non-perennial watercourses and local drainage lines, the largest of which is Saddlers Creek. - During a 10% AEP design storm, the construction work area would be inundated by flow that is conveyed along Saddlers Creek over a width of 30 m and to a maximum depth of 2.6 m, increasing to a width of 50 m and to a maximum depth of 3.4 m during a 1% AEP design storm. Inundation of the work area along other watercourses would be a maximum of 1.6 m, but typically less than 1 m during a 1% AEP design storm.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Construction activities along the work area have the potential to obstruct the conveyance of flow in Saddlers Creek as well as the minor watercourses and local drainage lines that cross the corridor.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Southern transmission line upgrade construction work area	More frequent than 10% AEP	x	✓	x	✓	✓	- Refer to Figure 5.1, sheet 6. - No change in the level of flood affectation compared to the exhibited project. - The work area crosses a number of perennial and non-perennial creeks, watercourses and local drainage lines, the largest of which are the Wyong River and Dora Creek. The construction work area would be inundated by runoff that is conveyed in these watercourses and local drainage lines during frequent rainfall events. - During a 1% AEP event, the new transmission line construction work area would be inundated by floodwater at a number of locations, including: - over a length of about 160 m and to a maximum depth of about 6 m where it crosses the Wyong River - over a length of about 80 m and to a maximum depth of about 2 m where it crosses Merchants Creek - over a length of about 200 m and to a maximum depth of about 6.5 m where it crosses Dora Creek - over a length of about 180 m and to a maximum depth of about 3 m where it crosses Felled Timber Creek - over a length of about 650 m and to a maximum depth of about 4 m where it crosses Jigadee Creek and one of its tributaries.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Construction activities along the work area have the potential to obstruct the conveyance of flow in the creeks, watercourses and local drainage lines that cross the corridor.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Bayswater South transmission line realignment construction work area	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheet 2. - No change in the level of flood affectation compared to the exhibited project. - While the work area is not impacted by mainstream flooding, there are a number of drainage lines that convey local catchment runoff through the site. Depths of overland flow along these drainage lines are typically less than 0.2 m during a 1% AEP event, but reach up to 0.8 m in a number of locations. These drainage lines discharge to Wisemans Creek and Saltwater Creek, which are located to the west of the construction work area.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within the work area have the potential to alter flooding and drainage patterns in the receiving drainage lines that discharge to Wisemans Creek and Saltwater Creek.

Construction ancillary facility or work area	Threshold of flooding ⁽¹⁾	Proposed construction activities ⁽²⁾					Assessment of Flood affectation under the amended project	Potential impacts of construction activities on flood behaviour under the amended project
		Site facilities ⁽³⁾	Material storage & spoil management ⁽⁴⁾	Temporary worker accommodation	Earthworks ⁽⁵⁾	Transmission line construction ⁽⁶⁾		
Singleton Military Area transmission line realignment construction work area	More frequent than 10% AEP	✓	✓	x	✓	x	- Refer to Figure 5.1, sheet 4. - No change in the level of flood affectation compared to the exhibited project. - The work area would be inundated by flow that is conveyed along a tributary of Nine Mile Creek that runs in a northerly direction through the middle portion of the work area. Depths of overland flow along the tributary where it runs through the work area are typically between 0.2 m and 0.5 m during a 10% AEP design storm, increasing to between 0.3 m and 0.6 m during a 1% AEP design storm. - The work area would also be inundated by local catchment runoff that is conveyed along a number of drainage lines that cross it to the north and south of the aforementioned tributary of Nine Mile Creek where depths of inundation are typically less than 0.3 m during a 1% AEP design storm.	- No change in the potential impacts of construction activities on flood behaviour compared to the exhibited project. - Activities within the work area have the potential to obstruct the conveyance of flow in the drainage lines that presently run through the work area.

1. The assessed threshold of flooding is based on pre-project conditions. Refer **Figure 5.1** (6 sheets) for flood extent mapping under pre-project conditions.
2. Refer to **Section 5.1** for a description of flood risks associated with each construction activity.
3. Site facilities include construction compounds, support facilities and temporary worker accommodation, which include site offices, staff amenities, storage of materials and parking.
4. Spoil management includes stockpiling and treatment of excavated material.
5. Earthworks includes construction of access roads and tracks, as well as and drainage works.
6. Transmission line construction includes working pads for piling machinery to install the footings of transmission line support towers as well as for machinery for the purpose of stringing the transmission lines.

TABLE 5.3
LENGTH OF ACCESS TRACKS INUNDATED BY FLOODWATERS

Type of access track	Exhibited project			Amended project		
	Length (m)	Length inundated by floodwater (m) ⁽¹⁾		Length (m)	Length inundated by floodwater (m) ⁽¹⁾	
		10% AEP	1% AEP		10% AEP	1% AEP
HTP northern section						
Minor works to existing access tracks	10,860	840	1,100	33,890	3,280	3,980
Upgrades to existing access tracks	69,030	5,480	8,570	52,810	3,620	5,630
New access tracks	48,750	2,310	9,420	51,340	3,040	10,070
Total within HTP northern section	128,640	8,630	19,090	138,040	9,940	19,680
HTP central section						
Minor works to existing access tracks	-	-	-	-	-	-
Upgrades to existing access tracks	68,500	4,900	5,190	57,750	2,870	3,110
New access tracks	20,700	710	860	19,550	450	540
Total within HTP central section	89,200	5,610	6,050	77,300	3,320	3,650
HTP southern section						
Minor works to existing access tracks	19,270	2,300	3,100	7,070	1,130	1,280
Upgrades to existing access tracks	62,980	5,670	5,920	92,960	7,520	8,650
New access tracks	8,150	340	390	4,480	220	250
Total within HTP southern section	90,410	8,310	9,410	104,510	8,870	10,180
Combined Total	308,250	22,560	34,550	319,850	22,130	33,510

1. For the purpose of quantifying the length of access track that is inundated by floodwater, a cutoff depth of 0.3 metres was adopted as being representative of mainstream flooding or major overland flow.

TABLE 5.4
INITIAL ASSESSMENT OF POTENTIAL FLOOD AFFECTATION OF LOCAL ROADS AND INTERSECTIONS THAT ARE TO BE UPGRADED UNDER THE AMENDED PROJECT

Identifier ⁽¹⁾	Location	Initial assessment of potential flood affectation of the project impact area under the amended project
Road upgrades		
RU01	Pokolbin Mountains Road	The road upgrade crosses several drainage lines that flow to Foxy Gully, which is a tributary of Muggyrang Creek. During a 1% AEP design storm, depths of flow in these minor watercourses are typically less than 0.5 m where they cross Pokolbin Mountains Road.
RU02	Broken Back Road	The road upgrade crosses several drainage lines that flow to Flying Fox Creek, which is a tributary of Cedar Creek. During a 1% AEP design storm, depths of flow in these minor watercourses are typically less than 0.5 m where they cross Broken Back Road.
RU03	Mount Baker Road	The western portion of the road upgrade generally follows the ridgeline between Cedar Creek and Congewai Creek and is not impacted by mainstream flooding or major overland flow. A minor watercourse that drains to Cedar Creek crosses the road upgrade at its eastern end, where depths of inundation would occur to a maximum of 1 m during a 1% AEP design storm.
RU04	Mount View Road	Crosses several minor watercourses that drain to Congewai Creek. During a 1% AEP design storm, depths of flow in these minor watercourses occur to a maximum of 1 m, but are typically less than 0.5 m where they cross Mount View Road.
RU05	Hayes Road	A minor watercourse that drains to Cedar Creek crosses the road upgrade at its eastern end, where depths of inundation would occur to a maximum of 1 m during a 1% AEP design storm.
RU06	MF1 Road	The southern portion of the road upgrade generally follows the ridgeline between Sweetmans Creek and Peach Tree Gully and is not impacted by mainstream flooding or major overland flow. The northern portion of the road upgrade crosses several drainage lines that flow to Congewai Creek. During a 1% AEP design storm, depths of flow in these minor watercourses are typically less than 0.5 m where they cross MF1 Road.
RU07	Watagan Road	The road upgrade crosses several drainage lines that flow to Dora Creek. During a 1% AEP design storm, depths of flow in these minor watercourses are typically less than 0.5 m where they cross Watagan Road.
Intersection upgrades		
IU01 [I-48]	Hebden Road and construction support site access	Potentially impacted by local catchment flow that is conveyed along the table drains that run in a westerly direction along both sides of Hebden Road.
IU02 [I-44]	Road at entry to Bayswater Power Station	Potentially impacted by flow in a minor tributary of Tinkers Creek, which crosses the northern portion of the intersection upgrade.
IU03 [I-47]	Pikes Gully Road and access to construction support site	Potentially impacted by local catchment flow that is conveyed along the table drains that run in an easterly direction along both sides of Pikes Gully Road.

Identifier ⁽¹⁾	Location	Initial assessment of potential flood affectation of the project impact area under the amended project
IU04 [I-43]	Lemington Road and access track east	Potentially impacted by local catchment flow that is conveyed along the table drains that run along both sides of Lemington Road.
IU05 [I-50]	Lemington Road and Old Lemington Road	Potentially impacted by flow in two minor tributaries of the Hunter River, which crosses the northern and southern portions of the intersection upgrade.
IU06 [I-49]	Lemington Road and access track west	Potentially impacted by flow in two minor tributaries of the Hunter River, which crosses the northern and southern portions of the intersection upgrade.
IU07 [I-03]	Golden Highway (Jerrys Plains Road) and Lemington Road	The intersection upgrade is located in an area that would be impacted by Hunter River flooding. During a 1% AEP flood, depths of inundation over the intersection upgrade would occur to a maximum of 3 m.
IU08 [I-33]	Golden Highway (Jerrys Plains Road) and access track north	Potentially impacted by flow in a minor tributary of Waterfall Creek, which crosses the southern portion of the intersection upgrade.
IU09 [I-42]	Archerfield Road and laydown area	Potentially impacted by flow in a minor tributary of the Hunter River, which cross the northern portion of the intersection upgrade.
IU10 [I-04]	Golden Highway (Jerrys Plains Road) and Comileroi Road	Potentially impacted by flow in Redbank Creek, which crosses Jerrys Plains Road immediately south of the intersection upgrade. The intersection upgrade is also potentially impacted by flow in a minor tributary of Redbank Creek, which crosses Comileroi Road immediately east of the intersection upgrade.
IU11 [I-40]	Long Point Road West and access track central	Potentially impacted by flow in two minor tributaries of Sandy Hollow Creek, which cross the eastern and western portions of the intersection upgrade.
IU12⁽²⁾ [I-46]	Long Point Road West and access track central	Potentially impacted by flow in two minor tributaries of Sandy Hollow Creek, which cross the eastern and western portions of the intersection upgrade.
IU13 [I-41]	Long Point Road West and access track east	Potentially impacted by flow in a minor tributary of the Hunter River, which crosses the eastern portion of the intersection upgrade.
IU14 [I-51]	Gouldsville Road and construction support site	Potentially impacted by flow in a minor tributary of the Hunter River, which crosses the southern portion of the intersection upgrade.
IU15 ⁽³⁾ [I-07]	Golden Highway (Jerrys Plains Road) and Gouldsville Road	The increase in footprint under the amended project does not significantly change the level of flood affectation compared to the exhibited project. Potentially impacted by local catchment flow that is conveyed along the table drains that run along both sides of Jerrys Plains Road.
IU16 [I-32]	Jerrys Plains Road and access track south	Potentially impacted by local catchment flow that is conveyed along the table drains that run along both sides of Jerrys Plains Road.
IU17 ⁽³⁾ [I-31]	Putty Road and access track north	The increase in footprint under the amended project does not significantly change the level of flood affectation compared to the exhibited project. Potentially impacted by flow in Loder Creek, which crosses Putty Road immediately east of the intersection upgrade. The intersection upgrade is also potentially impacted by flow in the table drain that runs along the southern side of Putty Road.

Identifier ⁽¹⁾	Location	Initial assessment of potential flood affectation of the project impact area under the amended project
IU18 [I-52]	Putty Road and access track south	Potentially impacted by flow in Loder Creek, which crosses Putty Road immediately west of the intersection upgrade. The intersection upgrade is also potentially impacted by flow in the table drains that runs in an easterly direction along both sides of Putty Road.
IU19 [I-36]	Broke Road and access track north	Potentially impacted by flow in two minor tributaries of Loder Creek, which cross the northern and southern portions of the intersection upgrade.
IU20 [I-35]	Broke Road and access track central	Potentially impacted by local catchment flow that is conveyed along the table drain that runs along the eastern side of Broke Road.
IU21⁽²⁾ [I-39]	Broke Road and access track south	Potentially impacted by flow in a tributary of Loder Creek, which crosses Broke Road immediately north of the intersection upgrade.
IU22 [I-38]	Broke Road and SMA access track	Potentially impacted by flow that is conveyed along a drainage channel that runs along the eastern side of Broke Road and discharges to Nine Mile Creek to the north of the intersection upgrade.
IU23 ⁽³⁾ [I-37]	Cessnock Road and access track north	No change in footprint and therefore level of flood affectation compared to the exhibited project. Potentially impacted by flow in two tributaries of Monkey Place Creek, which cross the eastern and western portions of the intersection upgrade.
IU24 [I-53]	Cessnock Road and access track north	Potentially impacted by flow in a tributary of Monkey Place Creek, which crosses the western portion of the intersection upgrade.
IU25 [I-21a]	Cessnock Road and Oakley Lane	Potentially impacted by flow in a tributary of Monkey Place Creek, which crosses the western portion of the intersection upgrade. The southern portion of the intersection upgrade is also potentially impacted by flow that surcharges the main channel of Monkey Place Creek, and is conveyed in a westerly direction along its northern overbank.
IU26 ⁽⁴⁾ [I-15]	McDonalds Road , Pokolbin Mountains Road and Oaky Creek Road	Potentially impacted by flow in Pokolbin Creek, which crosses the eastern portion of the intersection upgrade.
IU27 [I-34]	Wollombi Road and access track west	Potentially impacted by flow in a tributary of Congewai Creek, which crosses the middle portion of the intersection upgrade.
IU28 [I-54]	Wollombi Road and access track east	Potentially impacted by flow in a tributary of Congewai Creek, which crosses the western portion of the intersection upgrade.
IU29 [I-20]	Wollombi Road and Hayes Road	Potentially impacted by flow in a tributary of Congewai Creek, which crosses the western portion of the intersection upgrade.
IU30 [I-19]	Wollombi Road and Mount View Road in Millfield	Potentially impacted by local catchment flow that is conveyed along Wollombi Road towards its intersection with Mount View Road.
IU31 [I-25]	Martinsville Road and Watagan Road	Potentially impacted by local catchment flow that is conveyed along the table drain that runs along the southern side of Martinsville Road.
IU32 [I-58]	Freemans Drive and Mount Nellinda Road	Potentially impacted by local catchment flow that is conveyed along the table drain that runs in a westerly direction along the northern side of Freemans Drive towards its intersection with Mount Nellinda Road.
IU33 [I-28]	Freemans Drive and Mount Faulk Road	Potentially impacted by local catchment flow that is conveyed along the table drain that runs in an easterly direction along the southern side of Freemans Drive at its intersection with Mount Faulk Road.

Identifier ⁽¹⁾	Location	Initial assessment of potential flood affectation of the project impact area under the amended project
IU34 [I-45]	Freemans Drive and construction support site	Potentially impacted by local catchment flow that is conveyed along the table drain that runs along the eastern side of Freemans Drive.
IU35 ⁽³⁾ [I-23]	Martinsville Road and Freemans Drive	No change in footprint and therefore level of flood affectation compared to the exhibited project. Potentially impacted by flow in Dora Creek, which crosses Freemans Drive immediately east of the intersection upgrade.
IU36 ⁽⁴⁾ [-]	Jerry Plains Road and access track	Potentially impacted by local catchment flow that is conveyed along table drains that runs in an easterly direction along both sides of Jerrys Plains Road.

1. Refer **Figure 4.1** (6 sheets) for location of road and intersection upgrade identifiers. Value in brackets denotes the identifier that is adopted in Appendix K (Traffic and transport impact assessment) of the EIS.
2. Is included in Table 5.3 of Technical Report 12 of the EIS but no longer forms part of the amended project.
3. Identified in **Table 2.1** as involving a change in scope compared to the exhibited project.
4. Not included in Table 5.3 of Technical Report 12 of the EIS.

6 OPERATIONAL IMPACT ASSESSMENT

This section outlines the potential operational flood impacts resulting from the amended project and notes where the operational impacts from the proposed amendments and refinements are consistent with the operational impacts assessed as part of the exhibited project.

This section also contains an updated assessment of the impact that the Eraring substation extension would have on flood behaviour. As noted in **Chapter 3**, this updated assessment has been based on an updated set of flood models that incorporate details of the piped drainage network that have been provided by Origin Energy in the vicinity of the Eraring Power Station subsequent to the preparation of the FIA for the EIS.

6.1 Potential flood risk to the project and its impact on flood behaviour

Section 6 of Technical Report 12 of the EIS 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 Report 12 of the EIS, the operational related features of the project were divided into the following components:

- Bayswater South switching station
- Olney switching station
- Eraring substation extension
- the new 500 kV transmission line corridor that would link the existing 500 kV transmission lines at Bayswater in the north and Olney in the south
- the sections of existing 500 kV transmission line corridor to the north and south of the new 500 kV transmission line that would be upgraded to accommodate the new connections
- the sections of existing 330 kV transmission line corridor to the east of the Bayswater South switching station and within the western portion of the Singleton Military Area that would be realigned to accommodate the new 500 kV transmission line corridor.

While the project would also require modifications to equipment and circuit line connections within the existing substations at Bayswater and Eraring to accommodate the new 500 kV transmission line, these works would be confined to the existing footprint of the two substations and would therefore have no significant impact on flood behaviour.

Under the amended project:

- there would be no change in the general layout of:
 - the Bayswater South and Olney switching stations, as well as the Eraring substation extension
 - the sections of existing 500 kV transmission line corridor to the north and south of the new 500 kV transmission line
 - the sections of existing 330 kV transmission line corridor to the east of the Bayswater South switching station and within the western portion of the Singleton Military Area
- there would be changes to the configuration of towers and access roads along sections of the new 500 kV transmission line corridor at Olney, Mount Thorley and Gouldsville.

Section 6.1.1 presents the findings of an updated flood impact assessment for the Eraring substation extension based on the additional details provided by Origin Energy, while **Section 6.1.2** presents the findings of a flood impact assessment of the proposed changes to the configuration of towers and access roads along sections of the new 500 kV transmission line corridor at Olney, Mount Thorley and Gouldsville.

6.1.1 Updated flood impact assessment for the Eraring substation extension

The following provides an update of the assessment that is presented in Section 6.1.3 of Technical Report 12 of the EIS using the additional data provided by Origin Energy on the drainage system in the vicinity of the Eraring Power Station. Where relevant, comparison is made with the findings presented in Technical Report 12 of the EIS.

Impact of flooding on the Eraring substation extension using additional Origin Energy data

Figure 4.7a shows the indicative extent and depth of inundation in the vicinity of the Eraring substation extension under existing (i.e. pre-project) conditions for a 10% AEP design storm, while **Figures 4.7b** and **4.7c** respectively show the corresponding results for a 1% AEP design storm and the PMF event.

A major overland flowpath runs in a southerly direction through the eastern portion of the site of the Eraring substation extension (denoted “eastern overland flowpath” on **Figures 4.7a, 4.7b** and **4.7c**), where depths occur to a maximum of 0.7 metres during a 10% AEP design storm (the same as that presented in Technical Report 12 of the EIS), increasing to 0.9 metres during a 1% AEP design storm (0.2 metres less than that presented in Technical Report 12 of the EIS). The site of the Eraring substation extension is also inundated by local catchment runoff from the existing substation that is conveyed along a catch drain that runs in a southerly direction through the western portion of the site (denoted “western catch drain” on **Figures 4.7a, 4.7b** and **4.7c**) where depths of inundation occur to a maximum of 0.4 metres during a 10% AEP design storm, increasing to a maximum of 0.5 metres during a 1% AEP design storm (the same as that presented in Technical Report 12 of the EIS).

A series of diversion channels and culverts would be installed to convey flow through the site of the Eraring substation extension, the level of which would be set to manage the impact of flooding on the switchyards, transformers and associated infrastructure. Based on the assessed concept design that has been developed by Transgrid, the proposed works would include a large sized box culvert (measuring 4.2 metres wide) that would control flow that is conveyed along the major overland flow path that runs through the eastern portion of the site. The diversion channels and culverts in combination with the minimum level of the substation extension would be designed to achieve the hydrologic standards that are set out in Table 3.1 in Section 3.3 of Technical Report 12 of the EIS. The proposed arrangement would be subject to further development during detailed design.

Impact of the Eraring substation extension on flood behaviour using additional Origin Energy data

The Eraring substation extension has the potential to impact on flooding patterns due to:

- i. an increase in the rate and volume of runoff from the substation pad, access roads and other hardstand areas within the station extension, which in turn has the potential to increase the rate and volume of runoff being conveyed in the receiving drainage line

- ii. the obstruction and/or displacement of floodwaters that are presently conveyed through the site of the proposed substation extension, which in turn has the potential to increase flood levels upstream and/or alter existing flooding patterns in the receiving drainage line.

In order to assess the impact of the Eraring substation extension on flood behaviour, the structure of the flood models representing pre-project conditions was adjusted to incorporate details of the proposed works. The increase in runoff associated with new hardstand areas and the redirection of flow associated with the proposed diversion channels and culverts were also incorporated into the flood models.

The following figures showing flooding patterns and impacts in the vicinity of the Eraring substation extension under operational conditions should be referred to when reading the following discussion:

- **Figures 6.1a, 6.1b and 6.1c** show the indicative extent and depth of inundation in the vicinity of the Eraring substation extension under post-project conditions for design storms with AEPs of 10% and 1%, as well as the PMF event, respectively. **Figures C.4a and C.4b** in **Annexure C** respectively show corresponding results for design storms with AEPs of 0.5% and 0.2% AEP.
- **Figures 6.2a, 6.2b and 6.2c** show the impact that the Eraring substation extension would have on flood behaviour in terms of changes in peak flood levels for design storms with AEPs of 10% and 1%, as well as the PMF event, respectively. **Figures C.5a and C.5b** in **Annexure C** respectively show corresponding results for design storms with AEPs of 0.2% and 0.05% AEP.
- **Figures D.7a and D.7b** in **Annexure D** show maximum flow velocities under post-project conditions in the vicinity of the Eraring substation extension during storms with AEPs of 10% and 1%, while **Figures D.8a and D.8b** in **Annexure D** show the impact that it would have in terms of changes in maximum flow velocities for the same design storm events.
- **Figures D.9a and D.9b** in **Annexure D** show the duration of inundation in the vicinity of the Eraring substation extension under post-project conditions during storms with AEPs of 10% and 1%, while **Figures D.10a and D.10b** in **Annexure D** show the impact that it would have in terms of changes in the duration of inundation for the same design storm events.

The key findings of the assessment of the impact that the Eraring substation extension would have on flood behaviour are summarised below.

Changes in peak flood levels and depths of inundation

During storms with AEPs of 10% and 1%, there would be a reduction in the depth of inundation along the section of the eastern overland flowpath where it runs to the north (upstream) of the Eraring substation extension. This can be attributed to the increased efficiency of the culvert that is proposed to run under the eastern portion of the substation extension, which in turn would also lead to an increase in the rate and depth of flow in areas downstream of the Eraring substation extension as outlined below:

- During a 10% AEP design storm, there would be an increase in the depth of inundation along the eastern overland flowpath where it runs to the south (downstream) of the Eraring substation extension by a maximum of 0.06 metres on an existing depth of about 0.7 metres, compared to a maximum increase of 0.06 metres on an existing depth of about 0.8 metres based on the assessment that was presented in Technical Report 12 of the EIS.

- During a 1% AEP design storm, the depth of inundation along the overland flowpath would be increased by a maximum of 0.08 metres on an existing depth of 0.9 metres, compared to a maximum of 0.17 metres on an existing depth of about 0.9 metres based on the assessment that was presented in Technical Report 12 of the EIS.
- During storms with AEPs of 10% and 1% AEP, increases in the depth of inundation along the eastern overland flowpath would extend downstream to the inlet of the culvert that runs under the Main Northern Railway. This is consistent with the findings of the assessment that was presented in Technical Report 12 of the EIS.
- While the peak 1% AEP flood level at the inlet to the culvert that runs under the Main Northern Railway to the west (downstream) of the Eraring substation extension would be increased by 0.03 metres (compared to 0.06 metres based on the assessment that was presented in Technical Report 12 of the EIS), the resulting flood level under post-project conditions would still be about 1 metre below the level of the rail line.

During the PMF, depths of inundation would be increased along the section of the eastern overland flowpath:

- immediately north (upstream) of the Eraring substation extension by a maximum of 0.2 metres on an existing depth of 1.5 metres, which compares to a maximum of 0.2 metres on an existing depth of 1.8 metres based on the assessment that was presented in Technical Report 12 of the EIS.
- where it runs immediately adjacent to the Eraring Power Station by a maximum of 0.06 metres on an existing depth of about 1.2 metres, which compares to a maximum of 0.15 metres on an existing depth of about 1.5 metres based on the assessment that was presented in Technical Report 12 of the EIS.

The above findings show that while impacts are either the same or less than those based on the assessment that was presented in Technical Report 12 of the EIS, there would still be an increase in the depth of inundation during the PMF along the section of the eastern overland flowpath where it runs immediately adjacent to the Eraring Power Station. As noted in the EIS, consultation would continue to be undertaken with Origin Energy during the development of the detailed design to confirm the impact that an increase in the depth of inundation could have on the operation of the Eraring Power Station and to inform the scope of mitigation measures that may be required.

Changes in flow velocities

During storms with AEPs of 10% and 1%, increases in peak flow velocities in areas upstream and downstream of the Eraring substation extension would be less than 10 per cent, or would result in peak flow velocities under post-project conditions that are less than 1 metre per second. On this basis, it can be concluded that the Eraring substation extension would not have a significant impact on scour potential in the drainage lines and overland flowpaths that are located upstream and downstream of the Eraring substation extension. This is consistent with the findings of the assessment that was presented in Technical Report 12 of the EIS.

Changes in the extent and duration of flooding

Changes in the duration of inundation along the eastern overland flowpath where it runs to the south (downstream) of the Eraring substation extension would be less than one hour for design storms with AEPs of 10% and 1%. This is consistent with the findings of the assessment that was presented in Technical Report 12 of the EIS.

6.1.2 New 500 kV transmission line corridor

Permanent infrastructure located within the new transmission line corridor would comprise the 500 kV transmission lines that would be supported on a series of transmission line towers, as well as existing and new access tracks that would be used to access the towers for routine inspection and maintenance of the transmission line infrastructure. Refer **Section 5.2** for discussion on the potential flood related impacts of the access tracks of the amended project.

As noted in Section 6.1.4 of Technical Report 12 of the EIS:

- Transmission line towers located in areas of high depth and velocity of floodwater pose a risk of damage to the tower and transmission line unless appropriate measures are incorporated into their design. Based on the assessed concept design, a concrete column would be constructed in flood prone areas to support each tower leg. These columns would be up to 2.5 metres in diameter and would extend up to 8 metres above the tower footing. The proposed arrangement would be subject to further development during detailed design.
- While the legs and footings of the transmission line towers have the potential to obstruct floodwater and lead to an increase in the depth and velocity of flow, impacts would occur over a relatively localised area given their relatively small footprint. Scour protection would be provided to manage localised increases in flow velocities around the transmission line towers.

The flood mapping that is presented in Section 4.3 of Technical Report 12 of the EIS was used to inform the selection of the route of the transmission line corridor, as well as the locations of transmission line towers of the exhibited project. This flood mapping has also been used to inform the changes in the alignment of the new transmission line corridor and locations of transmission line towers as part of the amended project.

Table 6.1 in Technical Report 12 of the EIS contains a summary of flood behaviour at each tower along the transmission line corridor based on the exhibited project in terms of the maximum depth and velocity of flow during a 1% AEP design storm and the PMF. **Table 6.1** of this report provides an update of the information that is presented in Table 6.1 in Technical Report 12 at those tower locations that are to be revised under the amended project.

Table 6.1 shows that as a result of the proposed changes in tower locations:

- at Olney and Gouldsville, the depth and velocity of flooding would be similar to the exhibited project
- at Mount Thorley:
 - the number of towers impacted by Hunter River flooding would be the same as the exhibited project
 - the overall level of flooding would be similar, with increases in flooding occurring at some towers (such as towers T120, T121 and T124) and decreases in flooding occurring at others (such as towers T119 and T122).

Plates 6.1 and **6.2** show the indicative depth and extent of inundation in the vicinity of the new transmission line corridor at Mount Thorley during a 1% AEP flood and the PMF, respectively.

Consistent with the exhibited project, there is a significant difference in the depth and velocity of Hunter River flooding at Mount Thorley during a 1% AEP and the PMF. For example:

- tower T120 would be inundated to a depth of 3.7 metres and a velocity of 0.8 metres per second during a 1% AEP flood, which would increase to a depth of 8.4 metres and a velocity of 1.9 metres per second during the PMF.
- tower T124 would experience minor flooding during a 1% AEP flood, which would increase to a depth of 3.7 metres and a velocity of 2.7 metres per second during the PMF.

The above differences highlight the need to consider floods larger than the 1% AEP flood when assessing the impact of flooding on the new 500kV transmission line and the consequences of damage to the tower structures. On this basis, the following measures set out in Technical Report 12 of the EIS would still be applicable to the amended project:

- Scour protection would be provided at towers where there is a potential for scour to occur during a 1% AEP flood.
- Towers located on the floodplain (i.e. within the PMF) would be structurally designed to manage the risk of failure of the transmission line network due to damage from flooding.

TABLE 6.1
SUMMARY OF FLOOD BEHAVIOUR AT TRANSMISSION LINE TOWERS TO BE REVISED UNDER THE AMENDED PROJECT

Tower Identifier ⁽¹⁾	Exhibited project				Amended project				Comments
	1% AEP		PMF		1% AEP		PMF		
	Maximum Depth (m)	Maximum Velocity (m/s)	Maximum Depth (m)	Maximum Velocity (m/s)	Maximum Depth (m)	Maximum Velocity (m/s)	Maximum Depth (m)	Maximum Velocity (m/s)	
Olney									
T1	NF ⁽²⁾	NF ⁽²⁾	<0.3	0.3	NF ⁽²⁾	NF ⁽²⁾	<0.3	0.3	
T1B	-	-	-	-	0.3	0.2	0.4	0.4	
T2	<0.3	0.1	<0.3	0.2	<0.3	0.1	<0.3	0.2	
T3	<0.3	0.1	<0.3	0.2	<0.3	0.1	<0.3	0.2	
T3B	-	-	-	-	<0.3	0.1	<0.3	0.3	
T4	0.3	0.1	0.4	0.2	<0.3	0.1	<0.3	0.2	
T5	<0.3	0.1	<0.3	0.4	<0.3	0.1	<0.3	0.4	
T6	<0.3	0.1	<0.3	0.3	<0.3	0.1	<0.3	0.3	
T6B	-	-	-	-	<0.3	0.1	<0.3	0.2	
T7	<0.3	0.1	<0.3	0.3	<0.3	0.1	<0.3	0.3	
T8	<0.3	0.1	<0.3	0.2	<0.3	0.1	<0.3	0.3	
T8B	-	-	-	-	<0.3	0.1	0.3	0.2	
T9	<0.3	0.1	<0.3	0.3	<0.3	0.1	<0.3	0.1	
T10	<0.3	0.1	<0.3	0.2	<0.3	0.1	<0.3	0.2	

Tower Identifier ⁽¹⁾	Exhibited project				Amended project				Comments
	1% AEP		PMF		1% AEP		PMF		
	Maximum Depth (m)	Maximum Velocity (m/s)	Maximum Depth (m)	Maximum Velocity (m/s)	Maximum Depth (m)	Maximum Velocity (m/s)	Maximum Depth (m)	Maximum Velocity (m/s)	
Mount Thorley									
T115	<0.3	0.1	<0.3	0.2	<0.3	0.1	<0.3	0.2	
T116	<0.3	0.1	<0.3	1.1	<0.3	0.1	0.3	1.3	
T117	NF ⁽²⁾	NF ⁽²⁾	0.4	0.4	<0.3	0.1	<0.3	0.2	
T118	3.8	0.9	7.8	2.6	3.7	1.0	7.8	2.7	Impacted by Hunter River flooding based on exhibited project and amended project.
T119	2.5	1.0	6.5	2.5	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾	Impacted by Hunter River flooding based on exhibited project but not the amended project.
T120	0.6	1.6	4.5	3.2	3.7	0.8	8.4	1.9	Impacted by Hunter River flooding based on exhibited project and amended project.
T121	0.5	1.4	5	2.3	<0.3	0.1	3.6	0.8	Impacted by Hunter River flooding based on exhibited project and amended project.
T122	0.8	0.7	5.3	1.6	3.0	1.1	7.7	1.7	Impacted by Hunter River flooding based on exhibited project and amended project.
T123	1.7	0.9	6.2	1.5	1.7	1.0	6.3	1.5	Impacted by Hunter River flooding based on exhibited project and amended project.
T124	<0.3	0.1	2.3	0.9	<0.3	0.1	3.7	2.7	Impacted by Hunter River flooding based on exhibited project and amended project.
T124A	-	-	-	-	<0.3	0.1	2.2	1.0	Impacted by Hunter River flooding based on amended project but not the exhibited project.
T125	<0.3	0.1	1.5	1	<0.3	0.1	1.5	1	

Tower Identifier ⁽¹⁾	Exhibited project				Amended project				Comments
	1% AEP		PMF		1% AEP		PMF		
	Maximum Depth (m)	Maximum Velocity (m/s)	Maximum Depth (m)	Maximum Velocity (m/s)	Maximum Depth (m)	Maximum Velocity (m/s)	Maximum Depth (m)	Maximum Velocity (m/s)	
Gouldsville									
T129	<0.3	0.1	<0.3	0.3	<0.3	0.1	<0.3	0.3	
T130	<0.3	0.1	0.4	0.5	<0.3	0.1	0.4	0.5	
T131	<0.3	0.1	<0.3	0.3	<0.3	0.1	<0.3	0.2	
T132	<0.3	0.2	0.4	1.4	<0.3	0.2	0.4	1.4	

1. Refer Figure 4.3 and 4.4 (6 sheets each) for locations of transmission line towers and their identifier.
2. NF = Not impacted by mainstream flooding or major overland flow.

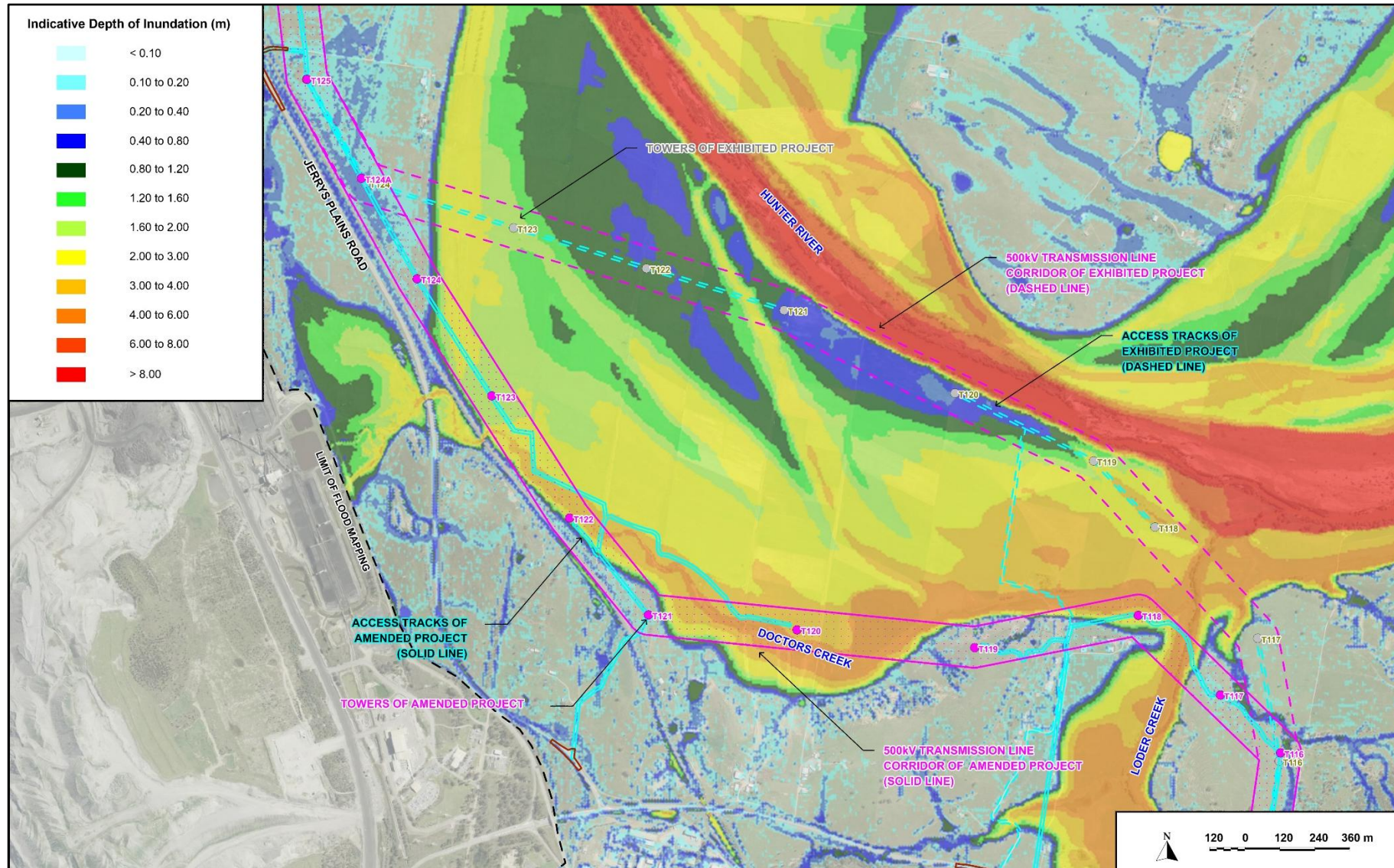


Plate 6.1 – Indicative depth and extent of inundation in the vicinity of the new 500kV transmission line corridor at Mount Thorley – 1% AEP event

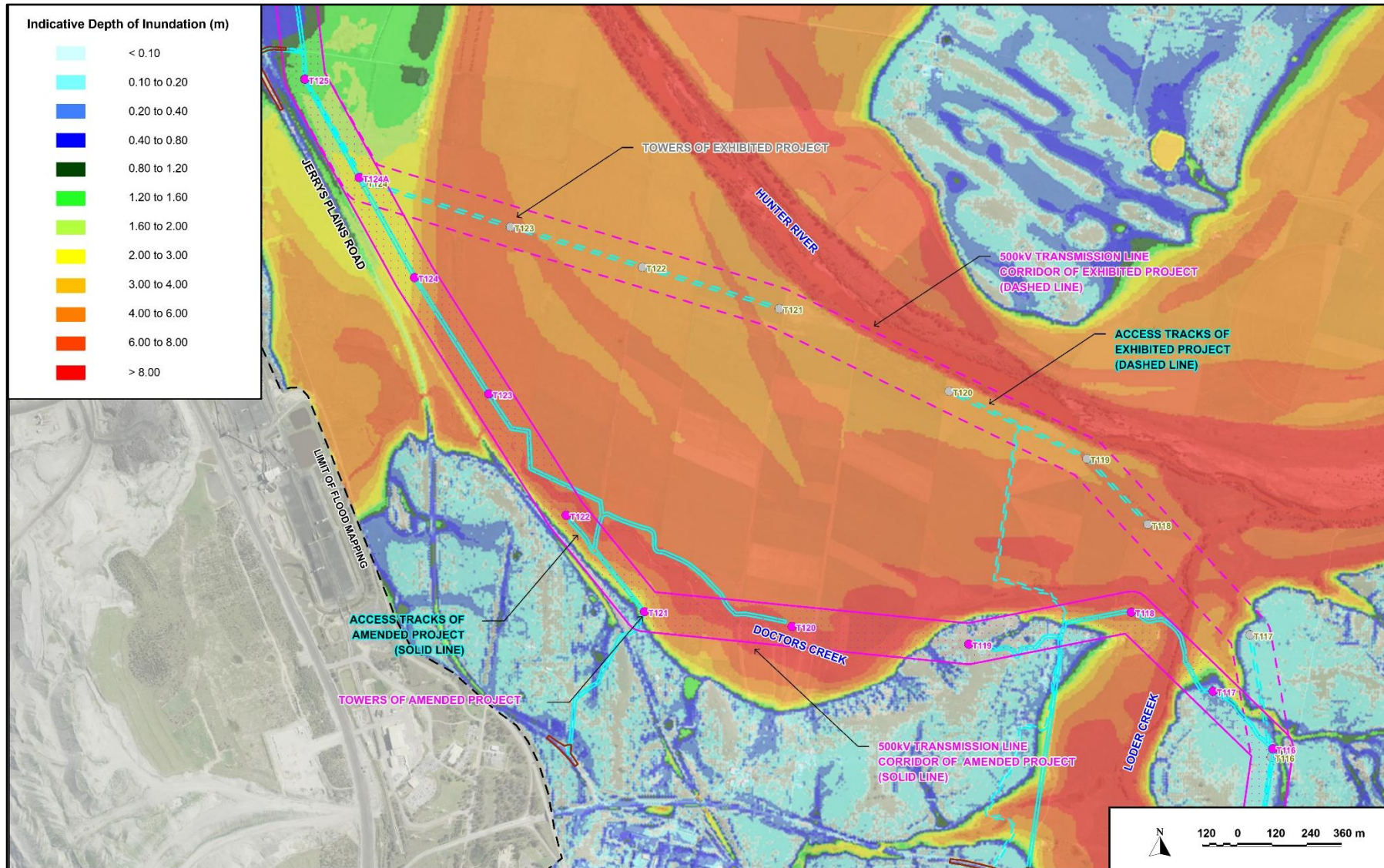


Plate 6.2 – Indicative depth and extent of inundation in the vicinity of the new 500kV transmission line corridor at Mount Thorley – PMF event

7 MANAGEMENT OF IMPACTS

This section sets out the updates to the measures that would be adopted to manage the flood related impacts of the project based on the impact assessment presented in the preceding sections of this report.

7.1 Environmental management

The approach to environmental management for the amended project is consistent with the approach described in section 24.1 of the EIS with the exception that a construction environmental management plan (CEMP) will be prepared for the construction of the project, rather than an environmental management strategy (EMS).

Flooding impacts during the construction of the project would be managed in accordance with a CEMP with supporting management plans. The CEMP and its supporting management plans would set out:

- how the layout of the construction support sites will be designed to manage the risk of construction personnel, facilities and equipment being exposed to hazardous flooding conditions
- procedures to monitor accurate and timely weather data, and disseminate warnings to personnel of impending floods during construction of the project
- procedures for the evacuation of construction personnel working in flood prone areas should a severe weather warning be issued.

7.2 Mitigation measures

Table 7.1 sets out the environmental management measures that would be implemented to manage flood related impacts during the construction and operation of the amended project. Bold and strikethrough text indicates a change to the mitigation measures as set out in the exhibited project. These amended mitigation measures form the finalised mitigation measures to inform the approval of the project and management of impacts through its construction and operation, should it be approved. These amended mitigation measures have been incorporated into the consolidated set of environmental management measures in Appendix E of the Amendment Report.

TABLE 7.1
FLOODING RELATED MITIGATION AND MANAGEMENT MEASURES

ID	Impact or Risk	Mitigation and management measure	Timing	Applicable area
FL1	Risk of flooding to construction support sites	Detailed construction planning will consider flood risk at construction sites and support facilities, including: - reviewing construction site layouts and staging construction activities in order to avoid or minimise obstruction of overland flow paths and limiting the extent of flow diversion required - designing the layout of construction ancillary facilities and implementing stormwater management controls during their establishment in order to manage the impact of flooding on construction personnel, equipment and materials. - identifying and applying measures to not worsen flood impacts on the community and on other property and infrastructure during construction up to and including the 1% AEP flood event where reasonable and feasible. Where warranted by the scale and nature of the proposed works this would include flood modelling and assessment to assess the extent of potential impacts and therefore the scope of mitigation measures that may be required - measures to mitigate alterations to local runoff conditions due to construction activities.	Detailed design and construction	Construction support sites
FL2	Risk of flooding to stockpiles	Spoil stockpiles would be located in areas that are not subject to frequent inundation by floodwater, ideally outside the 10% AEP flood extent. The level of flood risk accepted at stockpile sites would depend on the duration of stockpiling operations, the type of material stored, the nature of the receiving drainage lines and the extent to which it would impact flooding conditions in adjacent areas.	Detailed design and construction	All
FL3	Flood risks during construction	Construction ancillary facilities (including temporary workforce accommodation offices , workshops and staff facilities) would be located to manage the risk of construction personnel and machinery being exposed to hazardous flooding conditions during floods up to 1% AEP in magnitude based on the flood hazard vulnerability thresholds set out in <i>Flood Risk Management Guideline FB03 – Flood Hazard</i> (DPE, 2023).	Detailed design and construction	All

ID	Impact or Risk	Mitigation and management measure	Timing	Applicable area
FL4	Flood risks during construction	The finished floor level of temporary buildings that are to be used for worker accommodation are to be a minimum of 0.5 metres above the peak 1% AEP flood level.	Detailed design and construction	All
FL45	Flood risks during construction	Flood emergency management measures for construction of the project would be prepared and incorporated into relevant environmental and/or safety management documentation. This would include: - contingency planning for construction ancillary facilities that are located in areas that are inundated by mainstream flooding or major overland flow during a 1% AEP event - for construction facilities (including temporary worker accommodation) located within the floodplain (i.e. within the PMF extent) the identification of how flood related risks to personal safety and damage to construction facilities and equipment will be managed - procedures to monitor accurate and timely weather data, and disseminate warnings to construction personnel of impending flood producing rain	Detailed design and construction	All
FL56	Impact on existing flood behaviour	The impact of the project on flood behaviour would be confirmed during detailed design. This would include consideration of future climate change.	Detailed design	All
FL67	Impact on existing flood behaviour	The project would be designed to minimise changes in the frequency, depth, velocity and duration of inundation that would lead to adverse flood related impacts on: - surrounding areas for storms up to 1% AEP in intensity - critical infrastructure, vulnerable development or increases in risk to life due to a significant increase in flood hazard for floods up to the PMF.	Detailed design	All
FL78	Impact on existing flood behaviour	The substation extension and new switching stations would be designed to manage adverse impacts on the receiving drainage lines as a result of changes in the depth, velocity, extent and duration of flow during storms up to 1% AEP in intensity.	Detailed design	Substations and switching stations

ID	Impact or Risk	Mitigation and management measure	Timing	Applicable area
FL 9 89	Impact on existing flood behaviour	The impact of the Eraring substation extension on flood behaviour at the Eraring Power Station would be confirmed during detailed design. Consultation would continue to be carried out with Origin Energy to confirm the effect that any residual flood impacts could have on the operation of the Eraring Power Station for all floods up to the PMF, and to inform the scope of mitigation measures that may be required.	Detailed design	Eraring substation extension
FL 9 10	Impact on existing flood behaviour	The substations and switching stations, including their access road connections to existing roads, would be designed to ensure that the existing level of flood immunity of the road network is maintained and increases in flood depths and hazards along the road network are minimised.	Detailed design	Substations and switching stations
FL 10 11	Impact on existing flood behaviour	Localised increases in flow velocities around transmission line towers, at drainage outlets from the substations and switching stations, and at waterway crossings along access tracks would be mitigated through the provision of scour protection and energy dissipation measures.	Detailed design	All
FL 11 12	Flood impacts at transmission corridor	Transmission line towers located on the floodplain (i.e. within the PMF extent) would be designed to manage the risk of failure of the transmission line network due to damage from flooding.	Detailed design	HTP corridor
FL 12 13	Flood impacts at access tracks	Drainage control measures would be incorporated into the upgraded access tracks and new access tracks to manage runoff and the impact it could have on scour to the tracks and surrounding areas. These drainage control measures would be implemented in accordance with the following guidelines: i. <i>Guidelines for the Planning, Construction and Maintenance of Tracks</i> (Department of Land & Water Conservation, 1994) ii. <i>Managing Urban Stormwater: Soils and Construction – Volume 2C Unsealed Roads</i> (Department of Environment and Climate Change, 2008). Scour protection would be provided to manage localised increases in flow velocities upstream and downstream of waterway crossings along the upgraded or new access tracks, while the access tracks would be lined or stabilised where required to manage scour of the track and the impact this could have on the displacement of sediment into the downstream watercourse.	Detailed design and construction	Upgraded or new access tracks

ID	Impact or Risk	Mitigation and management measure	Timing	Applicable area
FL 13 14	Flood impacts at road and intersection upgrades	Further flood modelling would be undertaken to assess the impact that road and intersection upgrades would have on flood behaviour. Detailed three-dimensional layouts of the proposed road and intersection upgrades would be developed, which would be used to inform the layout of the associated drainage measures that are aimed at controlling external catchment runoff. The detailed three-dimensional layouts of the proposed road and intersection upgrades would also be used to undertake an assessment of the impact that the proposed works 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.	Detailed design	Road and intersection upgrades

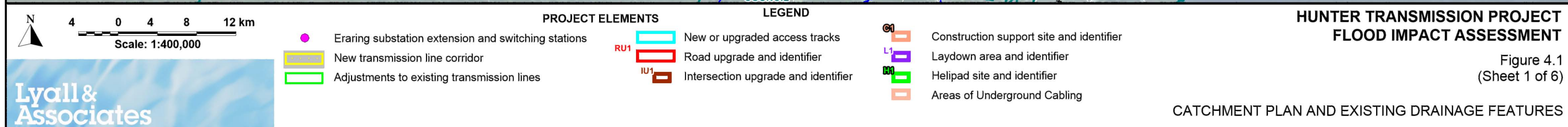
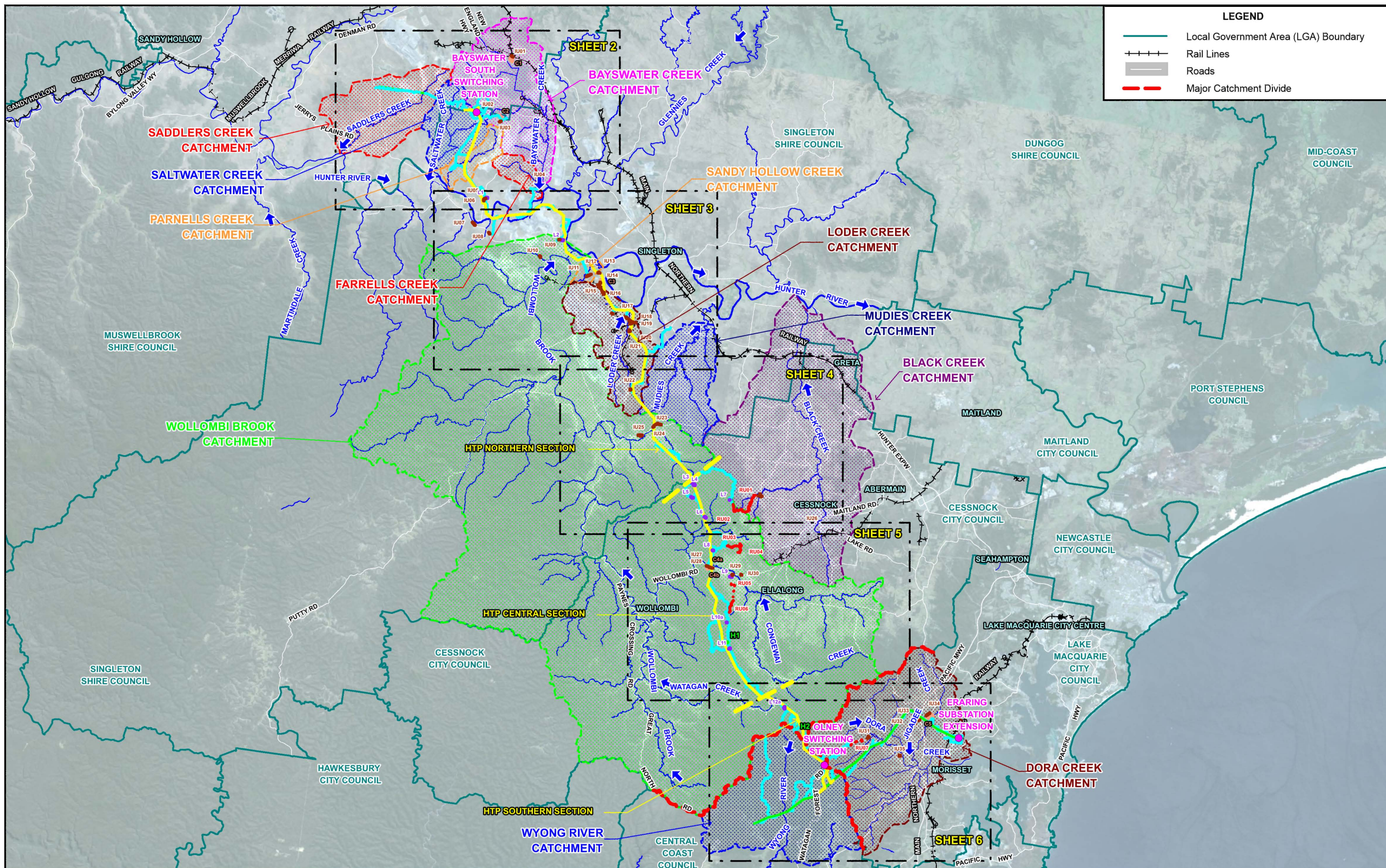
8 REFERENCES

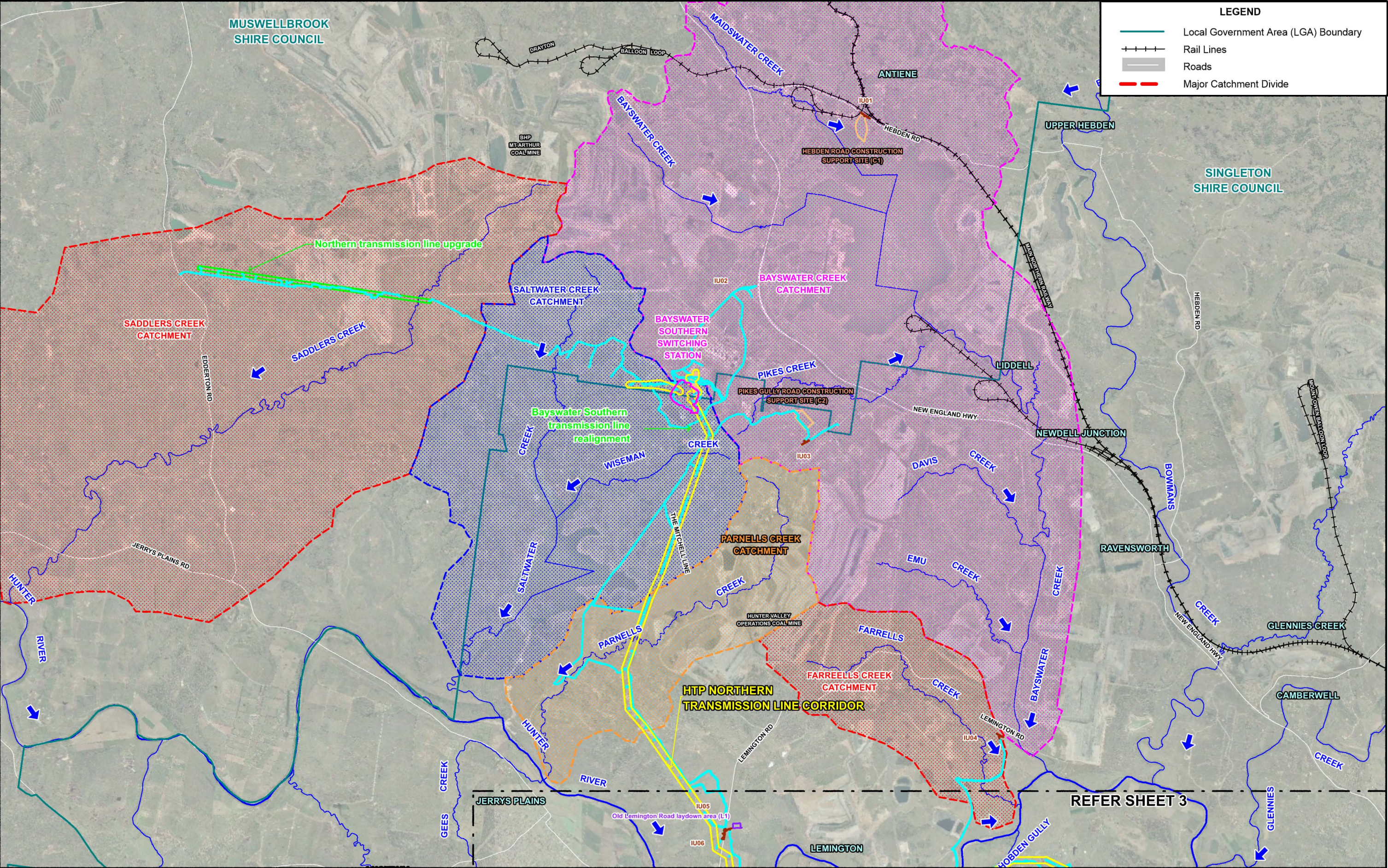
BMT, 2023. *Singleton Floodplain Risk Management Study and Plan - Volumes 1, 2 & 3*.

Department of Planning and Environment (DPE), 2023. *Floodplain Risk Management Manual (FRMM)*.

Geosciences Australia (GA), 2019. *Australian Rainfall and Runoff (ARR 2019)*.

FIGURES





800 0 800 1600 2400 m

Scale: 1:80,000

PROJECT ELEMENTS

	New transmission line corridor
	Adjustments to existing transmission line
	Eraring substation extension and switching stations

LEGEND

	New or upgraded access tracks
	Road upgrade and identifier
	Intersection upgrade and identifier

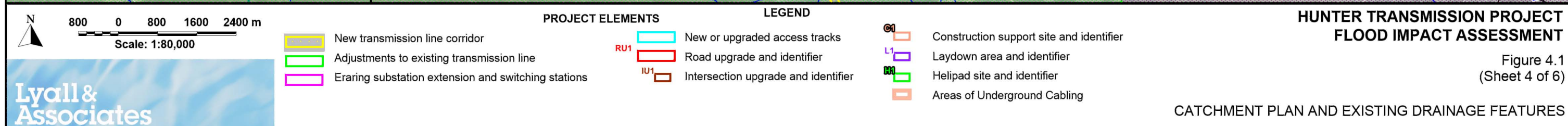
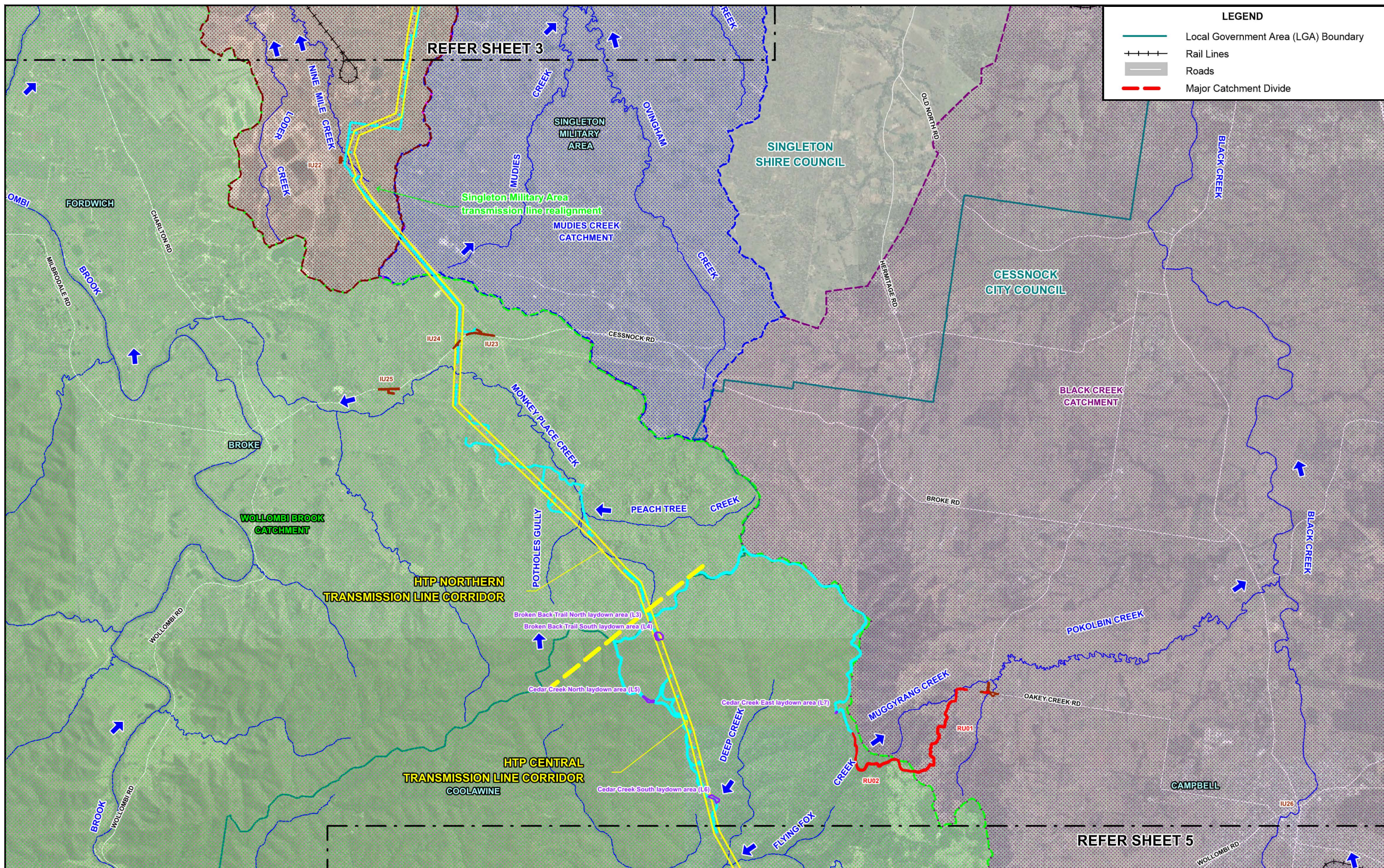
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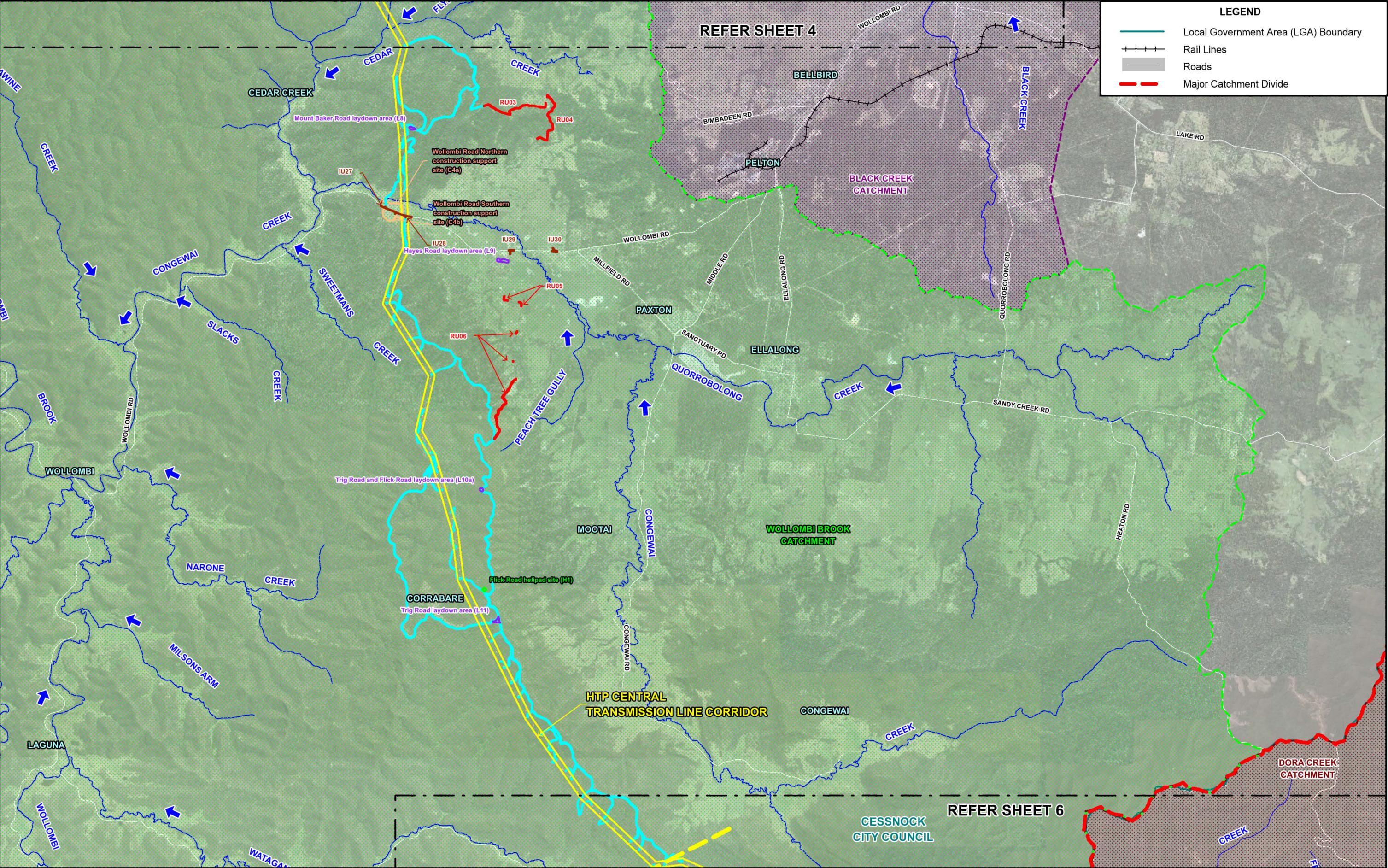
	Construction support site and identifier
	Laydown area and identifier
	Helipad site and identifier
	Areas of Underground Cabling

**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure 4.1
(Sheet 2 of 6)

CATCHMENT PLAN AND EXISTING DRAINAGE FEATURES





LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads
- Major Catchment Divide

PROJECT ELEMENTS

- New transmission line corridor
- Adjustments to existing transmission line
- Eraring substation extension and switching stations

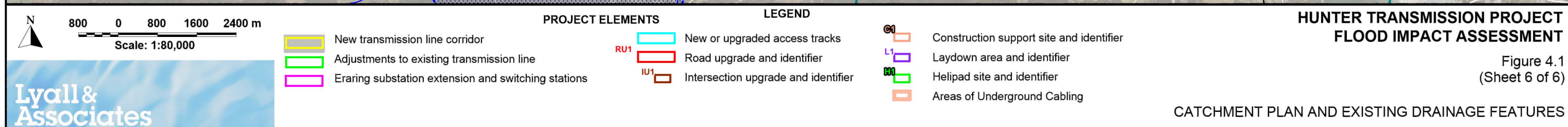
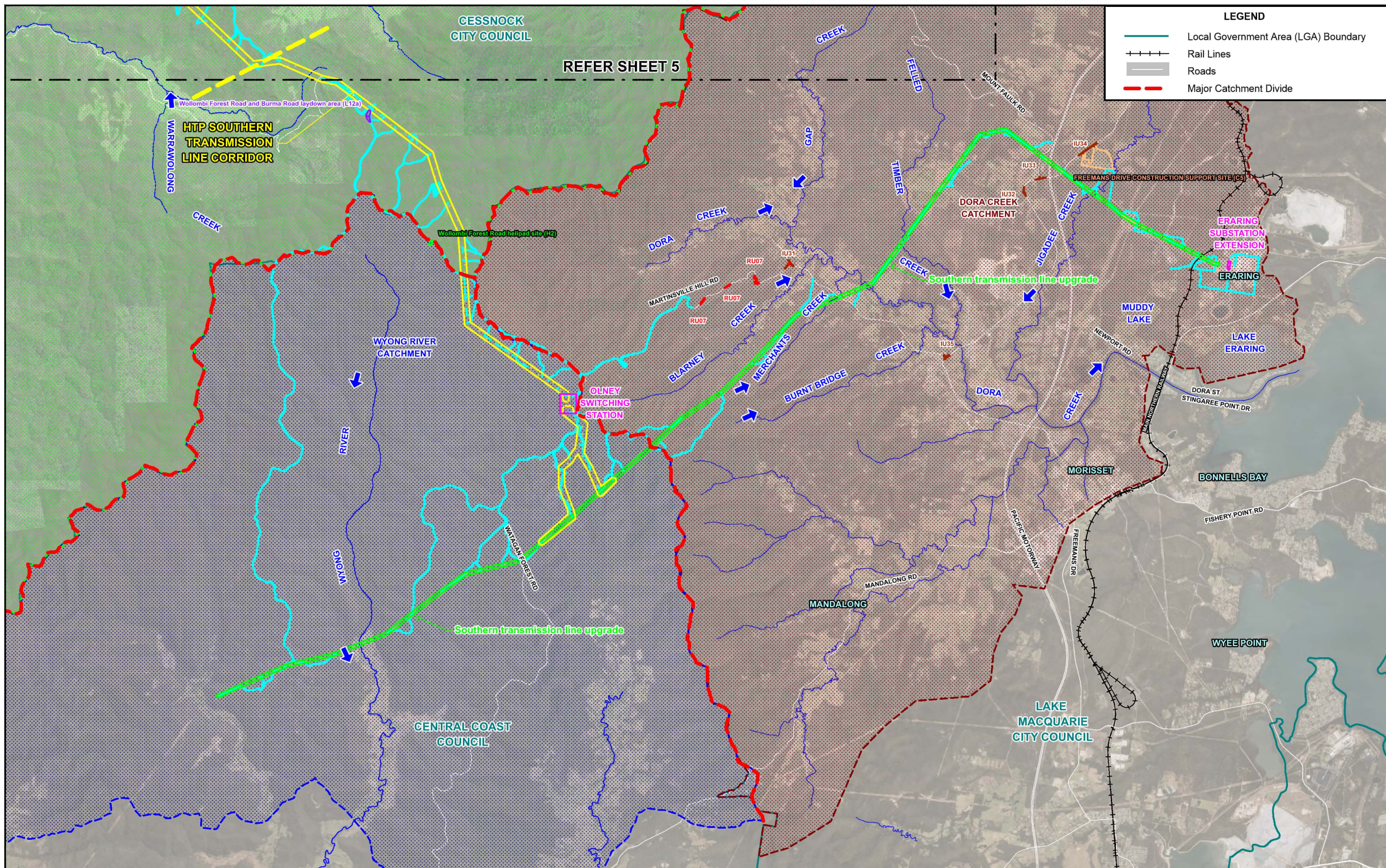
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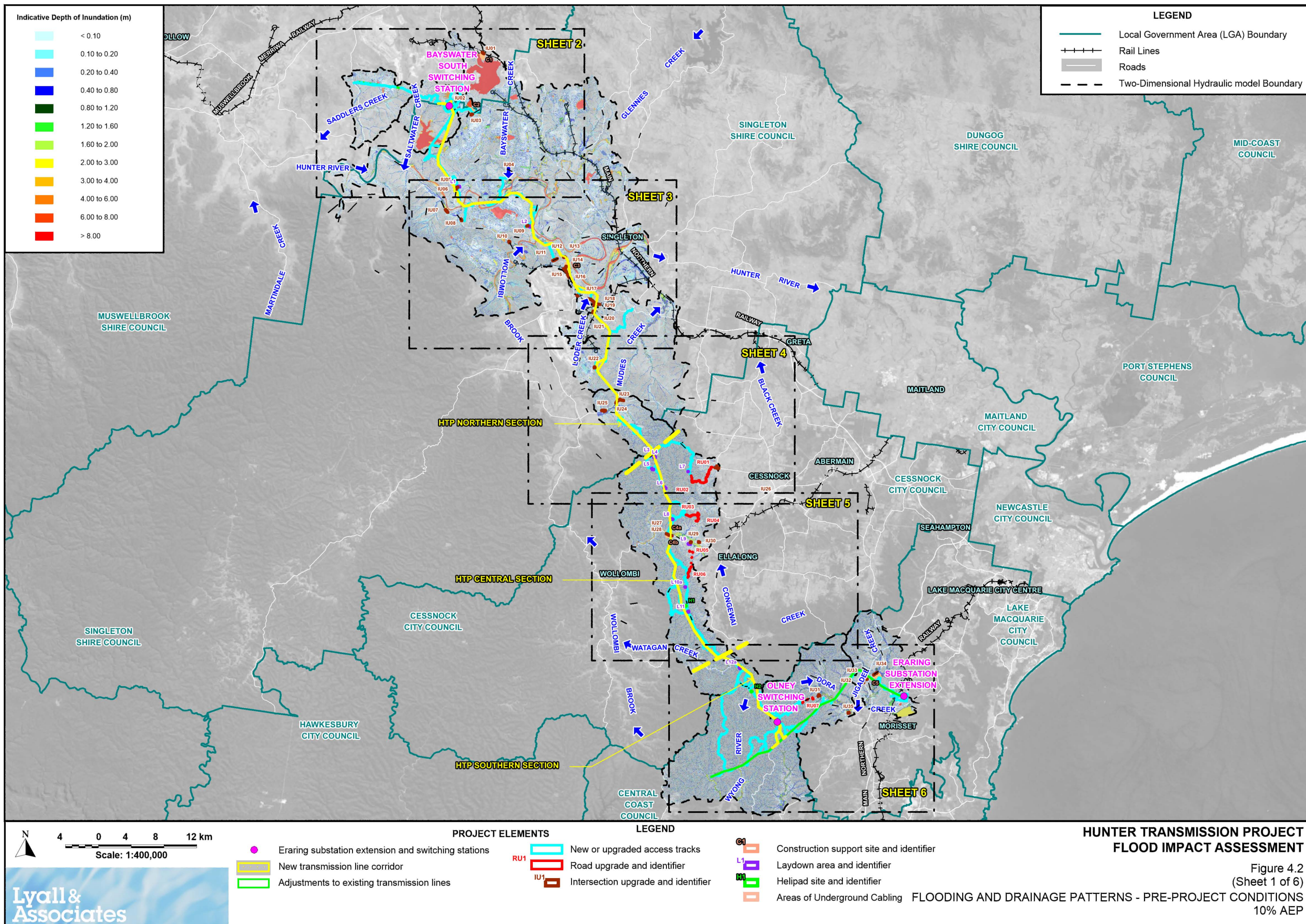
- New or upgraded access tracks
- Road upgrade and identifier
- Intersection upgrade and identifier
- Construction support site and identifier
- Laydown area and identifier
- Helipad site and identifier
- Areas of Underground Cabling

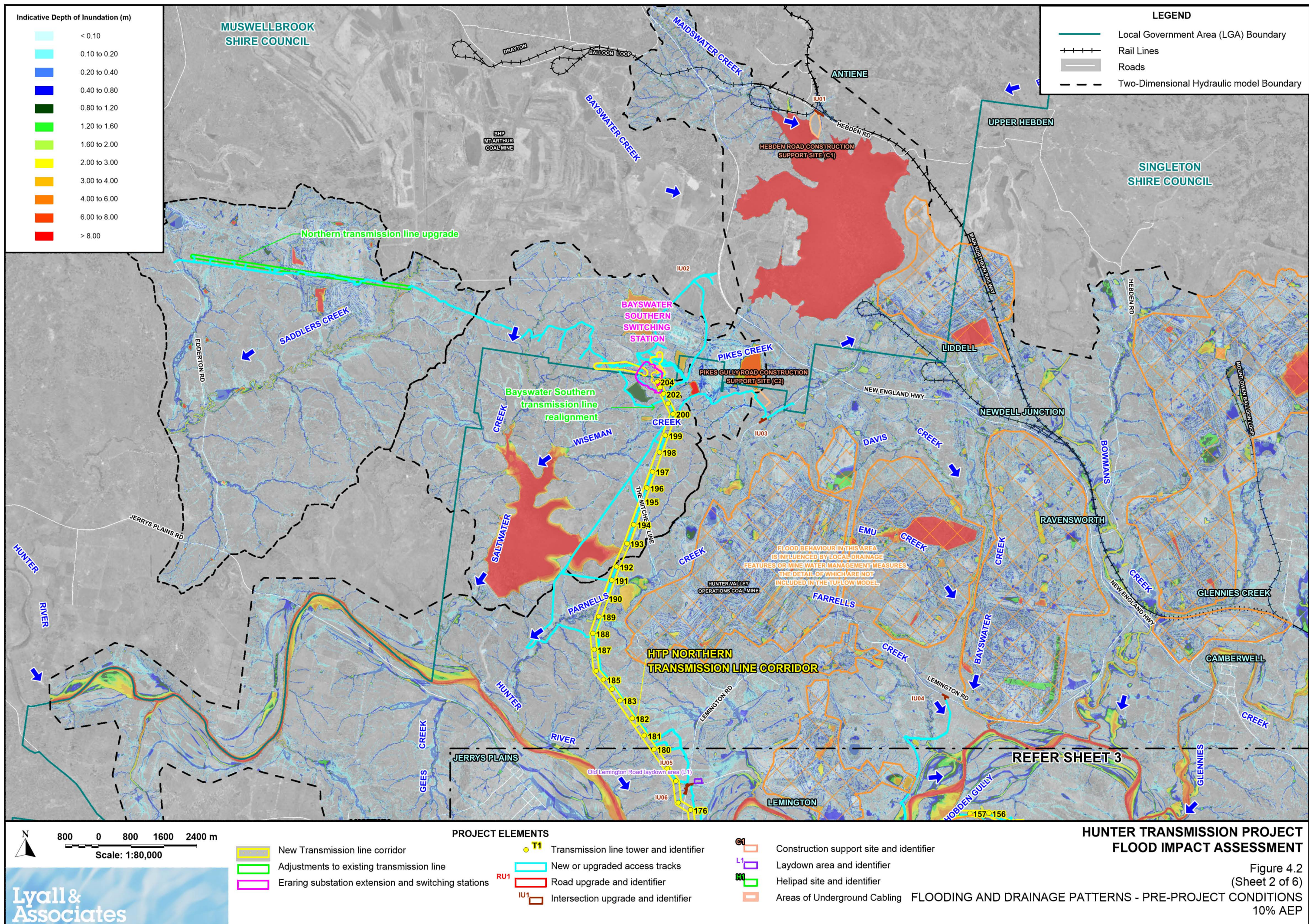
**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

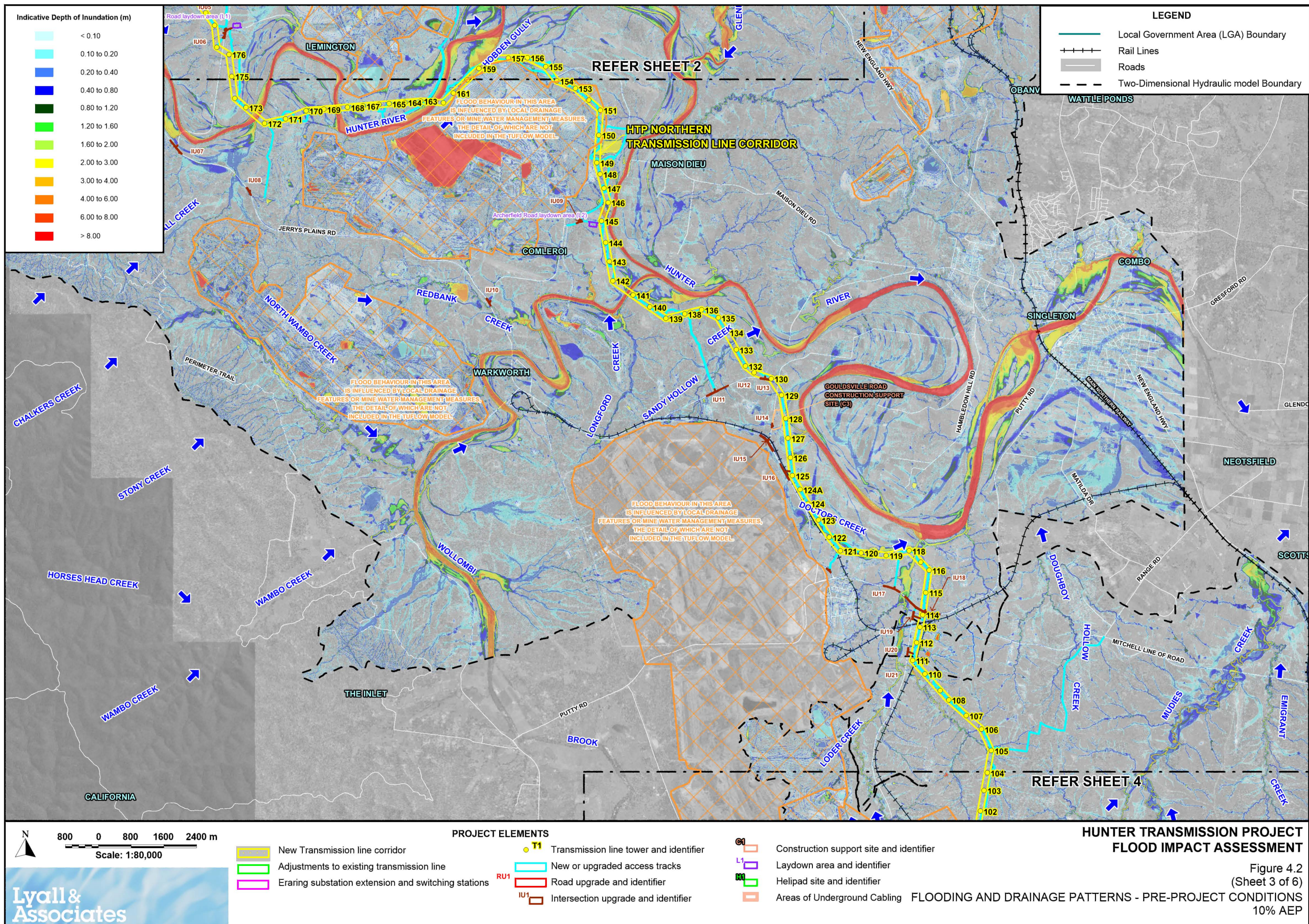
Figure 4.1
(Sheet 5 of 6)

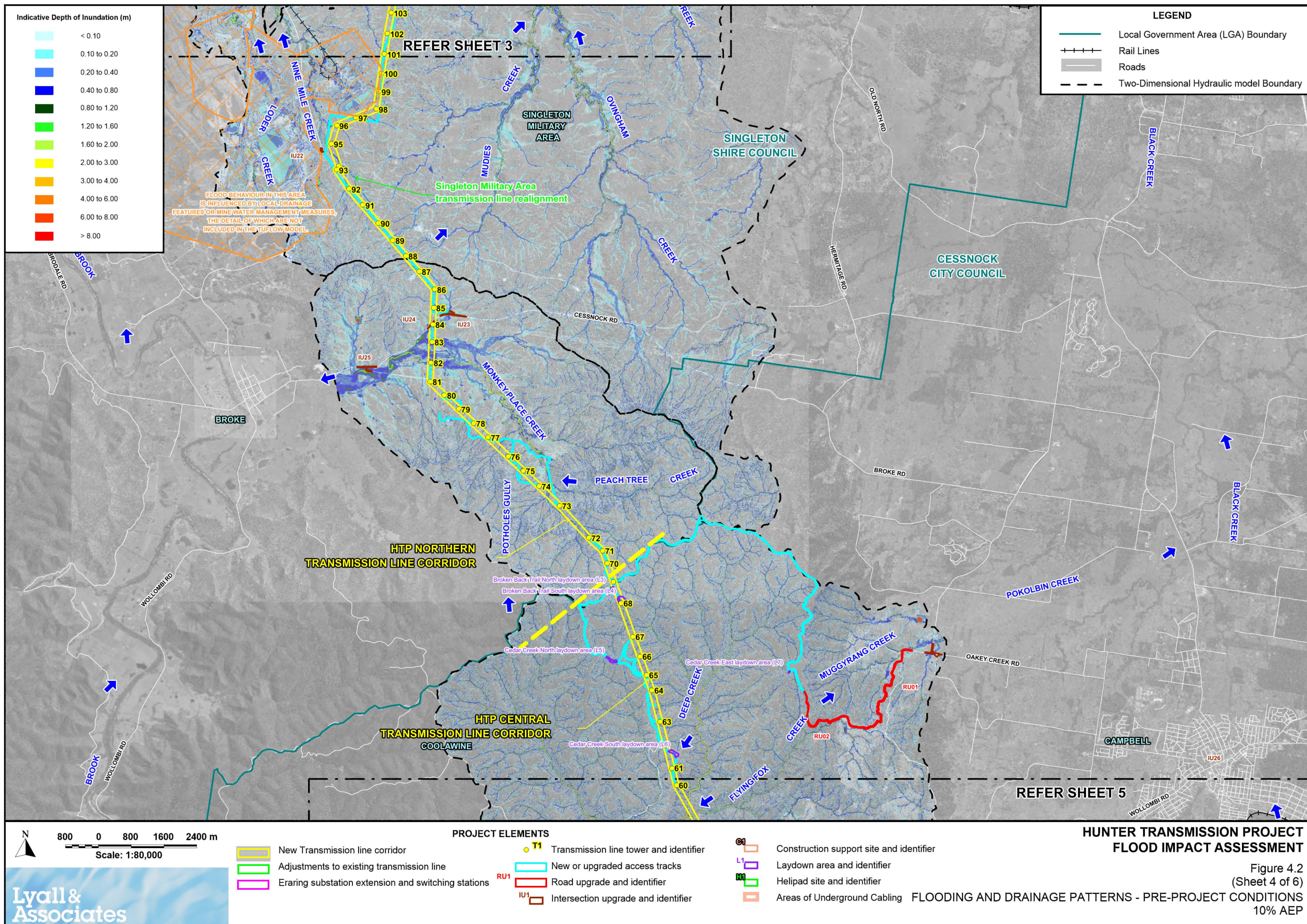
CATCHMENT PLAN AND EXISTING DRAINAGE FEATURES

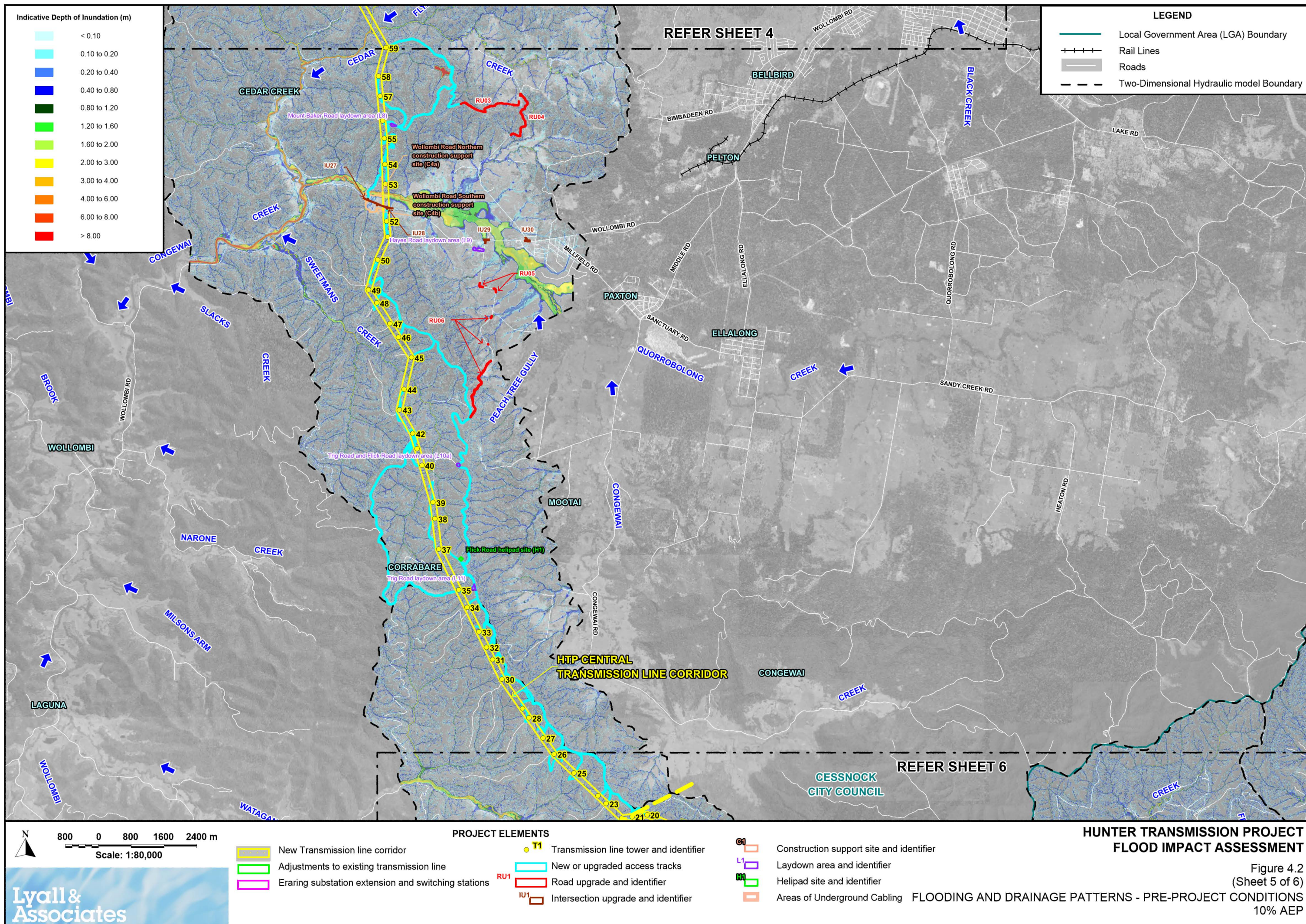


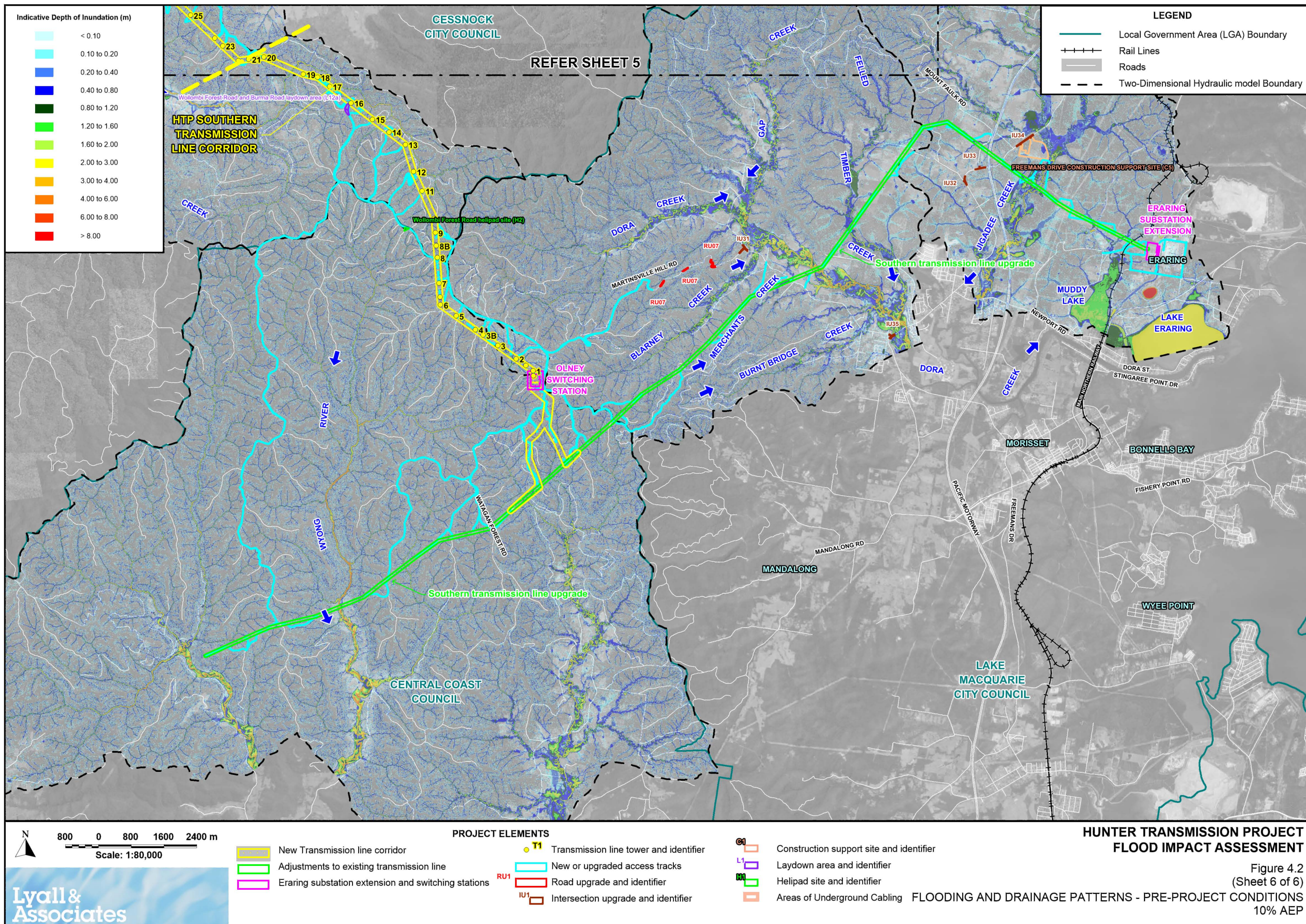


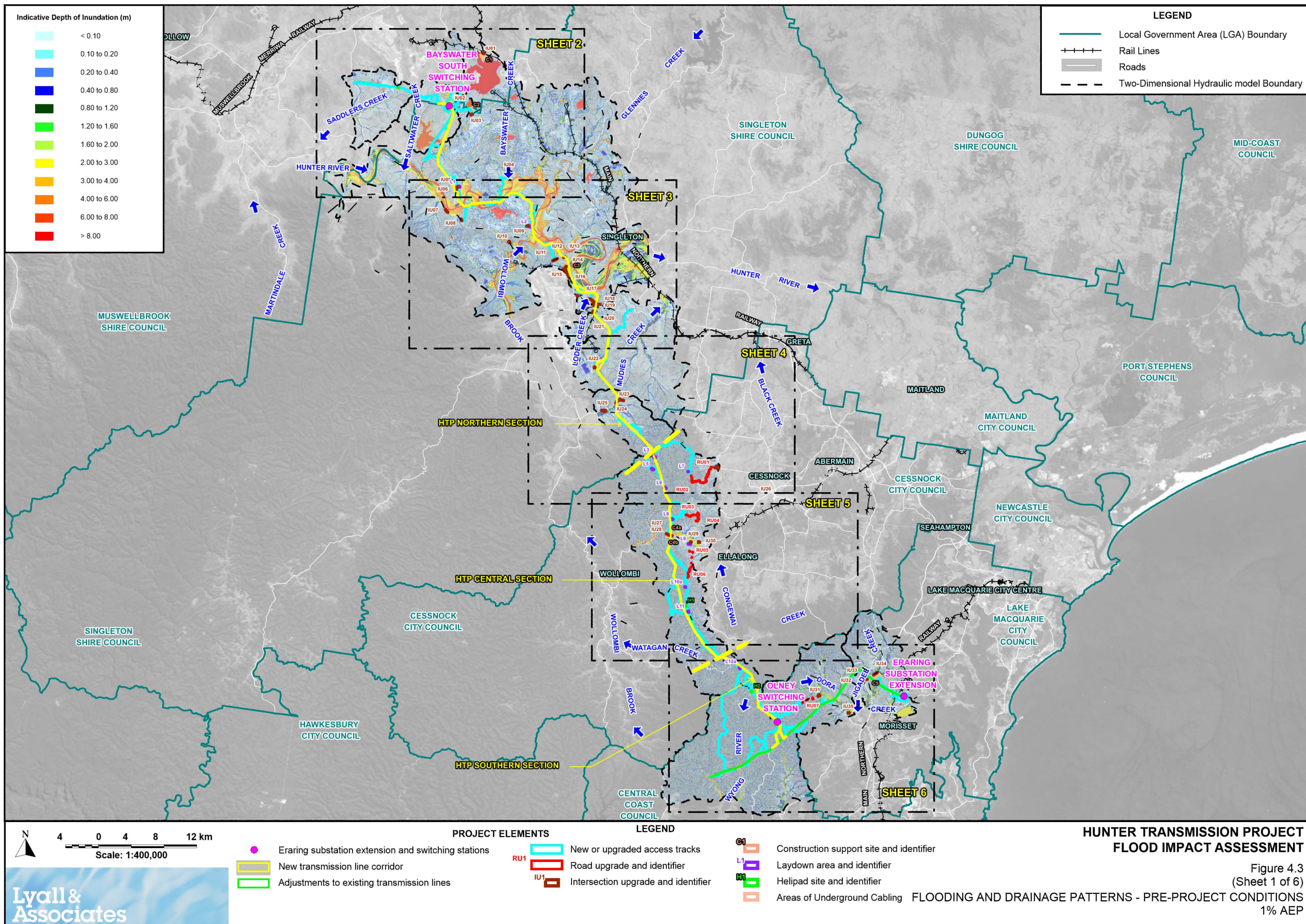


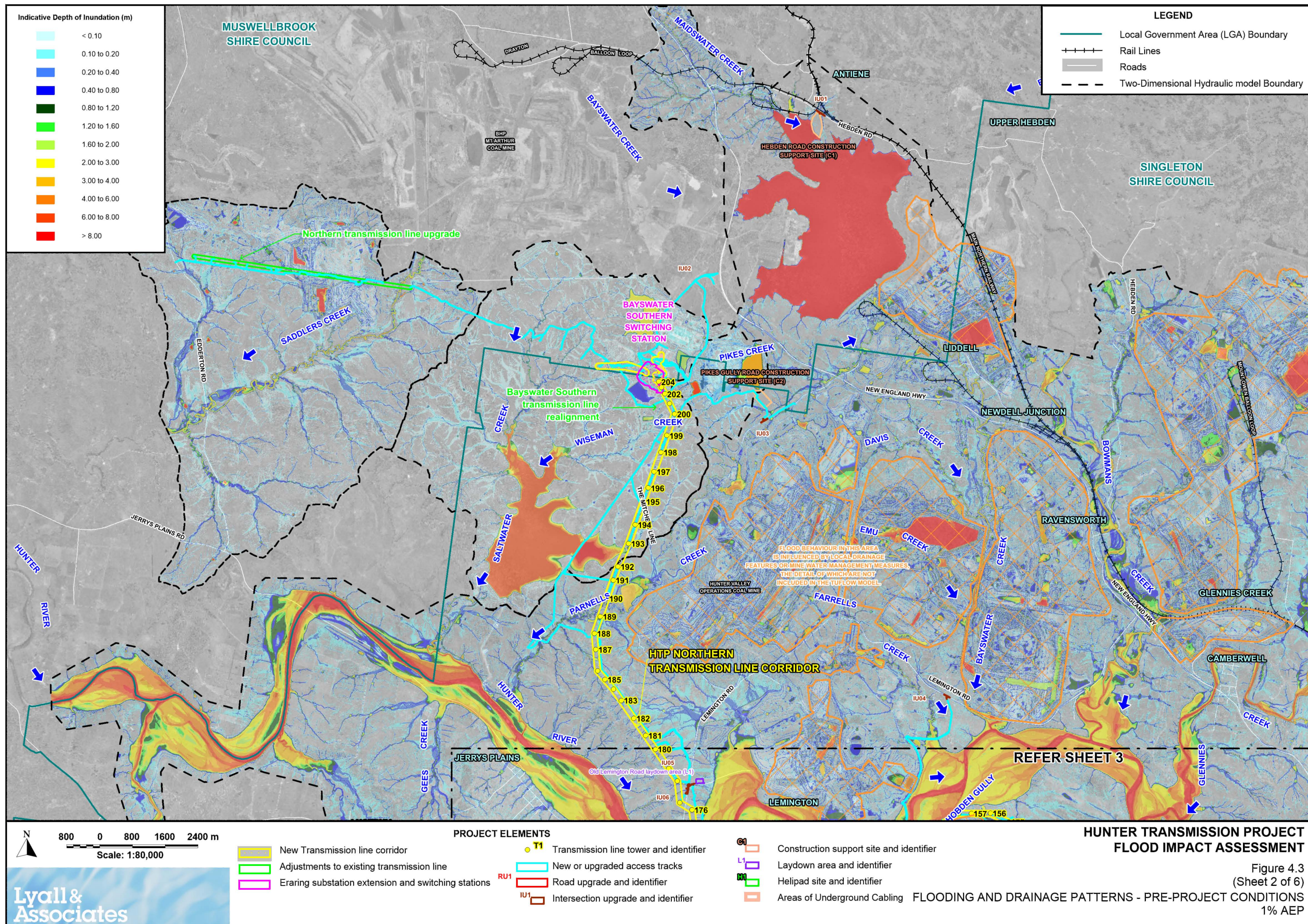


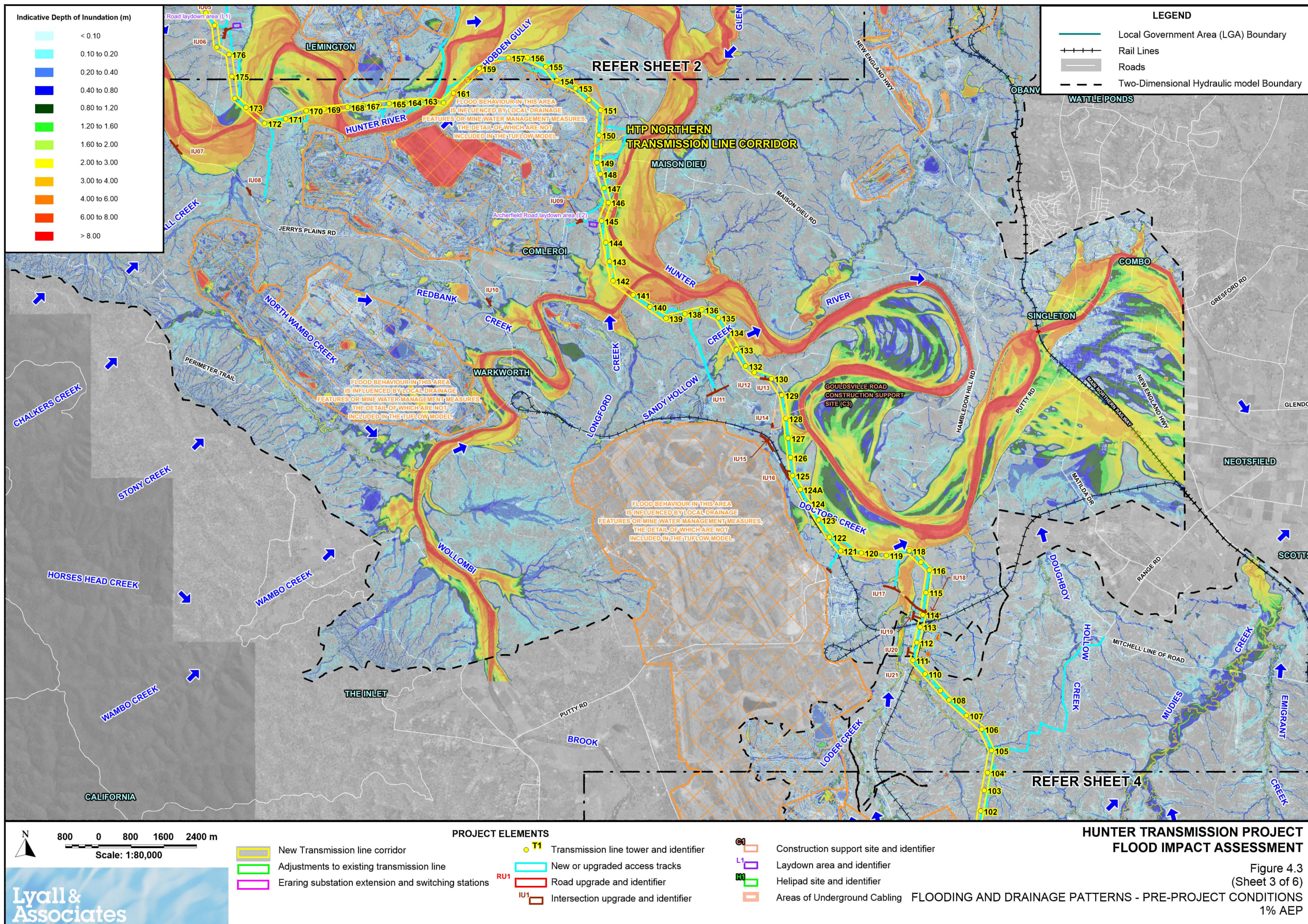


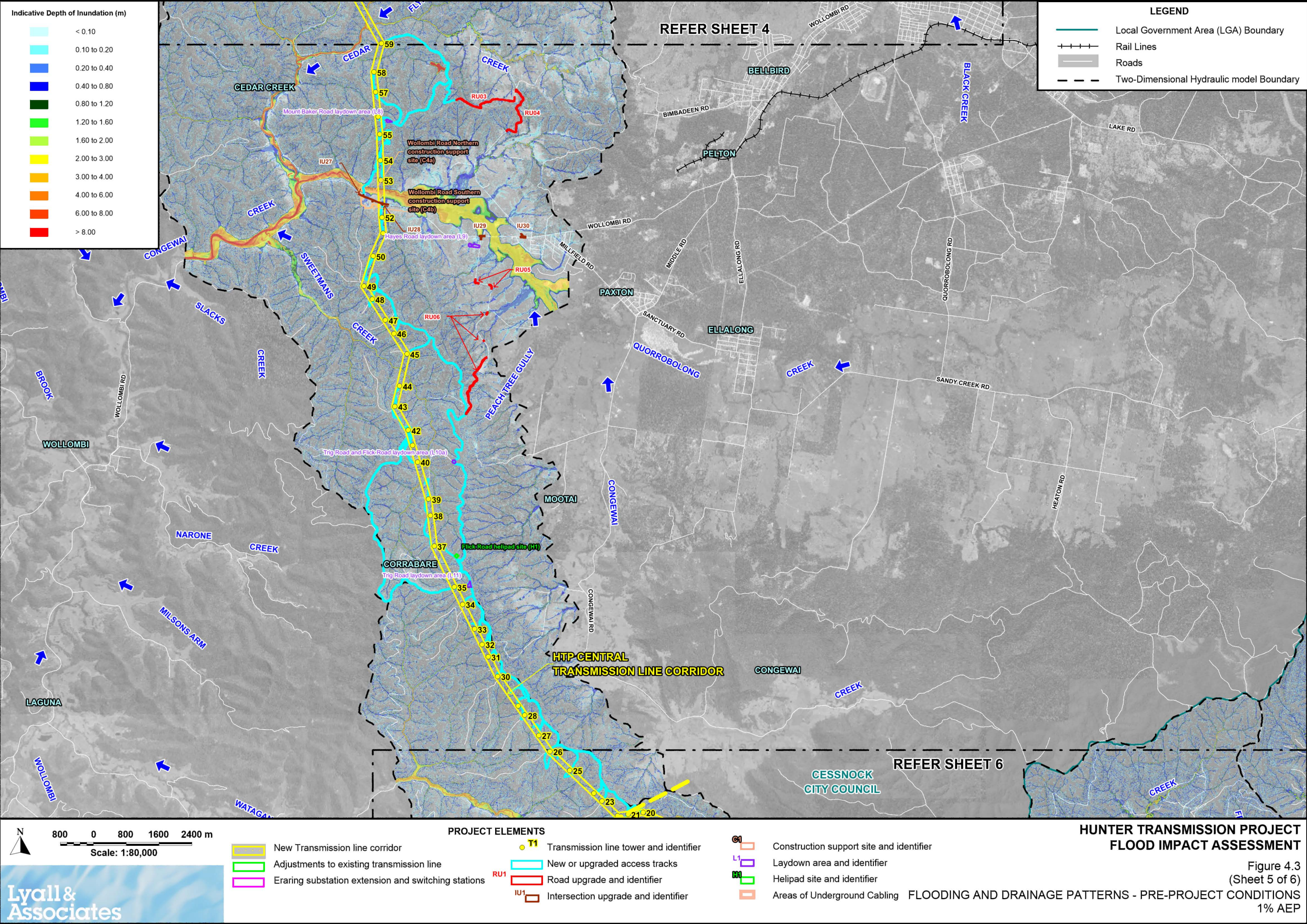


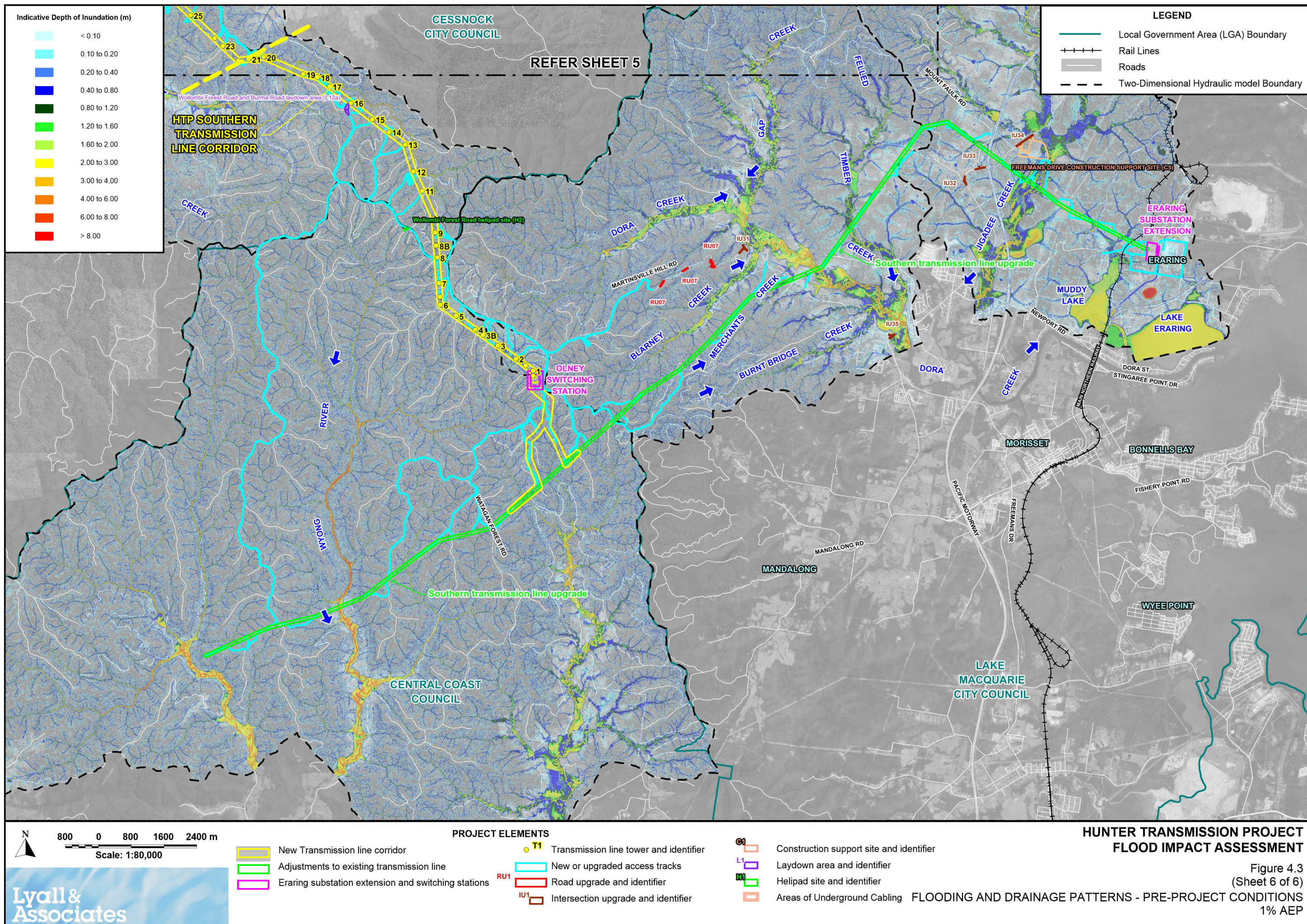


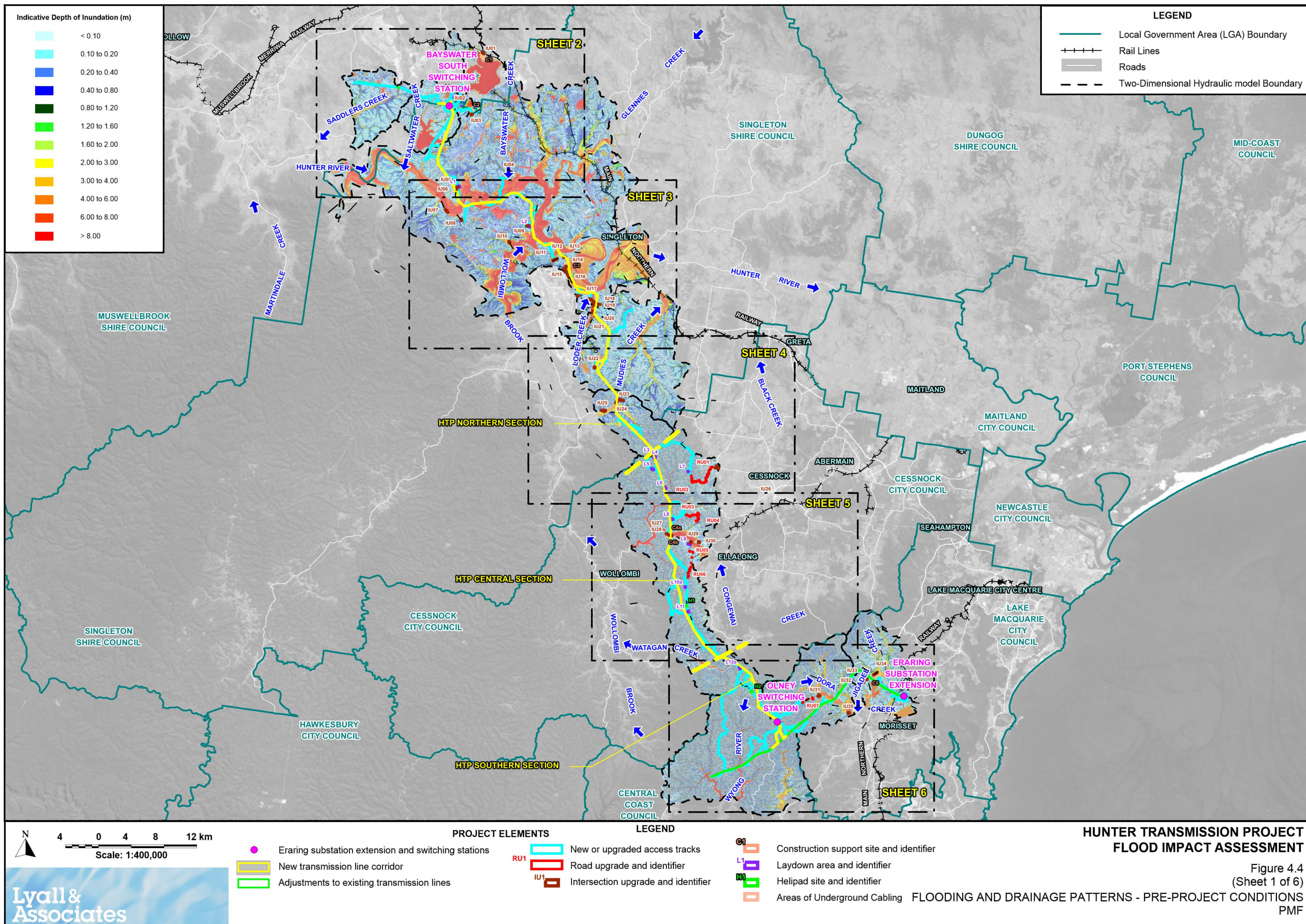


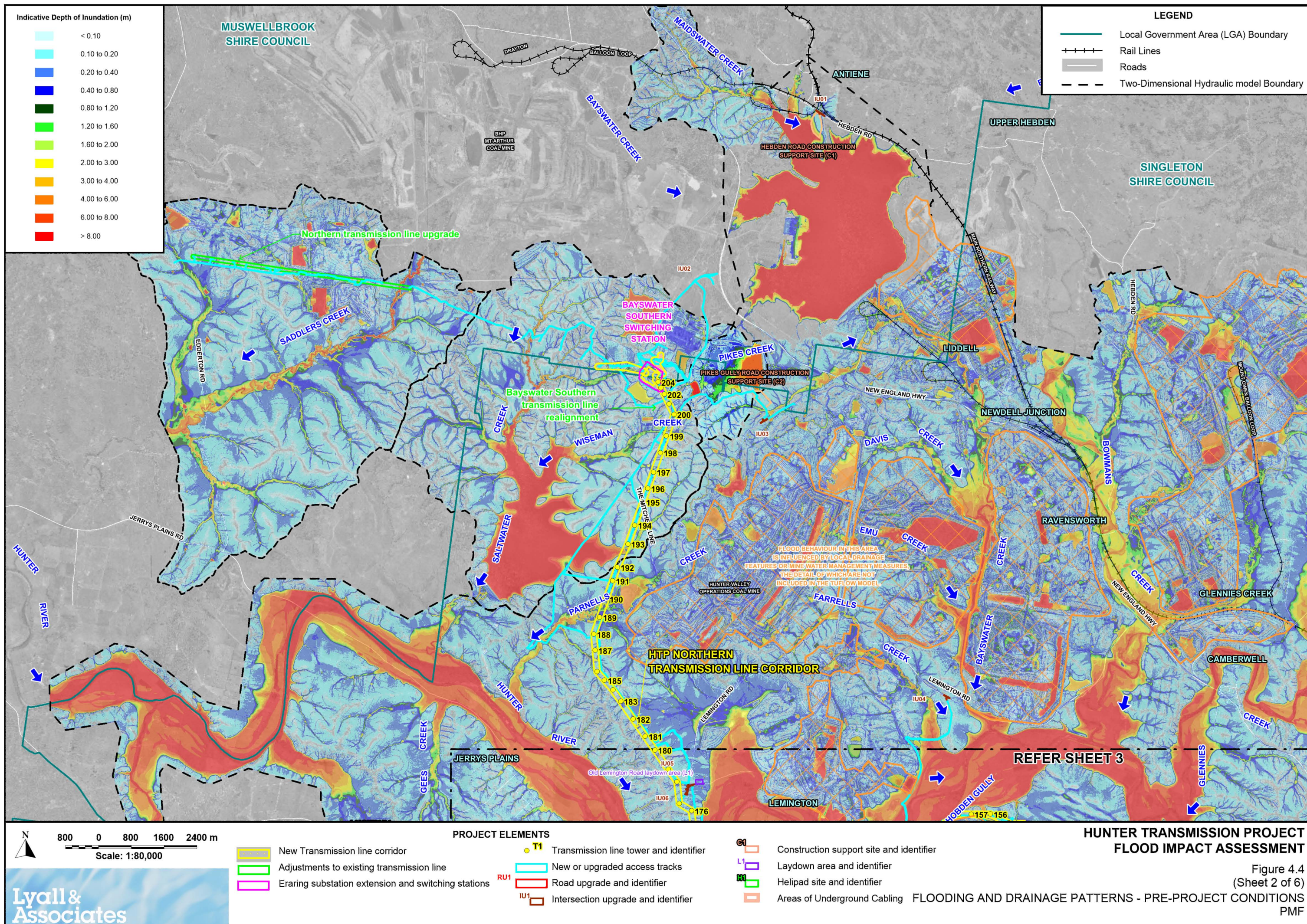


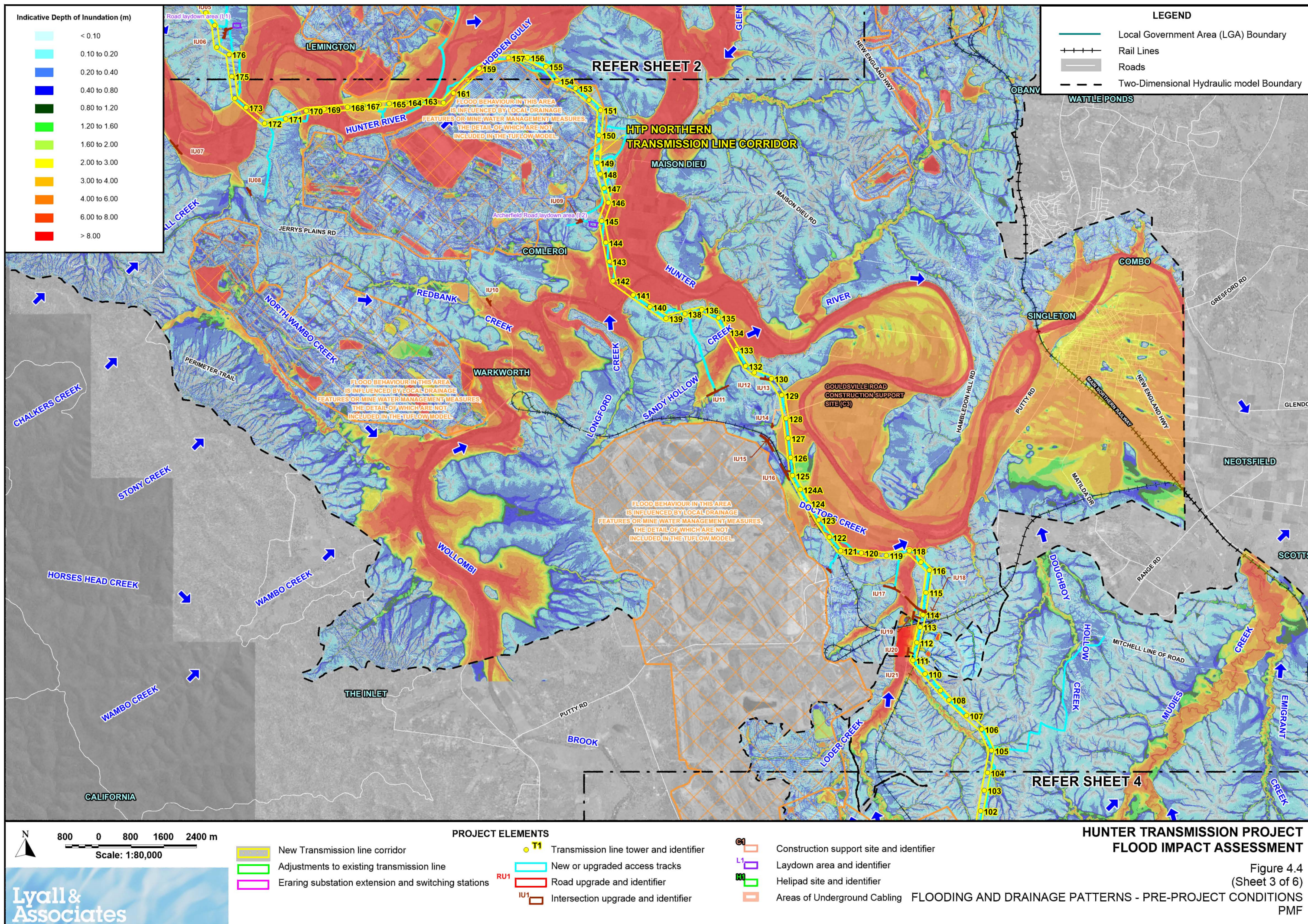


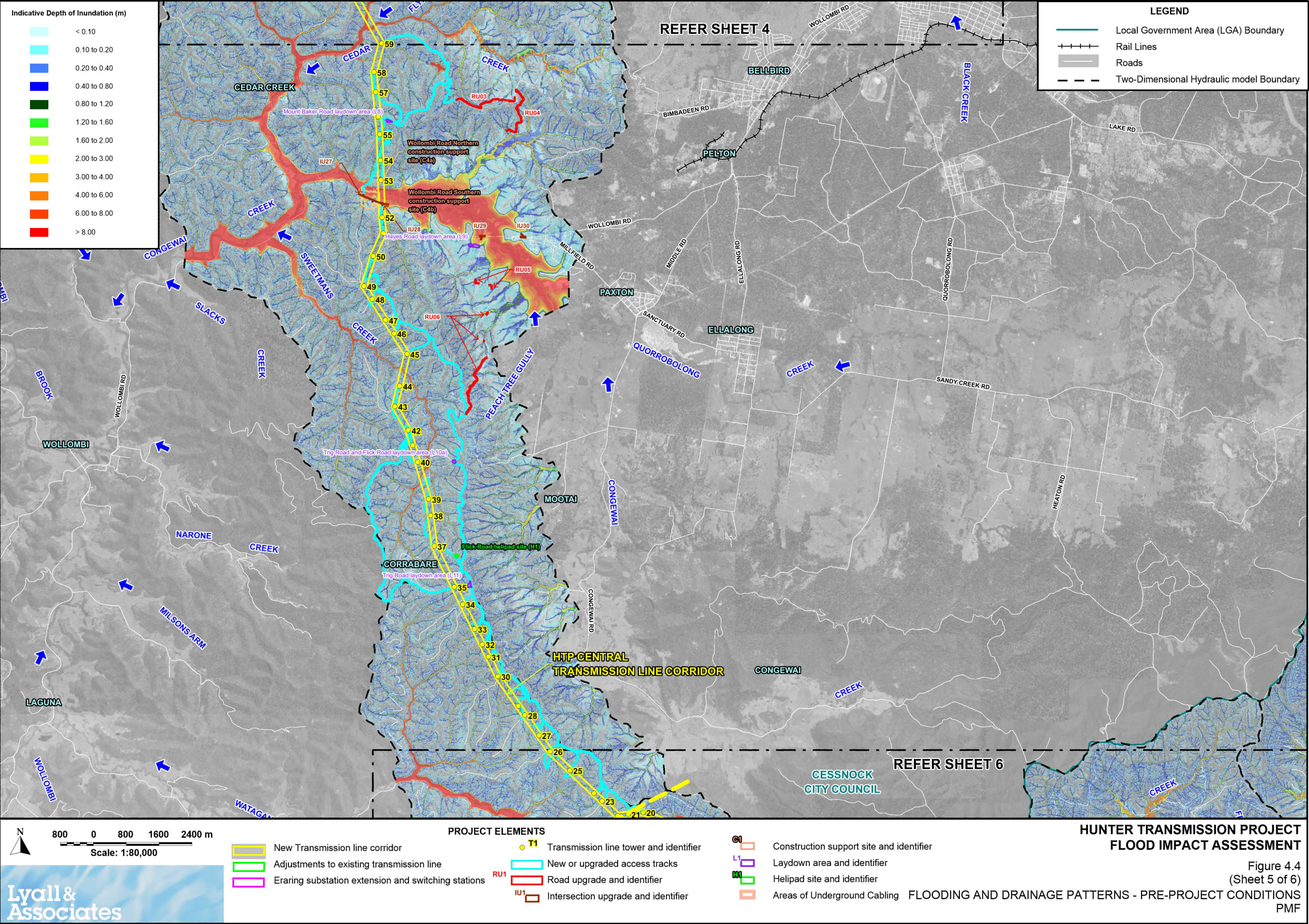


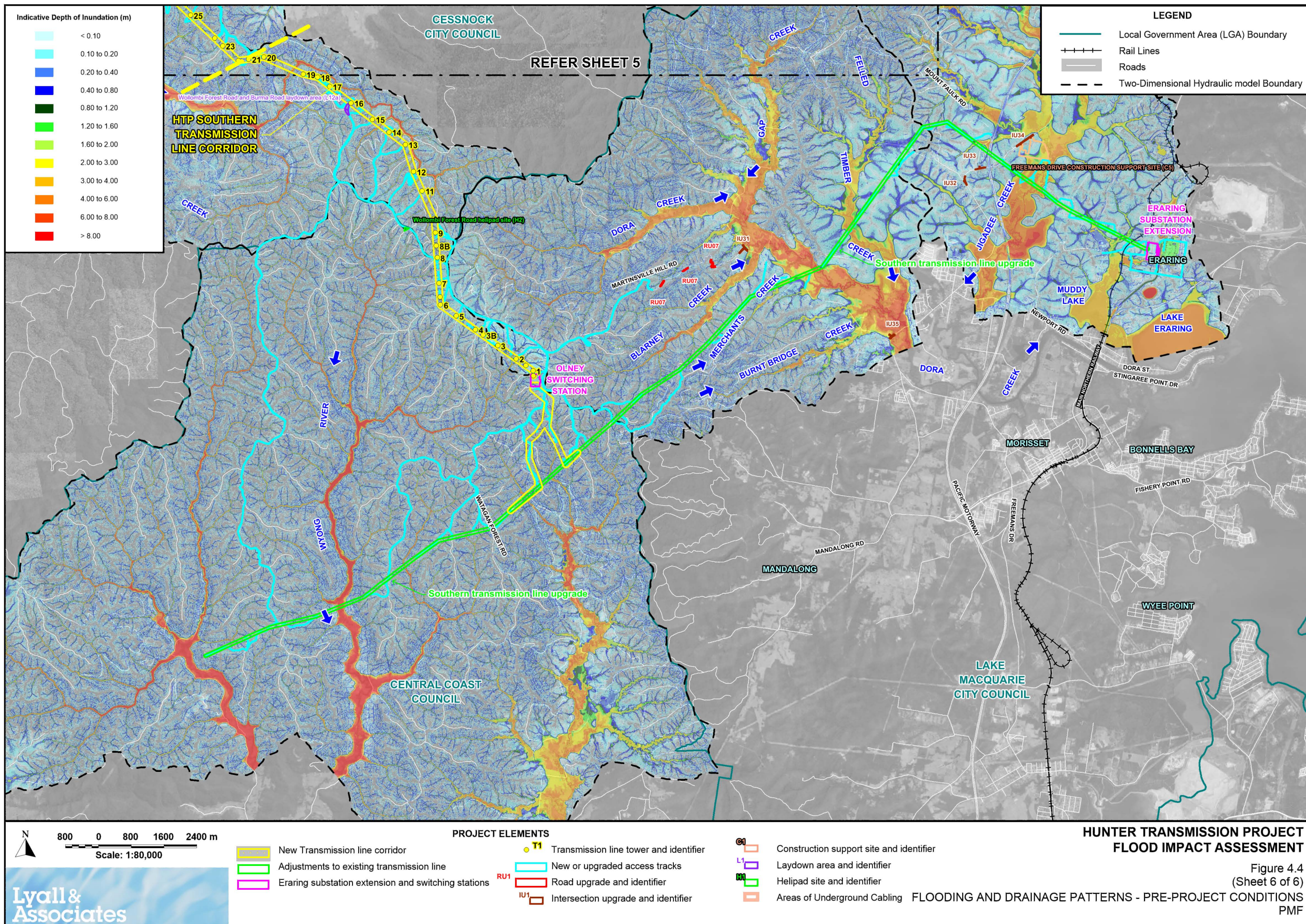


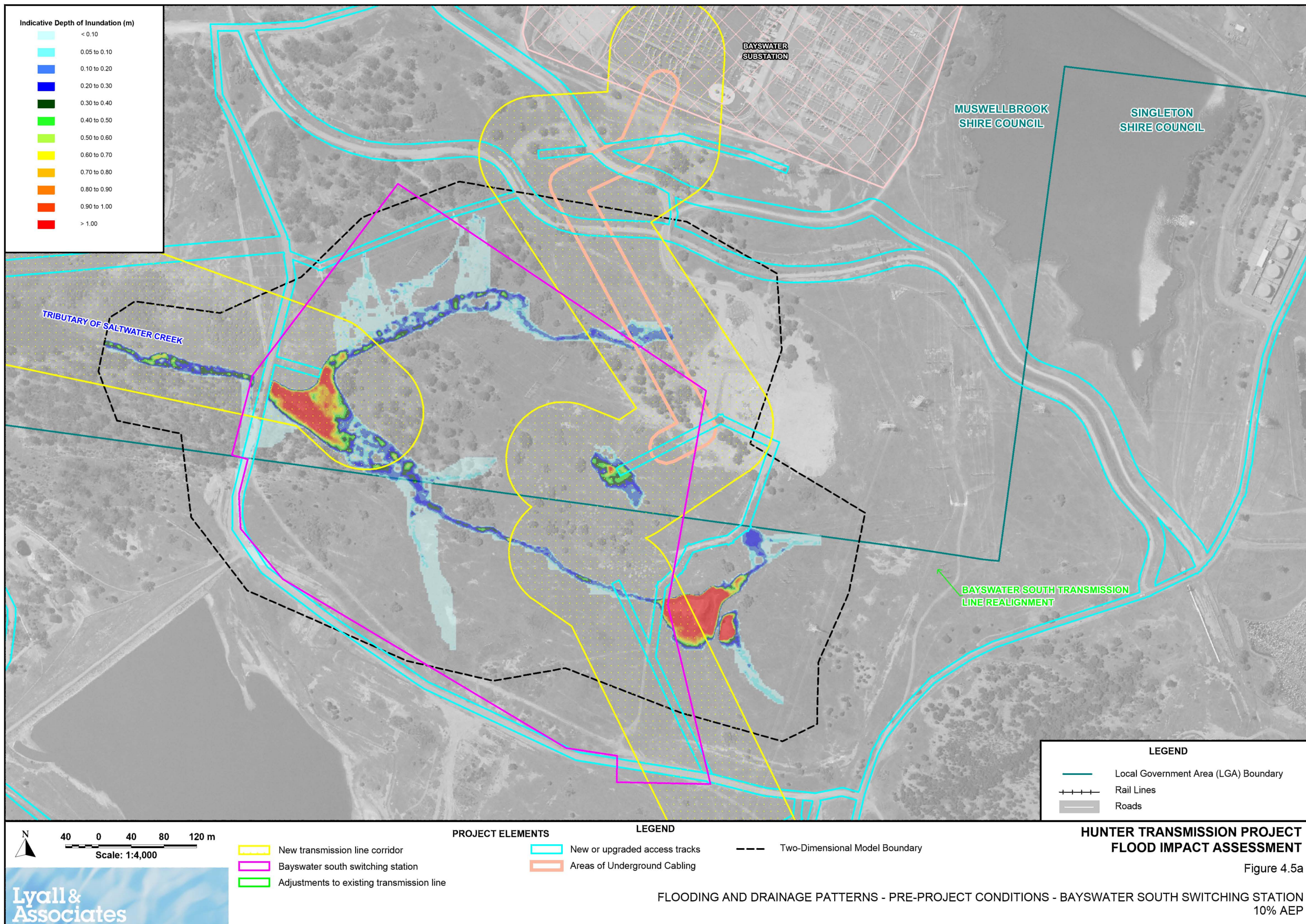


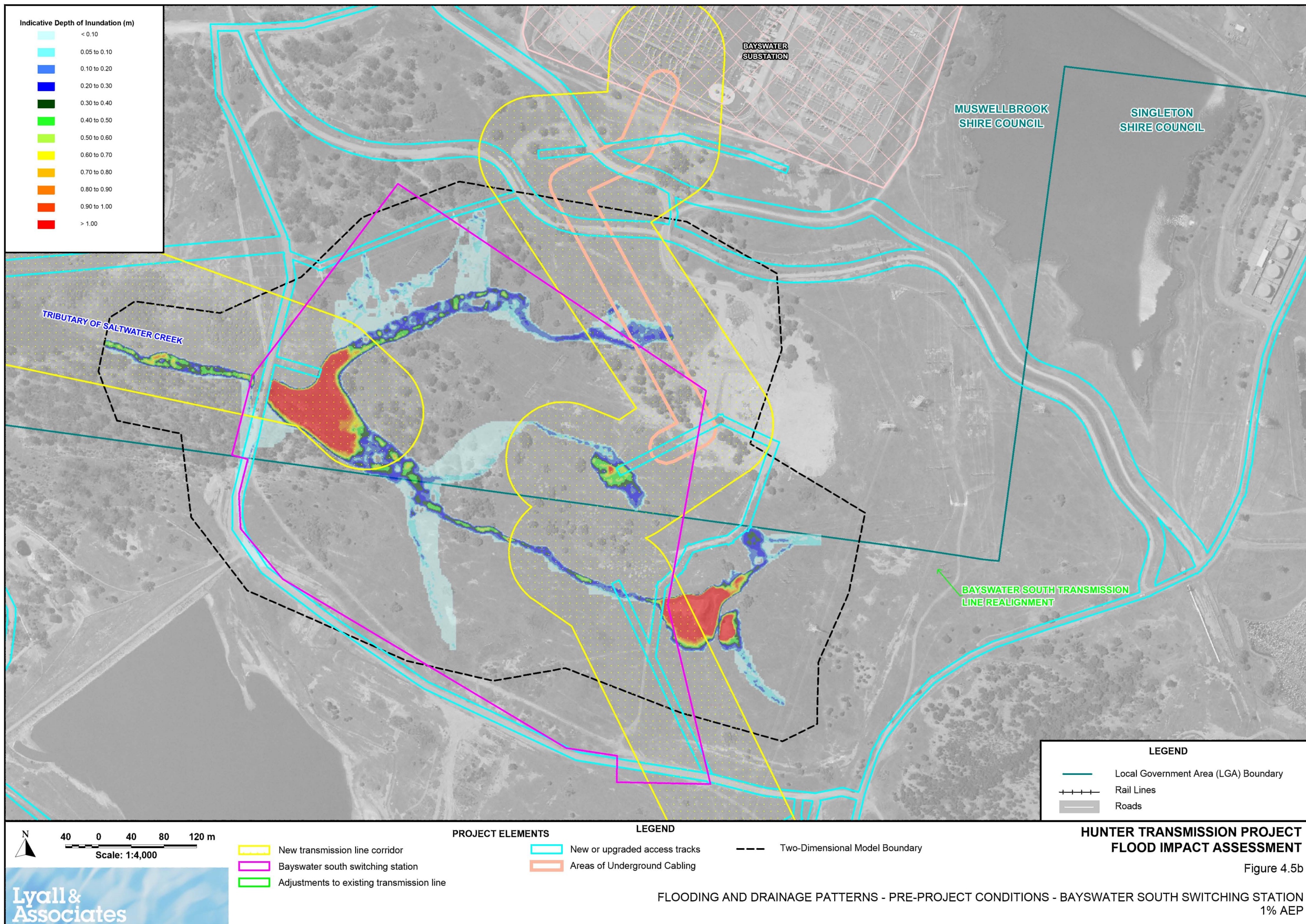


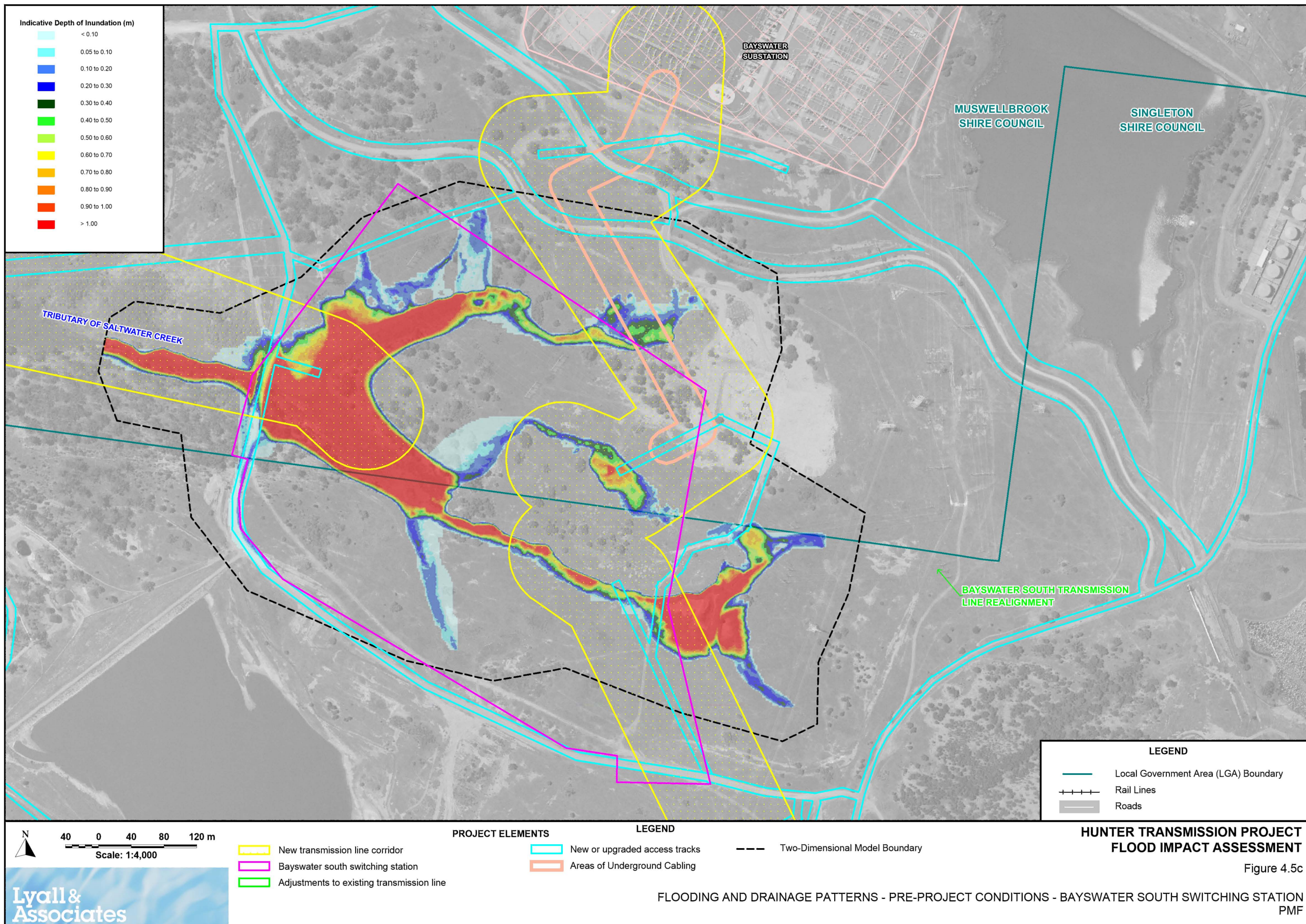


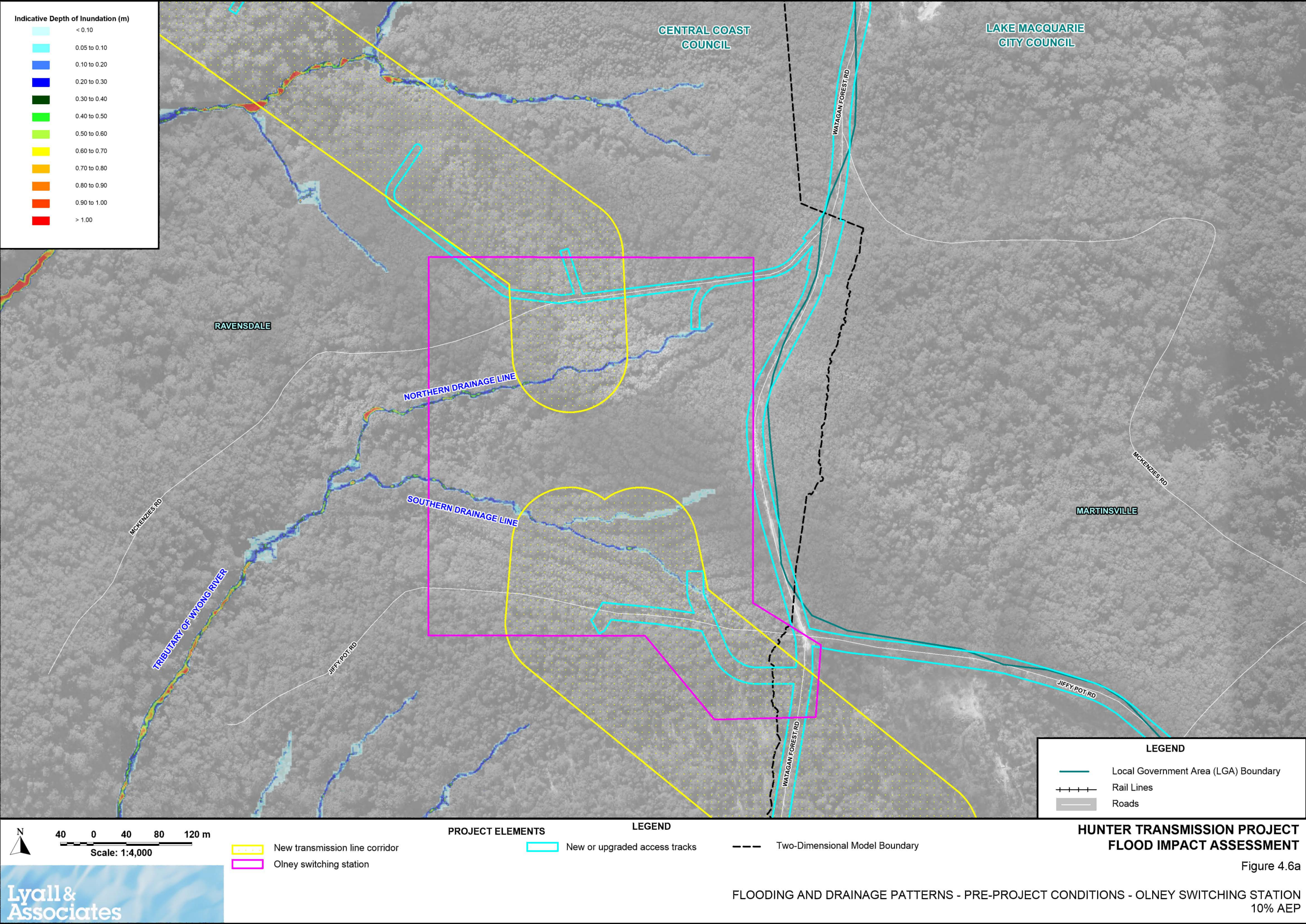


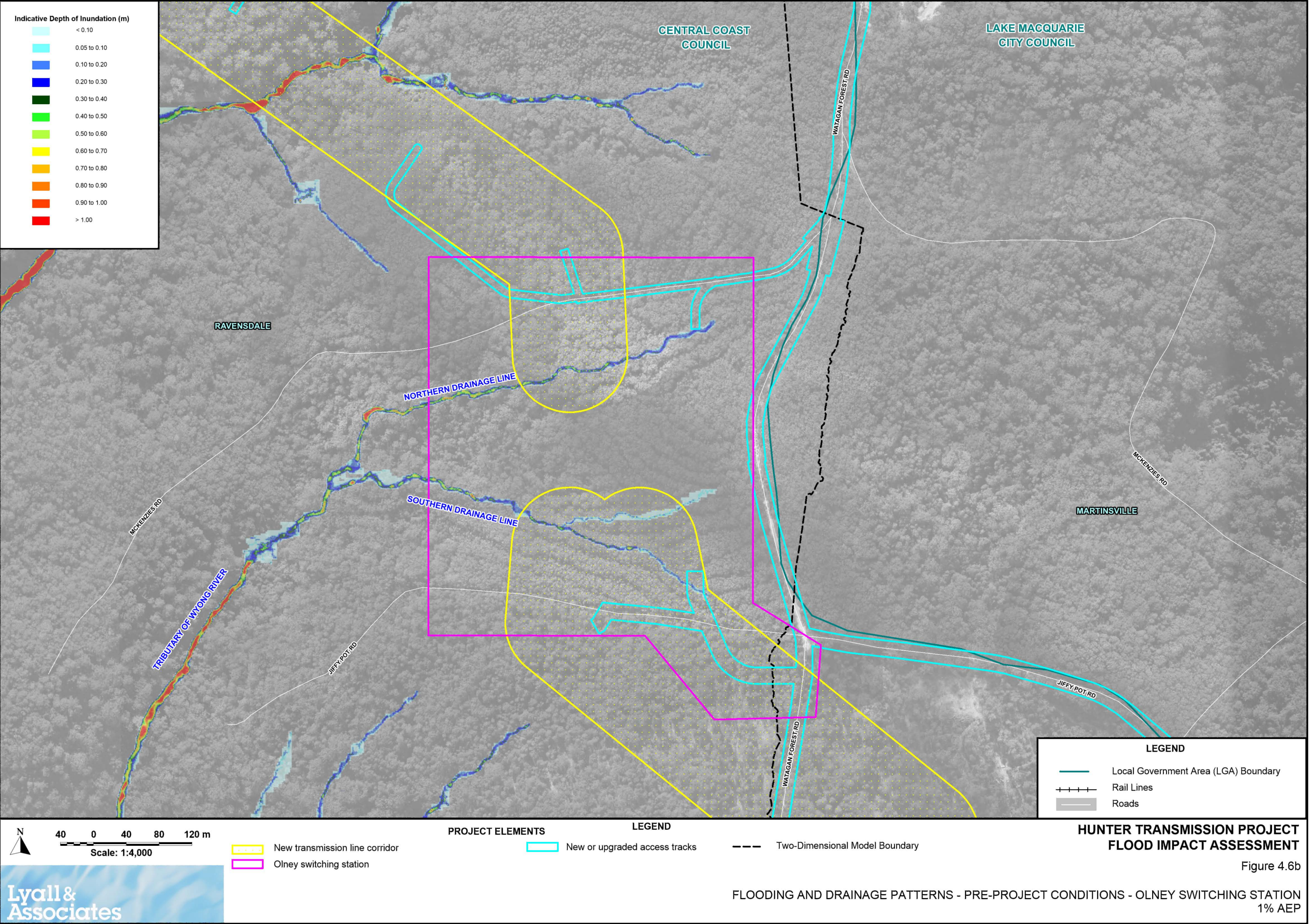


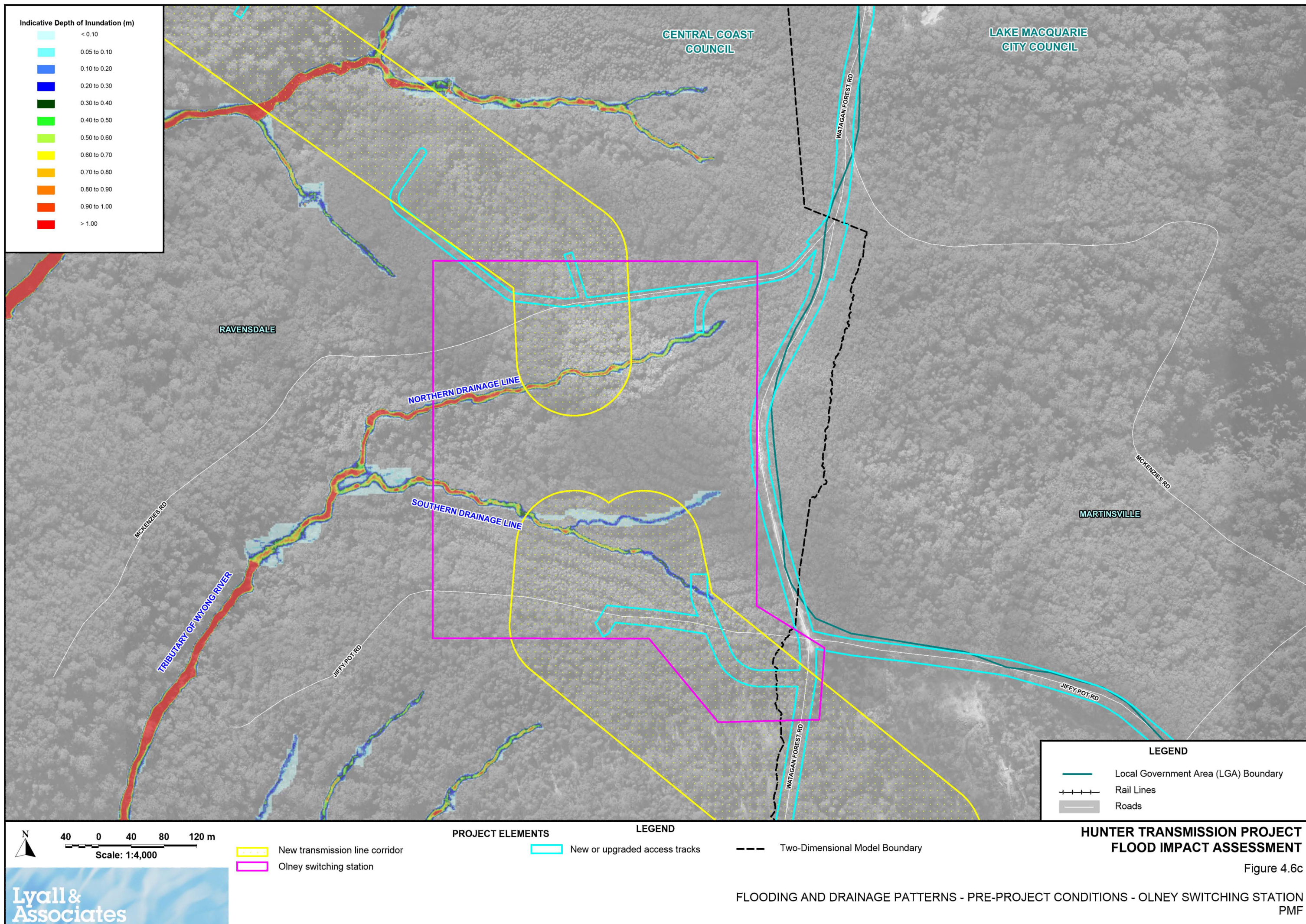


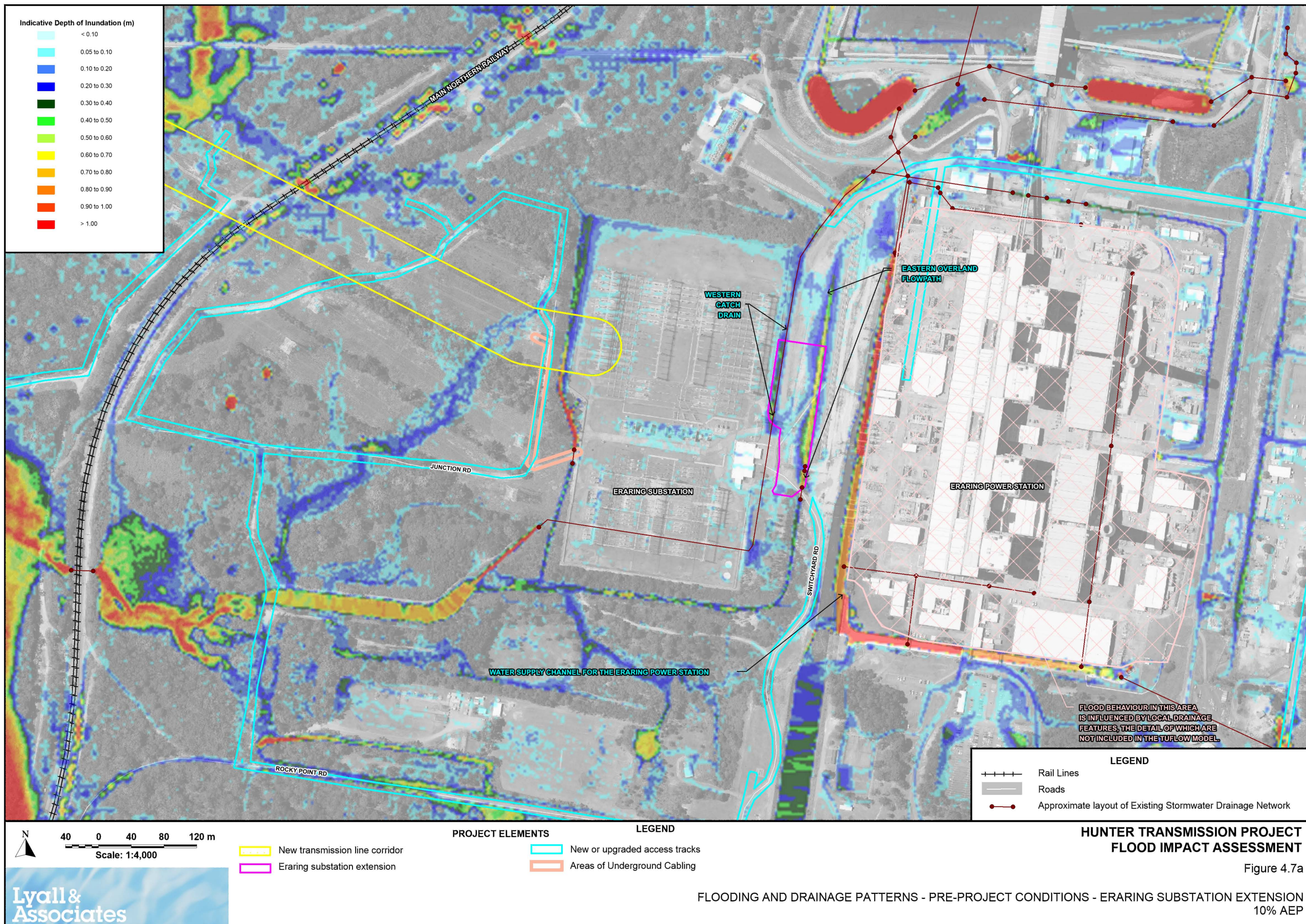


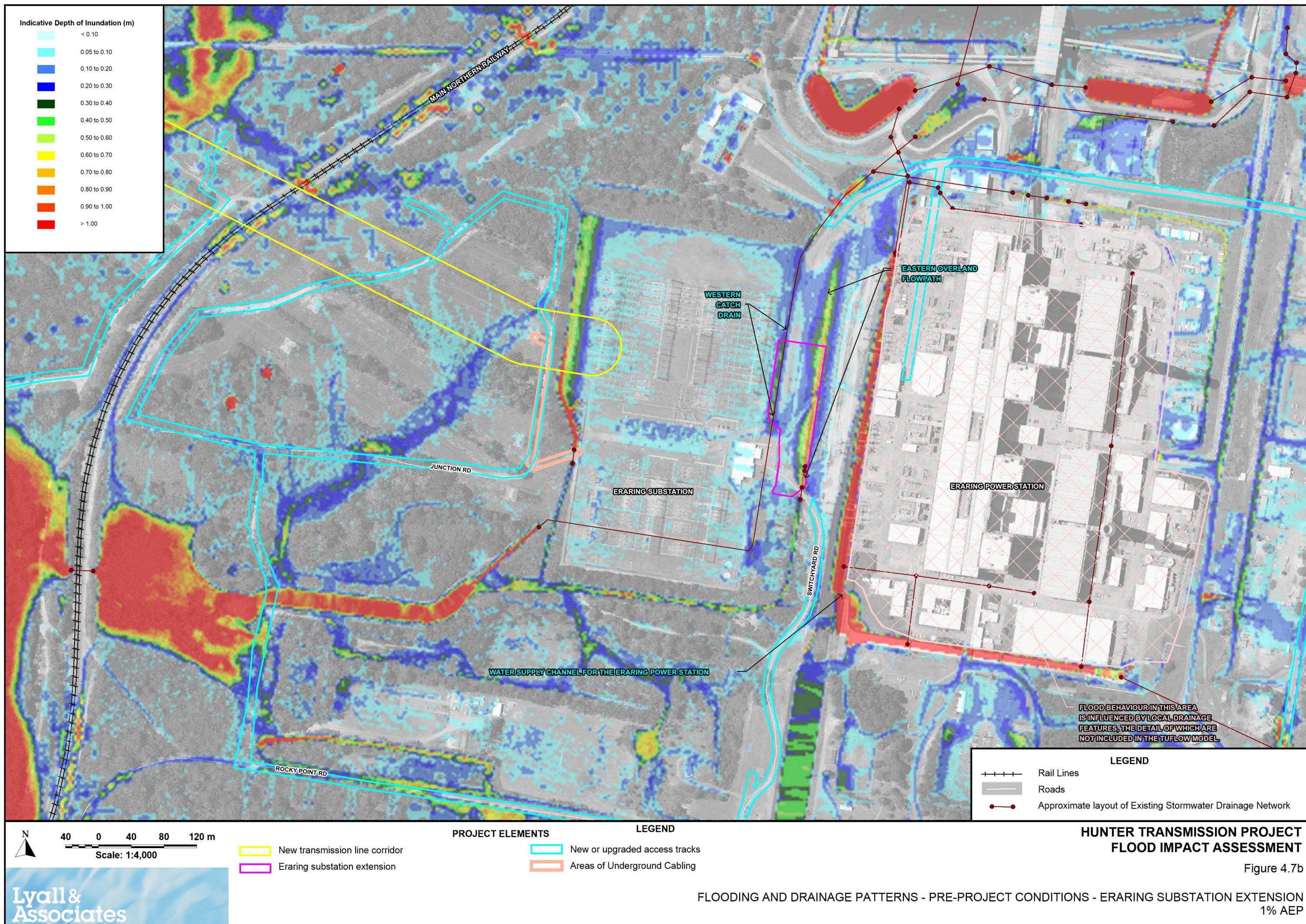


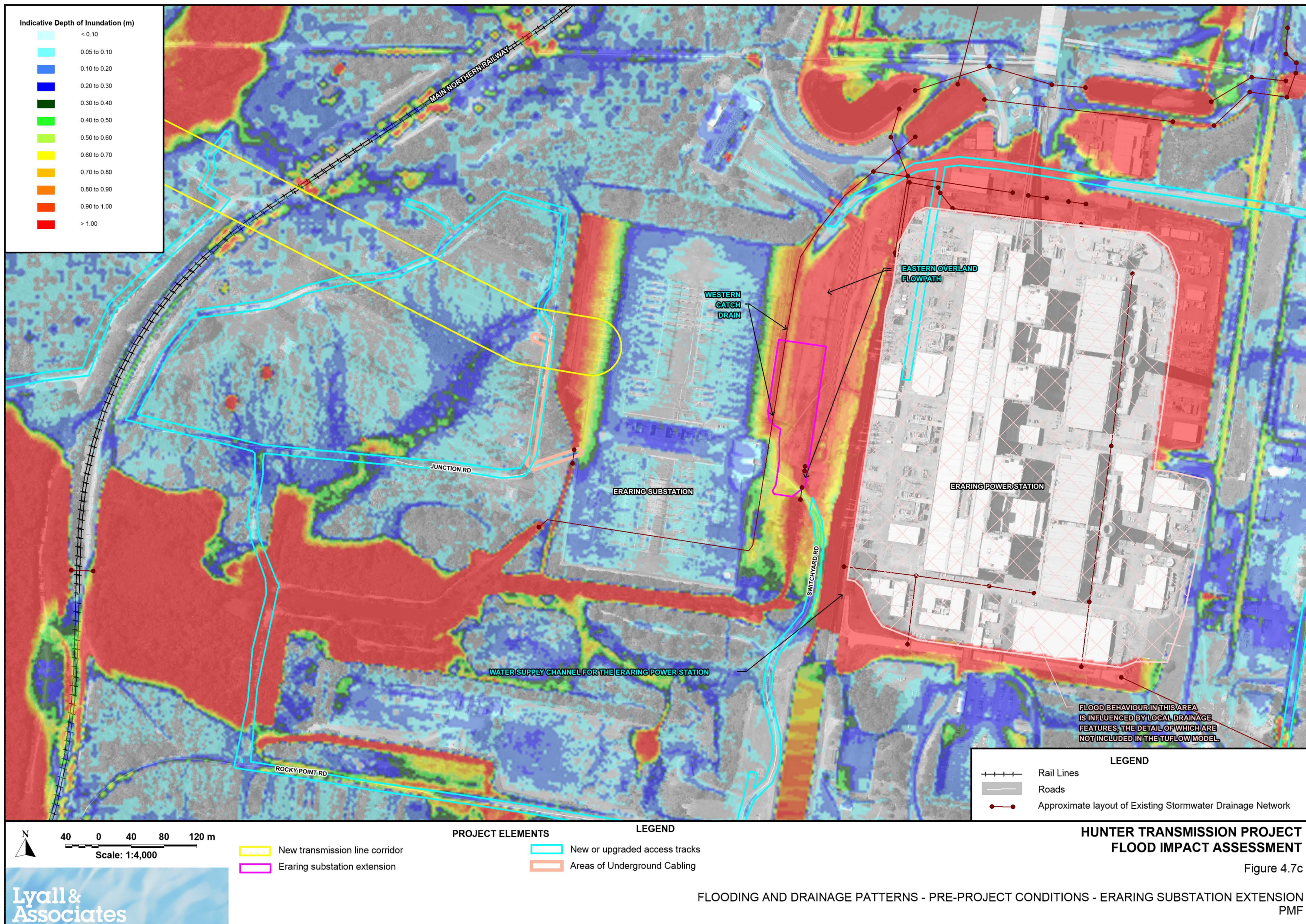


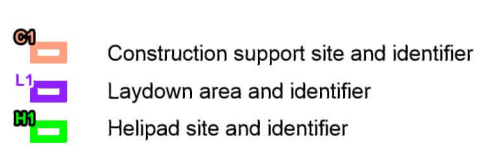
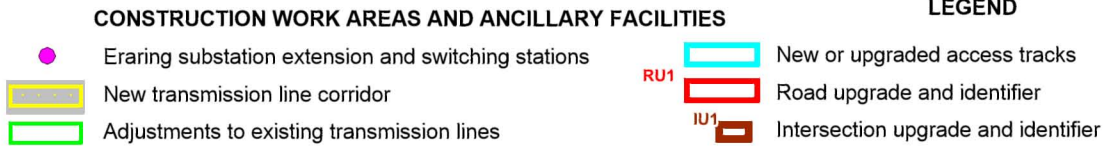
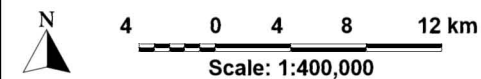
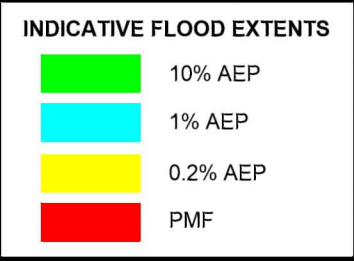
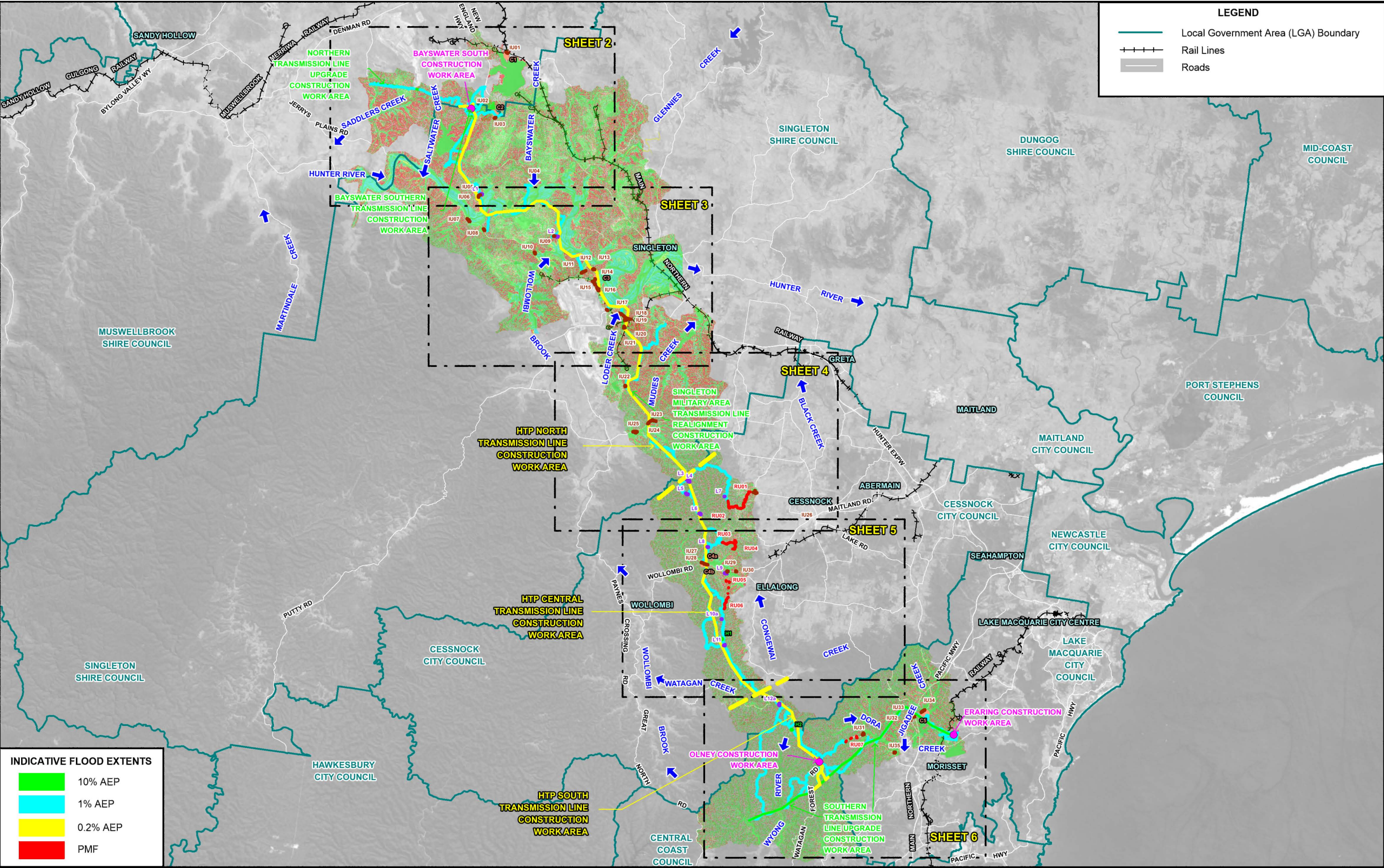








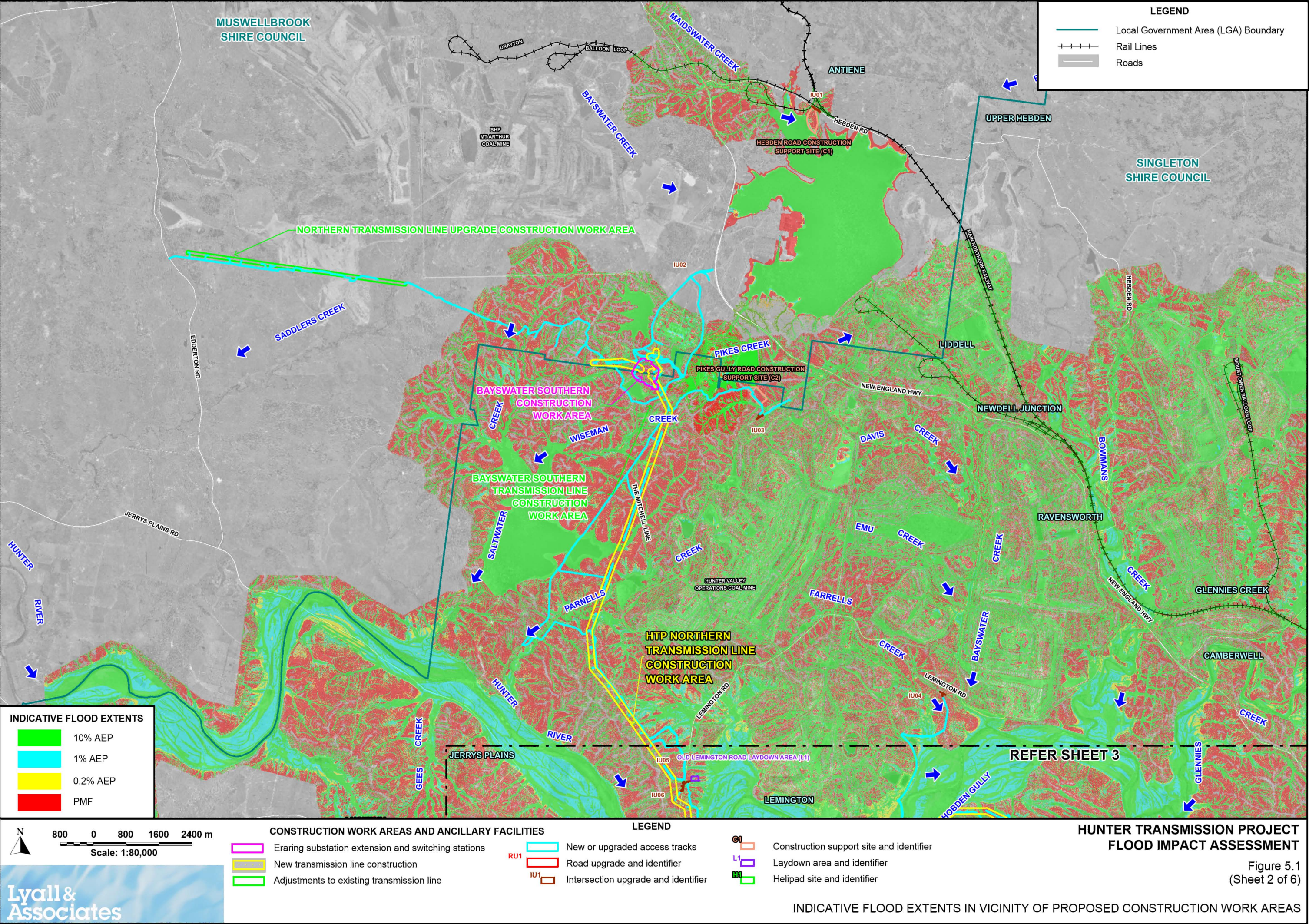


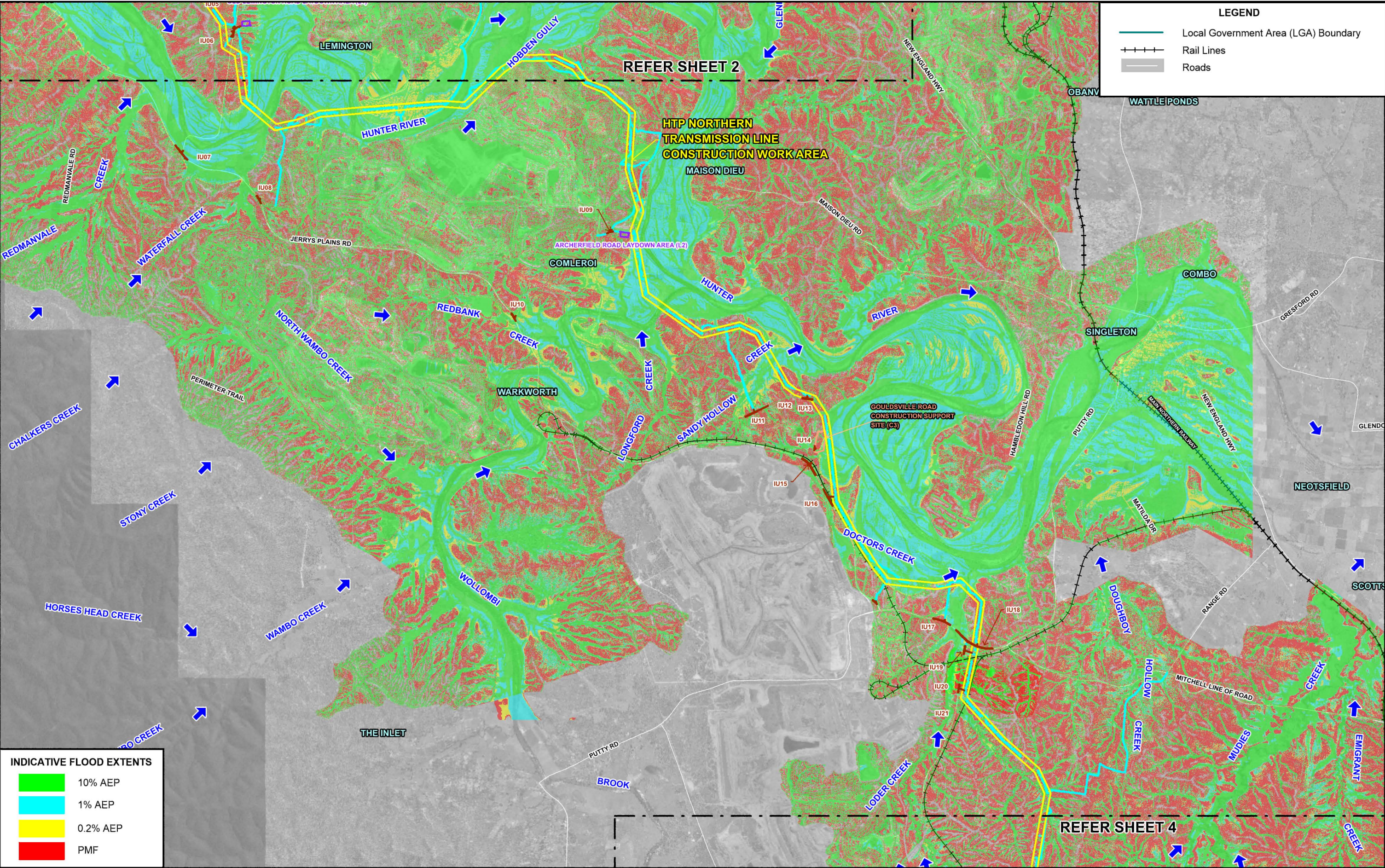


**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure 5.1
(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
---------	--------	----------	-----

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

Lyall & Associates

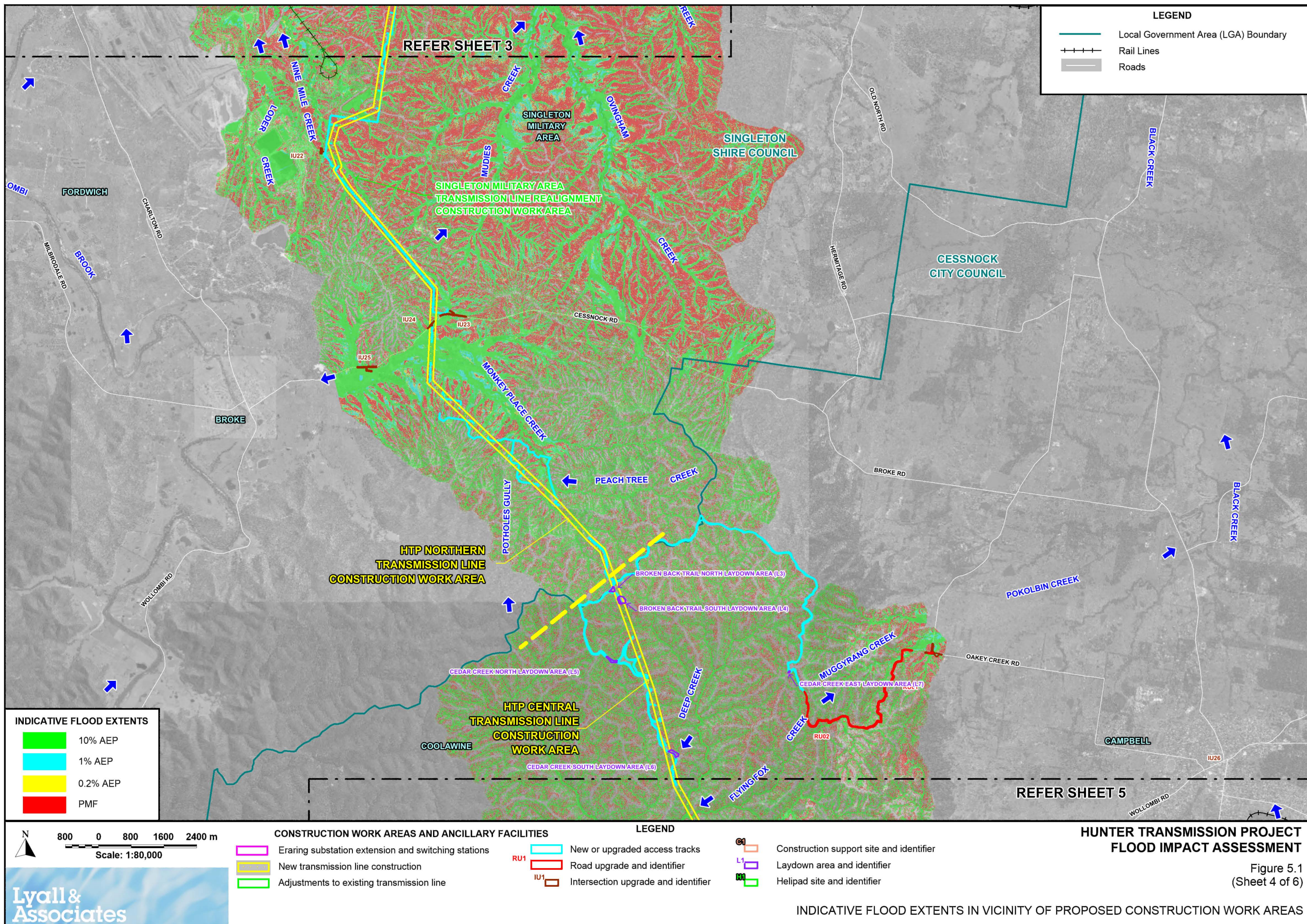
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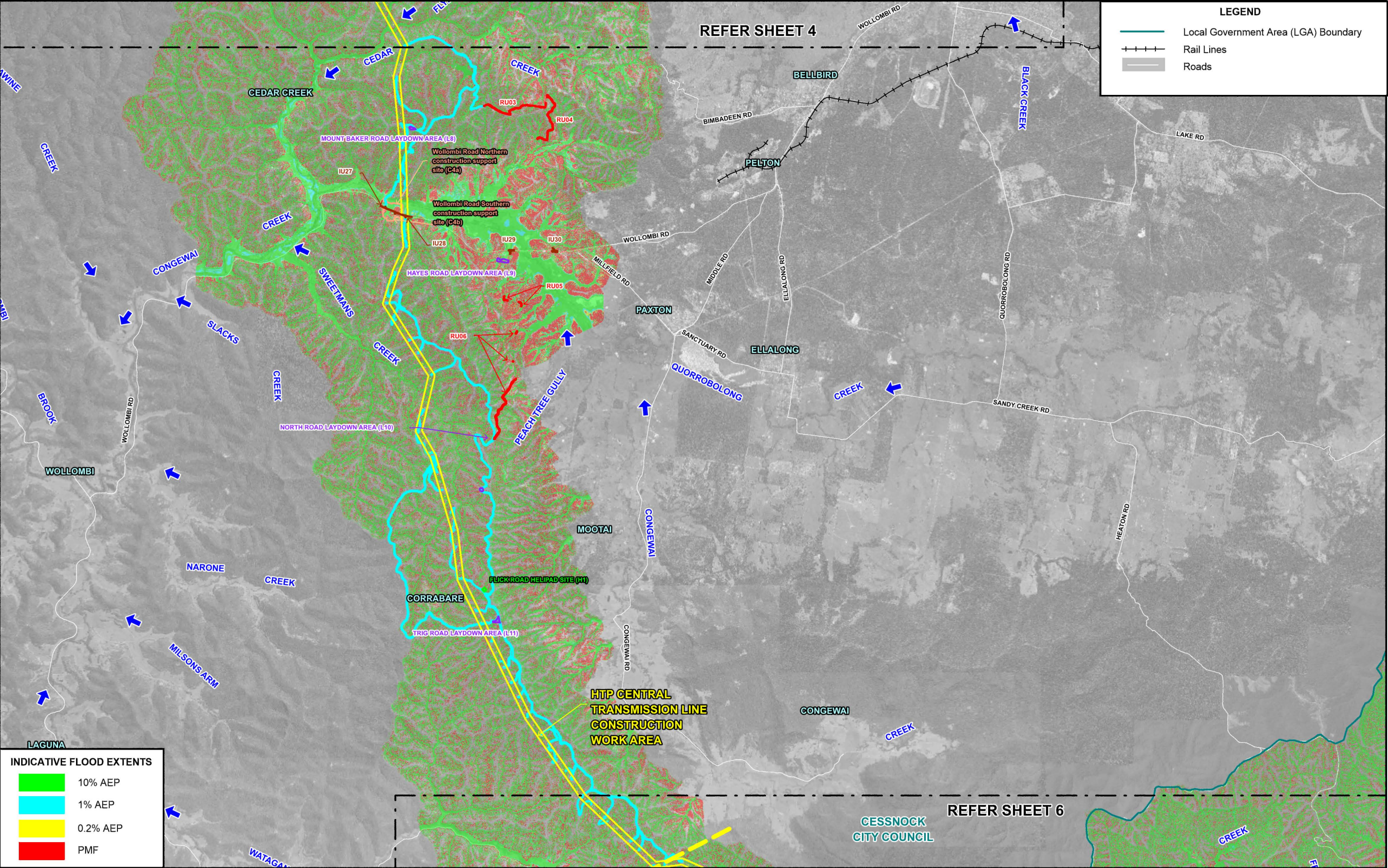
Eraring substation extension and switching stations	RU1	New or upgraded access tracks
New transmission line construction	IU1	Road upgrade and identifier
Adjustments to existing transmission line		Intersection upgrade and identifier

LEGEND

C3	Construction support site and identifier
L1	Laydown area and identifier
H1	Helipad site and identifier

INDICATIVE FLOOD EXTENTS IN VICINITY OF PROPOSED CONSTRUCTION WORK AREAS





INDICATIVE FLOOD EXTENTS

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

800 0 800 1600 2400 m
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Lyall & Associates

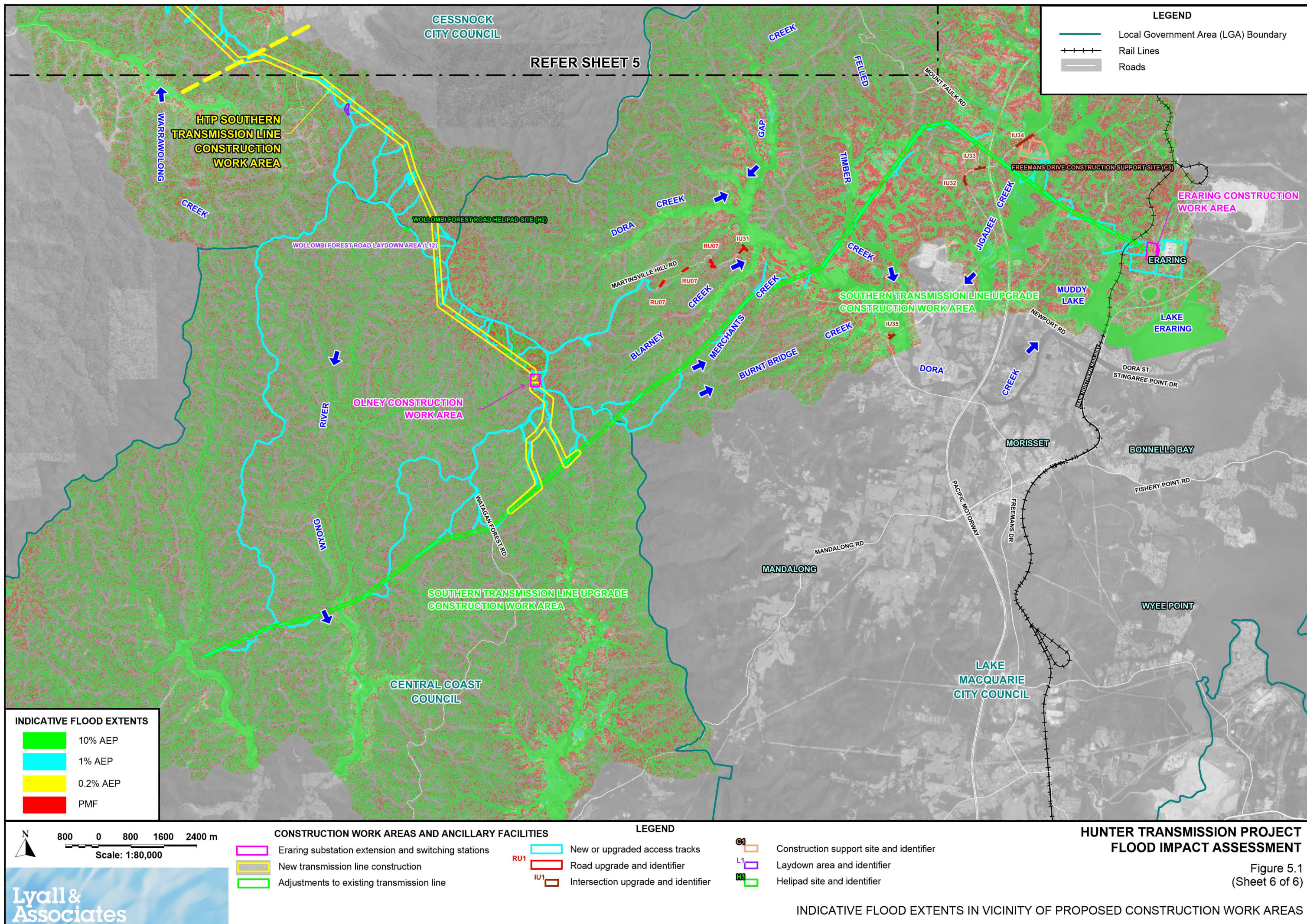
CONSTRUCTION WORK AREAS AND ANCILLARY FACILITIES

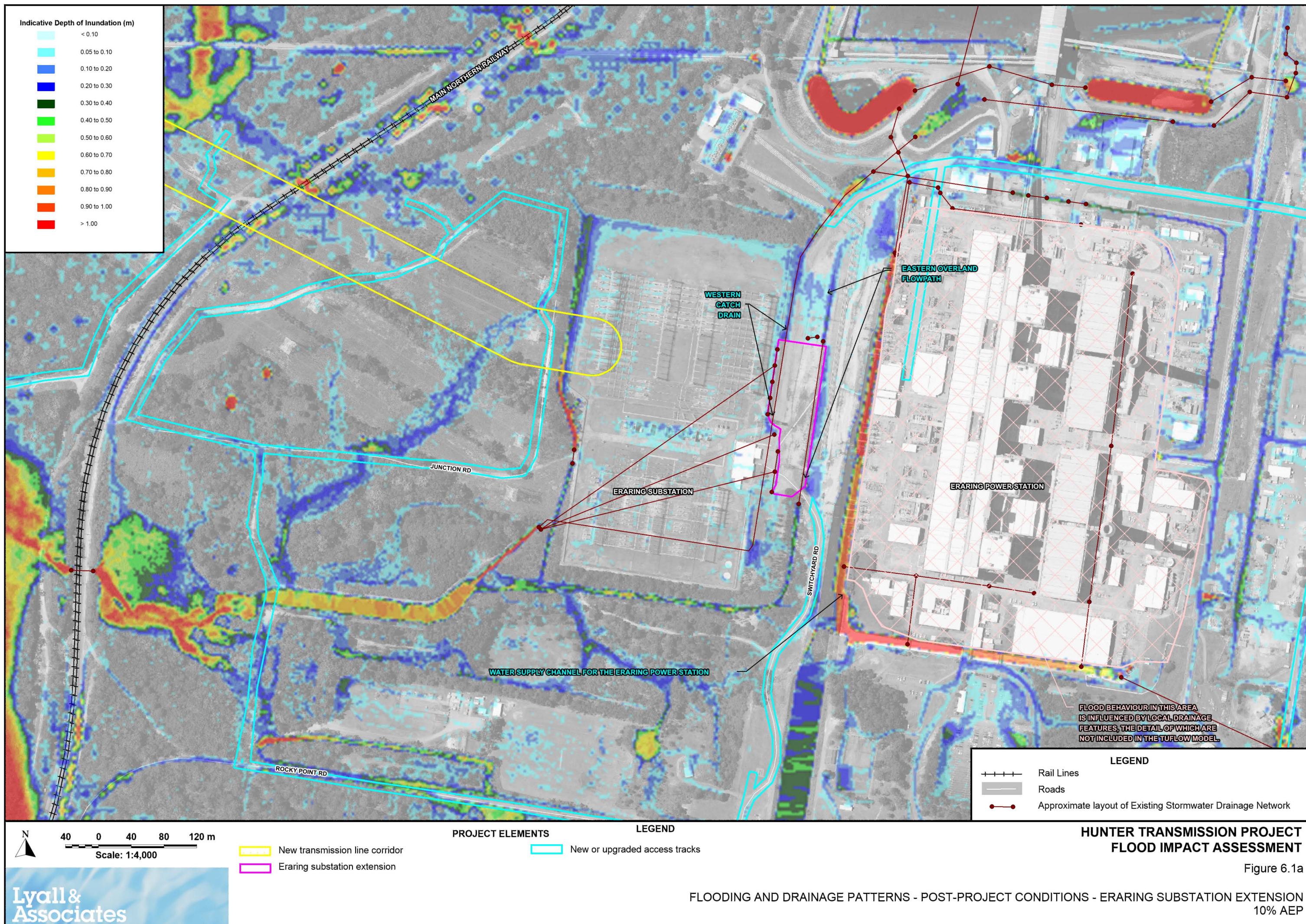
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New transmission line construction	IU1 Road upgrade and identifier
Adjustments to existing transmission line	IU1 Intersection upgrade and identifier

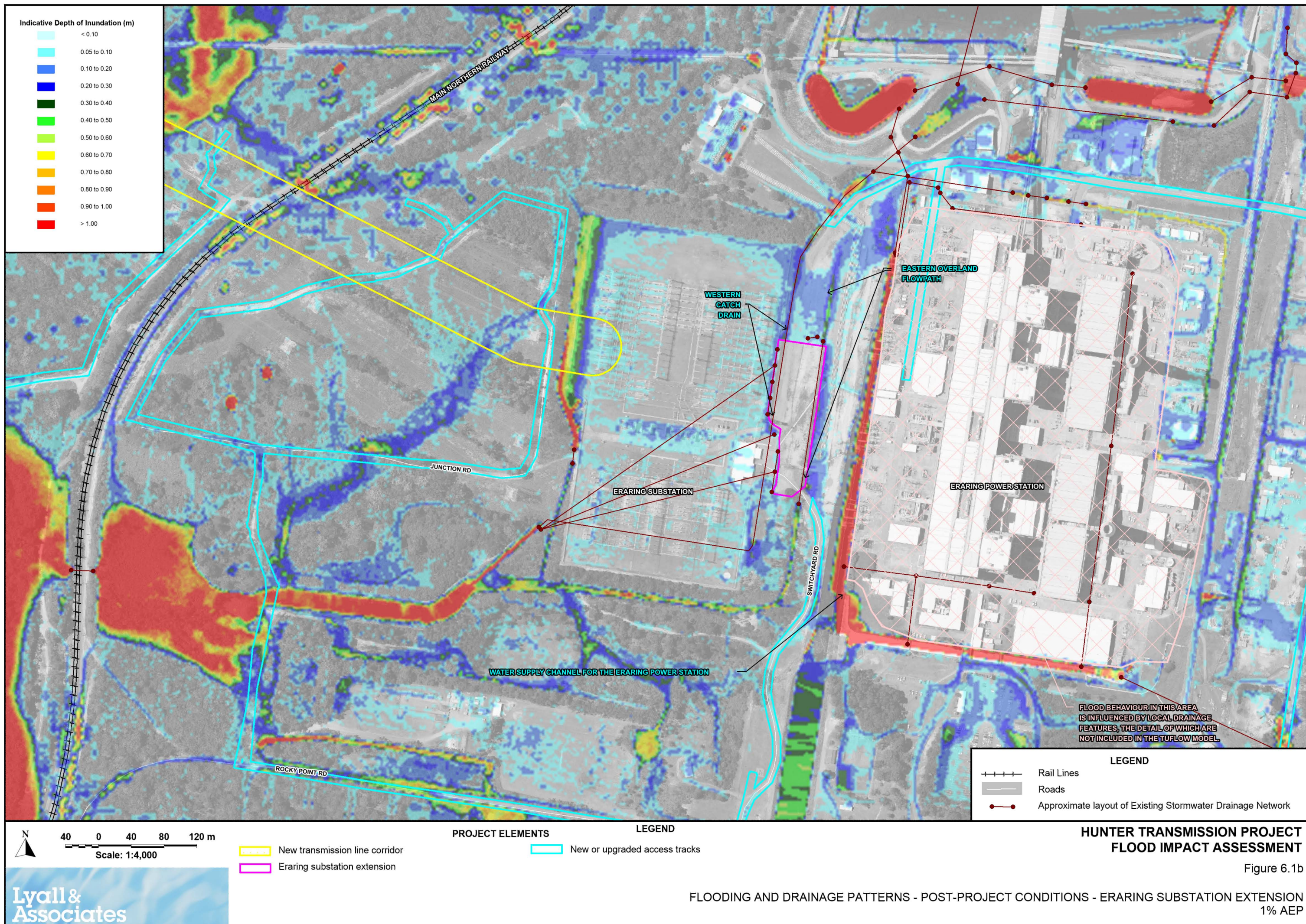
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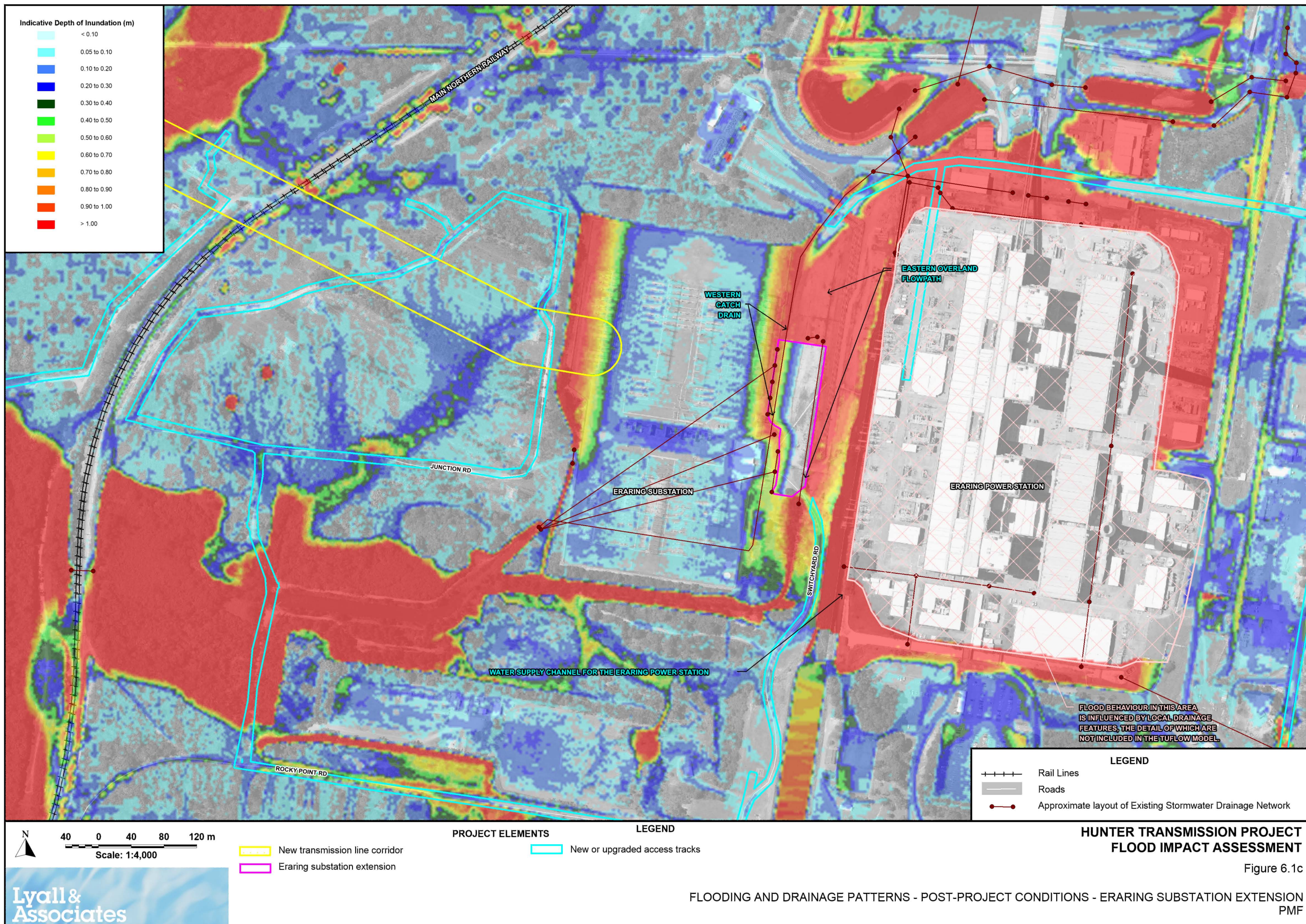
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L1 Laydown area and identifier
H1 Helipad site and identifier

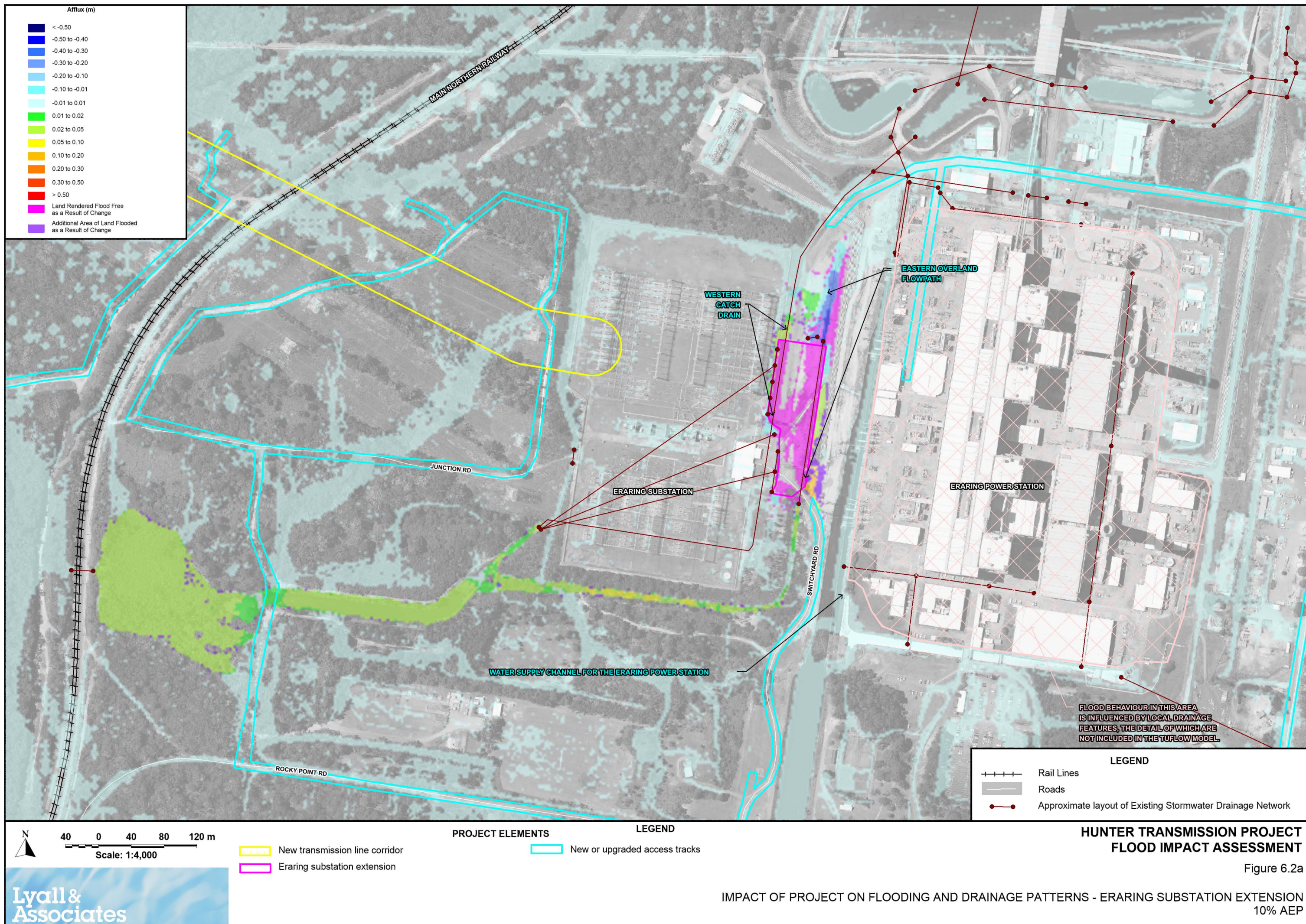
INDICATIVE FLOOD EXTENTS IN VICINITY OF PROPOSED CONSTRUCTION WORK AREAS

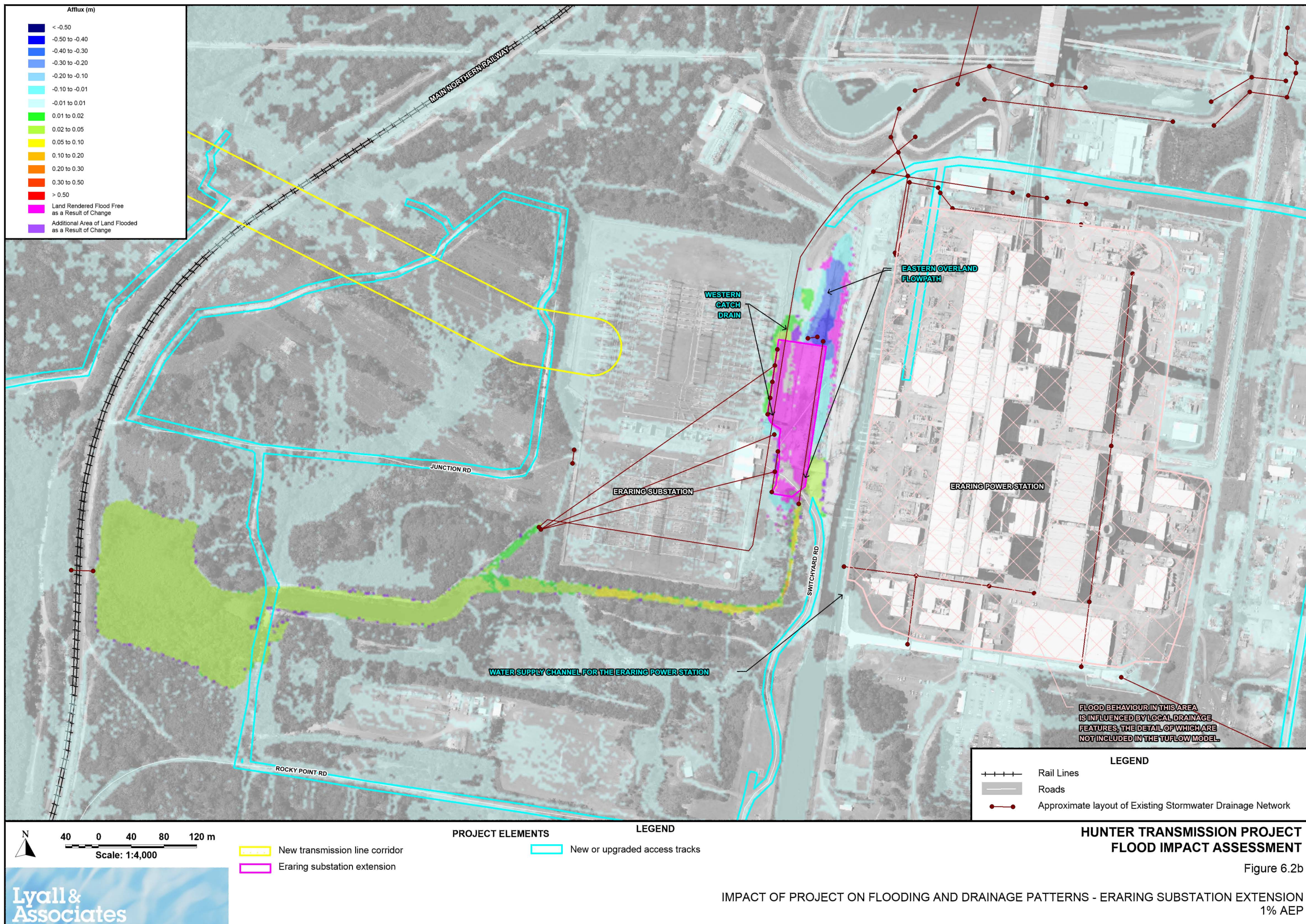


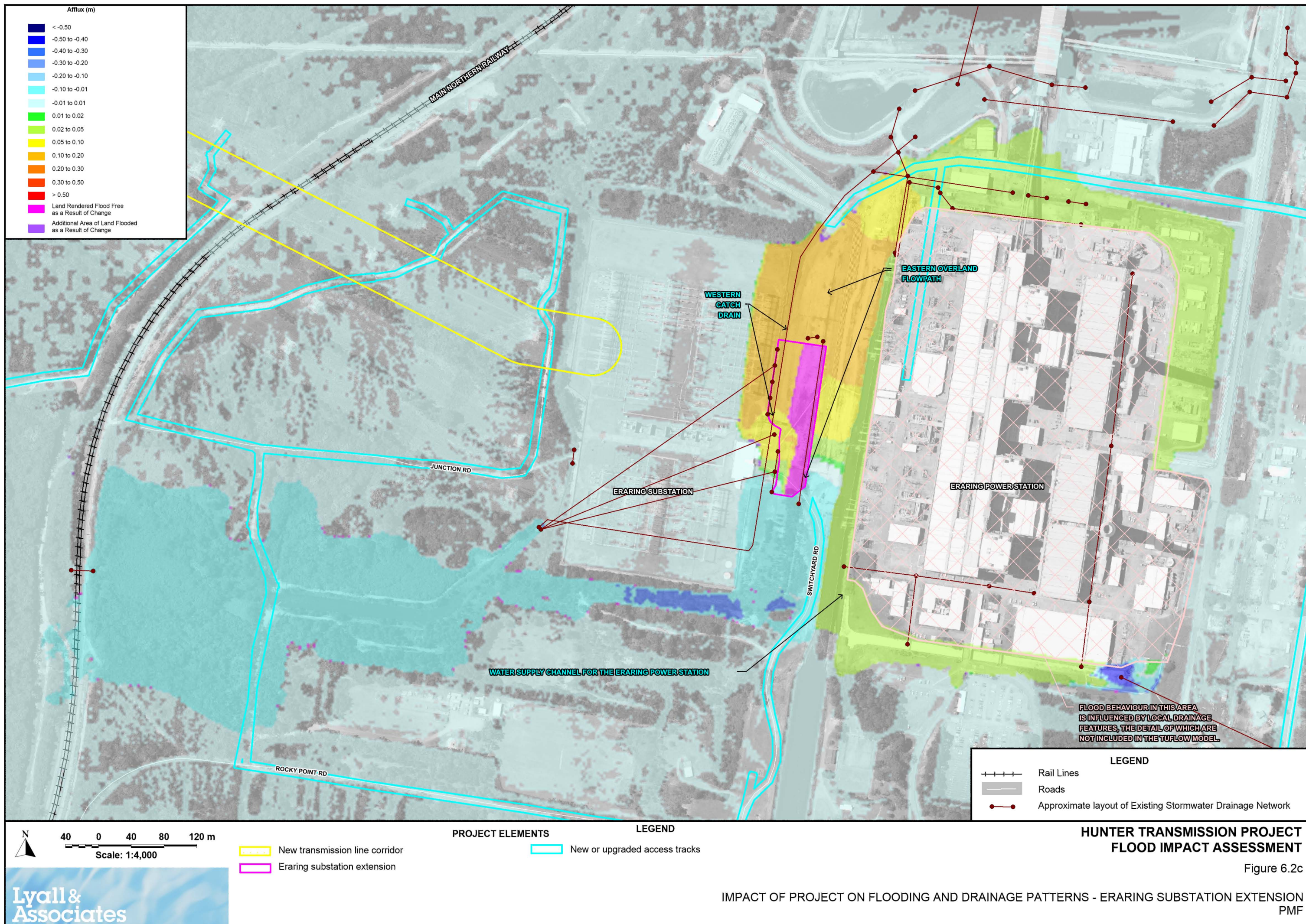




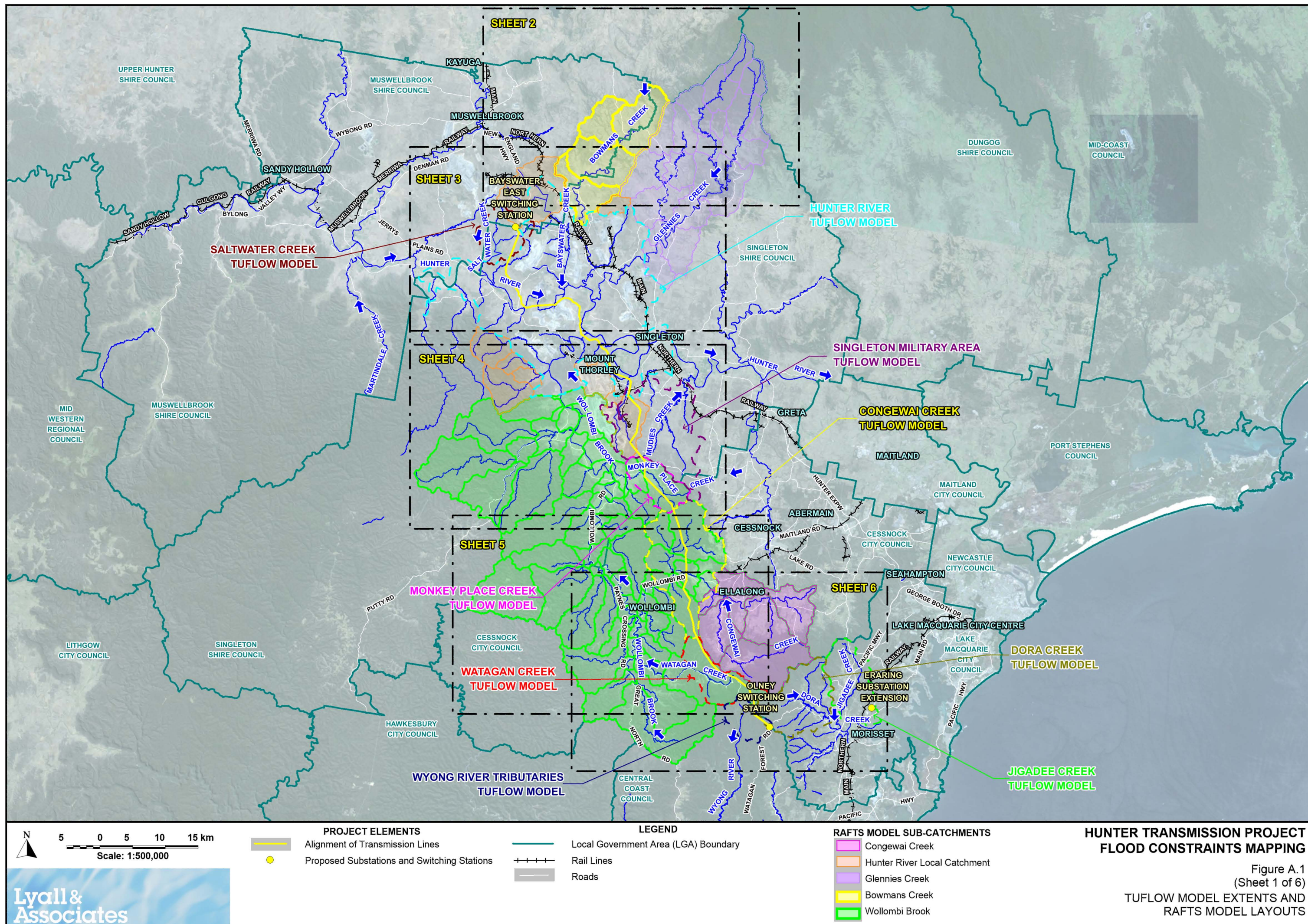


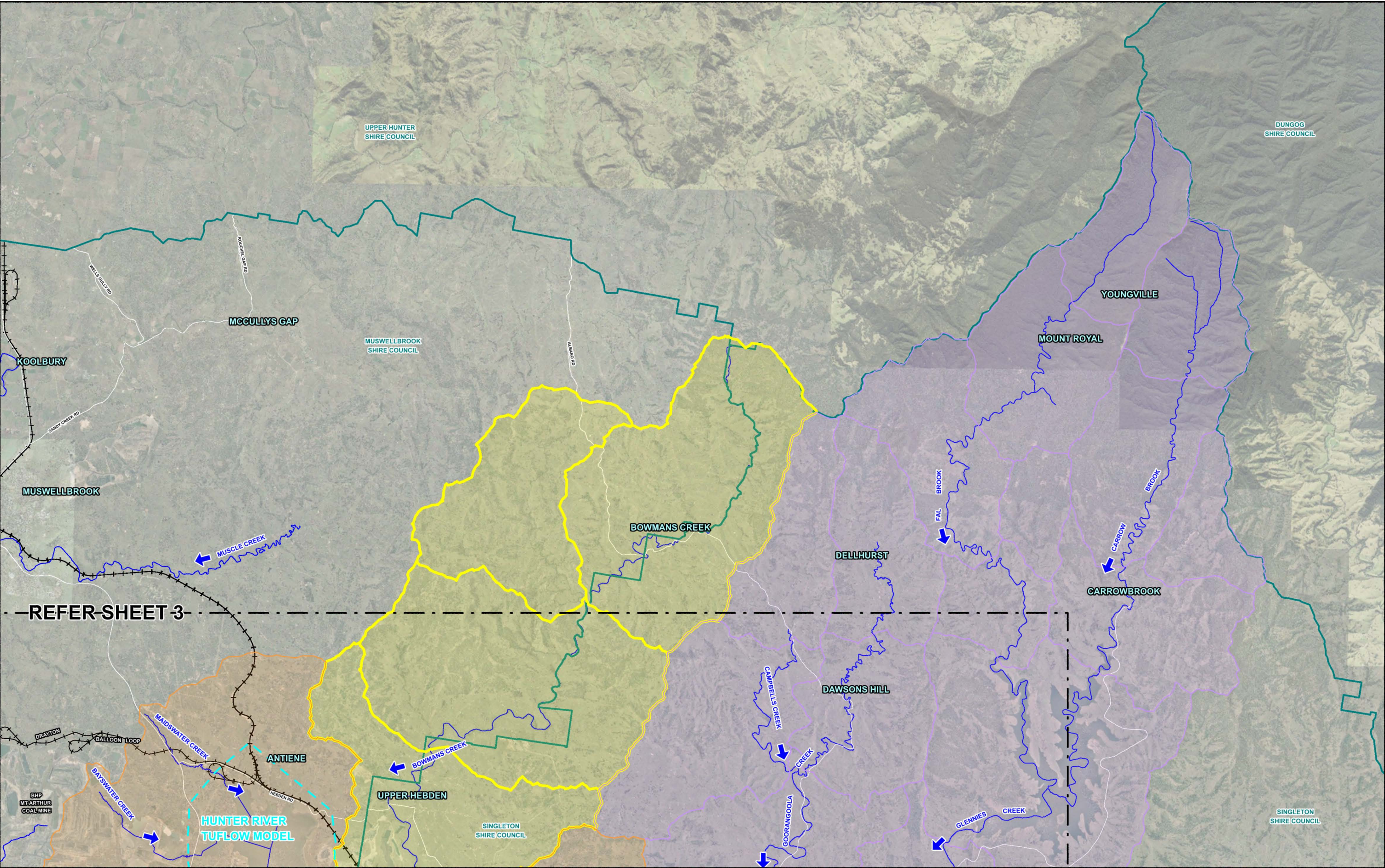






ANNEXURE A
FIGURES SHOWING THE LAYOUT OF THE HYDROLOGIC AND HYDRAULIC
MODELS





1.2 0 1.2 2.4 3.6 km
Scale: 1:120,000

PROJECT ELEMENTS

- Alignment of Transmission Lines
- Proposed Substations and Switching Stations

LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads

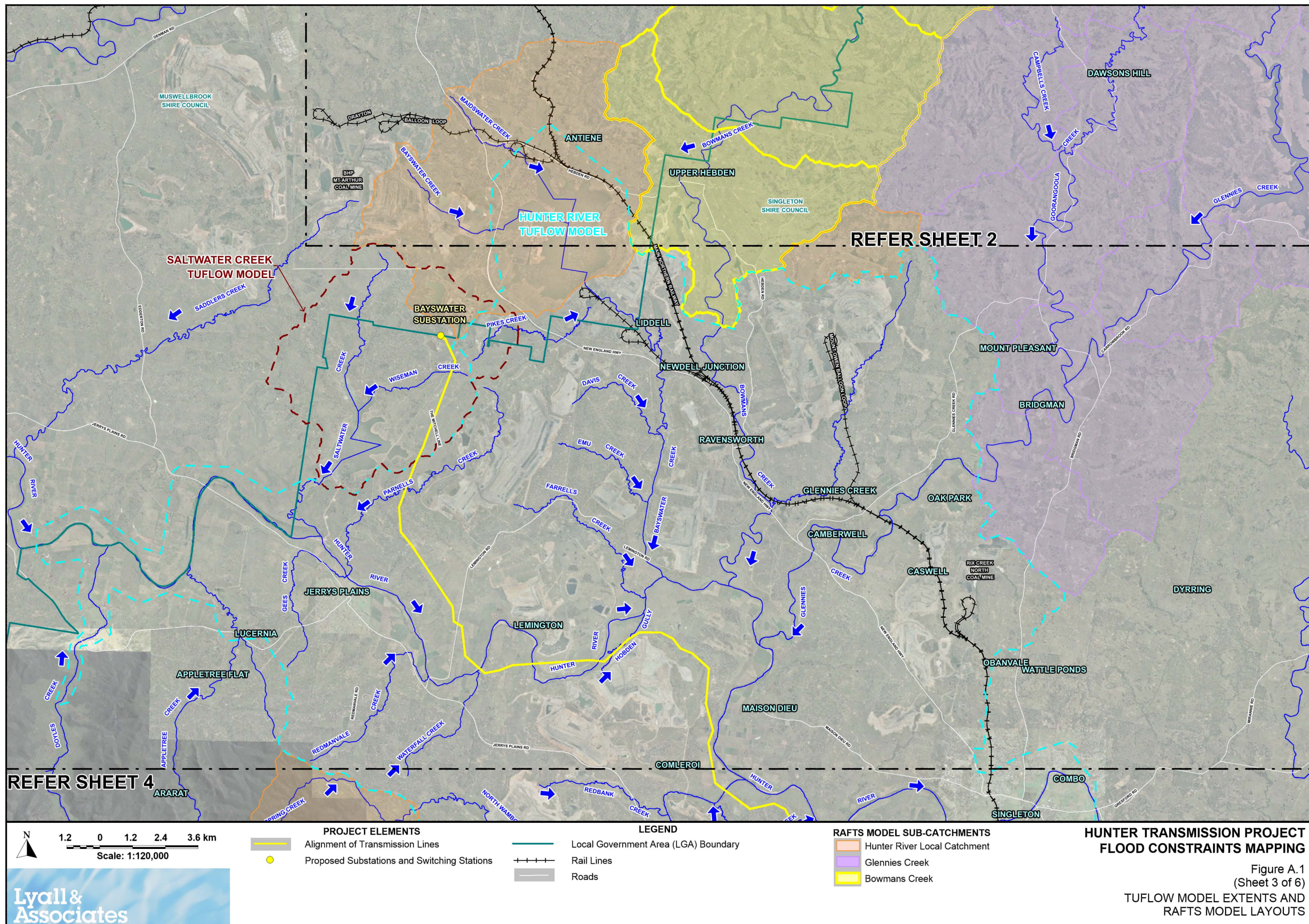
RAFTS MODEL SUB-CATCHMENTS

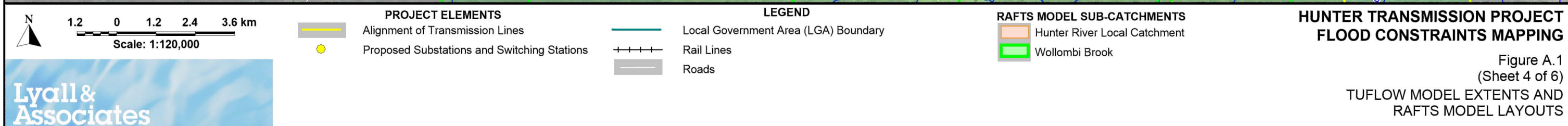
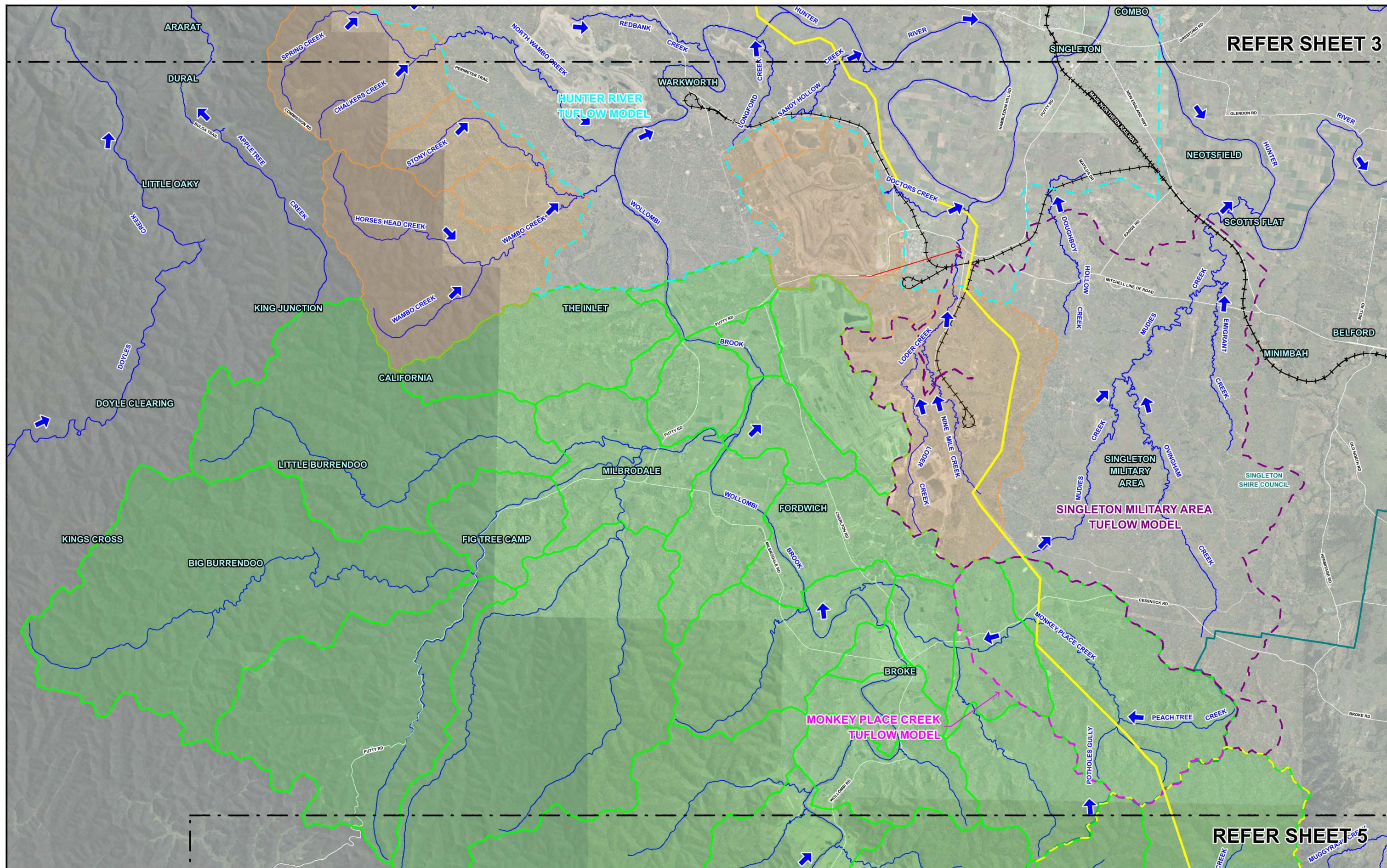
- Hunter River Local Catchment
- Glennies Creek
- Bowmans Creek

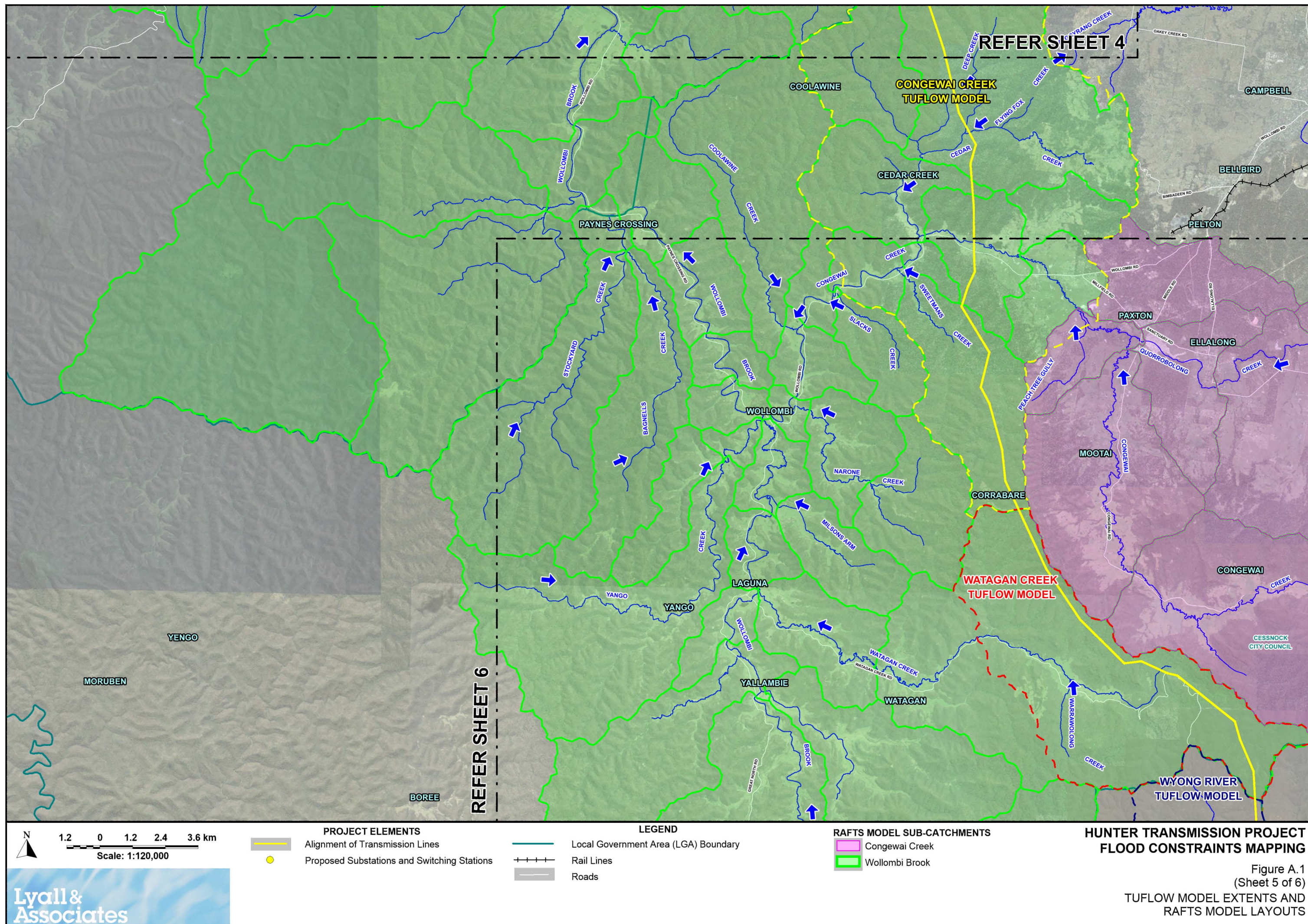
**HUNTER TRANSMISSION PROJECT
FLOOD CONSTRAINTS MAPPING**

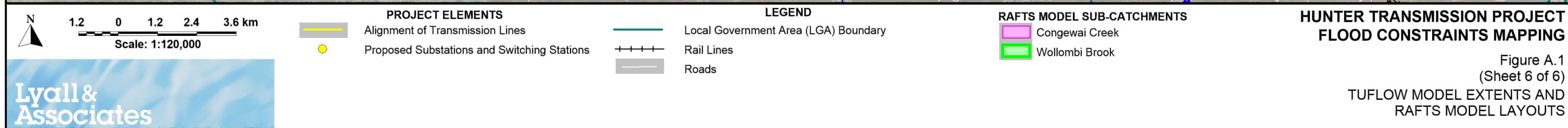
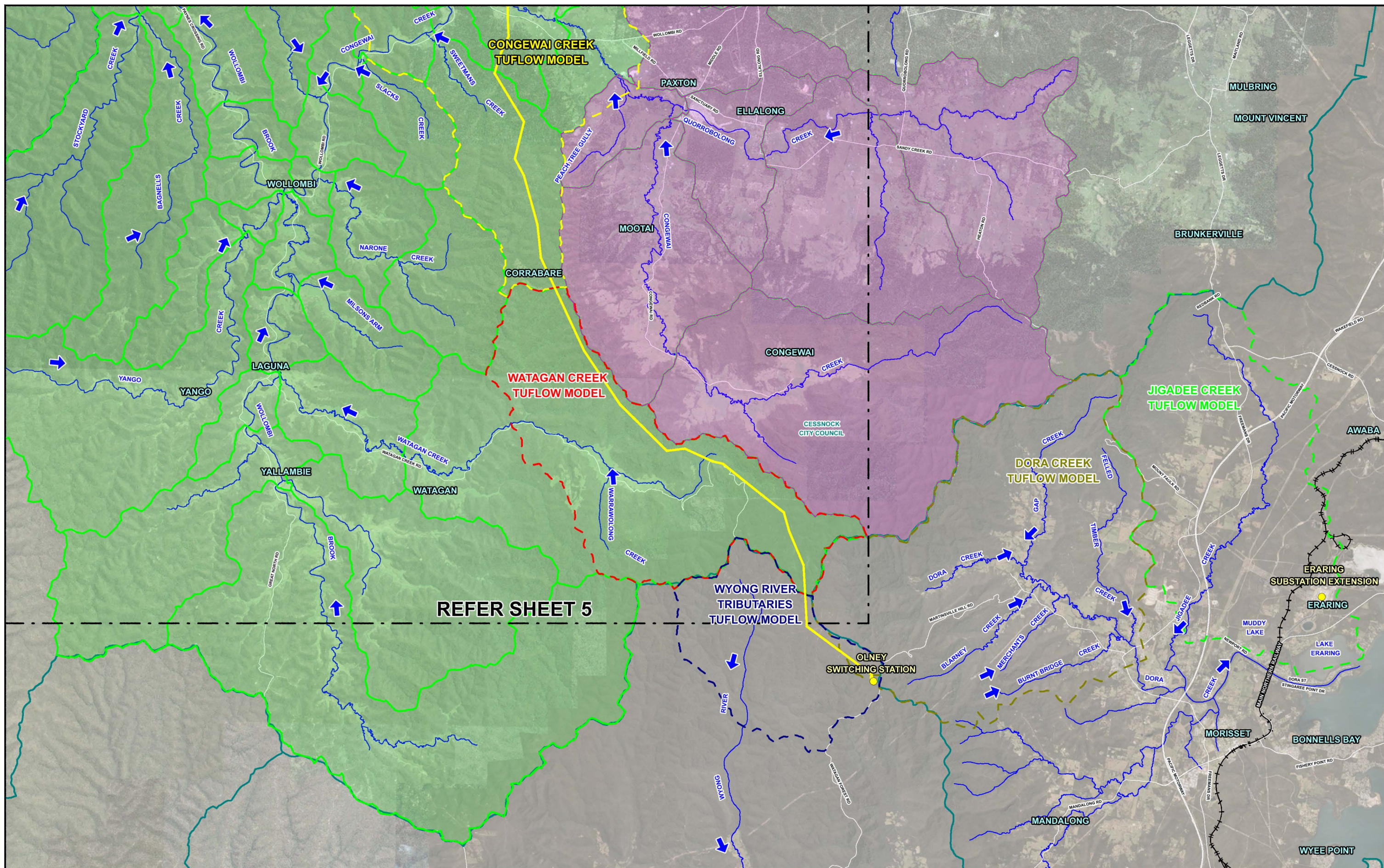
Figure A.1
(Sheet 2 of 6)
TUFLOW MODEL EXTENTS AND
RAFTS MODEL LAYOUTS

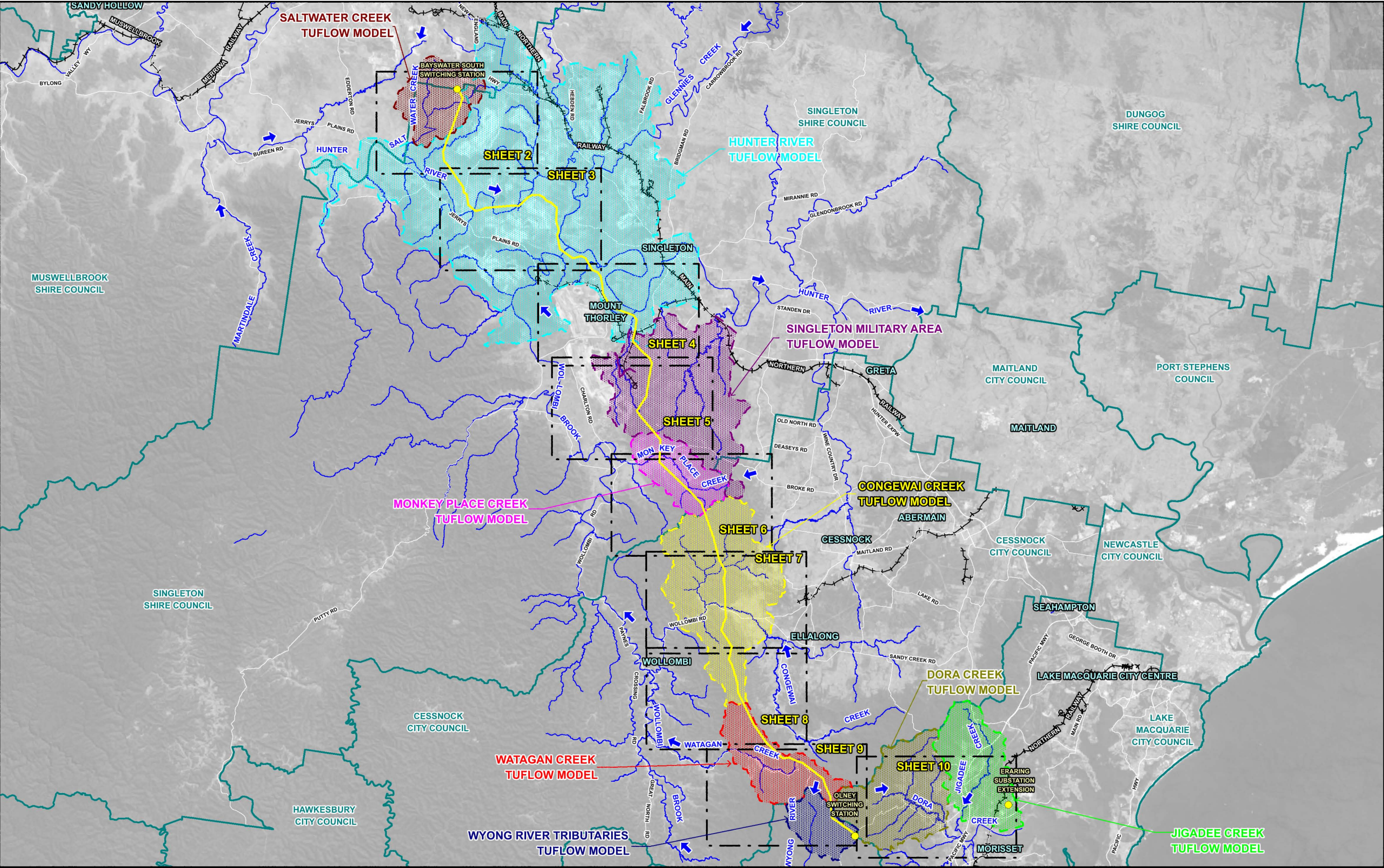
Lyall & Associates

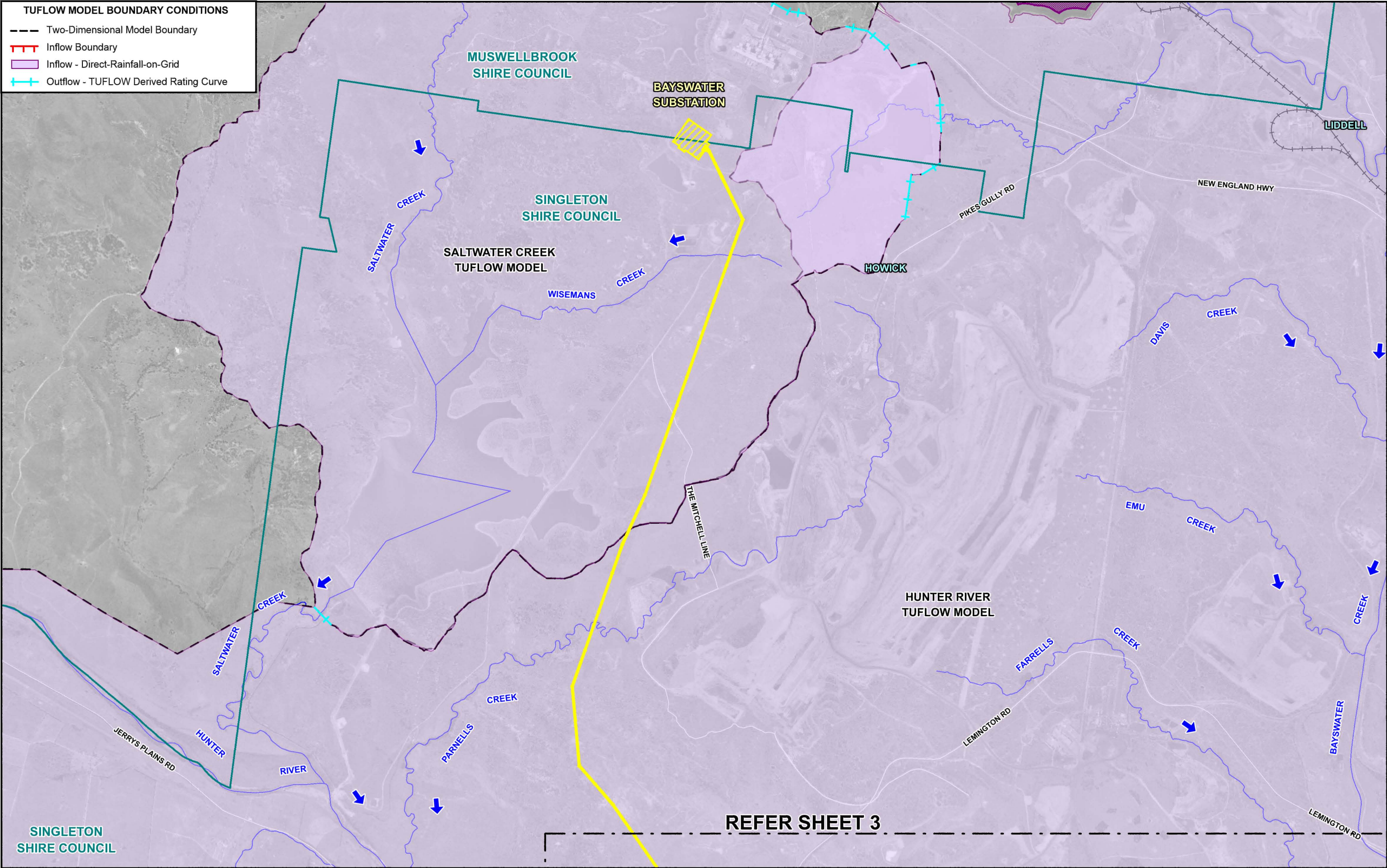


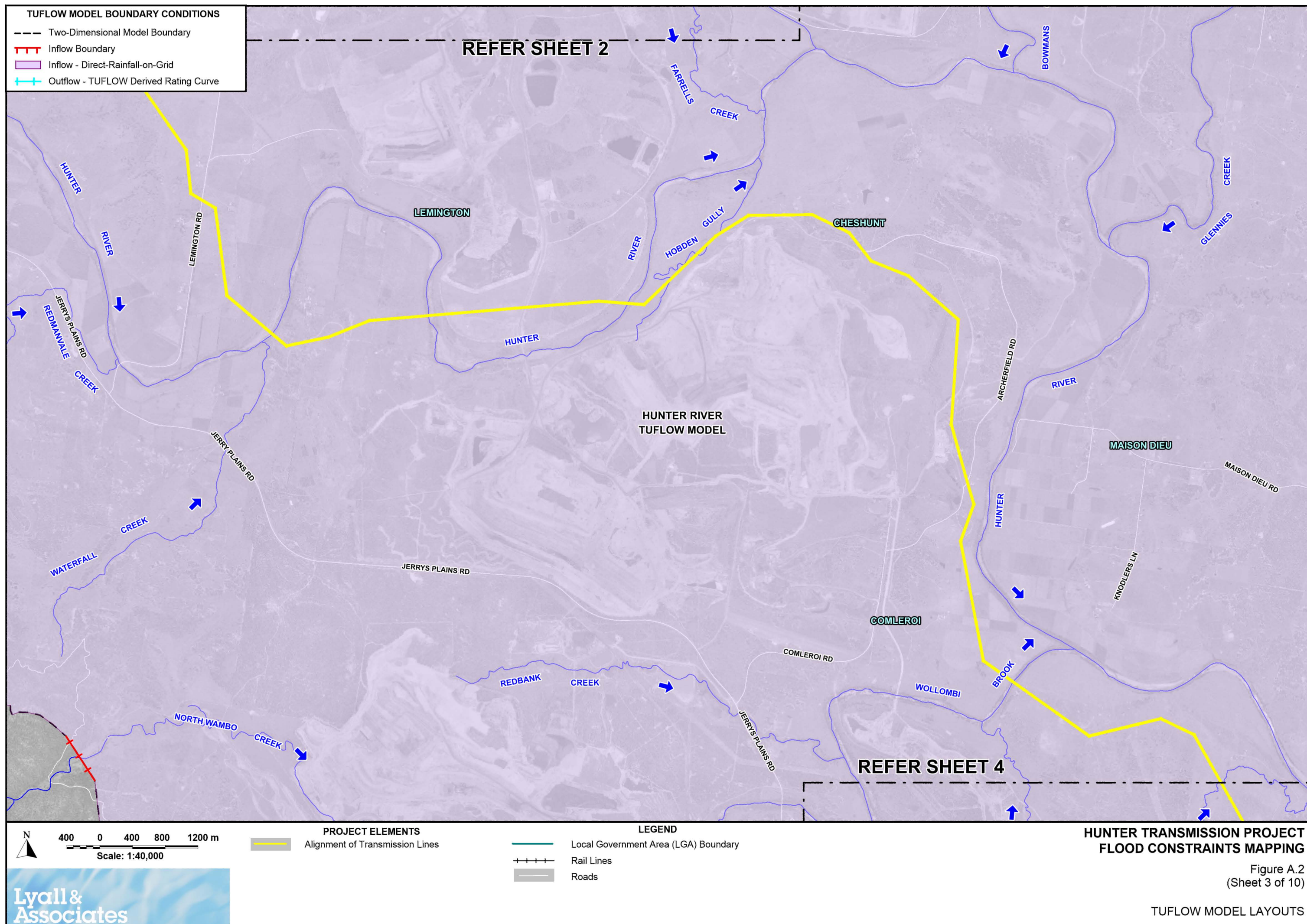






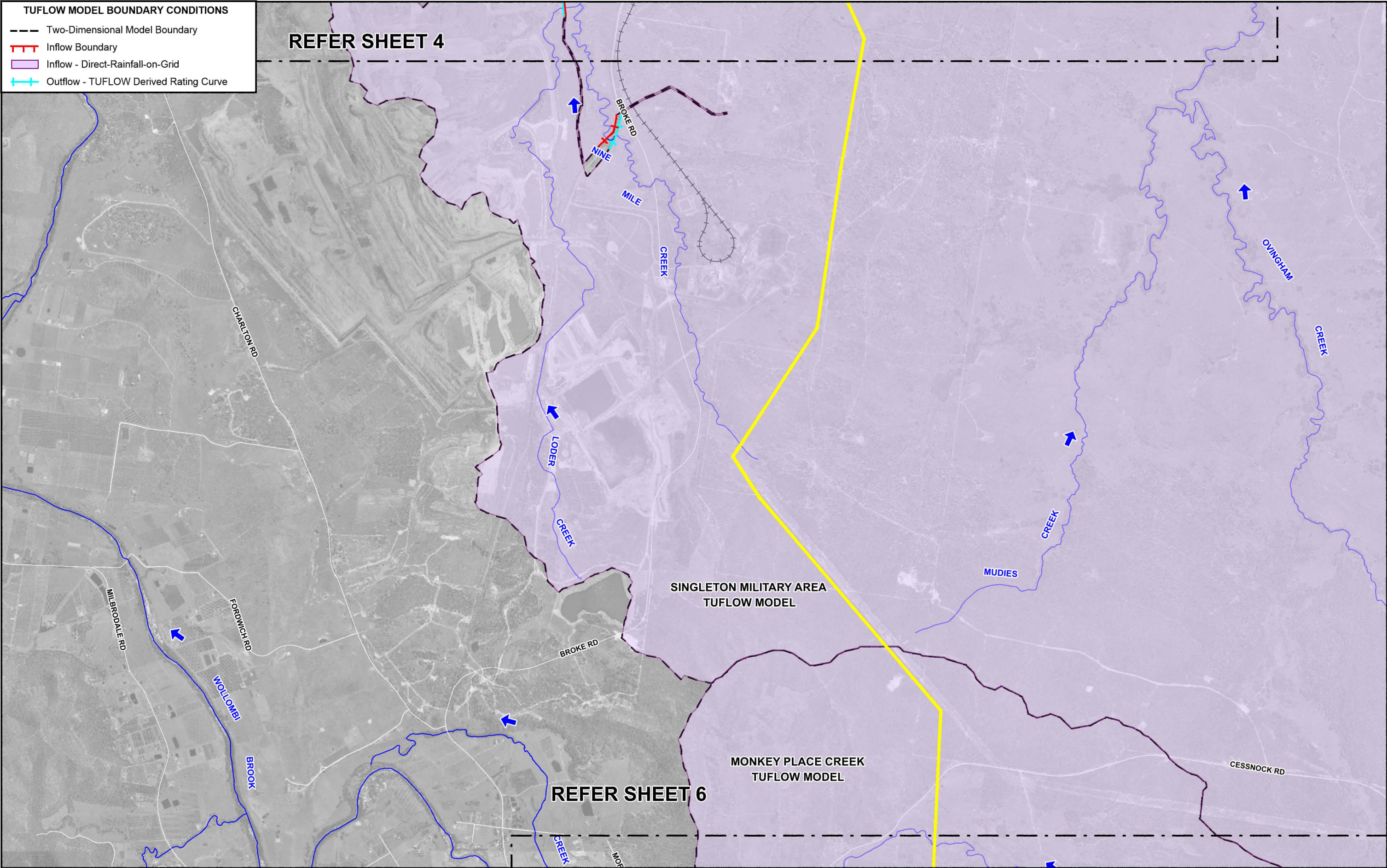






TUFLOW MODEL BOUNDARY CONDITIONS

- Two-Dimensional Model Boundary
- Inflow Boundary
- Inflow - Direct-Rainfall-on-Grid
- Outflow - TUFLOW Derived Rating Curve



400 0 400 800 1200 m

Scale: 1:40,000

PROJECT ELEMENTS

- Alignment of Transmission Lines

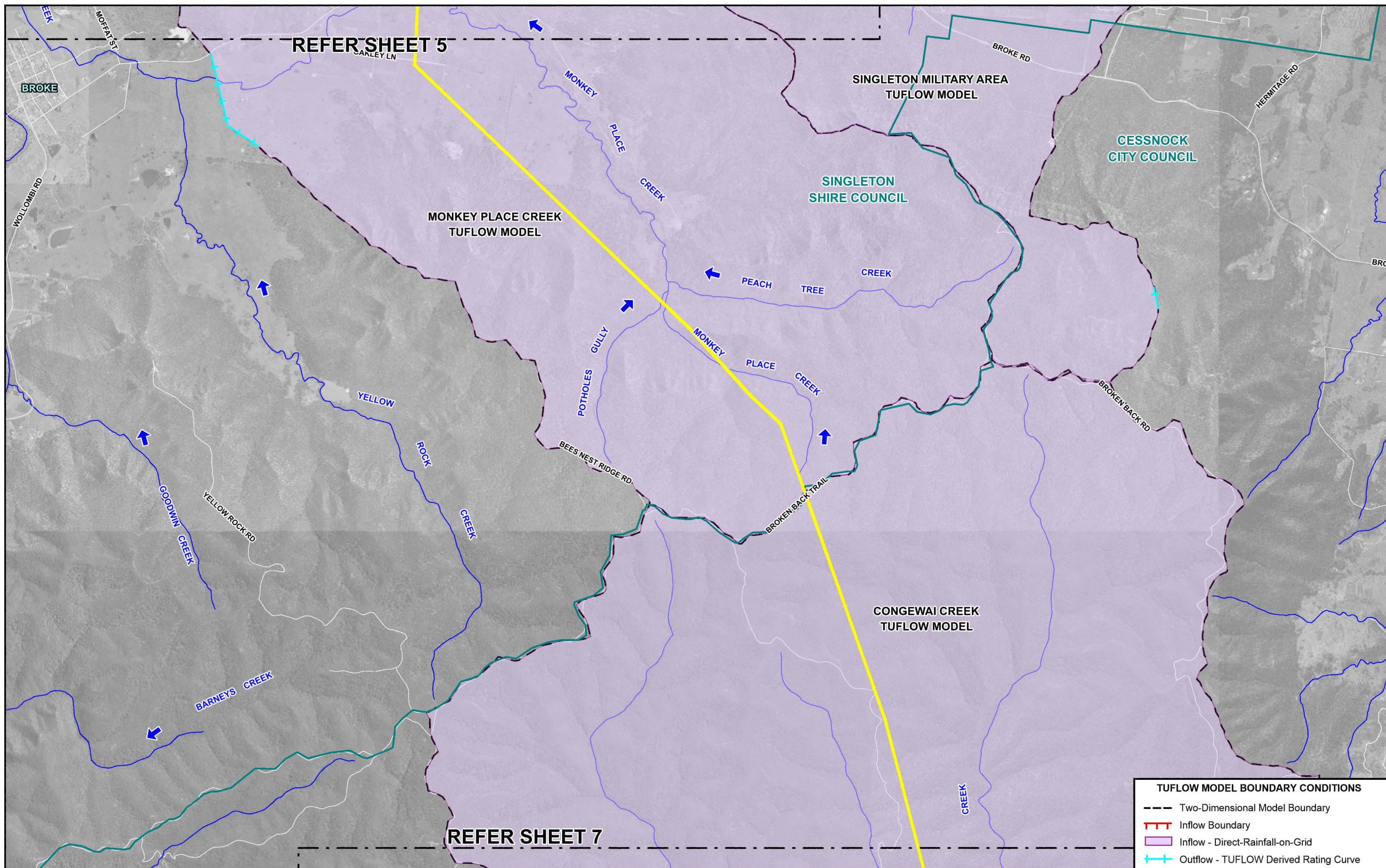
LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads

**HUNTER TRANSMISSION PROJECT
FLOOD CONSTRAINTS MAPPING**

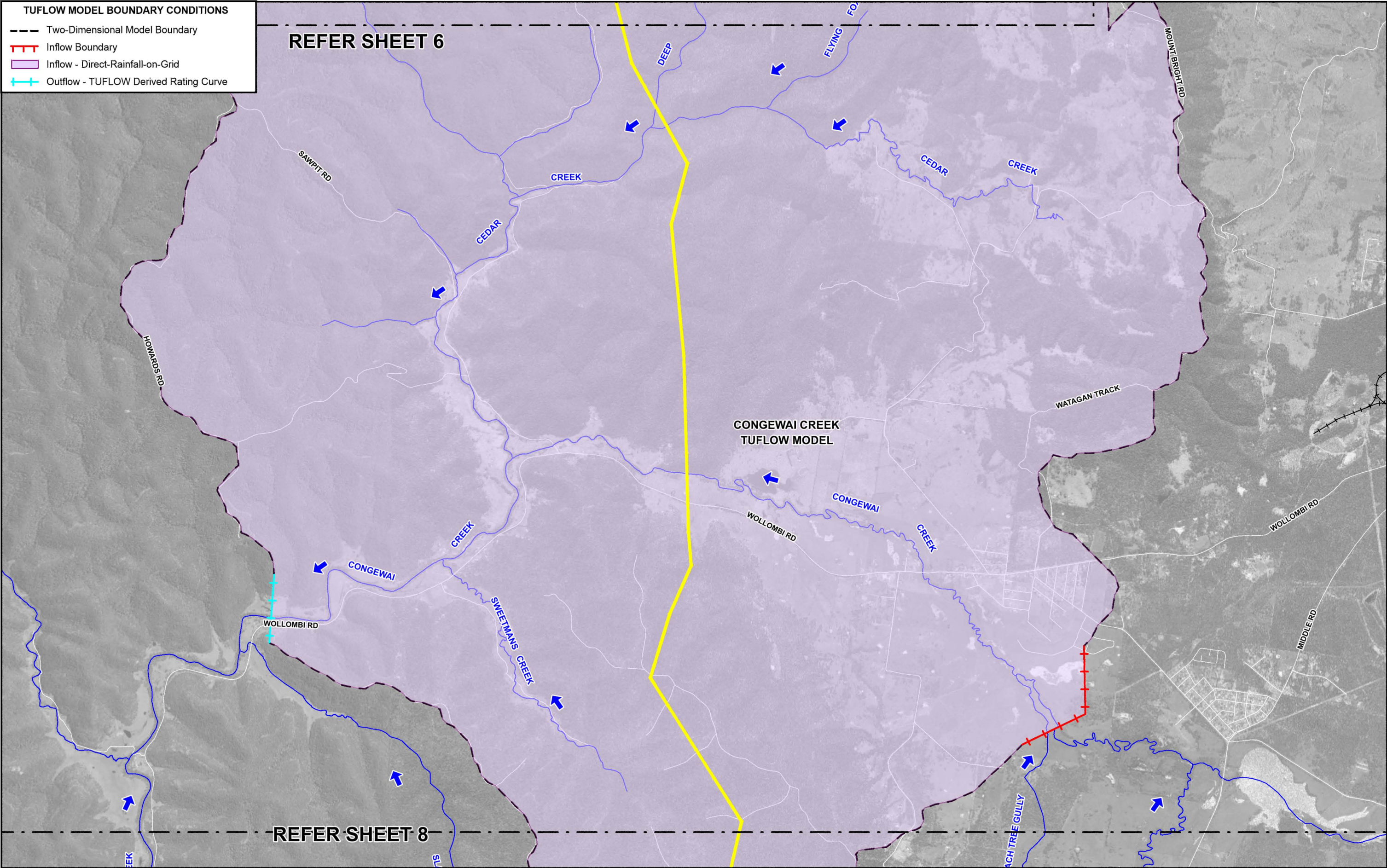
Figure A.2
(Sheet 5 of 10)

TUFLOW MODEL LAYOUTS



TUFLOW MODEL BOUNDARY CONDITIONS

- Two-Dimensional Model Boundary
- Inflow Boundary
- Inflow - Direct-Rainfall-on-Grid
- Outflow - TUFLOW Derived Rating Curve



400 0 400 800 1200 m

Scale: 1:40,000

PROJECT ELEMENTS

- Alignment of Transmission Lines

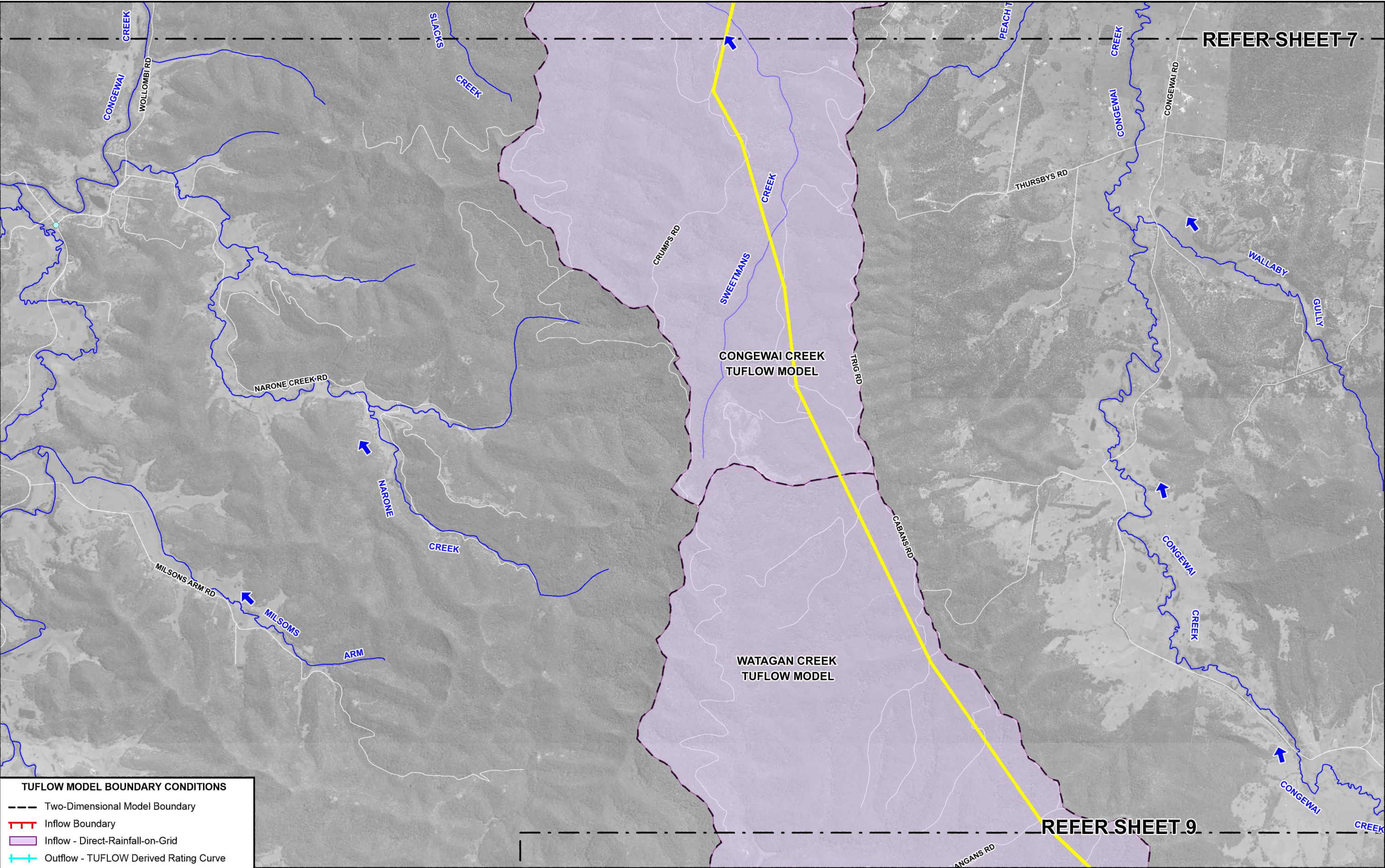
LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads

**HUNTER TRANSMISSION PROJECT
FLOOD CONSTRAINTS MAPPING**

Figure A.2
(Sheet 7 of 10)

TUFLOW MODEL LAYOUTS



TUFLOW MODEL BOUNDARY CONDITIONS

- Two-Dimensional Model Boundary
- Inflow Boundary
- Inflow - Direct-Rainfall-on-Grid
- Outflow - TUFLOW Derived Rating Curve

PROJECT ELEMENTS

- Alignment of Transmission Lines

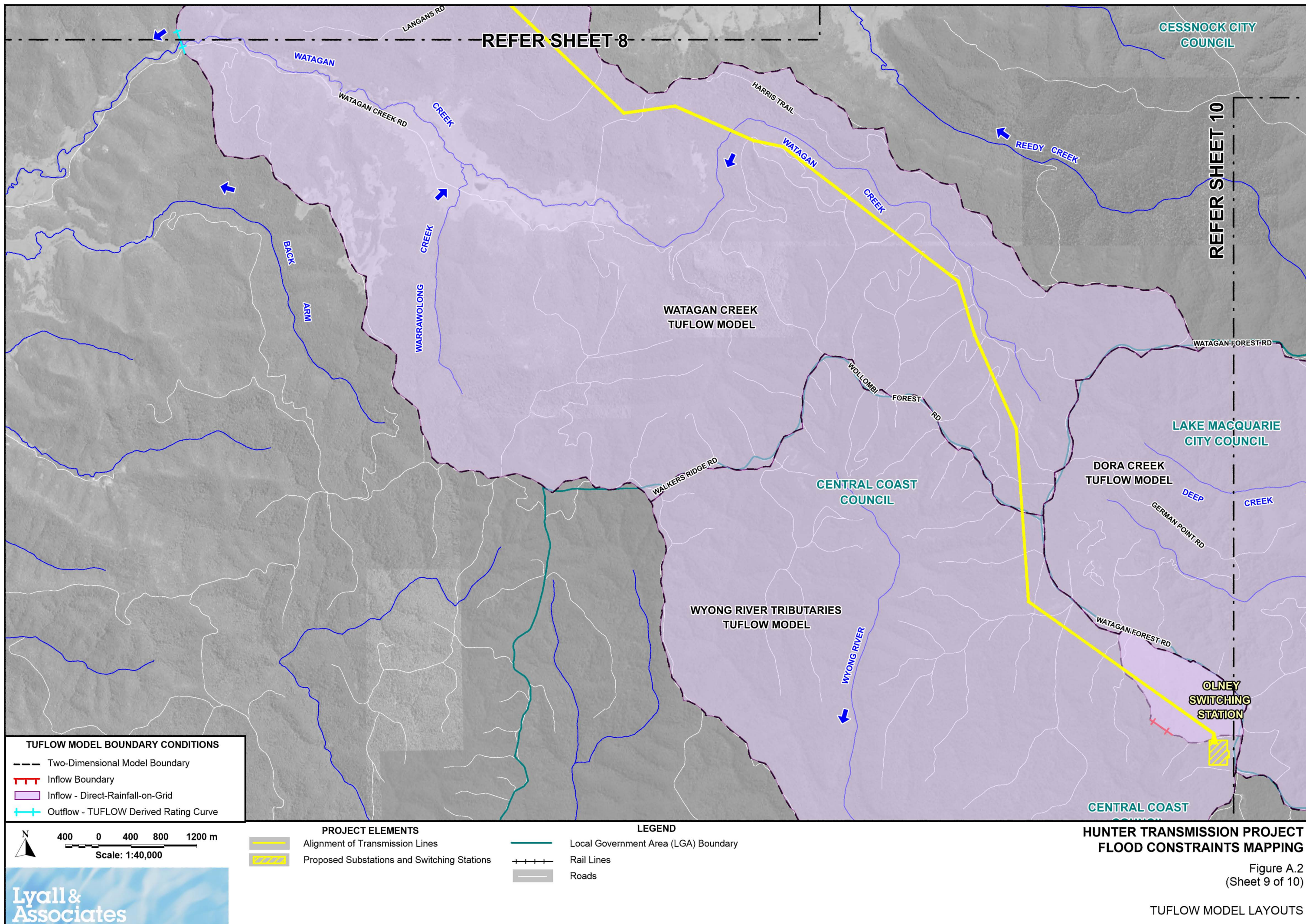
LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads

Scale: 1:40,000

Lyall & Associates

REFER SHEET 9



HUNTER TRANSMISSION PROJECT FLOOD CONSTRAINTS MAPPING

Figure A.2
(Sheet 9 of 10)

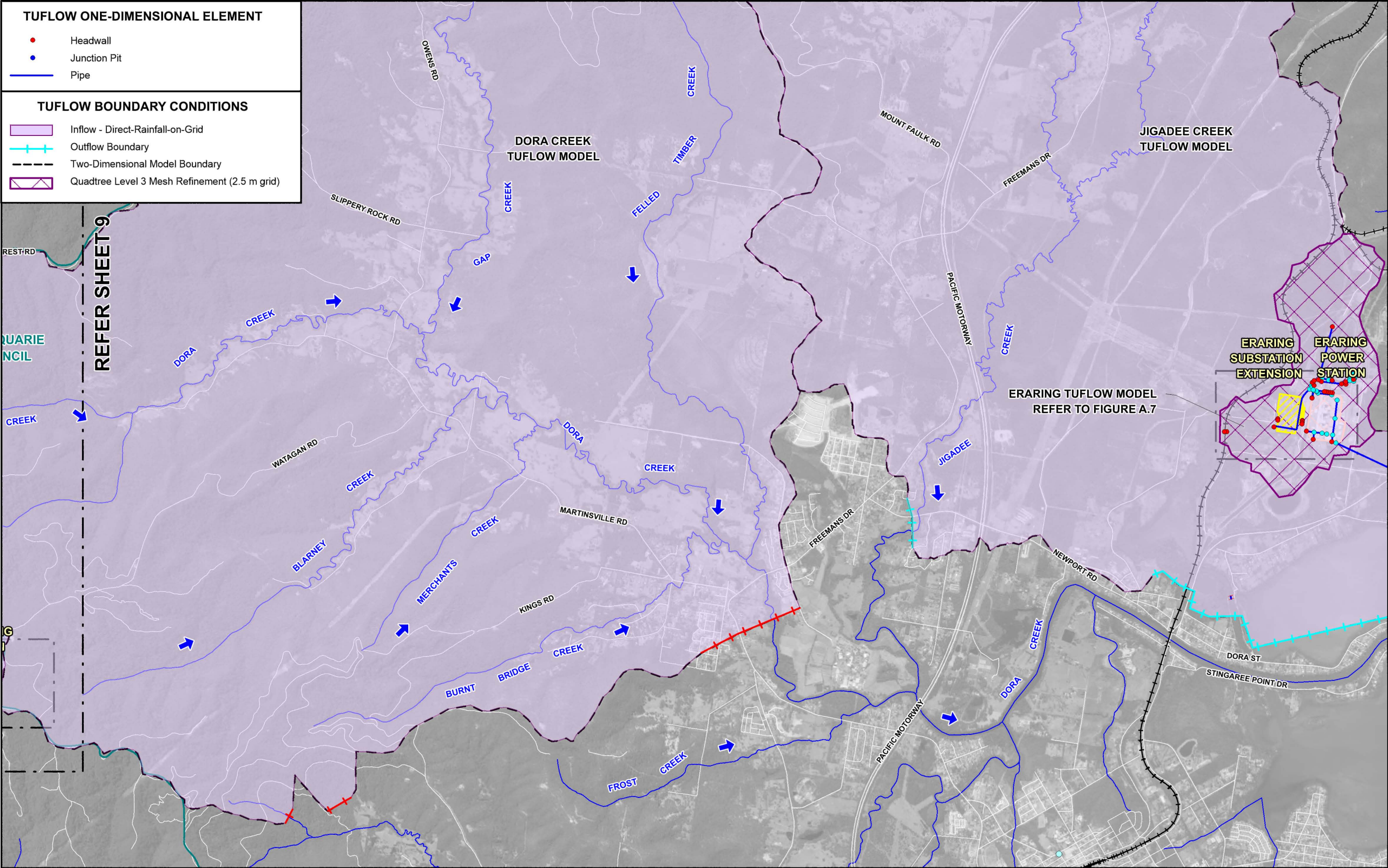
TUFLOW MODEL LAYOUTS

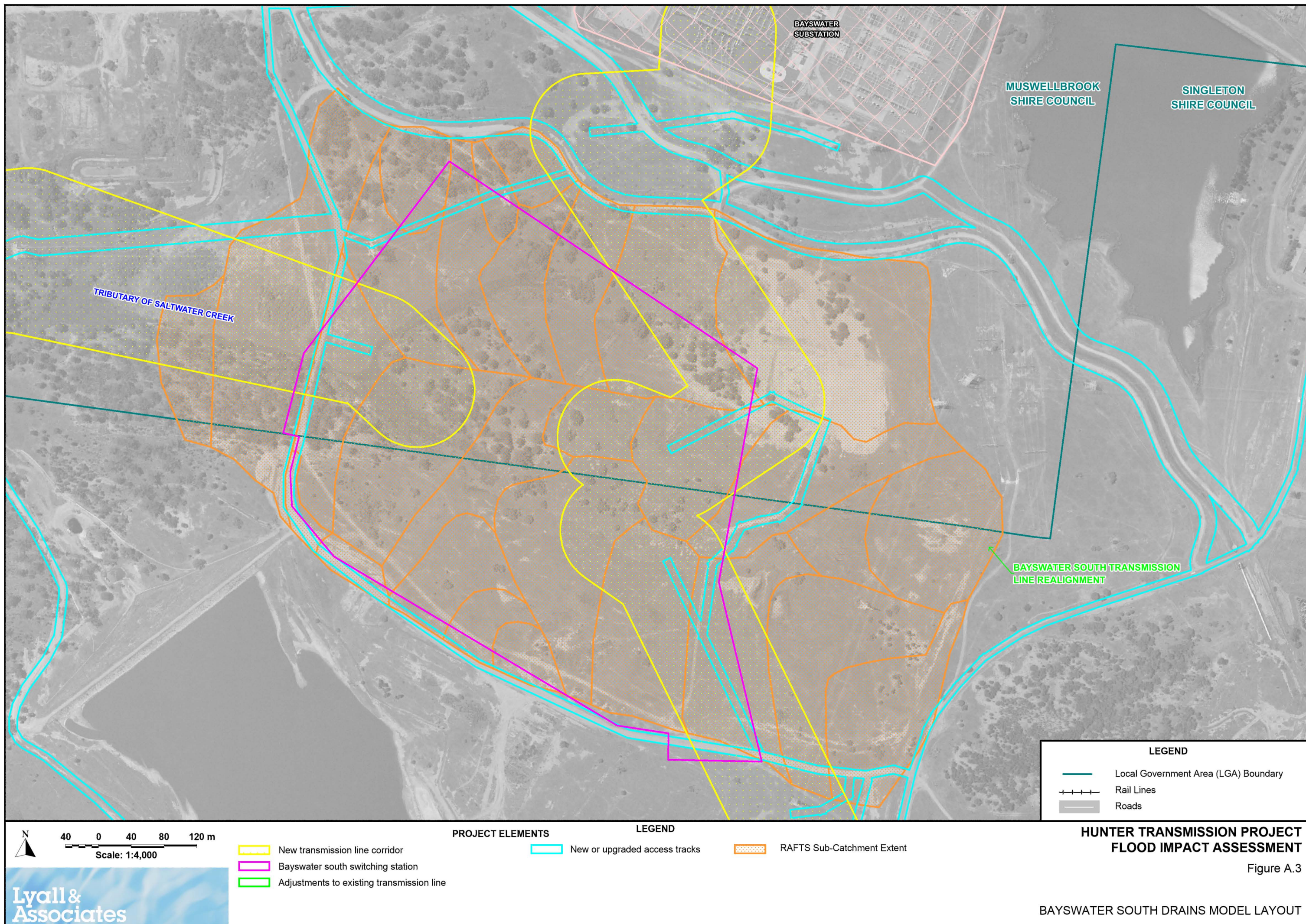
TUFLOW ONE-DIMENSIONAL ELEMENT

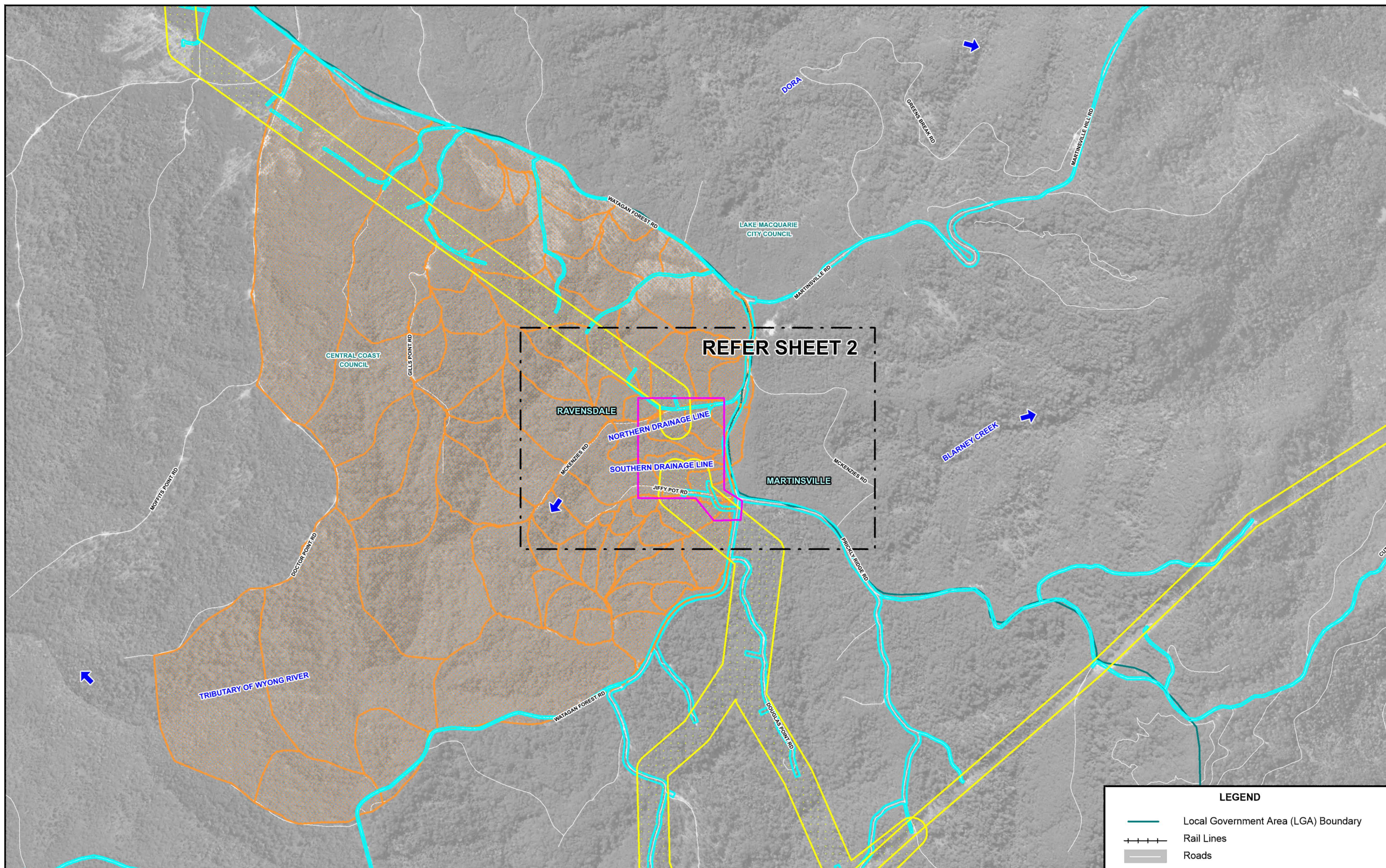
- Headwall
- Junction Pit
- Pipe

TUFLOW BOUNDARY CONDITIONS

- Inflow - Direct-Rainfall-on-Grid
- Outflow Boundary
- Two-Dimensional Model Boundary
- Quadtree Level 3 Mesh Refinement (2.5 m grid)







N
160 0 160 320 480 m
Scale: 1:16,000

Lycall & Associates

New transmission line corridor
Olney switching station

PROJECT ELEMENTS

New or upgraded access tracks

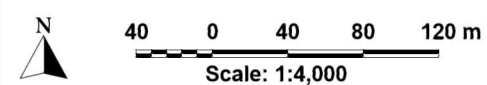
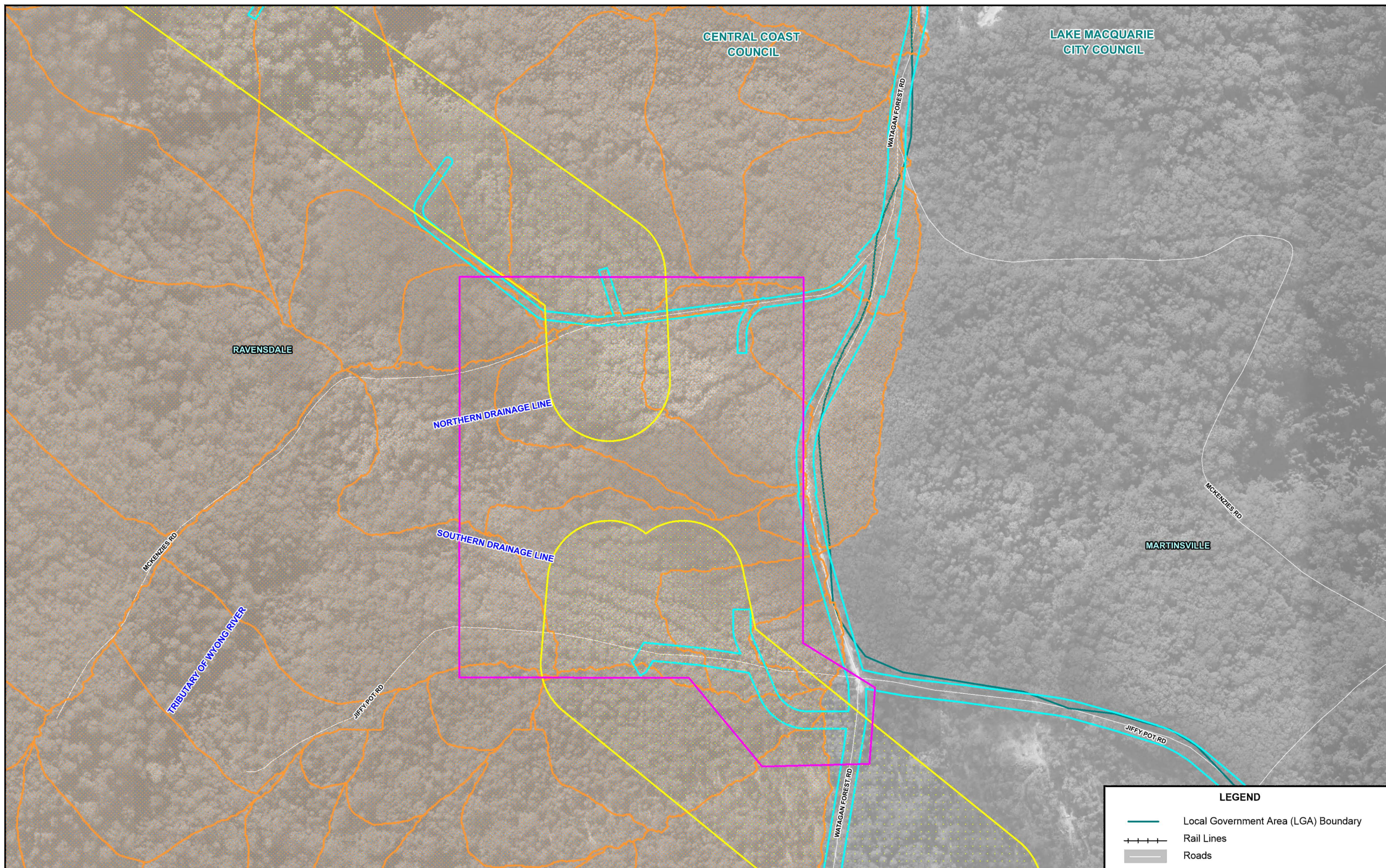
LEGEND

RAFTS Sub-Catchment Extent

**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure A.4
(Sheet 1 of 2)

OLNEY DRAINS MODEL LAYOUT



New transmission line corridor
 Olney switching station

PROJECT ELEMENTS

New or upgraded access tracks

LEGEND

RAFTS Sub-Catchment Extent

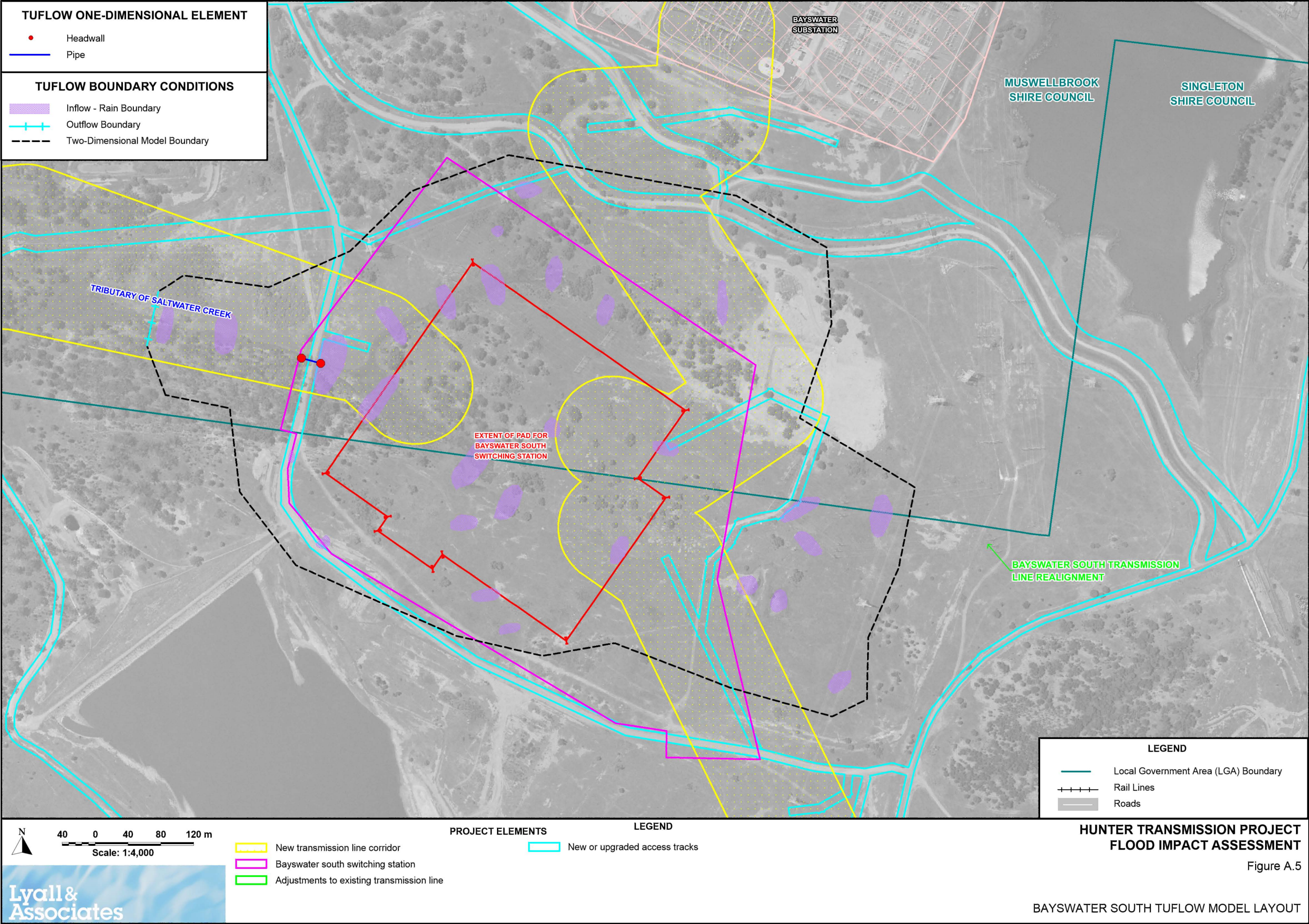
LEGEND

Local Government Area (LGA) Boundary
 Rail Lines
 Roads

**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

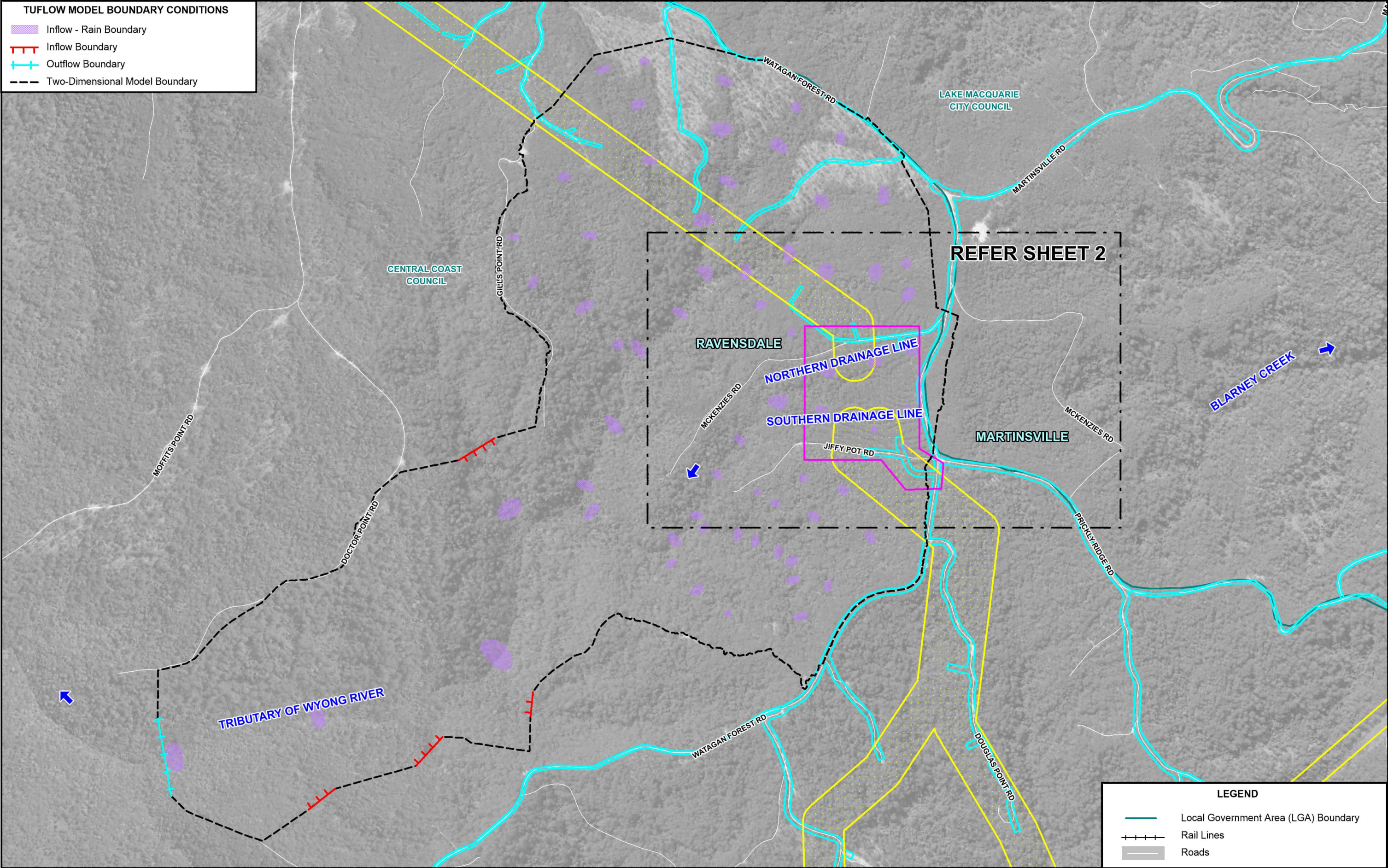
Figure A.4
(Sheet 2 of 2)

OLNEY DRAINS MODEL LAYOUT



TUFLOW MODEL BOUNDARY CONDITIONS

- Inflow - Rain Boundary
- Inflow Boundary
- Outflow Boundary
- Two-Dimensional Model Boundary



N

160 0 160 320 480 m

Scale: 1:16,000

New transmission line corridor

Olney switching station

PROJECT ELEMENTS

 New or upgraded access tracks

LEGEND

 Local Government Area (LGA) Boundary

Rail Lines

Roads

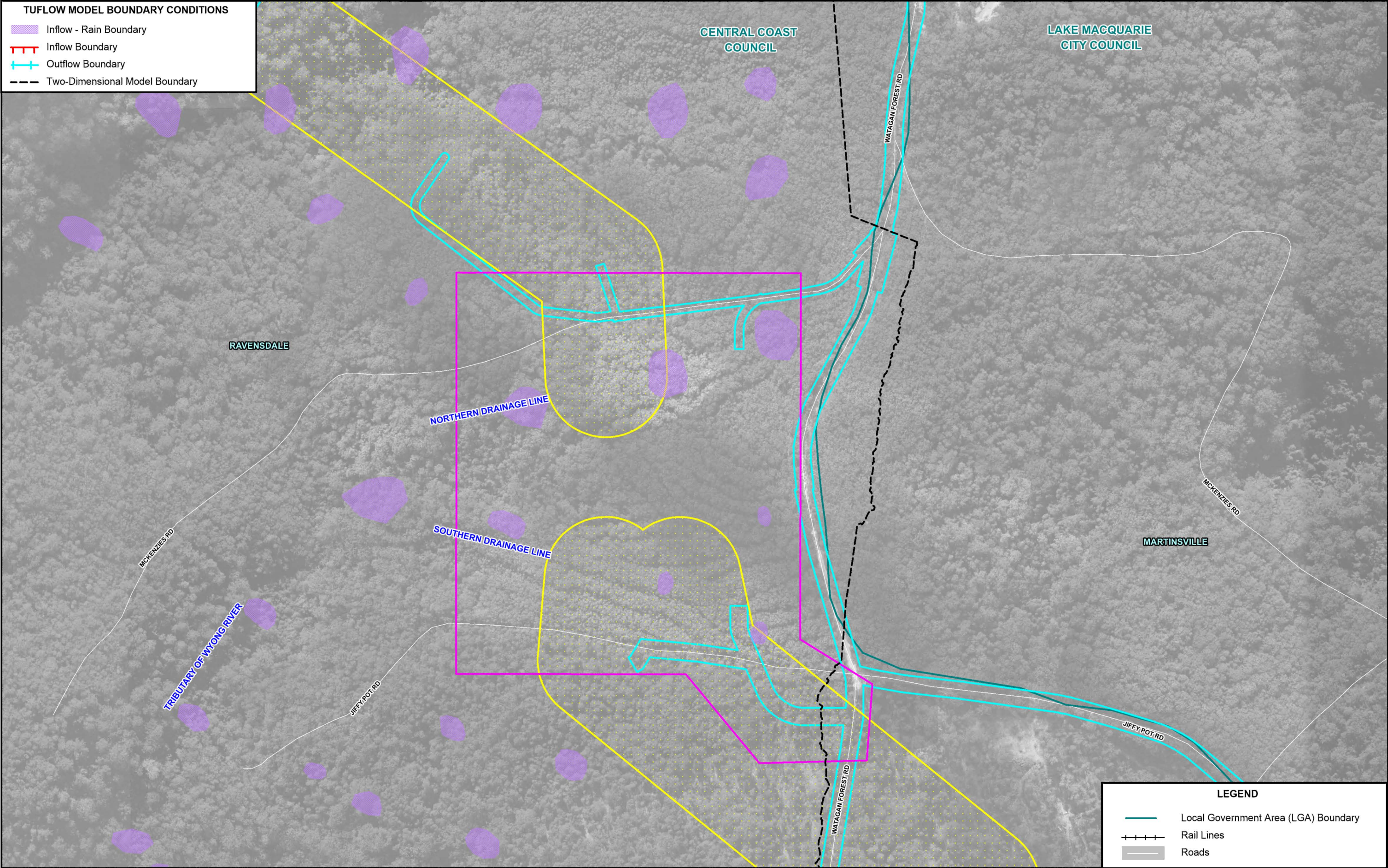
**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure A.6
(Sheet 1 of 2)

OLNEY TUFLOW MODEL LAYOUT

TUFLOW MODEL BOUNDARY CONDITIONS

- Inflow - Rain Boundary
- Inflow Boundary
- Outflow Boundary
- Two-Dimensional Model Boundary



LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads

Scale: 1:4,000

New transmission line corridor
 Olney switching station

PROJECT ELEMENTS

New or upgraded access tracks

**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure A.6
(Sheet 2 of 2)

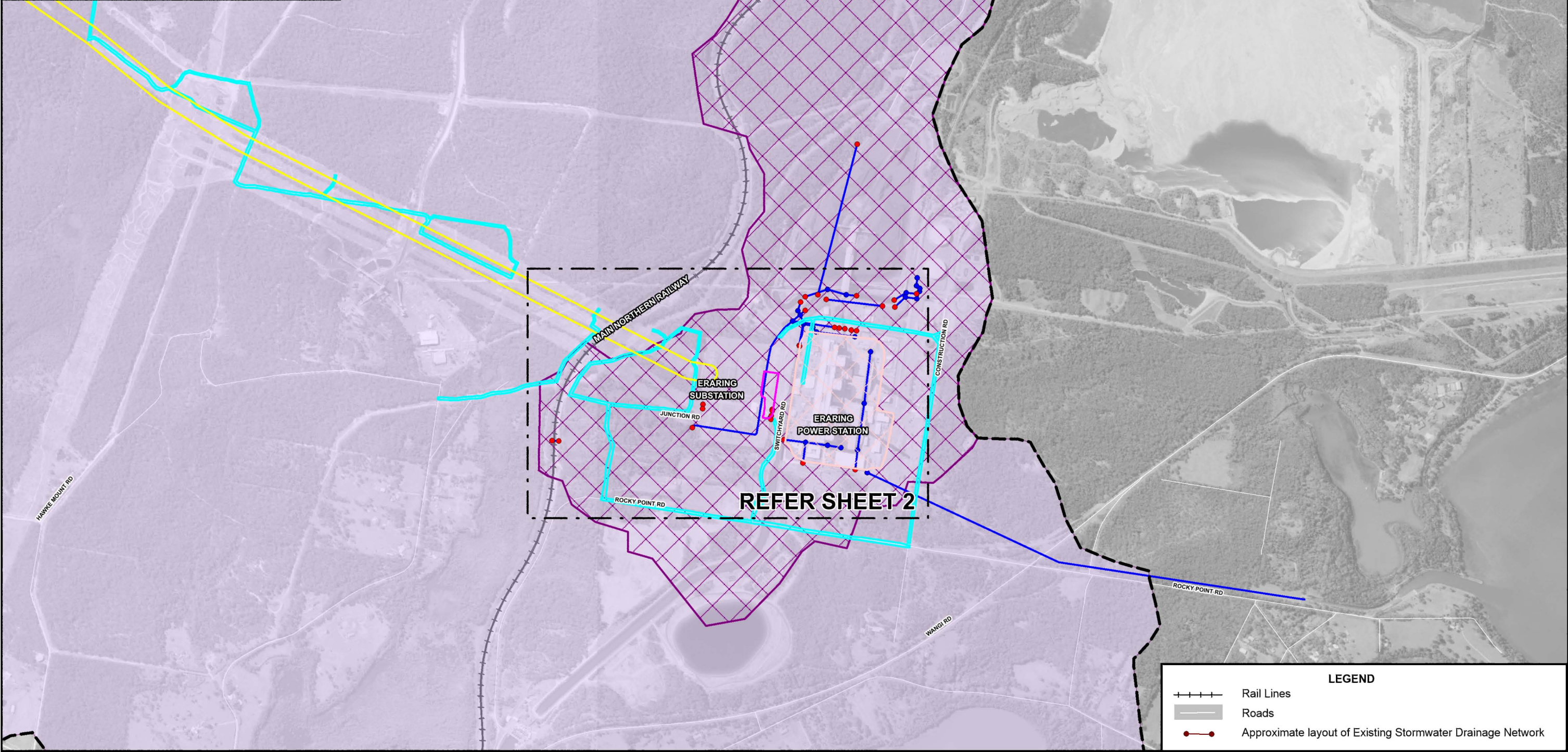
OLNEY TUFLOW MODEL LAYOUT

TUFLOW ONE-DIMENSIONAL ELEMENT

- Headwall
- Junction Pit
- Pipe

TUFLOW BOUNDARY CONDITIONS

- Inflow - Direct-Rainfall-on-Grid
- Outflow Boundary
- Two-Dimensional Model Boundary
- Quadtree Level 3 Mesh Refinement (2.5 m grid)



160
0
160
320
480 m

Scale: 1:16,000

New transmission line corridor

Eraring substation extension

PROJECT ELEMENTS

New or upgraded access tracks

Rail Lines

Roads

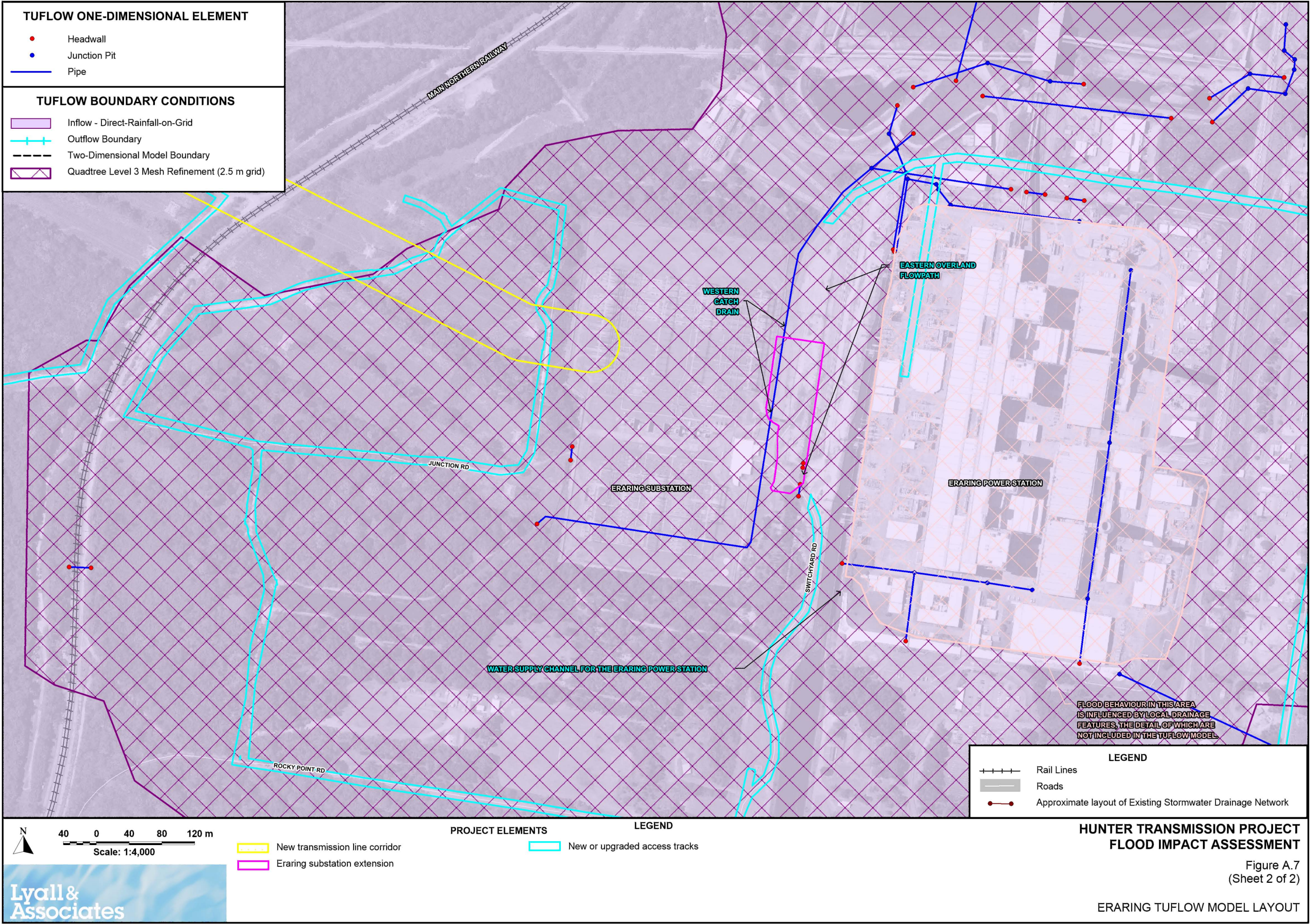
Approximate layout of Existing Stormwater Drainage Network

LEGEND

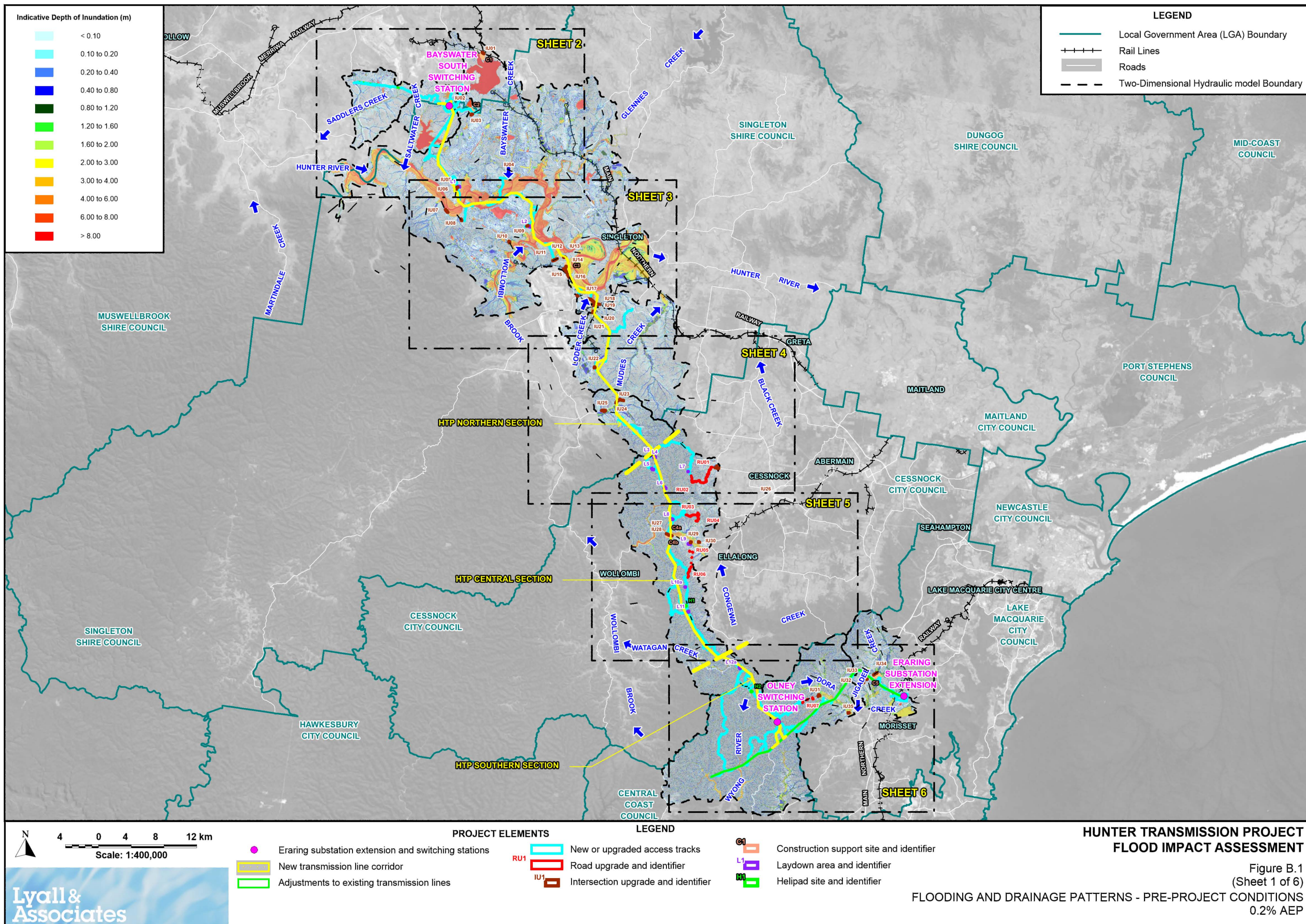
**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

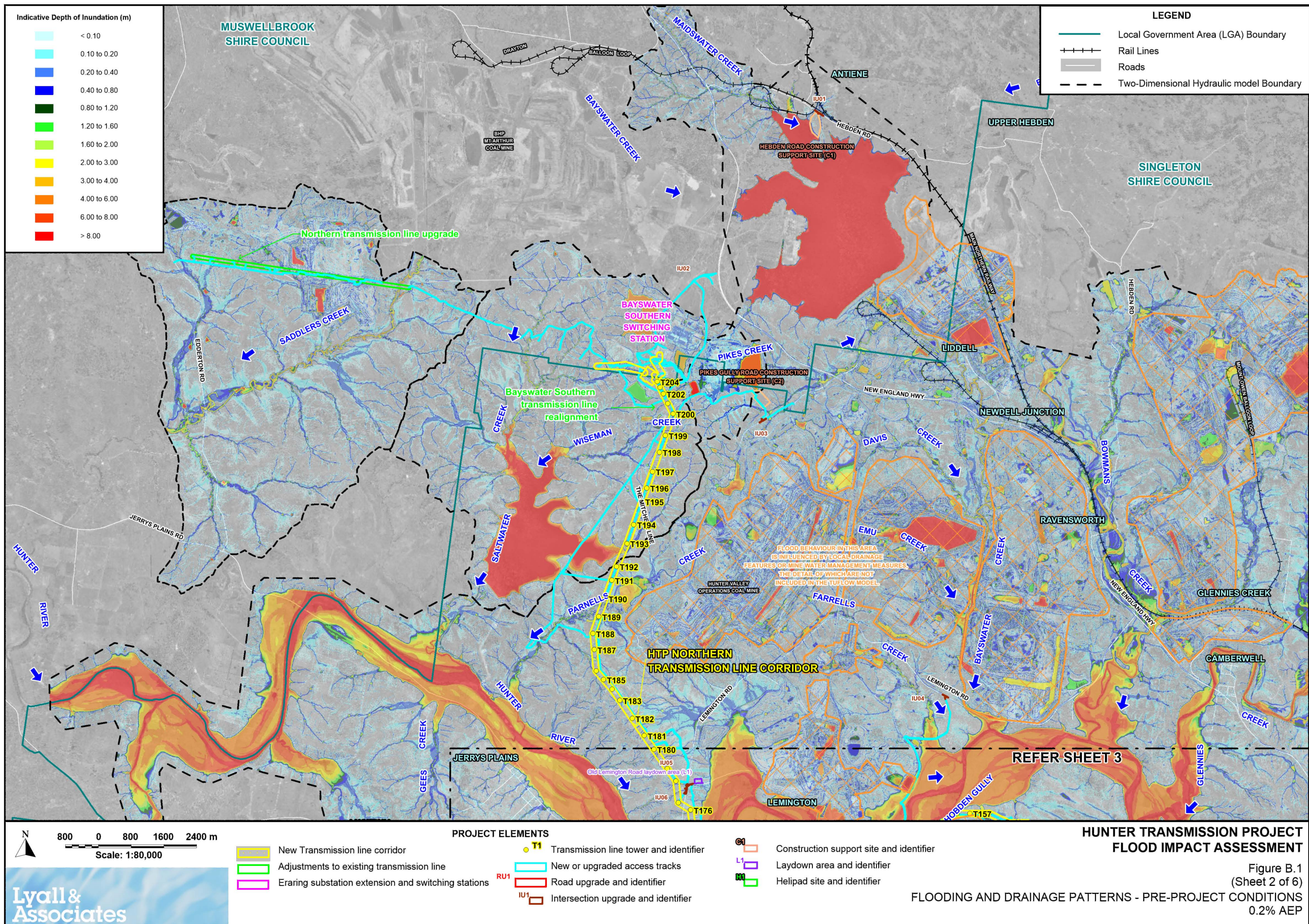
Figure A.7
(Sheet 1 of 2)

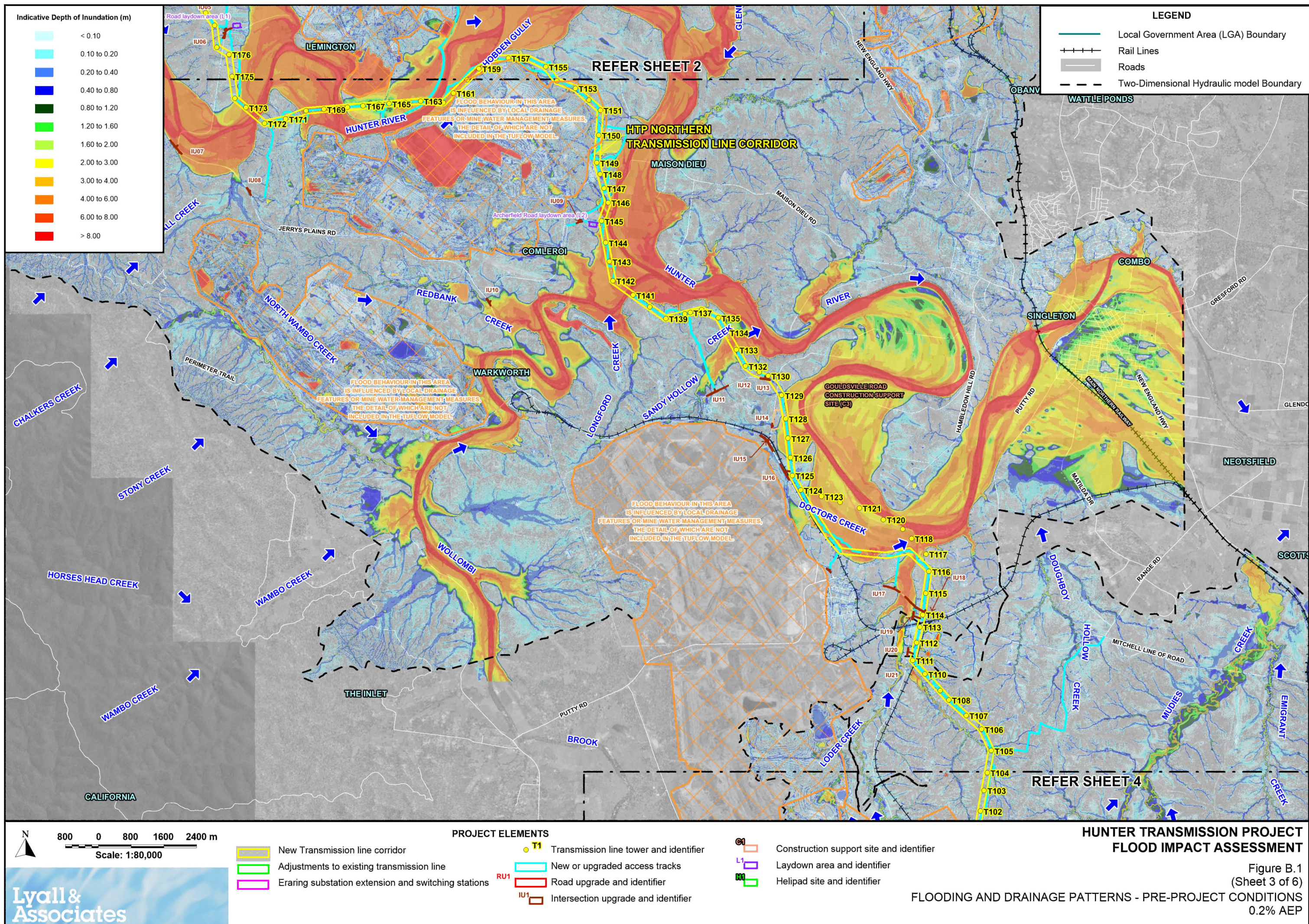
ERARING TUFLOW MODEL LAYOUT

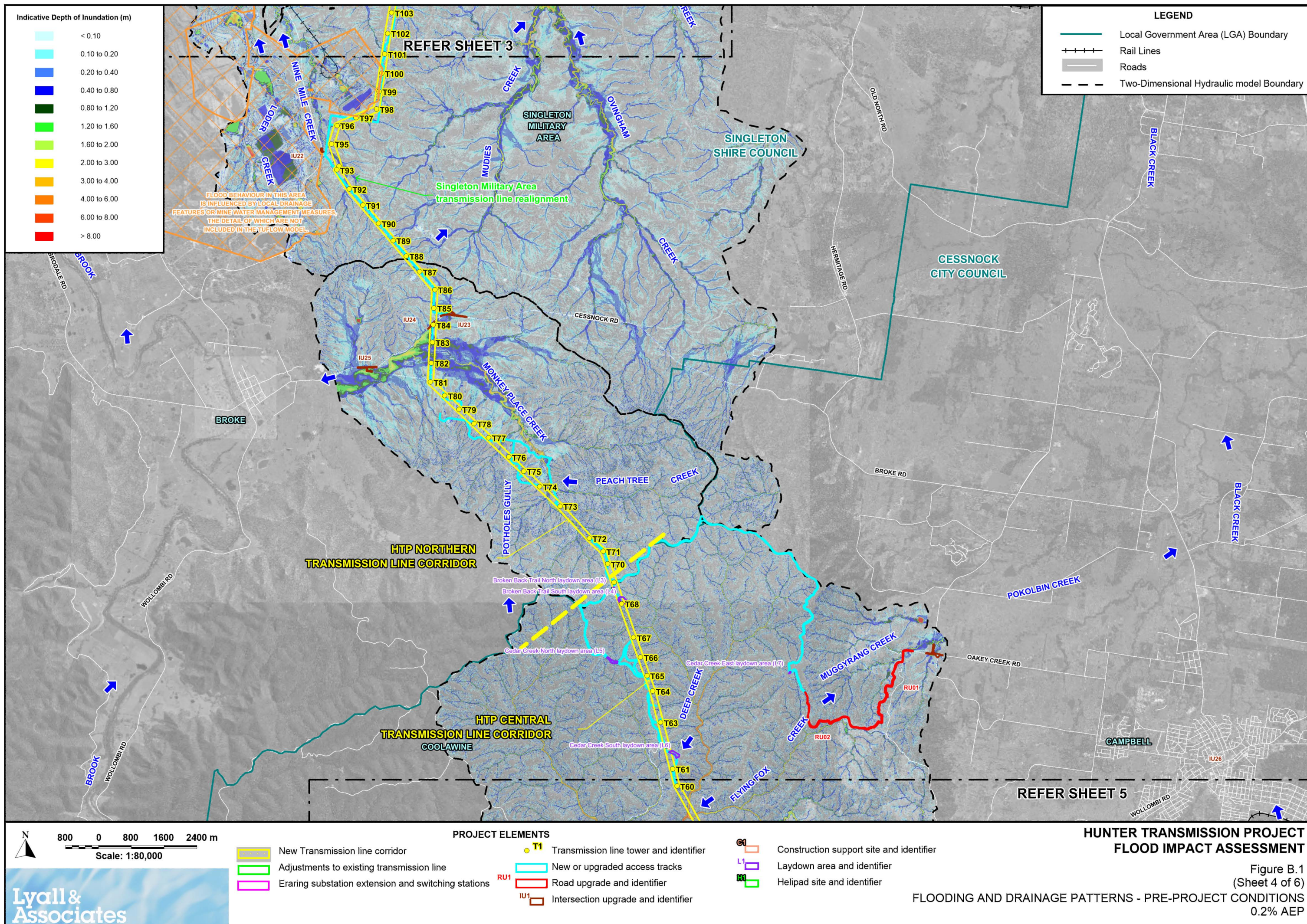


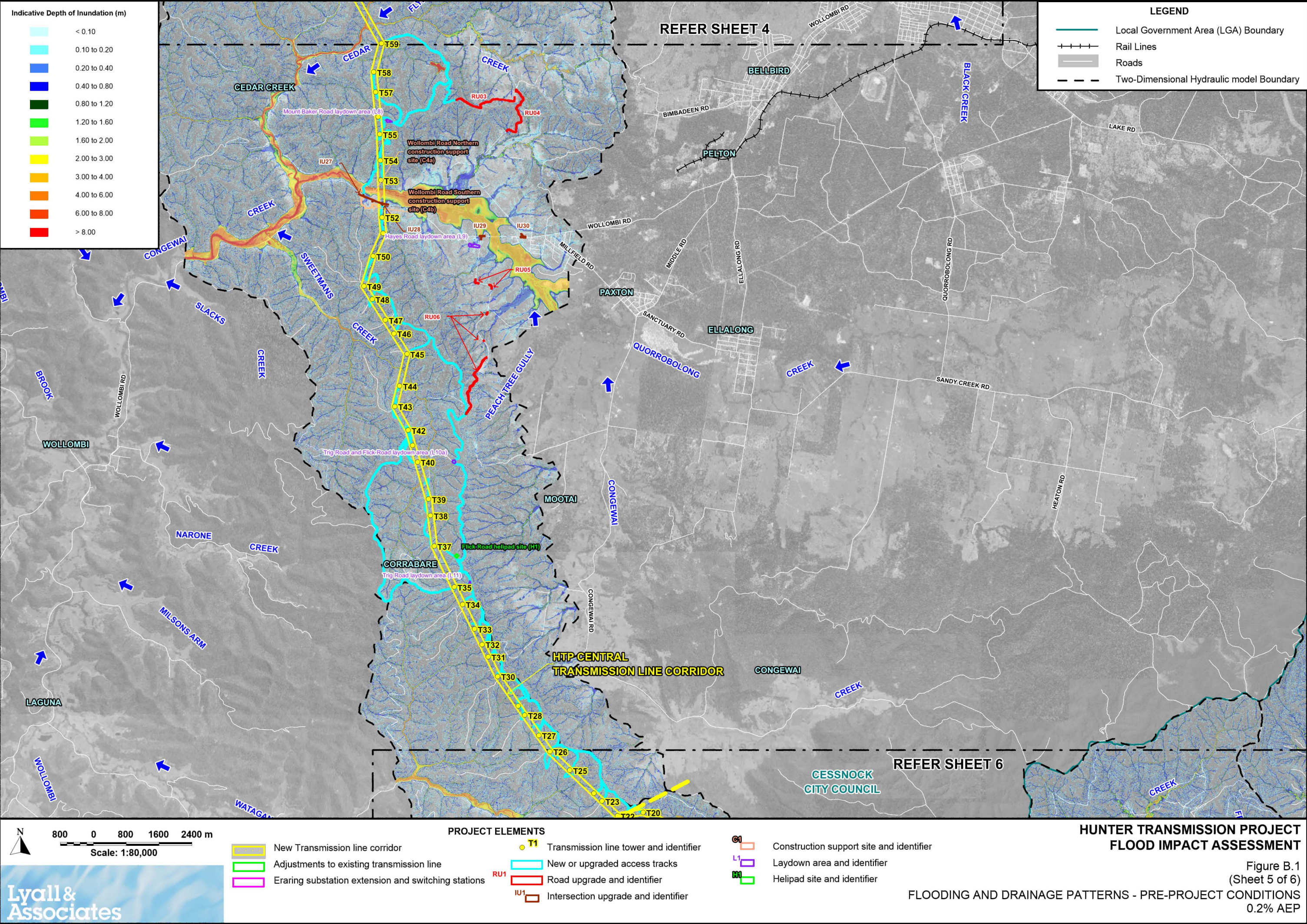
ANNEXURE B
FIGURES SHOWING THE INDICATIVE EXTENT AND DEPTH OF INUNDATION
ACROSS THE PROJECT DURING 0.2% AND 0.05% AEP EVENTS

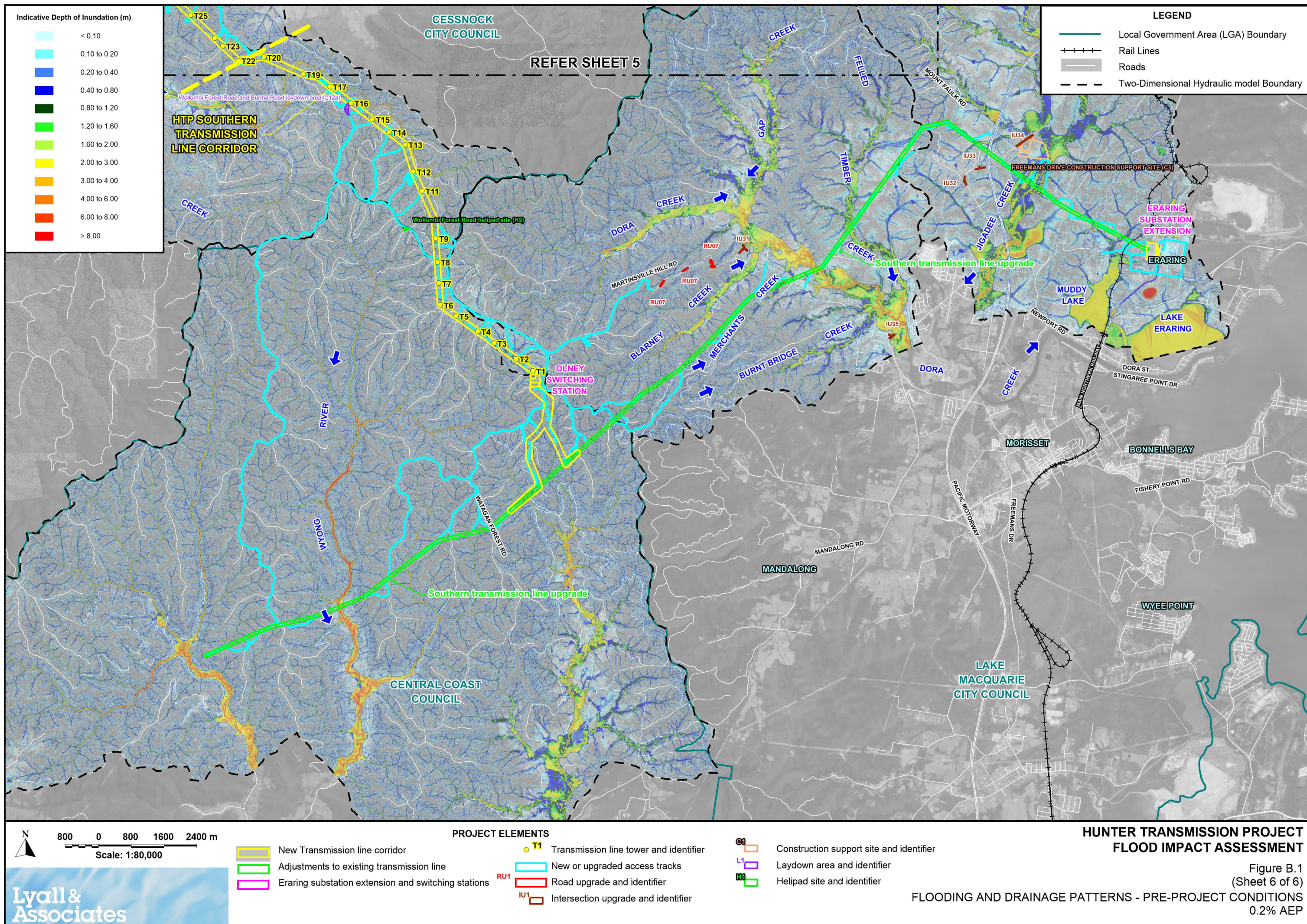


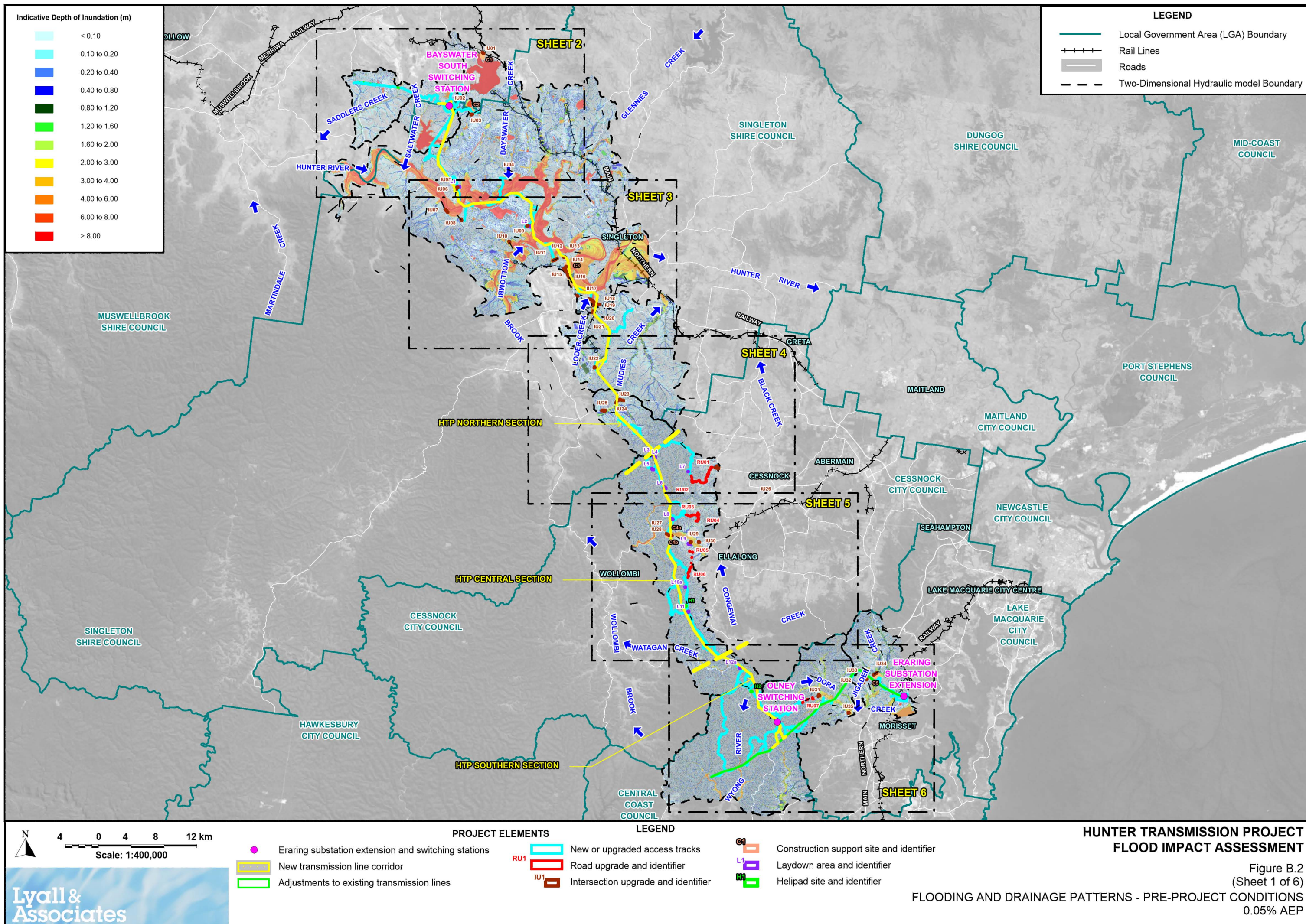


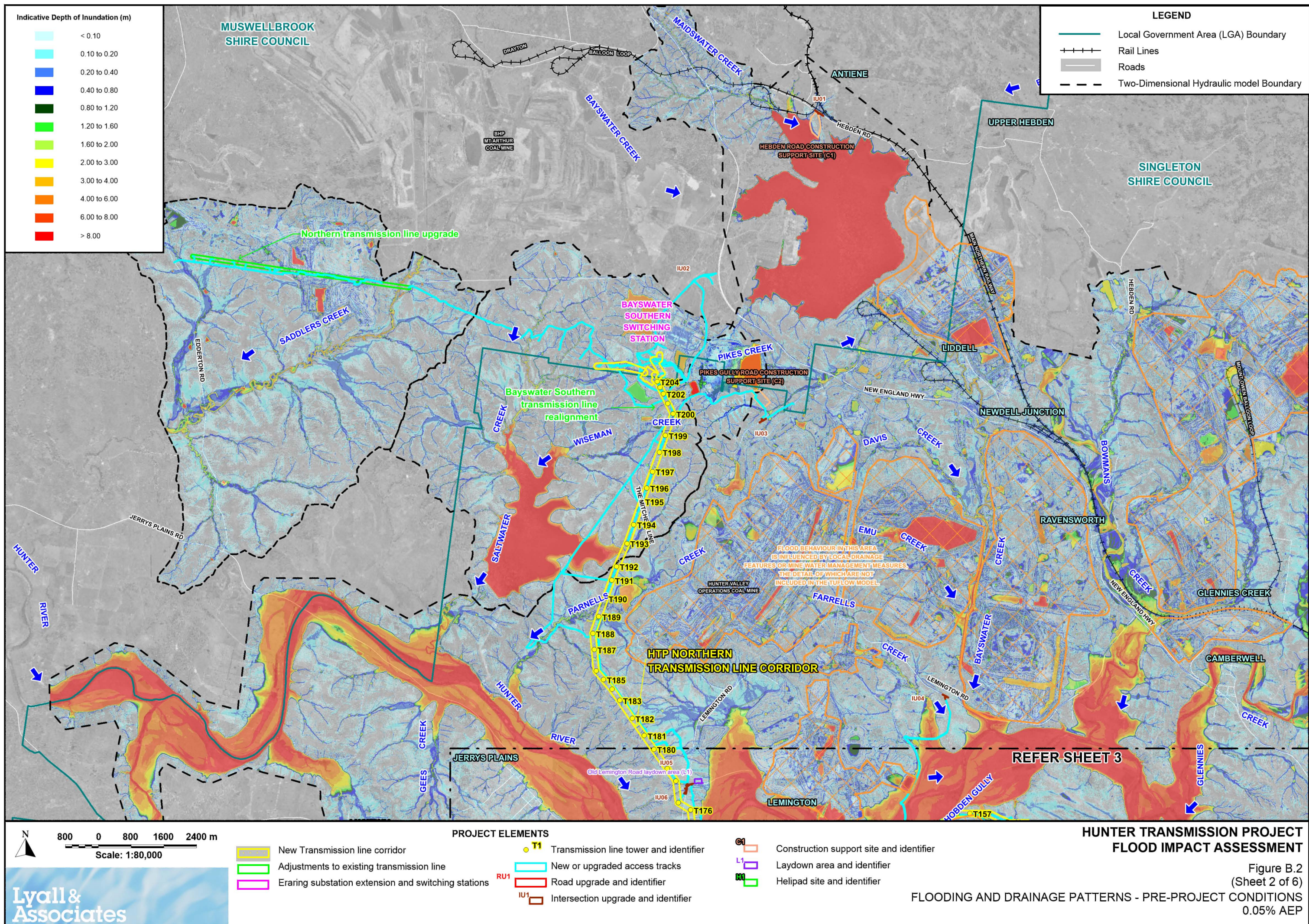


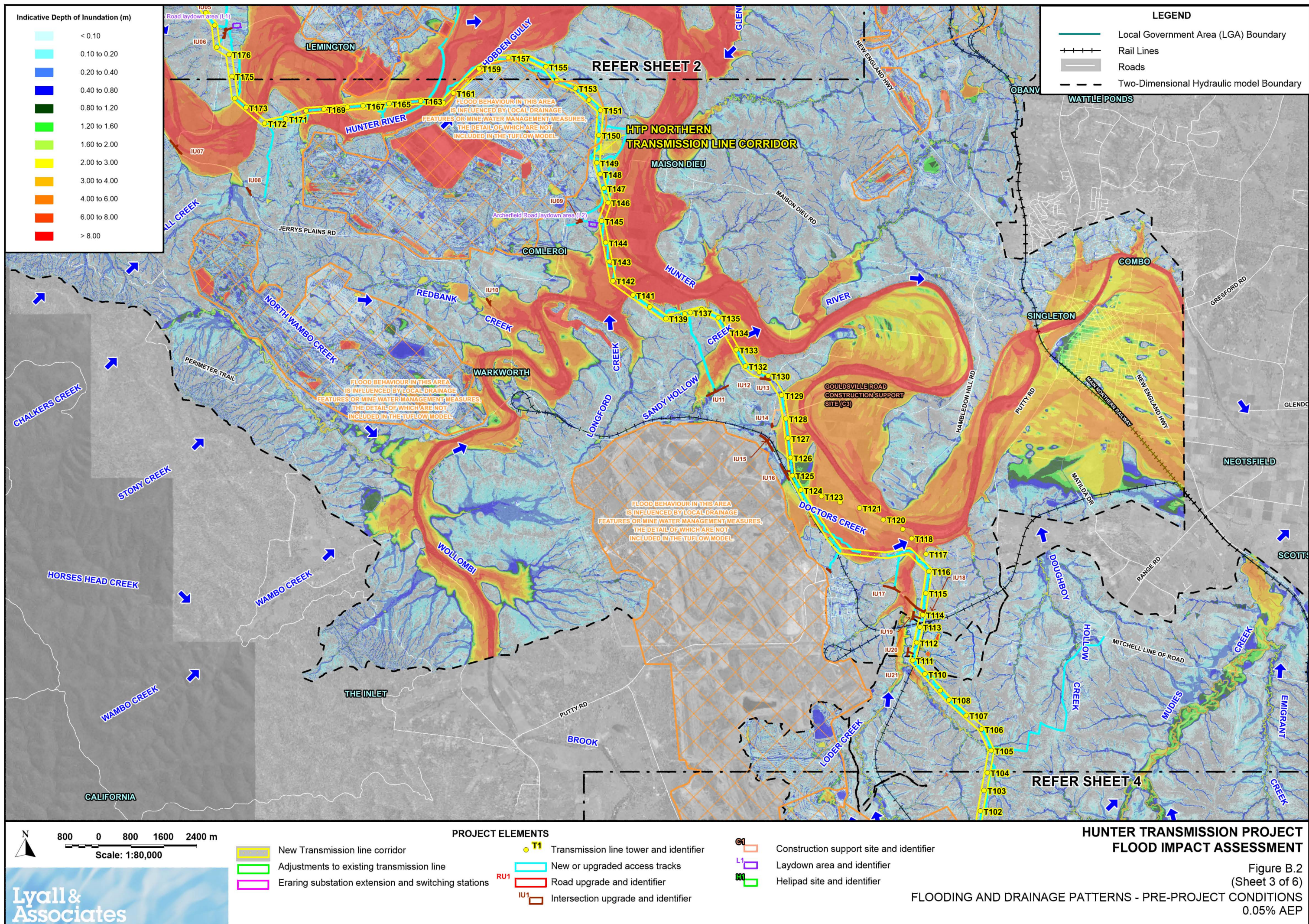


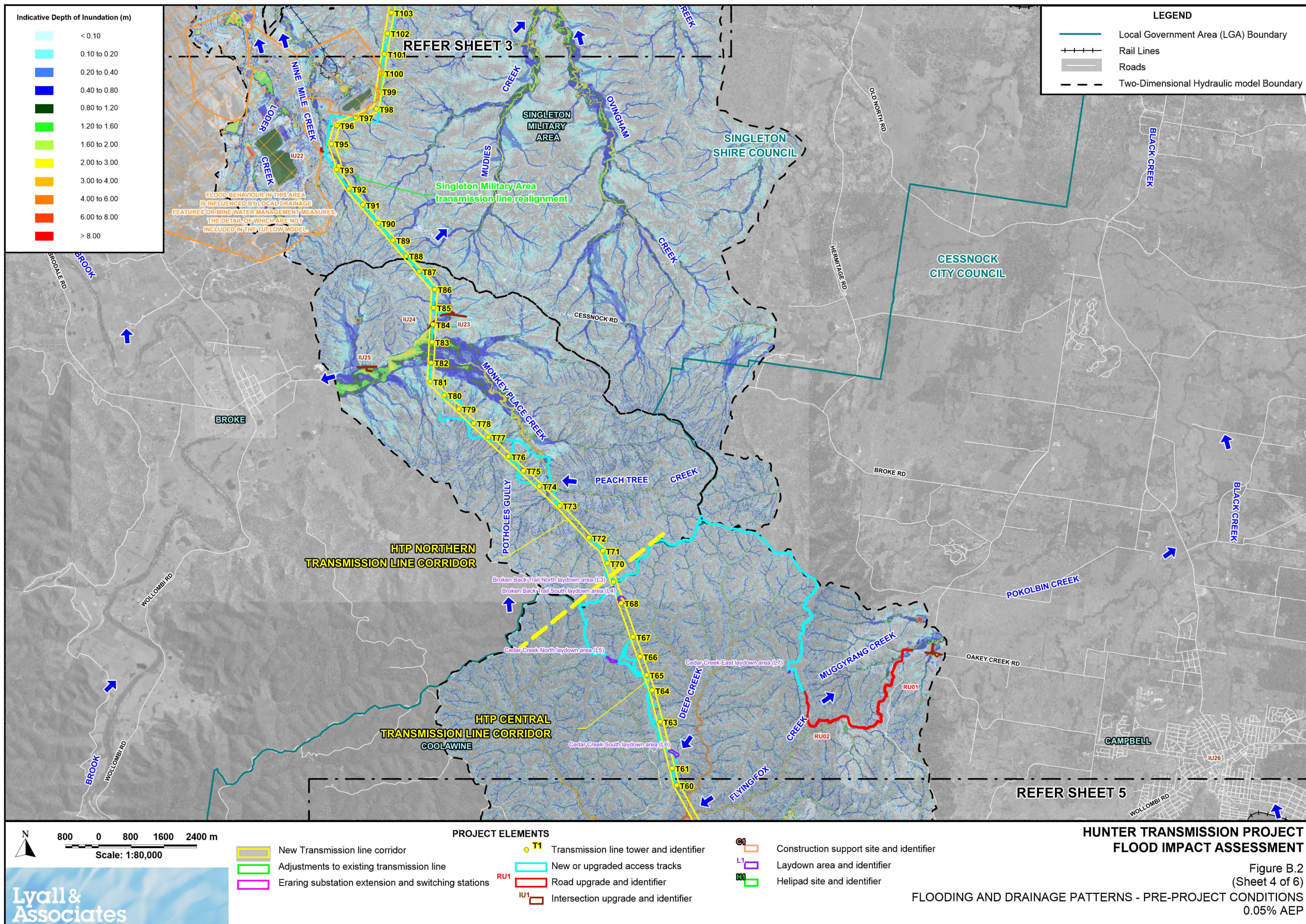


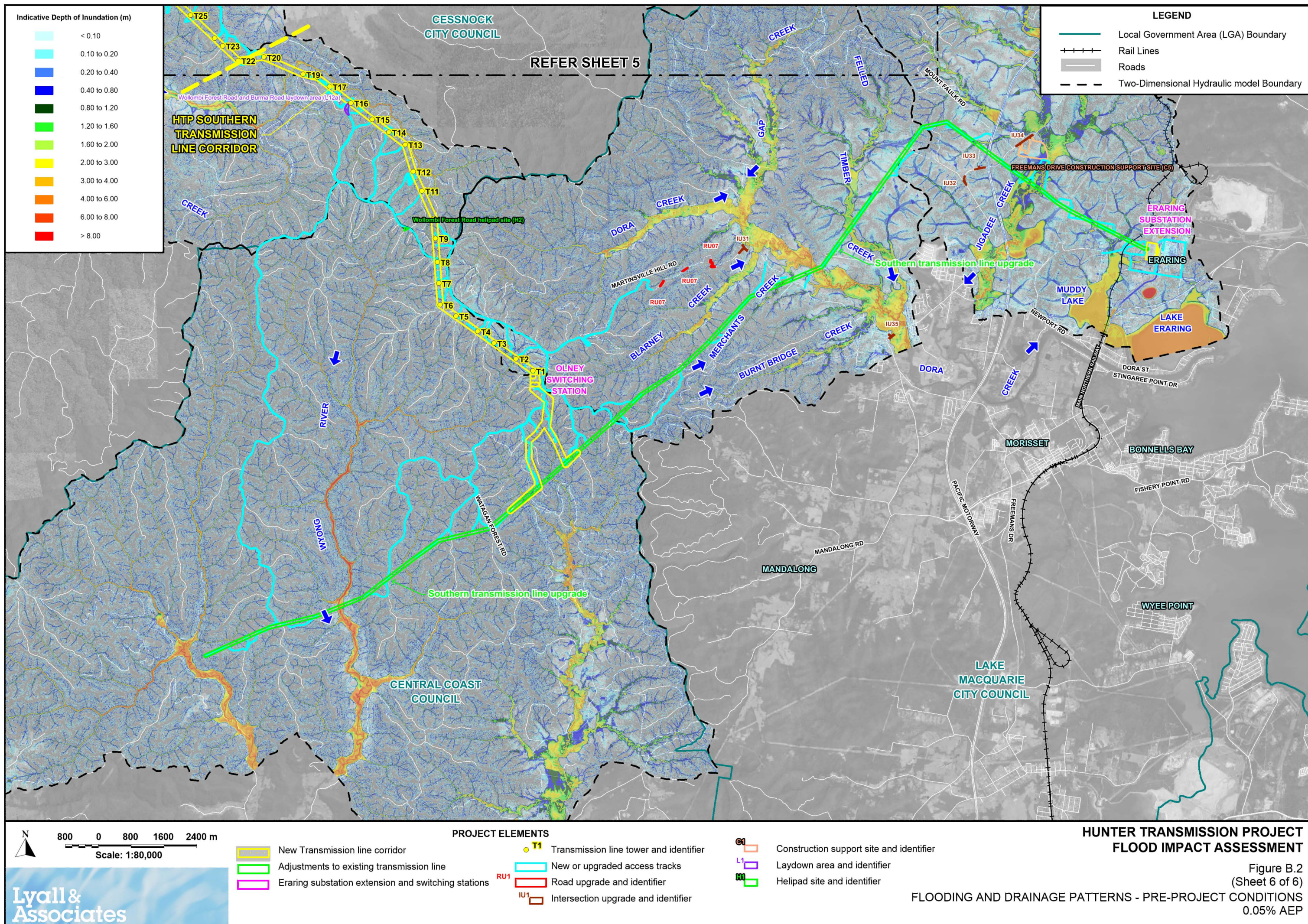




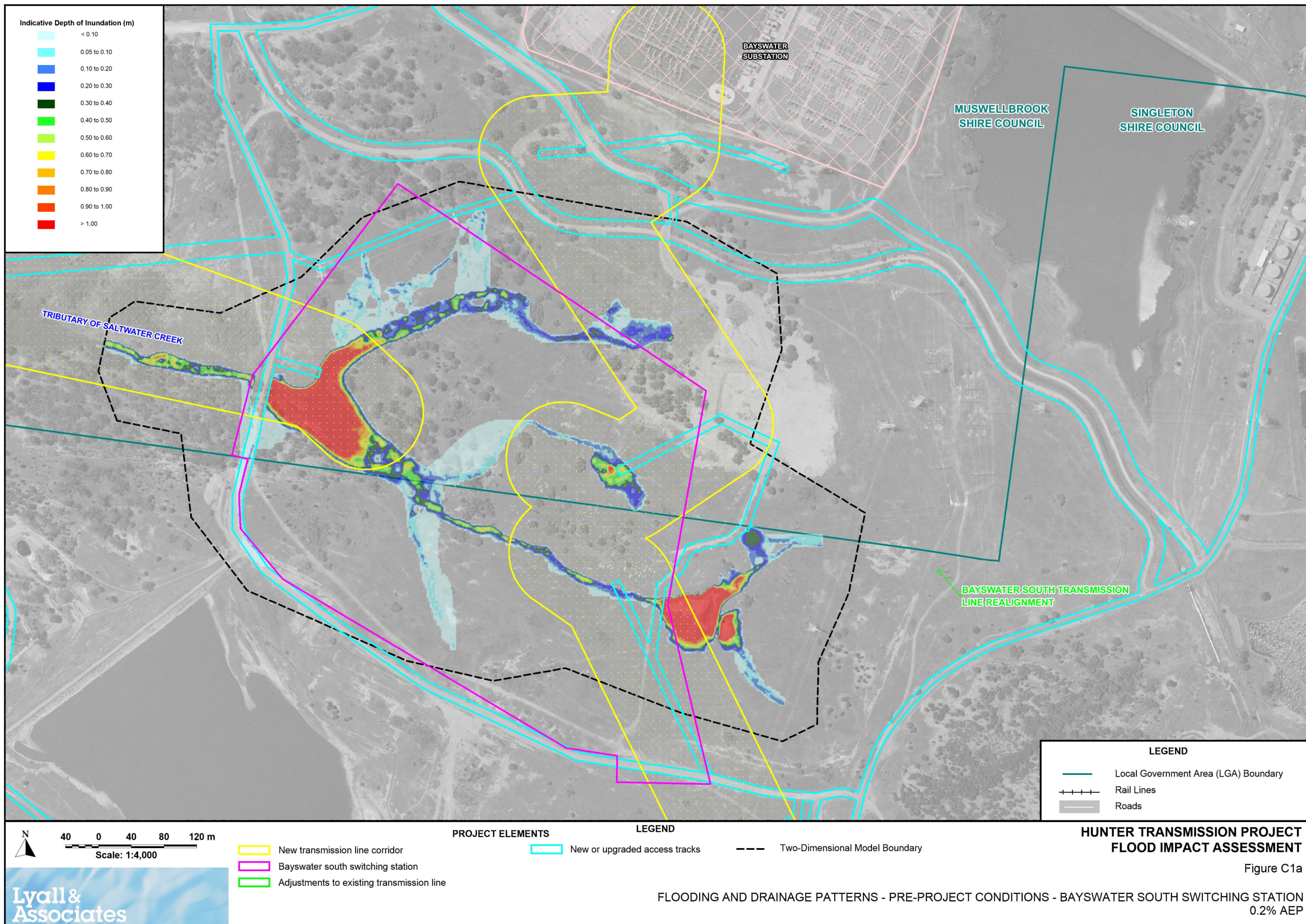


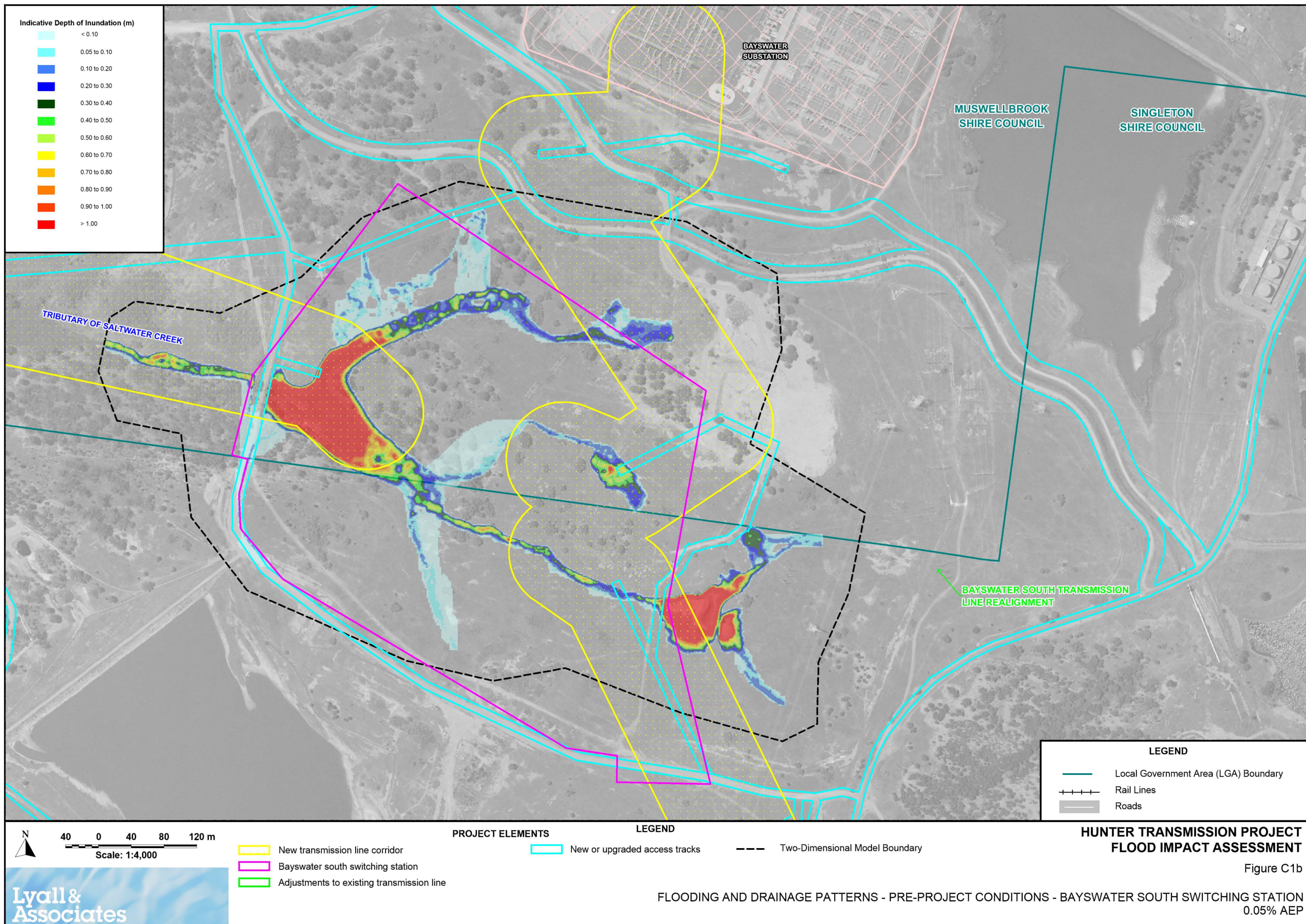


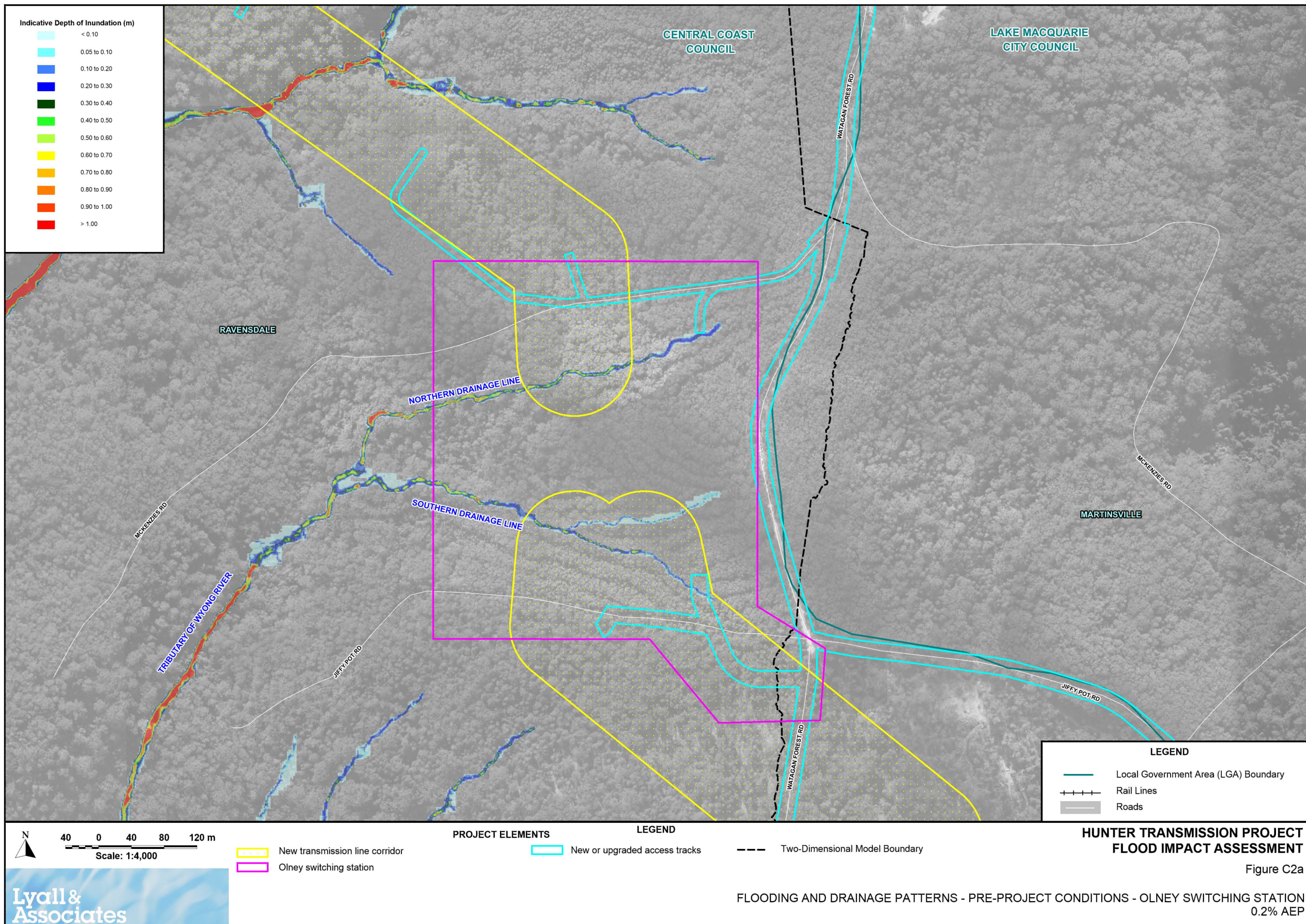


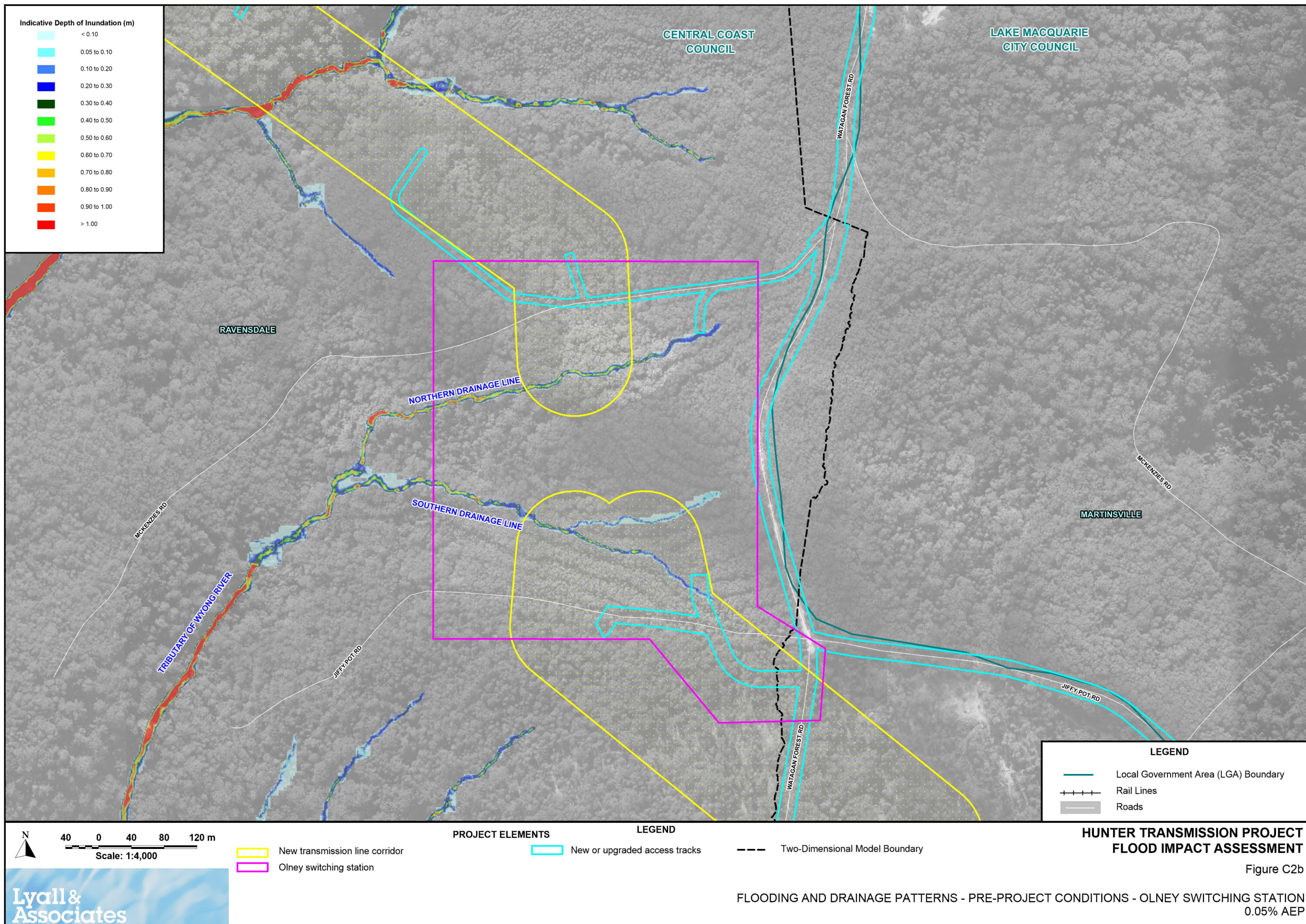


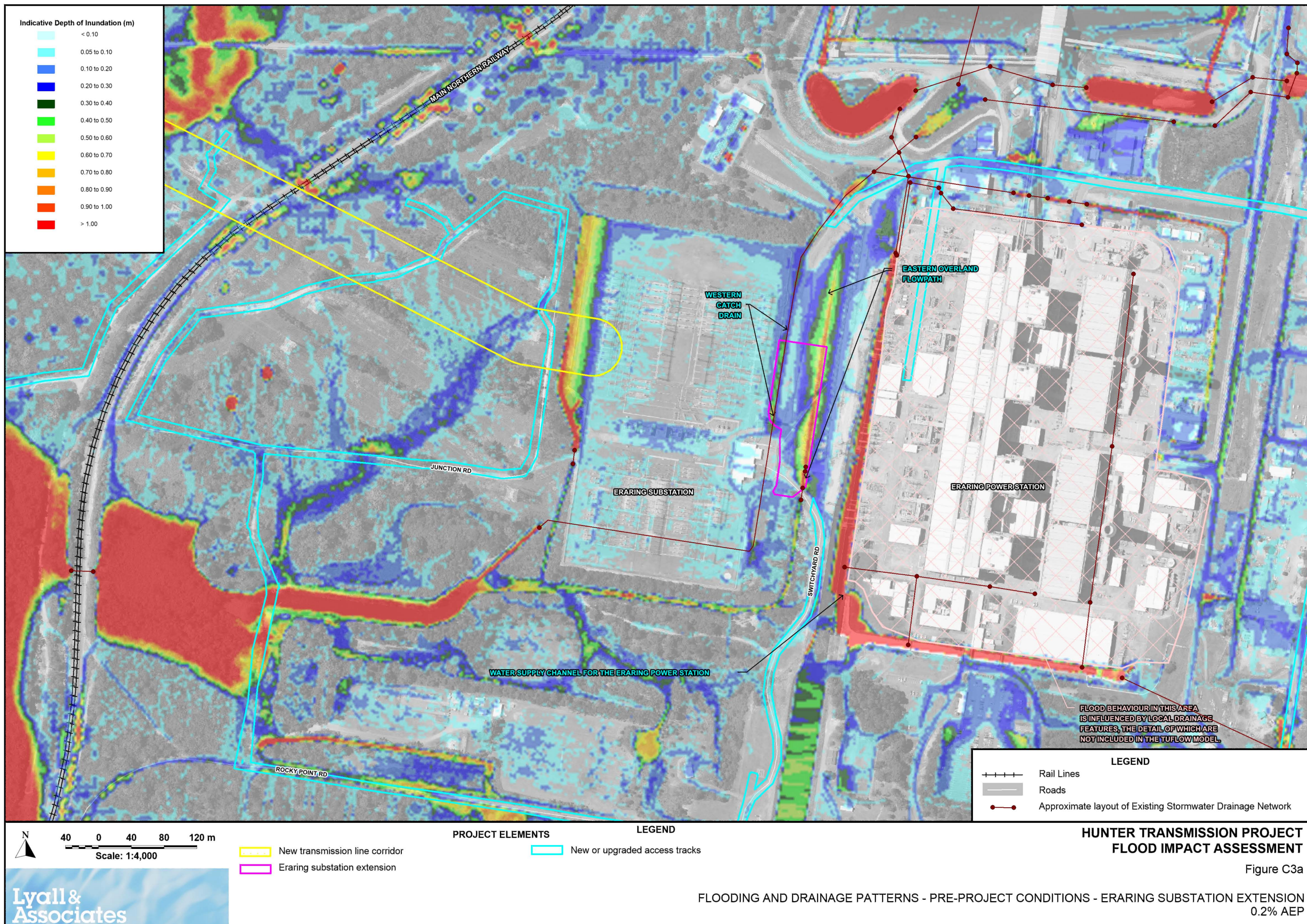
ANNEXURE C
FIGURES SHOWING THE INDICATIVE EXTENT AND DEPTH OF INUNDATION
IN THE VICINITY OF THE BAYSWATER SOUTH SWITCHING STATION,
OLNEY SWITCHING STATION AND ERARING SUBSTATION EXTENSION
DURING 0.2% AND 0.05% AEP EVENTS

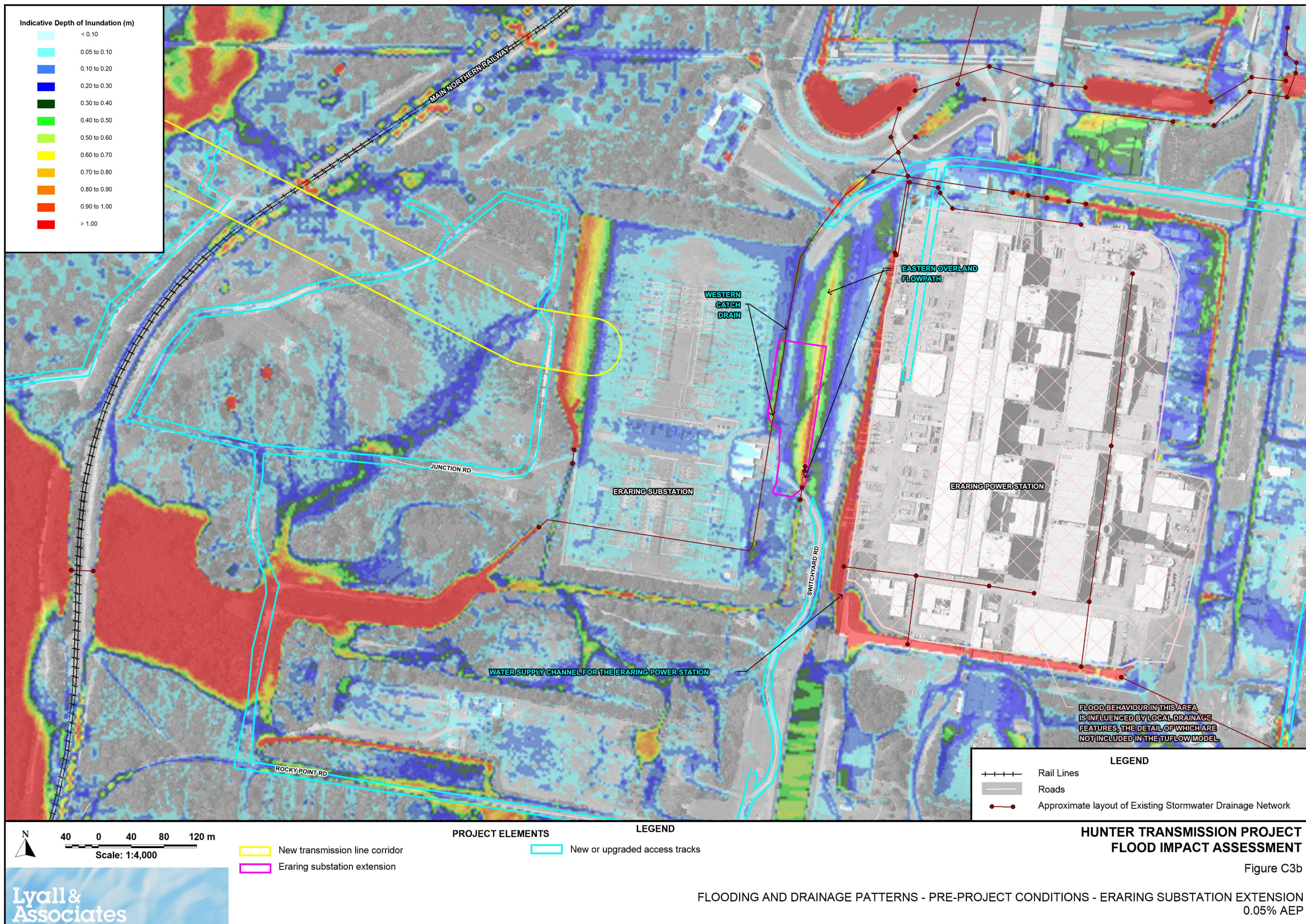


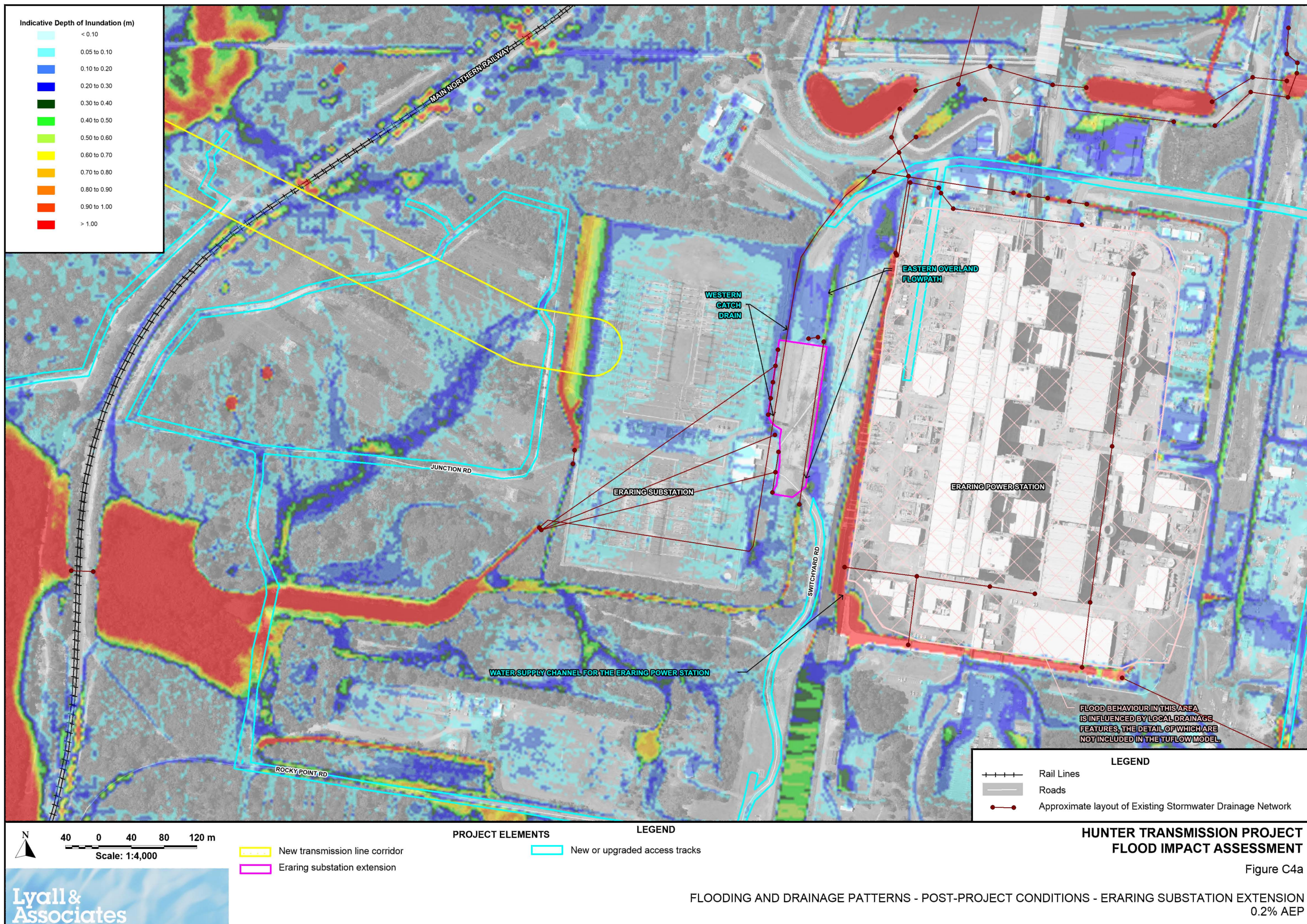


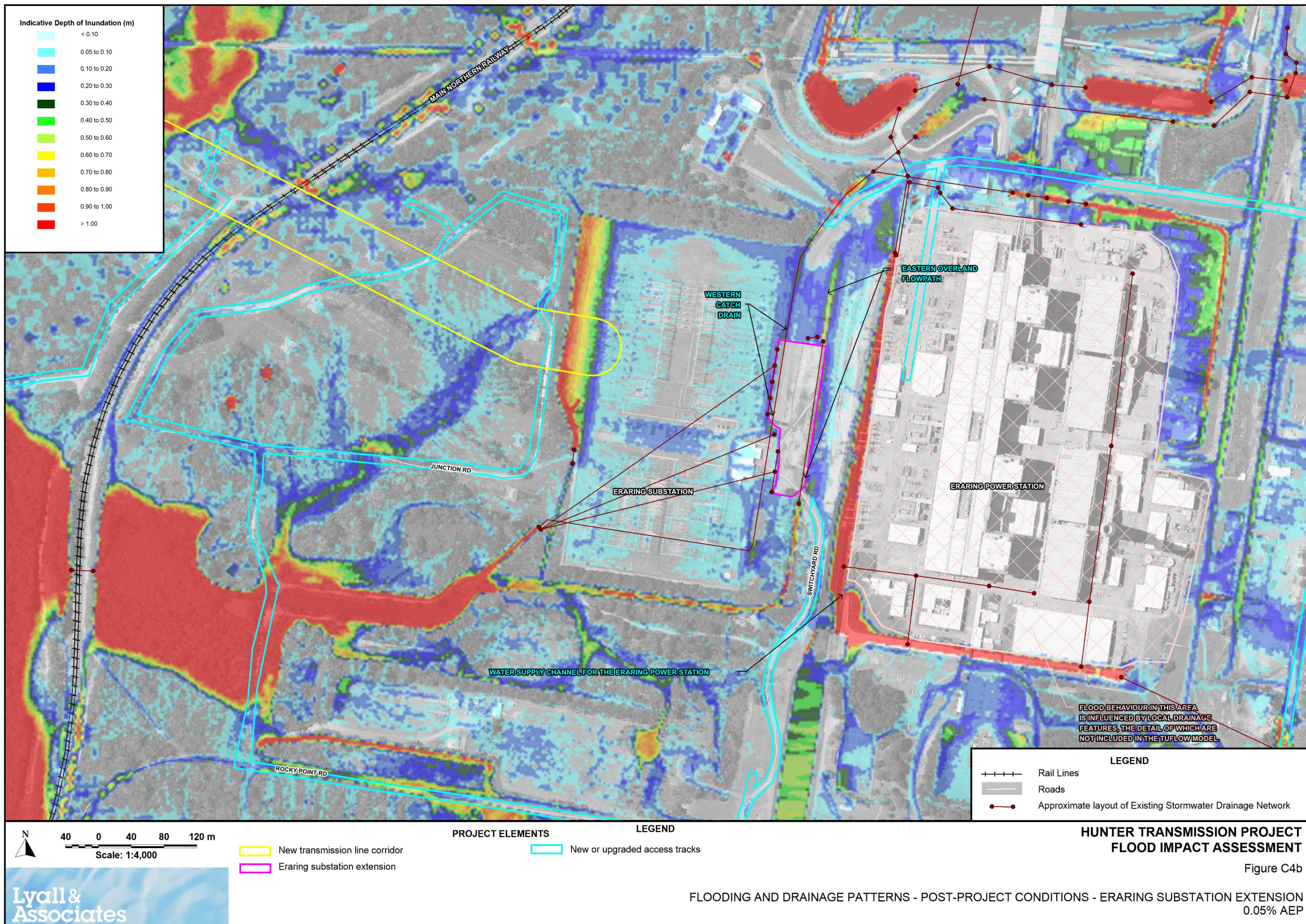


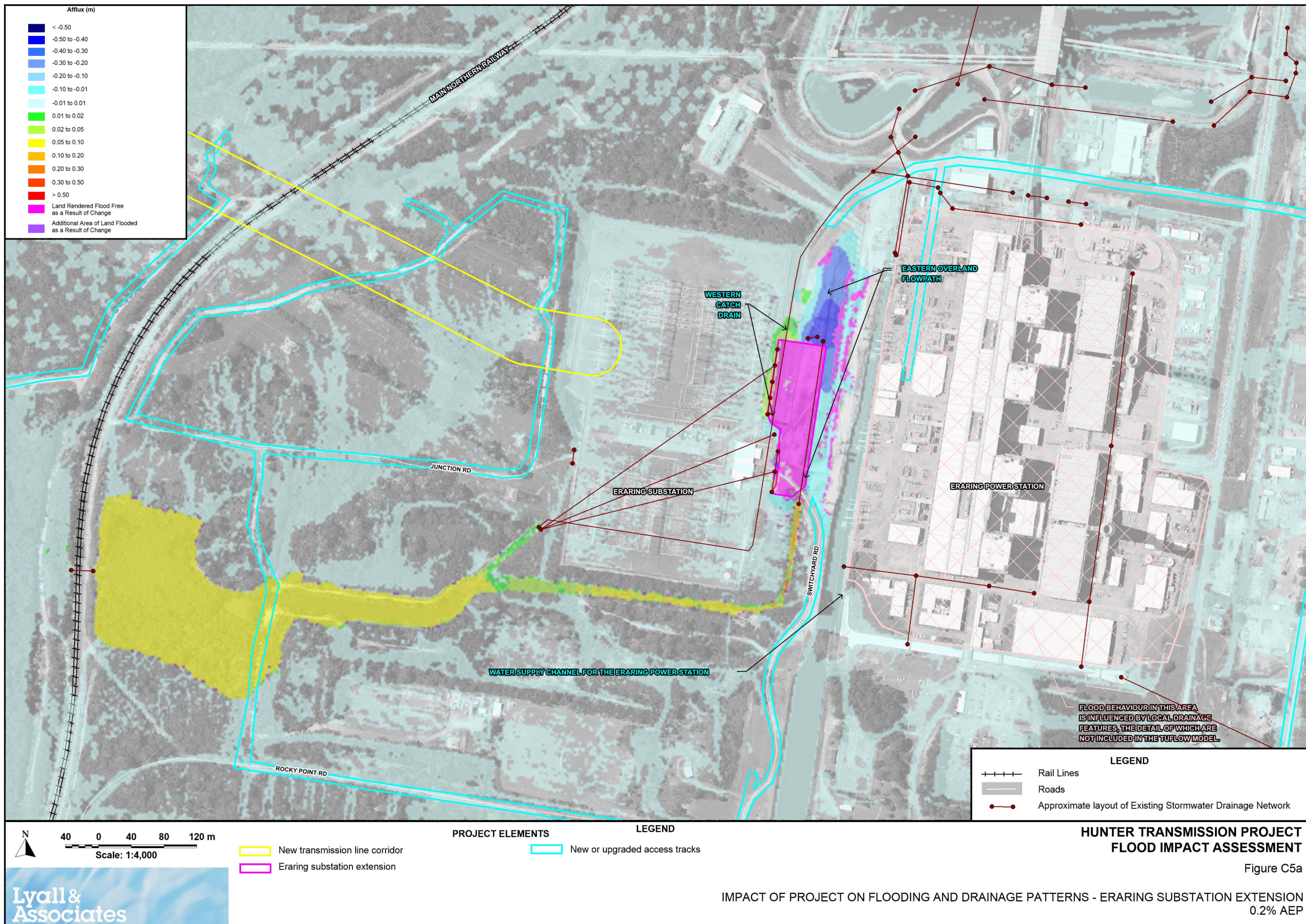


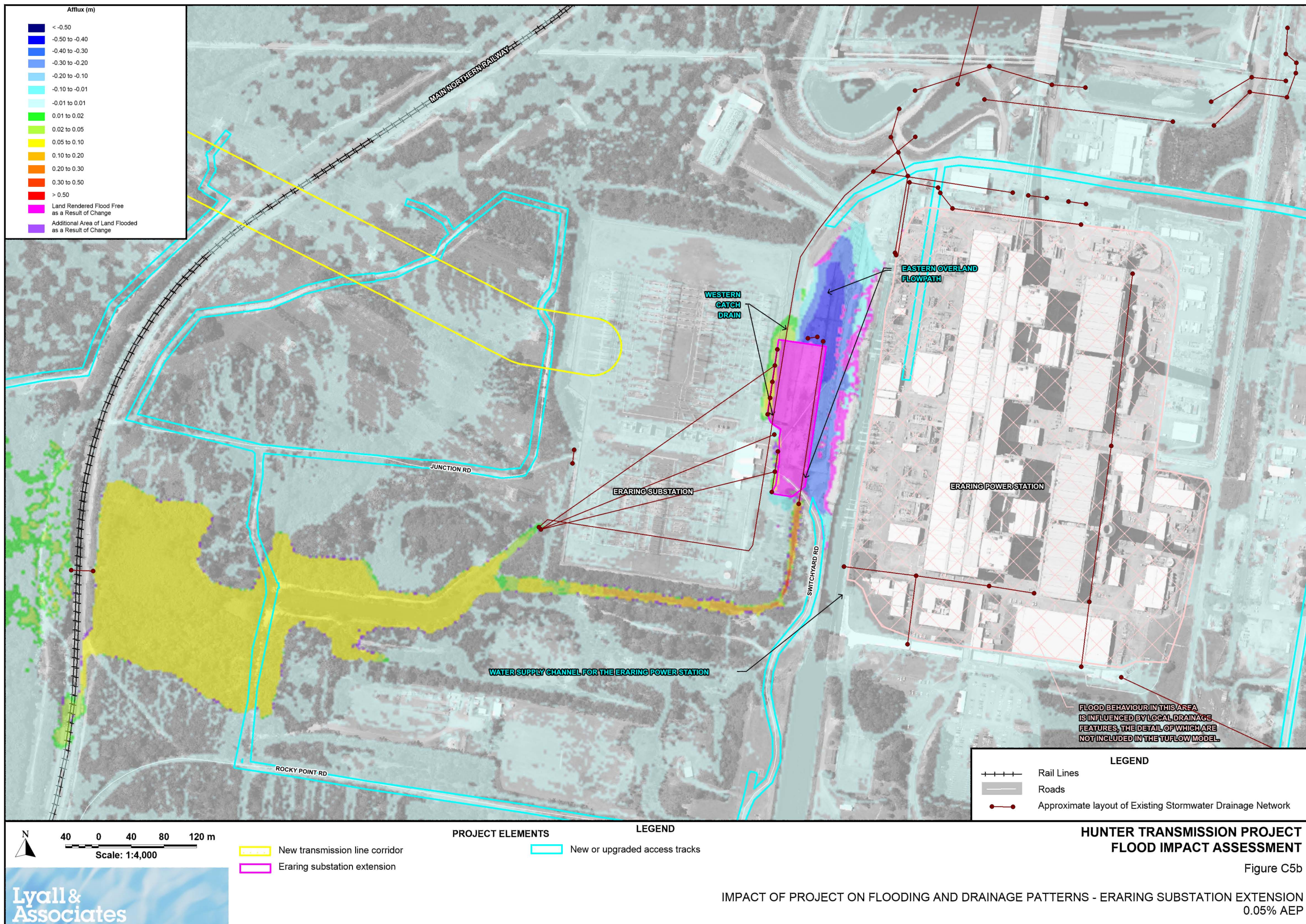




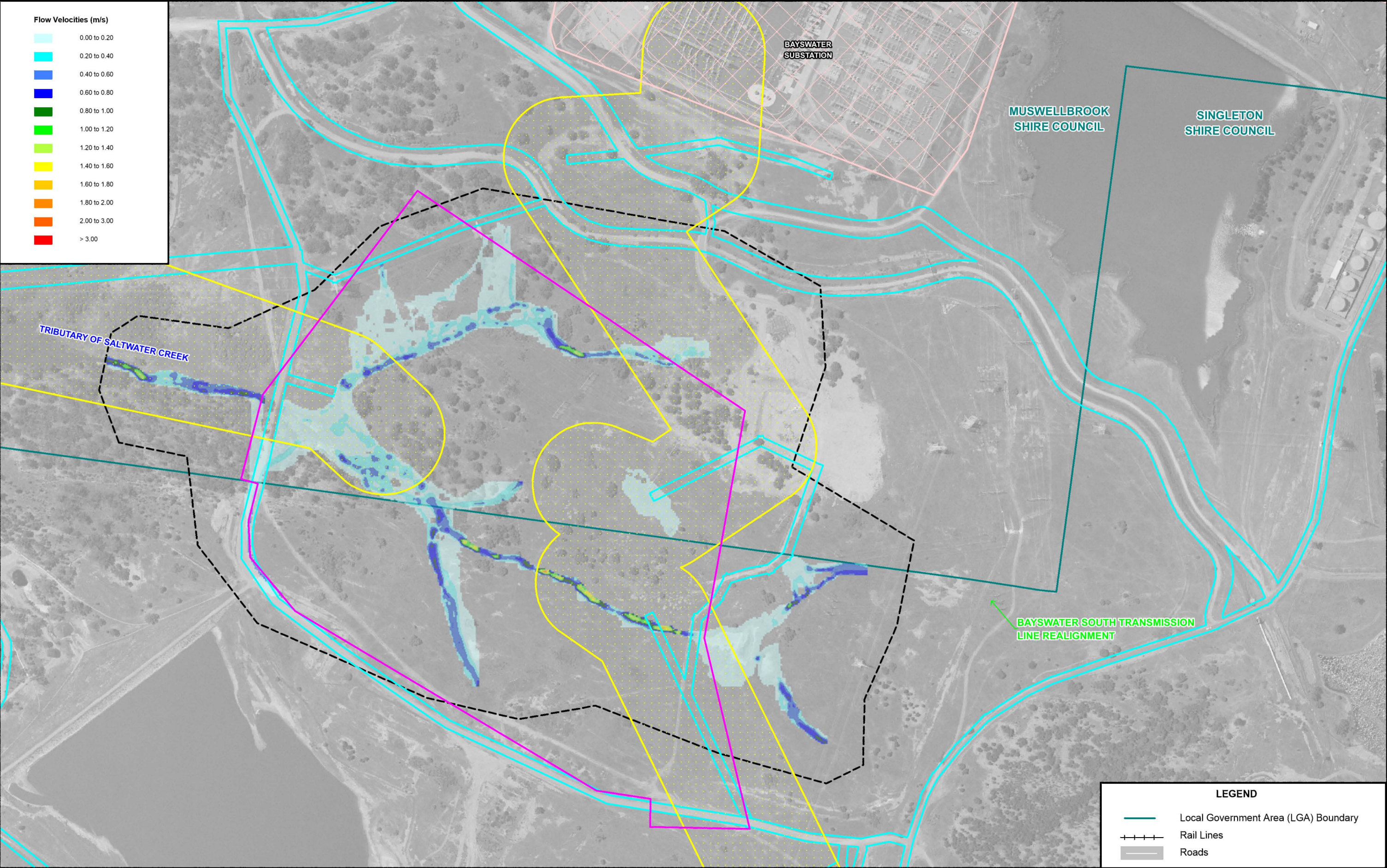


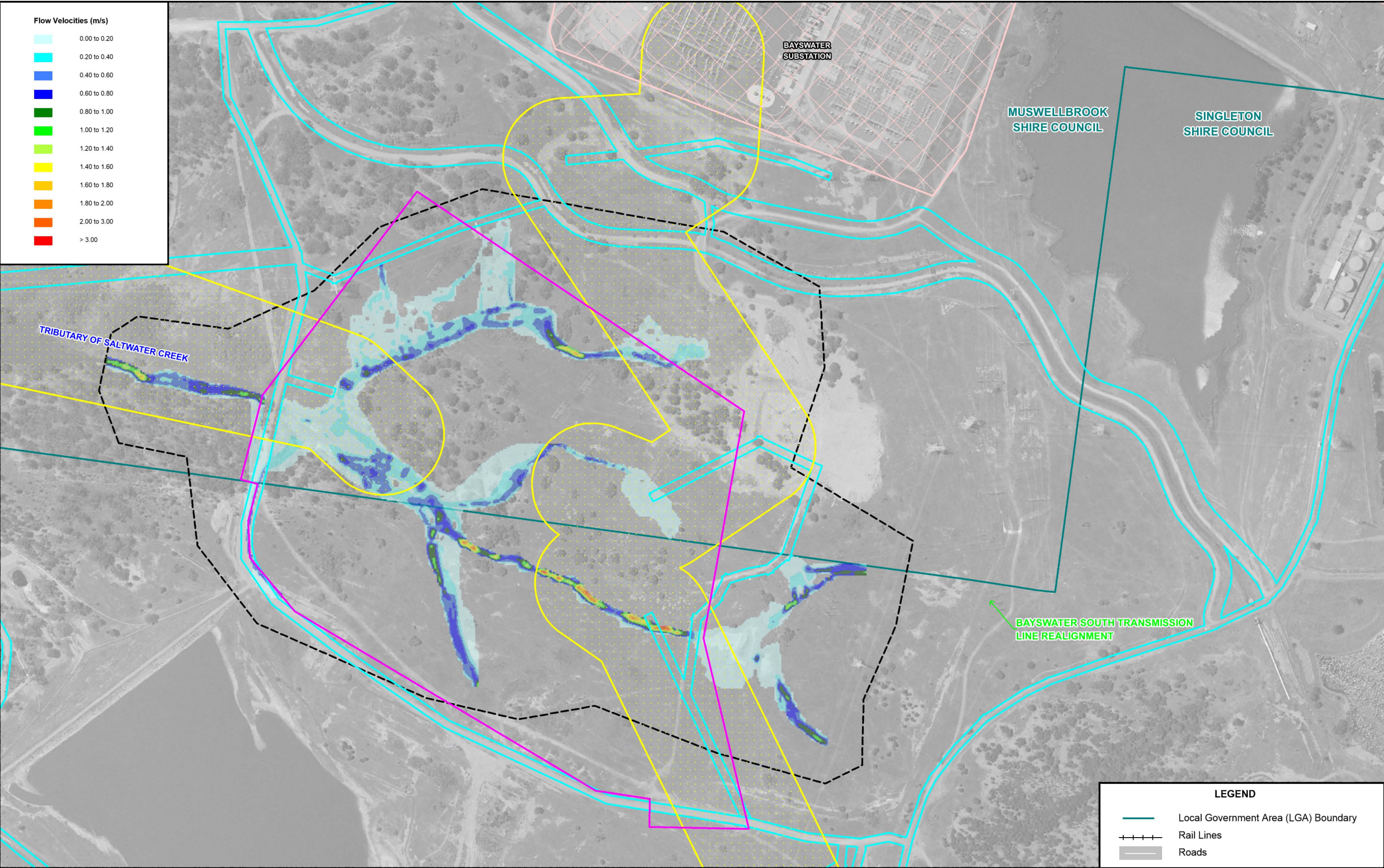


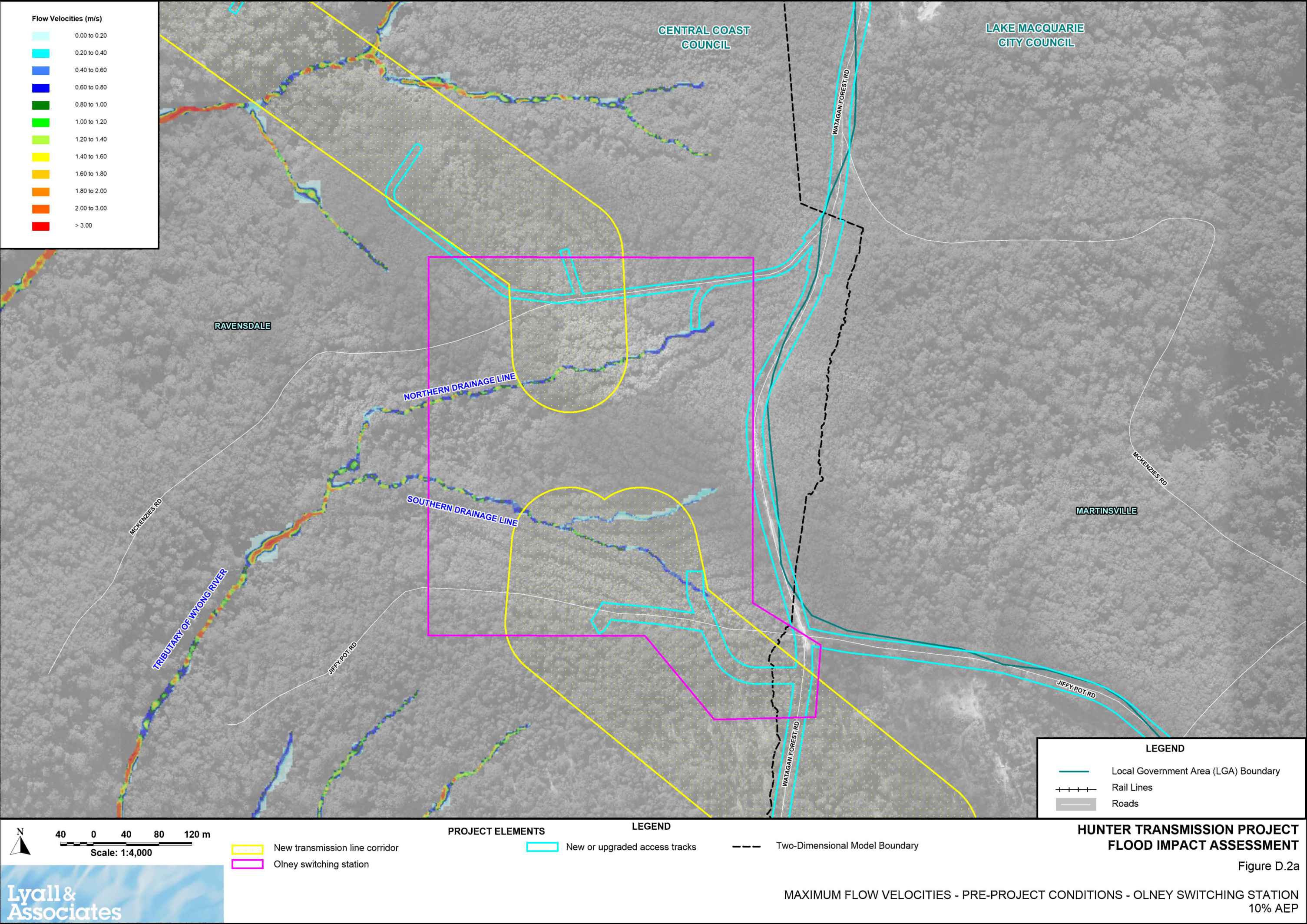


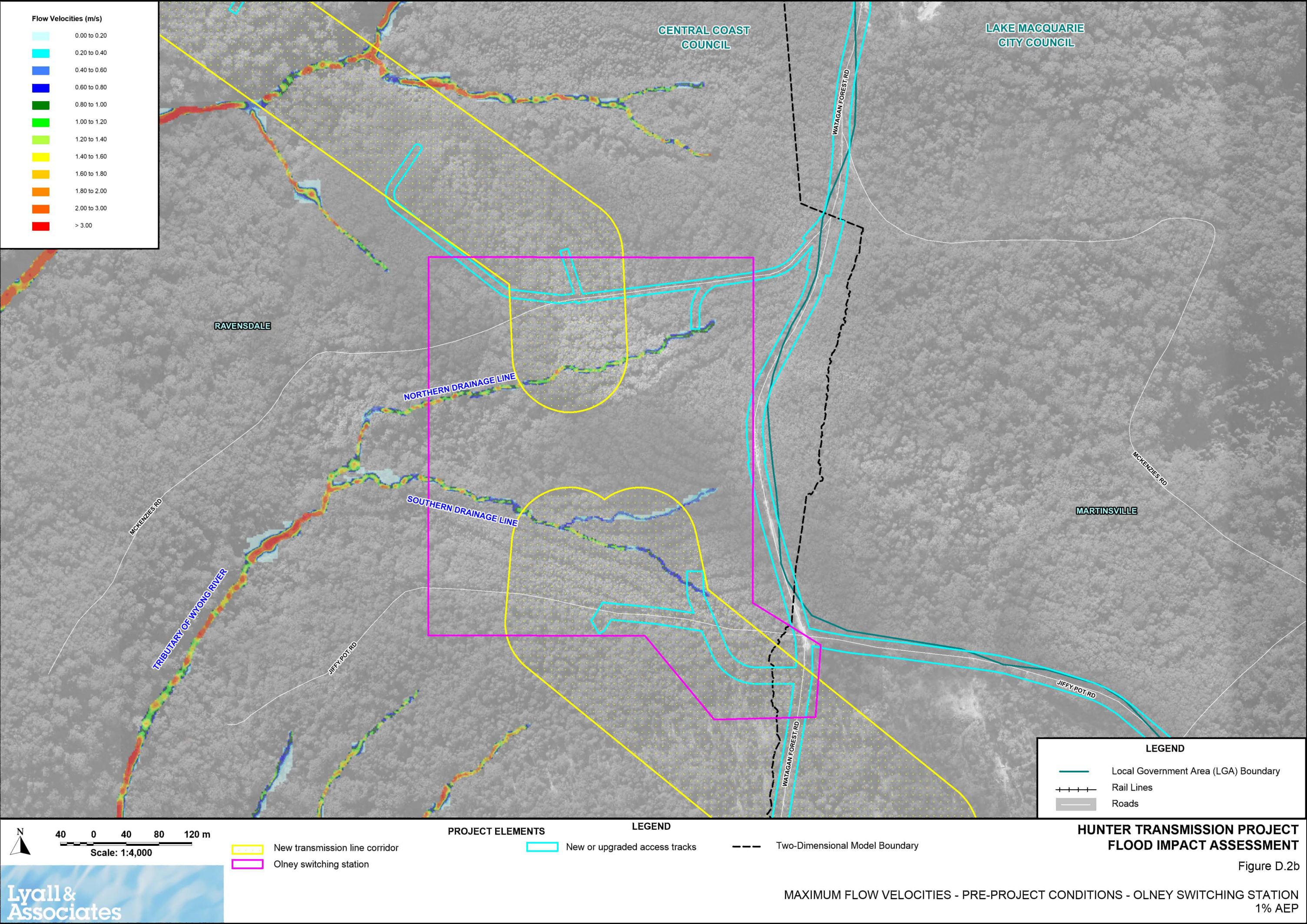


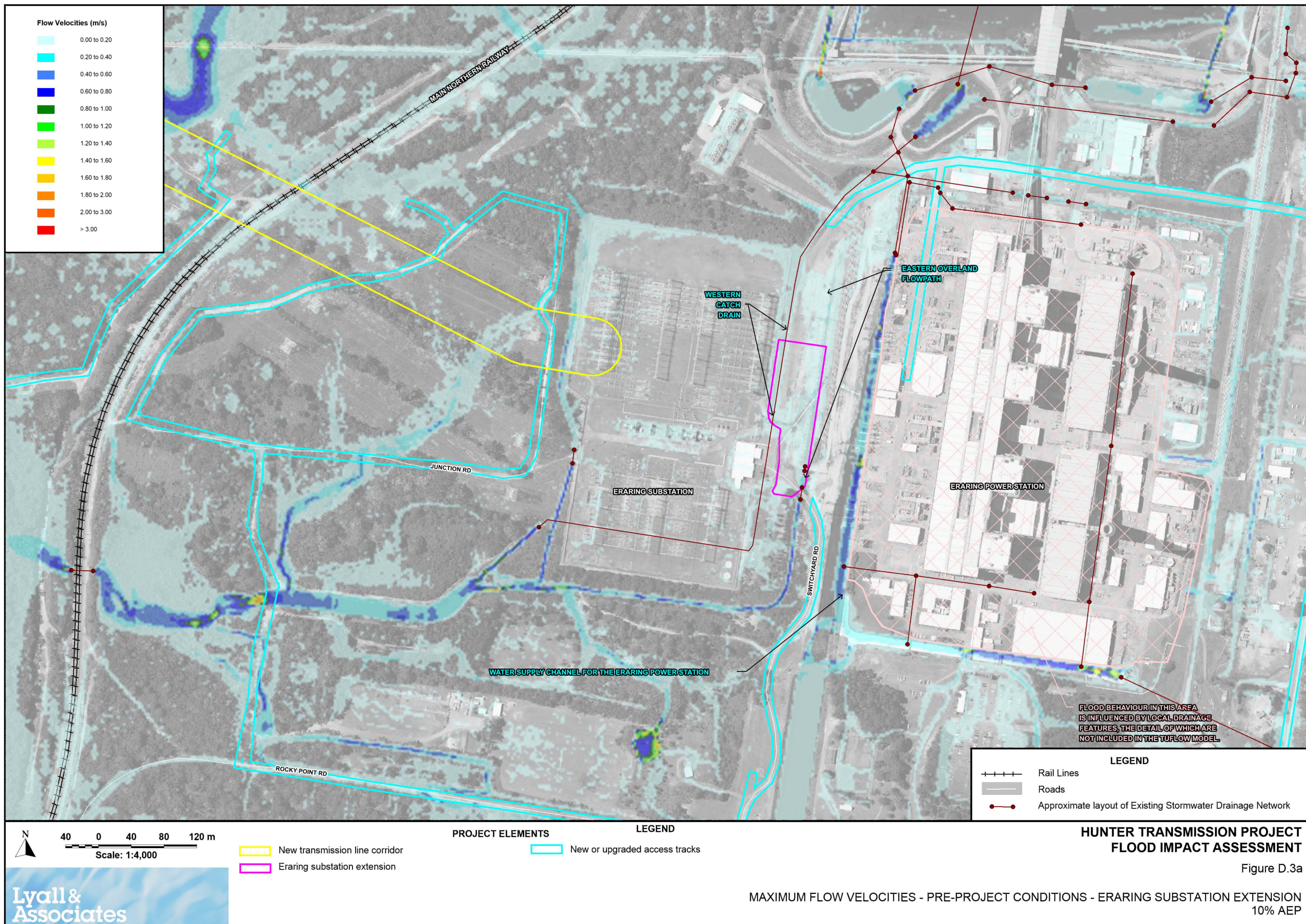
ANNEXURE D
FIGURES SHOWING MAXIMUM FLOW VELOCITIES AND DURATIONS OF
INUNDATION IN THE VICINITY OF THE BAYSWATER SOUTH SWITCHING
STATION, OLNEY SWITCHING STATION AND ERARING SUBSTATION
EXTENSION DURING 10% AND 1% AEP EVENTS

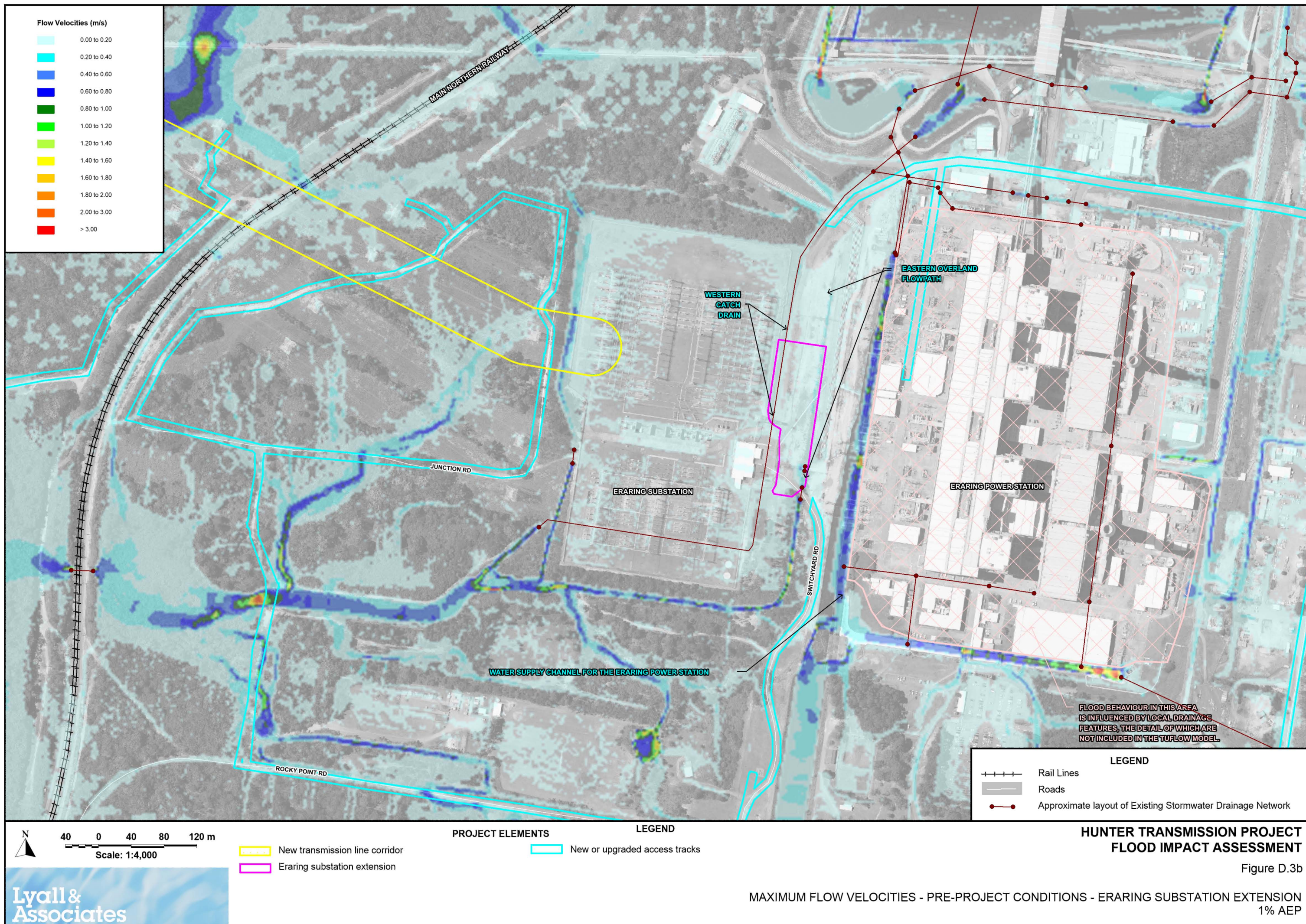


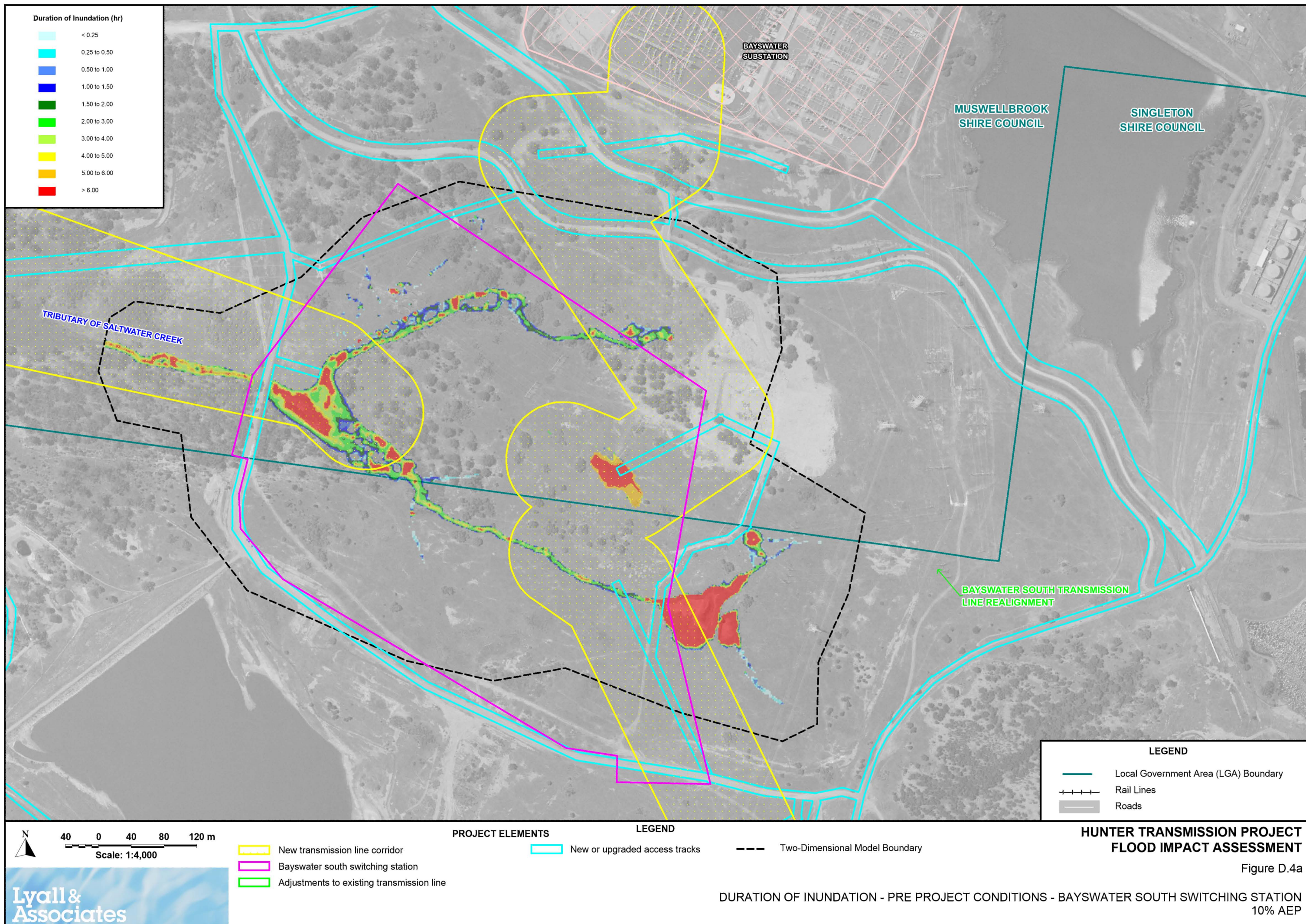


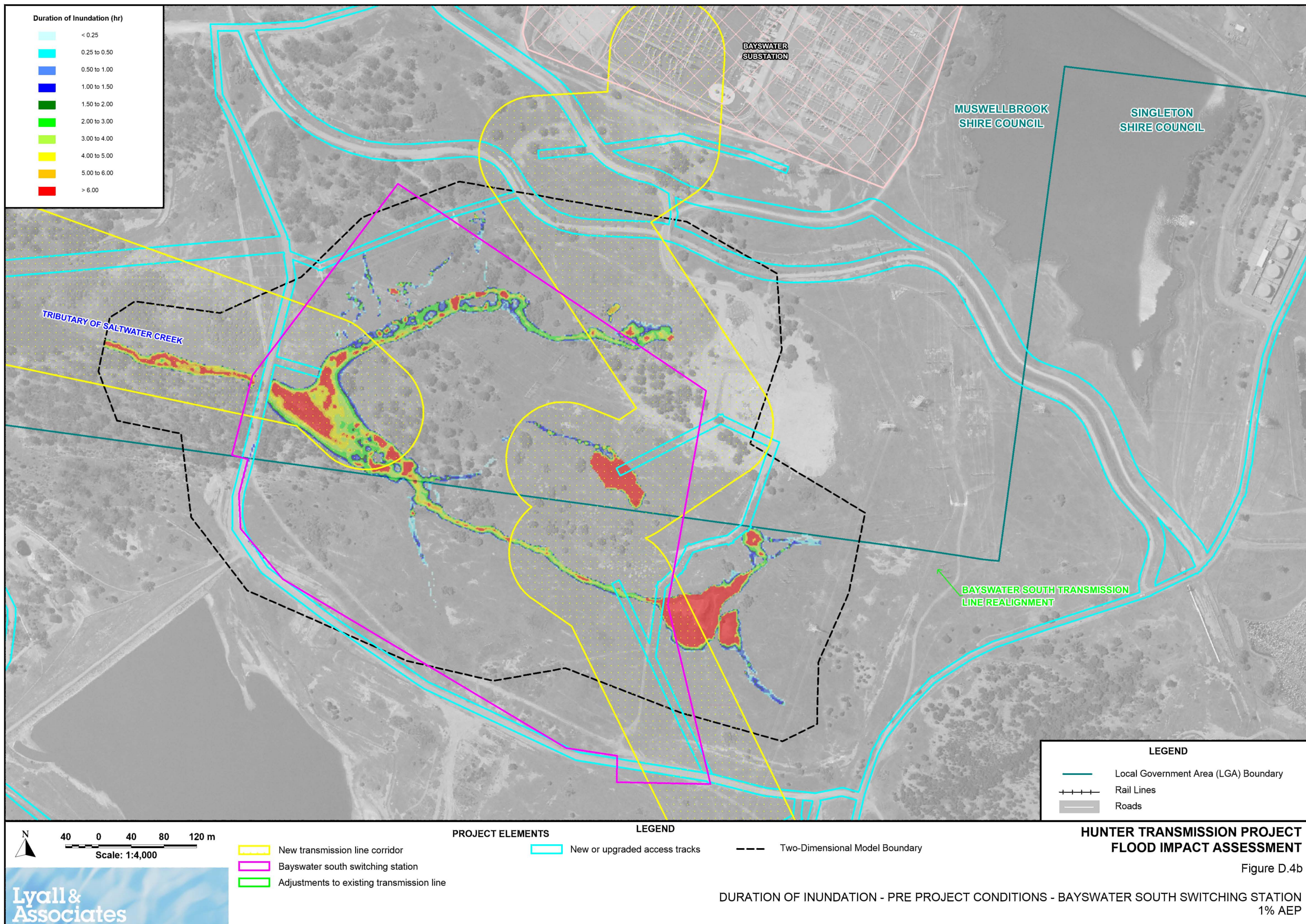


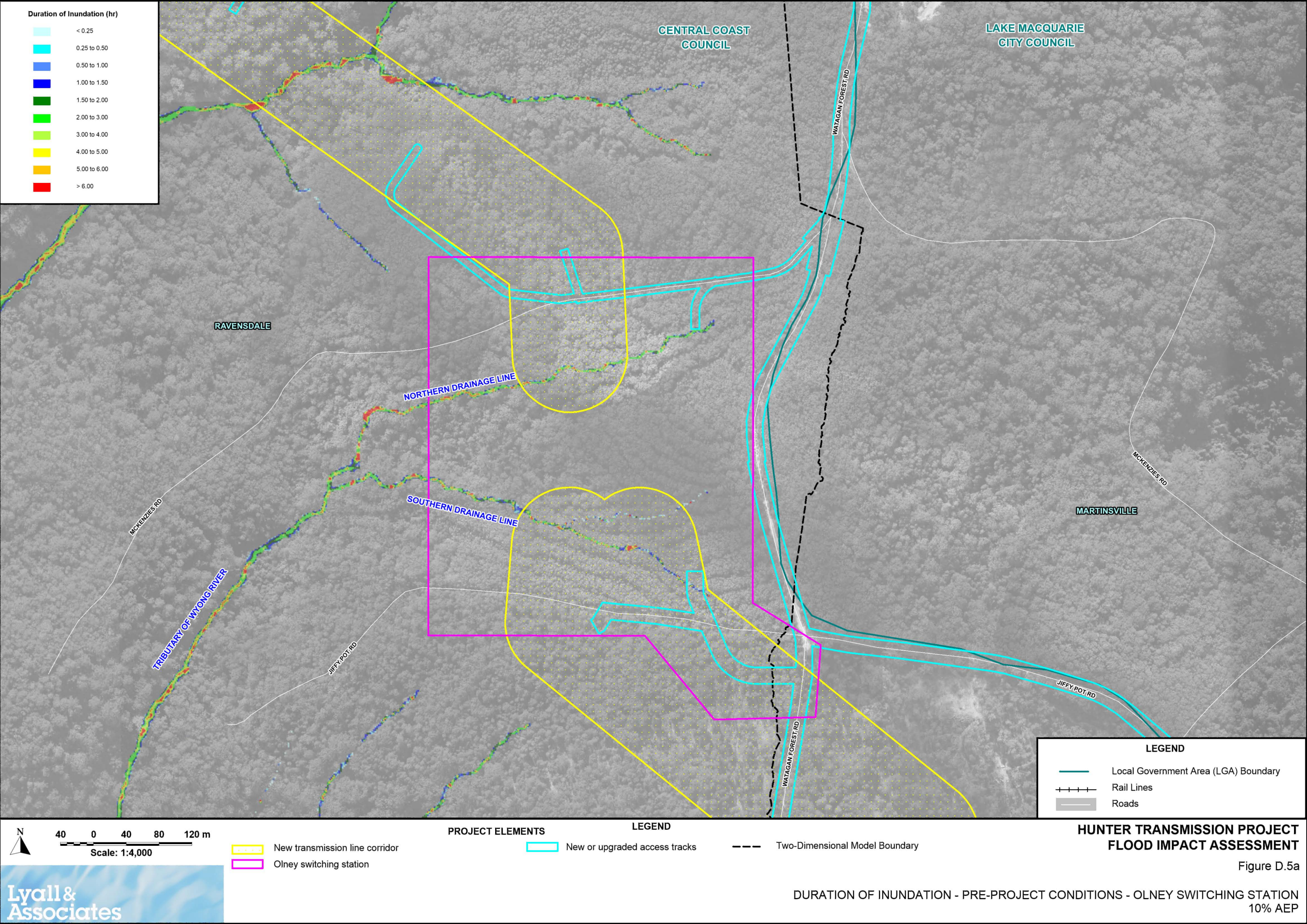


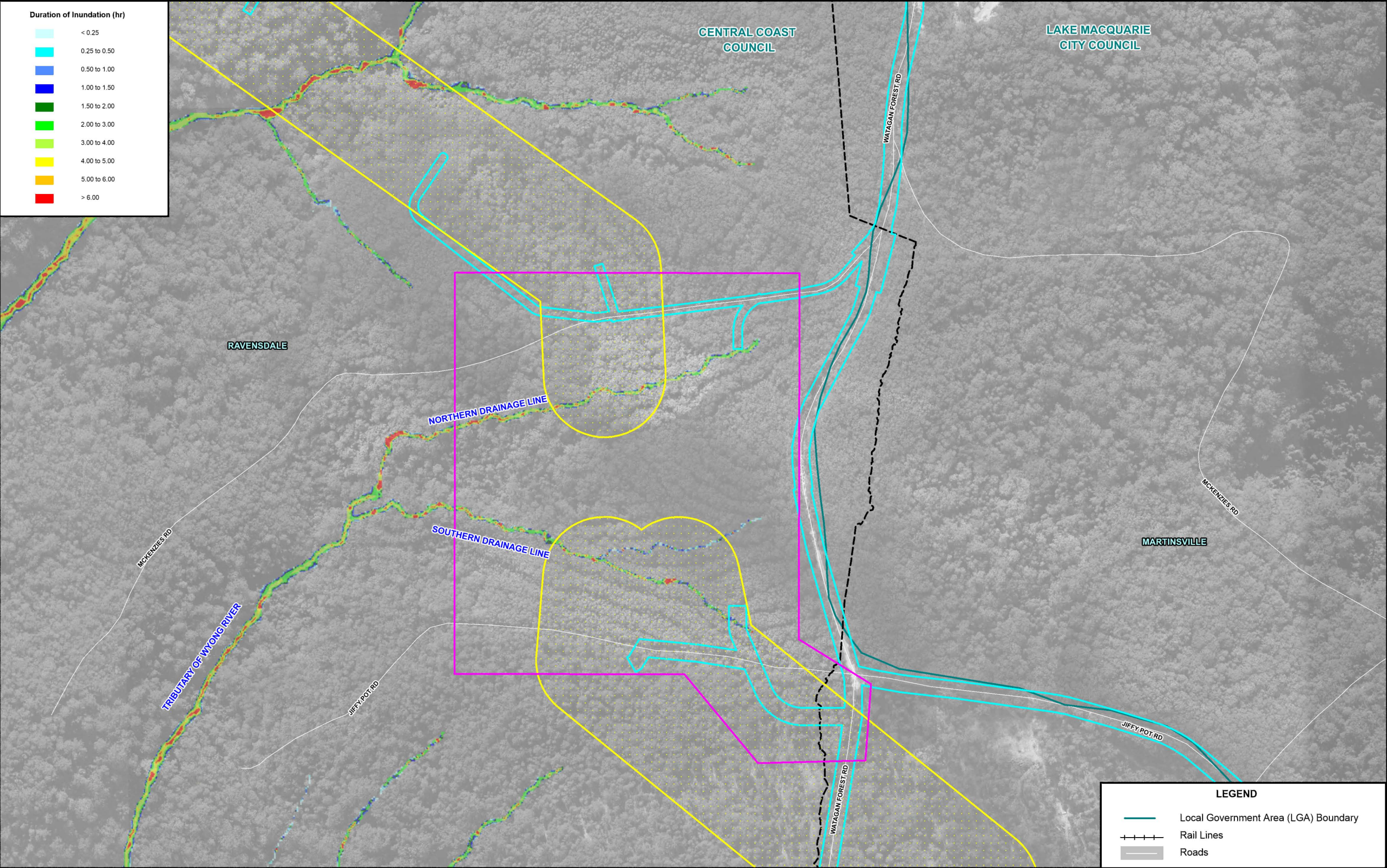


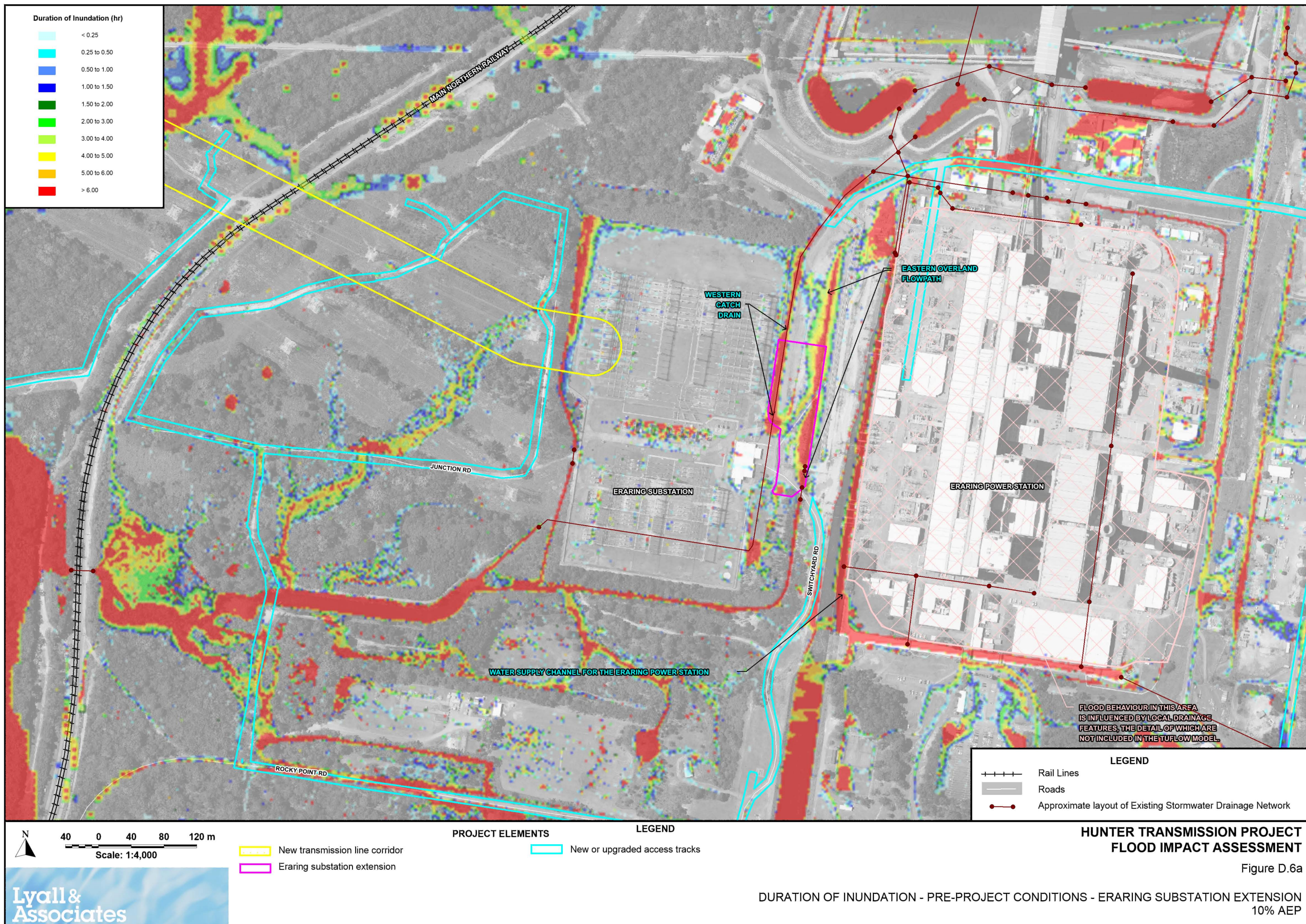


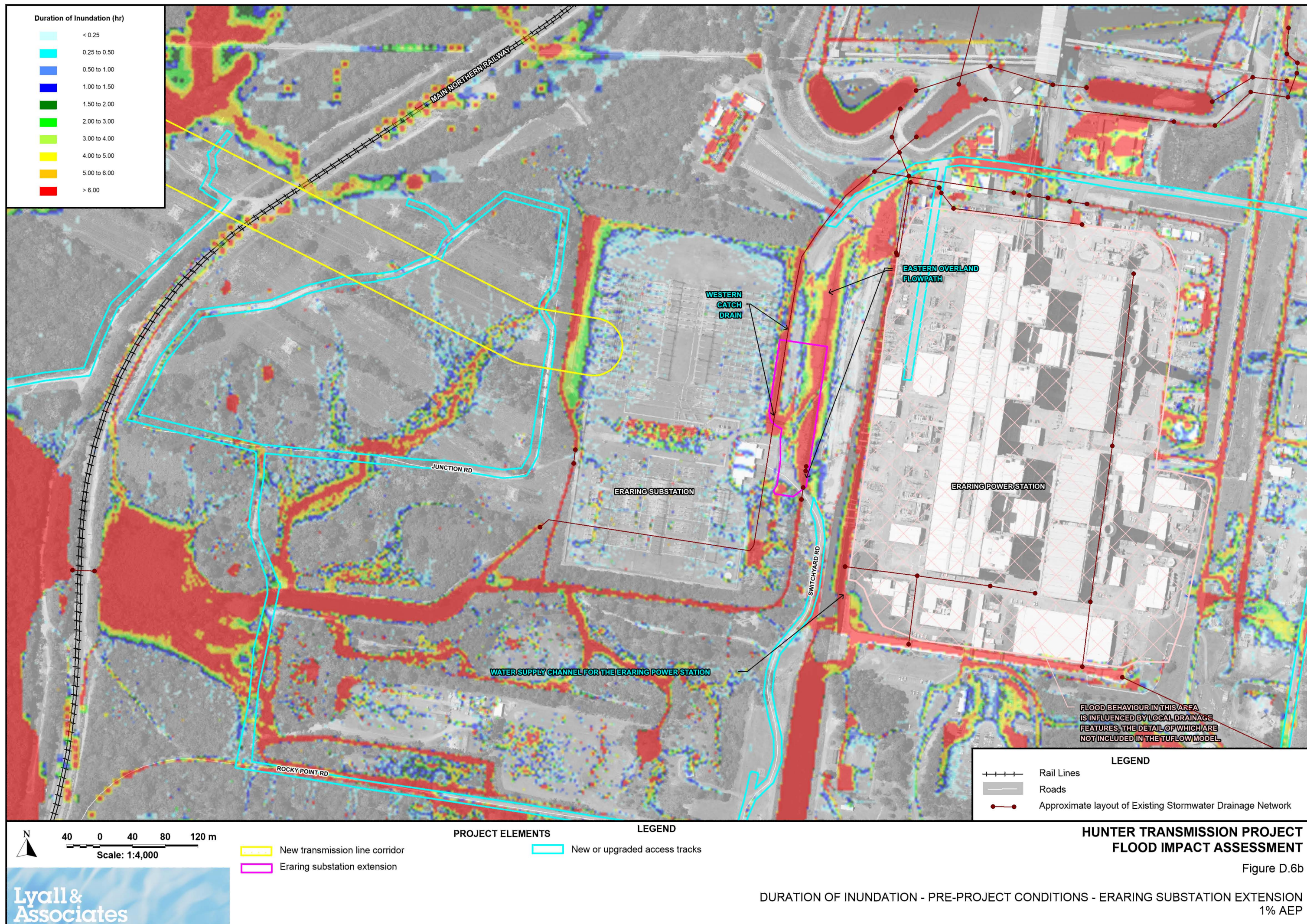


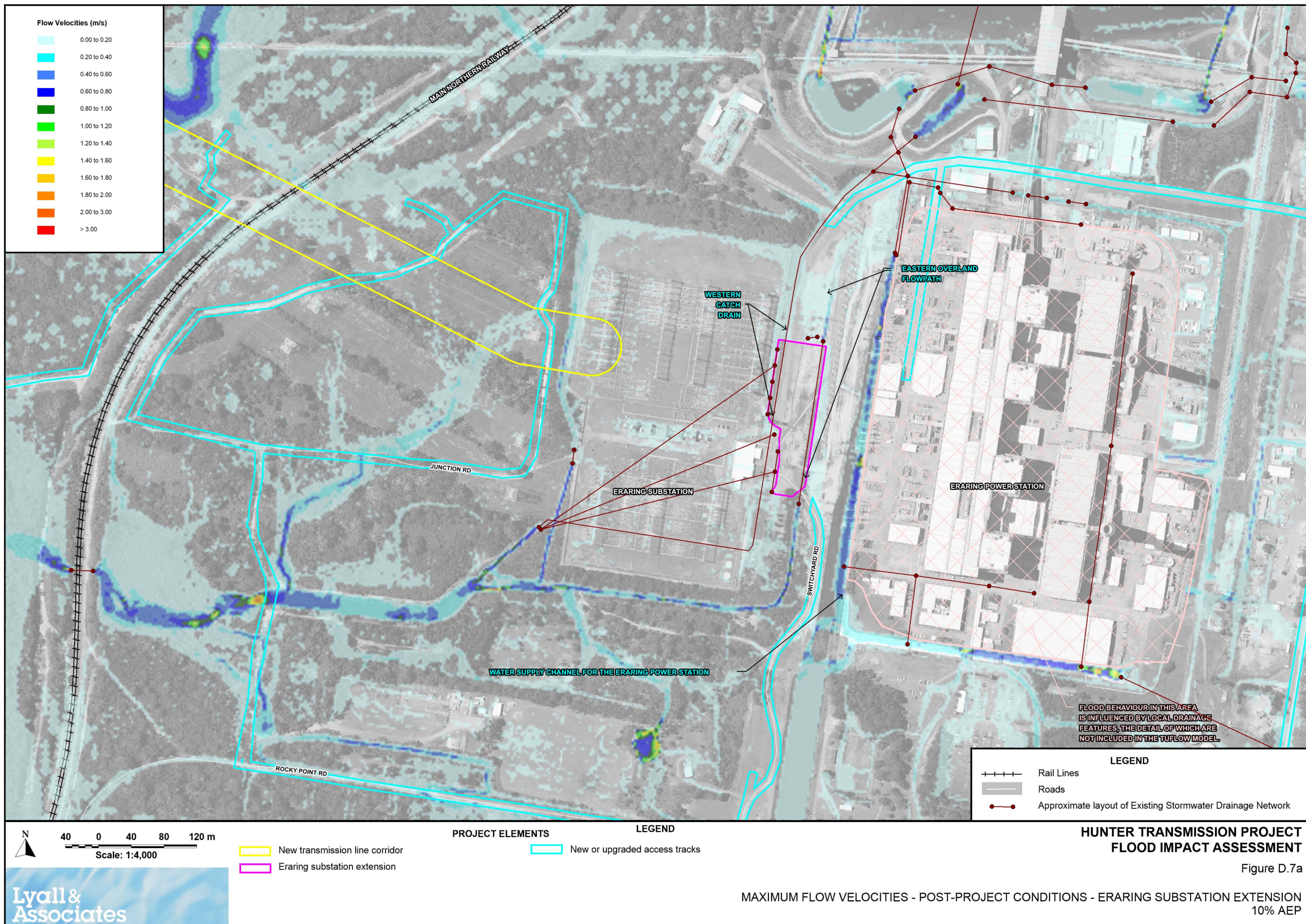


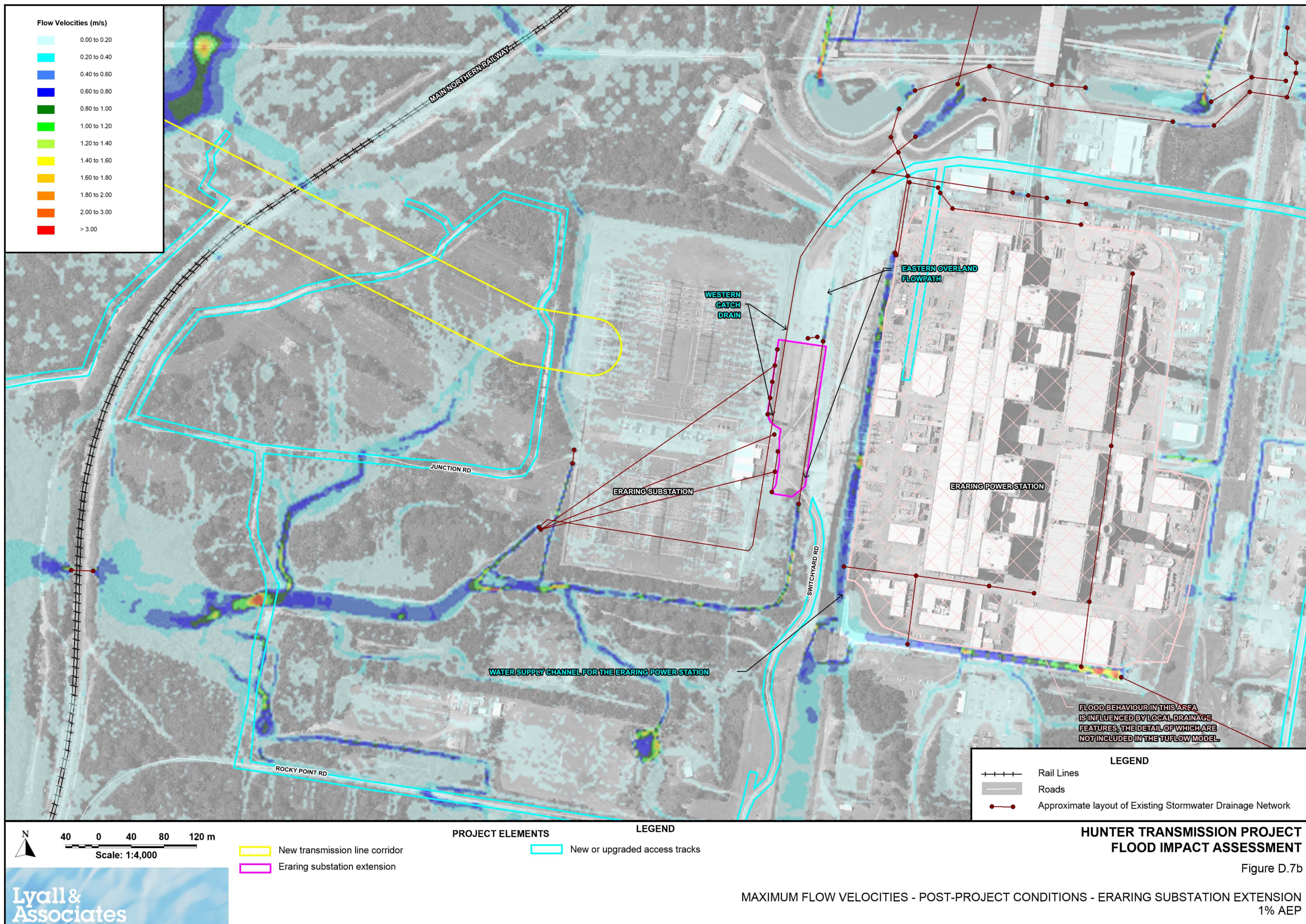


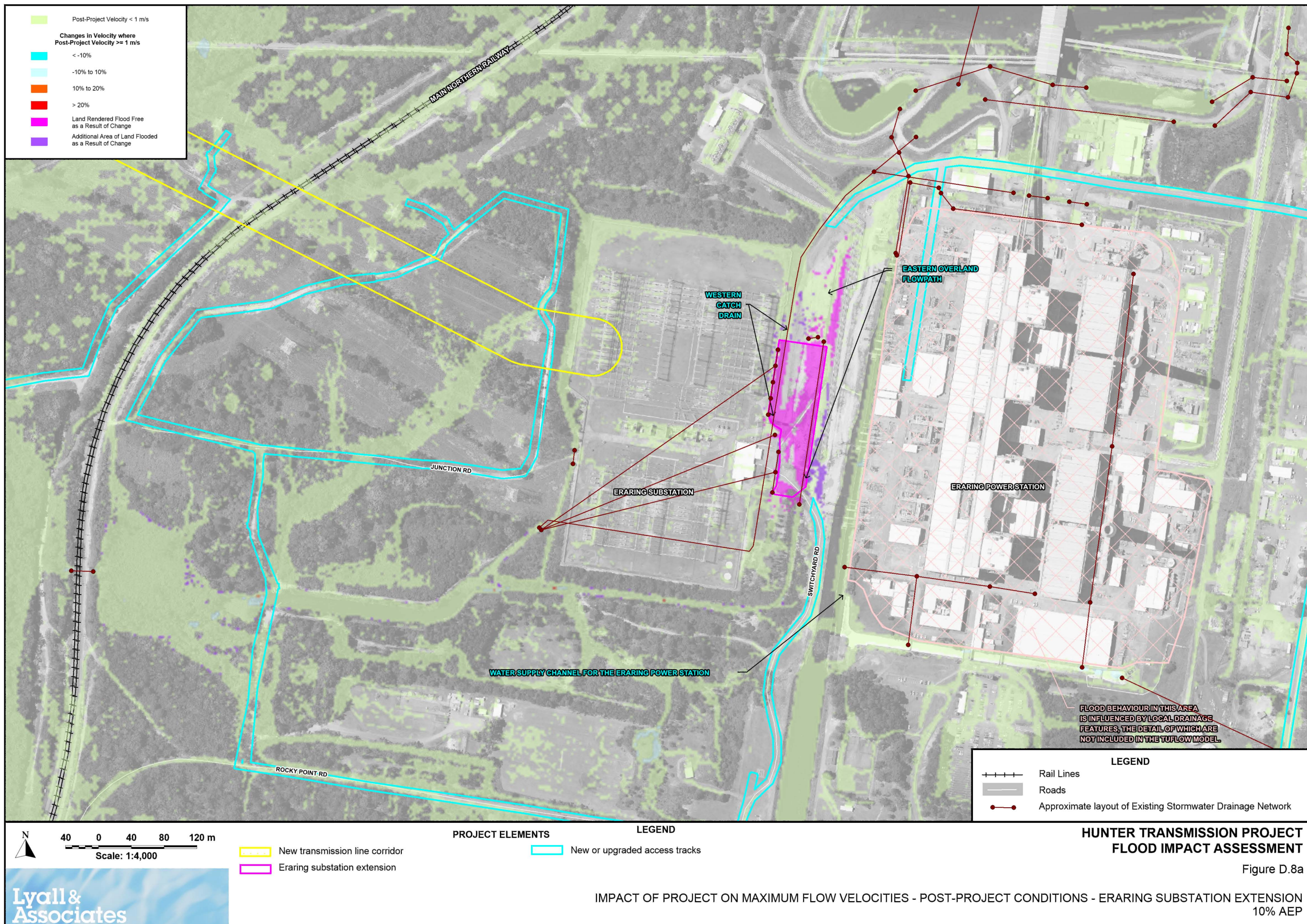


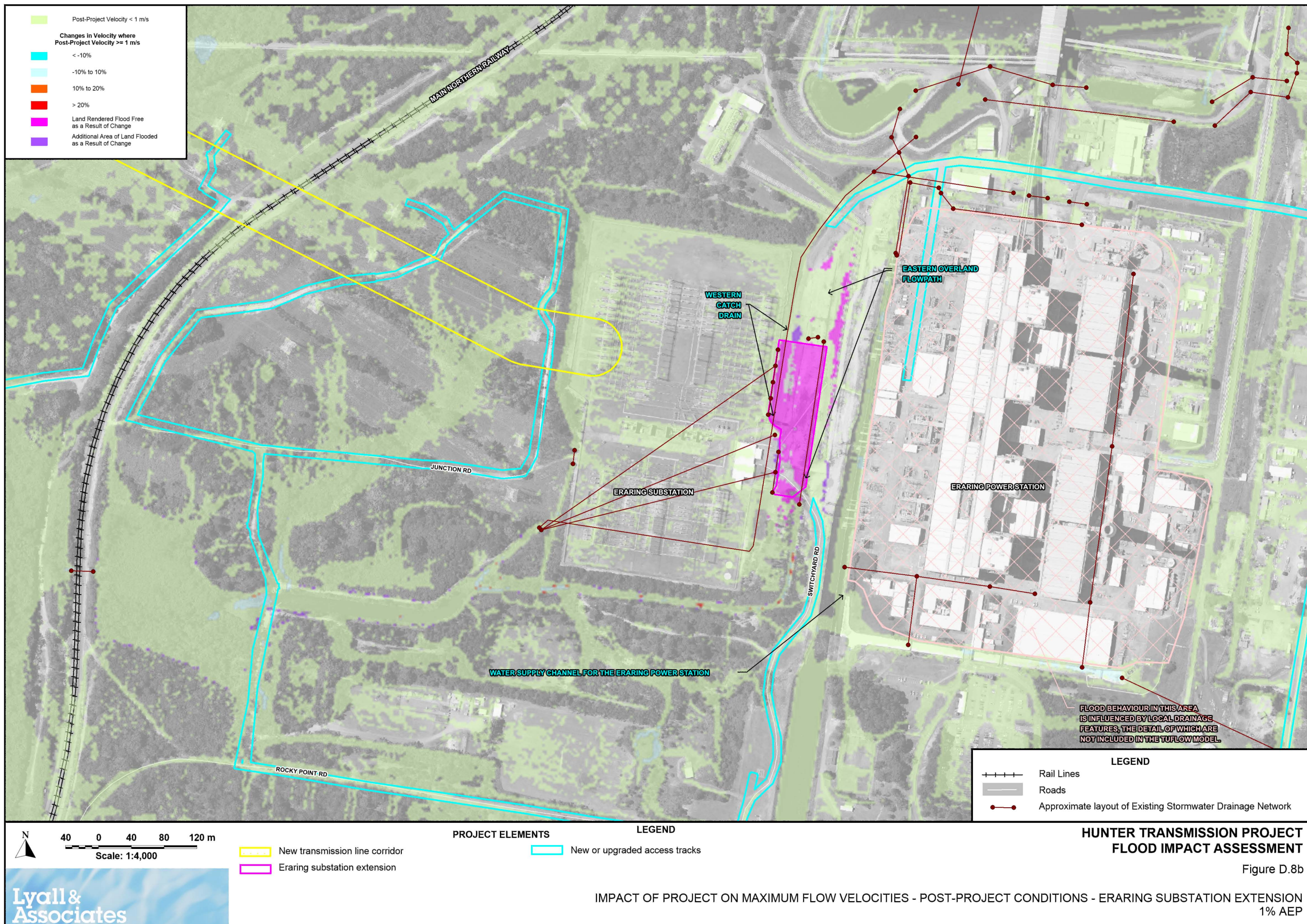


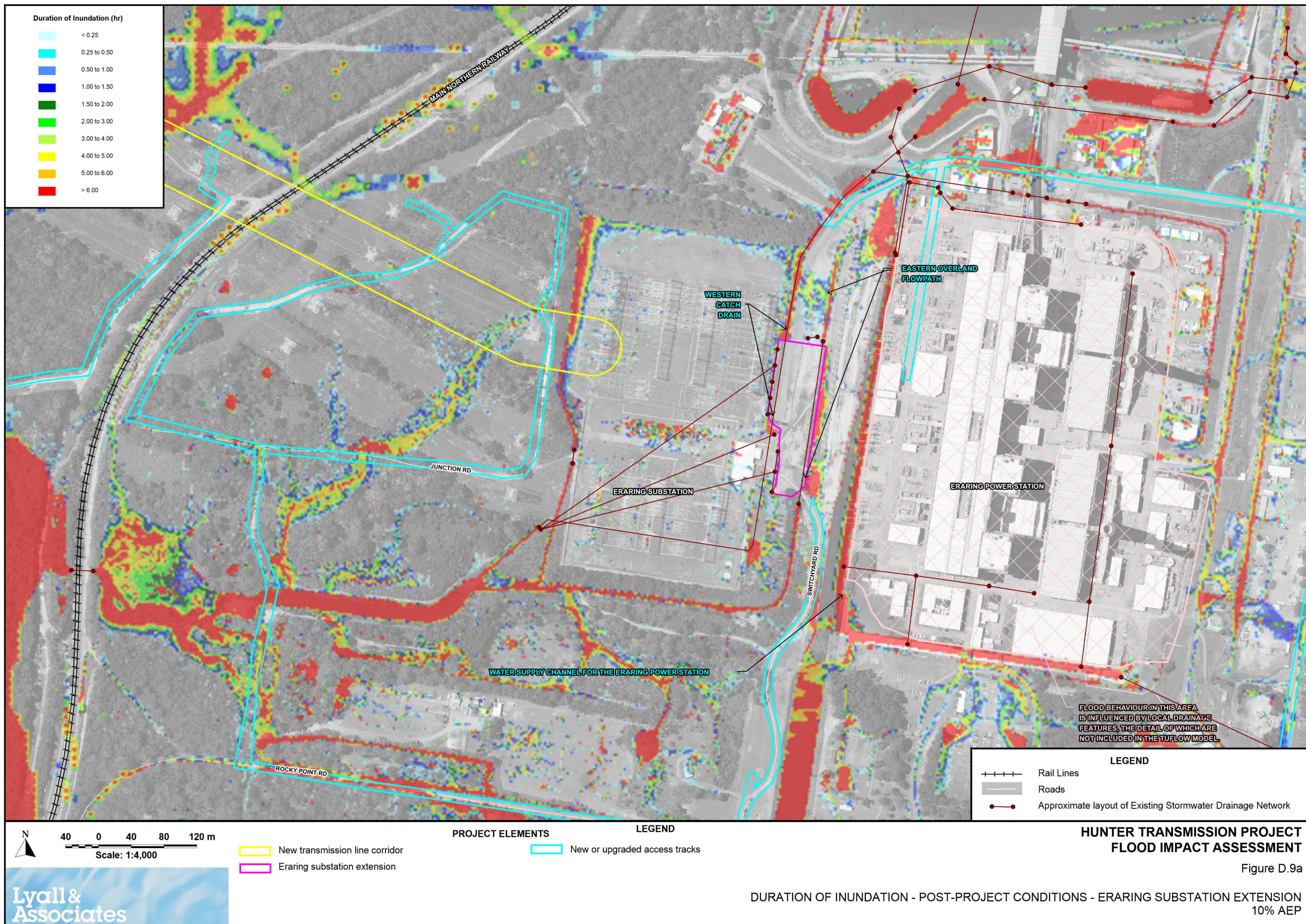


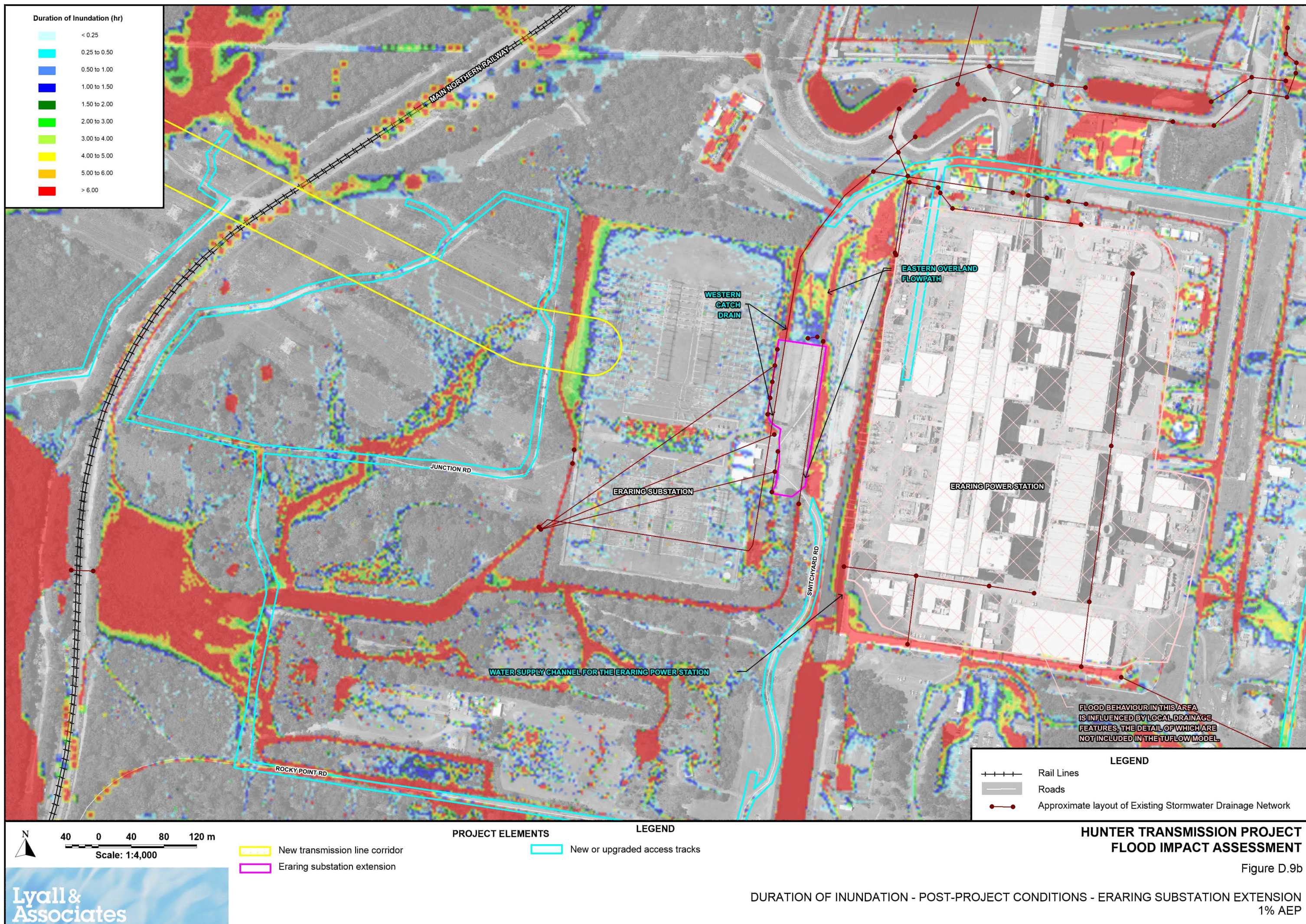


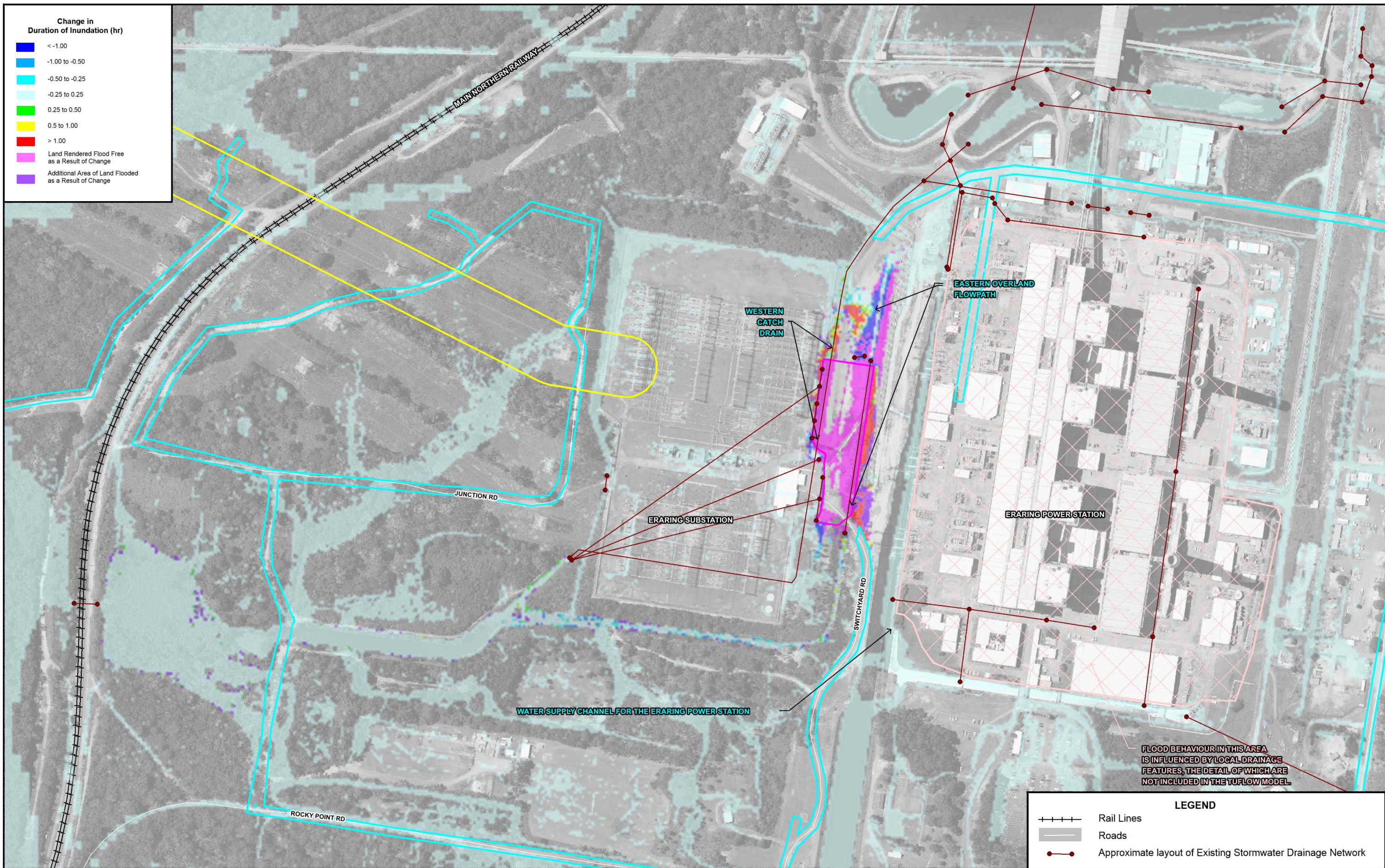


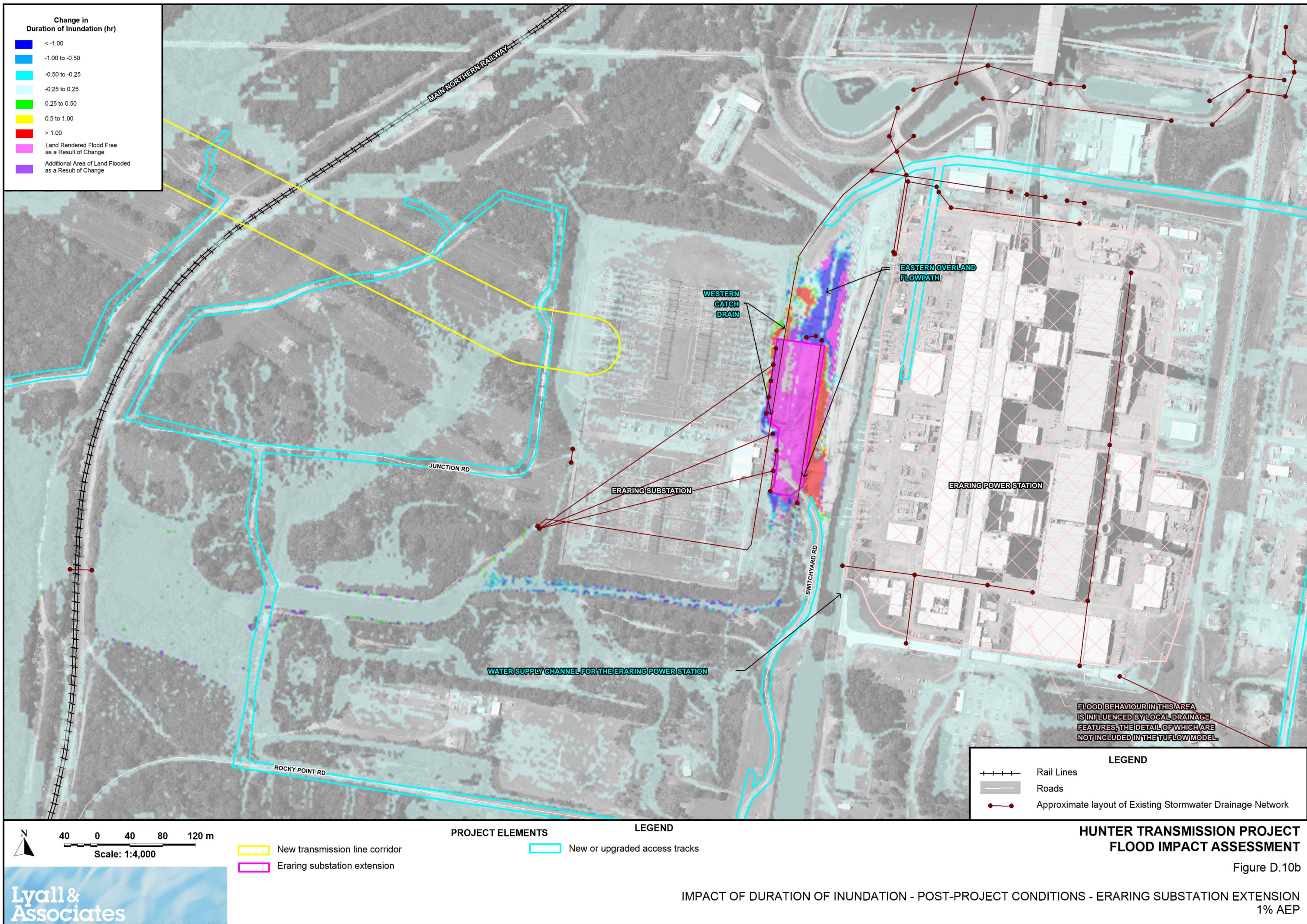






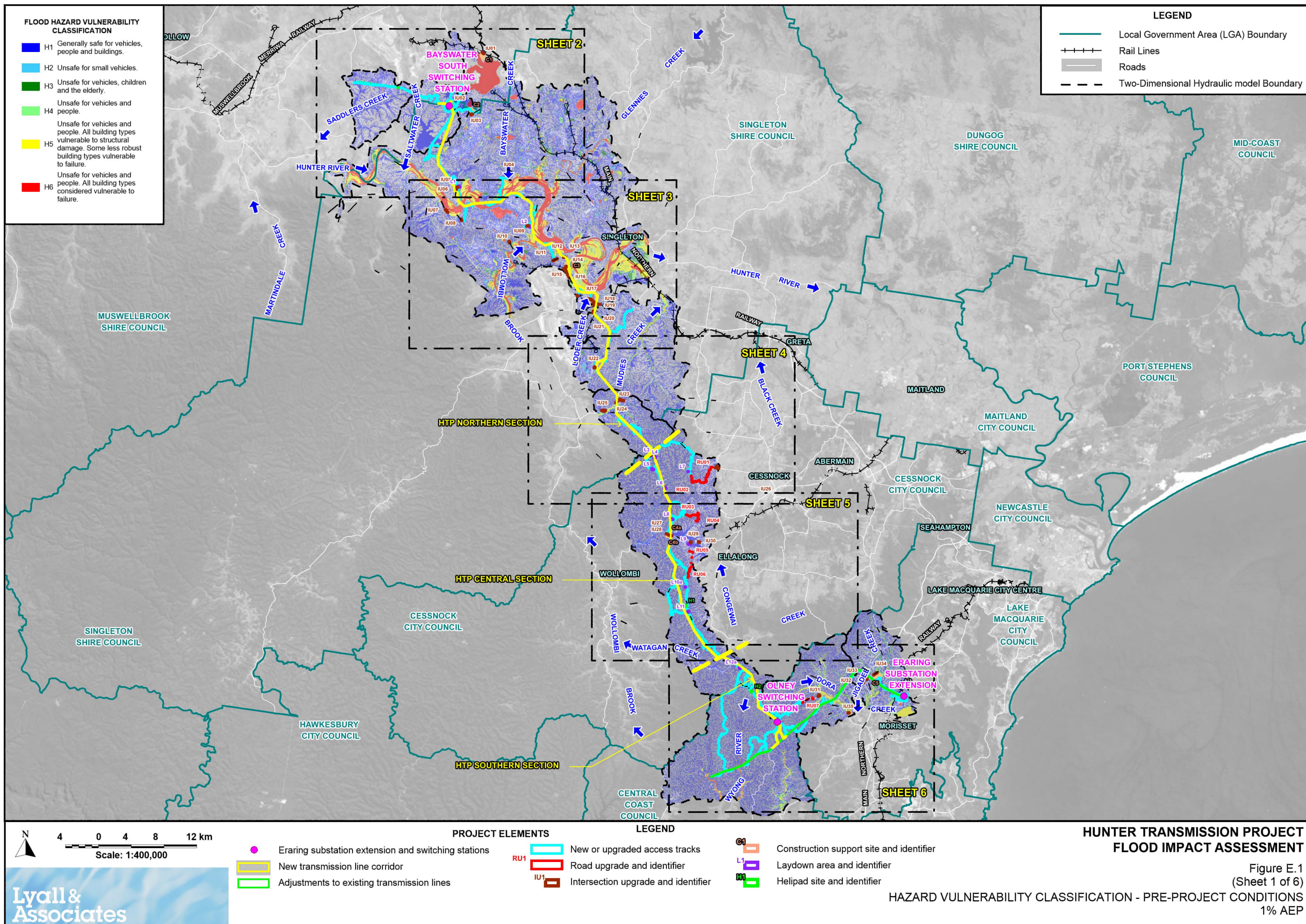


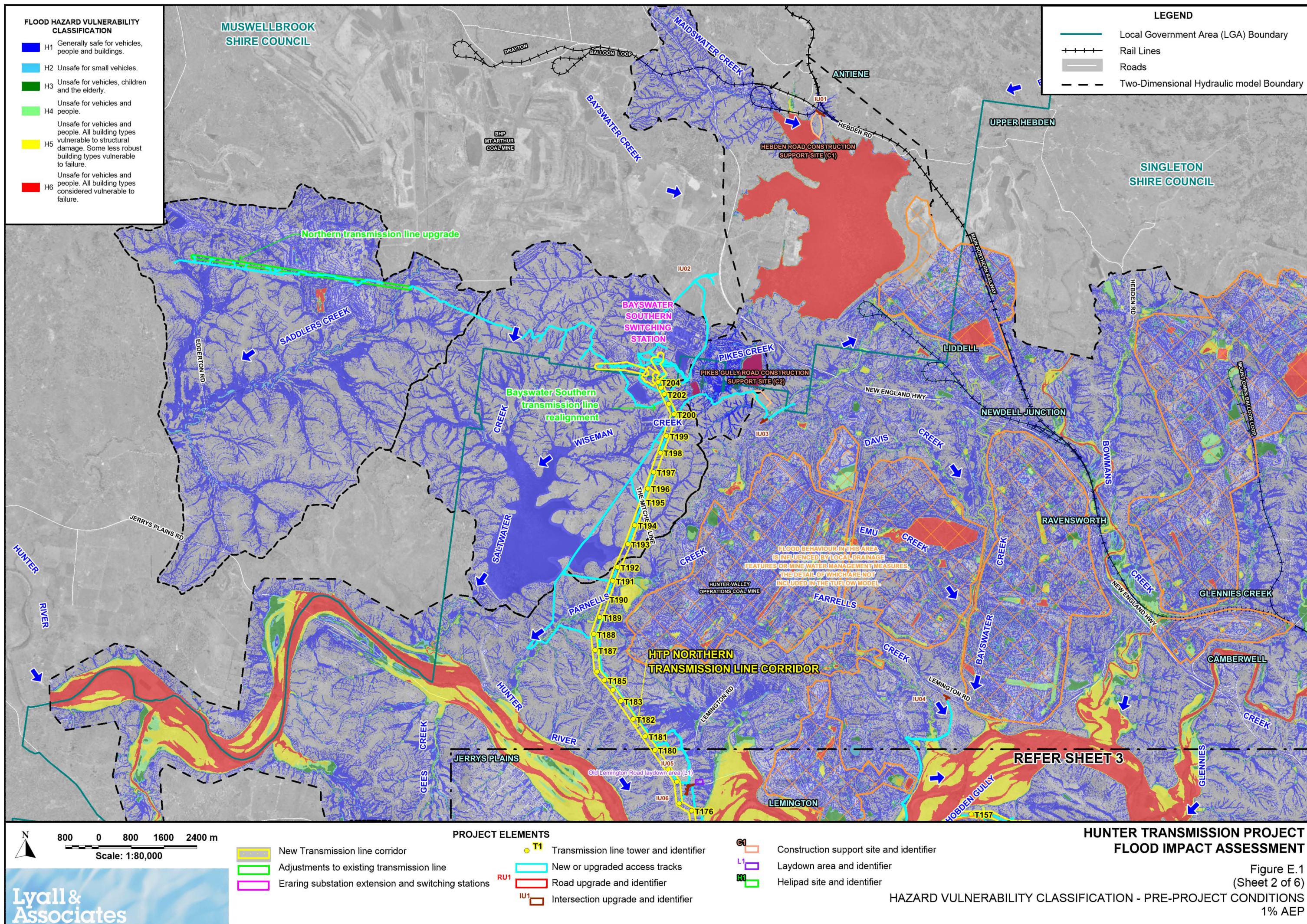


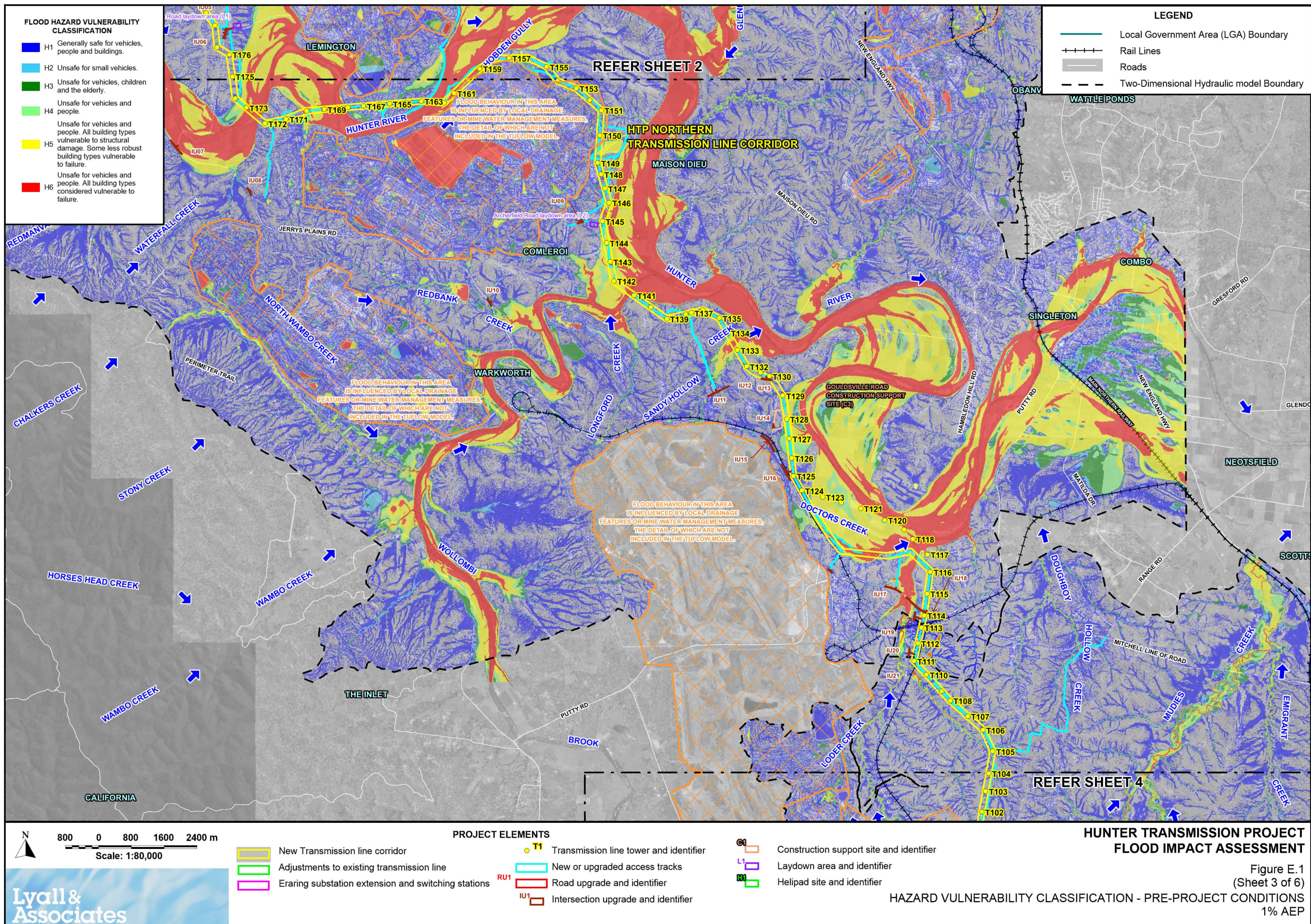


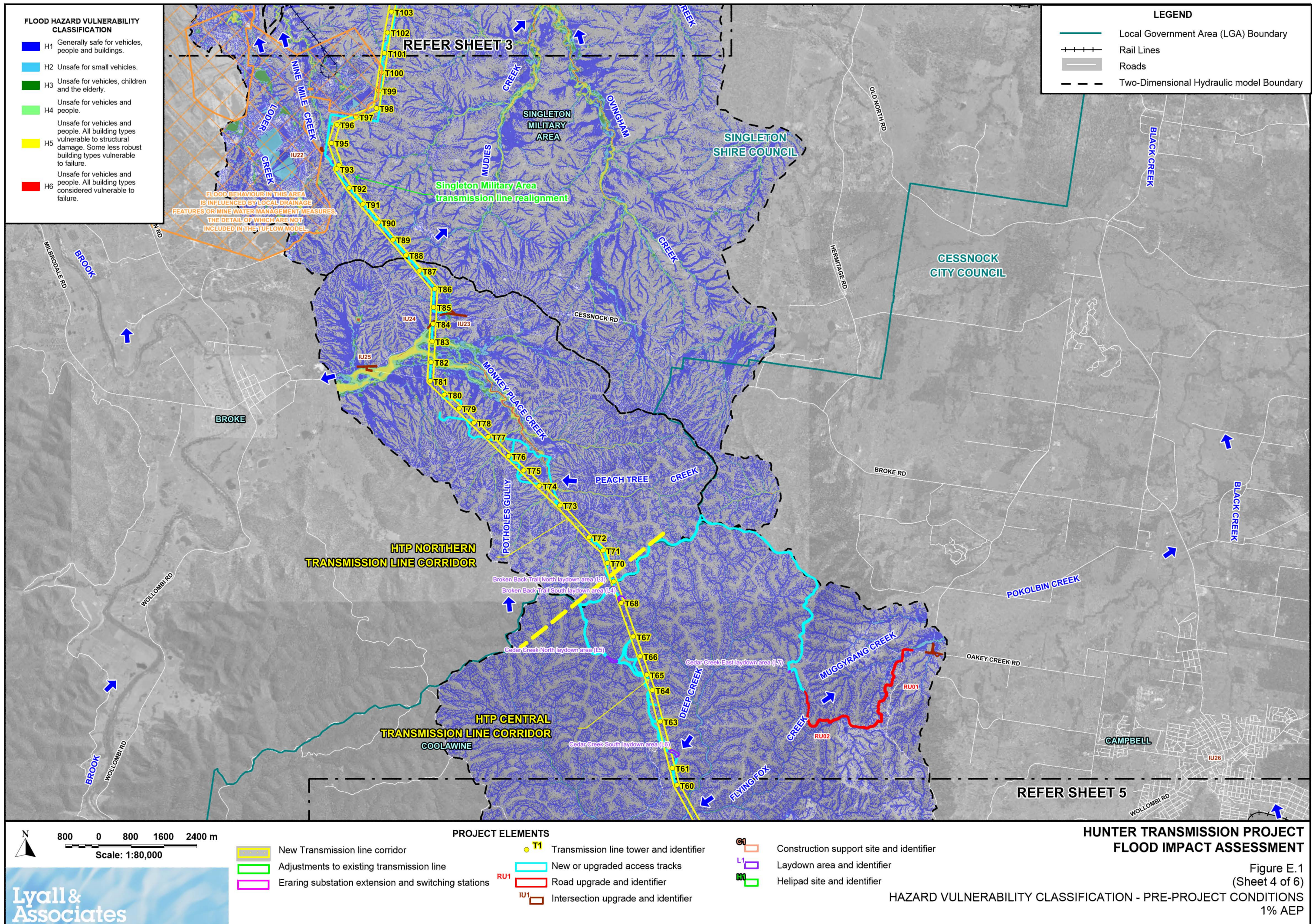
ANNEXURE E

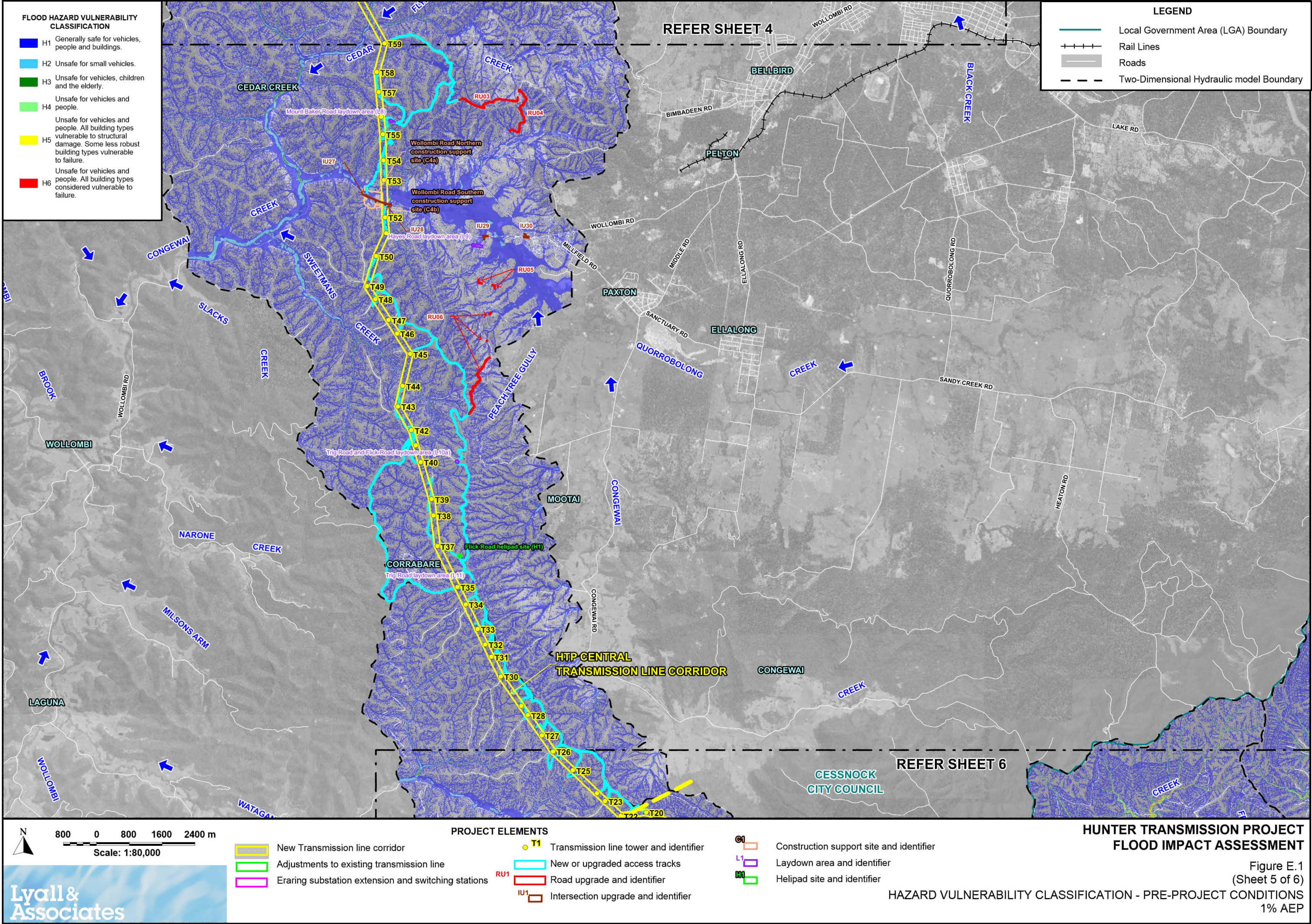
**FIGURES SHOWING THE HAZARD VULNERABILITY CLASSIFICATION AND
HYDRAULIC CATEGORISATION OF FLOODING ALONG THE PROJECT
IMPACT AREA AND IN THE VICINITY OF THE BAYSWATER SOUTH
SWITCHING STATION, OLNEY SWITCHING STATION AND ERARING
SUBSTATION EXTENSION DURING A 1% AEP EVENT**

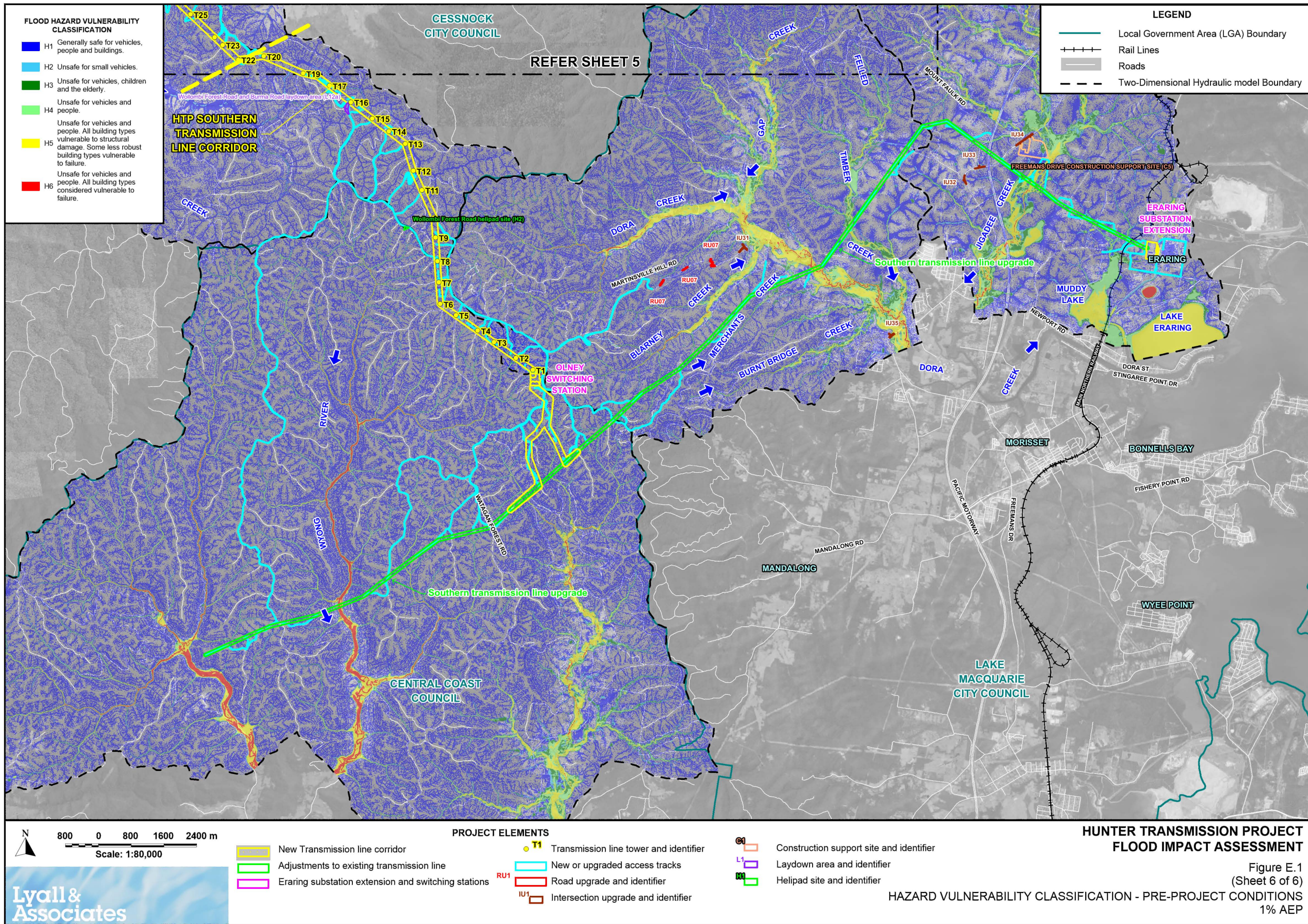


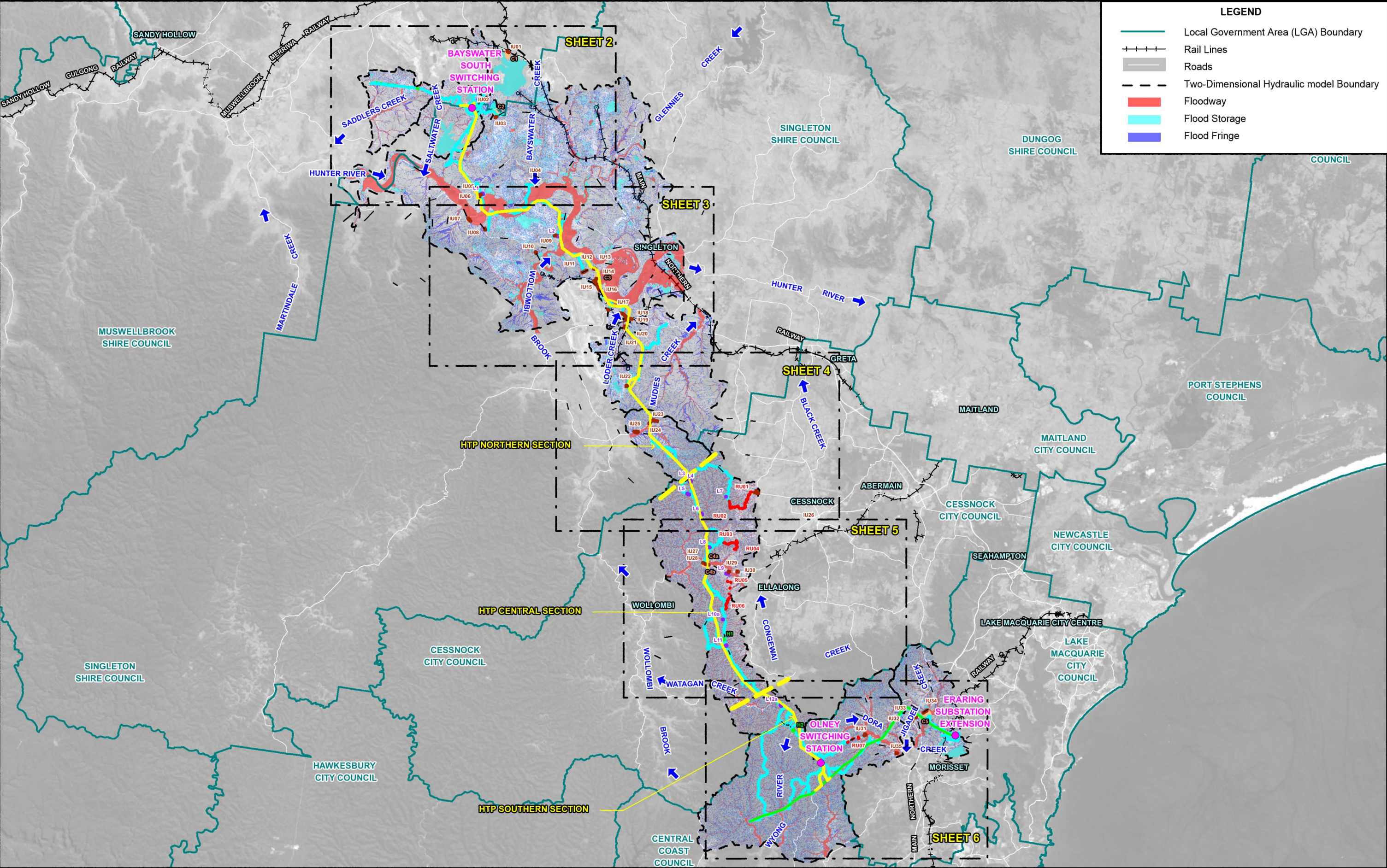












LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads
- Two-Dimensional Hydraulic model Boundary
- Floodway
- Flood Storage
- Flood Fringe

PROJECT ELEMENTS

- Eraring substation extension and switching stations
- New transmission line corridor
- Adjustments to existing transmission lines

LEGEND

- New or upgraded access tracks
- Road upgrade and identifier
- Intersection upgrade and identifier

LEGEND

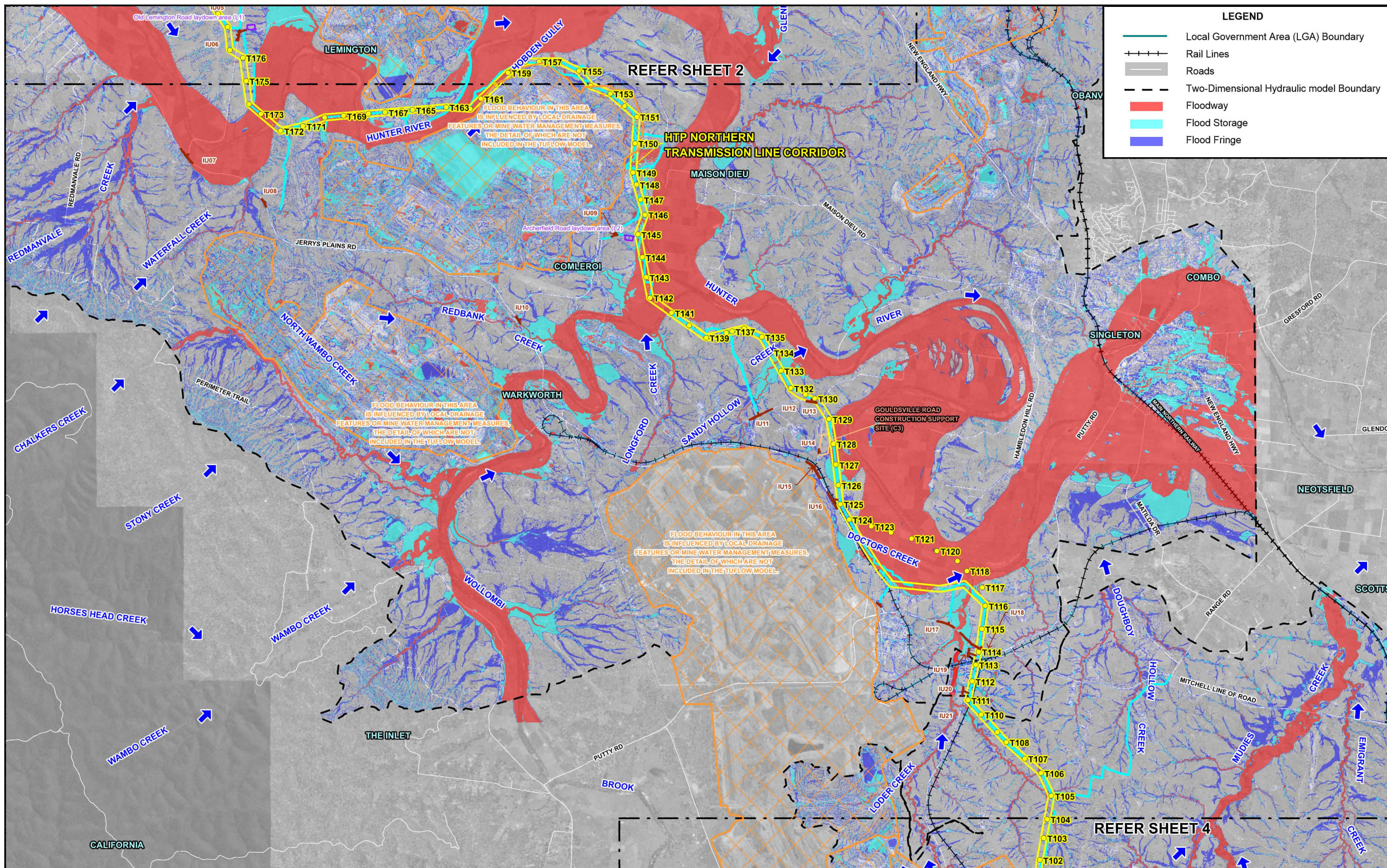
- Construction support site and identifier
- Laydown area and identifier
- Helipad site and identifier

**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure E.2
(Sheet 1 of 6)

HYDRAULIC CATEGORISATION OF FLOODING - PRE-PROJECT CONDITIONS
1% AEP

Lyall & Associates



LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads
- Two-Dimensional Hydraulic model Boundary
- Floodway
- Flood Storage
- Flood Fringe

N

800 0 800 1600 2400 m

Scale: 1:80,000

Lyall & Associates

PROJECT ELEMENTS

- T1 Transmission line tower and identifier
- RU1 Road upgrade and identifier
- IU1 Intersection upgrade and identifier
- C3 Construction support site and identifier
- L1 Laydown area and identifier
- H1 Helipad site and identifier

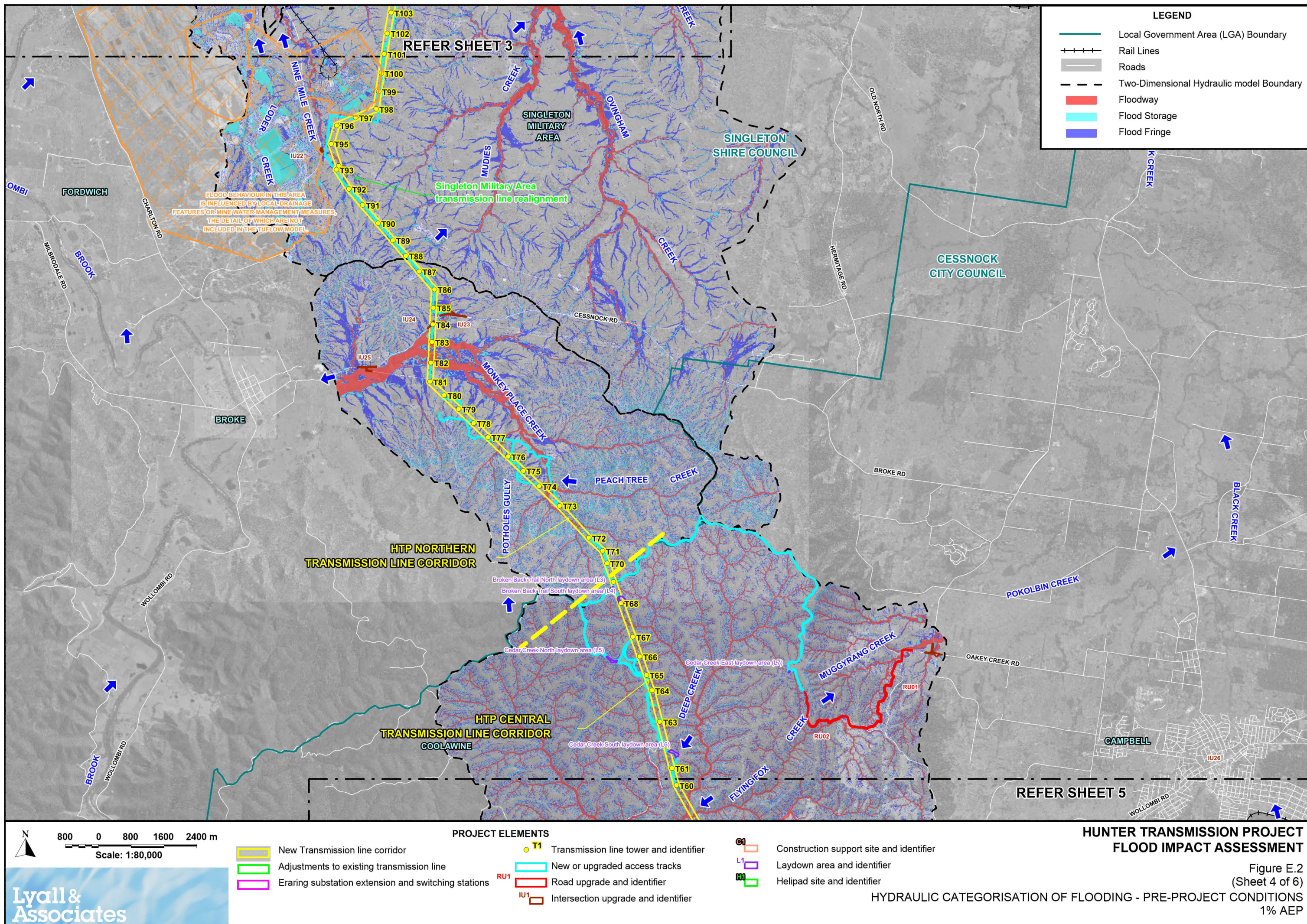
PROJECT ELEMENTS

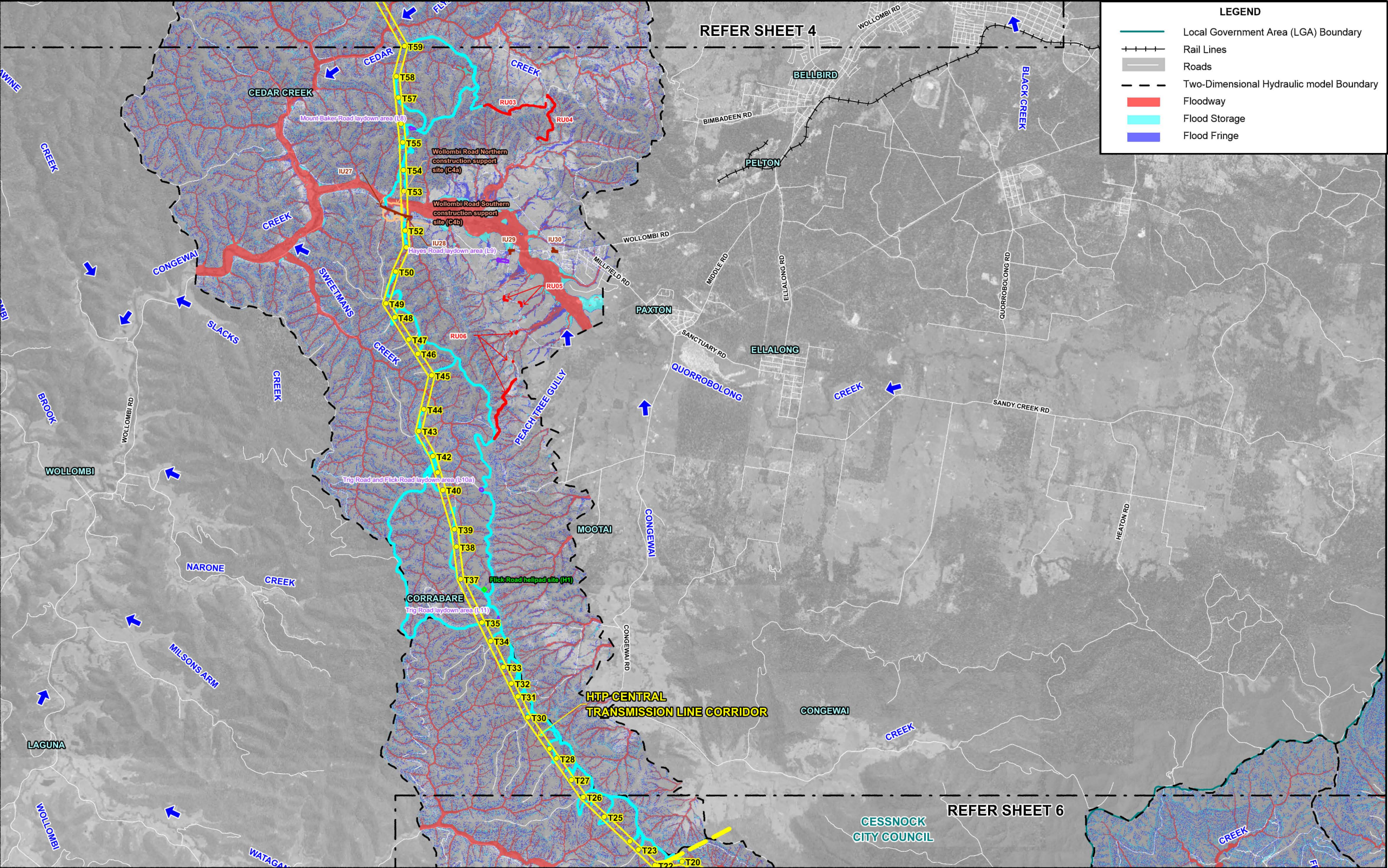
- New Transmission line corridor
- Adjustments to existing transmission line
- Eraring substation extension and switching stations
- New or upgraded access tracks

**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure E.2
(Sheet 3 of 6)

HYDRAULIC CATEGORISATION OF FLOODING - PRE-PROJECT CONDITIONS
1% AEP





800 0 800 1600 2400 m

Scale: 1:80,000

PROJECT ELEMENTS

	New Transmission line corridor		Transmission line tower and identifier		Construction support site and identifier
	Adjustments to existing transmission line		New or upgraded access tracks		Laydown area and identifier
	Eraring substation extension and switching stations		Road upgrade and identifier		Helipad site and identifier
			Intersection upgrade and identifier		

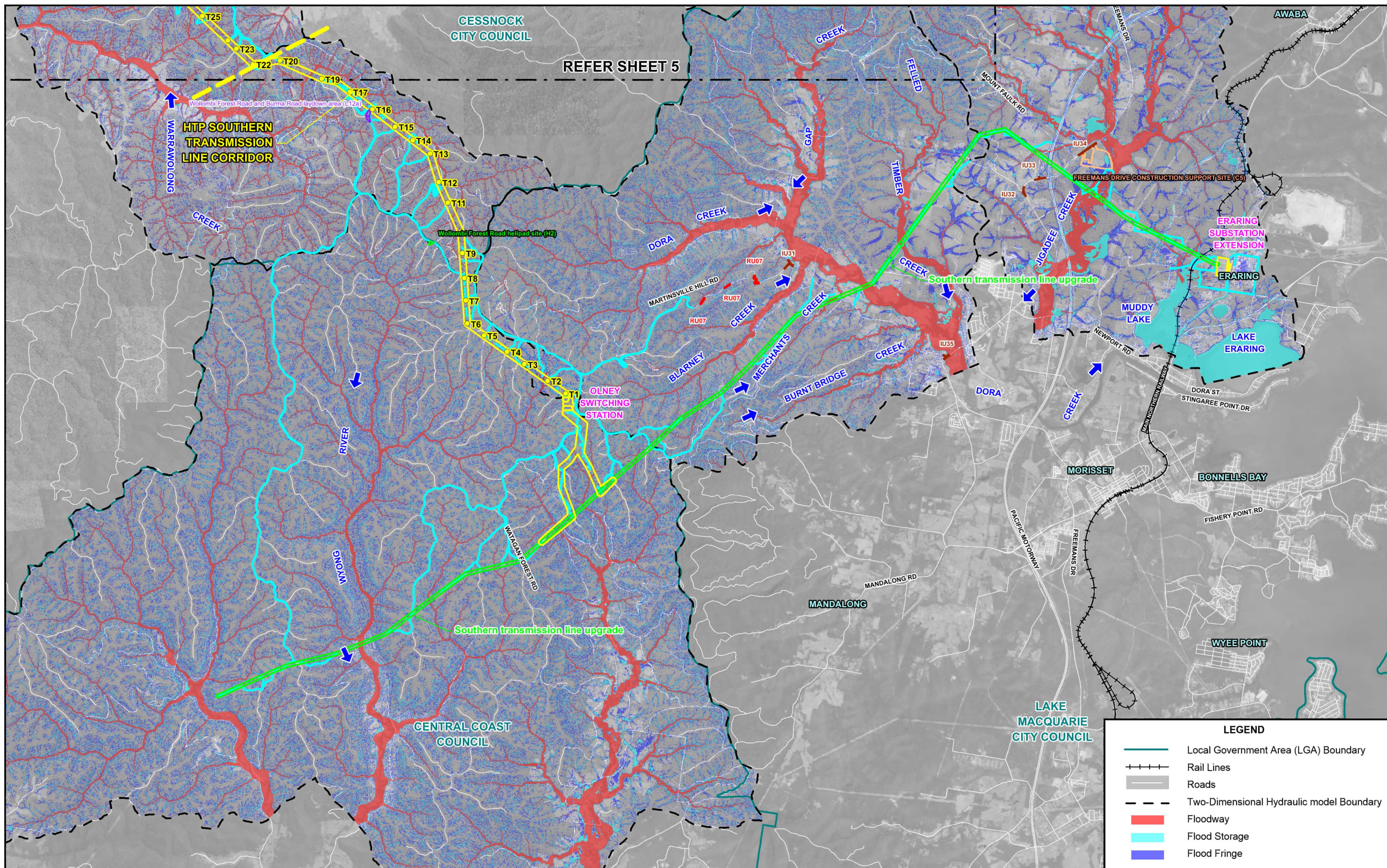
LEGEND

	Local Government Area (LGA) Boundary
	Rail Lines
	Roads
	Two-Dimensional Hydraulic model Boundary
	Floodway
	Flood Storage
	Flood Fringe

**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure E.2
(Sheet 5 of 6)

HYDRAULIC CATEGORISATION OF FLOODING - PRE-PROJECT CONDITIONS
1% AEP



Scale: 1:80,000

800 0 800 1600 2400 m

Legend

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads
- Two-Dimensional Hydraulic model Boundary
- Floodway
- Flood Storage
- Flood Fringe

PROJECT ELEMENTS

- New Transmission line corridor
- Adjustments to existing transmission line
- Eraring substation extension and switching stations
- T1 Transmission line tower and identifier
- New or upgraded access tracks
- RU1 Road upgrade and identifier
- Intersection upgrade and identifier
- Construction support site and identifier
- Laydown area and identifier
- Helipad site and identifier

**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure E.2
(Sheet 6 of 6)

HYDRAULIC CATEGORISATION OF FLOODING - PRE-PROJECT CONDITIONS
1% AEP

Lyall & Associates

CESSNOCK CITY COUNCIL

REFER SHEET 5

WARRAMOLONG

HTP SOUTHERN TRANSMISSION LINE CORRIDOR

Wollombi Forest Road and Burma Road laydown area (L12a)

Wollombi Forest Road/helipad site (H2)

OLNEY SWITCHING STATION

Southern transmission line upgrade

MANDALONG

LAKE MACQUARIE CITY COUNCIL

ERARING SUBSTATION EXTENSION

ERARING

LAKE ERARING

MUDDY LAKE

BONNELLS BAY

WYEE POINT

MANDALONG RD

PACIFIC MOTORWAY

FREEMANS DR

NEWPORT RD

DORA ST

STINGAREE POINT DR

WYONG RIVER

WATGAN FOREST RD

MARTINSVILLE HILL RD

BLARNEY CREEK

MERCHANTS CREEK

BURNT BRIDGE CREEK

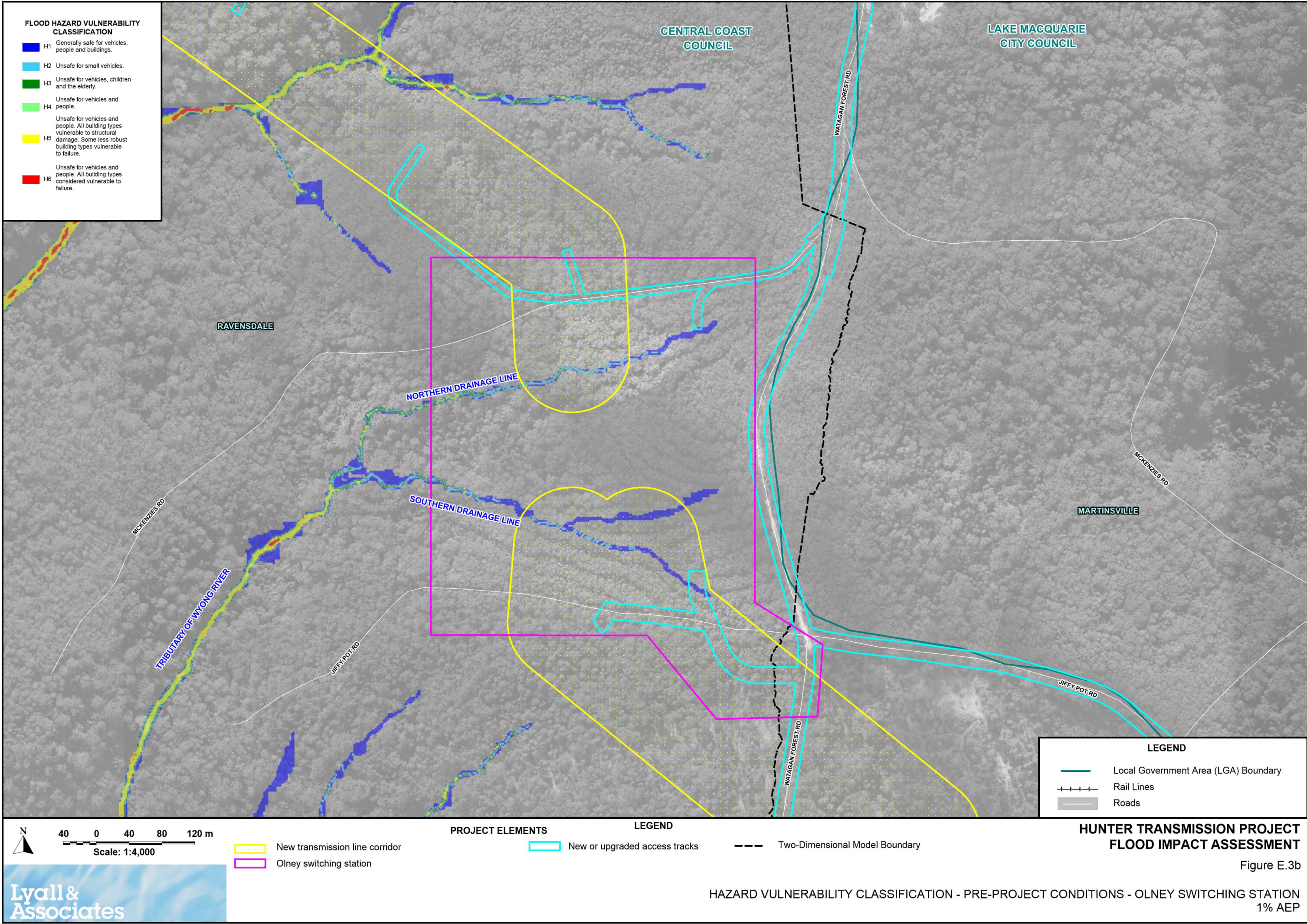
DORA CREEK

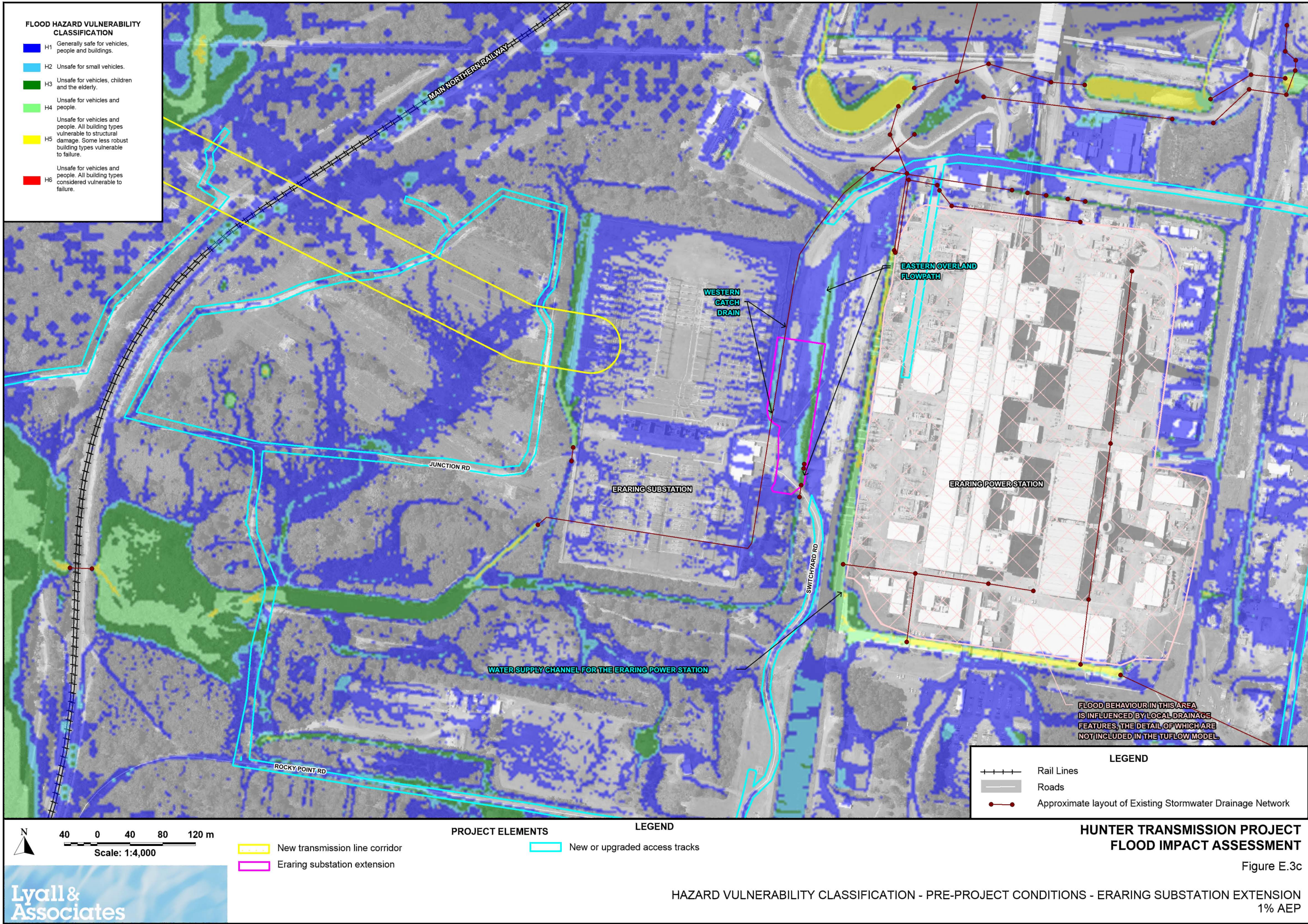
TIMBER CREEK

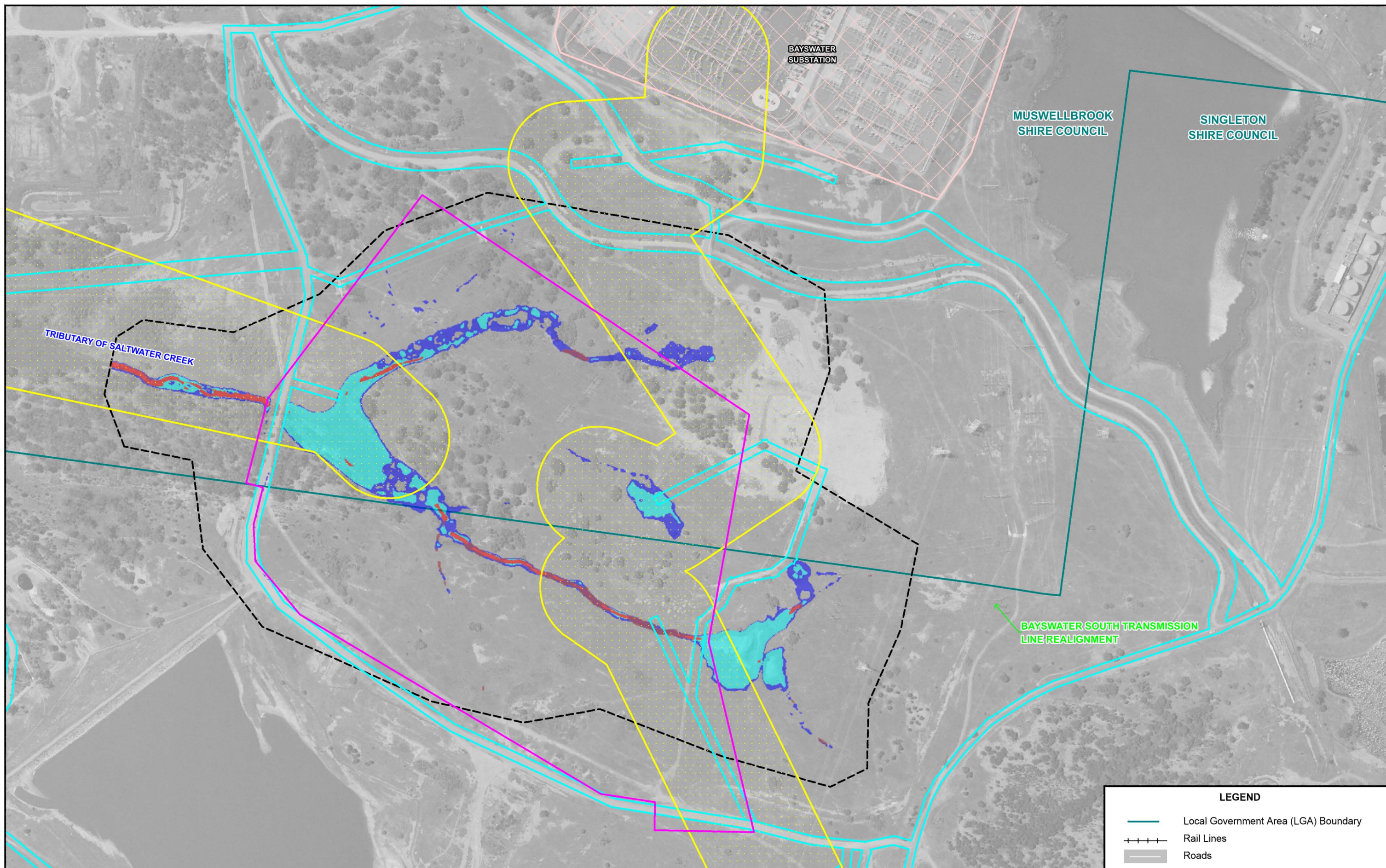
FELIO CREEK

JIGADEE CREEK

LAKE MACQUARIE CITY COUNCIL







LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads

N

40 0 40 80 120 m

Scale: 1:4,000

PROJECT ELEMENTS

- New transmission line corridor
- Bayswater south switching station
- Adjustments to existing transmission line

LEGEND

- New or upgraded access tracks
- Floodway
- Flood Storage
- Flood Fringe

Two-Dimensional Model Boundary

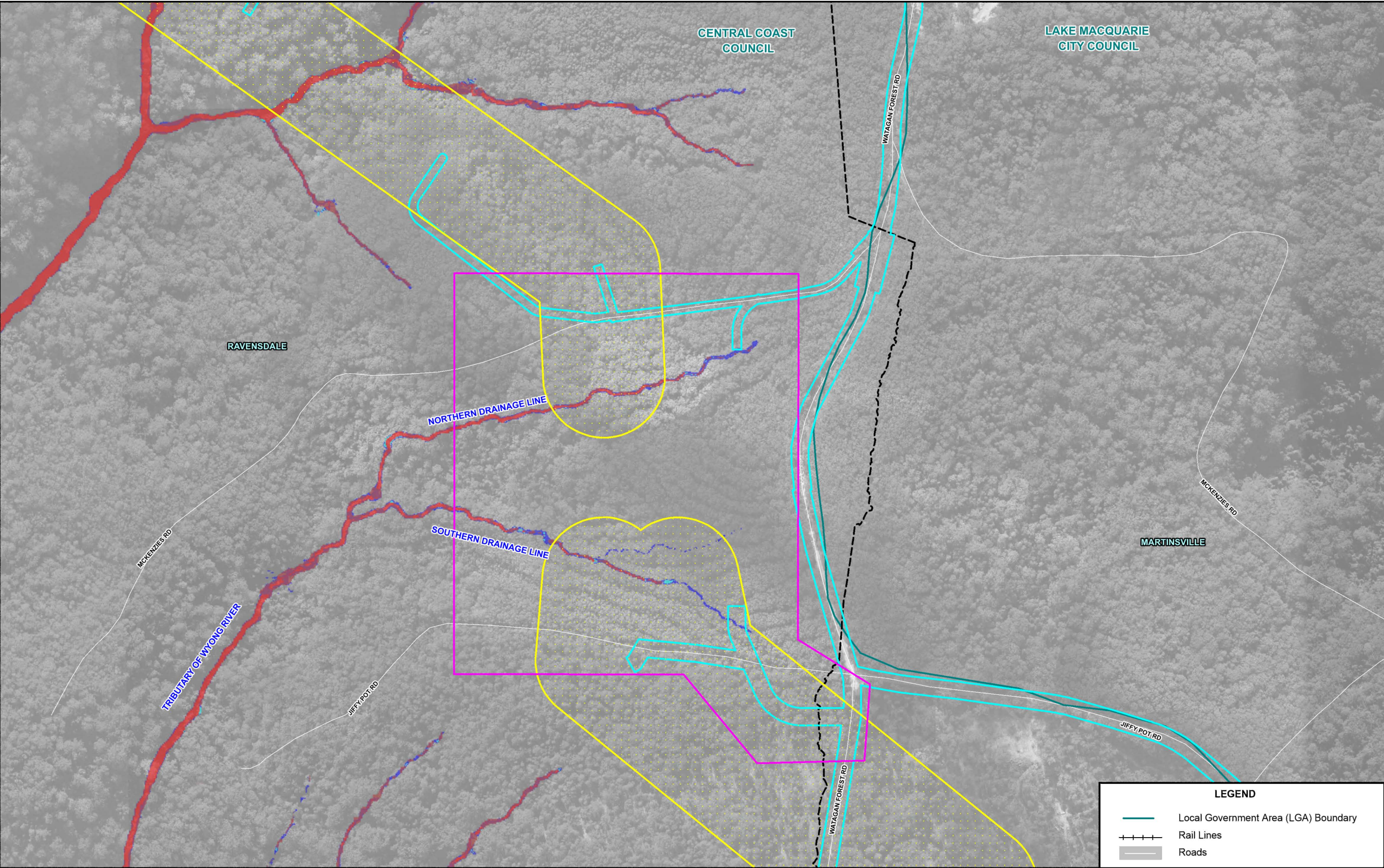
**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure E.3a

HAZARD VULNERABILITY CLASSIFICATION - PRE-PROJECT CONDITIONS - BAYSWATER SOUTH SWITCHING STATION

1% AEP

Lyall & Associates



40 0 40 80 120 m
Scale: 1:4,000

PROJECT ELEMENTS

- New transmission line corridor
- Olney switching station

LEGEND

- New or upgraded access tracks
- Floodway
- Flood Storage
- Flood Fringe

LEGEND

- Two-Dimensional Model Boundary

LEGEND

- Local Government Area (LGA) Boundary
- Rail Lines
- Roads

**HUNTER TRANSMISSION PROJECT
FLOOD IMPACT ASSESSMENT**

Figure E.4b

HYDRAULIC CATEGORISATION OF FLOODING - PRE-PROJECT CONDITIONS - OLNEY SWITCHING STATION
1% AEP

