Grantham Farm Zone Substation

Review of Environmental Factors

Endeavour Energy

19 February 2025

→ **The Power of Commitment**



DRAFT

Proposal name		Grantham Farm Zone Substation REF					
Document title		Grantham Farm Zone Substation | Review of Environmental Factors					
Proposal number		12651988					
File name		12651988_REP-Grantham Farm Zone Substation REF					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S3	A	E. Strauss	M. Purkiss	On File	S. Murphy	On File	13/02/2025
S3	B	E. Strauss	M. Purkiss	On File	S. Murphy	On File	17/02/2025
S3	C	E.Strauss	M Purkiss	On File	S Murphy	On File	19/02/2025
.							

GHD Pty Ltd | ABN 39 008 488 373
GHD Tower, Level 3, 24 Honeysuckle Drive
Newcastle, New South Wales 2300, Australia
T +61 2 4979 9921 | **F** +61 2 9475 0725 | **E** ntlmail@ghd.com | **ghd.com**

© GHD 2025
This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Contents

1. Introduction **1**
- 1.1 Purpose of this report 1
- 1.2 Proponent 2
- 1.3 Scope and limitations 2
- 1.4 Assumptions 2

2. The proposal **6**
- 2.1 Proposal objectives 6
- 2.2 Proposal details 6
  - 2.2.1 Construction summary 6
- 2.3 Location of the proposal 7
- 2.4 Land use and ownership 7
- 2.5 Proposal justification and consideration of alternatives 7
  - 2.5.1 Need for the proposal 7
  - 2.5.2 Proposal alternatives 7
- 2.6 Construction 8
  - 2.6.1 Size of proposed activity footprint 8
  - 2.6.2 Construction compound 8
  - 2.6.3 Machinery and equipment 8
  - 2.6.4 Construction staff 9
  - 2.6.5 Access 9
  - 2.6.6 Construction detail 9
  - 2.6.7 Duration and working hours 10
- 2.7 Operation 10

3. Statutory planning framework **11**
- 3.1 Environmental Planning and Assessment Act 1979 11
- 3.2 Other Commonwealth and State legislation 11

4. Community and agency consultation **15**
- 4.1 Transport and Infrastructure SEPP Consultation 16

5. Environmental assessment **17**
- 5.1 Site inspection 17
- 5.2 Topography, geology and soils 19
  - 5.2.1 Existing environment 19
  - 5.2.2 Potential impacts 20
  - 5.2.3 Mitigation measures 21
- 5.4 Surface water, hydrology and groundwater 23
  - 5.4.1 Existing environment 23
  - 5.4.2 Potential impacts 24
  - 5.4.3 Mitigation measures 25
- 5.5 Biodiversity 26
  - 5.5.1 Existing environment 26
  - 5.5.2 Potential impacts 27
  - 5.5.3 Mitigation measures 27
- 5.6 Aboriginal heritage 28

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5.6.1 Existing environment 28
5.6.2 Potential impacts 28
5.6.3 Mitigation measures 29
5.7 Non-Aboriginal heritage 30
5.7.1 Existing environment 30
5.7.2 Potential impacts 30
5.7.3 Mitigation measures 30
5.8 Traffic and transport 31
5.8.1 Existing environment 31
5.8.2 Potential impacts 31
5.8.3 Mitigation measures 31
5.9 Noise and vibration 32
5.9.1 Methodology 32
5.9.2 Existing environment 33
5.9.3 Potential impacts 33
5.9.4 Mitigation measures 34
5.10 Air quality 35
5.10.1 Existing environment 35
5.10.2 Potential impacts 36
5.10.3 Mitigation measures 37
5.11 Visual amenity 37
5.11.1 Existing environment 37
5.11.2 Potential impacts 37
5.11.3 Mitigation measures 1
5.12 Waste 1
5.12.1 Existing environment 1
5.12.2 Potential impacts 1
5.12.3 Mitigation measures 2
5.13 Light pollution 2
5.13.1 Existing environment 2
5.13.2 Potential impacts 2
5.13.3 Mitigation measures 3
5.14 Asset lifecycle 3
5.14.1 Existing environment 3
5.14.2 Potential impacts 3
5.14.3 Mitigation measures 3
5.15 Socio-economic 4
5.15.1 Existing environment 4
5.15.2 Potential impacts 4
5.15.3 Mitigation measures 5
5.16 Cumulative 5
5.16.1 Existing environment 5
5.16.2 Potential impacts 7
5.16.3 Mitigation measures 7
6. Summary of mitigation measures 8
6.1 Environmental management 8
6.2 Summary of mitigation measures 8
7. Conclusion 13
8. Certification and review 14

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

9. References **15**

Table index

Table 1.1	Proponent details	2
Table 2.1	Proposal timeframes	10
Table 3.1	Other environmental legislation	11
Table 4.2	Clause 2.10 – 2.15 requirements under the Transport and Infrastructure SEPP	16
Table 5.1	Photos taken during the site visit	17
Table 5.2	Topography, geology and soils mitigation measures	21
Table 5.3	Contaminated lands and hazardous materials mitigation measures	23
Table 5.4	Surface water, hydrology and groundwater mitigation measures	25
Table 5.5	Biodiversity mitigation measures	28
Table 5.6	Aboriginal heritage mitigation measures	29
Table 5.7	Non-Aboriginal mitigation measures	30
Table 5.8	Traffic and transport mitigation measures	32
Table 5.9	Noise and vibration mitigation measures	34
Table 5.10	Air quality mitigation measures	37
Table 5.11	Visual amenity mitigation measures	1
Table 5.12	Waste mitigation measures	2
Table 5.13	Light pollution mitigation measures	3
Table 5.14	Asset lifecycle mitigation measures	3
Table 5.15	Socio-economic mitigation measures	5
Table 5.16	Projects within 5 km of the proposal	5
Table 5.17	Blacktown City Council projects within 5 km of the proposal	6
Table 5.18	Cumulative mitigation measures	7
Table 6.1	Summary of mitigation measures	8

Figure index

Figure 1.1	Regional locality	4
Figure 1.2	Proposal layout – Site/roof plan (Source: Grantham Farm Zone Substation – Concept Design August 2024)	5
Figure 5.1	Wind rose data (9:00 am and 3:00 pm) from Prospect Reservoir (Source: (BOM, 2024))	35
Figure 5.2	Artistic render of completed ZS (Brewster Murray, 2024)	39

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Appendices

Appendix A	Concept design
Appendix B	Statutory checklists
Appendix C	EPBC protected matters
Appendix D	BioNet Atlas search results
Appendix E	AHIMS
Appendix F	Community and Stakeholder Engagement Strategy
Appendix G	TfNSW noise calculator
Appendix H	Environmental Noise Impact Assessment (Day Design, 2024)

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Abbreviations

Abbreviation	
Ah	Ampere-hour
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ANO	Authorised Network Operator
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASC	Australian Soil Classification
ASS	Acid Sulfate Soils
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BESS	Battery energy storage system
Biodiversity and Conservation SEPP	*State Environmental Planning Policy (Biodiversity and Conservation) 2021*
Blacktown LEP 2015	*Blacktown Local Environmental Plan 2015*
BTR	Build-to-rent
BSP	Bulk Supply Point
CEMP	Construction Environmental Management Plan
CLM Act	*Crown Land Management Act 2016*
CM Act	*Coastal Management Act 2016*
CSES	Community and Stakeholder Engagement Strategy
CWMP	Construction Water Management Plan
dBA	A-weighted decibels
DC	Direct current
DCCEEW	Department of Climate Change, Energy the Environment and Water
DPHI	Department of Planning, Housing and Infrastructure
DPI	Department of Primary Industries
EIS	Environmental Impact Statement
EMF	Electric and Magnetic Fields
Endeavour	Endeavour Energy
EPA	Environment Protection Authority
EPandA Act	*Environmental Planning and Assessment Act 1979*
EPandA Regulation	*Environmental Planning and Assessment Regulation 2021*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
GDE	Groundwater Dependent Ecosystem
GeoEnviro Consultancy	GeoEnviro Consultancy Pty Ltd
GHD	GHD Pty Ltd

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Abbreviation	
GSG	Greater Soil Group
HBMS	Hazardous building materials survey
Heritage Act	*Heritage Act 1977*
HEVAE	High ecological values aquatic ecosystems
ICNIRP	International Commission on Non-Ionizing Radiation Protection
JBSandG	JBSandG Australia Pty Ltd
KFH	Key Fish Habitat
km	Kilometre
kV	Kilovolts
kVA	Kilovolt amps
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LLS Act	*Local Land Services Act 2013*
m	Metre
m^2	Square metres
m^3	Cubic metres
MNES	Matters of National Environmental Significance
MVA	Megavolt-amperes
NPW Act	*National Parks and Wildlife Act 1974*
OoWH	Out of Work Hours
OSOM	Over-size, over-mass
PCT	Plant Community Type
PMST	Protected Matters Search Tool
POEO Act	*Protection of the Environment Operations Act 1997*
Precincts SEPP	*State Environmental Planning Policy (Precincts – Central River City) 2021*
RAP	Remedial Action Plan
REF	Review of Environmental Factors
Resilience and Hazards SEPP	*State Environmental Planning Policy (Resilience and Hazards) 2021*
SCADA	Supervisory Control and Data Acquisition
SER	Summary Environmental Report
SES	State Emergency Service
SF6	Sulphur hexafluoride
SIS	Species Impact Statement
SPL	Sound power level
SSD	State Significant Development
SSI	State Significant Infrastructure
TEC	Threatened Ecological Community
TfNSW	Transport for NSW
The Code	*NSW Code of Practice for Authorised Network Operators*

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Abbreviation	
TMP	Traffic Management Plan
Transport and Infrastructure SEPP	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
U_r	Regulated Voltage
VDC	voltage direct current
VMP	Vegetation Management Plan
WM Act	*Water Management Act 2000*
WSP	Water Sharing Plan
ZS	Zone Substation

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

1. Introduction

Endeavour Energy (Endeavour) has engaged GHD Pty Ltd (GHD) to prepare a Review of Environmental Factors (REF) for a proposed new Zone Substation (ZS) (the proposal). The proposal is located at 265 Garfield Road East, Grantham Farm (Riverstone) within Lot 99 DP 1282712 (the proposal site).

The proposed ZS would form part of the electricity distribution system to manage the growing electricity demand associated with a new land development known as Riverstone Precinct within the Blacktown Local Government Area (LGA).

The regional locality for the proposal is shown in Figure 1.1. The proposal layout is shown in Figure 1.2 Figure 1.2 and is based on the Grantham Farm Zone Substation – Concept Design prepared by Brewster Murray Architects dated August 2024, see Appendix A (Brewster Murray, 2024).

The demolition of the existing structure within the proposal site, tree removal and remediation works is not included in this REF and have been assessed separately in a Summary Environmental Report (SER) prepared by Endeavour (Endeavour Energy, 2024).

Endeavour is an Authorised Network Operator (ANO) under the *Electricity Network Assets (Authorised Transactions) Act 2015*. Endeavour is also a prescribed determining authority under:

– Section 5.6 of the *Environmental Planning and Assessment Act 1979* (EPandA Act)
– Clause 3(3) and Schedule 1(4) of the *Environmental Planning and Assessment Regulation 2021* (EPandA Regulation)

For development for the purposes of an electricity transmission or distribution network that is permitted without consent and is operated or to be operated by the ANO. Accordingly, Endeavour is the proponent and determining authority for the proposal.

1.1 Purpose of this report

This REF has been prepared by GHD on behalf of Endeavour. The environmental assessment and determination of the proposal has been undertaken in accordance with Part 5 of the EPandA Act. For this proposal, Endeavour is both the public authority proponent and the determining authority.

The description of the proposal and assessment of associated environmental impacts has been undertaken in the context of:

– Clause 171 of the EPandA Regulation
– *Guidelines for Division 5.1 assessments* (DPE, 2022)
– NSW *Biodiversity Conservation Act 2016* (BC Act)
– NSW *Fisheries Management Act 1994* (FM Act)
– The Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
– *State Environmental Planning Policy (Transport and Infrastructure) 2021*

The purpose of the REF is to describe the proposal, document the likely impacts of the proposal on the environment, and detail mitigation and management measures to be implemented. In doing so, the REF helps to fulfill the requirements of Section 5.5 of the EPandA Act, including that Endeavour examine and consider to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

– Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an Environmental Impact Statement (EIS) to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EPandA Act.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

– The significance of any impact on threatened species as defined by the BC Act and/or FM Act, as required under Section 1.7 of the EPandA Act, and therefore the requirement for a Species Impact Statement (SIS) or a Biodiversity Development Assessment Report (BDAR).
– The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured.
– The potential for the proposal to significantly impact any other Matters of National Environmental Significance (MNES) or Commonwealth land and the need to make a referral to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

1.2 Proponent

Table 1.1 below outlines the proponent contact details.

Table 1.1 Proponent details

Proposal Name	Grantham Farm Zone Substation
Proponent Name	Endeavour Energy
Client representative	Faith Ijeyan
Contact Details	Faith.Ijeyan@endeavourenergy.com.au

1.3 Scope and limitations

This report has been prepared by GHD for Endeavour Energy and may only be used and relied on by Endeavour Energy for the purpose agreed between GHD and Endeavour Energy as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Endeavour Energy arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer to Section 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.4 Assumptions

Assumptions made by GHD when preparing this REF include (but are not limited to):

– The proposal has been assessed based on information provided by Endeavour including:
    - A Concept Design prepared by Brewster Murray Architects (Brewster Murray, 2024), and the Overhead Connection (OH) Line Connection Preliminary Drawings prepared by Endeavor Energy (Endeavour Energy 2024), see Appendix A.
    - An Environmental Noise Impact Assessment prepared by Day Design Pty Ltd has been used to inform the operational noise assessment in this REF (Day Design, 2024), see Appendix H.
    - A Geotechnical Investigation was undertaken for the proposal site by GeoEnviro Consultancy Pty Ltd in 2022. Findings from this investigation have been incorporated into this REF (GeoEnviro Consultancy, 2022).
– The proposal is limited to the works described in Section 2.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

– The proposal has been assessed assuming the implementation of the safeguards and mitigation measures detailed in Section 4.1 of this report.

The following definitions are used throughout the REF:

– ‘Proposal’ refers to the proposed ZS, as described in Section 2.
– ‘Proposal site’ is defined as Lot 99 DP 1282712, 265 Garfield Road East, Grantham Farm (Riverstone).
– ‘Study area’ describes the area that could be indirectly impacted by the proposal and is the subject of relevant database searches (200 metres (m) unless otherwise stated).

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.



Data Disclaimer

Whilst every care has been taken to prepare this map, GHD makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Paper Size ISO A4

0 10 20 30 40

Metres

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

N

GHD

Endeavour Energy
Grantham Farm Zone Substation
Review of Environmental Factors

Project No. **12651988**
Revision No. **A**
Date **08/01/2025**

Regional locality

FIGURE 1.1

N:\AU\Newcastle\Projects\22\12651988\GIS\Maps\Deliverables\12651988_REF.aprx
Print date: 08 Jan 2025 - 12:51

Data source: LPI: DTDB / DCDB, 2024; Nearmap: Aerial Imagery, extracted 20250108HillShade: Nearmap WMS Server: . Created by: fmackay

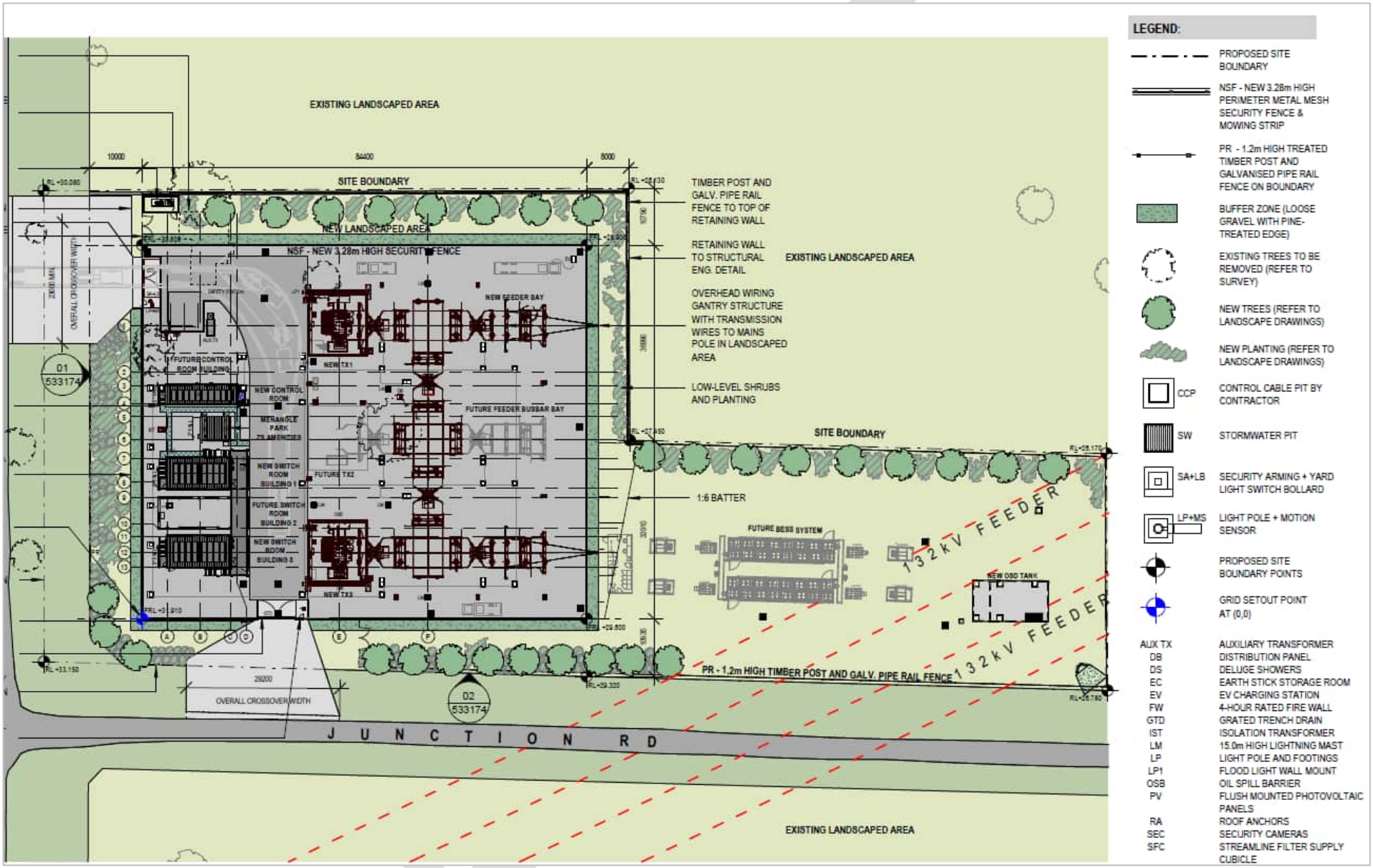


Figure 1.2 Proposal layout – Site/roof plan (Source: Grantham Farm Zone Substation – Concept Design August 2024)

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

2. The proposal

2.1 Proposal objectives

The proposal is located within Blacktown LGA which is currently experiencing population growth and an increase in local residential development.

The Riverstone Precinct is located west of the proposal site. This staged land development, completed in 2024 by Landcom (Landcom, 2024), has resulted in the construction of 300 new properties.

Fairwood Rise Rouse Hill is located south of the proposal site. This residential development is currently being constructed in stages, with Stage 1C yet to be completed. The current masterplan (Fairwood Rise Rouse Hill, 2025) for this development shows an estimated total of 250 residential properties. Stage 1C is located approximately 130 m southeast of the proposal.

To support the anticipated population growth associated with these residential developments, improved infrastructure and service provision is required. The proposal would support this objective by improving security of electricity supply and increasing reliability.

The objectives of the proposal are therefore to:

– Provide reliable electricity for the Riverstone East and Schofields development area, which will include approximately 20,000 new residential dwellings by 2044 (Endeavour Energy, 2024).
– Support future economic and population growth in Blacktown LGA.

2.2 Proposal details

2.2.1 Construction summary

The proposal includes the following:

– Construction of a new 132/11 kilovolt (kV) zone substation with two 45 megavolt-amperes (MVA) transformers including transformers bay equipment and middle feeder bay equipment.
– Installation of new 11 kV switchgear, and associated equipment.
– Installation of relocated prefabricated switch room buildings and one control room from Menangle Park, solar panels and battery system for the buildings.
– Installation of a new auxiliary padmount transformer and feeder conduits/ducts for 132 kV and 11 kV feeder and control cable conduits.
– Installation of earthing, protection, fire management, security and communications systems.
– Installation of six new steel poles within the boundary of the site.
– Construction of all related site-works including stormwater drainage, driveway pavements, gravel yard surfacing and security fencing and landscaping.
– Establishing new feeder and associated communication connections to the two existing overhead 132 kV feeders within the site boundary.

Consultation was undertaken with TfNSW for the proposed widening of the existing access driveway from Garfield Road East. TfNSW has provided design drawings and will continue to provide additional design information to Endeavour for the road cross section and road level. A notification was also sent to TfNSW on 12 February 2025 as per Endeavour Energy Consultation Protocol for REF. A follow-up email was sent to the Greater Sydney Roads Mailbox on 13 February 2025. The project team will continue to consult with TfNSW on the proposal.

The proposal layout is provided in Figure 1.2 and Appendix A (Brewster Murray, 2024).

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

2.3 Location of the proposal

The proposal is located at 265 Garfield Road East, Grantham Farm (Riverstone), NSW within Lot 99 DP1282712, see Figure 1.2.

The proposal site is located within the Blacktown LGA and is subject to the provisions of the *Blacktown Local Environmental Plan 2015* (Blacktown LEP 2015).

2.4 Land use and ownership

The land is owned by Endeavour. The proposal site is not mapped as Crown land. No land acquisition is required for the proposal.

2.5 Proposal justification and consideration of alternatives

2.5.1 Need for the proposal

The proposal would support the reliable provision of energy to the Blacktown LGA and surrounding areas. Local developments such as Fairwood Rise Rouse Hill and the Riverstone Precinct have led to an increase in the local population which is associated with the need for improved electricity provision. The proposed ZS is required to meet these growing energy demands.

2.5.2 Proposal alternatives

If network augmentation is not undertaken, there will be a significant increase in expected unserved energy over the next two decades as demand in the Riverstone East and Schofields development area increases.

2.5.2.1 Do nothing

The 'do nothing' option is not acceptable to Endeavour or the community because without the proposal, the increasing energy needs of Riverstone Precinct, Fairwood Rise Rouse Hill and surrounding areas would not be met. Without a secure, reliable energy supply, future development and population growth would not be adequately serviced.

2.5.2.2 Transformers

The following transformer options were considered by Endeavour to assess which transformer would have the lowest associated noise impacts:

– Option 1 – At 105% Regulated Voltage (U_r) No-Load with cooling for maximum rating (sound power level (SPL) of 71 A-weighted decibels (dBA)).
– Option 2 – At 105% U_r No-Load with cooling for maximum rating (SPL of 63 dBA).
– Option 3 – At 105% Ur No-Load and 2/3 rated load with cooling configuration for 2/3 rated load (SPL of 63 dBA).

Based on the outcomes of the Environmental Noise Impact Assessment undertaken to assess the operational noise impacts of the proposal (Day Design, 2024), see Appendix H, the preferred transformer is required to operate at a maximum level of 80 dBA at 66% load (approximately 73 dBA at no load).

2.5.2.3 Preferred option

The preferred option is to undertake the proposed construction of the ZS as described in Section 2.6.

The proposal site has been selected based on the following criteria:

– The new ZS must be located within the Riverstone East and Schofields Development Area to ensure future development supply is met and has minimal disturbance to existing infrastructure (e.g. road).

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

– Sufficient distance needs to be maintained between the existing Riverstone ZS and Schofields ZS to maintain stable energy supply.
– Approximately 1 hectare of land is required to accommodate the equipment.

2.6 Construction

2.6.1 Size of proposed activity footprint

The footprint of the proposal is shown in Figure 1.2.

The proposal site is confined to Lot 99 DP1282712 and the total footprint for the works would be approximately 14,200 square metres (m^2).

2.6.2 Construction compound

The exact location of the compound would be determined by the contractor and would be dependent on the order in which works are undertaken. The construction compound would be confined to Lot 99 DP1282712.

The compound is likely to consist of the following:

– Site shed
– Equipment laydown area
– Waste receptacles
– Storage areas for stockpiles and construct materials
– Sediment basin
– Carpark

The compound areas would not be established under the dripline of any existing trees. Refuelling, fuel decanting and vehicle maintenance work, if required, would take place in a designated sealed and bunded area within the construction compound areas or offsite.

2.6.3 Machinery and equipment

The proposal would require a range of construction plant and equipment. The following is an indicative list of equipment that would be required for the proposal:

– General work vehicles
– Excavators
– Vacuum truck
– Concrete and concrete trucks
– Concrete saw
– Cranes
– Forklift
– Hiab truck
– Elevated work platforms
– Trucks
– General hand tools (powered and unpowered)
– Pumps
– Oil storage and pumping plant
– Imported fill and aggregate
– Erosion and sediment controls

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

2.6.4 Construction staff

The proposal would require up to 50 full time/part time staff during peak construction. This number would change over the course of construction.

2.6.5 Access

The proposal is directly accessible from Garfield Road East, a two-way, sealed and marked road. Garfield Road East has an intersection with Windsor Road (A2) approximately 1.3 kilometres (km) northeast of the proposal site. Windsor Road can be used to access the proposal site from Paramatta, located approximately 20 km southeast of the proposal site.

Both Garfield Road East and Windsor Road are approved Transport for NSW (TfNSW) 19 m B-double routes (over 50 tonnes) (TfNSW, 2024).

Access to the site during construction will be via Junction Road until the site access is established on Garfield Road.

2.6.6 Construction detail

Works would be undertaken in the following manner as stated in Appendix A and in accordance with a Construction Environmental Management Plan (CEMP):

- Implement traffic control.
- Establish erosion and sediment control measures to redirect surface water around the area of works and prevent sediment leaving the site in accordance with the relevant section of the 'blue book' - *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).
- Undertake vegetation clearing, confined to the proposal site.
- Construction of the ZS including construction of:
  - 132/11 kV ZS with two 45 MVA transformers.
  - 132 kV outdoor equipment.
  - 11 kV switchgear with four sections of 11 kV busbar.
  - Existing prefabricated amenities building (to be decommissioned from Menangle Park Zone Substation).
  - Transformer, transformer bay equipment and middle feeder bay equipment.
  - 132 kV feeder conduits/ducts, transformer 11 kV cable conduits/ducts and control cable conduits.
  - 11 kV/415 volt (V) 315 kilovolt amps (kVA) auxiliary transformer padmount for the zone substation.
  - Two 110V DC 300 ampere-hours (Ah) at 10-hour rate battery systems, with a 110 voltage direct current (VDC) to 48VDC DC/DC converter.
  - Two 132 kV feeders and associated communications connections to Grantham Farm ZS from Vineyard Bulk Supply Point (BSP) and Rouse Hill Substation on Feeder 9JA.
  - Six new poles.
  - New INVAR conductor.
- Construction of ancillary features such as:
  - Earthing system.
  - Lightning protection and insulation.
  - Supervisory Control and Data Acquisition (SCADA) and communications systems.
  - Signage and labelling.
  - Security lighting and flood light wall mounts.
  - Site stormwater and drainage system.
  - Security fencing comprised of timber posts and metal mesh fencing.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

- Gravel yard surfacing.

– Construction of the control room and switch rooms, including installation and connection of:
  - Air-conditioning.
  - Solar panels.
  - Radio and antenna in the control room.
  - Fibre termination panel and two 144-port racks.
  - Fire management system.
  - Security system.
  - Deluge shower.
– Landscaping, including:
  - Planting of vegetation around the perimeter of the ZS to provide screening, see Section 5.3.
– Removal of erosion and sediment controls.
– Demobilize from site.

2.6.7 Duration and working hours

The proposal would be completed as outlined in Table 2.1.

Table 2.1 Proposal timeframes

Commencement Date	The estimated commencement date is June/July 2025.
Work Duration	The total timeframe of the proposal would be 24 months which includes 12 months of construction and a further 12 months of commissioning.
Work Hours	Works would take place during standard construction hours (7.00 am to 6.00 pm Monday to Friday and 8:00 am to 1:00 pm on Saturdays) unless otherwise approved by Endeavour. There is the potential for out of hours delivery and will require Out of Hours Work Approval. Refer to mitigation measures in Section 5.9. The proposed hours are in accordance with the *Interim Construction Noise Guideline* (DECC, 2009) and Endeavour working hours.

2.7 Operation

During construction, the proposal would operate as an ZS. Periodic maintenance would be undertaken by Endeavour which is likely to consist of a few maintenance vehicles per year.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

3. Statutory planning framework

3.1 Environmental Planning and Assessment Act 1979

The EPandA Act and the EPandA Regulation provide the framework for development assessment in NSW. The EPandA Act and EPandA Regulation include provisions to ensure that the potential environmental impacts of a development are considered in the decision-making process prior to works proceeding.

As described below, the proposal would be permitted without development consent in accordance with the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP). The proposal is therefore subject to the assessment requirements of Part 5 of the EPandA Act.

Endeavour is an ANO under the *Electricity Network Assets (Authorised Transactions) Act 2015*. Endeavour is also a prescribed determining authority under Section 5.6 of the EPandA Act and Clause 3(3) and Schedule 1(4) of the EPandA Regulation, for development for the purposes of an electricity transmission or distribution network that is permitted without consent (within the meaning of the Transport and Infrastructure SEPP) and is operated or to be operated by the ANO. Accordingly, Endeavour is the proponent and determining authority for this proposed activity.

This REF has been prepared in accordance with the *NSW Code of Practice for Authorised Network Operators* (the Code, 2015), which sets out the environmental assessment requirements for ANOs.

The proposal is not State significant infrastructure (SSI) or State significant development (SSD). The proposal can be assessed under Division 5.1 of the EPandA Act.

The EPandA Regulation lists the factors to be considered when assessing an activity under Part 5 of the EPandA Act. These, and the objects of the EPandA Act, are addressed in detail in Appendix B.

3.2 Other Commonwealth and State legislation

The proposal has also been assessed against other relevant Commonwealth and State environmental legislation in Table 3.1.

Table 3.1 Other environmental legislation

Legislation	Relevance to the Proposed Activity
Commonwealth legislation	
Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act protects Matters of National Environmental Significance (MNES), such as threatened species and ecological communities, migratory species (protected under international agreements), and National Heritage places (among others) (DCCEEW, 2024). A MNES search has been undertaken for the proposal, see Appendix C and Section 5.3. Due to the limited clearing required for the proposal as well as the small footprint of the proposal (limited to Lot 99 DP1282712), the proposal is unlikely to result in a significant impact on threatened biota or migratory species listed under the EPBC Act. Referral of the proposal to the Australian Minister for the Environment is therefore not considered necessary, see Section 5.3.
State legislation	
State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP)	Clause 2.7 (1) of the Biodiversity and Conservation SEPP states that an authority to clear vegetation under this policy is not required if it is a clearing authorised under s60(O) of the *Local Land Services Act 2013*. Section 60(O) provides an exemption for clearing under Part 5 of the EPandA Act and therefore consent is not required under this SEPP. The provisions of Chapter 3 and 4 of the Biodiversity and Conservation SEPP relate to the protection of koala habitat. Blacktown City Council is not listed in Schedule 2 of Biodiversity and Conservation SEPP. These chapters are not applicable to the proposal.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Legislation	Relevance to the Proposed Activity
State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP)	Chapter 2 of the Resilience and Hazards SEPP aims to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the *Coastal Management Act 2016* (CM Act). The objectives of Chapter 2 are to manage development in the coastal zone and establish a framework for land use planning and decision making in the coastal zone. The proposal is not located on land mapped under the Resilience and Hazards SEPP and is not mapped within a Coastal Environment Area, Coastal Wetland (or proximity area) or Coastal Use Area. Chapter 3 of the Resilience and Hazards SEPP manages hazardous and offensive industries. The proposal is not a hazardous or offensive industry. Chapter 4 the Resilience and Hazards SEPP provides a statewide planning approach to the remediation of contaminated land. The proposal site is contaminated, based on findings from a contamination assessment undertaken by JBSandG Australia Pty Ltd (JBSandG) in 2022. Site remediation activities have been assessed as part of a separate SER and will be completed prior to works commencing, see Section 1.1.
State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP)	Division 1 Consultation outlines consultation requirements when developing Zone Substations. This may involve consultation with Councils and other authorities. As the proposal meets the definition of development for the purposes of an electricity transmission or distribution network (s2.44) and would be carried out by Endeavour Energy (an ANO), this proposal is permissible without consent.
State Environmental Planning Policy (Precincts- Central River City)2021 (Precincts-Central River City SEPP)	The proposal site is located within the North West Growth Area (NWGA) and within the Central River City District. The Central River City SEPP contains planning provisions for precincts within the Central River City. It aims to consolidate and enhance planning, housing solutions and infrastructure: (a) to facilitate the development, redevelopment or protection of important urban, coastal and regional sites of economic, environmental or social significance to the State so as to facilitate the orderly use, development or conservation of those State significant precincts for the benefit of the State. (b) to facilitate service delivery outcomes for a range of public services and to provide for the development of major sites for a public purpose or redevelopment of major sites no longer appropriate or suitable for public purposes. Land within the South West Sydney Growth Area is subject to a biodiversity certification order which identifies and maps “Certified Area” and “Non-Certified Area”. Development proposals within Certified Area do not require any further biodiversity assessment. As the proposal site is within a mapped Certified Area as shown in the NWGA – Biodiversity Certification map (2007), no further biodiversity assessment is required.
Biodiversity Conservation Act 2016 (BC Act)	Part 7 of the BC Act provides the environmental assessment requirements for activities being assessed under Part 5 of the EPandA Act 1979. If a significant impact is likely, a SIS or a BDAR is required. Section 7.2(1)(a) and 7.3 describe the assessment requirements and thresholds for what is considered a significant impact. A BioNet Atlas search (NSW Government, 2024) was undertaken on 16 December 2024, see Appendix D. Due to the small footprint of the proposal and minor clearing required, the proposal is unlikely to result in a significant impact on any species and a SIS or a BDAR is not required, see Section 5.3.
Biosecurity Act 2015	The *Biosecurity Act 2015* and regulations provide requirements for state level priority weeds. The Act regulates all plants, with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Mitigation measures are detailed in Section 5.3 to reduce the spread of weeds.
Crown Land Management Act 2016 (CLM Act)	The CLM Act and regulations specify how Crown lands are managed and developed. The proposal site is not identified as Crown Land. Approval under the CLM Act is not required.
Electricity Supply Act 1995 (ES Act)	Clause 40(4) of the ES Act, Endeavour is required to undertake 40 days notification, and to review and consider feedback and responses. Clause 45 of the ES Act specifies the erection and placement of electricity works on public land that is connected with the erection, installation, extension, alteration, maintenance or removal of electricity works on any land.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Legislation	Relevance to the Proposed Activity
	Clause 56 of the ES Act specifies reasonable force may be used for the purpose of gaining entry to any land (other than such part of a building as is being used for residential purposes) under a power conferred by this Division, but only if authorised by the network operator or retailer concerned in accordance with this section.
Fisheries Management Act 1994 (FM Act)	The FM Act provides for the protection, conservation, and recovery of threatened species, populations and ecological communities of fish and marine vegetation and fish habitats, as well as promoting the development and sharing of fishery resources in NSW. The Department of Primary Industries (DPI) Fisheries Portal (DPI, 2024b) was reviewed on 16 December 2024 and the proposal site is not mapped within key fish habitat (KFH), as described in Section 1.1. Section 220ZZ of the FM Act lists the factors to be considered to determine the impact of an activity on threatened species, populations, ecological communities of fish and marine vegetation: – If the proposal is likely to significantly impact on the threatened species, populations or ecological communities, then an SIS is required. The proposal would not impact threatened species, populations or ecological communities due to no works being proposed in waterways/culverts. – Approval is required under the FM Act for works that constitute dredging and reclamation. The proposal would not fit the definition of dredging and reclamation under the FM Act (section 200 of FM Act). – Under section 219 of the FM Act, works within a waterway that may result in the temporary or permanent blockage of fish passage also require a permit from DPI Fisheries. The works would not block fish passage because no works are proposed within a waterway, therefore a permit under the FM Act is not required. The proposal site is not mapped within KFH, and as works do not meet the definitions listed in section 220ZZ of the FM Act, approval under the FM Act is not required.
Heritage Act 1977 (Heritage Act)	The proposal does not involve an item or place listed on the NSW State Heritage Register or the subject of an interim heritage order or listing and therefore approval under the Heritage Act is not required.
Local Land Services Act 2013 (LLS Act)	The objects of the LLS Act include *'to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistently with the principles of ecologically sustainable development'*. The Act regulates the clearing of native vegetation; however section 60(O)(b)(ii) excludes the need for consent under the LLS Act where the clearing is an activity carried out by a determining authority within the meaning of Part 5 of the EPandA Act.
National Parks and Wildlife Act 1974 (NPW Act)	The NPW Act regulates the control and management of all national parks, historic sites, nature reserves, and Aboriginal areas, and protects native flora and fauna in NSW. The main aim of the Act is to conserve the natural and cultural heritage of NSW. Where works will disturb Aboriginal objects, an Aboriginal Heritage Impact Permit (AHIP) is required. The nearest National Park is Rouse Hill Regional Park, which is located approximately 1.8 km southeast of the proposal site. No works are proposed on land reserved under the NPW Act. A search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 16 December 2024. Two known Aboriginal heritage sites have been identified within 200 m of the proposal site (see Appendix E). Due to previous disturbance of the proposal site, the proposal is considered unlikely to harm Aboriginal objects or sites and a permit under the NPW Act is not required, see Section 5.3.
Protection of the Environment Operations Act 1997 (POEO Act)	The POEO Act is the key environmental protection and pollution statute. The POEO Act is administered by the NSW Environment Protection Authority (EPA) and establishes environment protection licensing under Sections 47-49 and 122. The proposal does not constitute a scheduled development work or scheduled activity under Schedule 1. The proposal therefore does not require any licences under the POEO Act.
Roads Act 1993	Consent under section 138 of the *Roads Act 1993* is required from the relevant roads authority for any works or activities in a public reserve, public road or footpath (nature strip). The proposal site is currently accessible via Garfield Road East and Junction Road. The existing access off Garfield Road East is proposed to be widened.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Legislation	Relevance to the Proposed Activity
	Consultation has been undertaken with TfNSW in relation to the existing access off Garfield Road East and will continue during the upgrade of the road.
Water Management Act 2000 (WM Act)	The WM Act's main objective is to manage NSW water in a sustainable and integrated manner that will benefit today's generations without compromising future generations' ability to meet their needs. Section 91E of the Act establishes an approval regime for controlled activities within 40 metres of waterfront land. However, Clause 41 of the Water Management (General) Regulation 2018 provides an exemption for public authorities in relation to all controlled activities within 40 m of waterfront land. Is Therefore, approval under the WM Act is not required. There is the potential for dewatering groundwater, however, the expected volume will not exceed more than 3 ML. If more than 3 ML is required a WAL may be required and DCCEEW should be consulted.
Local Legislation	
Blacktown Local Environmental Plan (LEP) 2015	The LEP provides a framework that guides planning decisions for local government areas through zoning and development controls. The proposal site is zoned RU4 Primary Production Small Lots.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

4. Community and agency consultation

Pursuant to clause 40(4) of the ES Act, Endeavour is required to undertake 40 days notification, and to review and consider feedback and responses. Consultation required for the proposal is also in accordance with the Transport and Infrastructure SEPP is outlined in clause 2.10-2.17 and addressed in Table 4.1.

Table 4.1 Community and agency consultation

Community/agency consultation	Have any community stakeholders been identified for the proposed works? Yes ☒ No ☐ Road users of Garfield Road East and Junction Road would be stakeholders for the proposal. Community stakeholders also include private landowners within 200 m of the proposal. Approximately 23 residences are located within 200 m of the proposal site. These residences are predominantly agricultural properties. The nearest receiver to the proposal site is at 38 Gulgong Crescent, Rouse Hill 2155, which is located approximately 50 m south of the proposal site. Several new residential properties are being constructed along Garfield Road East associated with the Fairwood Rise Rouse Hill development which may be completed and become inhabited during the construction of the proposal, resulting in a greater number of potential receivers within 200 m of the proposal. Is consultation with other authorities required under the requirements of Clauses 2.10-2.17 of the Transport and Infrastructure SEPP? Yes ☐ No ☒ Are the works adjacent to a national park, nature reserve or other area reserved under the *National Parks and Wildlife Act 1974*? Yes ☐ No ☒ Are the works adjacent to a declared aquatic reserve under the *Fisheries Management Act 1994*? Yes ☐ No ☒
	Other agency and community consultation: A Community and Stakeholder Engagement Strategy (CSES) has been developed by GHD (GHD, 2025) and would be implemented by Endeavour and the contractor, Appendix F. The CSES aims to: – Define key community and stakeholder groups with Endeavour to be notified. – Develop key messages. – Develop an action plan to deliver notification collateral. – Outline the reporting mechanism for stakeholder consultation.
	Notification requirements The following collateral has been prepared: – Council letter with a 40-day response timeframe. – Project notification letter to neighbouring properties and stakeholders. – Local paper advertisement. – Stakeholder emails. – Web page content.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

4.1 Transport and Infrastructure SEPP Consultation

Part 2.2, Division 1 of the Transport and Infrastructure SEPP (clauses 2.10 to 2.16) outlines the requirements for consultation for public infrastructure proposals, see Table 4.2. Clause 2.10, 2.11, 2.12, 2.14 apply to consultation required with Blacktown City Council.

No consultation requirements were identified under the Transport and Infrastructure SEPP as outlined in Table 4.2 Consultation with Blacktown City Council and Transport for NSW are proposed as stated in the CSES.

Consultation with Council regarding impacts to Council's stormwater system has been previously undertaken, with consultation outcomes summarised in Section 5.4.

Table 4.2 Clause 2.10 – 2.15 requirements under the Transport and Infrastructure SEPP

Is consultation with Council required under Clause 2.10 – 2.14 of the Transport and Infrastructure SEPP?		
Are the proposed works likely to have a substantial impact on the stormwater management services which are provided by Council?	Yes ☐	No ☒
Are the proposed works likely to generate traffic to an extent that will strain the existing road system in a local government area?	Yes ☐	No ☒
Will the proposed works involve connection to a Council owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system?	Yes ☐	No ☒
Will the proposed works involved connection to a Council owned water supply system? If so, will this require the use of a substantial volume of water?	Yes ☐	No ☒
Will the proposed works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local Council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?	Yes ☐	No ☒
Will the proposed works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which Council is the roads authority and responsible for maintenance?	Yes ☐	No ☒
Are the works located on flood liable land? if so, will the works change flooding patterns to more than a minor extent?	Yes ☐	No ☒
Is there a local heritage item (that is not a state heritage item) or a heritage conservation area in the study area for the works? if yes, does a heritage assessment indicate that the potential impacts to the item/area are more than minor or inconsequential?	Yes ☐	No ☒
Is consultation with other agencies required under Clause 2.15 of the Transport and Infrastructure SEPP?		
Are the proposed works adjacent to a national park, nature reserve or other area reserved under the *National Parks and Wildlife Act 1974*?	Yes ☐	No ☒
Are the proposed works adjacent to a declared aquatic reserve under the *Fisheries Management Act 1994*?	Yes ☐	No ☒
Are the proposed works adjacent to a declared marine park under the *Marine Parks Act 1997*?	Yes ☐	No ☒
Are the proposed works adjacent to a declared aquatic reserve under the *Marine Estate Management Act 2014*?	Yes ☐	No ☒
Are the proposed works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*?	Yes ☐	No ☒
Do the proposed works involve the installation of a fixed or floating structure in or over navigable waters?	Yes ☐	No ☒
Are the proposed works for the purpose of residential development, an educational establishment, a health services facility, a correctional facility or group home in bush fire prone land?	Yes ☐	No ☒
Do the proposed works increase the amount of artificial light in the night sky and that is on land within the dark sky region?	Yes ☐	No ☒

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5. Environmental assessment

This section describes the key potential environmental impacts associated with the proposal during both construction and operation and details site-specific safeguards to ameliorate the identified potential impacts.

5.1 Site inspection

A site inspection was undertaken on the 12 December 2024 with a representative from GHD and Endeavour where photos were taken recording the observations made during the site as indicated in Table 5.1. Observations included:

- Traffic and roads - Garfield Road and Junction Road require upgrading.
- Access - from Garfield Road and Junction Road and liaison with TfNSW.
- Housing development - new housing development surrounding the site.
- Vegetation - existing of trees, shrubs and other vegetation to be removed from the site (approval pursuant to the SER).
- Land use - rural landscape and existing use, potential contamination.
- Visual amenity - Potential visual impact on surrounding environment.
- Transmission lines – existing transmission lines traversing the site.

Table 5.1 Photos taken during the site visit



Access to proposal site and housing development across the road.



Western perspective of Garfield Road.



Vegetation across the site.



Existing structure and site vegetation.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.



Corner of Junction Road and Garfield Road East.



Existing power lines traversing Junction Road.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5.2 Topography, geology and soils

5.2.1 Existing environment

Topography, geology and soils

A Geotechnical Investigation (GeoEnviro Consultancy, 2022) was undertaken for the proposal site. The Geotechnical Investigation included fieldwork, drilling seven boreholes, installing a geotechnical groundwater monitoring well and undertaking laboratory testing of samples gathered at the site.

The following subsurface profiles were encountered during the borehole sampling:

– Topsoil was approximately 300 mm to 400 mm thick and consisted of clayey silt of low liquid limit.
– Natural soil was found below the topsoil at all boreholes with medium to high plasticity silty clay.
– Bedrock at all boreholes consisted of shale and siltstone approximately 1.2 m to 2.0 m.
– Groundwater was not encountered at any of the boreholes. Groundwater is likely to be present approximately 4.5 m below existing ground surface.

Based on 1:100,000 Soil Landscape Map of Penrith, the site is underlain by residual soil of the Blacktown Landscape Group (9030bt) which is limited by localised seasonal waterlogging, localised water erosion hazard and localised surface movement potential (GeoEnviro Consultancy, 2022).

The Australian Soil Classification (ASC) (MinView, 2024) for the proposal is Kurosols. Kurosols have erodible subsoils. The upper part of the subsoil is likely to be highly acidic.

The Greater Soil Group (GSG) at the proposal site is mapped as Yellow Podzolic Soils - less fertile (granites and metasediments) (MinView, 2024). These are predominantly acidic soils occurring in poorly drained areas such as footslopes. These soils are highly erodible.

The site is underlain by Triassic aged sedimentary rock comprised of quartz-lithic to quartz-rich sandstone with conglomerate, mudstone and siltstone deposits (MinView, 2024).

The site is not mapped within Acid Sulfate Soils (ASS) and is not at risk of mine subsidence (NSW ePlanner, 2024). Naturally occurring asbestos refer to the mineral component found in certain types of soils and rocks.

The site is mapped in an area of ‘moderate salinity potential’ (GeoEnviro Consultancy, 2022).

The proposal site is relatively flat with an elevation of approximately 25 to 30 m Australian Height Datum (AHD) (Elvis, 2024). Surrounding land is used predominantly for residential developments and is also generally flat.

Contamination

The site is not listed as being contaminated on the EPA Contaminated Land Register searched on 16 December 2024 (NSW EPA, 2024).

JBSandG Services Pty Ltd (JBSandG) were engaged in 2022 by Endeavour to conduct a combined Preliminary and Detailed Site Investigation (PSI/DSI) of potential contamination on the proposal site. The investigations aimed to determine the presence, quantity, and condition of any hazardous materials on the site so they could be effectively and appropriately removed and/or managed prior to proposed demolition works commencing.

A Hazardous Building Materials Survey (HBMS) as part of the PSI/DSI was undertaken on the existing structure on site. The HBMS identified contamination and hazardous materials within the structure. The structure is proposed to be demolished and removed prior to the proposal occurring. The demolition was assessed in the SER (Endeavour Energy, 2024) and is not further considered in this REF.

Based on the investigation results of the PSI/DSI there was no evidence of widespread gross environmental contamination, with some isolated surficial asbestos on and in soil associated with existing and historical structures. It has been determined the site can be made suitable for the proposed Zone Substation development and land uses permissible under the current zoning.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

The PSI/DSI recommended a Remedial Action Plan (RAP) be developed in accordance with the relevant regulatory requirements to address the identified contamination issues to render the site suitable for the proposed land uses. Remediation of the site would be completed prior to the works commencing. The site will be free of this constraint prior to the commencement of construction.

5.2.2 Potential impacts

Construction

During construction, the main risks to geology and soils would be erosion and sedimentation from soil disturbance activities associated with:

– Onsite stormwater detention (OSD) and sediment basin.
– Earthworks including stripping and removing topsoil.
– Excavation for footings of the associated buildings and poles.
– Trenching for underground conduits.

The Geotechnical Investigation (GeoEnviro Consultancy, 2022) further identified the following activities as having the potential to negatively impact geology and soils:

– Platform preparation and earthworks including drainage improvement.
– Retaining walls and batter slopes.
– Building footings, masonry blast walls and transformer pad footings.
– Internal pavement and access driveway.
– Soil and groundwater aggressiveness.

All soil disturbance would be confined to the proposal site. If not adequately managed, the potential impacts to soils may include:

– Erosion of soil surfaces and stockpiled materials.
– Reduced site drainage.
– Dust generation.
– Increased sediment loads entering waterways such as First Ponds Creek, located approximately 125 m west of the proposal site.
– Soil compaction leading to reduced productivity and impacts on drainage.

Excavated spoil is expected to total approximately 11,214 cubic metres (m^3). Spoil would be reused onsite as far as practical. Excess spoil would be tested for contamination and disposed of offsite as described in Section 5.12 if any. The is expected to be large amounts of fill material imported to the site for the construction of the proposal.

Disturbed areas would be progressively rehabilitated as construction work progresses to minimise the duration of disturbance and unnecessary impacts eventuating.

All sediment runoff would be contained within the proposal site. The contractor would implement an erosion and sediment control plan in accordance with the *Managing Urban Stormwater: Soils and construction—Volume 1* 'Blue Book' (Landcom, 2004) to prevent sediment loss from site, particularly during rainfall events. Erosion and sediment controls would remain in place throughout the works until the proposal site is rehabilitated and stabilised.

A certified Profession in Erosion and Sediment Control (CPESC) approval is required to identify the most effective and cost-efficient management of erosion and sedimentation for the proposal site. Prior to and during construction, an Erosion and Sediment Control Plan (ESCP) will be required to manage and control risks.

Contamination

The site is contaminated, as described in the PSI/DSI prepared by JBSandG dated 2022. Remediation of the site would be completed prior to the works commencing. Potential impacts that may occur from the remediation will include the excavation and removal of contaminated fill by heavy vehicles.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

During construction, there is potential for accidental leaks or spillage of chemicals or lubricants. Accidental spills could contaminate soil and therefore have the potential to cause environmental harm. In the event that further areas of contamination are unexpectedly uncovered during construction, the unexpected contamination finds protocol would be implemented. Through the implementation of erosion and sediment controls, as described in Section 5.2.3, the potential soil erosion and sedimentation impacts would be temporary and minor.

Operation

After construction is complete, the proposal site would be left in a stabilised condition, and environmental controls would be removed.

The proposal is expected to have minor impacts on soils during the operation of the ZS. The risk of increased runoff as a result of an increase in hardstand surfaces, is considered in Section 5.3.2. The proposed transformers would be appropriately bunded to reduce risks during operation. The proposal site will also be fitted with a stormceptor and onsite stormwater detention.

Implementation of the mitigation measures outlined in Section 5.2.3 for the construction and operational of the ZS will result in minor impacts to the sites geology and soils.

If unexpected contamination is encountered, works will cease, and Endeavour's Environmental Specialist will be contacted.

5.2.3 Mitigation measures

Soils, geology and contamination mitigation measures are provided in Table 5.2.

Table 5.2 Topography, geology and soils mitigation measures

ID	Mitigation measure
SG01	Certified Profession in Erosion and Sediment Control (CPESC) approval may be required. 'Stop work' protocol for suspected contamination and unexpected finds protocols to be applied.
SG02	Prepare and implement an Erosion and Sediment Control Plan (ESCP) that includes soil and erosion protection measures in accordance with the *Managing Urban Stormwater: Soils and construction—Volume 1* (Landcom, 2004).
SG03	Locate stockpiles and construction materials away from vegetation, waterways and drainage lines, implement bunding practices where appropriate.
SG04	Minimise vehicle and machinery movement across exposed soil surfaces.
SG05	Minimise exposure of soils and retain vegetation where practicable.
SG06	All erosion and silt control devices will be visually inspected weekly by the contractor to ensure effectiveness as well as after each rainfall event.
SG07	Stockpiles would be designed, established, operated, and decommissioned in accordance with the *Stockpile Site Management Guidelines* (LGNSW, 2015).
SG08	The rehabilitation of disturbed areas will be carried out progressively as construction stages are completed, and in accordance with *Managing Urban Stormwater: Soils and Construction* (4th edition) (Landcom, 2004).
SG09	The contractor is to prepare an Environmental Incident Response Plan to include procedures for the storage and handling of hazardous materials including fuel and chemicals as follows: – Refuelling of machinery to occur offsite or in accordance with an approved refuelling management plan. – Storage of hazardous materials on-site to be in accordance with national guidelines and the safety data sheets relating to bunding, coverage, storage of incompatible materials, etc. – Appropriate spill kits would be kept on site at all times for potential chemical or fuel spills.
SG010	Construction contractors will be trained in the correct use of the spill kits.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5.3 Hazards and risks

5.3.1 Existing environment

Sulphur hexafluoride (SF_6)

Sulfur hexafluoride is an inorganic compound with the formula SF_6. It is a colourless, odorless, non-flammable, and non-toxic gas. It is used in the electricity industry to keep networks running safely and reliably. It's highly stable, non-toxic, non-flammable and electronegative, which means it will not form other compounds that will alter its state and effectiveness.

Bushfire

The proposal site is not mapped or identified as being bushfire prone (ePlanner, 2024).

5.3.2 Potential impacts

Construction

Sulphur hexafluoride

The proposed high voltage equipment, such as the transformers, is likely to contain SF_6 a greenhouse gas. If incorrectly handled or stored, the release of SF_6 into the atmosphere would have a negative environmental impact.

New equipment containing SF_6 would be transported and installed by licensed contractors to avoid spills or leaks during construction of the proposal. SF_6 spills or leaks will be managed as per EE SMI 122 - Use and Handling of SF_6.

Bushfire

Although the proposal site is not mapped as bushfire prone land, there is bushfire prone land mapped approximately 520 m northwest of the proposal site. Risk of fires doing construction is associated with 'hot works'. This risk would be short term and would be managed in accordance with the mitigation measures would be applied.

The fire danger rating will be checked daily prior to works commencing. If fire danger is rated at very high or higher or a total fire ban is declared, Endeavour will advise the contractor whether works are to proceed or if all personnel are to be stood down.

Operation

Sulphur hexafluoride

During operation, there is potential for accidental leaks of SF_6 to arise. This risk would be mitigated by the implementation of mitigation measures as well as regular maintenance and inspections of SF6 equipment by Endeavour.

Bushfire

After construction is complete, screening vegetation is proposed to be planted around the perimeter of the ZS. Groundcover species with a high risk of bushfire (such as native grasses) would not be planted for screening purposes to reduce the potential risk of bushfire during operation.

Electric and Magnetic Fields

Electric and Magnetic Fields (EMF) are part of the natural environment and EMF is produced wherever electricity or electrical equipment is in use. The higher the voltage, the stronger the electric field. Electric fields are strongest closest to the wires and electrical equipment and their level reduces quickly with distance.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

The proposed ZS would contain high voltage electrical infrastructure and therefore would produce EMF. Potential impacts to human health would be managed in accordance with the suggested mitigation measures. EMF can be managed in accordance with recommendations from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which is a federal agency responsible for protecting human and environmental health from EMF. ARPANSA has adopted the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines which set exposure limits for various types of electrical equipment and the nature of the exposure to that equipment.

Exposure of EMF to the public will be managed through:

Restricting access to the substation by the security fence

Ensuring EMF emission from electrical infrastructure is compliant with the relevant standards and guidelines stipulated by:

– International Commission on Non-Ionizing Radiation Protection (ICNIRP).
– Guidelines for limiting exposure to EMF (ARPANSA, 2010).

The ZS and its associated equipment have been designed such that EMF emissions are within acceptable standards.

5.3.3 Mitigation measures

Hazard and risk mitigation measures are provided in Table 5.3.

Table 5.3 Contaminated lands and hazardous materials mitigation measures

ID	Mitigation measure
HAZ1	In unexpected contamination is encountered, works will cease, and Endeavour's Environmental Specialist will be contacted.
HAZ2	SF6 spills or leaks will be managed as per EE SMI 122 - Use and Handling of SF_6.
HAZ3	The fire danger rating will be checked daily prior to works commencing. If fire danger is rated at very high or higher or a total fire ban is declared, Endeavour will advise the contractor whether works are to proceed or if all personnel are to be stood down.

5.4 Surface water, hydrology and groundwater

5.4.1 Existing environment

Surface water

The nearest waterway to the proposal site is First Ponds Creek, located approximately 125 m west of the proposal site at its nearest point. First Pond Creek is a perennial, third order waterway which drains northwards towards its confluence with Killarney Chain of Ponds, approximately 1.4 km north of the proposal site.

First Pond Creek is not mapped as supporting KFH or habitat for any threatened freshwater fish species (DPI, 2024b). The proposal site is not mapped within a drinking water catchment (SEED, 2024).

The proposal site is mapped within Water Sharing Plan (WSP): Greater Metropolitan Region Groundwater Sources 2023 Water Source 1: Sydney Basin Central Groundwater Source as well as the WSP for the Greater Metropolitan Region Unregulated River Water Sources 2023 (SEED, 2024).

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Flooding

The Blacktown City Council flood mapping portal was reviewed on 16 December 2024 to confirm flood mapping for the proposal site (Blacktown City Council, 2024).

The proposal site is not mapped as flood prone, however, it is noted that land adjoining the northern and eastern boundaries of Lot 99 DP1282712 are mapped as 'Riverine Low Flood Risk Precinct'. This Precinct is the area above the 100-year flood and includes all area up to and including the probable maximum flood.

Groundwater

The nearest groundwater borehole to the proposal site is GW112595, a monitoring bore, located approximately 225 m south of the proposal site, which has a standing water level of 2.345 m (WaterNSW, 2024).

Land adjoining the northern extent of the proposal site is mapped as a medium high ecological values aquatic ecosystems (HEVAE) Groundwater Dependent Ecosystem (GDE) (SEED, 2024). First Ponds Creek is mapped as having low category HEVAE instream value. A small pocket in the southeastern portion of the proposal site is mapped as having a low probability for GDE.

The Geotechnical Investigation did not encounter groundwater at any of the seven drilled boreholes. The Geotechnical Investigation concluded that groundwater is only likely to be encountered at depths in excess of 4.5 m below the existing ground surface (GeoEnviro Consultancy, 2022).

5.4.2 Potential impacts

Construction

Surface water

During construction, the main risks to water quality would be erosion and sedimentation of nearby waterways due to runoff associated with ground disturbance activities and stockpiling. Sediment and nutrient laden water resulting from ground disturbance during earthworks entering First Pond Creek may potentially impact local aquatic habitats due to increased sedimentation and varying turbidity.

There may be risks to water quality due to accidental spills during oil filling of the new transformers, and as part of the refuelling of plant and machinery. Potentially hazardous liquids include but are not limited to diesel, unleaded petrol, machinery oils and lubricants.

The potential for surface water impacts is considered low given the distance to watercourses and with the implementation of the mitigation measures in Section 5.3.3.

Flood risk

Construction activities have the potential to affect local flood behaviour and alter flood patterns, particularly during excavation activities and stockpiling of materials. Potential risks without appropriate management and mitigation include:

– Stockpiles, plant, and infrastructure altering floodwater dynamics leading to localised changes to flood depth or velocity.
– Mobilisation of sediment from stockpiles or disturbed soils or interactions with hazardous chemicals.
– Ingress of floodwaters within excavated areas.

Land adjoining the site is mapped as flood prone, however it is noted that this land is within a 'low risk' flood precinct. Any potential risks to flooding during construction would be short term and adequately managed by the mitigation measures proposed in Section 5.3.3.

Groundwater

Groundwater is not expected to be encountered during the works due to the shallow nature of proposed excavation needed to construct the proposal. Therefore, potential impacts to groundwater are expected to be negligible. There is the potential for dewatering groundwater, however, the volume the volume is not expected to exceed more than 3 ML.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

GDE is dependent on groundwater. Potential risks to GDE HEVAE are not anticipated as there are no proposed works within a waterway. Potential contaminated runoff entering groundwater would be minimised by the proposed mitigation measures.

Operation

Surface water

During operation, the ZS would be located on sealed hardstand which would represent an increase in hardstand surfaces at the proposal site. This increase in hardstand surfaces is expected to result in increased surface runoff, however, as stated, flood risk at the proposal site is considered to be low.

The site stormwater system includes an onsite stormwater detention (OSD) which discharges into council stormwater network. Council has been consulted as Endeavour's design is required to meet council stormwater criteria.

The primary risks to hydrology and water quality during operation would be from potential oil leakages from the transformers. The transformers are proposed to be constructed in a bunded area with an adequate spill containment system in place to prevent potential leaks resulting in offsite impacts. During operation, the potential impacts from the risk of an oil spill is considered to be low.

The onsite stormwater detention and its filter will impact on flow volumes and water quality from the site . Mitigation measures provided in Section 5.3.3 are expected to manage the risk of hydrology impacts during operation.

Flooding

The site is not identified as being flood prone land and has a low risk of being impacted by flooding.

Groundwater

It's not anticipated groundwater will be impacted by the construction and operation of the proposal.

5.4.3 Mitigation measures

Hydrology and water quality mitigation measures are provided in Table 5.4.

Table 5.4 Surface water, hydrology and groundwater mitigation measures

ID	Mitigation measure
W01	The storage and handling of fuels and chemicals would comply with Australian Standard AS1940.
W02	Prepare a spill management plan, runoff management plan and discharge criteria as per blue book requirements.
W03	All fuels and hazardous materials and liquids are to be safely stored on ground level in a sealed bunded area away from existing stormwater drainage systems and waterways.
W04	Refuelling, fuel decanting and vehicle maintenance work if required would take place in a designated sealed and bunded area within the construction compound area, or offsite.
W05	Water quality control measures would be used to prevent any materials (e.g. concrete, grout, sediment etc) entering drain inlets or waterways.
W06	No works would be undertaken during heavy rain. Weather forecasts would be monitored daily.
W07	A designated wash down area is required to be established. Wash down will use water with excess debris removed using hand tools. Wash down waste must be filtered before release, and away from all waterways.
W08	A Construction Water Management Plan (CWMP) to be prepared for the implementation of the project.
W09	A spill management, runoff management and discharge criteria are to be prepared as per blue book requirement.
W010	Refuelling, fuel decanting and vehicle maintenance work, if required, would take place in a designated sealed and bunded area within the construction compound areas or offsite.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5.5 Biodiversity

5.5.1 Existing environment

The methodology included undertaking searches of the following desktop databases, which were searched on 16 December 2024:

- Protected Matters Search Tool (PMST), see Appendix C
- BioNet database, see Appendix D
- Vegetation classes of New South Wales
- Biodiversity Values and Threshold map
- NSW SEED

The following protected matters were identified on or within a 10 km of the proposal site (16 December 2024), see Appendix C (DCCEEW, 2024):

- 8 threatened ecological communities (TECs)
- 99 listed threatened species
- 33 listed migratory species

The following threatened fauna species were identified by the BioNet Atlas (DPE, 2024a) on 16 December 2024 as potentially occurring within a 10 km buffer of the proposal site, see Appendix D:

- One vulnerable amphibian species
- One endangered amphibian species
- 19 vulnerable bird species
- Seven endangered bird species
- 11 vulnerable mammal species
- One endangered mammal species
- Two endangered gastropoda species
- Seven endangered flora species
- Seven vulnerable flora species

The NSW SEED portal (SEED, 2024) was used to review BioNet species sighting mapping on 16 December 2024. The nearest records are mapped as follows:

- One record of the Green and Golden Bell Frog (*Litoria aurea*), listed as endangered under the BC Act, located approximately 385 m south of the proposal site, recorded in 1969.
- One record of the Native Blackthorn (*Bursaria spinosa subsp. spinosa*), listed as vulnerable under the BC Act, located approximately 390 m west of the proposal site, recorded in 2016.

The listed TECs identified by the MNES search are as follows:

- Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion.
- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.
- Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion.
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.
- Shale Sandstone Transition Forest of the Sydney Basin Bioregion.
- Turpentine-Ironbark Forest of the Sydney Basin Bioregion.
- Western Sydney Dry Rainforest and Moist Woodland on Shale.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

– Review of the NSW SEED portal identifies no plant community types (PCTs) mapped within the proposal site. The following PCTs are identified adjoining the northwestern extent of the proposal site:
  - PCT 3448 Castlereagh Ironbark Forest – associated with:
    – BC Act listed TEC 10174 Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion.
    – EPBC Act listed TEC 20386 Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion.
  - PCT 3320 Cumberland Shale Plains Woodland – associated with:
    – BC Act listed TEC 10191 Cumberland Plain Woodland in the Sydney Basin Bioregion.
    – EPBC Act listed TEC 20403 Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.

5.5.2 Potential impacts

Construction

Impacts to threatened species

Vegetation clearing would be confined to Lot 99 DP1282712 and would total approximately 14,200 m^2.

The impact to threatened fauna habitat is not considered to be significant based on the following:

– The proposed clearing represents a relatively small area of the site.
– No clearing of PCTs associated with TECs is proposed.
– Clearing would be clearly marked and would not extend beyond the proposal site defined in Figure 1.2.
– A landscape management plan has been developed to outline the ongoing maintenance requirements for the proposed planting.

Introduction of pathogens

The proposal poses a small risk of spreading pathogens because vehicles, people, and machinery have the potential to bring fire ants, weed species and pathogens to site or carry them from the site.

This risk would be minimised by measures provided Section 5.4.3.

Groundwater dependant ecosystems

GDE may potentially be impacted during the construction of the proposal. Mitigation measures will be employed to protect GDE during construction activities based on the actions in the CEMP.

Impacts to threatened fauna species

Mitigation measures have been provided in to manage potential impacts to fauna if encountered.

Operation

Vegetation planted around the perimeter of the site to offset the removal of the existing vegetation (assessed and approved under a separate SER) will be maintained by Endeavour and replaced when required. Vegetation will include tall trees and shrubs as outlined in the Design Concept - Landscape Plan dated August 2024. The planting of native vegetation is likely to have a positive biodiversity impact by creating potential fauna habitat.

5.5.3 Mitigation measures

Biodiversity mitigation measures are provided in Table 5.5.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Table 5.5 Biodiversity mitigation measures

ID	Mitigation measure
BIO1	As part of the site induction process, provide all site personnel with information on the biodiversity values of the study area, including threatened species, no-go areas and responsibilities under relevant environmental legislation, including but not limited to the EPandA Act, BC Act, FM Act and EPBC Act.
BIO2	Should unexpected, threatened fauna be located at any time during construction, work should cease immediately in the area to prevent further harm to the individual. Contact Endeavour's Environmental Specialist and a suitably qualified ecologist to determine if further assessment is required. Works to only recommerce on advice from Endeavour's Environmental Specialist or a suitably qualified ecologist.
BIO3	Where clearing is required, establish exclusion zones to ensure clearing does not extend beyond the approved proposal site identified in the REF.
BIO4	To stop the spread of pathogens, the basic hygiene guidelines detailed in *Saving our Species - Hygiene guidelines - Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomi, myrtle rust, amphibian chytrid fungus and invasive plants* (DPIE, 2020) will be implemented.
BIO5	Manage adjacent areas of vegetation clearing in accordance with the following measures to reduce the potential invasion of noxious weed species: – Clean machinery, vehicles and footwear before moving to a new location. – Dispose of weed-contaminated soil at an appropriate location.
BIO6	The proposal site should be checked prior to works commencing for any signs of fire ants or fire ant nests. If observed, immediately notify DPI on 1800 680 244 or https://forms.bfs.dpi.nsw.gov.au/forms/9247**.** Characteristic of the ants or nests can be found at https://www.dpi.nsw.gov.au/dpi/bfs/insect-pests/rifa/Seen-them-call-us.

5.6 Aboriginal heritage

5.6.1 Existing environment

A search of the AHIMS was undertaken on 16 December 2024. Two known Aboriginal heritage sites have been identified within 200 m of the proposal site (see Appendix E). The AHIMS identifies the location, however does not provide detail of the significance of the sites.

One of the Aboriginal heritage items is located on the opposite side of Garfield Road East, approximately 115 m south of the proposal site. The second Aboriginal heritage item is located along the course of First Ponds Creek, approximately 170 m west of the proposal site. First Ponds Creek is located approximately 125 m west of the proposal site at its nearest point. Both of these sites are within 200 m from the proposal site and in proximity of the waterway.

The proposal site is partially a greenfield site. The southern and eastern boundaries of the site are within road corridors (Garfield Road East and Junction Road) and have therefore been previously disturbed due to the construction and operation of these roads. The remainder of the site is currently undeveloped and consists of uncleared vegetation. There is evidence of an informal racetrack/vehicle access track within Lot 99 DP1282712 which suggests that there has been previous use and disturbance.

Despite previous disturbance of portions of the proposal site, there remains potential for previously undiscovered Aboriginal heritage items to be uncovered during groundworks.

5.6.2 Potential impacts

Construction

The two known Aboriginal heritage items identified by the AHIMS search are buffered from the proposal site by either road infrastructure (Garfield Road East) or a waterway (First Ponds Creek).

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Under the *Due Diligence Code of Practice* (DECCW, 2010), landscape features that represent a greater probability of Aboriginal significance include land within a buffer zone of 200 m around waterways. The proposal site is within 200 m of a waterway because First Ponds Creek is located 125 m west of the proposal site at its nearest point. The *Due Diligence Code of Practice* (DECCW, 2010) states that further assessment is only required on land that is not disturbed land. As demonstrated above, the site shows evidence of previous use and disturbance. The implementation of safeguards provided in Section 5.6.3 would avoid harm to known Aboriginal heritage items within 200 m of the proposal site, and as such, further assessment is not considered required.

The proposed works can proceed with caution without requiring further specialist assessment provided that the proposal site subject to impact and the extent of the proposed works is consistent with that discussed in this report. An unexpected finds procedure has also been provided in Section 5.6.3 in the event that unexpected finds are discovered.

Operation

During operation, there would be no further ground disturbance because the proposal would operate on a hardstand, sealed surface. As such, the proposal is not expected to have any operational impacts to Aboriginal heritage.

5.6.3 Mitigation measures

Aboriginal heritage mitigation measures are provided in Table 5.6.

Table 5.6 Aboriginal heritage mitigation measures

ID	Mitigation measure
AH01	If any Aboriginal objects, sites or places (or potential Aboriginal objects, site or places) are discovered during any construction work, all works in the vicinity will cease and the area will be appropriately protected. The Endeavour Project Manager is to be notified and an archaeologist engaged to undertake a site inspection to assess the find. Following the on-site assessment, the archaeologist and RAPs (if they attended the site) are to advise on whether further management, mitigation or approvals are required in consultation with Heritage NSW. Should Aboriginal objects be identified, these are to be registered in the AHIMS. An AHIP would also need to be obtained to impact the site.
AH02	In the highly unlikely event that potential human skeletal material is identified over the course of the proposed works, the following procedure would be followed in accordance with the *Policy Directive – Exhumation of Human Remains* (NSW Department of Health, 2008), *Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office, 1998) and the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS, 1997): – Works in the vicinity of the remains would halt immediately. The contractor would notify the project manager who would in turn contact Heritage NSW. – If the remains are suspected to be human, a physical or forensic anthropologist would inspect the remains in situ, and make a determination of whether the remains are human and if so, the likely ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or forensic). – If the remains are identified as forensic the area would be deemed as a crime scene. – If the remains are identified as Aboriginal, the site would be secured and Heritage NSW and all registered Aboriginal parties would be notified in writing. – If the remains are non-Aboriginal (historical) remains, the site is to be secured and Heritage NSW contacted. – This process functions only to appropriately identify the remains and secure the site. From this time, the management of the remains would be determined through liaison with the appropriate stakeholders (NSW Police Force, forensic anthropologist, Heritage NSW, registered Aboriginal parties etc) and in accordance with the Public Health Act 2010.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5.7 Non-Aboriginal heritage

5.7.1 Existing environment

A search of the following databases was undertaken on 16 December 2024:

– NSW State Heritage Inventory (Heritage NSW, 2024)
– EPBC Act heritage list
– Australian Heritage Places Inventory
– Schedule 5 of Blacktown LEP 2015

The State Heritage Register was searched on 16 December 2024 and the nearest item to the proposal site of non-Aboriginal heritage is 'Nu Welwyn', located approximately 300 m south of the proposal site, which is listed under the *State Environmental Planning Policy (Precincts – Central River City) 2021* (Precincts SEPP).

Other non-Aboriginal heritage items located within 1 km of the proposal site are as follows:

– 'Rosebank', located approximately 670 m southwest of the proposal site, which is listed under the Precincts SEPP.
– 'Box Hill Inn', mapped approximately 870 m northeast of the proposal site. This item is listed as item 00724 on the State Heritage Register.
– 'Sydney Cultural Crescent Rock Art' is located approximately 880 m northeast of the proposal site. This area is mapped under the National Heritage List Australia.

5.7.2 Potential impacts

Construction

Due to the distance to the nearest identified non-Aboriginal heritage item, no known non-Aboriginal heritage items would be impacted by the proposal. Given the disturbed nature of the proposal site due to the construction and operation of Garfield Road East and Junction Road, it is considered unlikely that items of potential non-Aboriginal heritage significance would be encountered or impacted by the proposal.

However, in the unlikely instance that any items of non-Aboriginal heritage are encountered during ground excavation, the unexpected finds protocol outlined in Section 5.7.3 would be implemented.

Operation

After construction is complete, no further ground disturbance would be required. As such, no impacts to non-Aboriginal heritage are expected during the operation of the proposal.

5.7.3 Mitigation measures

Non-Aboriginal mitigation measures are provided in Table 5.7.

Table 5.7 Non-Aboriginal mitigation measures

ID	Mitigation measure
NA01	In the event that a site or artefact as defined by the *Heritage Act 1977* is identified during construction works, works must cease immediately at the location and no further harm to the object shall occur. The contractor will engage the Heritage Division, DCCEEW and a qualified heritage consultant, in accordance with Section 146 of the *Heritage Act 1977*, to determine an appropriate course of action prior to the recommencement of work in the area of the item. No work must commence in the vicinity of the find until any required approvals have been given by the Heritage Division.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5.8 Traffic and transport

5.8.1 Existing environment

The proposal site is located at the intersection of Garfield Road East, which forms the southern site boundary, and Junction Road, which forms the eastern site boundary. Both Junction Road and Garfield Road East are sealed and regularly maintained.

Garfield Road East has an intersection with Windsor Road (A2) approximately 1.3 km northeast of the proposal site. Windsor Road can be used to access the proposal site from Paramatta, located approximately 20 km southeast of the proposal site.

19 m TfNSW propose to widen the two-lane road to four lanes, with the opportunity to expand to six in the future. Various bus routes (B742, B734, B747, B746) operate on Garfield Road East. Bus shelters are located on Garfield Road East with the nearest one located approximately 420 m southwest of the proposal site.

5.8.2 Potential impacts

Construction

During construction, heavy vehicles, construction personnel and equipment would access the site via Garfield Road East and Junction Road. Approximately 50 construction personnel are required during peak construction. This would potentially result in up to 100 light vehicle movements per day. To mitigate impacts associated with these vehicle movements on local roads, construction personnel would be encouraged to carpool or make use of public transport where possible.

All construction vehicle parking would be within the proposal site. There would be increases in traffic on the surrounding road network associated with the delivery of equipment, machinery and plant, transportation of waste (off-site), and the daily arrival and departure of the construction staff as described, however, impacts would be short term and mitigated by measures provided in Section 5.8.3.

The existing site entrance via Garfield Road East is proposed to be widened to accommodate construction and future access to the proposal site. Consultation with TfNSW has been undertaken regarding the site entrance and is currently ongoing. Consultation is also continuing with TfNSW regarding the upgrade of Garfield Road East and Junction Road.

During construction of this widened entrance, traffic controls would be implemented according to the Traffic Management Plan (TMP), see Section 5.8.3.

The new transformers and prefabricated switch rooms/control room would be transported to site via an over-size, over-mass (OSOM) vehicle and jacked and skated or placed into position. The delivery of the transformers and prefabricated items would be carried out in accordance with the relevant permits from Blacktown City Council and TfNSW. OSOM vehicles require progressive road closures, which have the potential to disrupt the local road network. However, as the delivery of the transformers by OSOM vehicles is likely to be undertaken at night, outside peak traffic hours, the potential disruption to the local road network would be minor. An OoHW approval may be required to undertake the nigh works.

Operation

Once construction is complete, the ZS would be accessible via a widened entrance via Garfield Road East.

The ZS would be maintained by Endeavour which is likely to consist of a few light vehicles accessing the site periodically for repairs or inspections. No traffic and transport impacts are therefore expected during operation.

5.8.3 Mitigation measures

Traffic and transport mitigation measures are provided in Table 5.8.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Table 5.8 Traffic and transport mitigation measures

ID	Mitigation measure
TT01	A Traffic Management Plan (TMP) will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The TMP will include: – Consultation with Blacktown City Council, emergency service providers and residents to time works to reduce impacts. – Consultation with TfNSW regarding widening access from Garfield Road East. – Site specific traffic control measures (including signage) to manage and regulate traffic movement. – Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. – A response plan for any construction traffic incident. – Comply with Blacktown City Council requirements regarding traffic control, access and road/ pedestrian access.

5.9 Noise and vibration

5.9.1 Methodology

Noise impacts from the demolition and construction activities associated with the proposal have been predicted and assessed. Noise level objectives for management of construction noise impacts were determined in accordance with the:

– TfNSW Construction Noise and Vibration Guideline.
– TfNSW Construction and Maintenance Noise Estimator tool.
– Day Design Pty Ltd (Day Design) undertook an Environmental Noise Impact Assessment to assess the operational noise impacts of the proposal (Day Design, 2024), see Appendix H.

The construction noise impacts of the proposal have been assessed, see Appendix G.

The TfNSW calculator tool (Transport for NSW, 2024) was used to determine expected construction noise impacts.

The assessment was undertaken based on the sound power levels (SPLs) of the following equipment items:

– Excavator (20 tonne)
– Excavator (40 tonne)
– Vacuum truck
– Concrete truck/agitator
– Concrete saw
– Cranes
– Hiab truck
– Elevated work platforms
– Trucks
– General hand tools (powered and unpowered)
– Concrete pumps

The TfNSW calculator tool is a conservative noise tool that assesses the worst-case scenario noise impacts associated with the concurrent use of all of the above plant and equipment items. During the actual construction of the proposal, it is unlikely that every equipment item would be concurrent use, meaning that actual noise impacts are expected to be lower than predicted by the noise tool.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

The TfNSW calculator tool does not account for variation in the background noise levels of the existing environment. To account for the limitations of the calculator tool and the mitigation measures that it has proposed, it is suggested that the contractor adhere to standard construction hours, apply discretion in notification of affected receivers and avoid the concurrent use of noisy plant and equipment to minimise impacts as far as practicable. The TfNSW calculator tool is based on the anticipated worst-case scenario for the nearest receiver only, which in this case was 50 m from the proposal site. All other receivers at greater distances from the proposal site would experience equal or lower noise impacts.

The TfNSW calculator tool has also been used to determine the radius where proposed mitigation measures would cease to be required for the equipment proposed to be used. This is described further in Section 5.9.3.

5.9.2 Existing environment

The proposal is located in northeastern Grantham Farm, a residential area. Land extending north and east of the proposal site is sparsely populated and is used predominantly for residential purposes. The Riverstone Precinct is located west of the proposal site and Fairwood Rise Rouse Hill is located south of the proposal site. Both projects are residential developments.

Stage 1C of Fairwood Rise Rouse Hill is currently under construction, which adversely impacts the existing noise environment of the proposal site due to noise emitted by construction equipment and vehicles.

The proposal site is bound to the east by Junction Road and to the south by Garfield Road East. As such, the proposal site would be influenced by traffic noise associated with the local road network.

The nearest business to the proposal site is Bluesky Cleaning Management, located approximately 60 m east of the proposal site, buffered from the proposal site by Junction Road.

Approximately 23 receivers (residential and agricultural) are located within 200 m of the proposal site. The nearest receiver is at 38 Gulgong Crescent, Rouse Hill 2155, which is located approximately 50 m south of the proposal site. The number of receivers within 200 m of the proposal site is likely to increase once Riverstone Precinct and Fairwood Rise Rouse Hill are completed and inhabited.

5.9.3 Potential impacts

Construction

The TfNSW calculator, see Appendix G, assessed 11 plant/equipment items which had a cumulative SPL of 121 dBA. Appendix G demonstrates that mitigation measures are required for the nearest receiver located 50 m south of the proposal site. This receiver is expected to experience a predicted noise level of 79 dBA based on the concurrent use of all assessed plant/equipment items. All other receivers would experience equal or lower noise levels.

The noise assessment is provided in Appendix G. The assessment has been undertaken assuming that the proposed work hours are in accordance with the *Interim Construction Noise Guideline* (DECC, 2009). Any out of hours works such as the transportation of oversize amenities building or equipment, will need to be assessed and approved by an Endeavour Environmental Specialist.

As work is only proposed during standard hours, the TfNSW calculator has determined that standard mitigation measures should be implemented as well as periodic, verification monitoring and specification notification. These measures are provided in Section 5.9.4.

The assessment undertaken by the TfNSW calculator tool was repeated to determine the radius for which these mitigation measures would be applicable. Periodic and verification monitoring is only proposed for residential receivers located within 200 m of the proposal site. Specific notification is only proposed for the nearest receiver.

As described in Section 5.9.1, during construction, it is unlikely that all equipment items would be in use at the same time meaning that the actual noise level is expected to be lower than what has been assessed above and in Appendix G.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Operation

An Environmental Noise Impact Assessment (the Noise Assessment) was prepared by Day Design Pty Ltd (Day Design) to assess the operational noise impacts of the proposal (Day Design, 2024), Appendix H.

It is noted that the Noise Assessment identified the nearest receiver as being 100 m from the proposal site. This 'future' receiver was 36 Gulgong Crescent, Rouse Hill 2155, which was yet to be constructed when the Noise Assessment was undertaken. Due to the developments surrounding the proposal site, additional receivers have been identified since the Noise Assessment was undertaken. The nearest receiver is currently 38 Gulgong Crescent, Rouse Hill 2155, which is located approximately 50 m south of the proposal site. 36 Gulgong Crescent, Rouse Hill 2155 is still yet to be constructed.

The Noise Assessment assessed three proposed options for the transformer. The outcomes of the Noise Assessment have been considered in the design for the proposal. The Noise Assessment was informed by the results of an environmental noise logger which was placed at 35 Junction Road, Grantham Farm from 15 to 22 Aprill 2024.

The Noise Assessment investigated the following transformer options:

– Option 1 – At 105% U_r No-Load with cooling for maximum rating (SPL of 71 dBA)
– Option 2 – At 105% U_r No-Load with cooling for maximum rating (SPL of 63 dBA)
– Option 3 – At 105% Ur No-Load and 2/3 rated load with cooling configuration for 2/3 rated load (SPL of 63 dBA)

The Noise Assessment (Day Design, 2024) identified the relevant criteria for residential receptors as follows:

– 45 dBA during the day
– 43 dBA in the evening
– 38 dBA at night

The Noise Assessment identified the transformers, which are proposed to run continually, as being the main source of noise from the substation.

The Noise Assessment assessed the three proposed transformer options, detailed in Section 2.5.2 and further described in Appendix H, and determined that all three options would meet the acceptable noise level requirements of the NSW EPA's *Noise Policy for Industry*. Provided that the SPL of the new transformers are limited to a maximum level of 80 dBA at 66% load (approximately 73 dBA at no load), the noise emissions at all nearby existing and future sensitive receivers would meet the acceptable noise limits.

Fire walls are included in the proposed Concept Design, see Appendix A. As well as improving safety, firewalls also act a sound barrier which would assist in reducing noise produced during operation.

5.9.4 Mitigation measures

Noise and vibration mitigation measures are provided in Table 5.9.

Table 5.9 Noise and vibration mitigation measures

ID	Mitigation measure
NV1	Noise management controls would be prepared for inclusion in a Construction Noise and Vibration Management Plan (CNVMP) as part of the CEMP.
NV2	Where practical, operate machines at low speed or power and switch off when not in use.
NV3	Regularly inspect all plant and equipment to ensure compliance with industry best practice regarding noise levels and carry out repairs or modifications where necessary.
NV4	Machinery to be operated in accordance with the manufacturer's direction.
NV5	Limit construction activities to the hours between 7:00 am and 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday.
NV6	Contact details would be made available so that complaints can be received and a complaint register maintained.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

ID	Mitigation measure
NV7	Conduct environmental noise awareness inductions for all contractor employees and subcontractors.
NV8	High noise and vibration generating activities may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. High noise refers to construction noise impacts which exceed the highly affected noise management level of 75 dB(A) LAeq (15 min) during standard construction hours.
NV9	Plan and schedule concurrent noisy activities to minimise the number of items of noisy plant operating at one time and cumulative noise levels.
NV10	If OoWH activities are required, an out of hours works approval will be sought from Endeavour Environment Specialist.
NV11	Periodic notification for residents within 200 m will be undertaken via letterbox drop or email to provide project updates and advanced warning of potential disruptions.
NV12	Specific notification will be undertaken for the nearest receiver in the form of a personalised letter or phone call no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives.

5.10 Air quality

5.10.1 Existing environment

The proposal site is located on the northwestern extent of a residential area (Grantham Farm) with land extending to the north and east predominantly used for agriculture purposes and low-density residential properties. As such, local air quality is expected to be influenced by agricultural machinery to a minor extent.

Traffic volumes along Garfield Road East and Junction Road are currently low. Vehicle emissions are therefore expected to be negligible. Both of these roads are sealed and do not produce dust.

Fairwood Rise Rouse Hill, a residential development, is currently being constructed south of the proposal site. The construction of this development is expected to produce dust and emissions from construction vehicles which would have a negative impact on existing local air quality.

The nearest weather station with available wind rose data is Prospect Reservoir Weather Station (site ID 067019) (BOM, 2024) located approximately 15 km south of the proposal site. Available wind rose data shows that prevailing wind is predominantly south-westerly at both 9:00 am and 3:00 pm. Conditions are generally calm, see Figure 5.1.

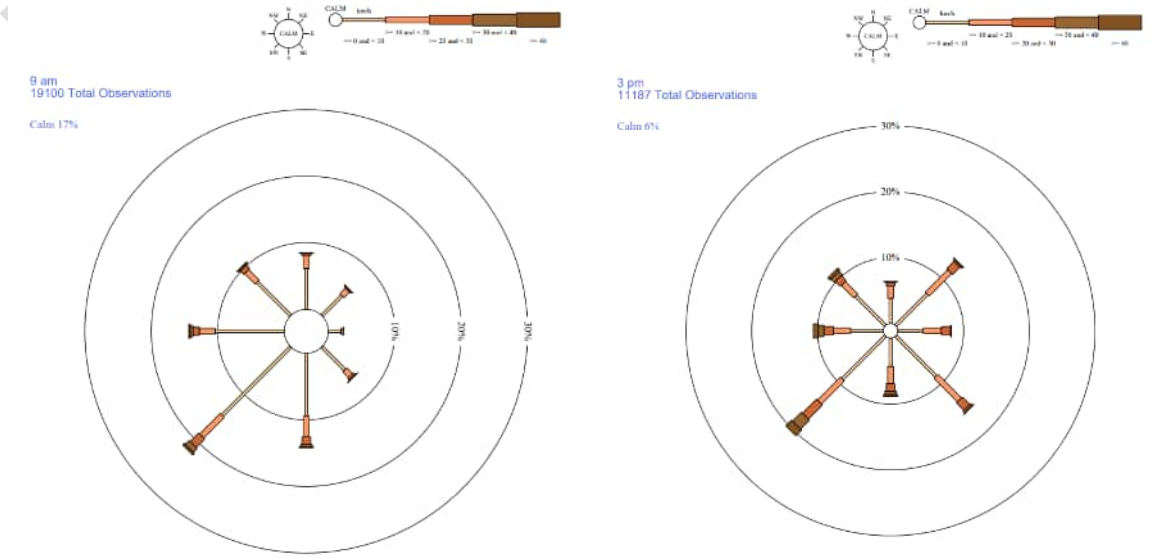


Figure 5.1 Wind rose data (9:00 am and 3:00 pm) from Prospect Reservoir (Source: (BOM, 2024))

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

The National Pollutant Inventory was reviewed on 16 December 2024 and the nearest polluting facility is A J Bush and Sons Riverstone, which is characterised as a meat and meat product manufacturer, located approximately 1.3 km southeast of the proposal site (DCCEEW, 2024).

5.10.2 Potential impacts

Construction

Dust

Potential air quality impacts during construction would be associated with the generation of dust and emissions from the movement of plant and equipment at the substation and associated construction traffic.

The proposal would result in ground disturbance associated with the following earthworks:

– Trenching for underground conduits.
– Excavation for the proposed footings of the control room building and amenities building.
– Excavation for the installation of ancillary features such as driveways, security fencing and site drainage.

As a result, potential dust generation would occur from the following:

– Mechanical disturbance causing dust emissions through the operation of equipment and vehicle movements over the proposal site which is currently unsealed.
– Wind erosion generating dust from exposed disturbed soil surface under high wind speeds during excavation.

The dust load generated over a typical construction day is likely to be minor and is not expected to result in reduced local air quality, provided that adequate mitigation measures are implemented during the works. The potential dust impacts would be localised and due to the distance from sensitive residential receivers, the potential impacts would be minor.

Exhaust emissions from machinery, trucks and construction staff vehicles would also impact local air quality, however, are expected to be minimal to negligible. All vehicles and equipment are expected to be maintained in a serviceable condition such that exhaust emissions are reduced to manufacturer specified levels. Any impacts arising from construction vehicle emissions are expected to be short term and temporary. The construction force required is also relatively small which would reduce potential vehicle emissions.

Potential dust generation during the earthworks required for the proposal would be managed in accordance with the mitigation measures provided in Section 5.10.3.

Sulphur hexafluoride (SF6)

As further discussed in Section 5.3, potential air quality risks may arise due to the incorrect handling of SF6, which high voltage equipment such as transformers may contain. The proposed high voltage equipment, such as the transformers, is likely to contain SF6, a greenhouse gas. If incorrectly handled or stored, the release of SF6 into the atmosphere would have a negative environmental impact. New equipment containing SF6 would be transported and installed by licensed contractors to avoid spills or leaks during construction of the proposal. SF6 spills or leaks will be managed as per EE SMI 122 - Use and Handling of SF6.

Operation

Dust

Air quality impacts associated with dust are not expected during operation because the proposal site would be sealed and stabilised after construction has been completed.

Sulphur hexafluoride (SF6)

SF in high voltage equipment, would be sealed within gas tight compartments and would be monitored for leaks by Endeavour during operation. During operation, in the event of an unplanned release of SF6 from the equipment, the quantity of SF6 potentially being emitted into the atmosphere would likely be minor.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5.10.3 Mitigation measures

Air quality mitigation measures are provided in Table 5.10.

Table 5.10 Air quality mitigation measures

ID	Mitigation measure
AQ01	Dust generated during construction would be visually monitored by construction staff. If dust generation is evident, measures such as water sprays, minimising vehicle movements and reducing vehicle speeds would be implemented as soon as practical.
AQ02	Cover all open trucks transporting spoil and fill to and from the site.
AQ03	Once construction is completed, stabilise all exposed areas through revegetation or similar means.
AQ04	Regularly inspect and maintain all construction equipment to reduce potential for excessive emissions.
AQ05	Cease construction activities if extreme wind conditions prevail.
AQ06	Plant and machinery would be turned off when not in use and maintained in accordance with Australian standards or manufacture recommendations.
AQ07	Any dust complaints will be investigated as soon as possible, and measures taken to manage any impacts identified.
AQ08	No burning of any materials would be permitted on-site.
AQ09	New equipment containing SF6 will be transported and installed by licensed contractors.
AQ010	SF6 spills or leaks will be managed as per EE SMI 122 - Use and Handling of SF6.

5.11 Visual amenity

5.11.1 Existing environment

From the proposal site, the following would be visible:

– Scattered trees and grassland vegetation surrounding the proposal site.
– Low density agricultural properties located to the east of the proposal site, some of which are dilapidated.
– Transmission infrastructure which runs through the northeast quadrant of the proposal site.
– Junction Road, which forms the eastern site boundary.
– Garfield Road East, which forms the southern site boundary.
– Construction associated with Fairwood Rise Rouse Hill, located south of the proposal site.

Ongoing construction of Fairwood Rise Rouse Hill currently impacts the visual amenity of the area due to the presence of construction equipment, vehicles and personnel. Properties associated with Stage 1C of this development, which are yet to be constructed, are located approximately 130 m southeast of the proposal at their nearest point, buffered from the proposal by Garfield Road East. Residents of Fairwood Rise Rouse Hill located along Garfield Road East would have visual access to the proposal site.

Agricultural residences located to the east and south of the proposal site would have intermittent views of the proposal site, broken by scattered trees as well as road infrastructure associated with Junction Road and Garfield Road East.

The proposal site would be directly visible to road users of both Junction Road and Garfield Road East.

5.11.2 Potential impacts

Construction

The proposal would result in temporary changes to visual amenity during the construction period, which would predominantly be experienced by road users and residents of Junction Road and Garfield Road East who would have direct views of the proposal as the works are undertaken.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Plant and equipment laydown, construction vehicles and site compounds may temporarily alter the visual landscape and result in minor impacts to sensitive receivers. Throughout construction, areas would be progressively rehabilitated where possible to minimise unnecessary visual impacts. This approach would ensure that any temporary visual changes are mitigated effectively, preserving the visual quality of the area as much as possible throughout the construction process.

The construction of the proposal will have similar visual character to that of the Fairwood Rise Rouse Hill development which is currently being constructed.

Through the implementation of the recommendations provided below, potential visual impacts are likely to be temporary and minor.

Operation

During operation, the visual amenity of the proposal site would be permanently altered due to the presence of the ZS. Artistic renders of what the ZS would look like during operation are provided in Figure 5.2 and Appendix A. The completed ZS would include feeder bays, a control room, switch room buildings, amenities building, firewalls and security fencing. The design has a maximum height of 15 m (for the proposed lightning masts) and would therefore be visible to road users and nearby residences. There will be the installation of six new steel poles within the boundary of the site.

Endeavour also proposes planting vegetation around the perimeter of the proposed ZS to form a screen, as shown in Appendix A. The Concept Design proposes a total of 29 trees to be planted which would be interspersed with other groundcover planting (Brewster Murray, 2024).

Native trees and groundcover species proposed to be planted include:

– Blueberry Ash (*Elaeocarpus reticulatus*)
– Water Gum (*Tristaniopsis laurina*)
– Hannah Ray *(Callistemon viminalis*
– Tall Baeckea (*Sannantha virgata*)
– Coast Rosemary (*Westringia fruticosa*)
– *Leptospermum scoparium "Rubrum"*
– Mat rush (*Lomandra longifolia*)
– Tanika rush (*Lornandra longifolia "Tanika"*)

This screening vegetation has been designed to limit the visual impacts for nearby properties as well as for road users of Junction Road and Garfield Road East. Screening vegetation would assist with blending the proposal into the surrounding environment. As such, the visual impact during operation is expected to be minor.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.



Figure 5.2 Artistic render of completed ZS (Brewster Murray, 2024)

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5.11.3 Mitigation measures

Visual amenity mitigation measures are provided in Table 5.11.

Table 5.11 Visual amenity mitigation measures

ID	Mitigation measure
VI01	Disturbed areas would be rehabilitated immediately following completion of construction
VI02	All temporary structures, equipment and waste are to be removed at the completion of works
VI03	Contain all work within the boundaries designated on the site plan
VI04	Restore work site to as close to the original condition as possible
VI05	All working areas will be maintained, kept free of rubbish, and cleaned up at the end of each working day.

5.12 Waste

5.12.1 Existing environment

Existing structures onsite would be demolished and remediated prior to the proposal commencing, in accordance with the assessment undertaken in the SER (Endeavour Energy, 2024).

As such, the proposal site would be an undeveloped roadside site which does not produce waste aside from minor quantities of roadside litter.

The nearest waste management facility is Austip Recycling located approximately 2 km northwest of the proposal site. The Northwest Recycling Centre is located approximately 3.4 km southwest of the proposal site.

5.12.2 Potential impacts

Construction

During the construction of the proposal the following waste streams would be generated:

– Excavated spoil not suitable for reuse onsite.
– Vegetation waste not suitable for reuse onsite.
– Liquid wastes such as oils, lubricants, chemicals etc. used by plant equipment.
– Miscellaneous wastes such as scrap metal, timber waste, sewerage, packaging, off cuts and excess materials.
– Workers wastes such as packaging and general waste including food scraps, aluminium cans, glass bottles, plastic and paper containers and putrescible waste generated by site construction personnel.

Any waste generated during the proposal would be managed in accordance with the waste management hierarchy. This provides that waste avoidance is a priority, followed by reuse and recycling/reprocessing, with disposal as a last resort.

All waste would be managed in accordance with the EPA's *Waste Classification Guideline* (EPA, 2014). Wherever possible, suitable excavated spoil would be re-used on site. If, in the unlikely event that re-use opportunities are unable to be identified, or the spoil is unsuitable for re-use due to its geotechnical features or quality, the spoil would be tested and classified according to the EPA Guidelines (EPA, 2014) and disposed of at an appropriately licensed facility. All excavated material generated including virgin excavated natural material (VENM) and excavated natural material (ENM) from the site shall be reused on the site.

It is anticipated only minor waste materials would be generated during construction. Domestic waste generated by construction personnel would be collected in separate waste containers or bags for collection and appropriate recycling or disposal. Through the implementation of the recommendations provided in Section 5.12.3, the potential waste impacts during construction will be minor.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

It is expected there will be off cuts, timbers and various waste. These will be required to be segregated, re-used or recycled as need. A Waste Management Plan (WMP) will be required to implement the WMP hierarchy to manage onsite waste.

Operation

Following the completion of the proposed activity, the site would operate as a ZS. Waste management procedures would be put in place by Endeavour to manage minor quantities of domestic waste or waste produced from maintenance activities.

As such, potential operational waste impacts are anticipated to be negligible.

5.12.3 Mitigation measures

Waste mitigation measures are provided in Table 5.12.

Table 5.12 Waste mitigation measures

ID	Mitigation measure
WA01	All waste will be assessed, classified, managed, and disposed of in accordance with the *Waste Classification Guidelines* (EPA, 2014). Waste will be appropriately transported, stored and handled according to their waste classification and in a manner that prevents pollution of the surrounding environment.
WA02	Use construction materials with recycled content where such materials are available, and cost-competitive with other materials.
WA03	If required, transport of waste material off-site, whether for reuse, recycling or disposal, would be conducted by a licensed waste contractor where required by legislation. All waste transport would be conducted in an environmentally sound manner.
WA04	Minimise the amount of waste material generated, particularly waste construction material.
WA05	All site waste would be managed in accordance with the waste reduction hierarchy of avoid, reduce, re-use and recycle as per the *Waste Avoidance and Resource Recovery Act 2001.*
WA06	Liquid waste is to be contained in appropriate sealed containers.
WA07	All surplus material, off cuts, and other debris resulting from the work shall be removed from site and disposed of by a licenced contractor to a licenced waste management facility.
WA08	Waste material is not to be left on site once the works have been completed.
WA09	If required, provide portable toilets for construction workers. Waste generated will be managed to ensure the appropriate disposal of sewage (e.g. removed by a licensed supplier).
WA10	A Waste Management Plan to be developed and implemented for the project. Waste segregation requirements to be included to prevention of cross-contamination.

5.13 Light pollution

5.13.1 Existing environment

The proposal site is currently an undeveloped, roadside lot which produces no light pollution.

Surrounding light sources currently include light associated with vehicle headlights travelling along Garfield Road East and Junction Road, as well as residential lights associated with surrounding properties.

5.13.2 Potential impacts

Construction

Construction of the proposal would be undertaken during standard hours during daylight. Any night works will be conducted as per the approved Out of Hours Work Protocol (OoHW).

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Operation

After construction is complete, the proposed ZS would include security lighting as well as flood light wall mounts, see Appendix A.

The positioning of this lighting has been designed to minimise potential impacts to vehicles making use of Garfield Road East and Junction Road as well as neighbouring residences. Lighting would be positioned so minimise light spill and impact on fauna.

With the implementation of the mitigation measure provided in Section 5.13.3, no light pollution impacts are anticipated.

5.13.3 Mitigation measures

Light pollution mitigation measures are provided in Table 5.13.

Table 5.13 Light pollution mitigation measures

ID	Mitigation measure
LP01	Proposed operational lighting will be undertaken in accordance with AS/NZS 1158.3.1:2020.
LP02	Use of construction lighting to be identified in CEMP as OoWH.

5.14 Asset lifecycle

5.14.1 Existing environment

There are no existing assets at the proposal site as it is currently an undeveloped allotment.

5.14.2 Potential impacts

Construction

An amenities building is proposed to be constructed as an ancillary facility for the proposed ZS. The existing amenities building at Menangle Park Zone Substation is proposed to be decommissioned and re-installed at the proposal site. This represents a re-use opportunity for the Menangle amenities building, which would otherwise be demolished and the materials disposed of into landfill.

Operation

Opportunities for assets at the ZS to be repurposed when they reach the end of their useable lifespan would be investigated during the operation of the proposal.

Regular maintenance and inspections would be undertaken by Endeavour throughout the lifecycle of the proposal to extend the lifespan of onsite equipment and machinery. Waste mitigation measures proposed in Section 5.12.3 would be implemented to ensure that the waste reduction hierarchy of avoid, reduce, re-use and recycle is adhered to as per the *Waste Avoidance and Resource Recovery Act 2001.*

5.14.3 Mitigation measures

Asset lifecycle mitigation measures are provided in Table 5.14.

Table 5.14 Asset lifecycle mitigation measures

ID	Mitigation measure
AL01	Machinery and equipment at the ZS will be regularly inspected and maintained by Endeavour.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5.15 Socio-economic

5.15.1 Existing environment

The proposal site is located within the Blacktown LGA in Grantham Farms. Grantham Farms had a population of 3,669 people and a median age of 30 years old as of the 2021 Census (ABS, 2021). The primary occupations in Grantham Farms are professionals, clerical and administrative workers and managers.

The proposal site is mapped as RU4 – Primary Production Small Lots under the Blacktown LEP 2015. Garfield Road East, which forms the southern boundary of the site is mapped as SP2 - Classified Road. Land further south is mapped as R2 - Low Density Residential, with land to the west mapped as SP2 - Drainage Infrastructure and RE1 – Public Recreation.

There are 23 receivers identified within 200 m of the proposal site which are comprised of both residential and agricultural properties. Several new residential properties are currently under construction along Garfield Road East as part of the Fairwood Rise Rouse Hill development which is estimated to have approximately 250 properties after completion.

The nearest mapped business is Bluesky Cleaning Management, located approximately 60 m east of the proposal site, buffered from the proposal site by Junction Road.

The Edmund Street regional basin is located approximately 150 m west of the proposal site. This basin is used for stormwater infrastructure. In 2023, Blacktown City Council upgraded this facility by constructing additional stormwater management infrastructure, a play space and wildlife habitat.

5.15.2 Potential impacts

Construction

During construction, the proposal would have a minor negative impact on the surrounding community due to the generation of additional noise, air pollution and construction traffic. Potential construction impacts would be short term and temporary in nature. Mitigation measures have been provided throughout Section 5.3 to manage potential impacts to noise, air quality and traffic.

Construction personnel would require goods and services during construction which may result in a small, positive impact on Grantham Farms and surrounding suburbs.

A CSES has been developed by GHD to manage community impacts and feedback throughout the proposal (GHD, 2025), see Appendix F. The CSES proposes undertaking consultation with all residences within 200 m of the proposal site prior to works commencing and throughout the proposal.

The CSES also proposes undertaking consultation with:

- Department of Planning, Housing and Infrastructure (DPHI).
- Environmental Protection Authority (EPA).
- Transport for NSW (TfNSW).
- Blacktown City Council.
- Fire and Rescue NSW – Blacktown Fire Station.
- NSW State Emergency Service (SES).
- Sydney Water.
- Other local residents with an interest in the proposal.
- Local area businesses and community groups.
- Local action groups.
- Ongoing consultation with residents, agencies and community groups throughout construction is intended to minimise socio-economic impacts by proactively identifying and managing potential issues before they escalate into broader concerns.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

– Mitigation measures provided in Section 5.15.3 as well as the processes outlined in the CSES are anticipated to adequately manage potential socio-economic impacts.

Operation

High security fencing has been proposed around the perimeter of the ZS to limit the risk of trespassing and illegal entry by the community.

During operation, the proposal would result in improved reliability of energy supply which would support future population growth and developments in the local area.

As such, the operation of the proposal would result in social and economic benefits to the community.

5.15.3 Mitigation measures

Socio-economic mitigation measures are provided in Table 5.15.

Table 5.15 Socio-economic mitigation measures

ID	Mitigation measure
SC01	Consultation with landowners located along Junction Road and Garfield Road East will be undertaken to avoid access disruptions or other impacts in line with the recommendations of the CSES (GHD, 2025).
SC02	Local goods and services will be used wherever possible.
SC03	All personnel will exercise courtesy in dealing with the community.
SC04	Display public information signs until construction is complete.
SC05	Carry out community and stakeholder consultation before works start.

5.16 Cumulative

5.16.1 Existing environment

Construction of the Fairwood Rise Rouse Hill development is currently ongoing. This is a staged development with portions of the work already completed. Stage 1C of this development is yet to be completed. Properties associated with this stage are located approximately 130 m southeast of the proposal at their nearest point, buffered from the proposal by Garfield Road East.

A review of the NSW Government's Major Proposals Portal (NSW Government, 2024) was undertaken on 17 December 2024. Concurrent projects within 5 km of the proposal are summarised in Table 5.16.

Table 5.16 Projects within 5 km of the proposal

Project	Status	Description	Distance from proposal
Sikh Grammar School Rouse Hill (SSD-9472)	Approved – yet to be constructed	Construction of a new school for students from Kindergarten to Year 12.	1.9 km south of proposal
New Public School - Tallawong - Modification 1 (SSD-51046975)	Approved - yet to be constructed	The proposed modification seeks to modify conditions relating to finished floor levels, flood management measures and related minor changes to the stormwater plans.	2.5 km southeast of proposal
Mixed use and affordable housing - Schofields Road (SSD-73853210)	Exhibition (ending 21 January 2025)	Construction of a mixed-use development comprising six residential apartment buildings (including affordable housing apartments) with 583 m^2 of retail and basement car parking.	3.45 km south of proposal

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Project	Status	Description	Distance from proposal
Tallawong Station Precinct South Mod 1 (SSD 9063)	Approved - yet to be constructed	Modification to the approved Concept Plan for Tallawong Station Precinct South (SSD 9063) including changes to building footprint, height, car parking rates, and ownership diagrams.	3.45 km southeast of proposal
Commercial Road Private Hospital (SSD-60830206)	Prepare EIS	Construction and operation of a new private hospital.	4.2 km southeast of the proposal
Caddies Hotel (SSD-76903717)	Prepare EIS	The proposal seeks to construct a 13-storey hotel with associated food and drink premises and conference facilities.	4.8 km southeast of the proposal
Tempus Street Rouse Hill Mixed Use BTR Development (SSD-76190964)	Prepare EIS	Construction of a 23-storey mixed-use build-to -rent (BTR) development comprising ground floor retail, commercial premises and co-working space, medical centre, 40 serviced, 122 co-living and 217 BTR apartments and basement car parking.	4.9 km southeast of the proposal

The Blacktown City Council website (Blacktown City Council, 2024) was searched on 17 December 2024. Projects with concurrent timeframes to the proposal within 5 km have been summarised in Table 5.17.

Table 5.17 Blacktown City Council projects within 5 km of the proposal

Project	Status	Description	Distance from proposal
Loftus St and Windsor Road, Grantham Farm	Ongoing - April 2025 completion	Signalised intersection	1.3 km northwest of the proposal site
Reserve 907 Grantham Street	December 2024 to February 2025	Playground and landscaping - playground equipment, landscaping, park furniture	1.7 km northwest of the proposal site
Construction of Kensington Park Road and Bligh Street	Ongoing - April 2025 completion	Road and drainage infrastructure	2.2 km southwest of the proposal site
Reserve 928 – Cranbourne Street, Riverstone	October 2024 to February 2025	Junior playground with play equipment, seating and a concrete pathway	2.2 km southwest of the proposal site
Railway Terrace Upgrade, Schofields – Riverstone Road to Schofields Road	January 2025 to December 2025	New two-lane (one lane in each direction) collector road	2.8 km southwest of the proposal site
Construction of Brighton Street basin, Railway Terrace, Riverstone	Approved - yet to be constructed	Construction of detention basins, bio-retention systems, gross pollutant traps and a culvert under Bright Street	2.6 km southwest of the proposal site
Rouse Road, Rouse Hill bioretention construction	Approved - yet to be constructed	Landscaped open channels, culverts, detention basin, bio basin, and a gross pollutant trap	3.2 km southeast of the proposal site
Advance Street, Schofields – design and construction of stormwater drainage	September 2024 to March 2025	The project includes the installation of approximately 500 meters of new stormwater drainage pipes along Advance Street, Schofields	3.3 km southwest of the proposal site
New neighbourhood park - Reserve 882 - Ken Birdsey Park, Schofields	November 2025 completion	Developing multifunction open space and recreational facilities	4 km south of the proposal site
Pelican Road Bridge	March 2025 to January 2026	36-metre-long bridge structure, 100 metres of new road construction including intersection works	4 km south of the proposal site
Riverstone/Alex Avenue - Trunk Drainage Pelican Road project	Ongoing - July 2025 completion	Construction of landscaped open channels, culverts, detention basin, bio basin, and a gross pollutant trap	4 km south of the proposal site

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Project	Status	Description	Distance from proposal
Construction of new Southern East-West Road, Schofields	Approved - yet to be constructed	Construction of the southern east-west road (R2.1) between Railway Terrace and Alex Avenue	4.1 km southwest of the proposal site
Embellishment of Reserve 890, Pelican Road Schofields	Approved - yet to be constructed	Construction of a local park including landscaping and fencing on Reserve 890	4.2 km southwest of the proposal site
Jacqui Avenue Basin 1 – Schofields	February 2025 to February 2026	Constructing new roads, traffic signals, roundabouts, culverts and landscaped open channels	4.2 km southwest of the proposal site
Ecological restoration project at Reserve 873	August 2024 to May 2025	Conserving and restoring critically endangered Cumberland Plain Woodland via a Vegetation Management Plan (VMP) at Reserve 873 and 822	4.3 km south of the proposal site

5.16.2 Potential impacts

Cumulative impacts have the potential to arise from the interaction of individual elements within the proposal and the added effects of other external proposals. Endeavour is required under Clause 171(2)(o) of the EPandA Regulations to take into account potential cumulative impacts as a result of the proposal.

The SER including the removal of the existing structure and vegetation on the site and development of future feeder works will have a cumulative impact during the construction of the proposal.

Cumulative impacts have the potential to arise depending on the construction timing of Stage 1C of the Fairwood Rise Rouse Hill. Cumulative impacts may include the following:

– Air quality impacts due to dust generation.
– Traffic impacts affecting Garfield Road East and the surrounding road network.
– Noise and vibration from concurrent use of equipment and machinery.
– Visual amenity and socio-economic impacts for the wider community.

Consultation between Endeavour and Fairwood Rise Rouse Hill would be required to mitigate these potential impacts.

Due to the high number of concurrent projects that have been identified within 5 km of the proposal, ongoing consultation between Endeavour and Blacktown City Council would be required in order to mitigate potential cumulative impacts.

Consultation with the relevant proponents of identified SSD projects would be carried out during construction planning to ensure that any potential cumulative impacts are minimised. Any additional mitigation measures from this consultation would be included in the CEMP for the proposal.

Potential cumulative impacts would be managed through the implementation of individual proposal specific environmental safeguards and management measures provided in 5.16.3.

5.16.3 Mitigation measures

Cumulative mitigation measures are provided in Table 5.18.

Table 5.18 Cumulative mitigation measures

ID	Mitigation measure
CU01	Ongoing coordination and consultation with proponents of identified SSD projects, Fairwood Rise Rouse Hill and Blacktown City Council will be undertaken prior to and during construction to: – Increase awareness of construction timeframes and potential impacts. – Coordinate impact mitigation and management (e.g. respite periods).

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

6. Summary of mitigation measures

6.1 Environmental management

During construction of the proposal, appropriate environmental safeguards would be implemented. A summary of site-specific environmental mitigation is provided as detailed in Table 6.1. Environmental safeguards outlined in this document would be incorporated into the Construction Environmental Management Plan (CEMP) and the Operational Environmental Management Plan (OEMP) or equivalent plan. These safeguards would minimise any potential adverse impacts arising from the proposal on the surrounding environment.

The construction contractor would assume day to day operational responsibility for managing the protection and mitigation measures contained within the CEMP, for implementing and monitoring the effectiveness of these measures, for investigating possible improvements to these measures and for preparing and supplying the supplementary plans that are to accompany the CEMP.

6.2 Summary of mitigation measures

In preparation of this REF, potential environmental impacts relating to the proposal have been identified and assessed. The proposal presents a low risk of environmental impact to the environment. Where applicable mitigation measures have been suggested in order to avoid or minimise these impacts. These issues are discussed in Section 6 of this document and the recommended mitigation measures are summarised in Table 6.1.

Table 6.1 Summary of mitigation measures

ID	Mitigation measure
Topography, geology and soils	
SG01	Certified Profession in Erosion and Sediment Control (CPESC) approval may be required. 'Stop work' protocol for suspected contamination and unexpected finds protocols to be applied.
SG02	Prepare and implement an Erosion and Sediment Control Plan (ESCP) that includes soil and erosion protection measures in accordance with the *Managing Urban Stormwater: Soils and construction—Volume 1* (Landcom, 2004).
SG03	Locate stockpiles and construction materials away from vegetation, waterways and drainage lines, implement bunding practices where appropriate.
SG04	Minimise vehicle and machinery movement across exposed soil surfaces.
SG05	Minimise exposure of soils and retain vegetation where practicable.
SG06	All erosion and silt control devices will be visually inspected weekly by the contractor to ensure effectiveness as well as after each rainfall event.
SG07	Stockpiles would be designed, established, operated, and decommissioned in accordance with the *Stockpile Site Management Guidelines* (LGNSW, 2015).
SG08	The rehabilitation of disturbed areas will be carried out progressively as construction stages are completed, and in accordance with *Managing Urban Stormwater: Soils and Construction* (4th edition) (Landcom, 2004).
SG09	The contractor is to prepare an Environmental Incident Response Plan to include procedures for the storage and handling of hazardous materials including fuel and chemicals as follows: – Refuelling of machinery to occur offsite or in accordance with an approved refuelling management plan. – Storage of hazardous materials on-site to be in accordance with national guidelines and the safety data sheets relating to bunding, coverage, storage of incompatible materials, etc. – Appropriate spill kits would be kept on site at all times for potential chemical or fuel spills.
SG010	Construction contractors will be trained in the correct use of the spill kits.
Hazards and risks	
HAZ1	In unexpected contamination is encountered, works will cease, and Endeavour's Environmental Specialist will be contacted.
HAZ2	SF6 spills or leaks will be managed as per EE SMI 122 - Use and Handling of SF6.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

ID	Mitigation measure
HAZ3	The fire danger rating will be checked daily prior to works commencing. If fire danger is rated at very high or higher or a total fire ban is declared, Endeavour will advise the contractor whether works are to proceed or if all personnel are to be stood down.
Surface water, hydrology and groundwater	
W01	The storage and handling of fuels and chemicals would comply with Australian Standard AS1940.
W02	Prepare a spill management plan, runoff management plan and discharge criteria as per blue book requirements.
W03	All fuels and hazardous materials and liquids are to be safely stored on ground level in a sealed bunded area away from existing stormwater drainage systems and waterways.
W04	Refuelling, fuel decanting and vehicle maintenance work if required would take place in a designated sealed and bunded area within the construction compound area, or offsite. The compound areas would not be established under the dripline of any existing trees.
W05	Water quality control measures would be used to prevent any materials (e.g. concrete, grout, sediment etc) entering drain inlets or waterways.
W06	No works would be undertaken during heavy rain. Weather forecasts would be monitored daily.
W07	A designated wash down area is required to be established. Wash down will use water with excess debris removed using hand tools. Wash down waste must be filtered before release, and away from all waterways.
W08	A Construction Water Management Plan (CWMP) to be prepared for the implementation of the project.
W09	A spill management, runoff management and discharge criteria are to be prepared as per blue book requirement.
W010	Refuelling, fuel decanting and vehicle maintenance work, if required, would take place in a designated sealed and bunded area within the construction compound areas or offsite.
Biodiversity	
BIO1	As part of the site induction process, provide all site personnel with information on the biodiversity values of the study area, including threatened species, no-go areas and responsibilities under relevant environmental legislation, including but not limited to the EPandA Act, BC Act, FM Act and EPBC Act.
BIO2	Should unexpected, threatened fauna be located at any time during construction, work should cease immediately in the area to prevent further harm to the individual. Contact Endeavour's Environmental Specialist and a suitably qualified ecologist to determine if further assessment is required. Works to only recommence on advice from Endeavour's Environmental Specialist or a suitably qualified ecologist.
BIO3	Where clearing is required, establish exclusion zones to ensure clearing does not extend beyond the approved proposal site identified in the REF.
BIO4	To stop the spread of pathogens, the basic hygiene guidelines detailed in *Saving our Species - Hygiene guidelines - Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomi, myrtle rust, amphibian chytrid fungus and invasive plants* (DPIE, 2020) will be implemented.
BIO5	Manage adjacent areas of vegetation clearing in accordance with the following measures to reduce the potential invasion of noxious weed species: – Clean machinery, vehicles and footwear before moving to a new location. – Dispose of weed-contaminated soil at an appropriate location.
BIO6	The proposal site should be checked prior to works commencing for any signs of fire ants or fire ant nests. If observed, immediately notify DPI on 1800 680 244 or https://forms.bfs.dpi.nsw.gov.au/forms/9247**.** Characteristic of the ants or nests can be found at https://www.dpi.nsw.gov.au/dpi/bfs/insect-pests/rifa/Seen-them-call-us.
Aboriginal heritage	
AH01	If any Aboriginal objects, sites or places (or potential Aboriginal objects, site or places) are discovered during any construction work, all works in the vicinity will cease and the area will be appropriately protected. The Endeavour Project Manager is to be notified and an archaeologist engaged to undertake a site inspection to assess the find. Following the on-site assessment, the archaeologist and RAPs (if they attended the site) are to advise on whether further management, mitigation or approvals are required in consultation with Heritage NSW. Should Aboriginal objects be identified, these are to be registered in the AHIMS. An AHIP would also need to be obtained to impact the site.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

ID	Mitigation measure
AH02	In the highly unlikely event that potential human skeletal material is identified over the course of the proposed works, the following procedure would be followed in accordance with the *Policy Directive – Exhumation of Human Remains* (NSW Department of Health, 2008), *Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office, 1998) and the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS, 1997): – Works in the vicinity of the remains would halt immediately. The contractor would notify the project manager who would in turn contact Heritage NSW. – If the remains are suspected to be human, a physical or forensic anthropologist would inspect the remains in situ, and make a determination of whether the remains are human and if so, the likely ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or forensic). – If the remains are identified as forensic the area would be deemed as a crime scene. – If the remains are identified as Aboriginal, the site would be secured and Heritage NSW and all registered Aboriginal parties would be notified in writing. – If the remains are non-Aboriginal (historical) remains, the site is to be secured and Heritage NSW contacted. – This process functions only to appropriately identify the remains and secure the site. From this time, the management of the remains would be determined through liaison with the appropriate stakeholders (NSW Police Force, forensic anthropologist, Heritage NSW, registered Aboriginal parties etc) and in accordance with the Public Health Act 2010.
Non-Aboriginal heritage	
NA01	In the event that a site or artefact as defined by the *Heritage Act 1977* is identified during construction works, works must cease immediately at the location and no further harm to the object shall occur. The contractor will engage the Heritage Division, DCCEEW and a qualified heritage consultant, in accordance with Section 146 of the *Heritage Act 1977*, to determine an appropriate course of action prior to the recommencement of work in the area of the item. No work must commence in the vicinity of the find until any required approvals have been given by the Heritage Division.
Traffic and transport	
TT01	A Traffic Management Plan (TMP) will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The TMP will include: – Consultation with Blacktown City Council, emergency service providers and residents to time works to reduce impacts. – Consultation with TfNSW regarding widening access from Garfield Road East. – Site specific traffic control measures (including signage) to manage and regulate traffic movement. – Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. – A response plan for any construction traffic incident. – Comply with Blacktown City Council requirements regarding traffic control, access and road/ pedestrian access.
Noise and vibration	
NV1	Noise management controls would be prepared for inclusion in a Construction Noise and Vibration Management Plan (CNVMP) as part of the CEMP.
NV2	Where practical, operate machines at low speed or power and switch off when not in use.
NV3	Regularly inspect all plant and equipment to ensure compliance with industry best practice regarding noise levels and carry out repairs or modifications where necessary.
NV4	Machinery to be operated in accordance with the manufacturer's direction.
NV5	Limit construction activities to the hours between 7:00 am and 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday.
NV6	Contact details would be made available so that complaints can be received and a complaints register maintained.
NV7	Conduct environmental noise awareness inductions for all contractor employees and subcontractors.
NV8	High noise and vibration generating activities may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. High noise refers to construction noise impacts which exceed the highly affected noise management level of 75 dB(A) LAeq (15 min) during standard construction hours.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

ID	Mitigation measure
NV9	Plan and schedule concurrent noisy activities to minimise the number of items of noisy plant operating at one time and cumulative noise levels.
NV10	If OoWH activities are required, an out of hours works approval will be sought from Endeavour Environment Specialist.
NV11	Periodic notification for residents within 200 m will be undertaken via letterbox drop or email to provide project updates and advanced warning of potential disruptions.
NV12	Specific notification will be undertaken for the nearest receiver in the form of a personalised letter or phone call no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives.
Air quality	
AQ01	Dust generated during construction would be visually monitored by construction staff. If dust generation is evident, measures such as water sprays, minimising vehicle movements and reducing vehicle speeds would be implemented as soon as practical.
AQ02	Cover all open trucks transporting spoil and fill to and from the site.
AQ03	Once construction is completed, stabilise all exposed areas through revegetation or similar means.
AQ04	Regularly inspect and maintain all construction equipment to reduce potential for excessive emissions.
AQ05	Cease construction activities if extreme wind conditions prevail.
AQ06	Plant and machinery would be turned off when not in use and maintained in accordance with Australian standards or manufacture recommendations.
AQ07	Any dust complaints will be investigated as soon as possible, and measures taken to manage any impacts identified.
AQ08	No burning of any materials would be permitted on-site.
AQ09	New equipment containing SF_6 will be transported and installed by licensed contractors.
AQ010	SF6 spills or leaks will be managed as per EE SMI 122 - Use and Handling of SF6.
Visual amenity	
VI01	Disturbed areas would be rehabilitated immediately following completion of construction.
VI02	All temporary structures, equipment and waste are to be removed at the completion of works.
VI03	Contain all work within the boundaries designated on the site plan.
VI04	Restore work site to as close to the original condition as possible.
VI05	All working areas will be maintained, kept free of rubbish, and cleaned up at the end of each working day.
Waste	
WA01	All waste will be assessed, classified, managed, and disposed of in accordance with the *Waste Classification Guidelines* (EPA, 2014). Waste will be appropriately transported, stored and handled according to their waste classification and in a manner that prevents pollution of the surrounding environment.
WA02	Use construction materials with recycled content where such materials are available, and cost-competitive with other materials.
WA03	If required, transport of waste material off-site, whether for reuse, recycling or disposal, would be conducted by a licensed waste contractor where required by legislation. All waste transport would be conducted in an environmentally sound manner.
WA04	Minimise the amount of waste material generated, particularly waste construction material.
WA05	All site waste would be managed in accordance with the waste reduction hierarchy of avoid, reduce, re-use and recycle as per the *Waste Avoidance and Resource Recovery Act 2001.*
WA06	Liquid waste is to be contained in appropriate sealed containers.
WA07	All surplus material, off cuts, and other debris resulting from the work shall be removed from site and disposed of by a licenced contractor to a licenced waste management facility.
WA08	Waste material is not to be left on site once the works have been completed.
WA09	If required, provide portable toilets for construction workers. Waste generated will be managed to ensure the appropriate disposal of sewage (e.g. removed by a licensed supplier).

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

ID	Mitigation measure
WA10	A Waste Management Plan to be developed and implemented for the project. Waste segregation requirements to be included to prevention of cross-contamination.
Light pollution	
LP01	Proposed operational lighting will be undertaken in accordance with AS/NZS 1158.3.1:2020.
LP02	Use of construction lighting to be identified in CEMP as OoWH.
Asset lifecycle	
AL01	Machinery and equipment at the ZS will be regularly inspected and maintained by Endeavour.
Socio-economic	
SC01	Consultation with landowners located along Junction Road and Garfield Road East will be undertaken to avoid access disruptions or other impacts in line with the recommendations of the CSES (GHD, 2025).
SC02	Local goods and services will be used wherever possible.
SC03	All personnel will exercise courtesy in dealing with the community.
SC04	Display public information signs until construction is complete.
SC05	Carry out community and stakeholder consultation before works start.
Cumulative	
CU01	Ongoing coordination and consultation with proponents of identified SSD projects, Fairwood Rise Rouse Hill and Blacktown City Council will be undertaken prior to and during construction to: – Increase awareness of construction timeframes and potential impacts. – Coordinate impact mitigation and management (e.g. respite periods).

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

7. Conclusion

The proposal is subject to assessment under Division 5.1 of the EPandA Act. This REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposal.

This has included consideration (as relevant) of impacts on threatened species and ecological communities and their habitats and other protected fauna and native plants, as well as the cultural heritage significance of the site. It has also considered potential impacts to MNES listed under the EPBC Act.

The proposal, as described in this REF, best meets the objectives stated in Section 2.1. The REF identifies the likely impacts of the proposal on the environment and details the environmental safeguards and mitigation measures to be implemented as part of a contractor's CEMP for the proposal.

– The proposal would be unlikely to cause a significant impact on the environment. Therefore, does not necessitate the preparation of an EIS nor approval to be sought from the Minister for Planning under Division 5.2 of the EPandA Act. A BDAR or SIS is not required as the proposal is not likely to 'significantly affect threatened species'.
– The proposal is not likely to have a significant impact on MNES nor the environment of Commonwealth land within the meaning of the EPBC Act (Commonwealth). A referral to the DCCEEW is not required.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

8. Certification and review

This REF provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal. In light of the above assessment of the proposed activity, it is considered that the overall impact on the environment is likely to be minimal and therefore acceptable. The long-term benefits of the activity will have a cumulative positive impact on the safety of road users and the activity should proceed accordingly.

Reviewed and endorsed by:

Signature:

Name:

Title:

Date:

Endeavour review by:

Signature:

Name:

Title:

Date:

Endeavour approval by:

Signature:

Name:

Title:

Date:

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

9. References

ABS. (2021). *Grantham Farms 2021 Census All Persons QuickStats*. Retrieved from https://www.abs.gov.au/census/find-census-data/quickstats/2021/SAL11743

ARPANSA. (2010). *Guidelines for limiting exposure to EMF*.

Blacktown City Council. (2024). *BCC Maps Online*. Retrieved from https://maps.blacktown.nsw.gov.au/

Blacktown City Council. (2024). *Blacktown City Council - Ward 1 Projects*. Retrieved from https://www.blacktown.nsw.gov.au/About-Council/What-we-do/Construction-works-and-projects/Ward-1-projects?dlv_BCC%20CL%20Public%20Works%20and%20Projects%20for%20Ward=(pageindex=2)

BOM. (2024). *Climate Data Online - Prospect Reservoir Weather Station*. Retrieved from http://www.bom.gov.au/climate/averages/tables/cw_067019.shtml

Brewster Murray. (2024). *Grantham Farm Zone Substation - Concept Design.*

DCCEEW. (2024). *National Pollutant Inventory*. Retrieved from https://www.npi.gov.au/npidata/action/load/map-search.

DCCEEW. (2024). *Protected Matters Search Tool*. Retrieved from https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool

DECC. (2009). *Interim Construction Noise Guideline*. Retrieved from https://www.environment.nsw.gov.au/resources/noise/09265cng.pdf

DECCW. (2010). *Due Diligence Code of Practice.*

DPE. (2022). *Guidelines for Division 5.1 assessments .*

DPE. (2024a). Retrieved from NSW BioNet. The Website for the Atlas of NSW Wildlife: http://www.bionet.nsw.gov.au/

DPI. (2024b). *Fisheries NSW Spatial Data Portal.* Retrieved from https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=Fisheries_Data_Portal

DPIE. (2020). *Hygiene Guidelines - Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomi, myrtle rust, amphibian chytrid fungus and invasive plants.*

Elvis. (2024). *Elvis - Elevation and Depth - Foundation Spatial Data*. Retrieved from **https://elevation.fsdf.org.au/**

Endeavour Energy. (2024). *RIT-D Draft Project Assessment Report.*

EPA. (2014). *Waste Classification Guidelines - Part 1: Classifying waste.* Retrieved from https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/wasteregulation/140796-classify-waste.pdf

ePlanner. (2024). *NSW Planning Portal Spatial Viewer*. Retrieved from https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address

Fairwood Rise Rouse Hill. (2025). *Fairwood Rise Rouse Hill Masterplan*. Retrieved from https://www.fairwoodrise.com.au/masterplan

GHD. (2025). *Community and Stakeholder Engagement Strategy (CSES).*

Heritage NSW. (2024). *State Heritage Inventory*. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/SearchHeritageItems?_ga=2.165972984.714120821.1658117920-344545924.1656901875

Landcom. (2004). *Blue Book - Managing Urban Stormwater | Soils and Construction | Volume 1, 4 Edition.*

Landcom. (2004). *Managing Urban Stormwater: Soils and construction—Volume 1.*

Landcom. (2024). *Riverstone Scheduled Lands - Precinct A (Stages 1-3)*. Retrieved from https://www.landcom.com.au/projects/riverstone-scheduled-lands-precinct-a-stages-1-3

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

LGNSW. (2015). Stockpile Site Management Guideline. Retrieved from https://www.lgnsw.org.au/Public/Public/Policy/REM-pages/REF_Templates-Resources.aspx

MinView. (2024). *MinView Regional NSW Mining Exploration and Geoscience* . Retrieved from https://minview.geoscience.nsw.gov.au/#/?lon=150.1501andlat=-29.80139andz=15andbm=bm3andl=

NPWS. (1997). Aboriginal Cultural Heritage Standards and Guidelines Kit.

NSW Department of Health. 2008. Policy Directive – Exhumation of Human Remains

NSW EPA. (2024). Contaminated land database.

NSW eSpade. (2024). *NSW Soil and Land Information*. Retrieved from https://www.environment.nsw.gov.au/eSpade2Webapp/#

NSW Government. (2020). *Saving our Species - Hygiene guidelines - Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomi, myrtle rust, amphibian chytrid fungus and invasive plants* . Retrieved from https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Wildlife-management/saving-our-species-hygiene-guidelines-200164.pdf

NSW Government. (2024). *BioNet Atlas Search*. Retrieved from https://atlas.bionet.nsw.gov.au/UI_Modules/ATLAS_/AtlasSearch.aspx

NSW Government. (2024). *Major Project Planning Portal*. Retrieved from https://www.planningportal.nsw.gov.au/major-projects

NSW Heritage Office. (1998). Skeletal Remains – Guidelines for the Management of Human Skeletal Remains

SEED. (2024). Retrieved from https://geo.seed.nsw.gov.au/vertigisstudio/web/?app=cabd04d595ec43c1aaf4298e80e83ec2

TfNSW. (2022). *Standard Management Procedure – Unexpected Heritage Items.*

TfNSW. (2024). *Transport for NSW Restricted Access Vehicles Map*. Retrieved from https://maps.transport.nsw.gov.au/egeomaps/restricted-access-vehicles-map/index.html

TfNSW. (2022). *Transport for NSW Noise Calculator Tool.* Retrieved from EMF-NV-TT-0067_Construction-and-Maintenance-Noise-Estimator

WaterNSW. (2024). *WaterNSW. All Groundwater Site details*. Retrieved from https://realtimedata.waternsw.com.au/water.stm?ppbm=GW026058andagand0andagpf_org

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Appendices

Appendix A

Concept design

C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF_r.tranM8LGV.rvt
2/08/2024 12:58:00 PM

GRANTHAM FARM ZONE SUBSTATION - CONCEPT DESIGN

LOT 99, DP1282712
PROJECT ADDRESS: 265 GARFIELD ROAD EAST, GRANTHAM FARM 2765

Endeavour Energy

AUGUST 2024

REVISION: **B**

DRAWING LIST

DWG No:	SCALE	DWG TITLE
533165	N/A	COVER SHEET
533166	NTS	DESIGN AND CHARACTER STATEMENT
533167	N/A	EXISTING VIEW - SHEET 1
533168	N/A	PHOTOMONTAGE - SHEET 1
533169	N/A	EXISTING VIEW - SHEET 2
533170	N/A	PHOTOMONTAGE - SHEET 2
533171	1:1000@A3	LOCALITY PLAN
533172	1:700@A3	SITE AND ROOF PLAN
533173	1:200@A3	FLOOR PLANS
533174	1:200@A3	STREET ELEVATIONS
533175	1:200@A3	SWITCH ROOM BUILDING ELEVATIONS
533176	1:100@A3	SWITCH ROOM BUILDING SECTIONS
533177	NTS	LANDSCAPE PLAN
533178	N/A	PLANTING SCHEDULE

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988

brewstermurray.com.au

Development Application Design & Character Statement
Endeavour Energy

GRANTHAM FARM ZONE SUBSTATION

THE PROPOSAL

GRANTHAM FARM ZONE SUBSTATION IS LOCATED ON AN EXISTING GREENSITE - PROPOSED AT 265 GARFIELD ROAD EAST, GRANTHAM FARM NSW 2765.

THE NEW OUTDOOR ZONE SUBSTATION WILL COMPRISE OF THE FOLLOWING:

- CONSTRUCTION OF 2 NEW 132/11 kV 45 MVA TRANSFORMERS WITH ASSOCIATED BUNDS, FIRE WALLS, OIL SEPARATORS AND SPILL BARRIER.
- CONSTRUCTION OF 2 NEW 11 kV PREFABRICATED SWITCH ROOM BUILDINGS WITH AN ABOVE GROUND CABLE MARSHALLING AREA AND STEEL LOADING DOCK.
- CONSTRUCTION OF A NEW PREFABRICATED CONTROL ROOM BUILDING.
- INSTALLATION OF AN EXISTING AMENITIES BUILDING WHICH WILL BE DECOMMISSIONED FROM MENANGLE PARK ZONE SUBSTATION.
- INSTALLATION OF ALL ASSOCATED UNDERGROUND CABLE CONDUITS.
- CONSTRUCTION OF ALL RELATED SITE-WORKS INCLUDING DRIVEWAY PAVEMENTS, GRAVEL YARD SURFACING AND SECURITY FENCING.
- INSTALLATION OF BUILDING AND SITE STORMWATER DRAINAGE.

DESIGN VERIFICATION

THE FOLLOWING DESIGN VERIFICATION STATEMENT WAS PREPARED BY MR. MICHAEL BULLEN, DIRECTOR OF BREWSTER MURRAY PTY. LTD. - ARCHITECTS, INTERIOR & URBAN DESIGNERS.

CONTEXT

GRANTHAM FARM ZONE SUBSTATION IS SURROUNDED BY A MIX OF AGRICULTURAL, COMMERCIAL, INDUSTRIAL, AND RURAL RESIDENTIAL BUILDINGS. THE PROPOSED 132/11 kV ZONE SUBSTATION WILL ACCOMODATE ESSENTIAL ELECTRICAL DISTRIBUTION EQUIPMENT AND SUPPLY TO MEET THE FUTURE RESIDENTIAL AND COMMERCIAL DEVELOPMENTS WITHIN THE RIVERSTONE PRECINCT. FURTHERMORE, THE KEY ELEMENTS OF THE PROPOSED BUILDINGS HAVE BEEN CAREFULLY CONSIDERED AND DESIGNED IN ORDER TO MINIMISE IMPACT ON THE AMENITIY OF THE FUTURE NEIGHBOURING PROPERTIES AND STREETSCAPE.

THE SITE HAS ROAD FRONTAGE TO

- NORTHERN BOUNDARY - EXISTING JUNCTION RD/RURAL PARKLANDS
- EASTERN BOUNDARY - EXISTING JUNCTION RD/GARFIELD RD EAST
- SOUTHERN BOUNDARY - EXISTING GARFIELD RD EAST/FUTURE RESIDENTIAL SETTING
- WESTERN BOUNDARY - FUTURE RESIDENTIAL SETTING

DESIGN RESPONSE

IN LIGHT OF THE ABOVE CONTEXT, THE FOLLOWING CONSIDERATIONS HAVE BEEN APPLIED TO THE DESIGN OF GRANTHAM FARM ZONE SUBSTATION:

- ONLY HIGH-QUALITY, LOW-MAINTENANCE DURABLE EXTERNAL MATERIALS HAVE BEEN SELECTED.
- A TIMBER POST AND GALVANISED STEEL ROD FENCE WILL SURROUND THE SITE BOUNDARY.
- A HIGH-SECURITY MESH FENCE AND SIMILAR GATES WILL SURROUND THE SWITCHYARD, SWITCH ROOM, TRANSFORMER BAYS, AMENITIES, AND CONTROL ROOM BUILDINGS.
- THE PROPOSED DESIGN UTILISES A MODULAR DESIGN - STEEL FRAMING WITH LIGHTWEIGHT METAL CLADDING AND LOUVRES INCLUDING TRIMS AND METAL ROOF SHEETING. THE WAVE-LIKE CLADDING IS INSPIRED BY THE MEANDERING FORM OF THE EXISTING FIRST PONDS CREEK.
- A NEW STORMWATER SYSTEM WILL BE INSTALLED TO COLLECT ALL STORMWATER RUN-OFF FROM THE SITE.

MATERIAL FINISHES


COLORBOND 'PALE EUCALYPTUS'


COLORBOND 'WOODLAND GREY'


COLORBOND 'SHALE GREY'


COLORBOND 'WINDSPRAY'


ALPOLIC 'SILVER METALLIC'


GALVANISED STEEL


NATURAL CONCRETE FINISH


DULUX 'TEAHOUSE'

SCHEDULE OF EXTERNAL COLOURS AND MATERIALS

REFER TO MATERIAL PALETTE FOR PROPOSED FINISHES LISTED BELOW.

NEW 11kV SWITCH ROOM BUIILDING (S)

WALL CLADDING:
- **MC1** - LIGHTWEIGHT METAL CLADDING - ALPOLIC 'SILVER METALLIC'
- **MC2** - LIGHTWEIGHT METAL CLADDING - COLORBOND 'PALE EUCALYPTUS'

METAL ROOF CLADDING:
- **MD1** - LIGHTWEIGHT METAL CLADDING - COLORBOND 'WOODLAND GREY'
  GUTTERS - COLORBOND 'WOODLAND GREY'
  DOWNPIPES - COLORBOND 'WOODLAND GREY'
  FASCIA BOARD - COLORBOND 'WOODLAND GREY'
- **MC3** - METAL CLAD ROOF SOFFIT - COLORBOND 'WOODLAND GREY'

EXTERNAL DOOR FRAMES, DOORS & VENTILATION LOUVRES:
- **PC1** - POWDER COATED PAINT FINISH - TO MATCH COLORBOND 'WOODLAND GREY'
- **P1** - PAINT FINISH - DULUX 'TEAHOUSE'
- **GALV** - STAIR HANDRAILS

NEW CONTROL ROOM

WALL CLADDING:
- **MC1** - LIGHTWEIGHT METAL CLADDING - ALPOLIC 'SILVER METALLIC'
- **MC2** - LIGHTWEIGHT METAL CLADDING - COLORBOND 'PALE EUCALYPTUS'

METAL ROOF CLADDING:
- **MD1** - LIGHTWEIGHT METAL CLADDING - COLORBOND 'WOODLAND GREY'
  GUTTERS - COLORBOND 'WOODLAND GREY'
  DOWNPIPES - COLORBOND 'WOODLAND GREY'
  FASCIA BOARD - COLORBOND 'WOODLAND GREY'
- **MC3** - METAL CLAD ROOF SOFFIT - COLORBOND 'WOODLAND GREY'

EXTERNAL DOOR FRAMES, DOORS & VENTILATION LOUVRES:
- **PC1** - POWDER COATED PAINT FINISH - TO MATCH COLORBOND 'WOODLAND GREY'
- **P1** - PAINT FINISH - DULUX 'TEAHOUSE'
- **GALV** - STAIR HANDRAILS

MENANGLE PARK ZS AMENITIES BUILDING (EXISTING)

WALL CLADDING:
- **MC4** - LIGHTWEIGHT METAL CLADDING - COLORBOND 'SHALE GREY'

METAL ROOF CLADDING:
- **MD2** - LIGHTWEIGHT METAL CLADDING - COLORBOND 'WINDSPRAY'
  GUTTERS - COLORBOND 'WINDSPRAY'
  DOWNPIPES - COLORBOND 'WINDSPRAY'
  FASCIA BOARD - COLORBOND 'WINDSPRAY'
- **MC5** - METAL CLAD ROOF SOFFIT - COLORBOND 'WINDSPRAY'

EXTERNAL DOOR FRAMES, DOORS & VENTILATION LOUVRES:
- **PC1** - POWDER COATED PAINT FINISH - TO MATCH COLORBOND 'SHALE GREY'
- **P1** - PAINT FINISH - DULUX 'TEAHOUSE'

NEW TRANSFORMER BUND & OIL SPILL BARRIERS
- **CONC** - CONCRETE - NATURAL FINISH
- **MC4** - LIGHTWEIGHT METAL CLADDING - COLORBOND 'SHALE GREY'

brewster murray
Architecture
Interiors
Urban Design
Project Management
ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF
B	02.08.24	ISSUED FOR REF

Consultants

Client: Endeavour Energy

Project: GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD EAST, GRANTHAM FARM NSW 2765

Drawing: DESIGN AND CHARACTER STATEMENT

North

Scale: NTS

Date: AUG. 2024

Job No.: 24-6613

Drawing No.: 533166 / B

Issued for: REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.
© Copyright 2022

C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF_r.tranM8LGV.rvt
2/08/2024 12:58:03 PM



01 | EXISTING VIEW FROM GARFIELD RD E

SCALE N/A

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev	Date	Description
A	17.07.24	ISSUED FOR REF

Consultants

Client: Endeavour Energy

Project: GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD
EAST, GRANTHAM FARM
NSW 2765

Drawing: EXISTING VIEW - SHEET 1

North

Scale: N/A

Date: JUL. 2024

Job No.: 24-6613

Drawing No.: 533167 / A

Issued for: REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.
© Copyright 2022

C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF_r.tranM8LGV.rvt
2/08/2024 12:58:05 PM



02 AERIAL VIEW FROM GARFIELD RD E

SCALE N/A

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF
B	02.08.24	ISSUED FOR REF

Consultants

Client

Endeavour Energy

Project

GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD
EAST, GRANTHAM FARM
NSW 2765

Drawing

PHOTOMONTAGE - SHEET 1

North

Scale

N/A

Date

AUG. 2024

Job No.

24-6613

Drawing No.

533168 / B

Issued for

REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.
© Copyright 2022

C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF_r.tranM8LGV.rvt
2/08/2024 12:58:08 PM



04 | STREET VIEW FROM CNR GARFIELD RD EAST & JUNCTION RD

SCALE N/A

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF
B	02.08.24	ISSUED FOR REF

Consultants

Client

Endeavour Energy

Project

GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD EAST, GRANTHAM FARM NSW 2765

Drawing

PHOTOMONTAGE - SHEET 2

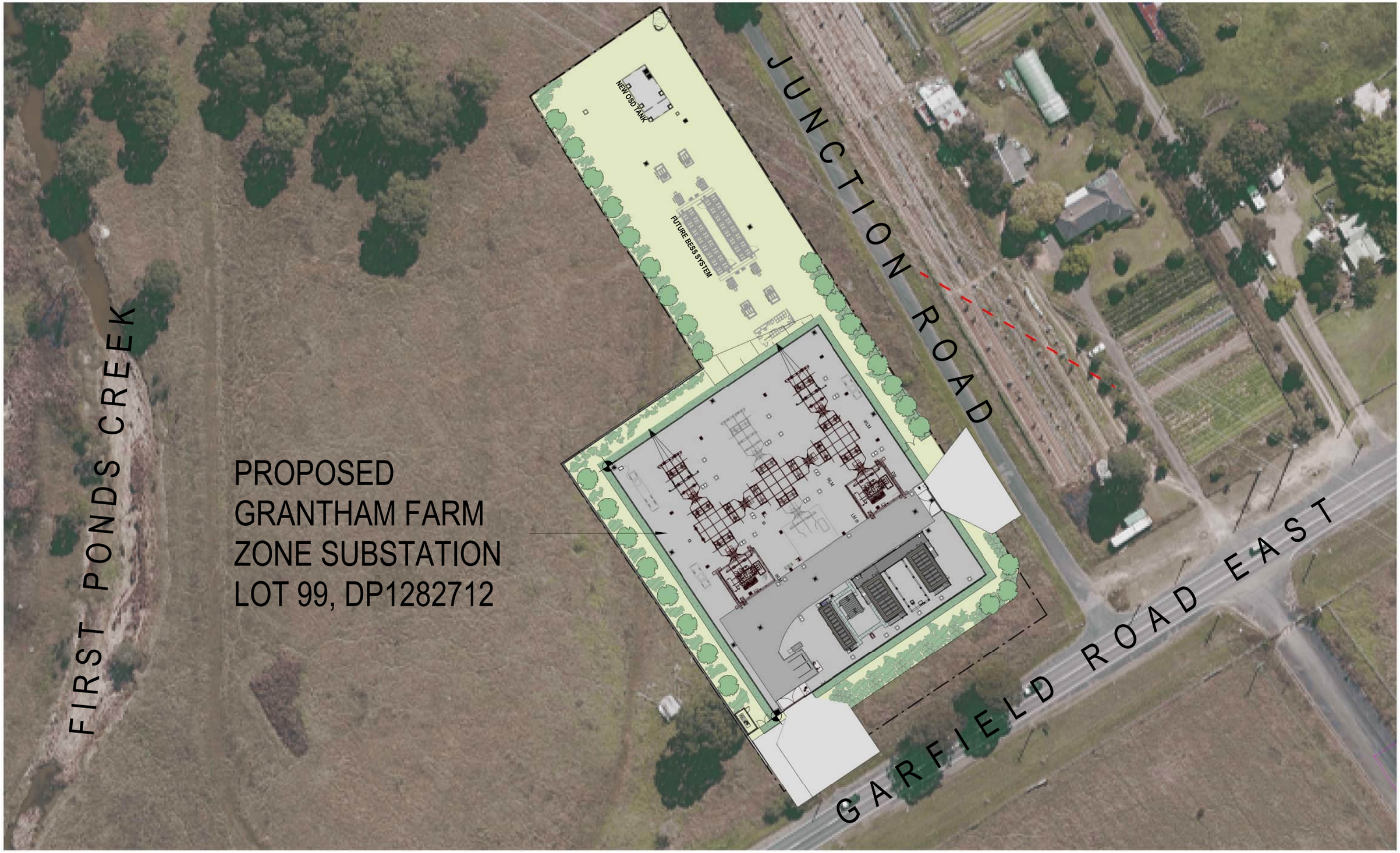
North	Scale	Date	Job No.	Drawing No.
	N/A	AUG. 2024	24-6613	533170 / B

Issued for

REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.
© Copyright 2022

C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF_r.tranM8LGV.rvt
2/08/2024 12:58:15 PM



01 | LOCALITY PLAN

SCALE 1 : 1000

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF
B	24.07.24	ISSUED FOR REF
C	02.08.24	ISSUED FOR REF

Consultants

Client

Endeavour Energy

Project

GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD EAST, GRANTHAM FARM NSW 2765

Drawing

LOCALITY PLAN

North	Scale	Date	Job No.	Drawing No.
	1: 1000	AUG. 2024	24-6613	533171 / C

Issued for

REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.
© Copyright 2022

C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF_r.tranM8LGV.rvt
2/08/2024 12:58:45 PM

DEMOLISH EXISTING PROPERTY PRIOR TO BENCHING OF SITE

EXISTING TREES TO BE REMOVED PRIOR TO BENCHING OF SITE

FIRE HYDRANT BOOSTER AND NSF ENCLOSURE

DRIVEWAY EXTENSION

4.0m WIDE REMOVABLE ACCESS GATES

1.0m WIDE WALKWAY SHOWN HATCHED.

2.0m WIDE GRAVEL BUFFER ZONE ALL AROUND HIGH - SECURITY MESH FENCE

SITE BOUNDARY SETOUT POINT (SOP1)

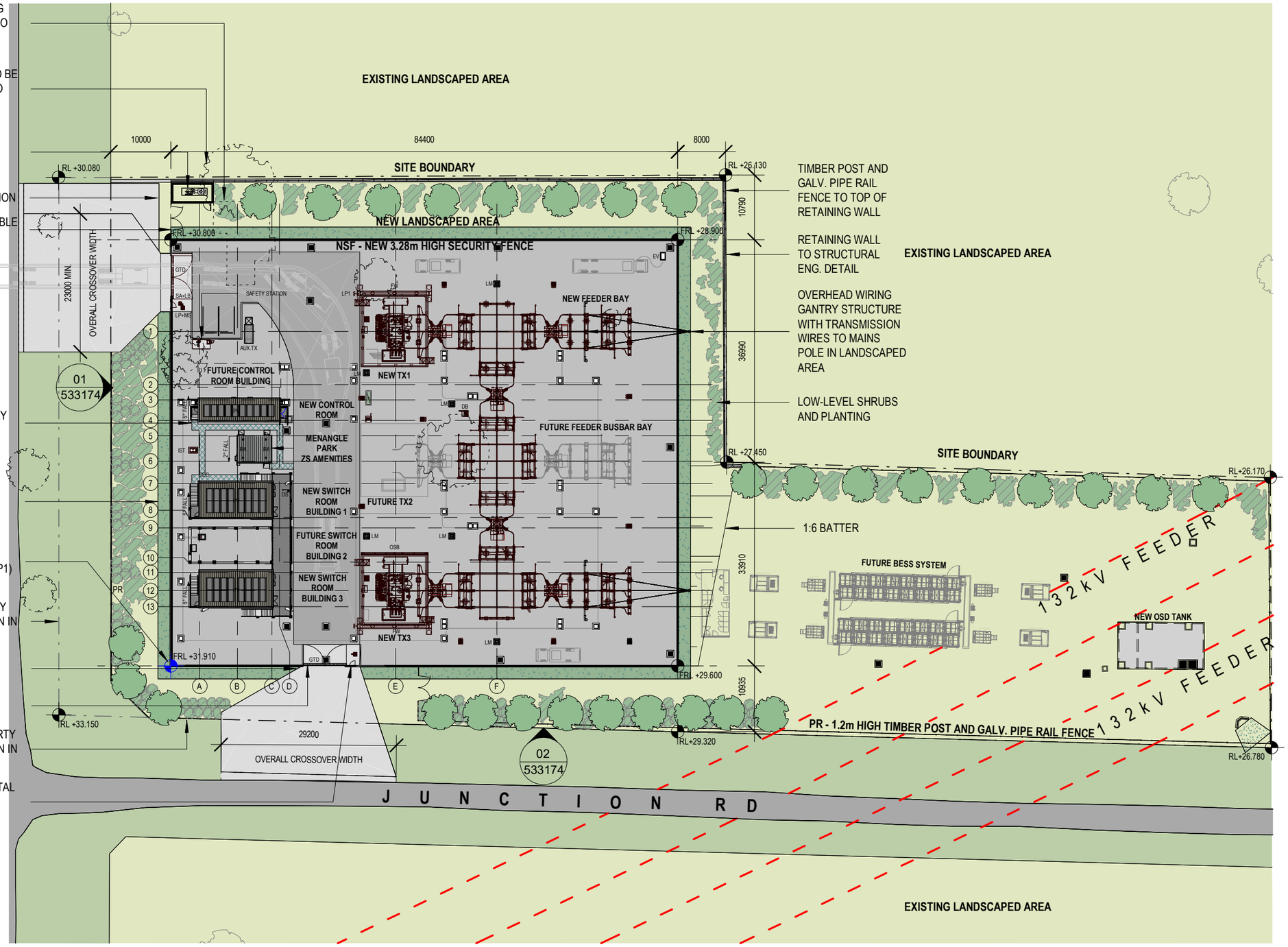
EXISTING PROPERTY BOUNDARY - SHOWN IN GREY

NEW CONCRETE DRIVEWAY

NEW 7.2m WIDE SECURITY GATES

PROPOSED PROPERTY BOUNDARY - SHOWN IN BLACK

NEW 1.0m WIDE METAL MESH PERSONNEL SECURITY GATE



LEGEND:

- PROPOSED SITE BOUNDARY
- NSF - NEW 3.28m HIGH PERIMETER METAL MESH SECURITY FENCE & MOWING STRIP
- PR - 1.2m HIGH TREATED TIMBER POST AND GALVANISED PIPE RAIL FENCE ON BOUNDARY
- BUFFER ZONE (LOOSE GRAVEL WITH PINE-TREATED EDGE)
- EXISTING TREES TO BE REMOVED (REFER TO SURVEY)
- NEW TREES (REFER TO LANDSCAPE DRAWINGS)
- NEW PLANTING (REFER TO LANDSCAPE DRAWINGS)
- CCP — CONTROL CABLE PIT BY CONTRACTOR
- SW — STORMWATER PIT
- SA+LB — SECURITY ARMING + YARD LIGHT SWITCH BOLLARD
- LP+MS — LIGHT POLE + MOTION SENSOR
- PROPOSED SITE BOUNDARY POINTS
- GRID SETOUT POINT AT (0,0)

AUX TX	AUXILIARY TRANSFORMER
DB	DISTRIBUTION PANEL
DS	DELUGE SHOWERS
EC	EARTH STICK STORAGE ROOM
EV	EV CHARGING STATION
FW	4-HOUR RATED FIRE WALL
GTD	GRATED TRENCH DRAIN
IST	ISOLATION TRANSFORMER
LM	15.0m HIGH LIGHTNING MAST
LP	LIGHT POLE AND FOOTINGS
LP1	FLOOD LIGHT WALL MOUNT
OSB	OIL SPILL BARRIER
PV	FLUSH MOUNTED PHOTOVOLTAIC PANELS
RA	ROOF ANCHORS
SEC	SECURITY CAMERAS
SFC	STREAMLINE FILTER SUPPLY CUBICLE

01 | SITE/ROOF PLAN

SCALE1 : 700

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF
B	17.07.24	ISSUED FOR REF
C	24.07.24	ISSUED FOR REF
D	02.08.24	ISSUED FOR REF
E	07.08.24	ISSUED FOR REF

Consultants

Client: Endeavour Energy

Project: GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD EAST, GRANTHAM FARM NSW 2765

Drawing: SITE AND ROOF PLAN

North | Scale: 1: 700 | Date: AUG. 2024 | Job No.: 24-6613 | Drawing No.: 533172 / E

Issued for: REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect. © Copyright 2022

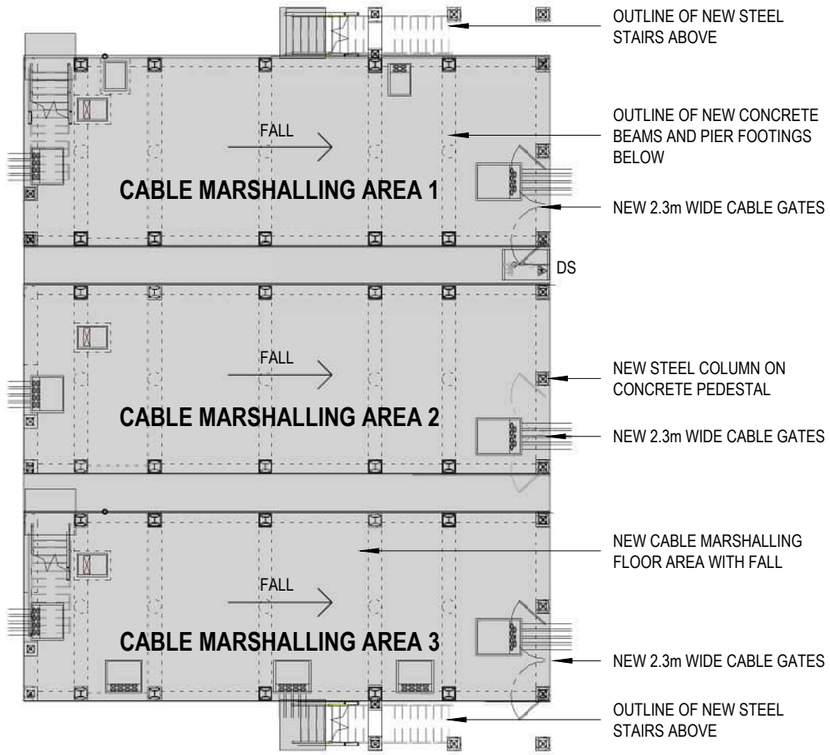
K:\100 - PROJECT\2024\24-6613 - EE - Grantham Farm ZS - Concept Design\04 - Drawings\03 - REF\24-6613 - Grantham Farm ZS - REF.rvt
7/08/2024 3:34:47 PM

GENERAL NOTE

INTERNAL LAYOUT, EQUIPMENT SPECIFICATIONS, AND BUILDING SIZES DEPICTED IN THIS DOCUMENT ARE PRELIMINARY AND SUBJECT TO CHANGE. FINAL DETAILS WILL BE DETERMINED FOLLOWING RECEIPT OF ADDITIONAL INFORMATION AND REQUIREMENTS FROM THE PRINCIPAL DURING THE DETAIL DESIGN PHASE.

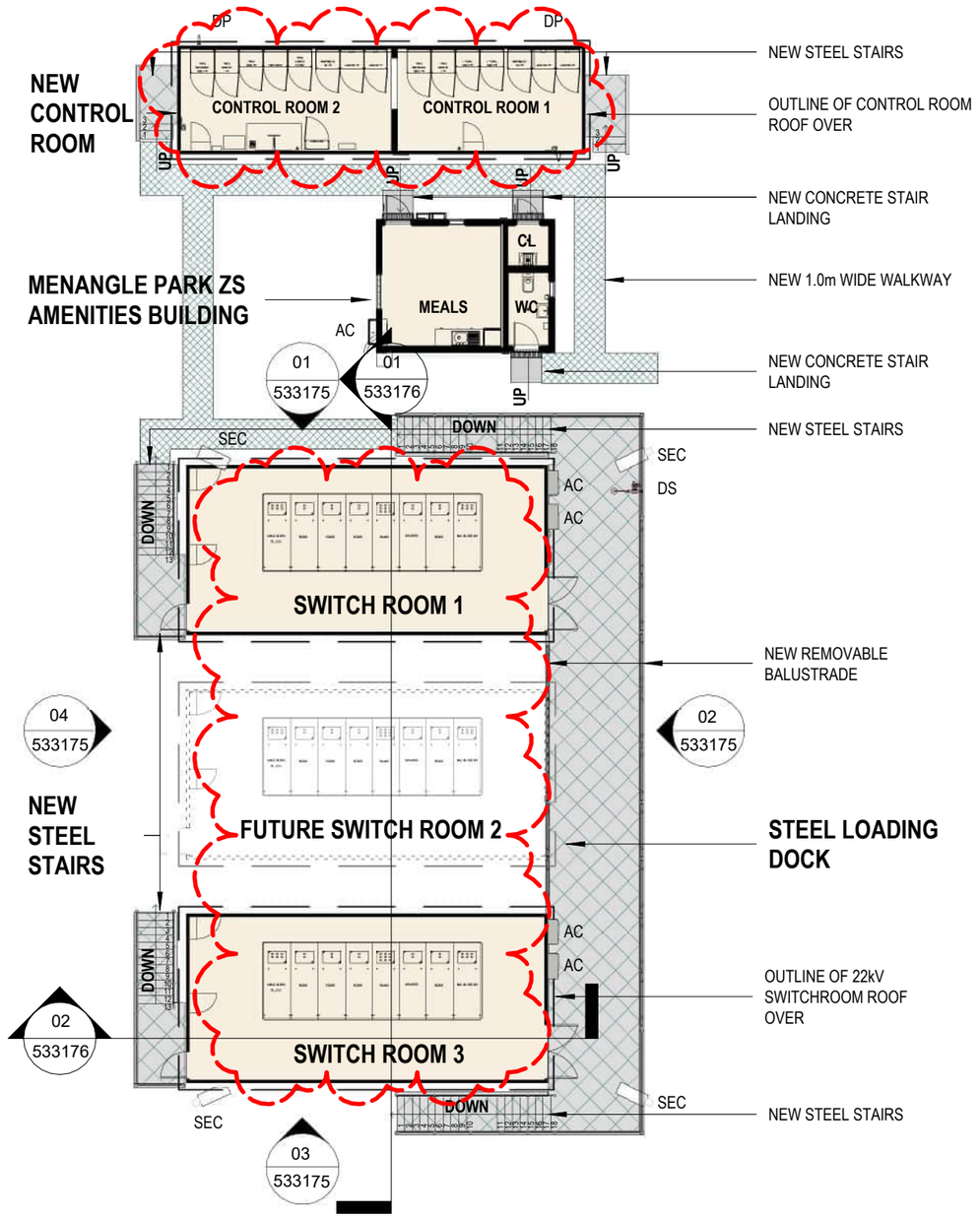
LEGEND:

A/C	A/C CHANGEOVER CABINET
AC	AIR CONDITIONING UNIT
CCP	CABLE CONTROL PIT
DP	DOWNPIPE
DS	DELUGE SHOWERS
SEC	SECURITY CAMERAS



01 | CABLE MARSHALLING AREA

SCALE 1 : 200



02 | GROUND FLOOR LEVEL

SCALE 1 : 200

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF
B	02.08.24	ISSUED FOR REF

Consultants

Client

Endeavour Energy

Project

GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD
EAST, GRANTHAM FARM
NSW 2765

Drawing

FLOOR PLANS

North

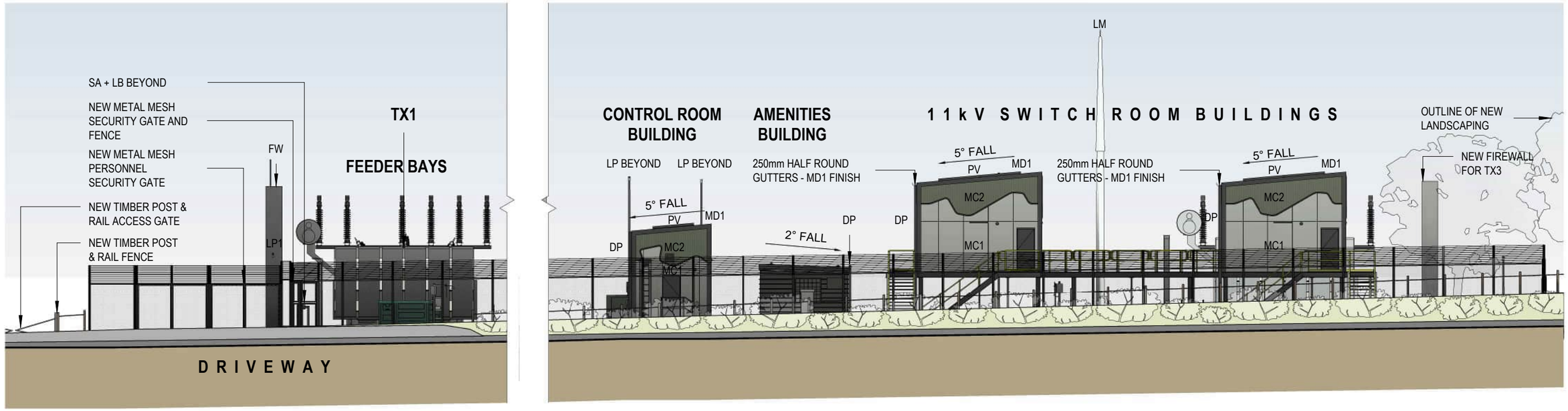
Scale	Date	Job No.	Drawing No.
1: 200	AUG. 2024	24-6613	533173 / B

Issued for

REF

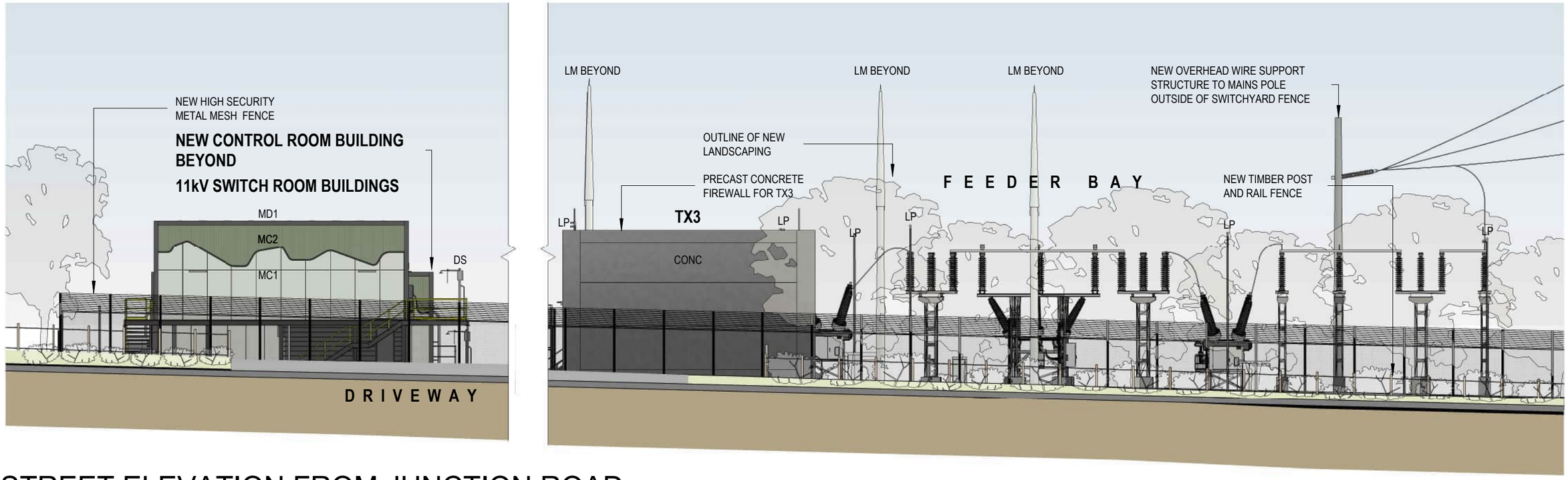
Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect. © Copyright 2022

C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF_r.tranM8LGV.rvt
2/08/2024 12:59:21 PM



01 STREET ELEVATION FROM GARFIELD ROAD EAST

SCALE 1 : 200



02 STREET ELEVATION FROM JUNCTION ROAD

SCALE 1 : 200

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF
B	02.08.24	ISSUED FOR REF

Consultants

Client

Endeavour Energy

Project

GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD
EAST, GRANTHAM FARM
NSW 2765

Drawing

STREET ELEVATIONS

North	Scale	Date	Job No.	Drawing No.
	1: 200	AUG. 2024	24-6613	533174 / B

Issued for

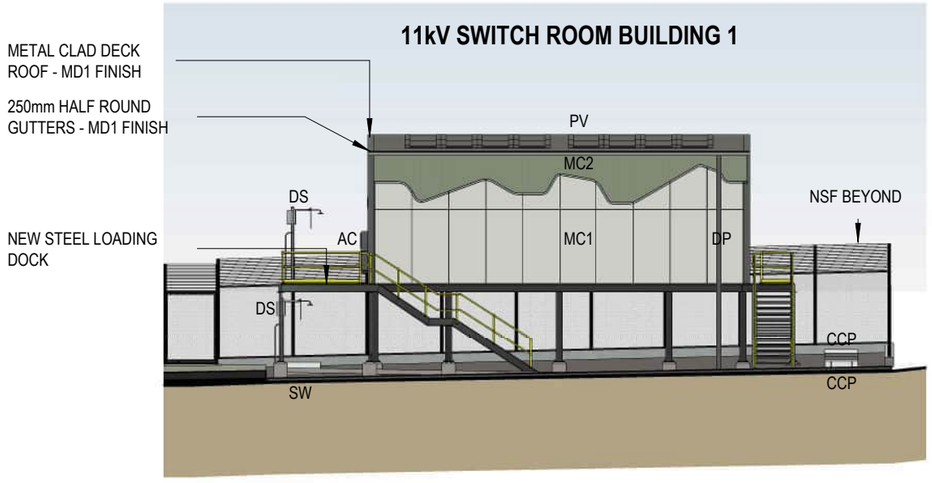
REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.
© Copyright 2022

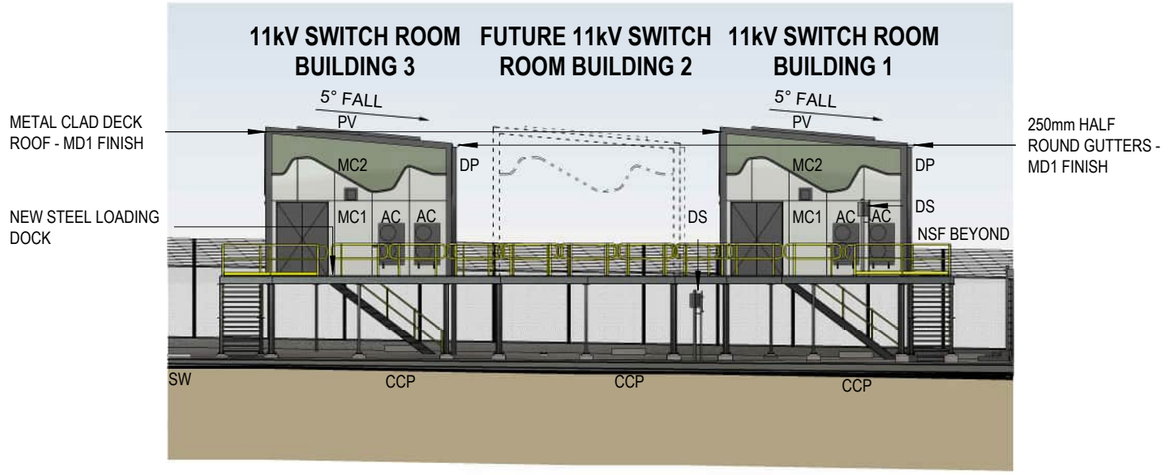
C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF_r.tranM8LGV.rvt
2/08/2024 1:00:35 PM

LEGEND:

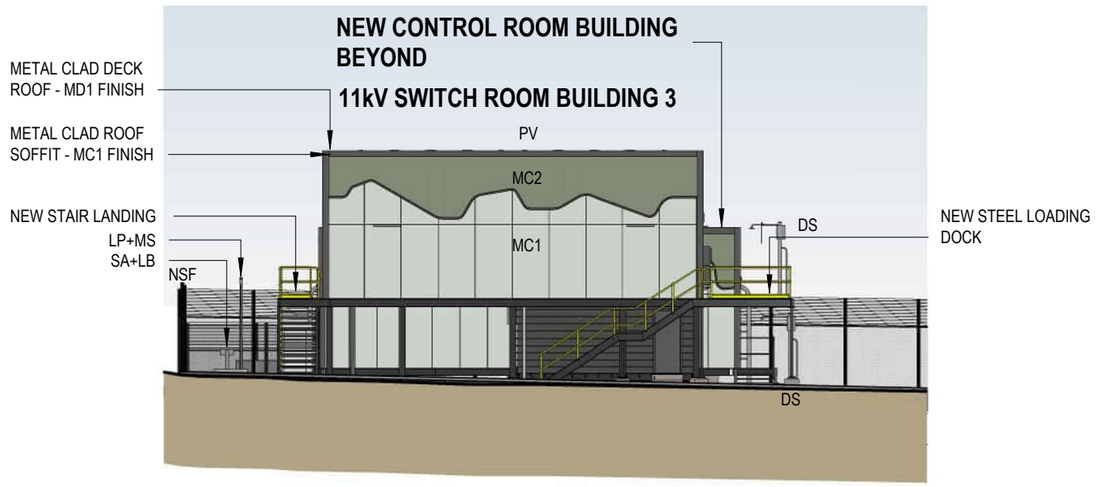
AC	AIR CONDITIONING UNIT
CCP	CABLE CONTROL PIT
DP	DOWNPIPE
DS	DELUGE SHOWERS
IST	ISOLATION TRANSFORMER
NSF	HIGH-SECURITY FENCE
PV	FLUSH MOUNTED PHOTOVOLTAIC PANELS
SW	STORMWATER PIT



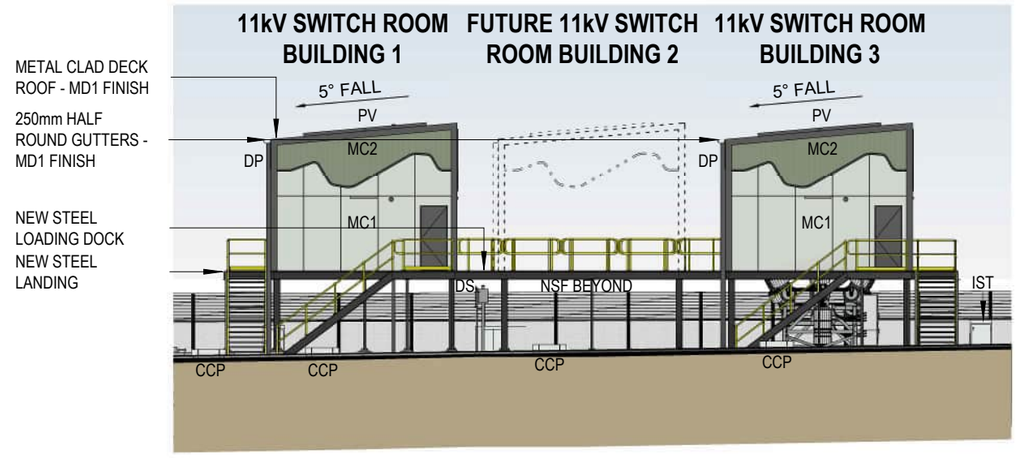
01 ELEVATION 1
SCALE 1 : 200



02 ELEVATION 2
SCALE 1 : 200



03 ELEVATION 3
SCALE 1 : 200



04 ELEVATION 4
SCALE 1 : 200

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF

Consultants

Client

Endeavour Energy

Project
GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD
EAST, GRANTHAM FARM
NSW 2765

Drawing
SWITCH ROOM BUILDING ELEVATIONS

North

Scale
1: 200

Date
JUL. 2024

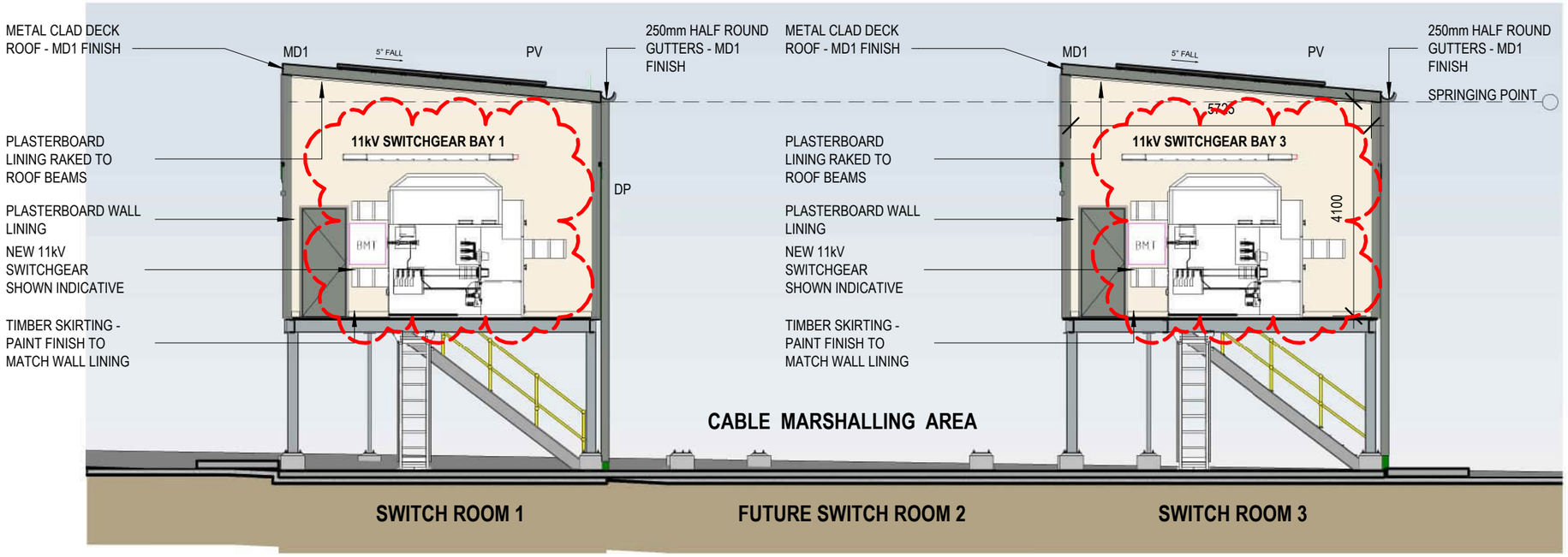
Job No.
24-6613

Drawing No.
533175 / A

Issued for
REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.
© Copyright 2022

C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF _r.tranM8LGV.rvt
2/08/2024 1:01:04 PM

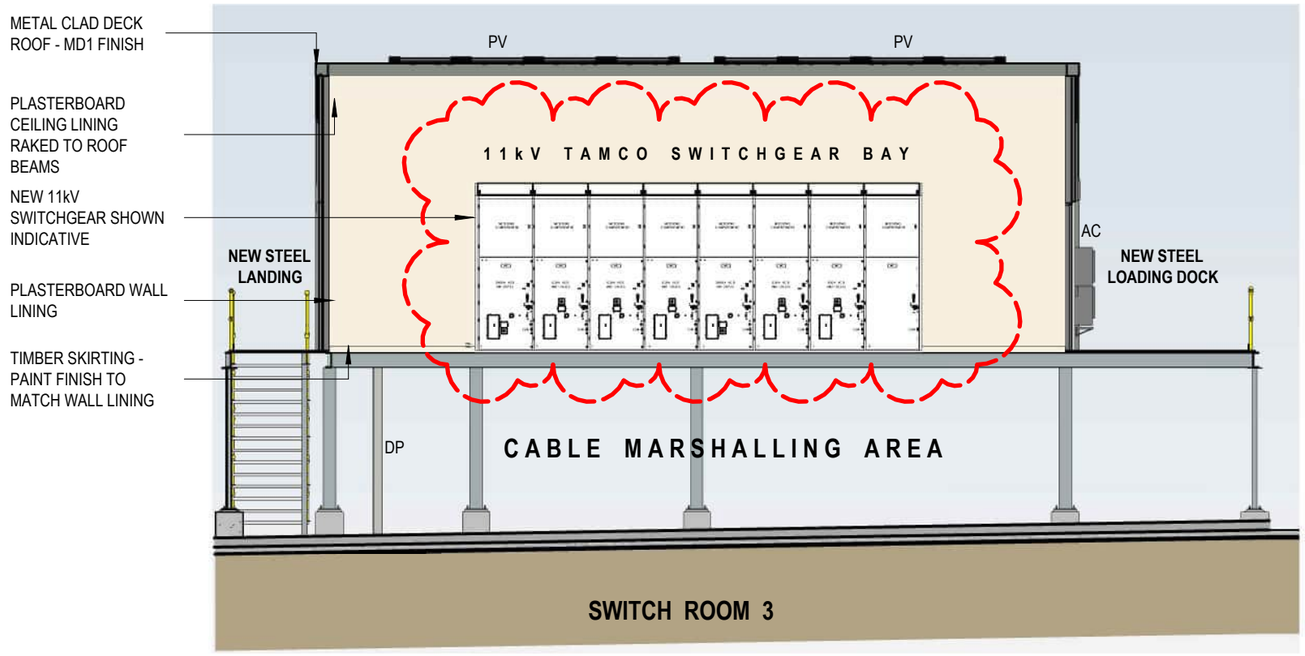


GENERAL NOTE

INTERNAL LAYOUT, EQUIPMENT SPECIFICATIONS, AND BUILDING SIZES DEPICTED IN THIS DOCUMENT ARE PRELIMINARY AND SUBJECT TO CHANGE. FINAL DETAILS WILL BE DETERMINED FOLLOWING RECEIPT OF ADDITIONAL INFORMATION AND REQUIREMENTS FROM THE PRINCIPAL DURING THE DETAIL DESIGN PHASE.

01 | SWITCH ROOM - LONG SECTION

SCALE 1 : 100



02 | SWITCH ROOM - CROSS SECTION

SCALE 1 : 100

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF
B	02.08.24	ISSUED FOR REF

Consultants

Client: Endeavour Energy

Project: GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD
EAST, GRANTHAM FARM
NSW 2765

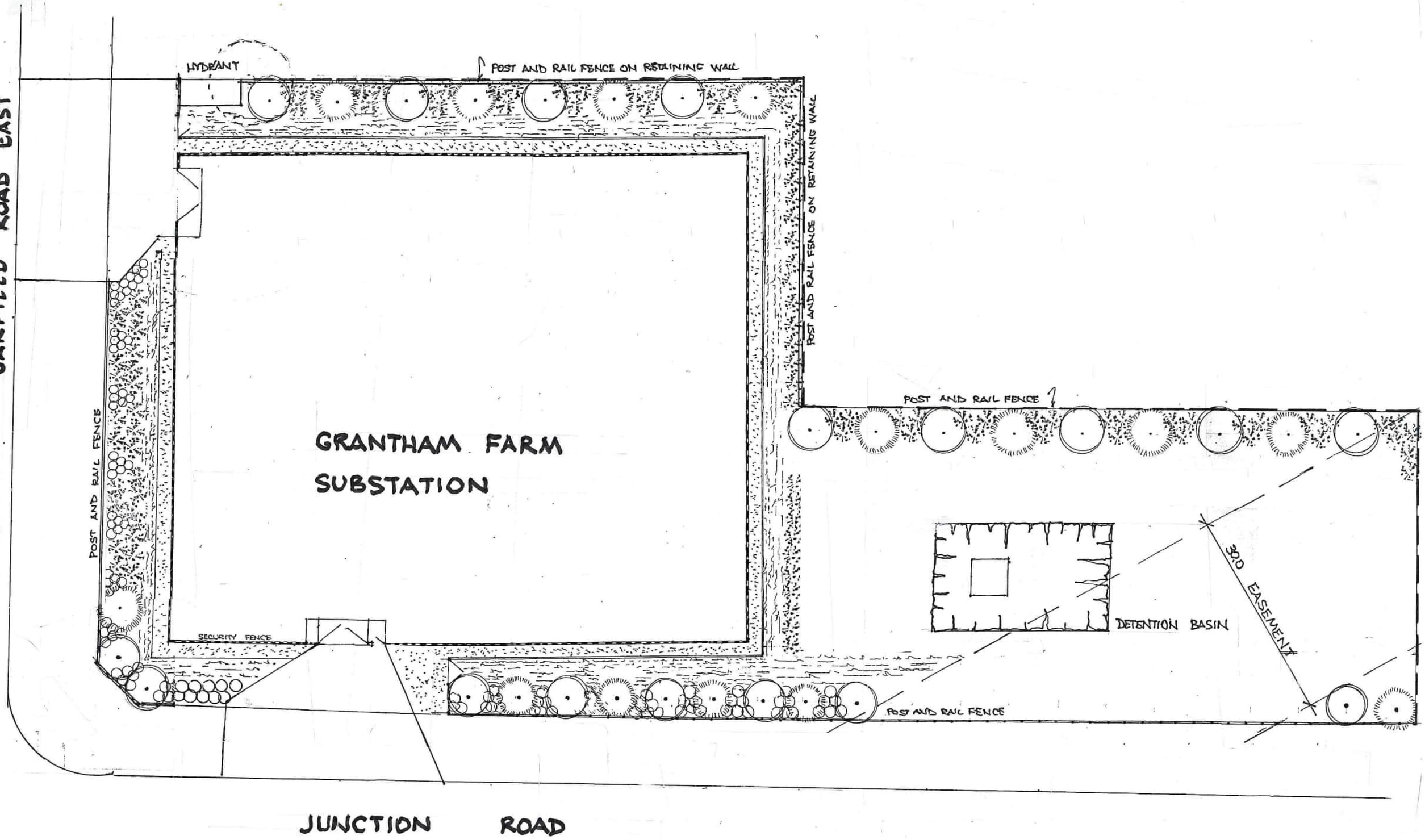
Drawing: SWITCH ROOM BUILDING SECTIONS

North	Scale	Date	Job No.	Drawing No.
	1: 100	AUG. 2024	24-6613	533176 / B

Issued for: REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.
© Copyright 2022

C:\Users\r.tran\Documents\24-6613 - Grantham Farm ZS - REF_r.tranM8LGV.rvt
2/08/2024 1:01:08 PM



brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev

Issue	Date	Description
A	17.07.24	ISSUED FOR REF

Consultants

PRECINCT LANDSCAPES

Client

Endeavour Energy

Project

GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD EAST, GRANTHAM FARM NSW 2765

Drawing

LANDSCAPE PLAN

North

Scale

NTS

Date

JUL. 2024

Job No.

24-6613

Drawing No.

533177 / A

Issued for

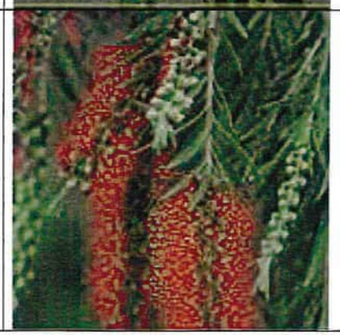
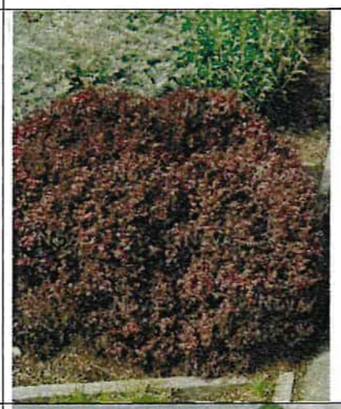
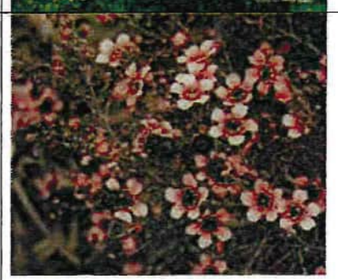
REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.

© Copyright 2022

GRANTHAM FARM SUBSTATION PRELIMINARY PLANT SCHEDULE

Tall trees (Eucalyptus, Angophora spp) not selected or proposed as their canopies within a 10 metre wide planting zone are likely to extend over the substation compound.

Botanic name/ Common Name Mature Size on this site SYMBOL	General Form of Plant	Detail of foliage
Elaeocarpus reticulatis Blueberry Ash Tree to 8m x 5 m		
Tristaniopsis laurina Water Gum Tree to 10m x 5m		
Callistemon Hannah Ray Screening shrub to 4m		
Sannantha virgata Tall Baeckea Screening hedge shrub to 3m		
Westringea fruiticosa Coast Rosemary to 1.500m		
Leptospermum scoparium "Rubrum" Groundcover shrub to 1.000m		
Lomandra longifolia Mat rush Rush form to 900mm		
Lomandra longifolia "Tanika" Tanika Rush form to 750mm		

NOTE:
Rushes could be substituted with conventional turf but mowing becomes a constant maintenance issue.

Rushes such as Lomandra spp, Dianella etc require little maintenance

Native grasses not recommended due to potential fire hazard

brewster murray

Architecture
Interiors
Urban Design
Project Management

ABN 63 804 200 206
99 York Street
Sydney NSW 2000
Australia
+612 9299 0988
brewstermurray.com.au

Rev	Date	Description
A	17.07.24	ISSUED FOR REF

Consultants

PRECINCT LANDSCAPES

Client

Endeavour Energy

Project

GRANTHAM FARM ZONE SUBSTATION

265 GARFIELD ROAD
EAST, GRANTHAM FARM
NSW 2765

Drawing

PLANTING SCHEDULE

North	Scale	Date	Job No.	Drawing No.
	N/A	JUL. 2024	24-6613	533178 / A

Issued for

REF

Verify all dimensions before commencing work. Use figured dimensions.
Do not scale off drawing. This design is copyright and may not be reproduced without the written permission of the architect.
© Copyright 2022

GRANTHAM FARM ZS TO ROUSE HILL SS – GRANTHAM FARM ZS TO VINEYARD BSP (TC) NORTH (NTW–000048–002) – 132KV FEEDER 9JA & 9J7
132kV FDR 9JA LINE CUT IN AND CUT OUT WORKS FOR GRANTHAM FARM ZS SUPPLY

DRAWING DETAILS

DRAWING LIST						
Sr.No	DRAWING NUMBER	TITLE 1	TITLE 2	REVISION	ISSUE	ISSUE DATE
1	533542 SHEET 2 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	132KV TRANSMISSION LINE CONNECTION LAYOUT	1	FOR REVIEW	15/11/2024
2	533542 SHEET 3 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	PLAN AND PROFILE	1	FOR REVIEW	15/11/2024
3	533542 SHEET 4 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	LANDING SPAN ARRANGEMENT AND LINE HARDWARE	1	FOR REVIEW	15/11/2024
4	533542 SHEET 5 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	LINE SCHEDULE	1	FOR REVIEW	15/11/2024
5	533542 SHEET 6 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	STRINGING CHARTS	1	FOR REVIEW	15/11/2024
6	533542 SHEET 7 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	TR AND EW CIRCUITS	1	FOR REVIEW	15/11/2024
7	533542 SHEET 8 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	9JA AND 9J7 SINGLE LINE DIAGRAM	1	FOR REVIEW	15/11/2024
8	533542 SHEET 9 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	GRANTHAM FARM ZS TRANSMISSION LINE EASEMENT	1	FOR REVIEW	15/11/2024
9	533542 SHEET 10 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	EARTHING INSTALLATION	1	FOR REVIEW	15/11/2024
10	533542 SHEET 11 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	132KV STEEL STRAIN POLE '2' AND '10' HOLE & FERRULE LAYOUT	1	FOR REVIEW	15/11/2024
11	533542 SHEET 12 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	FOUNDATION SCHEDULE	1	FOR REVIEW	15/11/2024
12	533542 SHEET 13 OF 13	GRANTHAM FARM ZS OVERHEAD LINE CONNECTION	FOUNDATION FOR POLE '2' AND '10'	1	FOR REVIEW	15/11/2024

DRAWING CHANGES

1. N/A.

REFERENCES

1. EARTHING DESIGN REPORT – "ZSE 24234–01 REV 0" FOR EARTHING DESIGN OF POLES
2. 533542 – SID
3. ENVIRONMENTAL REPORT – THE CONTRACTOR SHALL REFER TO ENDEAVOUR ENERGY FOR ANY SITE SPECIFIC ENVIRONMENTAL IMPACT STATEMENTS BEFORE CONSTRUCTION COMMENCES. ALL NOMINATED MITIGATION MEASURES MUST BE IMPLEMENTED.

DESIGN NOTES

1. ALL NEW POLES ARE STEEL POLES.
2. EXISTING OHEW ON FEEDER 9JA IS OPGW 24F, WHICH IS PROPOSED TO BE CONNECTED TO THE GRANTHAM FARM ZS THROUGH NEW UGOF 144F FROM POLES '2' AND '10' DOWN TO THE CONTROL ROOM '2' AND '1' RESPECTIVELY AT GRANTHAM FARM ZS..
3. NEW OHEW IS NEPTUNE 19/3.25 AAC 144F FROM POLE '2' AND '10' TO THE 132kV GANTRIES STRUCTURES PROPOSED AT BAY 1 AND BAY 3 BUS BARS OF THE GRANTHAM FARM ZS.
4. EXISTING CONDUCTOR ON FEEDER 9JA IS INVAR 590mm^2 .
5. USE LINE HARDWARE FOR INVAR 590mm^2 TERMINATION AT THE NEW POLES '2' AND '10'.
6. INSTALL NEW 132kV CONDUCTOR ACCC PARIS (874mm^2) ON ALL NEW POLES WITHIN THE CUT–IN LINE SECTION.
7. REFER SHEET '8' FOR ACCC PARIS (874mm^2) RATINGS.
8. DESIGN CRITERIA AS BELOW.

DESIGN MAXIMUM WIND SPEED	
SECURITY LEVEL	III
DESIGN LIFE	50 YEARS
WIND RETURN PERIOD	200 YEARS
REGION	A2
REGIONAL WIND SPEED	44.5 m/s
WIND DIRECTION MULTIPLIER	1.0
CLIMATE CHANGE MULTIPLIER	1.0
TERRAIN CATEGORY	TC2.0 (SCATTERED OBSTRUCTIONS)
HEIGHT	17 – 21.4 m
$M_{z,cat}$	SET TO AS/NZS7000
M_d	1

NETWORK SECURITY CAUTION

1. SEEK ADVICE FROM PROTECTION & CONTROL WHEN WORKING ON THESE CIRCUITS.

DBYD

ATTENTION

1. CURRENT DBYD SEARCHES MUST BE ACQUIRED AND CHECKED PRIOR TO CONSTRUCTION WORKS.
2. DAMAGE TO UNDERGROUND ASSETS MUST BE REPORTED TO THE RELEVANT ASSET OWNER IMMEDIATELY.
3. ASSET OWNER CONTACT DETAILS TO BE OBTAINED FROM CURRENT DBYD DOCUMENTATION.

SAFETY IN DESIGN STATEMENT

1. NO ATYPICAL OR UNUSUAL SAFETY HAZARD HAVE BEEN IDENTIFIED.
2. USE APPROPRIATE SWMS TO CONTROL SAFETY HAZARD.
3. REFER DESIGN NOTES.

HTLS ACCC PARIS CONDUCTOR INSTALLATION

1. ACCC PARIS CONDUCTOR SHALL BE HANDLED WITH CARE AVOIDING ANY DAMAGE TO THE CONDUCTOR DURING HANDLING AND STRINGING.
2. ALL HARDWARE TO BE USED WITHIN THE CUT–IN LINE SECTION SHALL BE FIT TO SUIT THE 2500A RATING AND A MAXIMUM OF 200°C CONTINGENCY TEMPERATURE.
3. ALL HARDWARE TO BE USED WITHIN THE EXISTING 9JA FEEDER MODIFIED LINE SECTION SHALL BE FIT TO SUIT THE 2500A RATING AND A MAXIMUM OF 290°C CONTINGENCY TEMPERATURE.
4. AT THE GANTRY TERMINAL CONNECTION AT THE DROPPERS ALL HARDWARE SHALL BE FIT TO SUIT THE 2500A RATING AND A MAXIMUM OF 200°C CONTINGENCY TEMPERATURE.
5. SPANS WITH THE CUT–IN LINE SECTION RANGES FROM 17m TO 45m, WHERE THE HTLS ACCC PARIS STRINGING HAS BEEN KEPT BETWEEN 1.0 TO 1.5%.
6. ALL PALMS FOR THE FITTINGS HAVE 50 X 50 BOLT HOLES FIT TO SUIT AT ALL STRAIN POLES WHERE BONDING IS APPLICABLE.
7. USE APPROPRIATE SWMS TO CONTROL SAFETY HAZARD.

POLE INSTALLATION NOTES:

1. BAULK EARTH WORKS TO GO PRIOR TO THE INSTALLATIONS OF POLE STRUCTURES.
2. FINAL LEVEL TO BE CONFIRMED AFTER THE BENCHING THE EARTH WORKS. POLE FOUNDATIONS SHALL BE REFERENCED FROM THESE FINAL LEVELS.
3. EARTH SHALL BE COMPACTED TO THE DESIRED DRY DENSITY.
4. POLE EMBEDMENTS ARE DESIGNED TO BE INSTALLED IN A FIRM GROUND.

SURVEY

1. ENDEAVOUR2022 – MAIN (EXTERNAL ACCESS)
2. ENDEAVOUR_2022 MASTER POINTCLOUD
3. SURVEY CORDINATES TO GDA 2020.
4. SITE LOCATION AT GRANTHAM FARM ZS (LOT 99 RIVERSTONE ROAD EAST, GRANTHAM FARM NSW 2765)
4. GROUND LEVELS ARE EXTRACTED FROM SURVEY. ACTUAL REDUCE LEVELS SHALL BE BASED AT THE SITE.

ENDEAVOUR ENERGY CONTACT
Name: CARLO SCARPIN Ph: 02 98536153

WARNING
LIVE ENDEAVOUR ENERGY CABLES & OTHER SERVICES IN THIS AREA. PLEASE CONTACT DIAL BEFORE YOU DIG ON TEL: 1100 FOR SEARCHES TWO DAYS PRIOR TO EXCAVATION.

THIS DESIGN DRAWING HAS BEEN PREPARED IN GDA2020–MGA56 COORDINATE SYSTEM.

WORKS COMPLETED/FIELD BOOK
CONSTRUCTED BY:
WORKS COMPLETED:
SIGNATURE: DATE:
INSPECTED BY:
SIGNATURE: DATE:

ASSET RECORDING
I:
OF:
CONTACT No.:
HEREBY CERTIFY THAT ASSETS MARKED AS–BUILT ON THIS DRAWING HAVE BEEN RECORDED AS PER ENDEAVOR ENERGY STANDARD SAD 0004.
SIGNATURE:
DATE:

AMENDMENTS
A ORIGINAL ISSUE NPR–0148 Job No.

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

© This drawing and the copyright Therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE
APPROVED M.AZAMI
DRAWN M.B
DATE 15/11/24
CH'D J.V.S

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE DIMENSIONS IN MILLIMETRES

AUTHORISED STEVEN PATON

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR–000048–002
DRAWING LIST

MGR TRANSMISSION PROJECT DEVELOPMENT

A1 | 533542 | Rev. 1

SHEET No 1 OF 13 SHEETS

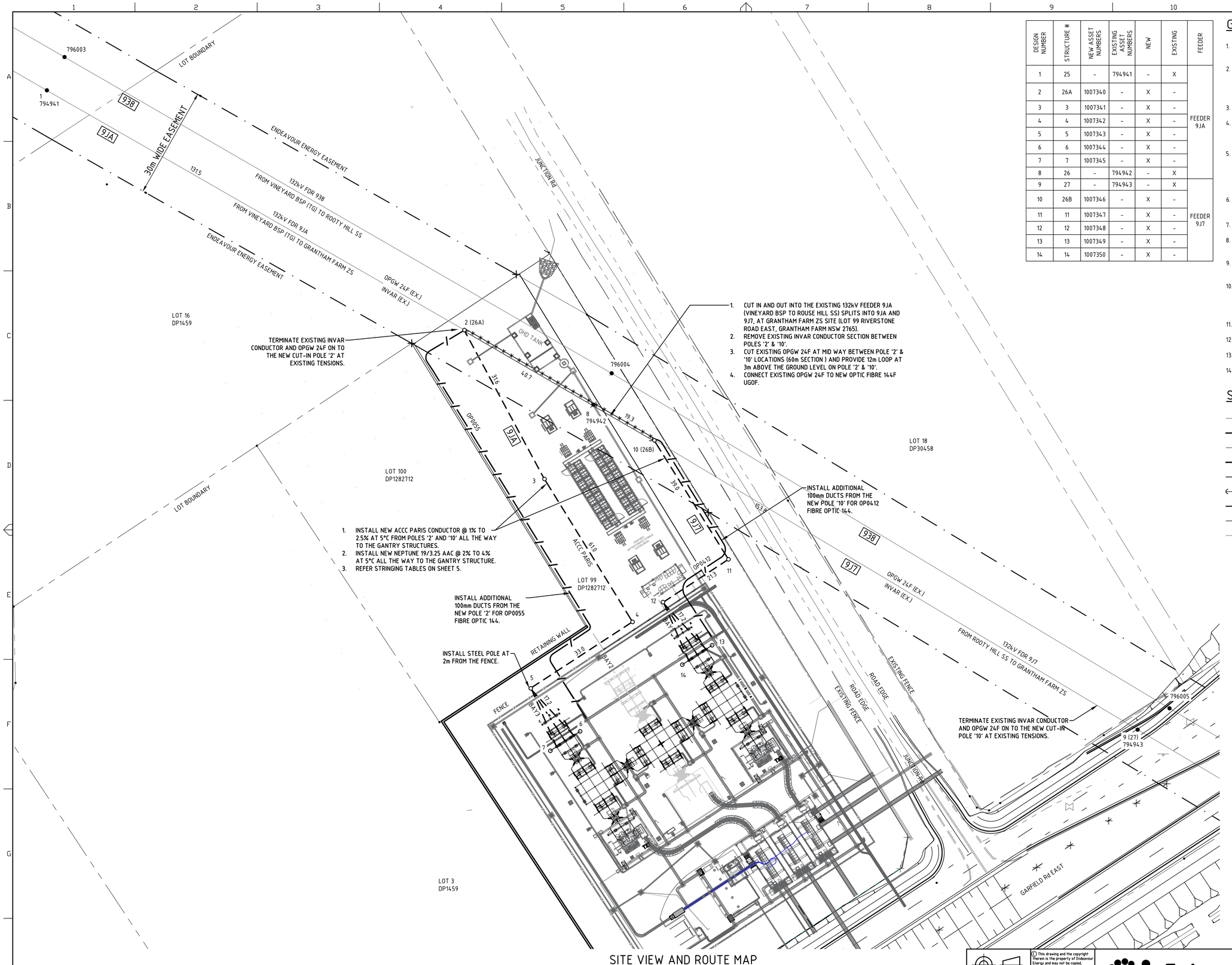
DESIGN NUMBER	STRUCTURE #	NEW ASSET NUMBERS	EXISTING ASSET NUMBERS	NEW	EXISTING	FEEDER
1	25	-	794941	-	X	FEEDER 9JA
2	26A	1007340	-	X	-	
3	3	1007341	-	X	-	
4	4	1007342	-	X	-	
5	5	1007343	-	X	-	
6	6	1007344	-	X	-	
7	7	1007345	-	X	-	
8	26	-	794942	-	X	
9	27	-	794943	-	X	FEEDER 9J7
10	26B	1007346	-	X	-	
11	11	1007347	-	X	-	
12	12	1007348	-	X	-	
13	13	1007349	-	X	-	
14	14	1007350	-	X	-	

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT ENDEAVOUR ENERGY NETWORK STANDARDS AND DRAWINGS.
2. THE GENERIC SCOPE OF WORKS IS ASSOCIATED WITH CUT IN AND OUT OF THE EXISTING OVERHEAD FEEDER 9JA (VINEYARD BSP TO ROUSE HILL SS) SPLITS INTO 9JA AND 9J7 AT GRANTHAM FARM ZS SITE (LOT 99 RIVERSTONE ROAD EAST, GRANTHAM FARM NSW 2765).
3. ENDEAVOUR ENERGY'S GENERIC EMP, EMS 0001, IS PART OF THIS DESIGN.
4. ATTENTION: DBYD SERVICE SEARCHES, POTHOLING AND CO-ORDINATION WITH UNDERGROUND UTILITY PROVIDERS SHALL BE PERFORMED PRIOR TO ANY EXCAVATION WORKS ON SITE.
5. DO NOT PLACE ANY RELIANCE ON ANY QUANTITIES OR DIMENSIONS GIVEN IN THIS DRAWING QUANTITIES AND DIMENSIONS GIVEN ON THIS DRAWING ARE BASED ON DESIGN INFORMATION AND SITE CONDITIONS AT THE TIME OF DESIGN. AS QUANTITIES AND DIMENSIONS ARE SUBJECT TO CHANGE. CONSTRUCTION MUST CHECK ALL QUANTITIES AND DIMENSIONS ON SITE PRIOR TO CONSTRUCTION.
6. CONSTRUCTION SHALL PEG ALL PROPERTY BOUNDARIES AND ESTABLISH FINAL LEVELS PRIOR TO COMMENCEMENT OF WORKS, IF REQUIRED.
7. REFER SHEET 8 FOR THE EASEMENT DETAILS.
8. ALL WASTE MATERIAL INCLUDING SPOIL FROM EXCAVATION WORKS TO BE TRANSPORTED TO AN APPROVED WASTE DISPOSAL DEPOT.
9. ALL WASTE MATERIAL INCLUDING SPOIL FROM EXCAVATION WORKS TO BE TRANSPORTED TO AN APPROVED WASTE DISPOSAL DEPOT.
10. WORKS AS EXECUTED DRAWINGS ARE TO BE DEVELOPED UTILIZING GPS CO-ORDINATES. WORKS AS EXECUTED DRAWINGS ARE TO BE FORWARDED TO THE ENDEAVOUR ENERGY PROJECT MANAGER WITHIN 7 DAYS OF THE COMPLETION OF WORKS.
11. PHASING TO BE CONFIRMED PRIOR TO ENERGISATION.
12. DRAWING TO BE READ IN CONJUNCTION WITH SAFETY IN DESIGN REPORT FOR GRANTHAM FARM ZS.
13. REFER SHEET '11 AND '12' FOR THE CABLE INSTALLATION (RETICULATION) DETAILS.
14. REFER TO SHEET '5' FOR DETAIL POLE SCHEDULE.

SITE PLAN LEGEND

- EXISTING INVAR CONDUCTOR AND OPGW 24F.
- INSTALL NEW ACCC PARIS CONDUCTORS AND OHEW NEPTUNE ACC.
- EXISTING FENCE
- NEW UG FIBRE OPTIC 144.
- REMOVE EXISTING 132kV CONDUCTOR.
- AERIAL STAY BETWEEN POLE '2' AND '10'.
- EXISTING 132kV TRANSMISSION LINE EASEMENT
- BOUNDARY LINE, POST AND RAIL FENCE (PR).
- CADASTRAL BOUNDARY
- 9JA FEEDER NO.
- EXISTING POLE
- REMOVE POLE
- NEW POLE



SITE VIEW AND ROUTE MAP
SCALE 1:500

WORKS COMPLETED/FIELD BOOK

CONSTRUCTED BY: _____

WORKS COMPLETED: _____

SIGNATURE: _____ DATE: _____

INSPECTED BY: _____

SIGNATURE: _____ DATE: _____

ASSET RECORDING

I: _____

OF: _____

CONTACT No.: _____

HEREBY CERTIFY THAT ASSETS MARKED AS-BUILT ON THIS DRAWING HAVE BEEN RECORDED AS PER ENDEAVOR ENERGY STANDARD SAD 0004.

SIGNATURE: _____

DATE: _____

AMENDMENTS

A	ORIGINAL ISSUE	Job No.	NPR-048

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

© This drawing and the copyright therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE		APPROVED	M.AZAMI
DRAWN	M.B		
DATE	15/11/24		
CH'D	J.V.S		

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE
DIMENSIONS IN MILLIMETRES

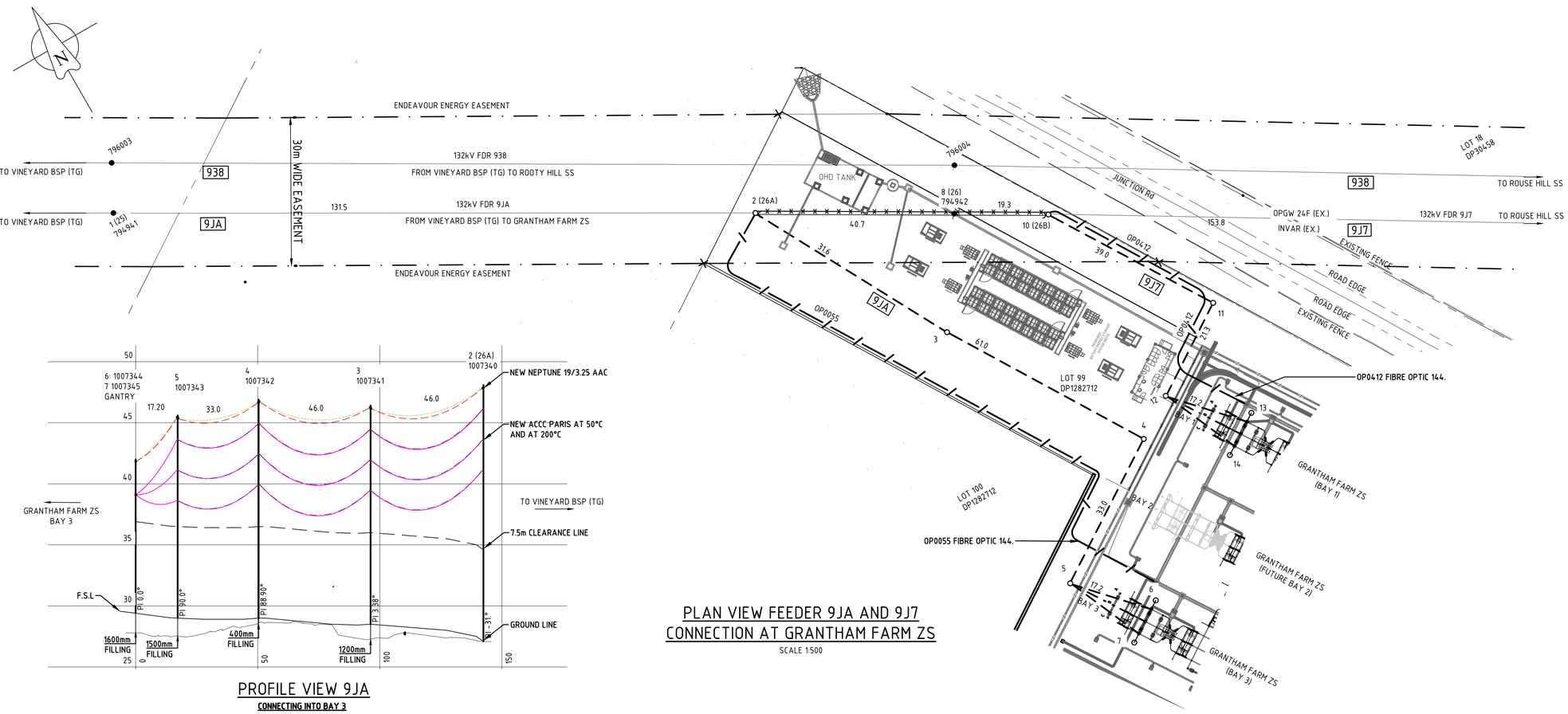
AUTHORISED
_

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
GRANTHAM FARM ZS TRANSMISSION LINE CONNECTION LAYOUT

MGR TRANSMISSION PROJECT DEVELOPMENT

A1	533542	Rev. 1

SHEET No 2 OF 13 SHEETS



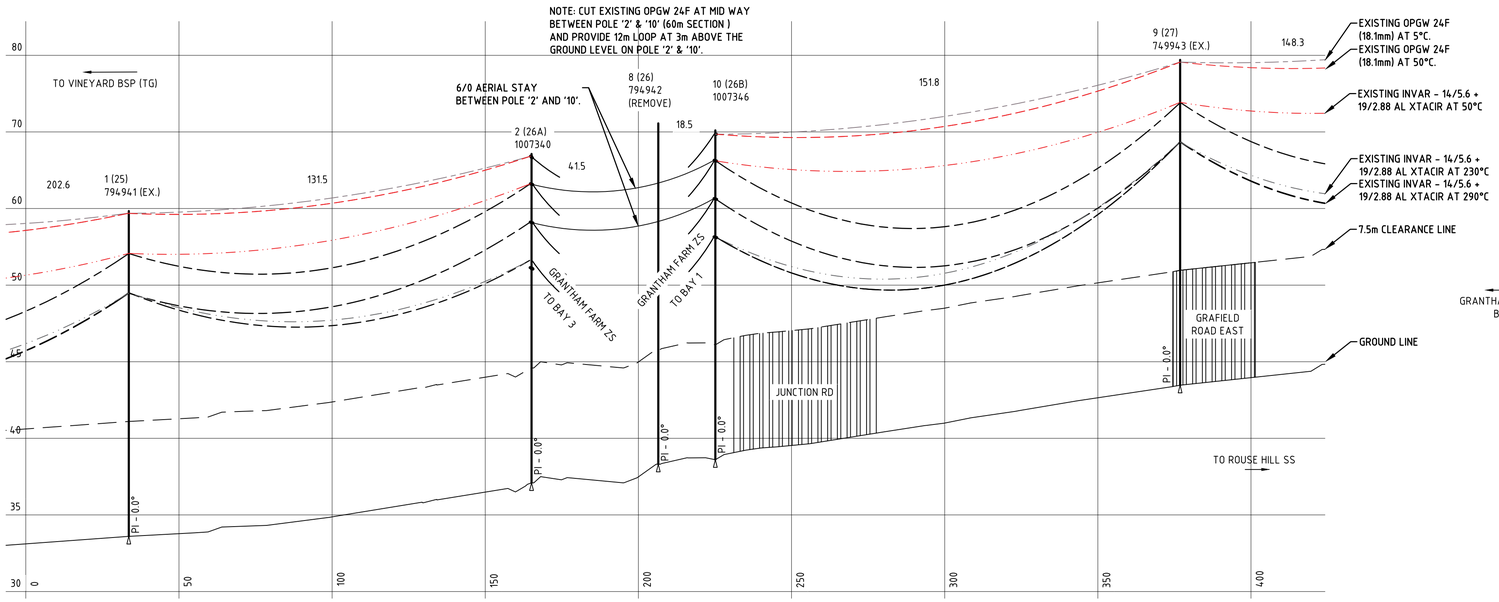
PLAN VIEW FEEDER 9JA AND 9J7 CONNECTION AT GRANTHAM FARM ZS

SCALE 1:500

PROFILE VIEW 9JA

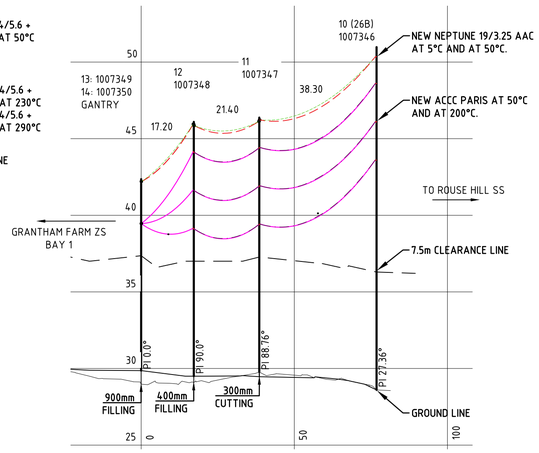
CONNECTING INTO BAY 3

SCALE HORIZONTAL 1:1000 VERTICAL 1:200



PROFILE VIEW 9JA (EXISTING ALIGNMENT)

SCALE HORIZONTAL 1:1000 VERTICAL 1:200



PROFILE VIEW 9J7

CONNECTING INTO BAY 1

SCALE HORIZONTAL 1:1000 VERTICAL 1:200

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT ENDEAVOUR ENERGY NETWORK STANDARDS AND DRAWINGS.
2. RETAIN EXISTING OPGW 24F ON EXISTING FEEDER AND TERMINATE ON NEW INLINE TERMINATION POLES '2' AND '10'. CONNECT OPGW 24F TO NEW UGOF 144F.
3. REFER SHEET-5 FOR CORRESPONDING STRINGING CHARTS.
4. THE FOLLOWING OHEW ASSEMBLIES SHOULD BE USED:
   - OPGW TERMINATION (TYPE 4) – REFER DWG 298128.
   - OPGW STRAIN (TYPE 2) – REFER DWG 298176.
   - STRAIN INSULATORS – ALR001 – SY10077 – REF DWG 398038.
4. OPGW DISPLAYED AT 50°C.
5. EXISTING 132KV CONDUCTORS ON 9JA FEEDER IS INVAR – 14/5.6 + 19/2.88 AL XTACIR AND THE STRINGING TENSIONS ARE REFERENCED FROM DWG 316975 AS 48KN @15°C.
6. POLES '2' AND '10' TO BE BACKSTAYED BY A 2TONS BLOCK LOAD.
7. EXISTING GROUND LEVELS ARE EXTRACTED FROM THE SURVEY FILE SY076166.1.1. FINAL LEVELS ARE TO BE SITED AFTER THE BAULK EARTH WORKS.
8. HARDWARE/FITTINGS TO BE REPLACED IF THE EXISTING CONDITION IS COMPROMISED.
9. REFER TO SHEET 4 FOR THE RECOMMENDED HARDWARE FOR ACCC PARIS CONDUCTOR.
10. REFER SHEET '2' FOR THE SCOPE OF WORKS.

PROFILE LEGEND

- NEW OHEW – NEPTUNE 19/3.25 AAC @ 5°C
- NEW OHEW – NEPTUNE 19/3.25 AAC AND OPGW 24F @ 50°C
- NEW 132kV HTLS ACCC PARIS @ 50°C
- NEW 132kV HTLS ACCC PARIS @ 200°C
- EXISTING OPGW – 24F @ 5°C, RE-TERMINATE AT EXISTING TENSIONS.
- EXISTING 132KV INVAR – 14/5.6 + 19/2.88 AL XTACIR @ 50°C.
- EXISTING 132kV INVAR – 14/5.6 + 19/2.88 AL XTACIR @ 230°C, RE-TERMINATE AT EXISTING TENSIONS.
- EXISTING 132kV INVAR – 14/5.6 + 19/2.88 AL XTACIR @ 290°C, RE-TERMINATE AT EXISTING TENSIONS.
- GROUND CLEARANCE LINE – 6.7m
- ROAD CLEARANCE – 7.5m
- EXISTING GROUNDLINE
- F.S.L FINISHED SURFACE LEVELS.

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

AMENDMENTS
A ORIGINAL ISSUE NPR-048

© This drawing and the copyright therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE
APPROVED M.AZAMI
DRAWN M.B
DATE 15/11/24
CH'D J.V.S

Endeavour Energy

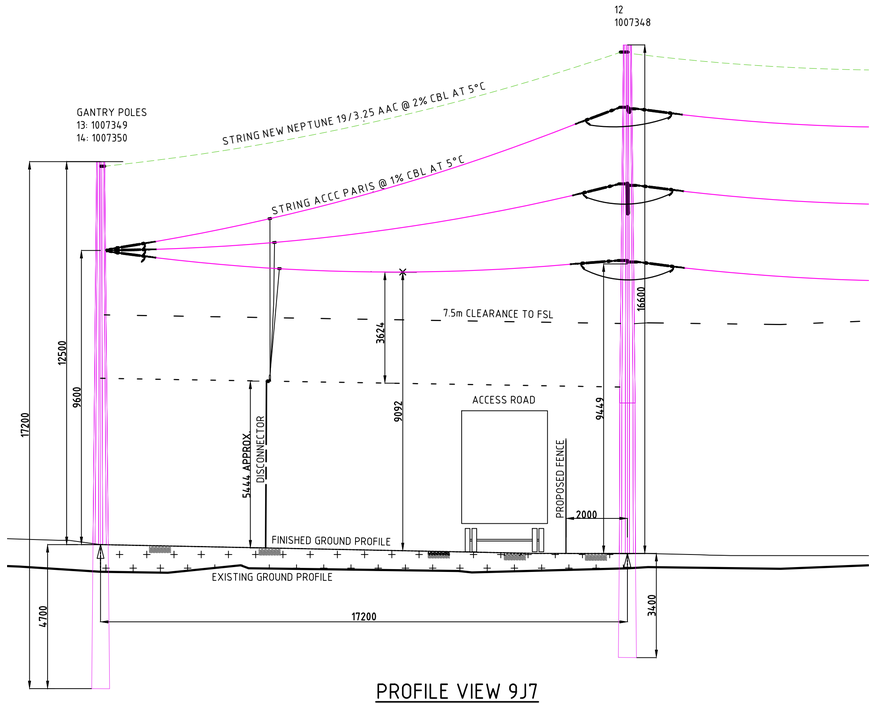
REFERENCE DRAWINGS

DO NOT SCALE
DIMENSIONS IN MILLIMETRES

AUTHORISED
–

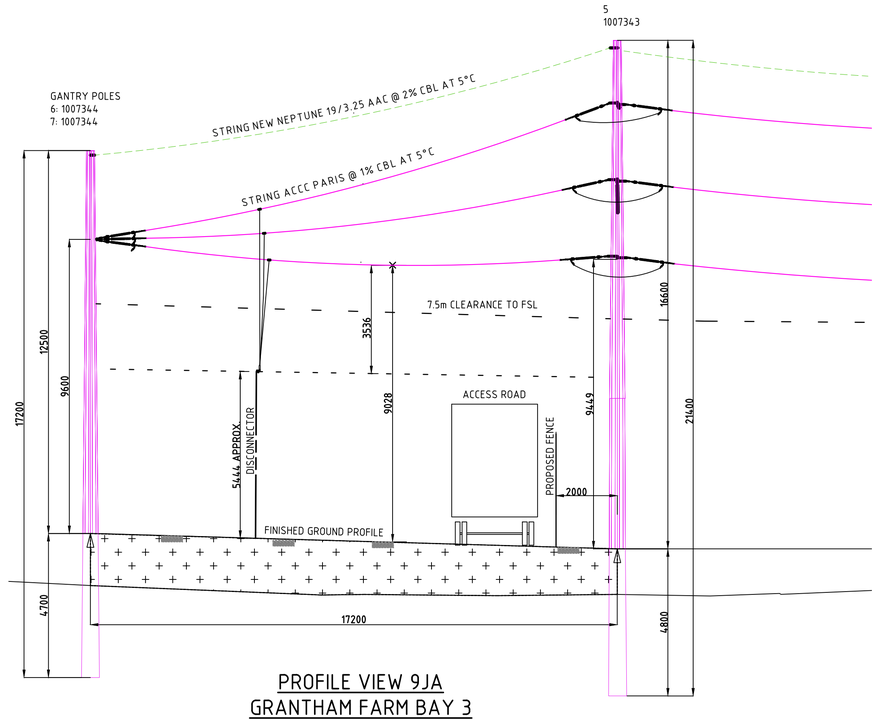
JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
PLAN AND PROFILE

MGR TRANSMISSION PROJECT DEVELOPMENT
A1 533542 Rev. 1
SHEET No 3 OF 13 SHEETS



PROFILE VIEW 9J7
GRANTHAM FARM BAY 1

SCALE NTS



PROFILE VIEW 9JA
GRANTHAM FARM BAY 3

SCALE NTS

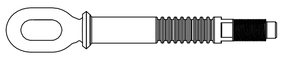
GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT ENDEAVOUR ENERGY NETWORK STANDARDS AND DRAWINGS.
2. REFER SHEET 2 AND 3 FOR MORE NOTES.

PROFILE LEGEND

- EXISTING INVAR CONDUCTOR AND OPGW 24F.
- INSTALL NEW ACCC PARIS CONDUCTORS.
- INSTALL NEW OHEW NEPTUNE ACC.
- 7.5M CLEARANCE ABOVE F.S.L.
- SUBSTATION EQUIPMENT HEIGHT ABOVE F.S.L.

ACCC PARIS CONDUCTOR LINE HARDWARE



COMPRESSION DEADEND EYE

SCALE 1:5



CORE WEDGE

SCALE 1:5



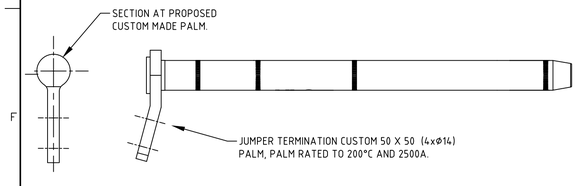
WEDGE HOUSING

SCALE 1:5



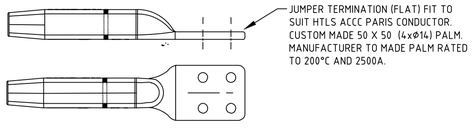
INNER DEADEND TUBE

SCALE 1:5



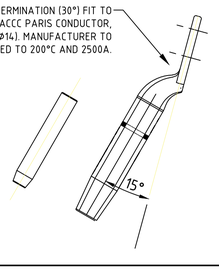
40 X COMPRESSION DEADEND TUBE (PLP - 25301421)
CUSTOM MADE PALM

SCALE 1:5



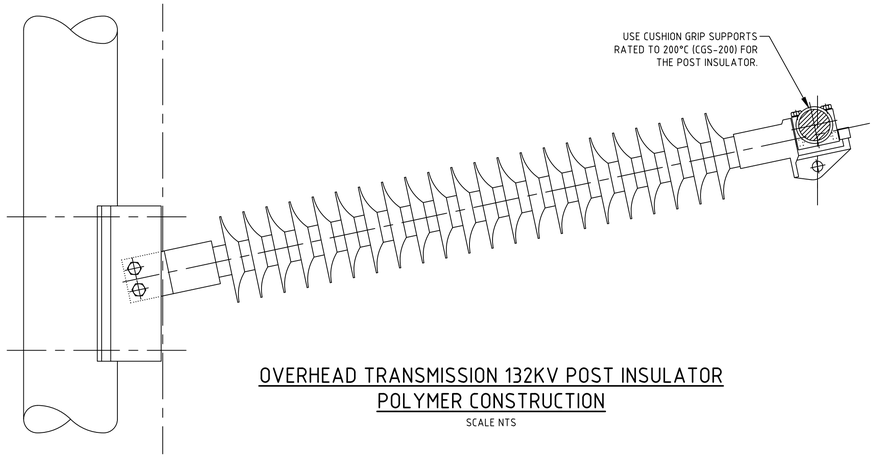
3 X JUMPER TERMINAL (CUSTOM - FLAT)

SCALE 1:5



70 X JUMPER TERMINAL (30°) CUSTOM

SCALE 1:5



OVERHEAD TRANSMISSION 132KV POST INSULATOR
POLYMER CONSTRUCTION

SCALE NTS

PRECAUTIONARY MEASURES FOR HTLS CONDUCTOR STRINGING

1. COMPRESSION DEAD-END & JUMPER TERMINAL FOR ACCC CONDUCTORS INSTALLATION INSTRUCTIONS SHALL BE ADHERED.
2. ENSURE THAT THE CORRECT COMPRESSION PRODUCT HAS BEEN SELECTED FOR THE CONDUCTOR. COMPARE CATALOG NUMBERS OF THE PRODUCT WITH ASSOCIATED CONDUCTOR SIZE AND MANUFACTURER LITERATURE.
3. BE CERTAIN THAT THE DIES BEING USED TO COMPRESS THE FITTINGS MATCH THE ENGRAVED SIZES MARKED ON THE PRODUCT SURFACES. THE DIES WILL HAVE MARKINGS ON THE SURFACE OF THE DIE FACE OR THE EDGES OF THE DIE.
4. THE COMPRESSION PRESS AND THE DIE MUST BE INSPECTED BEFORE USE. ENSURE THAT THEY ARE WELL LUBRICATED; THERE ARE NO HYDRAULIC OIL LEAKS; THE PRESS IS OF CORRECT SIZE (60 - 100 TONS) TO ADEQUATELY COMPRESS THE FITTINGS; DIE SURFACES MATE COMPLETELY WHEN THE PRESS IS FULLY EXTENDED; AND THAT THE DIES ARE IN GOOD CONDITION WITHOUT SIGNIFICANT OR WEAR.
5. BEFORE INSTALLATION, THE MATING SURFACES OF THE PRODUCTS TO BE INSTALLED, SUCH AS THE INNER BORE OF THE ALUMINUM TUBE, THE INNER BORE AND OUTER SURFACES OF STEEL HARDWARE, MUST BE INSPECTED FOR SURFACE IMPERFECTIONS, ETC. IF ANY SIGNIFICANT IRREGULARITIES EXIST, THE PRODUCT MUST BE DISCARDED OR RETURNED TO THE MANUFACTURER. DO NOT INSTALL DEFECTIVE OR DAMAGED COMPRESSION HARDWARE.
6. ENSURE THAT THE CORRECT COMPRESSION PRODUCT HAS BEEN SELECTED FOR THE CONDUCTOR. COMPARE CATALOG NUMBERS OF THE PRODUCT WITH ASSOCIATED CONDUCTOR SIZE AND MANUFACTURER LITERATURE.
7. BE CERTAIN THAT THE DIES BEING USED TO COMPRESS THE FITTINGS MATCH THE ENGRAVED SIZES MARKED ON THE PRODUCT SURFACES. THE DIES WILL HAVE MARKINGS ON THE SURFACE OF THE DIE FACE OR THE EDGES OF THE DIE.
8. THE COMPRESSION PRESS AND THE DIE MUST BE INSPECTED BEFORE USE. ENSURE THAT THEY ARE WELL LUBRICATED; THERE ARE NO HYDRAULIC OIL LEAKS; THE PRESS IS OF CORRECT SIZE (60 - 100 TONS) TO ADEQUATELY COMPRESS THE FITTINGS; DIE SURFACES MATE COMPLETELY WHEN THE PRESS IS FULLY EXTENDED; AND THAT THE DIES ARE IN GOOD CONDITION WITHOUT SIGNIFICANT OR WEAR.

AMENDMENTS

ISSUE	ORIGINAL	NPR-0148
A	Job No.	

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

© This drawing and the copyright Therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

	ORIGINAL SCALE	APPROVED
DRAWN	M.B	M.AZAMI
DATE	15/11/24	
CH'D	J.V.S	

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE
DIMENSIONS IN MILLIMETRES

AUTHORISED
-

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
LANDING SPAN ARRANGEMENT AND LINE HARDWARE

MGR TRANSMISSION PROJECT DEVELOPMENT

A1 | 533542 | Rev. 1

SHEET No 4 OF 13 SHEETS

LINE SCHEDULE

FIELD POLE NUMBER			ADDITIONAL COMMENTS	EARTH WORKS (+FILL, -CUT)	COORDINATES/LOCATION						CONSTRUCTION			POLE									SCOPE OF WORKS
STRUCTURE #	NEW	EXISTING			EASTING (m)	NORTHING (m)	ELEVATION (m)	F.S.L (m)	AHEAD SPAN LENGTH (m)	LINE DEV. (DEGREE)	132kV	OPGW	OHEW	TYPE (LENGTH / STRENGTH)	POLE ASSEMBLY DRAWING NUMBER	STAY	FOOTING	RELOCATE	REPLACE	NEW	EXISTING	REMOVE	DESIGN NUMBER	
25	-	794941	NO CHANGE.	-	303410.72	6272819.84	23.60	23.60	131.5	0°	SSD-21 (EX.)	TYPE 1 OPGW 24F (EX.)	-	SSD-21 (S, EX.)	-	-	-	-	-	-	X	-	1	FEEDER 9JA (CONNECTION INTO BAY 1, GRANTHAM FARM ZS)
26A	1007340	-	INSTALL NEW TERMINATION STEEL POLE AND TERMINATE EXISTING XTACIR (INVAR CONDUCTOR) ON THE POLE. TERMINATE EXISTING OPGW 24F ON THE SAME POLE AND PROVIDE LOOP AT 3m ABOVE THE GROUND LEVEL. INSTALL ACCC PARIS AND NEPTUNE AAC OHEW TO GRANTHAM FARM ZS. CONNECT POLE '2' TO POLE '10' THROUGH AERIAL STAY AS SHOWN BELOW. INSTALL TWIN INSULATORS FOR THE TERMINATION ASSEMBLY.	-	303524.74	6272754.35	27.09	27.09	46.0	34°	83S (MODIFIED)	TYPE 4 OPGW 24F (SHACKLED TO THE STEEL RING PLATE ON THE STEEL POLE)	TYPE 4 EW (SHACKLED TO THE STEEL RING PLATE ON THE STEEL POLE)	CUSTOM 21.5m STEEL POLE WITH ANCHOR BOLTS BY THE FABRICATOR. (POLE BASE DIAMETER FIXED TO 1280mm)	-	2 X 6/0	2.0m DIAMETER X 8.0m DEEP (C) REFER SHEET 13 (BASE PLATE ANCHOR BOLTS BY SUPPLIER)	-	-	X	-	-	2	
3	1007341	-	INSTALL NEW STEEL POLE (VERTICAL LINE POST) AND INSTALL OHEW AS PER EARTHING CIRCUIT. POLE TO BE EMBEDDED 4700mm INTO THE GROUND AFTER THE BAULK EARTH WORKS. POLE TO BE PROTECTED WITH ADDITIONAL IN-GROUND CORROSION PROTECTION 'NUKOTE ST', 500mm ABOVE GROUND AND 1200mm BELOW THE GROUND LEVEL.	+1200mm	303546.61	6272713.66	27.80	28.50	46.0	0°	82S	-	TYPE 3 EW	21.4m/32kN (S)	-	-	4.7 (C)	-	-	X	-	-	3	
4	1007342	-	INSTALL NEW STEEL POLE AND INSTALL OHEW AS PER EARTHING CIRCUIT. POLE TO BE EMBEDDED 3500mm INTO THE GROUND AFTER THE BAULK EARTH WORKS. POLE TO BE PROTECTED WITH ADDITIONAL IN-GROUND CORROSION PROTECTION 'NUKOTE ST', 500mm ABOVE GROUND AND 1200mm BELOW THE GROUND LEVEL.	+400mm	303570.65	6272674.62	28.58	28.99	33.0	90°	84S	-	TYPE 2 EW	21.4m/32kN (S)	-	-	3.5 (C)	-	-	X	-	-	4	
5	1007343	-	INSTALL NEW STEEL POLE AND INSTALL OHEW AS PER EARTHING CIRCUIT. POLE TO BE EMBEDDED 4800mm INTO THE GROUND AFTER THE BAULK EARTH WORKS. POLE TO BE PROTECTED WITH ADDITIONAL IN-GROUND CORROSION PROTECTION 'NUKOTE ST', 500mm ABOVE GROUND AND 1200mm BELOW THE GROUND LEVEL.	+1500mm	303542.86	6272656.49	27.52	29.00	17.2	90°	84S	-	TYPE 2 EW	21.4m/32kN (S)	-	-	4.8 (C)	-	-	X	-	-	5	
6	1007344	-	INSTALL NEW STEEL POLES FOR GANTRY STRUCTURE AND INSTALL OHEW AS PER EARTHING CIRCUIT. FABRICATE 17.1m/32kN POLES FOR THE GANTRY. POLE TO BE EMBEDDED 4600mm INTO THE GROUND AFTER THE BAULK EARTH WORKS. POLE TO BE PROTECTED WITH ADDITIONAL IN-GROUND CORROSION PROTECTION 'NUKOTE ST', 500mm ABOVE GROUND AND 1200mm BELOW THE GROUND LEVEL.	+1600mm	303556.33	6272644.74	27.83	29.50	-	-	132kV GANTRY	-	TYPE 4 EW	GANTRY 17.2m/32KN (S)	-	-	4.7 (C)	-	-	X	-	-	6	
7	1007345	-		+1600mm	303548.21	6272639.44	27.56	29.50	-	-		-	TYPE 4 EW	GANTRY 17.2m/32KN (S)	-	-	4.7 (C)	-	-	X	-	-	7	
26	-	794942	REMOVE EXISTING POLE.	-	303560.54	6272733.61	28.31	28.31	-	0°	SSD-21 (EX.)	-	-	-	-	-	-	-	-	-	-	X	8	
27	-	794943	EXISTING STEEL POLE ON GARFIELD Rd EAST. NO CHANGE.	-	303708.13	6272648.49	33.46	33.46	151.8	0°	STD-21 (EX.)	TYPE 1 OPGW 24F (EX.)	-	STD-21	-	-	-	-	-	-	X	-	9	FEEDER 9J7 (CONNECTION INTO BAY 3, GRANTHAM FARM ZS)
26B	1007346	-	INSTALL NEW TERMINATION STEEL POLE AND TERMINATE EXISTING XTACIR (INVAR CONDUCTOR) ON THE POLE. TERMINATE EXISTING OPGW 24F ON THE SAME POLE AND PROVIDE LOOP AT 3m ABOVE THE GROUND LEVEL. INSTALL ACCC PARIS AND NEPTUNE AAC OHEW TO GRANTHAM FARM ZS. CONNECT POLE '2' TO POLE '10' THROUGH AERIAL STAY AS SHOWN BELOW. INSTALL TWIN INSULATORS FOR THE TERMINATION ASSEMBLY.	-	303576.63	6272724.22	28.60	28.60	38.3	28°	84S (MODIFIED)	TYPE 4 OPGW 24F (SHACKLED TO THE STEEL RING PLATE ON THE STEEL POLE)	TYPE 4 EW (SHACKLED TO THE STEEL RING PLATE ON THE STEEL POLE)	CUSTOM 21.5m STEEL POLE WITH ANCHOR BOLTS BY THE FABRICATOR. (POLE BASE DIAMETER FIXED TO 1280mm)	-	2 X 6/0	2.0m DIAMETER X 8.0m DEEP (C) REFER SHEET 13 (BASE PLATE ANCHOR BOLTS BY SUPPLIER)	-	-	X	-	-	10	
11	1007347	-	INSTALL NEW STEEL POLE AND INSTALL OHEW AS PER EARTHING CIRCUIT.	-300mm	303596.85	6272691.72	29.79	29.77	21.4	90°	84S	-	TYPE 2 EW	20m/32kN (S)	-	-	3.4 (C)	-	-	X	-	-	11	
12	1007348	-	INSTALL NEW STEEL POLE AND INSTALL OHEW AS PER EARTHING CIRCUIT.	+400mm	303578.95	6272680.04	29.12	29.50	17.2	90°	84S	-	TYPE 2 EW	20m/32kN (S)	-	-	3.4 (C)	-	-	X	-	-	12	
13	1007349	-	INSTALL NEW STEEL POLES FOR GANTRY STRUCTURE AND INSTALL OHEW AS PER EARTHING CIRCUIT. FABRICATE 17.1m/32kN POLES FOR THE GANTRY. POLE TO BE EMBEDDED 4600mm INTO THE GROUND AFTER THE BAULK EARTH WORKS. POLE TO BE PROTECTED WITH ADDITIONAL IN-GROUND CORROSION PROTECTION 'NUKOTE ST', 500mm ABOVE GROUND AND 1200mm BELOW THE GROUND LEVEL.	+900mm	303592.42	6272668.29	29.22	29.86	-	-	132kV GANTRY	-	TYPE 4 EW	GANTRY 17.2m/32KN (S)	-	-	4.7 (C)	-	-	X	-	-	13	
14	1007350	-		+900mm	303584.30	6272662.99	28.92	29.86	-	-		-	TYPE 4 EW	GANTRY 17.2m/32KN (S)	-	-	4.7 (C)	-	-	X	-	-	14	

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ENDEAVOUR ENERGY'S RELEVANT TERMS AND CONDITIONS.
2. ALL DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE.
3. ALL NEW POLES FOR THIS PROJECT ARE EITHER STEEL POLES.
4. INSTALL VIBRATION DAMPERS ON EXISTING OPGW-24F AND INVAR CONDUCTORS.
5. REFER SHEET '6' FOR THE STRINGING CHARTS.
6. ALL POLES ARE STANDARD POLES EXCEPT FOR POLE '2' AND '10'.
7. INSTALL NEW HTLS ACCC PARIS FOR THE ENTIRE RECONSTRUCTION SECTION FROM GANTRY STRUCTURES AT GRANTHAM FARM ZS TO POLE STRUCTURE 6,7 AND 13,14.
8. REFER SHEET 13 FOR HOLE AND FERRULE ARRANGEMENT FOR STEEL PPOLE '2' AND '10'.
9. REFER SHEET 3 FOR PLAN AND PROFILE OF FEEDER 9JA AND 9J7.
10. USE INLINE TEMPORARY STAYS (TWO BLOCKS) EQUIVALENT TO 4/G AT 45 DEGREE GROUND SLOPE FOR STRINGING. TERMINATION POLES '2' AND '10'. MAINTAIN BACK STAYS UNTIL STRINGING AREIAL STAYS BETWEEN POLE '2' AND '10'.
11. HARDWARE/FITTINGS ON EXISTING 9JA FEEDER SHALL BE FIT TO SUIT INVAR (XTACIR) - 14/5.6 + 19/2.88 AL.
12. USE HTLS ACCC PARIS FOR BRIDGING/BONDING AT ALL POLES STRUCTURES.
13. USE UNDRILLED FITTINGS TO CONNECT THROUGH BONDING BETWEEN INVAR AND ACCC PARIS CONDUCTORS.
14. POLE EMBEDMENT VARIES DUE TO PROPOSED BAULK EARTH WORKS AROUND THE PROPOSED TRANSMISSION LINE CUT-IN SECTION.
15. CONCRETE BACKFILL SHALL BE STRENGTH GRADE N25 (25MPA) TO AS3600 WITH MINIMAL NOMINAL SIZE AGGREGATE OF 20MM. HANDLING AND PLACEMENT SHALL BE IN ACCORDANCE WITH AS3600. MECHANICAL VIBRATION SHALL BE USED TO COMPACT CONCRETE.
16. FOUNDATION NOTATION C - CONCRETE, REFER TO DRAWING 048343.
17. GROUND LEVELS ARE EXTRACTED FROM LIDAR SURVEY. ACTUAL REDUCE LEVELS SHALL BE BASED AT THE SITE.

DAMPER SCHEDULE

VORTEX DAMPER PLACEMENT SCHEDULE - FOR 132kV CONDUCTORS

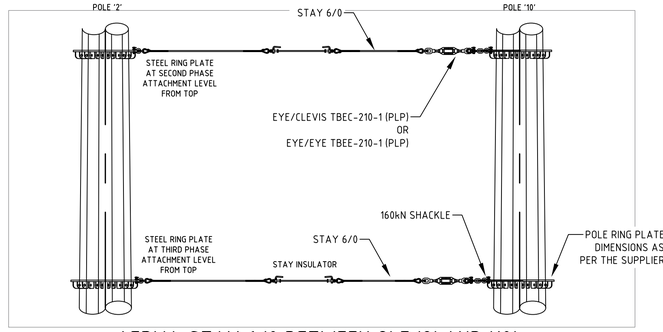
DESIGN NUMBER	NEW POLES	EXISTING POLES	POLE TYPE	CONDUCTORS PER PHASE	DESIGN TENSION (%CBL @ 5°C) OR (EDT @ 5°C)	ARMOUR ROD	AHEAD SPAN POLE	DAMPERS PER EACH SPAN EACH PHASE	SPAN BEHIND/ SPAN AHEAD SKETCH	BACK SPAN DIM. D (mm)	BACK SPAN DIM. B (mm)	AHEAD SPAN DIM. A (mm)	AHEAD SPAN DIM. C (mm)	COMMENTS
1	-	794941	SUSPENSION	-	24.6%/ 52.08kN	AGS UNIT	131.5	-	-	-	-	-	-	EXISTING BRACED POST/SUSPENSION POLE. SINGLE DAMPER ALREADY INSTALLED.TERMINATE INVAR CONDUCTOR ON THIS POLE AT EXISTING TENSIONS. SPAN CONNECTS TO POLE '1'.
2	1007340	-	TERMINATION	1 x XTACIR (INVAR)	-	NIL	46.0	2 x STOCKBRIDGE VSD-4050	AS SHOWN	914	1143	-	-	VIBRATION DAMPERS : VSD-4050 / 028074_CUST (PLP DRAWING)
3	1007341	-	STRAIN	1 x ACCC PARIS	-	-	46.0	-	-	-	-	-	-	NOT REQUIRED
4	1007342	-	STRAIN	1 x ACCC PARIS	-	-	33.0	-	-	-	-	-	-	NOT REQUIRED
5	1007343	-	STRAIN	1 x ACCC PARIS	-	-	17.2	-	-	-	-	-	-	NOT REQUIRED
6	1007344	-	GANTRY	1 x ACCC PARIS	-	-	-	-	-	-	-	-	-	NOT REQUIRED
7	1007345	-		1 x ACCC PARIS	-	-	-	-	-	-	-	-	-	NOT REQUIRED
8	-	794942	-	-	-	-	-	-	-	-	-	-	-	NOT REQUIRED
9	-	794943	SUSPENSION	1 x XTACIR (INVAR)	25.5%/ 54.0kN	AGS UNIT	151.8	-	-	-	-	-	-	EXISTING BRACED POST/SUSPENSION POLE. DAMPERS ALREADY INSTALLED. TERMINATE INVAR CONDUCTOR ON THIS POLE AT EXISTING TENSIONS. SPAN CONNECTS TO POLE '9'.
10	1007346	-	STRAIN	1 x XTACIR (INVAR)	-	NIL	38.3	2 x STOCKBRIDGE VSD-4050	AS SHOWN	940	1168	-	-	VIBRATION DAMPERS : VSD-4050 / 028074_CUST (PLP DRAWING)
11	1007347	-	STRAIN	1 x ACCC PARIS	-		21.4	-	-	-	-	-	-	NOT REQUIRED
12	1007348	-	STRAIN	1 x ACCC PARIS	-		17.2	-	-	-	-	-	-	NOT REQUIRED
13	1007349	-	GANTRY	1 x ACCC PARIS	-		-	-	-	-	-	-	-	NOT REQUIRED
14	1007350	-		1 x ACCC PARIS	-		-	-	-	-	-	-	-	NOT REQUIRED

SPIRAL DAMPER PLACEMENT SCHEDULE - FOR OHEW AND OPGW CONDUCTORS

DESIGN NUMBER	NEW POLES	EXISTING POLES	POLE TYPE	OHEW/OPGW	DESIGN TENSION (%CBL @ 5°C) OR (EDT @ 5°C)	AHEAD SPAN POLE	DAMPERS PER EACH SPAN EACH PHASE	NUMBER OF DAMPERS BACK SPAN	NUMBER OF DAMPERS AHEAD SPAN	COMMENTS
1	-	794941	SUSPENSION	OPGW 24F 18.1mm	-	131.5	-	-	-	-
2	1007340	-	TERMINATION	OPGW 24F 18.1mm	15.0%/ 11.11kN	46.0	2 x OFSVD-106	-	2	TERMINATE OPGW 24F AT POLE '2'. VIBRATION DAMPERS : OFSVD-0106 / 002100_CUST
3	-	-	STRAIN	NEPTUNE AAC	-	46.0	-	-	-	-
4	-	-	STRAIN	NEPTUNE AAC	-	33.0	-	-	-	-
5	-	-	STRAIN	NEPTUNE AAC	-	17.2	-	-	-	-
6	-	-	GANTRY	NEPTUNE AAC	-	-	-	-	-	-
7	-	-		NEPTUNE AAC	-	-	-	-	-	-
8	-	794942	-	NEPTUNE AAC	-	-	-	-	-	-
9	-	794943	SUSPENSION	OPGW 24F 18.1mm	-	151.8	-	-	-	-
10	1007346	-	STRAIN	OPGW 24F 18.1mm	15.8%/ 11.63kN	38.3	2 x OFSVD-106	-	2	TERMINATE OPGW 24F AT POLE '10'. VIBRATION DAMPERS : OFSVD-0106 / 002100_CUST
11	-	-	STRAIN	NEPTUNE AAC	-	21.4	-	-	-	-
12	-	-	STRAIN	NEPTUNE AAC	-	17.2	-	-	-	-
13	-	-	GANTRY	NEPTUNE AAC	-	-	-	-	-	-
14	-	-		NEPTUNE AAC	-	-	-	-	-	-

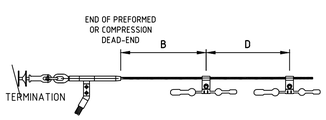
DAMPERS NOTES

1. INSTALL VIBRATION DAMPERS ON EXISTING OPGW-24F. MAINTAIN EXISTING TENSIONS FOR OPGW-24F WHILE TERMINATION AT POLE STRUCTURES '2' AND '10'.
2. INSTALL VIBRATION DAMPERS ON EXISTING INVAR (XTACIR) CONDUCTORS AS SHOWN IN THE TABLE. INSTALL PROTECTOR RODS AS PER PLP DRAWING 061-092-RD. MAINTAIN EXISTING TENSIONS FOR INVAR CONDUCTOR WHILE TERMINATION AT POLE STRUCTURES '2' AND '10'.
3. DAMPERS ARE NOT REQUITED FOR NEPTUNE AAC OVERHEAD EARTWIRE AND HTLS CONDUCTOR ACCC PARIS.
4. SECTIONS SHOWN MAY INCLUDE DESIGN SPANS ONLY. REFER STRINGING TABLES FOR ACTUAL STRAIN SECTION DETAILS.
5. ALL SPIRAL VIBRATION DAMPERS (SVD) SHALL BE PLACED SUCH THAT THE START OF THE GRIPPING SECTION IS INSTALLED 200mm FROM THE END OF THE ARMOUR RODS AND/OR PREFORMED DEAD-END GRIPS.
   - 5.1. FOR SEPARATE MULTIPLE SVDs PER SPAN, 200mm SPACING SHALL BE PROVIDED BETWEEN THE DAMPERS.
   - 5.2. WHERE TENSIONS EXCEED 20% CBL, MANUFACTURER ADVICE MAY BE REQUIRED FOR OPTIMUM SPACING OF SVDs.
6. STOCKBRIDGE (DOG-BONE) VIBRATION DAMPERS TO BE ORDERED FROM PLP, **PART NO. VSD-4050**. THESE ARE TO BE INSTALLED AS PER DIMENSIONS SHOWN IN THE DRAWING, WHICH ARE BASED ON MANUFACTURER / DESIGN RECOMMENDATIONS.



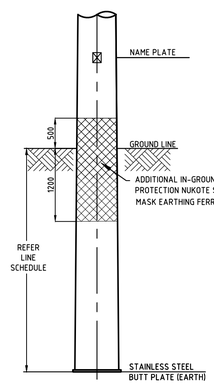
AERIAL STAY 6/0 BETWEEN OLE '2' AND '10'

SCALE 1:40



DAMPER PLACEMENT FOR EXISTING 'INVAR' CONDUCTOR AT POLE '2' AND '10'

SCALE NTS



CORROSION PROTECTION

SCALE NTS

PRELIMINARY - NOT FOR CONSTRUCTION

ISSUED 15/11/2024

AMENDMENTS

A	ORIGINAL ISSUE	NPR-048

Job No.

© This drawing and the copyright therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

Endeavour Energy

ORIGINAL SCALE		APPROVED	M.AZAMI
DRAWN	M.B		
DATE	15/11/24		
CH'D	J.V.S		

REFERENCE DRAWINGS

DO NOT SCALE DIMENSIONS IN MILLIMETRES

AUTHORISED: STEVEN PATON

MGR TRANSMISSION PROJECT DEVELOPMENT

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
LINE SCHEDULE

A1 | 533542 | Rev. 1

SHEET No 5 OF 13 SHEETS

STRINGING CHARTS

STRINGING TABLE GUIDE LINE						
#	MAIN SECTION	CIRCUIT	CONDUCTOR/CABLE	DESIGN TENSION (%CBL @ 5°C)	RULING SPAN (m)	TOTAL OPGW 144F CABLE LENGTH (m)	REFERENCE TABLE
1	POLE '10' TO POLE '29' (FDR 9J7)	TR	INVAR - 14/5.6 + 19/2.88 AL XTACIR	25.5	146.6	-	TABLE-1
2	POLE '2' TO POLE '16' (FDR 9JA)	TR	INVAR - 14/5.6 + 19/2.88 AL XTACIR	24.6	219.6	-	TABLE-2
3	POLE '10' TO POLE '29' (FDR 9J7)	OPGW	24 FIBRE OPGW	15.8	146.6	-	TABLE-3
4	POLE '2' TO POLE '16' (FDR 9JA)	OPGW	24 FIBRE OPGW	15.0	219.6	-	TABLE-4
5	POLE '10' TO POLE '11'	TR	ACCC PARIS	1.5	37.6	115.0	TABLE-5
6	POLE '11' TO POLE '12'	TR	ACCC PARIS	1.5	20.8	60.0	TABLE-6
7	POLE '12' TO POLE '13,14 GANTRY'	TR	ACCC PARIS	1.1	17.5	45.0	TABLE-7
8	POLE '10' TO POLE '11'	OHEW	NEPTUNE 19/3.25 AAC	2.5	37.7	42.0	TABLE-8
9	POLE '11' TO POLE '12'	OHEW	NEPTUNE 19/3.25 AAC	2.0	20.9	23.0	TABLE-9
10	POLE '12' TO POLE '13,14 GANTRY'	OHEW	NEPTUNE 19/3.25 AAC	2.0	17.5	40.0	TABLE-10
11	POLE '2' TO POLE '4'	TR	ACCC PARIS	2.5	45.5	145.0	TABLE-11
12	POLE '4' TO POLE '5'	TR	ACCC PARIS	2.5	32.6	100.0	TABLE-12
13	POLE '5' TO POLE '6,7 GANTRY'	TR	ACCC PARIS	1.1	17.5	45.0	TABLE-13
14	POLE '2' TO POLE '4'	OHEW	NEPTUNE 19/3.25 AAC	2.5	45.6	50.0	TABLE-14
15	POLE '4' TO POLE '5'	OHEW	NEPTUNE 19/3.25 AAC	2.5	32.8	36.0	TABLE-16
16	POLE '5' TO POLE '6,7 GANTRY'	OHEW	NEPTUNE 19/3.25 AAC	2.5	17.5	40.0	TABLE-16

FIELD POLE NUMBER			DESIGN NUMBER	SCOPE OF WORKS
STRUCTURE #	NEW	EXISTING		
25	-	794941	1	FEEDER 9JA (CONNECTION INTO BAY 1, GRANTHAM FARM ZS)
26A	1007340	-	2	
3	1007341	-	3	
4	1007342	-	4	
5	1007343	-	5	
6	1007344	-	6	
7	1007345	-	7	
26	-	794942	8	
27	-	794943	9	FEEDER 9J7 (CONNECTION INTO BAY 3, GRANTHAM FARM ZS)
26B	1007346	-	10	
11	1007347	-	11	
12	1007348	-	12	
13	1007349	-	13	
14	1007350	-	14	

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ENDEAVOUR ENERGY'S RELEVANT TERMS AND CONDITIONS.
2. DYNAMOMETERS MUST BE USED WHEN TENSIONING CONDUCTORS.
3. ALL TENSIONS ARE IN KILONEWTONS UNLESS STATED OTHERWISE.
4. ALL DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE.
5. INSTALL NEW HTLS ACCC PARIS FOR THE ENTIRE RECONSTRUCTION SECTION FROM GANTRY STRUCTURE AT SMEATON GRANGE ZS TO POLE STRUCTURE 16.
6. TENSIONS SHOWN ARE HORIZONTAL TENSIONS FOR A SINGLE CONDUCTOR.
7. TENSIONS SHOWN ARE APPLICABLE FOR SAGGING IMMEDIATELY AFTER RUN OUT AND VALID UNTIL 10 HOURS.
8. NO TEMPERATURE ADJUSTMENT REQUIRED FOR 10 YEAR CREEP WHILE READING THE TABLE FOR ACCC PARIS AND NEPTUNE AAC..
9. STRINGING SHALL BE STOPPED BELOW TEMPERATURES OF 5°C.
10. REFER DRAWING 527237 SHEET 3 TO 7 FOR PLAN AND PROFILE.
11. REFER DRAWING 527237 SHEET 5 FOR THE CONSTRUCTION SCHEDULE.
12. USE INLINE TEMPORARY STAYS EQUIVALENT TO 4/G AT 45 DEGREE GROUND SLOPE FOR STRINGING. STRAIN POLES ARE NOT DESIGNED FOR TERMINATION LOADS.
13. USE HTLS ACCC PARIS FOR BRIDGING/BONDING.
14. SAG TABLES PRODUCED FOR EXISTING SPANS OF OPGW 24F AND INVAR CONDUCTOR ON THE EXISTING FEEDER 9JA. SAG VALUES ARE INDICATIVE BASED ON LIDAR DATA. SAGS SHALL BE ADJUSTED DURING STRINGING TO ENSURE SUSPENSION ATTACHMENTS AT NEIGHBORING BRACED POST STRUCTURES ARE PLUMB.
15. ALL EXISTING FITTINGS ASSOCIATED WITH THE EXISTING OPGW 24F AND INVAR CONDUCTORS TO BE REPLACED IF CONDITION FOUND TO BE COMPROMISED.
16. OHEW NEPTUNE AAC STRUNG TO MATCH SAG AND TENSION OF ACCC PARIS CONDUCTOR.
17. POLE EMBEDMENT VARIES DUE TO PROPOSED BAULK EARTH WORKS AROUND THE PROPOSED TRANSMISSION LINE CUT-IN SECTION.
18. POLE '2' AND '10' ARE DESIGNED FOR;
    - 18.1. EXISTING XTACIR (INVAR CONDUCTOR) LOADS
    - 18.2. NEW PROPOSED HTLS ACCC PARIS CONDUCTOR LOADS FROM GRANTHAM FARM ZS
    - 18.3. TERMINATION LOADS FROM OPGW 24F AND OHEW (NEPTUNE AAC).

STRINGING CHARTS FOR EXISTING FEEDER 9JA

NOTE: RE-TERMINATE INVAR AND OPGW 24F AT EXISTING TENSIONS ON NEW POLES '2' AND '10'.

CONDUCTOR STRINGING (SECTION SPAN COUNT = 3) - TABLE 1									
STRAIN SECTION	POLE '10' TO POLE '29'					TENSION (%CBL) @ 5°C			25.5%
DESIGN SPAN	POLE '9' TO POLE '10'					RULING SPAN (m)			146.6
CONDUCTOR	INVAR - 14/5.6 + 19/2.88 AL XTACIR (EXISTING, DO NOT ALLOW FOR CREEP)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	57.50	54.00	50.90	47.80	45.02	42.38	39.95	37.74	35.65
SAG (m)	1.23	1.30	1.38	1.47	1.57	1.66	1.76	1.87	1.98

CONDUCTOR STRINGING (SECTION SPAN COUNT = 10) - TABLE 2									
STRAIN SECTION	POLE '2' TO POLE '16' (FDR 9JA)					TENSION (%CBL) @ 5°C			24.6%
DESIGN SPAN	POLE '1' TO POLE '2'					RULING SPAN (m)			219.6
CONDUCTOR	INVAR - 14/5.6 + 19/2.88 AL XTACIR (EXISTING, DO NOT ALLOW FOR CREEP)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	54.46	52.08	49.82	47.69	45.73	43.95	42.25	40.68	39.20
SAG (m)	0.97	1.02	1.06	1.11	1.16	1.20	1.25	1.30	1.35

CONDUCTOR STRINGING (SECTION SPAN COUNT = 3) - TABLE 3									
STRAIN SECTION	POLE '10' TO POLE '29'(FDR 9JA)					TENSION (%CBL) @ 5°C			15.8%
DESIGN SPAN	POLE '9' TO POLE '10'					RULING SPAN (m)			146.6
CONDUCTOR	OPGW-24F (EXISTING, DO NOT ALLOW FOR CREEP)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	12.16	11.63	11.09	10.59	10.08	9.59	9.13	8.68	8.25
SAG (m)	0.99	1.04	1.09	1.14	1.20	1.26	1.32	1.39	1.46

CONDUCTOR STRINGING (SECTION SPAN COUNT = 4) - TABLE 4									
STRAIN SECTION	POLE '2' TO POLE '16' (FDR 9JA)					TENSION (%CBL) @ 5°C			15.0%
DESIGN SPAN	POLE '1' TO POLE '2'					RULING SPAN (m)			219.6
CONDUCTOR	OPGW-24F (EXISTING, DO NOT ALLOW FOR CREEP)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	11.59	11.11	10.72	10.32	9.93	9.57	9.22	8.89	8.57
SAG (m)	0.78	0.81	0.85	0.88	0.91	0.95	0.98	1.02	1.06

STRINGING CHARTS FOR FEEDER 9J7 (GRANTHAM FARM ZS BAY 1)

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 5									
STRAIN SECTION	POLE '10' TO POLE '11'					TENSION (%CBL) @ 5°C			1.5%
DESIGN SPAN	POLE '10' TO POLE '11'					RULING SPAN (m)			37.2
CONDUCTOR	132kV ACCC PARIS (NEW, 20°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	2.78	2.74	2.72	2.70	2.68	2.66	2.64	2.62	2.60
SAG (m)	1.49	1.51	1.52	1.53	1.54	1.55	1.57	1.58	1.59

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 6									
STRAIN SECTION	POLE '11' TO POLE '12'					TENSION (%CBL) @ 5°C			1.5%
DESIGN SPAN	POLE '11' TO POLE '12'					RULING SPAN (m)			20.8
CONDUCTOR	132kV ACCC PARIS (NEW, 20°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	3.06	2.93	2.86	2.79	2.72	2.66	2.60	2.54	2.51
SAG (m)	0.41	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50

CONDUCTOR STRINGING (SECTION SPAN COUNT = 01) - TABLE 7									
STRAIN SECTION	POLE '12' TO POLE '13,14 GANTRY'					TENSION (%CBL) @ 5°C			1.0%
DESIGN SPAN	POLE '12' TO POLE '13,14 GANTRY'					RULING SPAN (m)			16.8
CONDUCTOR	132kV ACCC PARIS (NEW, 20°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	1.95	1.89	1.83	1.80	1.77	1.74	1.71	1.70	1.70
SAG (m)	0.43	0.44	0.46	0.47	0.47	0.48	0.49	0.49	0.49

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 8									
STRAIN SECTION	POLE '10' TO POLE '11'					TENSION (%CBL) @ 5°C			2.5%
DESIGN SPAN	POLE '10' TO POLE '11'					RULING SPAN (m)			37.4
CONDUCTOR	NEPTUNE 19/3.25 AAC (NEW, 10°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	0.66	0.64	0.63	0.62	0.61	0.59	0.58	0.57	0.56
SAG (m)	1.15	1.18	1.20	1.23	1.25	1.28	1.31	1.33	1.35

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 9									
STRAIN SECTION	POLE '11' TO POLE '12'					TENSION (%CBL) @ 5°C			2.0%
DESIGN SPAN	POLE '11' TO POLE '12'					RULING SPAN (m)			20.9
CONDUCTOR	NEPTUNE 19/3.25 AAC (NEW, 10°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	0.56	0.53	0.51	0.49	0.47	0.45	0.43	0.42	0.41
SAG (m)	0.41	0.43	0.46	0.48	0.49	0.51	0.53	0.55	0.57

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 10									
STRAIN SECTION	POLE '12' TO POLE '13,14 GANTRY'					TENSION (%CBL) @ 5°C			2.0%
DESIGN SPAN	POLE '12' TO POLE '13,14 GANTRY'					RULING SPAN (m)			17.1
CONDUCTOR	NEPTUNE 19/3.25 AAC (NEW, 10°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	0.58	0.53	0.50	0.47	0.44	0.42	0.40	0.39	0.37
SAG (m)	0.29	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.44

STRINGING CHARTS FOR FEEDER 9JA (GRANTHAM FARM ZS BAY 3)

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 11									
STRAIN SECTION	POLE '2' TO POLE '4'					TENSION (%CBL) @ 5°C			1.5%
DESIGN SPAN	POLE '2' TO POLE '3'					RULING SPAN (m)			45.7
CONDUCTOR	132kV ACCC PARIS (NEW, 20°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	2.72	2.70	2.68	2.67	2.66	2.64	2.63	2.62	2.61
SAG (m)	2.23	2.25	2.26	2.27	2.28	2.29	2.30	2.31	2.32

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 12									
STRAIN SECTION	POLE '4' TO POLE '5'					TENSION (%CBL) @ 5°C			1.5%
DESIGN SPAN	POLE '4' TO POLE '5'					RULING SPAN (m)			32.6
CONDUCTOR	132kV ACCC PARIS (NEW, 20°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	2.81	2.76	2.73	2.70	2.68	2.65	2.62	2.60	2.58
SAG (m)	1.10	1.12	1.13	1.14	1.16	1.17	1.18	1.19	1.20

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 13									
STRAIN SECTION	POLE '5' TO POLE '6,7 GANTRY'					TENSION (%CBL) @ 5°C			1.0%
DESIGN SPAN	POLE '5' TO POLE '6,7 GANTRY'					RULING SPAN (m)			16.7
CONDUCTOR	132kV ACCC PARIS (NEW, 20°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	1.89	1.84	1.79	1.75	1.73	1.70	1.68	1.66	1.66
SAG (m)	0.44	0.46	0.47	0.48	0.48	0.49	0.50	0.50	0.50

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 14									
STRAIN SECTION	POLE '2' TO POLE '4'					TENSION (%CBL) @ 5°C			3.5%
DESIGN SPAN	POLE '2' TO POLE '3'					RULING SPAN (m)			45.7
CONDUCTOR	NEPTUNE 19/3.25 AAC (NEW, 10°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	0.94	0.91	0.88	0.86	0.84	0.82	0.80	0.78	0.76
SAG (m)	1.17	1.21	1.25	1.28	1.32	1.35	1.38	1.41	1.45

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 15									
STRAIN SECTION	POLE '4' TO POLE '5'					TENSION (%CBL) @ 5°C			3.5%
DESIGN SPAN	POLE '4' TO POLE '5'					RULING SPAN (m)			32.7
CONDUCTOR	NEPTUNE 19/3.25 AAC (NEW, 10°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	1.03	0.96	0.91	0.86	0.82	0.78	0.75	0.72	0.70
SAG (m)	0.55	0.59	0.63	0.66	0.69	0.72	0.76	0.79	0.81

CONDUCTOR STRINGING (SECTION SPAN COUNT = 1) - TABLE 16									
STRAIN SECTION	POLE '5' TO POLE '6,7 GANTRY'					TENSION (%CBL) @ 5°C			2.0%
DESIGN SPAN	POLE '5' TO POLE '6,7 GANTRY'					RULING SPAN (m)			17.2
CONDUCTOR	NEPTUNE 19/3.25 AAC (NEW, 10°C CREPT COMPENSATION INCLUDED)								
TEMPERATURE (°C)	0	5	10	15	20	25	30	35	40
TENSION (kN)	0.62	0.57	0.52	0.49	0.46	0.44	0.42	0.40	0.38
SAG (m)	0.27	0.29	0.32	0.34	0.36	0.38	0.40	0.41	0.43

AMENDMENTS

A	ORIGINAL ISSUE	NPR-048
	Job No.	

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

© This drawing and the copyright therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE

APPROVED M.AZAMI

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE DIMENSIONS IN MILLIMETRES

AUTHORISED STEVEN PATON

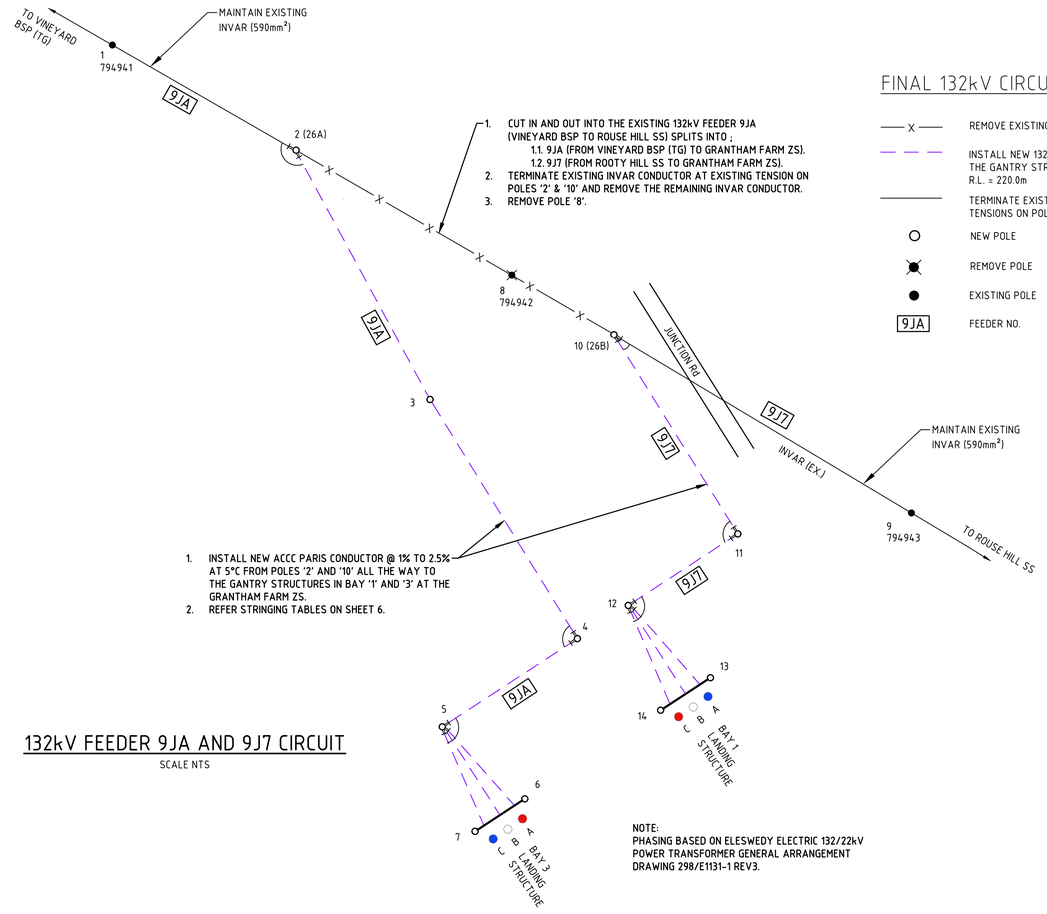
DRAWN	M.B		
DATE	15/11/24		
CH'D	J.V.S		

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
STRINGING CHARTS

MGR TRANSMISSION PROJECT DEVELOPMENT

A1 | 533542 | Rev. 1

SHEET No 6 OF 13 SHEETS



132kV FEEDER 9JA AND 9J7 CIRCUIT

SCALE NTS

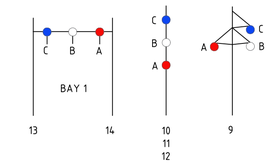
NOTE:
PHASING BASED ON ELESWEDY ELECTRIC 132/22kV POWER TRANSFORMER GENERAL ARRANGEMENT DRAWING 298/E1131-1 REV3.

FINAL 132kV CIRCUIT - NTS

- X — REMOVE EXISTING INVAR CONDUCTOR SECTION.
- INSTALL NEW 132KV ACCC PARIS CONDUCTOR ALL THE WAY TO THE GANTRY STRUCTURES. REFER STRINGING TABLES OF SHEET 6. R.L. = 220.0m C.L. = 1000m.
- TERMINATE EXISTING INVAR CONDUCTOR AT EXISTING TENSIONS ON POLE '2' AND '10'
- NEW POLE
- REMOVE POLE
- EXISTING POLE
- 9JA FEEDER NO.

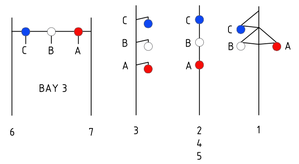
9J7 PHASING DETALS.

LOOKING TOWARDS GRANTHAM FARM ZS FROM ROUSE HILL SS.



9JA PHASING DETALS.

LOOKING TOWARDS GRANTHAM FARM ZS FROM VINEYARD BSP (TG)



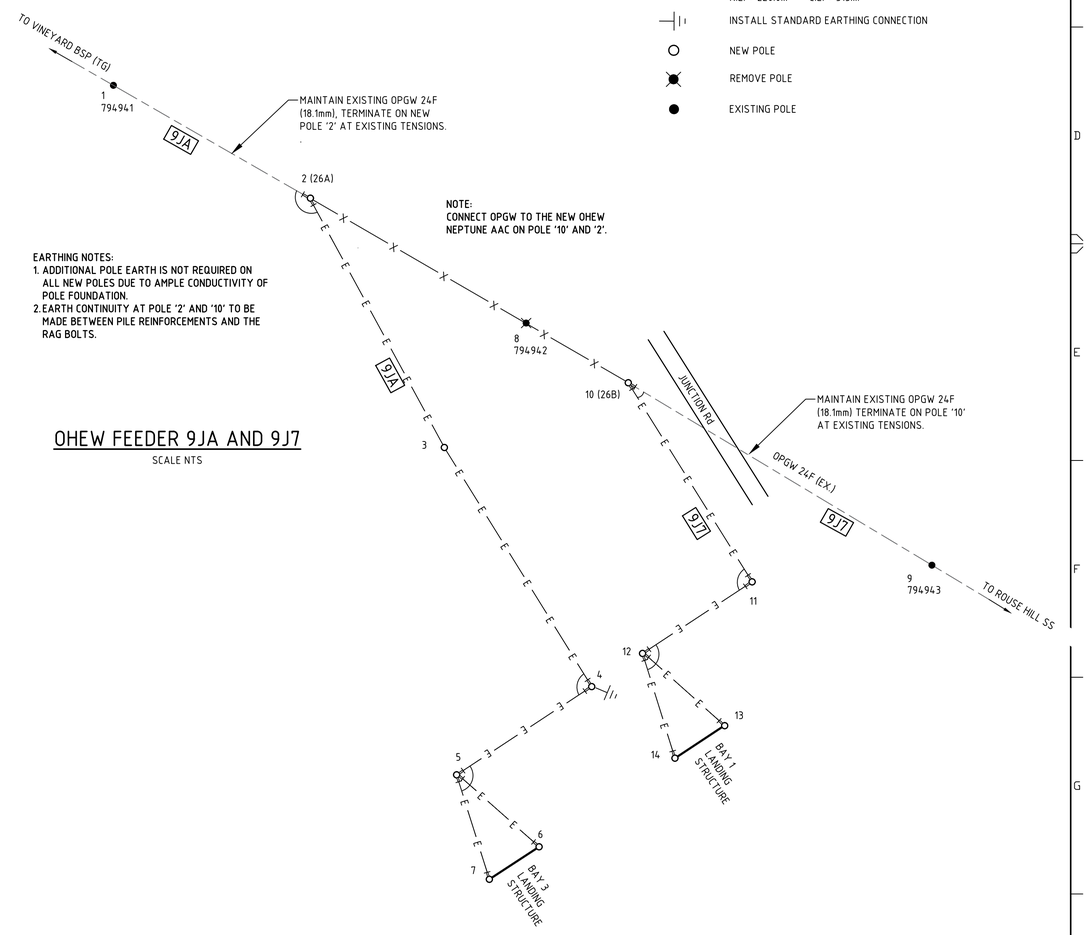
NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ENDEAVOUR ENERGY'S NETWORK STANDARDS AND CONNECTION POLICY.
2. CUT IN AND OUT INTO THE EXISTING 132KV FEEDER 9JA (VINEYARD BSP TO ROUSE HILL SS) SPLITS THIS FEEDER INTO 9JA AND 9J7, AT GRANTHAM FARM ZS SITE (LOT 99 RIVERSTONE ROAD EAST, GRANTHAM FARM NSW 2765).
3. PHASING DIAGRAMS SHOWN FROM THE ROUSE HILL SS AND VINEYARD BSP (TG) GOT FEEDER 9J7 AND 9JA RESPECTIVELY.
4. PHASING DETAILS HAS BEEN CAPTURED FROM SITE INVESTIGATION. HOWEVER, PHASING SHALL BE CONFIRMED BEFORE COMMISSIONING.
5. REFER STRINGING TABLES ON SHEET 6.

N

FINAL OHEW CIRCUIT - NTS

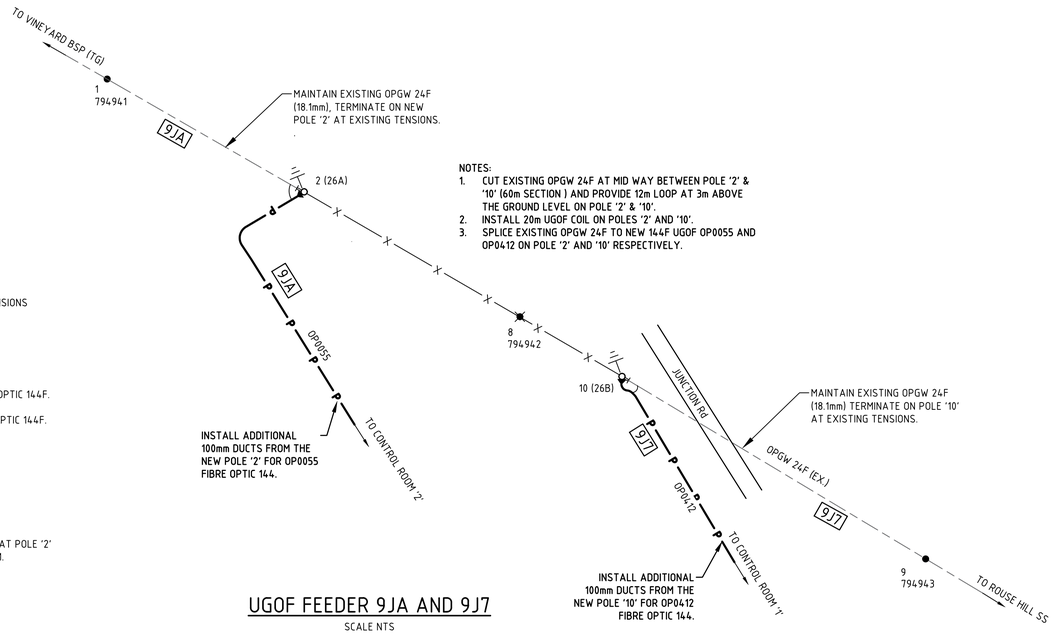
- TERMINATE EXISTING OPGW 24F AT EXISTING TENSIONS
- X — CUT EXISTING OPGW 24F AT MID WAY BETWEEN POLE '2' & '10' (60m SECTION) AND PROVIDE 12m LOOP AT 3m ABOVE THE GROUND LEVEL ON POLE '2' & '10' (POLE HEIGHT ABOVE GROUND = 21.0m)
- E — INSTALL NEW OHEW NEPTUNE 19/3.25 AAC @ 2% TO 4% AT 5°C ALL THE WAY TO THE GANTRY STRUCTURES. REFER STRINGING TABLES ON SHEET 6. R.L. = 220.0m C.L. = 315m.
- INSTALL STANDARD EARTHING CONNECTION
- NEW POLE
- REMOVE POLE
- EXISTING POLE



EARTHING NOTES:
1. ADDITIONAL POLE EARTH IS NOT REQUIRED ON ALL NEW POLES DUE TO AMPLE CONDUCTIVITY OF POLE FOUNDATION.
2. EARTH CONTINUITY AT POLE '2' AND '10' TO BE MADE BETWEEN PILE REINFORCEMENTS AND THE RAG BOLTS.

OHEW FEEDER 9JA AND 9J7

SCALE NTS



FINAL UGOF CABLE CIRCUIT - NTS

- TERMINATE EXISTING OPGW 24F AT EXISTING TENSIONS
- X — REMOVE EXISTING OPGW 24F SECTION.
- INSTALL STANDARD EARTHING CONNECTION
- P — INSTALL ADDITIONAL 100mm DUCTS.
  1. FROM THE NEW POLE '10' FOR OP0412 FIBRE OPTIC 144F. C.L. 230m
  2. FROM THE NEW POLE '2' FOR OP0055 FIBRE OPTIC 144F. C.L. 250m
- NEW POLE
- REMOVE POLE
- EXISTING POLE
- CONNECT EXISTING OPGW 24F TO THE UGOF 144F AT POLE '2' AND '10', AND CONNECTING TO THE CONTROL ROOM.

UGOF CABLE PART NO. ??????

UGOF FEEDER 9JA AND 9J7

SCALE NTS

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

AMENDMENTS
A ORIGINAL ISSUE NPR-048

© This drawing and the copyright Therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE		APPROVED	M.AZAMI
DRAWN	M.B		
DATE	15/11/24		
CH'D	J.V.S		

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE
DIMENSIONS IN MILLIMETRES

AUTHORISED
STEVEN PATON

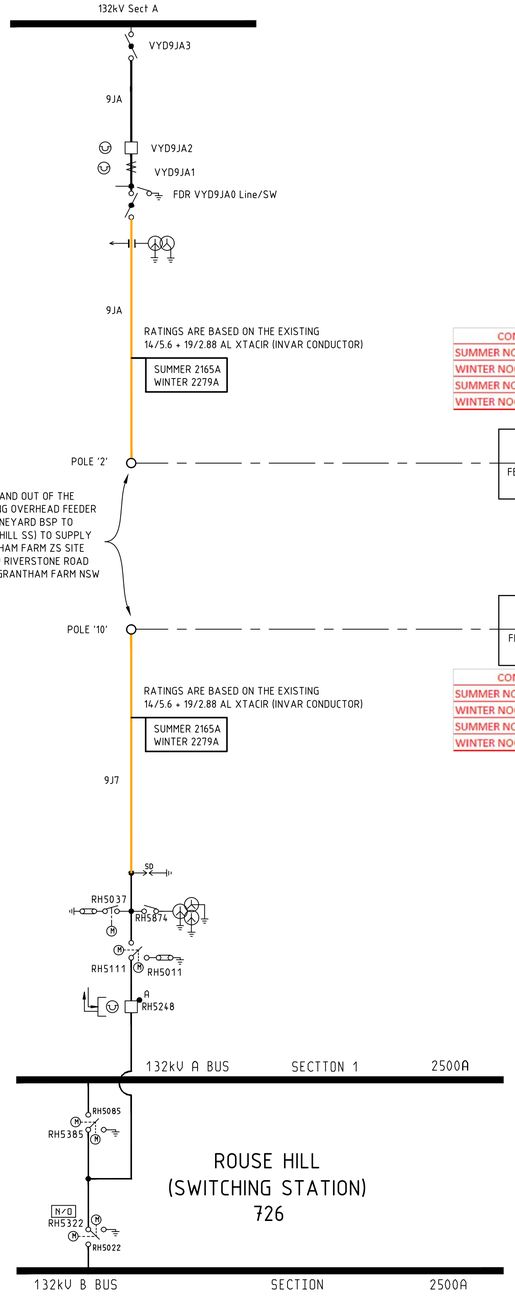
JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
TR AND EW CIRCUITS

MGR TRANSMISSION PROJECT DEVELOPMENT

A1 | 533542 | Rev. 1

SHEET No 7 OF 13 SHEETS

VINEYARD BSP (TG)
132kV BUS SECTION

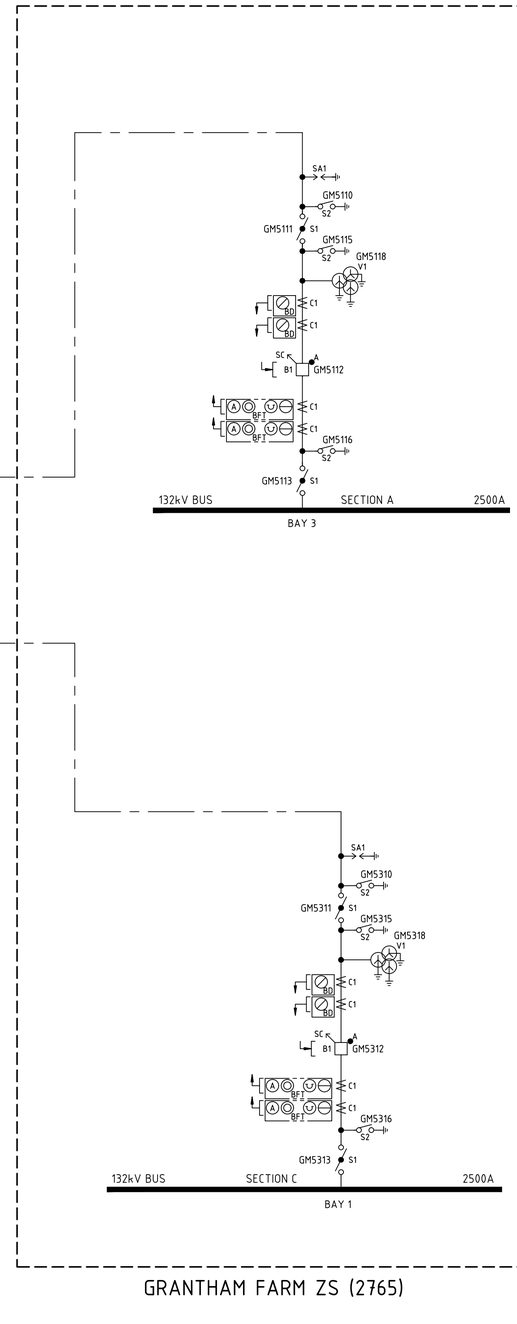


CONDITION	A	MVA
SUMMER NOON -NORMAL	2586	591
WINTER NOON - NORMAL	2751	629
SUMMER NOON - EMERGENC	2781	636
WINTER NOON - EMERGENCY	2928	670

SCOPE OF WORKS
POLES 2, 3, 4, 5, 6, 7.
FEEDER 9JA GRANTHAM FARM ZS
ACCC PARIS

SCOPE OF WORKS
POLES 10, 11, 12, 13, 14.
FEEDER 9J7 GRANTHAM FARM ZS
ACCC PARIS

CONDITION	A	MVA
SUMMER NOON -NORMAL	2586	591
WINTER NOON - NORMAL	2751	629
SUMMER NOON - EMERGENC	2781	636
WINTER NOON - EMERGENCY	2928	670



GRANTHAM FARM ZS (2765)

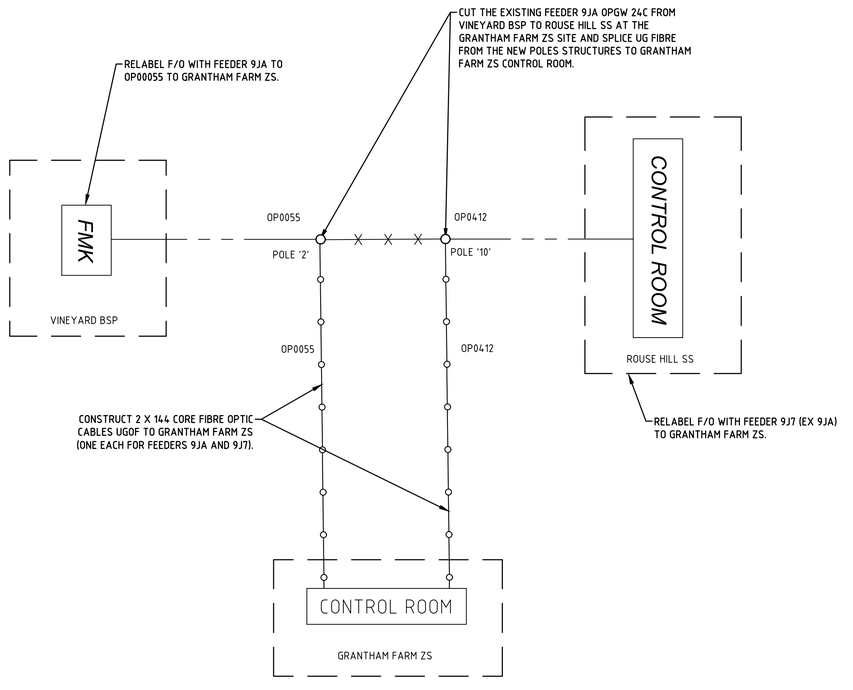
PROPOSED 132kV FEEDER
ARRANGEMENT

NOTES

1. THIS IS AN INTERIM DRAWING IS NOT AN AS-BUILT.
2. THIS IS TO CAPTURE THE FINAL DESIGN AND NETWORK CHARACTERISTICS AND PLANNING WILL BE ADVICED ON THE INSTALLED LINE RATINGS AFTER THE COMPLETION OF WORKS.
3. RATINGS FOR NEW ACCC CONDUCTORS ARE FOR NORMAL OPERATING TEMPERATURE OF 180°C AND CONTINGENCY TEMPERATURE OF 200°C.
4. ALL OH CONDUCTORS REMAIN UNCHANGED ALONG THE EXISTING 9JA FEEDER.
5. NEW CONDUCTORS ARE PROPOSED FOR THE CUT-IN CONNECTION TO THE GRANTHAM FARM ZS ONLY.
   - 5.1. NEW CONDUCTOR TO THE GRANTHAM FARM ZS IS ACCC PARIS.
   - 5.2. EXISTING OPGW 24F (EXISTING 9JA FEEDER) SPLICED TO THE NEW UG FIBRE OPTIC 144F TO THE GRANTHAM FARM ZS CONTROL ROOM.

LEGEND

- EXISTING OPGW 24F
- NEW UGOF 144F
- REMOVE EXISTING OPGW 24F
- EXISTING INVAR CONDUCTOR (14/5.6 + 19/2.88 AL XTACIR)
- NEW ACCC PARIS CONDUCTOR OH MAINS
- SCOPE OF WORKS



PROPOSED 144C OPGW FIBRE OPTIC
ARRANGEMENT

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

© This drawing and the copyright Therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

AMENDMENTS		
A	ORIGINAL ISSUE	NPR-048

ORIGINAL SCALE AS SHOWN		APPROVED M.AZAMI	
DRAWN	M.B		
DATE	15/11/24		
CH'D	J.V.S		

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE DIMENSIONS IN MILLIMETRES

AUTHORISED STEVEN PATON

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
9JA AND 9J7 SINGLE LINE DIAGRAM

MGR TRANSMISSION PROJECT DEVELOPMENT

A1 | 533542 | Rev. 1

SHEET No 8 OF 13 SHEETS

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT ENDEAVOUR ENERGY NETWORK STANDARDS AND DRAWINGS.

EASEMENT LEGEND

- EXISTING INVAR CONDUCTOR AND OPGW 24F.
- NEW ACCC PARIS CONDUCTOR BLOWOUT AT 50°C
- CONDUCTOR BLOWOUT AT 50°C 500Pa + 3m CLEARANCE (AS7000)
- EXISTING TRANSMISSION LINE EASEMENT
- NEW TRANSMISSION LINE EASEMENT
- REMOVE EXISTING CONDUCTOR AND OPGW
- 9JA FEEDER NO.
- EXISTING POLE
- REMOVE POLE
- 50m CHAINAGE (m)
- 9JA FEEDER NO.
- PROPOSED EASEMENT WITH THE ENDEAVOUR ENERGY PROPERTY
- NEW STAY

TERMINATE EXISTING 132kV MAINS AND OPGW 24F ON NEW POLE '2'

FROM VINEYARD BSP (TG) TO GRANTHAM FARM ZS

CUT IN AND OUT OF THE EXISTING OVERHEAD FEEDER 9JA FROM VINEYARD BSP TO ROUSE HILL SS GRANTHAM FARM ZS SITE (LOT 99 RIVERSTONE ROAD EAST, GRANTHAM FARM NSW 2765) REMOVE EXISTING CONDUCTORS.

TERMINATE EXISTING 132kV MAINS AND OPGW 24F ON NEW POLE '10'

PROPOSED EASEMENT TO MATCH WITH EXISTING EASEMENT INTERSECTION POINT

PROPOSED EASEMENT TO MATCH WITH EXISTING EASEMENT DEVIATION CORNER

PROPOSED EASEMENT TO MATCH WITH EXISTING EASEMENT INTERSECTION POINT

PROPOSED EASEMENT TO MATCH WITH PROPOSED FENCE/BOUNDARY LINE.

NEW ACCC PARIS CONDUCTOR SHOWN AT 50°C @500Pa BLOWOUT WIND

LOT 100 DP1282712

LOT 99 DP1282712

LOT 3 DP1459

LOT 18 DP30458

30m WIDE EASEMENT

132kV FDR 9J7 FROM ROOTY HILL SS TO GRANTHAM FARM ZS

EXISTING ENDEAVOUR ENERGY EASEMENT

JUNCTION ROAD

ROAD EDGE

EXISTING FENCE

GANTRY 1

GANTRY 2

BAY 1

BAY 2

BAY 3

TX3

EASEMENT AREA = 2857.5m²

EASEMENT MAP

SCALE 1:250

WORKS COMPLETED/FIELD BOOK

CONSTRUCTED BY:

WORKS COMPLETED:

SIGNATURE: DATE:

INSPECTED BY:

SIGNATURE: DATE:

ASSET RECORDING

I:

OF:

CONTACT No.:

HEREBY CERTIFY THAT ASSETS MARKED AS-BUILT ON THIS DRAWING HAVE BEEN RECORDED AS PER ENDEAVOR ENERGY STANDARD SAD 0004.

SIGNATURE:

DATE:

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

AMENDMENTS
A ORIGINAL ISSUE
JOB No. NPR-048

© This drawing and the copyright therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

		ORIGINAL SCALE	APPROVED
DRAWN	M.B		M.AZAMI
DATE	15/11/24		
CH'D	J.V.S		

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE
DIMENSIONS IN MILLIMETRES

AUTHORISED
–

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
GRANTHAM FARM ZS TRANSMISSION LINE EASEMENT

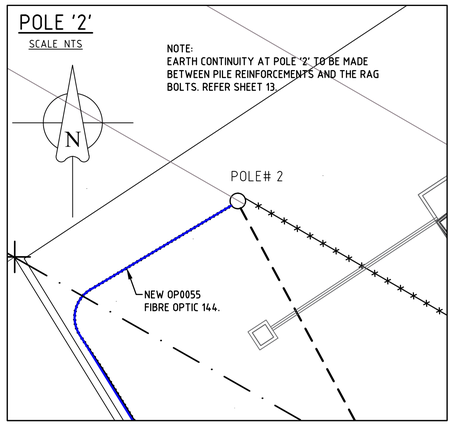
MGR TRANSMISSION PROJECT DEVELOPMENT

A1 | 533542 | Rev. 1

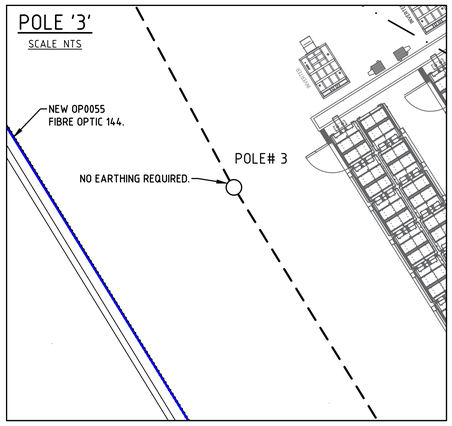
SHEET No 9 OF 13 SHEETS

POLE '2'
SCALE NTS

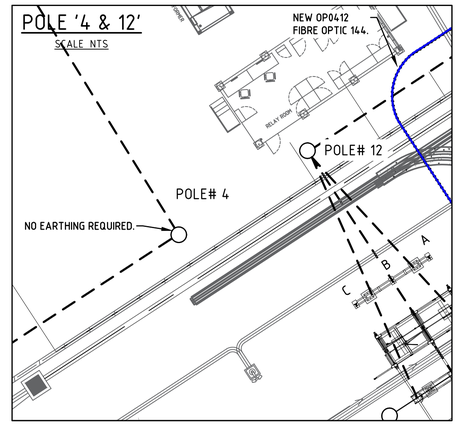
NOTE:
EARTH CONTINUITY AT POLE '2' TO BE MADE BETWEEN PILE REINFORCEMENTS AND THE RAG BOLTS. REFER SHEET 13.



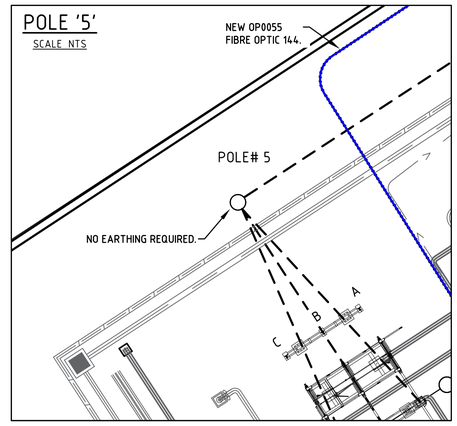
POLE '3'
SCALE NTS



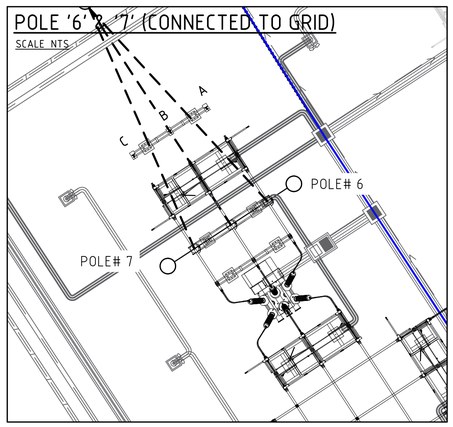
POLE '4 & 12'
SCALE NTS



POLE '5'
SCALE NTS

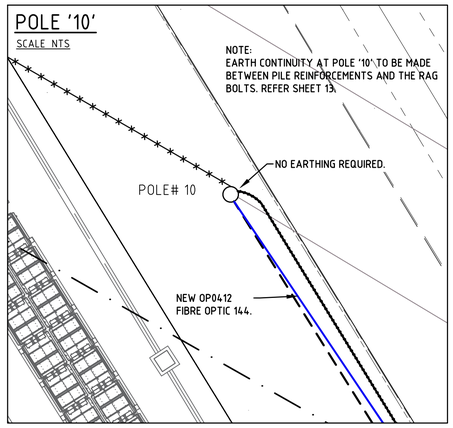


POLE '6' & '7' (CONNECTED TO GRID)
SCALE NTS

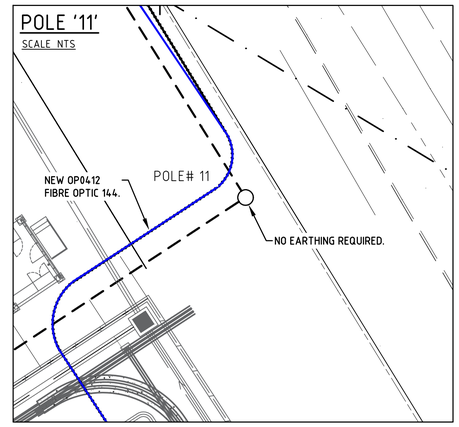


POLE '10'
SCALE NTS

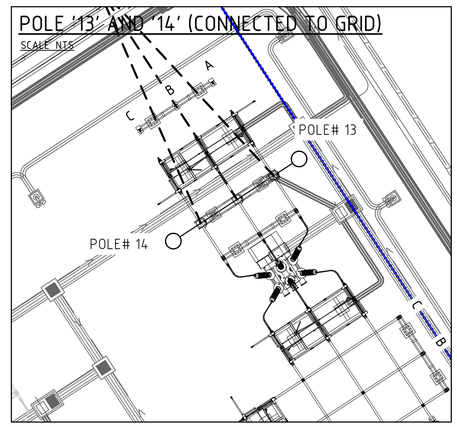
NOTE:
EARTH CONTINUITY AT POLE '10' TO BE MADE BETWEEN PILE REINFORCEMENTS AND THE RAG BOLTS. REFER SHEET 13.



POLE '11'
SCALE NTS



POLE '13' AND '14' (CONNECTED TO GRID)
SCALE NTS



NOTES

EARTHING CONSTRUCTION REQUIREMENTS

THE FOLLOWING EARTHING ARRANGEMENT IS RECOMMENDED TO ACHIEVE COMPLIANCE TO THE APPLICABLE SAFETY CRITERIA.

1. STEEL TRANSMISSION POLES 'X' MUST BE CONSTRUCTED WITH NO ADDITIONAL EARTH ROD/S.
2. STEEL TRANSMISSION POLES 'X' MUST BE CONSTRUCTED WITH ADDITIONAL EARTH ROD/S.
3. ALL THE CONDUCTIVE POLES MUST BE WITH MINIMUM 2mm THICK INSULATION COATING TO MITIGATE NON-COMPLIANT TOUCH VOLTAGES.
4. CLEARANCE DISTANCE FROM POLES/EARTHS TO THIRD PARTY ASSETS INCLUDING NEW TELSTRA PITS, WATER AND GAS PIPE ASSESS POINT MUST BE ACCURATELY MEASURED IN THE SITE IF THEY ARE IN CRITICAL DISTANCE TO POLES. REFER TO MINIMUM SEPARATION REQUIREMENT TABLE BELOW.
5. CLEARANCE DISTANCE FROM POLES/EARTHS TO CUSTOMER ASSETS INCLUDING METALLIC FENCES (BACKYARD CRITERIA ASSETS), METALLIC PIPES BONDED TO MEN ETC. MUST BE ACCURATELY MEASURED IN THE SITE.
6. BENTONITE QUANTITY IS APPROXIMATELY ONE BAG PER 5m OF EARTH ELECTRODE.
7. ELECTRODE TO BE PRE-CRIMPED WITH A HEXAGON DIE.
8. REFER EARTHING DESIGN REPORT"ZSE 24234-01 REV 0" FOR EARTHING DESIGN OF POLES.

SITE SPECIFIC REQUIREMENTS

DURING CONSTRUCTION OF NEW SECTION OF FEEDER, USE TEMPORARY BRIDGING CONDUCTORS TO CREATE AND EQUIPOTENTIAL BOND BEFORE MAKING OR BREAKING EARTH CONNECTIONS TO ENSURE PERSONAL DOES NOT BECOME PART OF THE PATH TO GROUND.

FIELD CREW AND PM SHALL REFER TO THE EARTHING REPORT AND PERFORM CONSTRUCTION, TESTING AND SUBMISSION OF RESULTS AS PER THE EARTHING REPORT.

SEPARATION REQUIREMENTS

CARE MUST BE TAKEN TO ENSURE THAT THE FOLLOWING SEPARATION OF METALLIC INFRASTRUCTURES FROM TRANSMISSION POLES AND EARTH RODS ARE MAINTAINED ACCORDING TO THE TABLES BELOW. FOR CRITICAL LOCATIONS MEASUREMENTS MUST BE TAKEN AT THE SITE.

#	POLE #	BACKYARD (m)	URBAN (m)	TELE (m)	MEN (m)	WATER VALVE (m)	GAS VALVE (m)
1	2	TBA	TBA	TBA	TBA	TBA	TBA
2	3	TBA	TBA	TBA	TBA	TBA	TBA
3	4	TBA	TBA	TBA	TBA	TBA	TBA
4	5	TBA	TBA	TBA	TBA	TBA	TBA
5	6	TBA	TBA	TBA	TBA	TBA	TBA
6	7	TBA	TBA	TBA	TBA	TBA	TBA
7	10	TBA	TBA	TBA	TBA	TBA	TBA
8	11	TBA	TBA	TBA	TBA	TBA	TBA
9	12	TBA	TBA	TBA	TBA	TBA	TBA
10	13	TBA	TBA	TBA	TBA	TBA	TBA
11	14	TBA	TBA	TBA	TBA	TBA	TBA

EARTHING SCHEDULE

EARTHING DATA - NPR-000048 132kV FEEDER 9JA AND 9J7)

ASSET	POLE '2'	POLE '3'	POLE '4'	POLE '5'	POLE '6'	POLE '7'	POLE '10'	POLE '11'	POLE '12'	POLE '13'	POLE '14'
POLE MATERIAL	STEEL	STEEL	STEEL	STEEL	STEEL	STEEL	STEEL	STEEL	STEEL	STEEL	STEEL
EARTHWIRE	NEPTUNE 19/3.25 AAC OPGW 24F (EX.)	NEPTUNE 19/3.25 AAC	NEPTUNE 19/3.25 AAC	NEPTUNE 19/3.25 AAC	NEPTUNE 19/3.25 AAC	NEPTUNE 19/3.25 AAC	NEPTUNE 19/3.25 AAC	NEPTUNE 19/3.25 AAC OPGW 24F (EX.)	NEPTUNE 19/3.25 AAC	NEPTUNE 19/3.25 AAC	NEPTUNE 19/3.25 AAC
SOIL RESISTIVITY AVERAGE IN OHMS (TOP LAYER)	38 Ωm	38 Ωm	38 Ωm	38 Ωm	38 Ωm	38 Ωm	38 Ωm	38 Ωm	38 Ωm	38 Ωm	38 Ωm
SOIL RESISTIVITY AVERAGE IN OHMS (MID LAYER)	7 Ωm	7 Ωm	7 Ωm	7 Ωm	7 Ωm	7 Ωm	7 Ωm	7 Ωm	7 Ωm	7 Ωm	7 Ωm
SOIL RESISTIVITY AVERAGE IN OHMS (BOT LAYER)	29 Ωm	29 Ωm	29 Ωm	29 Ωm	29 Ωm	29 Ωm	29 Ωm	29 Ωm	29 Ωm	29 Ωm	29 Ωm
UPPER SOIL LAYER DEPTH	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
MIDDLE SOIL LAYER DEPTH	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
LOCATION TYPE	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban
132KV FAULT LEVEL (kA)	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
DESIGN SOFTWARE / TOOL / GUIDE	CDEGS										
SIZE/NO. OF ELECTRODES (SEPARATE EARTHING)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)	NO ADDITIONAL EARTHING (STEEL POLES ONLY)
DESIGN EARTHING GRID RESISTANCE	2.1 Ω	3.2 Ω	3.2 Ω	3.3 Ω	3.8 Ω	3.8 Ω	2.1 Ω	3.3 Ω	3.3 Ω	3.8 Ω	3.8 Ω
BONDING CONDUCTOR SIZE IN mm^2 (INSULATED/BARE)	-	-	-	-	-	-	-	-	-	-	-
CONNECTION TYPE (CAD OR CRIMP)	-	-	-	-	-	-	-	-	-	-	-
INSULATED DEPTH FROM GROUND LEVEL (IN METRES)	-	-	-	-	-	-	-	-	-	-	-
TOTAL LENGTH OF EARTH ELECTRODE SYSTEM CABLE (INCL. INSULATED & BARE IN METRES)	-	-	-	-	-	-	-	-	-	-	-
TOUCH POTENTIAL CONTROL MEASURE	-	-	-	-	-	-	-	-	-	-	-
POLE INSULATION ABOVE GROUND	-	-	-	-	-	-	-	-	-	-	-
POLE INSULATION BELOW GROUND	-	-	-	-	-	-	-	-	-	-	-
NOTES	-	-	-	-	-	-	-	-	-	-	-

ATTENTION

ALL SERVICES SEARCHES MUST BE CHECKED BEFORE CONSTRUCTION

WORKS COMPLETED/FIELD BOOK

CONSTRUCTED BY: _____

WORKS COMPLETED: _____

SIGNATURE: _____ DATE: _____

INSPECTED BY: _____

SIGNATURE: _____ DATE: _____

ASSET RECORDING

I: _____

OF: _____

CONTACT No.: _____

HEREBY CERTIFY THAT ASSETS MARKED AS-BUILT ON THIS DRAWING HAVE BEEN RECORDED AS PER ENDEAVOUR ENERGY STANDARD SAD 0004.

SIGNATURE: _____

DATE: _____

AMENDMENTS

A	ORIGINAL ISSUE	NPR-0048

Job No.

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

© This drawing and the copyright therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE AS SHOWN

APPROVED M.AZAMI

DRAWN	M.B		
DATE	15/11/24		
CH'D	J.V.S		

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE
DIMENSIONS IN MILLIMETRES

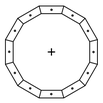
AUTHORISED
STEVEN PATON

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
EARTHING INSTALLATION

MGR TRANSMISSION PROJECT DEVELOPMENT

A1 | 533542 | Rev. 1

SHEET No 10 OF 13 SHEETS



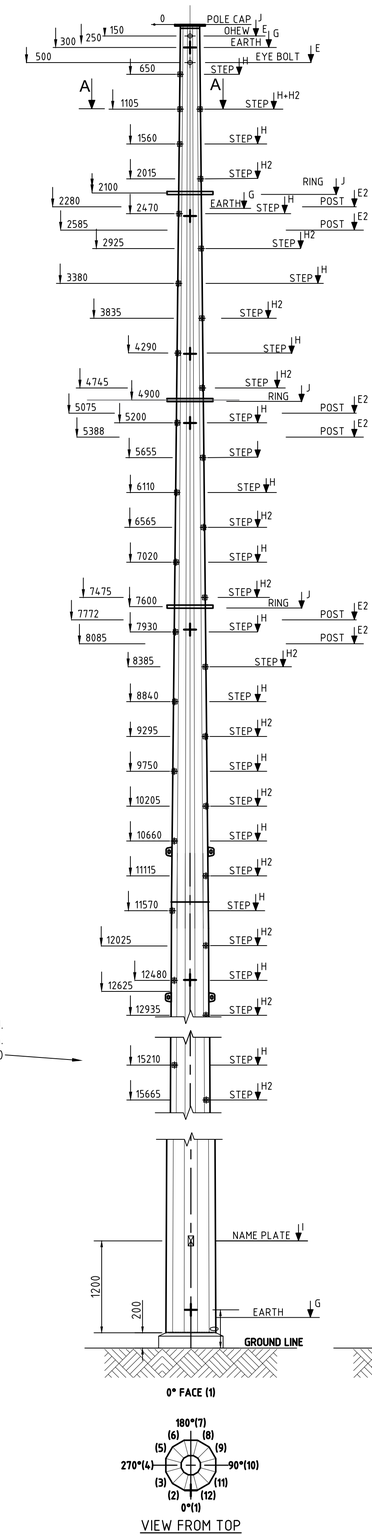
SECTION J

POLE RINGS TO BE DESIGNED BY SUPPLIER
HOLES SHOWN ARE INDICATIVE. HOLES ARE
TO BE SUITABLE FOR M20 BOLT

POLE SECTION JOINTING	
DESIGN SLIP	SUPPLIER TO DESIGN
MAX SLIP	
MIN SLIP	

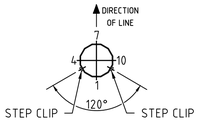
CONSTRUCTION TOLERANCE	
DIMENSION	TOLERANCE
0 TO 500mm	± 2mm
501 TO 10 000mm	± 10mm
POLE LENGTH	± 50mm

TABLE 1	
LENGTH OF POLE (m)	QTY OF POLE STEP FERRULES
21.5	35



NOTE: STEP BOLTS ARE NOT SHOWN.
STEP BOLTS AT 455mm SPACING.
LAST STEP BOLT SHOWN AT 25220

VIEW FROM TOP



SECTION A-A
STEP LOCATION
VIEW FROM TOP



SECTION E
25ø HOLE



SECTION E2
25ø HOLE



SECTION G
M12 EARTH FERRULE



SECTION H2
M16 STEP BOLT CLIP



SECTION H
M16 STEP BOLT CLIP



SECTION I
IDENTIFICATION PLATE

NOTES

1. DIMENSIONS ARE CENTERLINE.
2. POLE STEPS ARE REQUIRED TO BE INSTALLED FROM 6m ABOVE GROUND LEVEL. STEP BOLT SPACING IS 455mm
3. POLES ARE BASED PLATE MOUNTED.
4. SUPPLIER TO DESIGN POLE INCLUDING STRAIN RINGS.
5. JACKING LUGS LOCATIONS ARE INDICATIVE. REMOVABLE JACKING LUGS TO BE FITTED TO SUIT 40T PREFERRED HYDRAULIC JACKING SYSTEM.
6. WELDING TO BE CONTINUOUS THROUGHOUT & IN ACCORDANCE WITH AS1554.
7. AFTER FABRICATION STRAIGHT MEMBERS TO BE HOT DIP GALVANISED IN ACCORDANCE WITH AS/NZS 4680.

LEGEND			
SYMBOL	DESCRIPTION	QTY	DRG
J	POLE RING	4	SUPPLIER TO DESIGN
G	M12 EARTHING FERRULE	5	401002
H	STEP BOLT CLIP	REFER TABLE ABOVE	401002
I	IDENTIFICATION PLATE	1	053999
E	25ø HOLE	2	401002

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

AMENDMENTS
A ORIGINAL ISSUE NPR-048
Job No.

© This drawing and the copyright Therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE AS SHOWN
APPROVED M.AZAMI
DRAWN M.B
DATE 15/11/24
CH'D J.V.S

Endeavour Energy

REFERENCE DRAWINGS
DO NOT SCALE DIMENSIONS IN MILLIMETRES
AUTHORISED STEVEN PATON
MGR TRANSMISSION PROJECT DEVELOPMENT

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
132kV STEEL STRAIN POLE '2' AND '10' HOLE & FERRULE LAYOUT

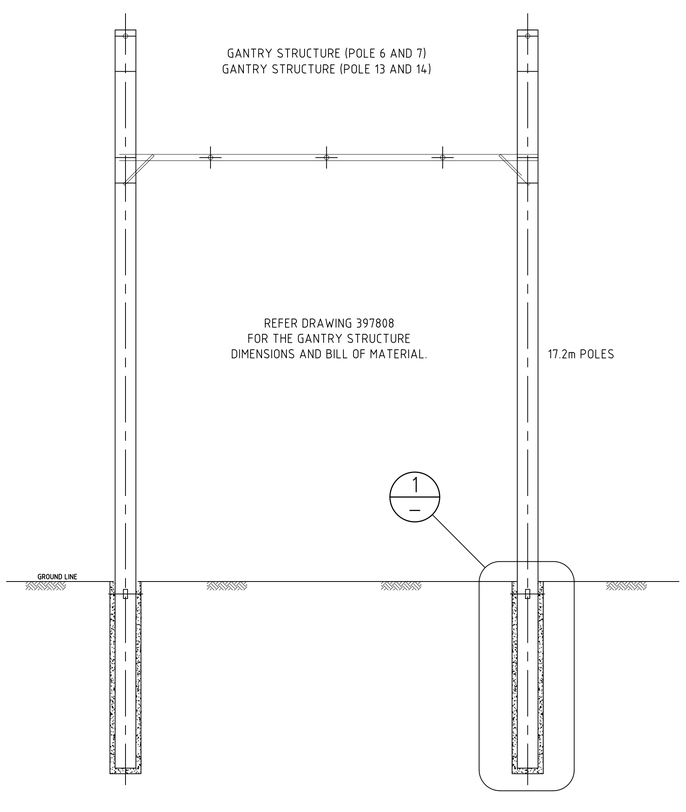
A1 533542 Rev. 1
SHEET No 11 OF 13 SHEETS

FOUNDATION SCHEDULE

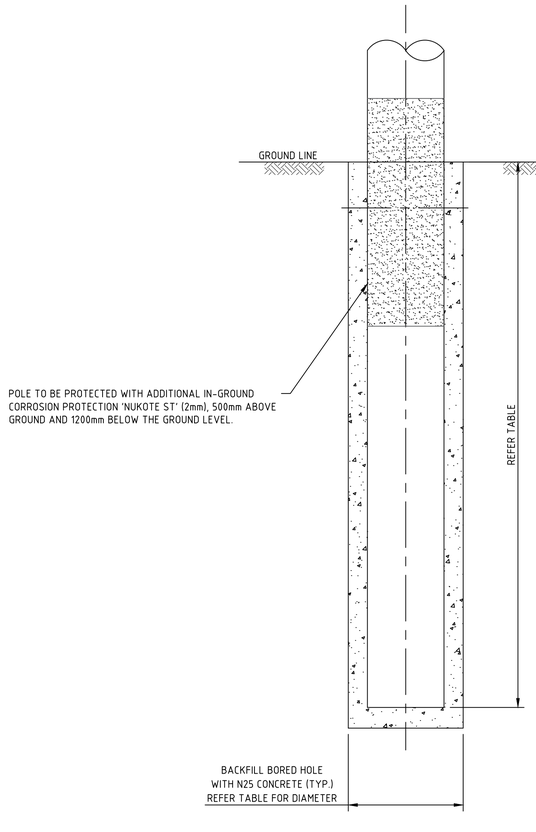
FIELD POLE NUMBER			ADDITIONAL COMMENTS	EARTH WORKS (+FILL, -CUT)	COORDINATES/LOCATION				POLE				SCOPE OF WORKS
STRUCTURE #	NEW	EXISTING			EASTING (m)	NORTHING (m)	ELEVATION (m)	F.S.L (m)	TYPE (LENGTH / STRENGTH)	FOOTING	AUGER DIAMETER (mm)	DESIGN NUMBER	
25	-	794941	NO CHANGE.	-	303410.72	6272819.84	23.60	23.60	SSD-21 (S, EX.)	-	-	1	FEEDER 9JA (CONNECTION INTO BAY 1, GRANTHAM FARM ZS)
26A	1007340	-	PILE FOUNDATION WITH ANCHOR BOLTS BY SUPPLIER. ALLOW UNDERGROUND PILOT CABLE CONNECTION.	-	303524.74	6272754.35	27.09	27.09	CUSTOM 21.5m STEEL POLE WITH ANCHOR BOLTS BY THE FABRICATOR	POLE FOUNDATION REINFORCED CONCRETE 2.0 X 8.0 (C) PILE FOUNDATION WITH ANCHOR BOLTS BY SUPPLIER	2000 (TBC)	2	
3	1007341	-	POLE TO BE EMBEDDED 4700mm INTO THE GROUND AFTER THE BAULK EARTH WORKS.	+1200mm	303546.61	6272713.66	27.80	28.50	21.4m/32kN (S)	4.7 (C)	1000	3	
4	1007342	-	POLE TO BE EMBEDDED 3500mm INTO THE GROUND AFTER THE BAULK EARTH WORKS.	+400mm	303570.65	6272674.62	28.58	28.99	21.4m/32kN (S)	3.5 (C)	1000	4	
5	1007343	-	POLE TO BE EMBEDDED 4800mm INTO THE GROUND AFTER THE BAULK EARTH WORKS.	+1500mm	303542.86	6272656.49	27.52	29.00	21.4m/32kN (S)	4.8 (C)	1000	5	
6	1007344	-	GANTRY. POLE TO BE EMBEDDED 4600mm INTO THE GROUND AFTER THE BAULK EARTH WORKS.	+1600mm	303556.33	6272644.74	27.83	29.50	GANTRY 17.1m/32KN (S)	4.7 (C)	1000	6	
7	1007345	-		+1600mm	303548.21	6272639.44	27.56	29.50	GANTRY 17.1m/32KN (S)	4.7 (C)	1000	7	
26	-	794942	REMOVE EXISTING POLE.	-	303560.54	6272733.61	28.31	28.31	-	-	-	8	
27	-	794943	NO CHANGE.	-	303708.13	6272648.49	33.46	33.46	STD-21	-	-	9	FEEDER 9J7 (CONNECTION INTO BAY 3, GRANTHAM FARM ZS)
26B	1007346	-	PILE FOUNDATION WITH ANCHOR BOLTS BY SUPPLIER ALLOW UNDERGROUND PILOT CABLE CONNECTION.	-	303576.63	6272724.22	28.60	28.60	CUSTOM 21.5m STEEL POLE WITH ANCHOR BOLTS BY THE FABRICATOR.	POLE FOUNDATION REINFORCED CONCRETE 2.0 X 8.0 (C) PILE FOUNDATION WITH ANCHOR BOLTS BY SUPPLIER	2000 (TBC)	10	
11	1007347	-	INSTALL NEW STEEL POLE AND INSTALL OHEW AS PER EARTHING CIRCUIT.	-300mm	303596.85	6272691.72	29.79	29.77	20m/32kN (S)	3.4 (C)	1000	11	
12	1007348	-	INSTALL NEW STEEL POLE AND INSTALL OHEW AS PER EARTHING CIRCUIT.	+400mm	303578.95	6272680.04	29.12	29.50	20m/32kN (S)	3.4 (C)	1000	12	
13	1007349	-	GANTRY. POLE TO BE EMBEDDED 4600mm INTO THE GROUND AFTER THE BAULK EARTH WORKS.	+900mm	303592.42	6272668.29	29.22	29.86	GANTRY 17.1m/32KN (S)	4.7 (C)	1000	13	
14	1007350	-		+900mm	303584.30	6272662.99	28.92	29.86	GANTRY 17.1m/32KN (S)	4.7 (C)	1000	14	

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFEREED TO THE PRINCIPAL BEFORE PROCEEDING WITH THE WORKS.
2. WHERE THERE IS ANY CONFLICT BETWEEN SPECIFICATION AND THESE NOTES, THE REQUIREMENTS IN THESE NOTES PREVAIL.
3. PIER DESIGN IS TO BE READ IN CONJUNCTION WITH GEOTECHNICAL REPORTS: "JG22276B- GEOTECH INVESTIGATION REPORT BY GEOENVIRO AT RIVERSTONE EAST MAY 2022.
4. GANTRY STRUCTURE TO BE ERECTED SO THAT POLE TOPS ARE LEVEL AND CROSSARM IS HORIZONTAL.
5. FOOTING DESIGNED TO AS/NZS 7000.
6. THE FOUNDATION MATERIAL IS NATURAL CLAY OR BETTER AND SHALE/SILTSTONE (WHERE MATERIAL GROUND) OR APPROVED ENGINEERED FILL TO THE GEOTECHNICAL ENGINEER'S SPECIFICATION. SAFE BEARING CAPACITY OF MINIMUM 800kPa. IF GROUND CONDITIONS ARE FOUND TO VARY MODIFICATION TO THE STRUCTURE FOUNDATION MAY BE REQUIRED.
7. PREPARATION AND TESTING OF THE EXISTING SUBGRADE SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERS SPECIFICATIONS.
8. COMPACTION TESTING REQUIREMENTS FOR ENGINEERED FILL AND SUB BASE LAYERS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERS SPECIFICATIONS.
9. PIER HOLES TO BE FILLED DURING THE SAME DAY OF BORING, UNLESS OTHERWISE ADVISED BY THE PRINCIPAL.



132kV SUBSTATION LANDING STRUCTURE WITH STEEL POLES
SCALE NTS



DETAIL 1 —
SCALE 1 : 20

AMENDMENTS
A ORIGINAL ISSUE NPR-048
Job No.

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

© This drawing and the copyright therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE		APPROVED	M.AZAMI
DRAWN	M.B		
DATE	15/11/24		
CH'D	J.V.S		

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE
DIMENSIONS IN MILLIMETRES

AUTHORISED
STEVEN PATON

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
FOUNDATION SCHEDULE

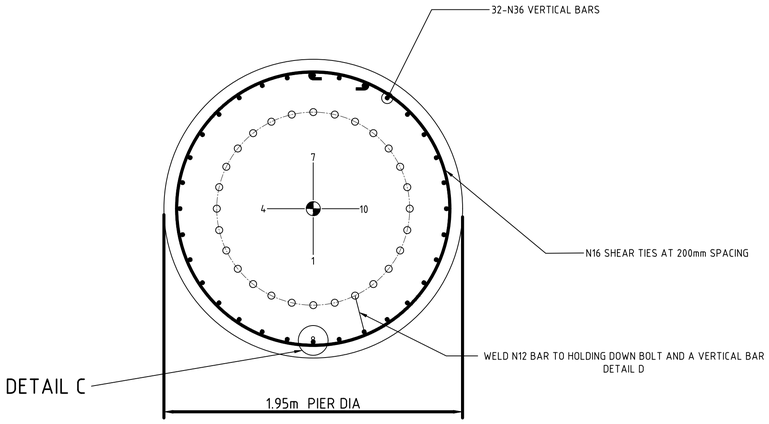
MGR TRANSMISSION PROJECT DEVELOPMENT

A1 | 533542 | Rev. 1

SHEET No 12 OF 13 SHEETS

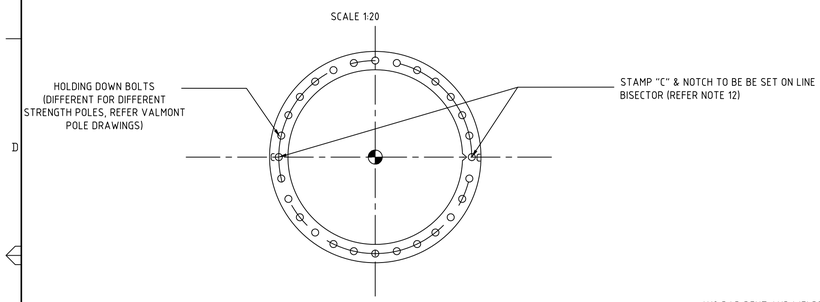
DIAL BEFORE YOU DIG www.1100.com.au

ATTENTION
ALL SERVICES SEARCHES MUST BE CHECKED BEFORE CONSTRUCTION



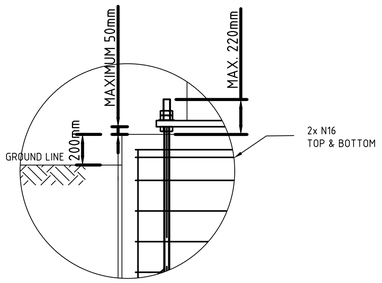
DETAIL C

SECTION A
SCALE 1:20

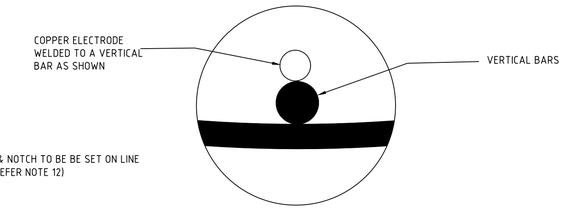


DENOTES CENTER OF PIER

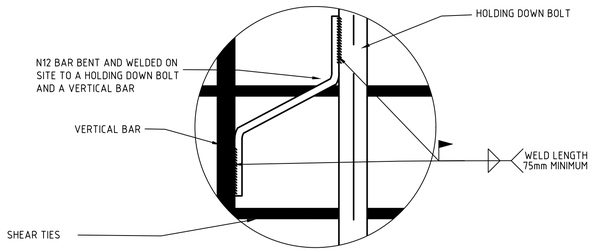
NOTE: BOLT CAGE SET OUT TO BE SIGNED OFF BY THE PRINCIPAL ENGINEER BEFORE CONCRETE PLACEMENT



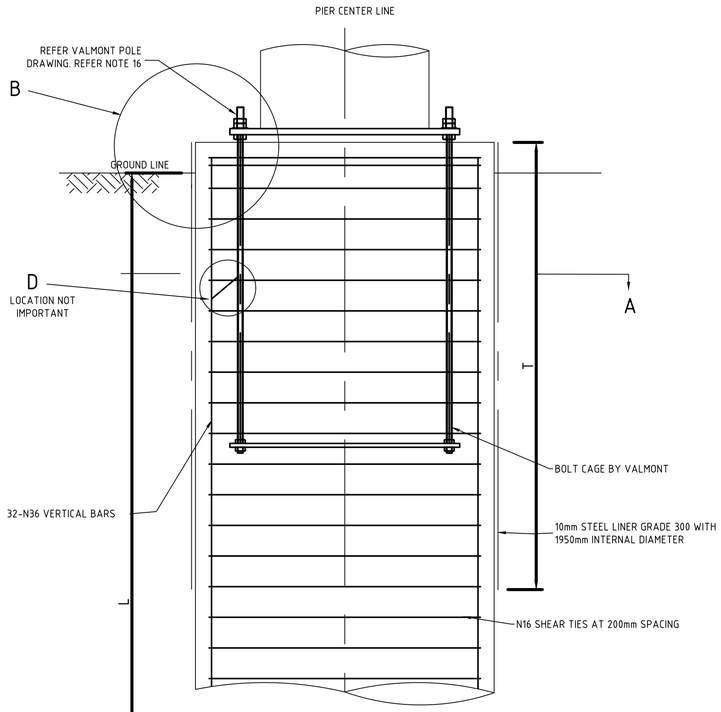
DETAIL B
SCALE 1:20



DETAIL C
EARTHING DETAIL, SEE SHEET 6
SCALE 1:2



DETAIL D
HOLDING DOWN BOLT AND VERTICAL BAR CONNECTION
NOT TO SCALE



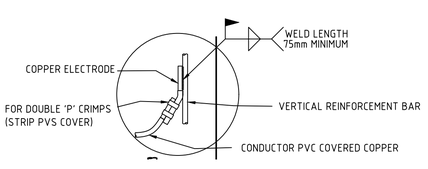
SCALE 1:20

GENERAL NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFEREED TO THE PRINCIPAL BEFORE PROCEEDING WITH THE WORKS.
2. WHERE THERE IS ANY CONFLICT BETWEEN SPECIFICATION AND THESE NOTES, THE REQUIREMENTS IN THESE NOTES PREVAIL.
3. PIER DESIGN IS TO BE READ IN CONJUNCTION WITH GEOTECHNICAL REPORT.
4. CONTRACTOR IS ADVISED TO READ THE GEOTECHNICAL REPORTS, IN PARTICULAR THE WORKING PLATFORM SECTION, AND FAMILIARIZE THEMSELVES WITH THE SITE CONSTRAINTS. CONTRACTOR TO PROVIDE CERTIFICATION FROM A CHARTERED ENGINEER, CONFIRMING ADEQUACY OF THE PROPOSED CONSTRUCTION METHODOLOGY.
5. THE METHOD OF CONSTRUCTION AND MAINTENANCE OF SAFETY, DURING CONSTRUCTION ARE THE RESPONSIBILITY OF THE CONTRACTOR. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO CONTRACTIBILITY OR SAFETY, THE MATTER SHALL BE REFERRED TO THE PRINCIPAL BEFORE PROCEEDING WITH THE WORKS.
6. AS PER GEOTECHNICAL REPORTS: CONCRETING BY TREMIE WITH HIGH SLUMP (180mm) IS RECOMMENDED
7. STEEL LINERS WILL BE REQUIRED. LENGTHS ARE GIVEN IN TABLE 1. CONTRACTOR CAN ALTER THE DEPTH OF THE STEEL LINER BASED ON THE GEOTECHNICAL REPORT AND ANY OTHER FACTOR TO COMPLY WITH SAFETY CONCERNS.
8. CONCRETE TO COMPLY WITH AS 3600:
   F'c = 40MPa
   MAXIMUM AGGREGATE SIZE = 20mm
9. CEMENT TYPE GP TO AS 3972.
10. REINFORCEMENT BARS: DEFORMED RIBBED N BARS TO AS 4671.
11. MINIMUM CONCRETE COVER TO REINFORCEMENT:
    TOP = 75mm
    SIDES = 75mm
    BOTTOM = 75mm
12. ALL REINFORCEMENT, VERTICAL AND SHEAR TIES, TO BE WELDED TO EACH OTHER SO THAT CONDUCTIVITY IS CONTINUOUS. HOLDING DOWN BOLTS TO BE WELDED TO A VERTICAL BAR ON SITE.
13. REINFORCEMENT TO BE MINIMUM 100mm FROM BOLT CAGE.
14. BOLT CAGE AND STEEL REINFORCEMENT TO BE POSITIONED CENTRAL TO PIERS.
15. BOLT CAGE SETTING OUT SHALL BE OBSERVED AND SIGNED OFF BY THE PRINCIPAL PRIOR TO CONCRETE PLACEMENT.
16. PIER HOLES TO BE FILLED DURING THE SAME DAY OF BORING, UNLESS OTHERWISE ADVISED BY THE PRINCIPAL.
17. UNDERGROUND SERVICES ARE IN THE VICINITY, SLIT TRENCHING OR NON DESTRUCTIVE DIGGING WILL BE REQUIRED.
18. AFTER CORRECT INSTALLATION OF FOUNDATION AS PER POLE FOUNDATION SET OUT PLAN AND PLACEMENT OF POLE ON HOLD DOWN BOLTS FIRST, TIGHTEN BOLTS TO SNUG TIGHT (FULL FORCE OF A PERSON USING STANDARD PODGER SPANNER).
19. SECOND, TIGHTEN EACH NUT EXTRA 2/3 OF A TURN AND THEN INSTALL LOCK NUT. THE ORDER OF TIGHTENING MUST BE TWO BOLTS AT 180DEG TO EACH OTHER AT TIME.

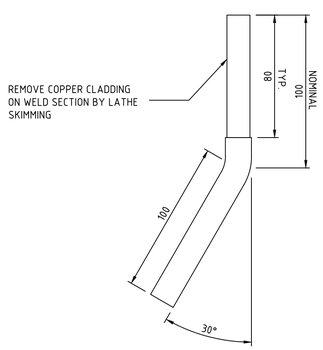
TABLE 1

DESIGN NUMBER	FIELD POLE NUMBER			PIER LENGTH L (m)	MINIMUM STEEL LINER LENGTH T (m)	PILE DIAMETER (m)	SCOPE OF WORKS
	STRUCTURE #	NEW	EXISTING				
2	26A	1007340	-	8	4.0	2.0	FEEDER 9JA (CONNECTION INTO BAY 1, GRANTHAM FARM ZS)
10	26B	1007346	-	8	4.0	2.0	FEEDER 9J7 (CONNECTION INTO BAY 3, GRANTHAM FARM ZS)

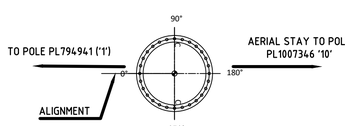


SCALE 1:10

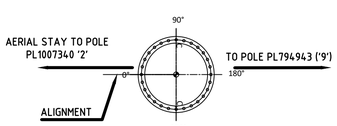
DETAIL C
EARTHING DETAIL



COPPER CLAD STEEL EARTH ELECTRODE DETAIL (DETAIL C)
SCALE 1:2



'2' (26A) PL1007340



'10' (26B) PL1007346

POLES FOUNDATION SETOUT PLAN
NTS

AMENDMENTS
A — ORIGINAL ISSUE — NPR-048 — Job No.
REVISION A
NO CHANGES.

PRELIMINARY - NOT FOR CONSTRUCTION
ISSUED 15/11/2024

© This drawing and the copyright Therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE
APPROVED M.AZAMI
DRAWN M.B
DATE 15/11/24
CH'D J.V.S

Endeavour Energy

REFERENCE DRAWINGS
DO NOT SCALE DIMENSIONS IN MILLIMETRES
AUTHORISED STEVEN PATON
MGR TRANSMISSION PROJECT DEVELOPMENT

JUNCTION RD
GRANTHAM FARM ZS OVERHEAD LINE CONNECTION
NPR-000048-002
FOUNDATION FOR POLE '2' AND '10'

A1 | 533542 | Rev. 1
SHEET No 13 OF 13 SHEETS

Appendix B

Statutory checklists

Clause 171 checklist

The following factors, listed in clause 171 of the EPandA Regulation, have been considered to assess the likely impacts of the proposal on the natural and built environment.

Factor	Impact
a) Any environmental impact on a community? The community would not be affected through declines in the local environment as a result of the proposal. Mitigation measures have been designed to reduce environmental impacts on the community to negligible levels (refer to Section 4.1).	Short term minor negative
b) Any transformation of a locality? There would be localised visual impacts associated with construction of the proposal, associated with transport of construction equipment, personnel and vehicles. As the proposal site is visible to nearby receivers and road users of Garfield Road East and Junction Road, some visual impact is expected. This impact would be short term and limited to the construction phase of the proposal. After the works have been completed, the proposal site would function as a ZS. Screening vegetation is proposed to be planted on the perimeter of the ZS to minimise visual impacts for nearby properties as well as road users of Garfield Road East and Junction Road. The presence of the ZS would represent a long-term transformation of the locality, however this impact is not expected to be significant.	Short-term negative Minor long-term
c) Any environmental impact on the ecosystems of the locality? The ecosystems of the locality would not be affected through declines in local environmental values (e.g. biodiversity, physical environment) as a result of the proposal. Extensive mitigation measures have been designed to reduce environmental impacts (refer to Section 4.1).	Negligible
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? During construction, the proposal would result in minor reduction in the aesthetic quality of the locality as the result of potential dust generation, noise and vibration, visual impacts and traffic impacts. These impacts would be mitigated through the implementation of measures summarised in Section 4.1. After construction of the proposal is complete, the ZS would be screened from visual receivers by planted vegetation to reduce potential aesthetic impacts. No long-term changes in the recreational, scientific, environmental quality or value of a locality are expected as a result of the proposal.	Short-term negative
e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposal site is currently an undeveloped, roadside site. The proposal site does not currently have any aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value. As such, no long-term changes to the character or nature of the site or its immediate environs are expected as a result of the proposal.	Negligible
f) Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974)?* With effective implementation of the safeguards provided in Section 4.1 of this REF, the proposal is not considered likely to have a significant negative impact on the habitat of any protected fauna.	Negligible
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? With effective implementation of the safeguards provided in Section 4.1 of this REF, the proposal is not considered likely to significantly endanger any species of animal, plant or other form of life.	Negligible
h) Any long-term effects on the environment? No significant negative long-term impacts are considered likely with effective implementation of the proposed mitigation measures in Section 4.1 of this REF.	Negligible

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Factor	Impact
i) Any degradation of the quality of the environment? No significant degradation of the quality of the environment is expected with effective implementation of the safeguards in Section 4.1 of this REF.	Negligible
j) Any risk to the safety of the environment? The proposal is unlikely to pose any significant risk to the safety of the environmental attributes outlined in Section 4.1. Any potential impacts arising during the construction of the proposal would be minimised with the implementation of the safeguards in Section 4.1 of this REF. During operation, the proposal would be maintained by Endeavour and operated in accordance with their existing safety procedures.	Negligible
k) Any reduction in the range of beneficial uses of the environment? The proposal is not likely to result in any reduction in the range of beneficial uses of the environment.	Negligible
l) Any pollution of the environment? Waste materials, fuel spills and sediment have the potential to cause pollution to the environment. However, given the proposed safeguards detailed in Section 4.1 of this REF, pollution to the environment is unlikely to occur.	Negligible
m) Any environmental problems associated with the disposal of waste? All waste generated by the proposal would be disposed of in a manner which would not damage or disturb any native flora or fauna or the physical environment. The disposal of waste would be in accordance with EPA approved methods of waste disposal. Safeguards detailed in Section 4.1 of this REF would protect the environment from problems associated with all waste disposal.	Negligible
n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal does not create any demand for resources that are in short supply nor is it likely to result in an increased demand on any natural resources that are likely to become in short supply. Endeavour would attempt to draw supplies and resources from established suppliers having appropriate environmental approvals and standards.	Negligible
o) Any cumulative environmental effect with other existing or likely future activities? Cumulative impacts are assessed in Section 5.16. Several concurrent projects were identified within a 5 km radius of the proposal. Ongoing communication between Endeavour and Blacktown City Council as well as the proponents of identified SSD projects would be required to manage potential impacts arising from concurrent construction phases.	Negligible
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal is not expected to have any impacts to coastal processes and coastal hazards, including those under projected climate change conditions.	Negligible
q) Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1 As the proposal is located within Blacktown LGA, it is subject to the Blacktown Local Strategic Planning Statement (LSPS). An objective for Blacktown LGA identified in the LSPS is to achieve 'sustainable growth, supported by essential infrastructure'. The proposal is considered to be essential infrastructure because it would service the growing electricity supply needs of Blacktown LGA. Without the proposal, growth and development would be constrained by existing electricity infrastructure which is inadequate.	Long term positive
r) Other relevant environmental factors? Environmental factors impacted by the proposal are discussed in Section 4.1 of this REF. With the implementation of the safeguards given in Section 4.1 in this REF, no additional impacts would be generated by the proposal.	Nil

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Objects of the EPandA Act

The objects of the EPandA Act, and their relevance to the proposal, are addressed below.

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposal is needed to improve local electricity provision to support the growing population and increasing development opportunities within Blacktown LGA.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered below.
1.3(c) To promote the orderly and economic use and development of land.	The proposal would improve existing electrical infrastructure which would provide for future growth and development in the region which is considered to be an economic use of the land.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposal.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	The proposal would require clearing of existing vegetation within the proposal site. The potential impacts on vegetation, threatened species, populations and ecological communities are addressed in Section 5.3.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	Management of potential risks to Aboriginal and non-Aboriginal heritage is considered in Sections 5.6 and 5.7.
1.3(g) To promote good design and amenity of the built environment.	The proposal has been designed to fit in with the existing design and amenity of the built environment, including with the existing transmission infrastructure located at the proposal site.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposal.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the proposal.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Community consultation has been addressed in Section 4.

Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the proposal.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

The precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

The precautionary principle has guided the assessment of environmental impacts for this REF and the development of mitigation measures throughout Section 4.1.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Intergenerational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The proposal would improve future electricity supply and reliability, which would have a long-term positive impact on future generations.

Conservation of biological diversity and ecological integrity

Biological diversity and ecological integrity are assessed in Section 5.3.

Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by the carrying out of a proposal, including air, water, land and living things. The value of the proposal to the community in terms of improved electricity supply and reliability was recognised.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Appendix C

EPBC protected matters

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 16-Dec-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	8
Listed Threatened Species:	99
Listed Migratory Species:	33

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	242
Commonwealth Heritage Places:	1
Listed Marine Species:	46
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	6
Regional Forest Agreements:	None
Nationally Important Wetlands:	2
EPBC Act Referrals:	69
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community likely to occur within area	In feature area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area	In feature area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area	In feature area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area	In feature area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area	In feature area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area	In feature area
Turpentine-Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area	In buffer area only
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia			
Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Aphelocephala leucopsis](#) Southern Whiteface [529]	Vulnerable	Species or species habitat may occur within area	In feature area
[Ardenna grisea](#) Sooty Shearwater [82651]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Botaurus poiciloptilus](#) Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
[Callocephalon fimbriatum](#) Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
[Calyptorhynchus lathami lathami](#) South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Climacteris picumnus victoriae](#) Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Diomedea antipodensis](#) Antipodean Albatross [64458]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Diomedea antipodensis gibsoni](#) Gibson's Albatross [82270]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat likely to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In feature area
FISH			
Epinephelus daemelii			
Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Macquaria australasica			
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In feature area
Prototroctes maraena			
Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area	In feature area
FROG			
Heleioporus australiacus			
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area	In feature area
Litoria aurea			
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area	In feature area
Mixophyes balbus			
Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
MAMMAL			
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area	In feature area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat may occur within area	In buffer area only
Notamacropus parma Parma Wallaby [89289]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat known to occur within area	In feature area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
PLANT			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat known to occur within area	In feature area
Acacia gordonii [5031]	Endangered	Species or species habitat known to occur within area	In buffer area only
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat known to occur within area	In feature area
Allocasuarina glareicola [21932]	Endangered	Species or species habitat likely to occur within area	In feature area
Asterolasia elegans [56780]	Endangered	Species or species habitat may occur within area	In buffer area only
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area	In feature area
Darwinia biflora [14619]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Eucalyptus cryptica listed as Eucalyptus sp. Cattai (Gregson s.n., 28 Aug 1954) [93502]	Critically Endangered (listed as Eucalyptus sp. Cattai	Species or species habitat known to occur within area	In feature area
Genoplesium baueri Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area	In feature area
Haloragodendron lucasii Hal [6480]	Endangered	Species or species habitat may occur within area	In buffer area only
Kunzea rupestris [8798]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Lasiopetalum joyceae [20311]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Leucopogon exolasius Woronora Beard-heath [14251]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat known to occur within area	In feature area
Micromyrtus blakelyi [6870]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Micromyrtus minutiflora [11485]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Olearia cordata [6710]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat known to occur within area	In buffer area only
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area	In feature area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area	In feature area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat likely to occur within area	In feature area
Pultenaea parviflora [19380]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In feature area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Zieria involucrata [3087]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
REPTILE			
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Hoplocephalus bungaroides Broad-headed Snake [1182]	Endangered	Species or species habitat may occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
SHARK			
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
SNAIL			
Pommerhelix duralensis Dural Land Snail [85268]	Endangered	Species or species habitat known to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thalassarche impavida](#)			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Thalassarche melanophris](#)			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Thalassarche salvini](#)			
Salvin's Albatross [64463]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Thalassarche steadi](#)			
White-capped Albatross [64462]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Migratory Marine Species			
[Caretta caretta](#)			
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Chelonia mydas](#)			
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Dermochelys coriacea](#)			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Eretmochelys imbricata](#)			
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Mobula alfredi as Manta alfredi](#)			
Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In buffer area only
[Mobula birostris as Manta birostris](#)			
Giant Manta Ray [90034]		Species or species habitat may occur within area	In buffer area only
[Natator depressus](#)			
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Migratory Terrestrial Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Cuculus optatus](#) Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area	In feature area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Australian Postal Corporation		
Commonwealth Land - Australian Postal Corporation [12746]	NSW	In buffer area only
Commonwealth Land - Australian Postal Corporation [14619]	NSW	In buffer area only
Commonwealth Land - Australian Postal Corporation [14618]	NSW	In buffer area only
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian & Overseas Telecommunications Corporation [15900]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [14252]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12733]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12738]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [16125]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12753]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [14229]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [16529]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [16252]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [14267]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [14228]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [14227]	NSW	In buffer area only
Defence		
Commonwealth Land - Defence Service Homes Corporation [14624]	NSW	In buffer area only
Commonwealth Land - Defence Service Homes Corporation [14621]	NSW	In buffer area only
Commonwealth Land - Defence Service Homes Corporation [14590]	NSW	In buffer area only
Commonwealth Land - Defence Service Homes Corporation [14231]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Service Homes Corporation [14579]	NSW	In buffer area only
Commonwealth Land - Director of Defence Service Homes [14620]	NSW	In buffer area only
Defence - HMAS NIRIMBA [10030]	NSW	In buffer area only
Defence - HMAS NIRIMBA [10031]	NSW	In buffer area only
Defence - RICHMOND - FUEL FARM, DENTAL, MEDICAL [10222]	NSW	In buffer area only
Defence - RICHMOND - FUEL FARM, DENTAL, MEDICAL [10225]	NSW	In buffer area only
Defence - RICHMOND - FUEL FARM, DENTAL, MEDICAL [10220]	NSW	In buffer area only
Defence - RICHMOND - FUEL FARM, DENTAL, MEDICAL [10221]	NSW	In buffer area only
Defence - RICHMOND - FUEL FARM, DENTAL, MEDICAL [10226]	NSW	In buffer area only
Defence - RICHMOND - FUEL FARM, DENTAL, MEDICAL [10227]	NSW	In buffer area only
Defence - RICHMOND - FUEL FARM, DENTAL, MEDICAL [10229]	NSW	In buffer area only
Defence - RICHMOND - FUEL FARM, DENTAL, MEDICAL [10228]	NSW	In buffer area only
Defence - RICHMOND - MIDDLE MARKER [11171]	NSW	In buffer area only
Defence - RICHMOND - OUTER MARKER [10212]	NSW	In buffer area only
Defence - RICHMOND - OUTER MARKER [10213]	NSW	In buffer area only
Defence - Defence Housing Authority		
Commonwealth Land - Defence Housing Authority [14131]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14259]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14216]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14151]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14258]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14152]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [15951]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14153]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14137]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14264]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14136]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Housing Authority [14135]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14134]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14265]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14262]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14217]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14178]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14243]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14171]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16013]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14179]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14132]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16275]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14210]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14139]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14138]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14159]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14173]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14211]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16271]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14172]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14249]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16274]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14175]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14248]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16273]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14174]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14212]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Housing Authority [14157]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14156]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14155]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14154]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14133]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14150]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14176]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14207]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14177]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14204]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [12740]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14203]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [12741]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14206]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14256]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14205]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14257]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16141]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14200]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14254]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16140]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14255]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16143]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14202]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16142]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14201]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14253]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Housing Authority [14250]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14251]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16276]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16277]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16272]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14114]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14209]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14208]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [15902]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [15039]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [15038]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14130]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14165]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [12745]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14164]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14238]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14162]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [12742]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [12744]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16146]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16147]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16144]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16145]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16060]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14166]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14167]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14120]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Housing Authority [16139]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14225]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14126]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14158]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14121]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14224]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14124]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14127]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14128]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14125]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14129]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14140]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14145]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14146]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16138]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14144]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14277]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14220]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14147]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14148]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14142]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14141]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14221]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14222]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14261]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14149]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14260]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Housing Authority [14263]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [12743]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14223]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14109]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14168]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14219]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14169]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14160]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14163]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14218]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14161]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16012]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [12739]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14195]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14194]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14197]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14196]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14118]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14116]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14117]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14226]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14115]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14113]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14112]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14111]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14110]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14591]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Housing Authority [14199]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14190]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14240]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14198]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14193]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14191]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14192]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14122]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14123]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14234]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14235]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14239]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14237]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14108]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14170]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14236]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14188]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14189]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [15213]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14266]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14119]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16136]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [16137]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14143]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14215]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14184]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14242]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Housing Authority [14241]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14247]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14213]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14245]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14246]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14244]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14214]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14182]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14181]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14183]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14186]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14185]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14180]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [14187]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14556]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14587]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14588]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14523]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14589]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14524]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14525]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14623]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14622]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14586]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14580]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14578]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14583]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Director of War Service Homes [14582]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14581]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14585]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14584]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14232]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [14233]	NSW	In buffer area only
Transport and Regional Services - Airservices Australia		
Commonwealth Land - Airservices Australia [14230]	NSW	In buffer area only
Unknown		
Commonwealth Land - [15453]	NSW	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Natural			
Shale Woodland Llandilo	NSW	Listed place	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
[Chalcites osculans as Chrysococcyx osculans](#) Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
[Diomedea antipodensis](#) Antipodean Albatross [64458]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Diomedea antipodensis gibsoni as Diomedea gibsoni](#) Gibson's Albatross [82270]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Diomedea sanfordi](#) Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Sterna striata White-fronted Tern [799]		Migration route may occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat may occur within area overfly marine area	In buffer area only
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche bulleri platei as Thalassarche sp. nov. Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Thalassarche melanophris](#) Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Thalassarche salvini](#) Salvin's Albatross [64463]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Reptile			
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Cattai	National Park	NSW	In buffer area only
Pitt Town	Nature Reserve	NSW	In buffer area only
Rouse Hill	Regional Park	NSW	In buffer area only
Scheyville	National Park	NSW	In buffer area only
Wianamatta	Regional Park	NSW	In buffer area only
Windsor Downs	Nature Reserve	NSW	In buffer area only

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Longneck Lagoon	NSW	In buffer area only
Pitt Town Lagoon	NSW	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Warragamba Dam Raising Project	2017/7940		Completed	In buffer area only
Controlled action				
418 Withers Road Subdivision of lot 1020 & 1022	2010/5578	Controlled Action	Post-Approval	In buffer area only
Commercial development, Lot 9 and Lot 21 Mile End Road, Rouse Hill, NSW	2018/8294	Controlled Action	Post-Approval	In buffer area only
Conrad and Keirle Roads Residential Subdivision	2000/78	Controlled Action	Post-Approval	In buffer area only
Construct an integrated residential development, NSW	2013/6910	Controlled Action	Post-Approval	In buffer area only
Develop 380 ha land for residential & commercial use, NSW	2014/7119	Controlled Action	Post-Approval	In buffer area only
Glenwood Residential Subdivision	2000/77	Controlled Action	Post-Approval	In buffer area only
Kellyville Precinct	2020/8828	Controlled Action	Post-Approval	In buffer area only
North West Rail Link	2012/6360	Controlled Action	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Residential Development	2013/6974	Controlled Action	Post-Approval	In buffer area only
Residential Development, Lots 13 & 14, Balmoral Road, Kellyville, NSW	2013/6884	Controlled Action	Post-Approval	In buffer area only
Residential Development/Lot 102 DP 830738 Conrad Road	2001/518	Controlled Action	Completed	In buffer area only
Residential Development of Lot G and H	2000/114	Controlled Action	Post-Approval	In buffer area only
Rooty Hill Concrete Batching Plant and associated facilities	2003/949	Controlled Action	Completed	In buffer area only
Not controlled action				
18-hole, golf course development, west of Eastern Creek	2004/1757	Not Controlled Action	Completed	In feature area
Bulk Earthworks (Stages 1A, 1B &1C)	2009/4998	Not Controlled Action	Completed	In buffer area only
Clearance of 6.3ha of Cumberland Plain Woodland for industrial subdivision cnr of Old Walgrove and W	2004/1445	Not Controlled Action	Completed	In buffer area only
Clearance of vegetation for Warehouse Units	2003/994	Not Controlled Action	Completed	In buffer area only
Concrete Batching Plant and Associated Facilities	2005/2067	Not Controlled Action	Completed	In buffer area only
Conrad Road Residential Subdivision	2001/320	Not Controlled Action	Completed	In feature area
Construction of a playing field and associated facilities	2004/1798	Not Controlled Action	Completed	In buffer area only
Development of Rouse Hill Anglican College	2001/157	Not Controlled Action	Completed	In buffer area only
Duplication of the single rail line between Quakers Hill & Vineyard	2009/4872	Not Controlled Action	Completed	In buffer area only
Electricty Substation at Old Wallgrove Road	2005/2220	Not Controlled Action	Completed	In buffer area only
Erection of a dwelling and associated access and infrastructure, 19 Tidswell Str	2003/1078	Not Controlled Action	Completed	In buffer area only
Fyfe Road, Rouse Hill Residential Subdivision	2002/831	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
gas main installation from Eastern Creek to Erskine Park	2005/2235	Not Controlled Action	Completed	In buffer area only
hazard reduction burn	2003/1181	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Lot 43 Fyfe Road Residential Subdivision	2002/838	Not Controlled Action	Completed	In buffer area only
Lots 24 & 25 Kierle Road Residential Subdivision, Kellyville	2001/335	Not Controlled Action	Completed	In buffer area only
Mountain View Classrooms Construction	2001/306	Not Controlled Action	Completed	In buffer area only
Northwest Transitways Project	2002/796	Not Controlled Action	Completed	In buffer area only
Oakhurst Residential Subdivision	2000/41	Not Controlled Action	Completed	In buffer area only
Precinct 9,Tallowood Hills Estate	2001/173	Not Controlled Action	Completed	In buffer area only
Removal of Trees	2010/5535	Not Controlled Action	Completed	In buffer area only
Removal of Weeds & Native Vegetation Hannah Avenue	2006/2621	Not Controlled Action	Completed	In buffer area only
Residential development, 28 Balmoral Road, Kellyville	2014/7145	Not Controlled Action	Completed	In buffer area only
residential development, Lalor Road and Stanbury Place	2002/892	Not Controlled Action	Completed	In buffer area only
Residential development at Doonside Crescent Woodcroft, Blacktown LGA	2004/1378	Not Controlled Action	Completed	In buffer area only
Residential Development Kellyville	2000/60	Not Controlled Action	Completed	In buffer area only
Residential development within 2.08ha, Fyfe Road	2005/1966	Not Controlled Action	Completed	In feature area
Residential Land Subdivision-Fairway Drive Kellyville	2011/5910	Not Controlled Action	Completed	In buffer area only
Residential Subdivision	2001/316	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Residential Subdivision	2001/304	Not Controlled Action	Completed	In feature area
Residential subdivision, cnr Doris Hirst Place and Highs Road	2005/2392	Not Controlled Action	Completed	In buffer area only
Residential subdivision and conservation area	2011/5858	Not Controlled Action	Completed	In buffer area only
Residential subdivision Lot 1005 Conrad Road	2003/1054	Not Controlled Action	Completed	In feature area
Rezoning & Disposal of Quakers Hill property	2001/281	Not Controlled Action	Completed	In feature area
Riverstone Integrated Water Services Proposal	2007/3216	Not Controlled Action	Completed	In feature area
Rouse Hill Infrastructure Project, Second Ponds Creek Area, Proposed Drainage Wo	2003/1258	Not Controlled Action	Completed	In buffer area only
Second Ponds Creek urban development	2004/1905	Not Controlled Action	Completed	In feature area
Second Ponds Creek Urban Development of Precinct 1b	2005/1991	Not Controlled Action	Completed	In feature area
Seniors Living Precinct Memorial Avenue, Kellyville	2010/5601	Not Controlled Action	Completed	In buffer area only
Stormwater detention basin and road upgrade at Green Rd	2004/1695	Not Controlled Action	Completed	In buffer area only
Subdivision of land (6.791 ha) for light industrial use	2003/1299	Not Controlled Action	Completed	In buffer area only
The North Kellyville Water Related Services Project	2007/3784	Not Controlled Action	Completed	In buffer area only
Urban Development- Lots 7 & 8 Curtis Road	2011/6028	Not Controlled Action	Completed	In buffer area only
Vegetation Clearance	2001/481	Not Controlled Action	Completed	In buffer area only
Vegetation Clearance (revised)	2003/976	Not Controlled Action	Completed	In buffer area only
Wastewater Lead-Out Line Lot 6- DP 1004614 Kellyville	2001/360	Not Controlled Action	Completed	In buffer area only
Western Sydney Parklands Bungarribbee Precinct and Doonside residential developm	2007/3718	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Wonderland Business Park Precinct, Stage 1, Lot D1	2004/1626	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
Replacement of flows with recycled water	2006/3050	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Residential Subdivision of Lot 60 Baulkham Hills Shire	2001/431	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Rouse Hill sewer carrier and water mains	2003/1059	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Transfer of Airservices Australia property	2011/5809	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
Residential development, Garfield and Regent Streets, Riverston, NSW	2015/7571	Referral Decision	Completed	In buffer area only
Residential subdivision Lot 8 in DP 220102	2010/5765	Referral Decision	Completed	In buffer area only

Bioregional Assessments			[Resource Information]
SubRegion	BioRegion	Website	Buffer Status
Sydney	Sydney Basin	BA website	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

© Commonwealth of Australia

Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix D

BioNet Atlas search results

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Entities in selected area [North: -33.62 West: 150.83 East: 150.93 South: -33.72] returned a total of 1,189 records of 57 species.
Report generated on 16/12/2024 1:24 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Amphibia	Limnodynastidae	3042	*Heleioporus australiacus*		Giant Burrowing Frog	V,P	V	1	
Animalia	Amphibia	Hylidae	3166	*Litoria aurea*		Green and Golden Bell Frog	E1,P	V	9	
Animalia	Aves	Anatidae	0216	*Oxyura australis*		Blue-billed Duck	V,P		2	
Animalia	Aves	Apodidae	0334	*Hirundapus caudacutus*		White-throated Needletail	V,P	V,C,J,K	2	
Animalia	Aves	Ardeidae	0197	*Botaurus poiciloptilus*		Australasian Bittern	E1,P	E	2	
Animalia	Aves	Accipitridae	0218	*Circus assimilis*		Spotted Harrier	V,P		4	
Animalia	Aves	Accipitridae	0226	*Haliaeetus leucogaster*		White-bellied Sea-Eagle	V,P		37	
Animalia	Aves	Accipitridae	0225	*Hieraaetus morphnoides*		Little Eagle	V,P		10	
Animalia	Aves	Accipitridae	0230	^^*Lophoictinia isura*		Square-tailed Kite	V,P,3		6	
Animalia	Aves	Accipitridae	8739	^^*Pandion cristatus*		Eastern Osprey	V,P,3		1	
Animalia	Aves	Falconidae	0238	*Falco subniger*		Black Falcon	V,P		3	
Animalia	Aves	Rostratulidae	0170	*Rostratula australis*		Australian Painted Snipe	E1,P	E	5	
Animalia	Aves	Scolopacidae	0161	*Calidris ferruginea*		Curlew Sandpiper	E4A,P	CE,C,J,K	4	
Animalia	Aves	Scolopacidae	0168	*Gallinago hardwickii*		Latham's Snipe	V,P	V,J,K	14	
Animalia	Aves	Scolopacidae	0158	*Tringa nebularia*		Common Greenshank	E1,P	E,C,J,K	1	
Animalia	Aves	Cacatuidae	0268	^^*Callocephalon fimbriatum*		Gang-gang Cockatoo	E1,P,3	E	2	
Animalia	Aves	Cacatuidae	8862	^*Calyptorhynchus lathami lathami*		South-eastern Glossy Black-Cockatoo	V,P,2	V	2	
Animalia	Aves	Psittacidae	0260	*Glossopsitta pusilla*		Little Lorikeet	V,P		9	
Animalia	Aves	Psittacidae	0309	*Lathamus discolor*		Swift Parrot	E1,P	CE	16	
Animalia	Aves	Psittacidae	0302	^^*Neophema pulchella*		Turquoise Parrot	V,P,3		2	
Animalia	Aves	Strigidae	0248	^^*Ninox strenua*		Powerful Owl	V,P,3		6	
Animalia	Aves	Tytonidae	0250	^^*Tyto novaehollandiae*		Masked Owl	V,P,3		1	
Animalia	Aves	Acanthizidae	0504	*Chthonicola sagittata*		Speckled Warbler	V,P		1	
Animalia	Aves	Meliphagidae	0603	^*Anthochaera phrygia*		Regent Honeyeater	E4A,P,2	CE	1	
Animalia	Aves	Meliphagidae	8303	*Melithreptus gularis gularis*		Black-chinned Honeyeater (eastern subspecies)	V,P		3	
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*		Varied Sittella	V,P		36	
Animalia	Aves	Artamidae	8519	*Artamus cyanopterus cyanopterus*		Dusky Woodswallow	V,P		39	
Animalia	Aves	Petroicidae	0380	*Petroica boodang*		Scarlet Robin	V,P		2	
Animalia	Mammalia	Petauridae	1136	*Petaurus australis*		Yellow-bellied Glider	V,P	V	2	
Animalia	Mammalia	Petauridae	1137	*Petaurus norfolcensis*		Squirrel Glider	V,P		2	
Animalia	Mammalia	Pteropodidae	1280	*Pteropus poliocephalus*		Grey-headed Flying-fox	V,P	V	98	
Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*		Yellow-bellied Sheathtail-bat	V,P		15	

Animalia	Mammalia	Molossidae	1329	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V,P		41	
Animalia	Mammalia	Vespertilionidae	1353	*Chalinolobus dwyeri*	Large-eared Pied Bat	E1,P	E	6	
Animalia	Mammalia	Vespertilionidae	1372	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P		22	
Animalia	Mammalia	Vespertilionidae	1357	*Myotis macropus*	Southern Myotis	V,P		41	
Animalia	Mammalia	Vespertilionidae	1361	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P		31	
Animalia	Mammalia	Vespertilionidae	1025	*Vespadelus troughtoni*	Eastern Cave Bat	V,P		2	
Animalia	Mammalia	Miniopteridae	1346	*Miniopterus australis*	Little Bent-winged Bat	V,P		17	
Animalia	Mammalia	Miniopteridae	3330	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V,P		49	
Animalia	Gastropoda	Camaenidae	I006	*Meridolum corneovirens*	Cumberland Plain Land Snail	E1		128	
Animalia	Gastropoda	Camaenidae	I130	*Pommerhelix duralensis*	Dural Land Snail	E1	E	6	
Plantae	Flora	Campanulaceae	7963	*^^Isotoma fluviatilis subsp. fluviatilis*		3	X	3	
Plantae	Flora	Ericaceae	7752	*Epacris purpurascens var. purpurascens*		V		1	
Plantae	Flora	Ericaceae	9569	*Leucopogon fletcheri subsp. fletcheri*		E1		2	
Plantae	Flora	Fabaceae (Faboideae)	2853	*Dillwynia tenuifolia*		V		47	
Plantae	Flora	Fabaceae (Faboideae)	3007	*Pultenaea parviflora*		E1	V	55	
Plantae	Flora	Fabaceae (Mimosoideae)	3860	*Acacia pubescens*	Downy Wattle	V	V	17	
Plantae	Flora	Malvaceae	6140	*Lasiopetalum joyceae*		V	V	1	
Plantae	Flora	Myrtaceae	4134	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	1	
Plantae	Flora	Myrtaceae	11892	*Eucalyptus sp. Cattai*		E4A	CE	1	
Plantae	Flora	Myrtaceae	4274	*Micromyrtus minutiflora*		E1	V	9	
Plantae	Flora	Myrtaceae	4293	*Syzygium paniculatum*	Magenta Lilly Pilly	E1	V	3	
Plantae	Flora	Proteaceae	10917	*Grevillea juniperina subsp. juniperina*	Juniper-leaved Grevillea	V		359	
Plantae	Flora	Proteaceae	5458	*^^Persoonia hirsuta*	Hairy Geebung	E1,P,3	E	2	
Plantae	Flora	Thymelaeaceae	6965	*Pimelea curviflora var. curviflora*		V	V	3	
Plantae	Flora	Thymelaeaceae	6190	*Pimelea spicata*	Spiked Rice-flower	E1	E	4	

Appendix E

AHIMS

This information has been removed to protect sensitive Aboriginal heritage information

Appendix F

Community and Stakeholder Engagement Strategy

Grantham Farm Zone Substation

Community and Stakeholder Engagement Strategy

Endeavour Energy

19 February 2025

→ The Power of Commitment



DRAFT

Project name		Grantham Farm Zone Substation REF					
Document title		Grantham Farm Zone Substation | Community and Stakeholder Engagement Strategy					
Project number		12651988					
File name		Grantham Farm Zone Substation REF					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S3	A	B Fraser	K Munro		S Murphy		13/02/25
S3	B	B Fraser	K Munro		S Murphy		19/02/25

GHD Pty Ltd | ABN 39 008 488 373
Contact: Ben Fraser, Consultant - Social, Engagement and Communications | GHD
133 Castlereagh Street, Level 15
Sydney, New South Wales 2000, Australia
T +61 2 9239 7100 | **F** +61 2 9239 7199 | **E** sydmail@ghd.com | **ghd.com**

© GHD 2025
This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Contents

1. Introduction **3**
- 1.1 Project background 3
- 1.2 Scope and limitations 5

2. About this Community and Stakeholder Engagement Strategy **6**
- 2.1 Purpose 6
- 2.2 Engagement objectives 6
- 2.3 Key messages 7

3. Stakeholder identification and analysis **8**
- 3.1 Government agencies 8
- 3.2 Neighbouring properties 11
- 3.3 Community and stakeholder groups 12

4. Engagement approach **15**
- 4.1 Engagement planning and delivery 15
- 4.2 Communication and engagement tools 16
- 4.3 Communications risk management 17

5. Engagement action plan **18**

6. Protocols **20**
- 6.1 Roles and responsibilities 20
- 6.2 Reporting 20
- 6.3 Enquires and complaints management 20

Table index

Table 3.1 Stakeholder mapping (Government agencies) 8
Table 3.2 Stakeholder mapping (Neighbouring properties) 11
Table 3.3 Stakeholder mapping (Community and stakeholder groups) 12
Table 4.1 Communication and engagement tools, methods and responsibilities 16
Table 4.2 Risk level key 17
Table 4.3 Identified risks for engagement 17
Table 5.1 Inception phase consultation 18
Table 5.2 Community Consultation phase 18
Table 5.3 Project closeout phase 19
Table 6.1 Roles and responsibilities 20

Figure index

Figure 1.1 Regional context of project site (Source: NSW Planning Portal Spatial Viewer) 4
Figure 1.2 Project site location (Source: NSW Planning Portal Spatial Viewer) 4
Figure 4.1 International Association for Public Participation engagement spectrum 15

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Appendices

Appendix A Notification area map (200 m radius)

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

1. Introduction

To meet the growing electricity demands in the Riverstone Precinct, Endeavour Energy is proposing the construction of the Grantham Farm Zone Substation (the project). This infrastructure is important for maintaining the reliability and capacity of the electricity network in the area, to support new residential and commercial developments.

As part of the planning process, a Review of Environmental Factors (REF) is being prepared to identify and mitigate potential environmental and social impacts. The REF process ensures the project is developed in compliance with relevant statutory requirements, while also addressing community feedback and concerns. Through early and meaningful engagement, community and stakeholders will have opportunities to provide input during the initial planning stage.

1.1 Project background

The project will be located in the Local Government Area of Blacktown and on a 14,170 m² site at 265 Garfield Road East, Grantham Farm, New South Wales (refer to Figure 1.1 and Figure 1.2). The project site is strategically positioned to serve the Riverstone Precinct, the substation will play a key role in delivering reliable electricity supply to support future growth.

The project will include:

- Construction of a new 132/11 kilovolt (kV) zone substation with two 45 megavolt-amperes (MVA) transformers including transformers bay equipment and middle feeder bay equipment.
- Installation of new 11kV switchgear, and associated equipment.
- Installation of relocated prefabricated switch room buildings and one control room from Menangle Park, solar panels and battery system for the buildings.
- Installation of a new auxiliary padmount transformer and feeder conduits/ducts for 132 kV and 11kVcfeeder and control cable conduits.
- Installation of earthing, protection, fire management, security and communications systems.
- Installation of six new steel poles within the boundary of the site.
- Construction of all related site-works including stormwater drainage, driveway pavements, gravel yard surfacing and security fencing and landscaping.
- Establish two 132 kV feeders and associated communications connections to Grantham Farm ZS from Vineyard BSP and Rouse Hill SS on Feeder 9JA.

The REF will evaluate a range of environmental factors, including but not limited to biodiversity, noise, traffic, and heritage, to ensure all impacts are understood and mitigated. The project represents a critical investment in the region's infrastructure and will work to provide sustainable and reliable energy distribution for years to come.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

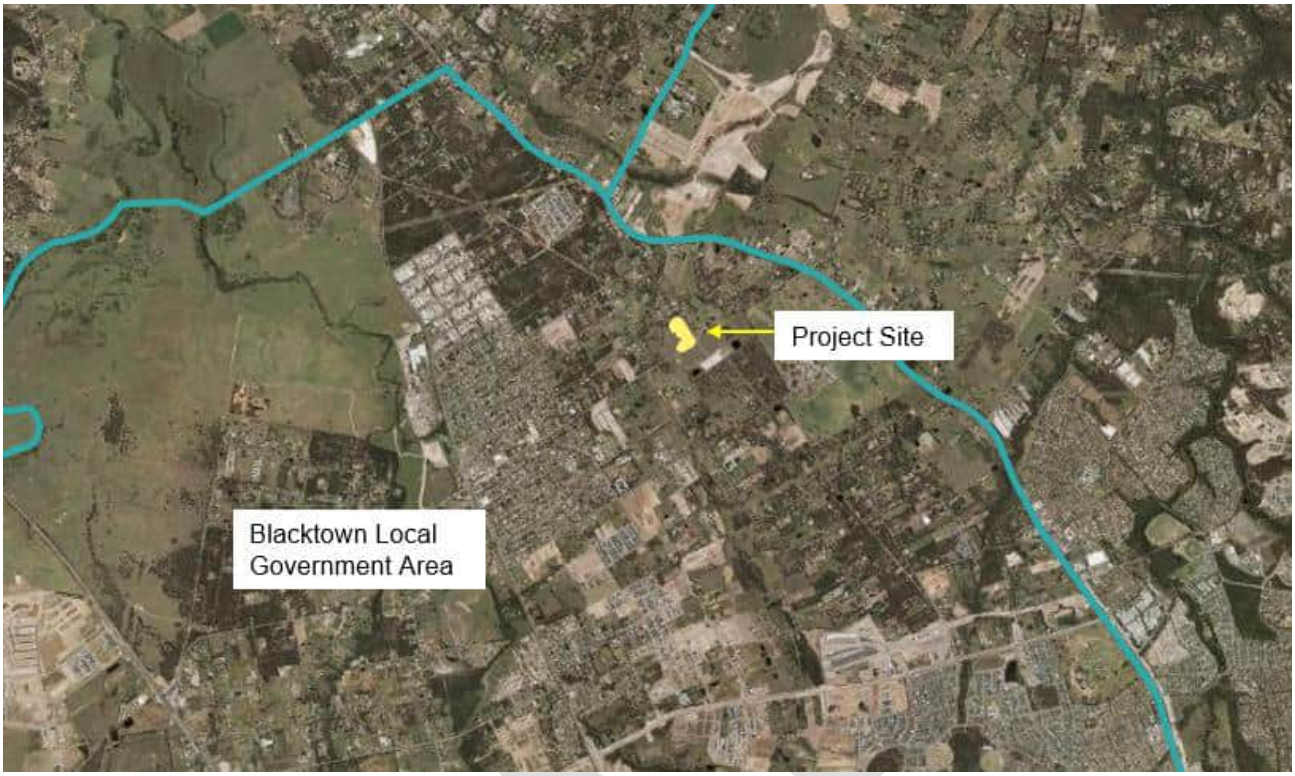


Figure 1.1 Regional context of project site (Source: NSW Planning Portal Spatial Viewer)

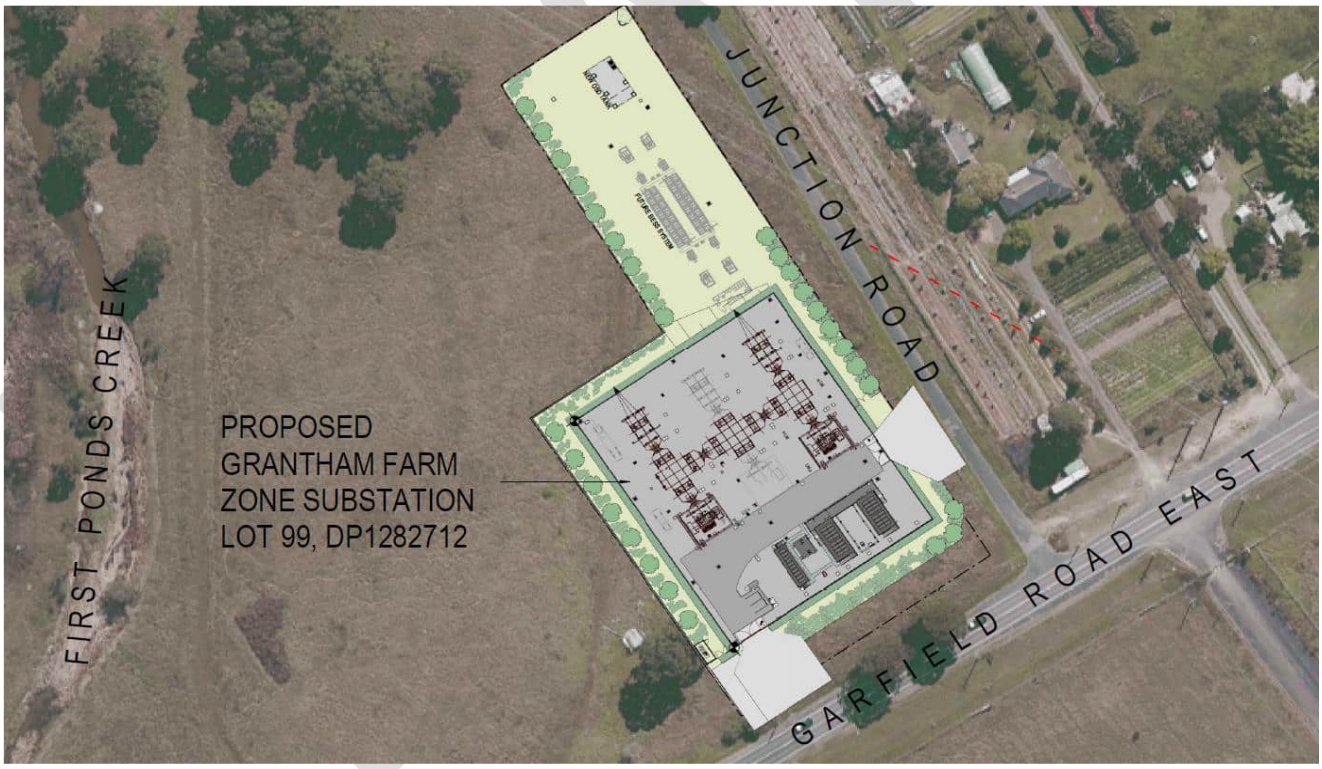


Figure 1.2 Project site location (Source: NSW Planning Portal Spatial Viewer)

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

1.2 Scope and limitations

This report: has been prepared by GHD for Endeavour Energy and may only be used and relied on by Endeavour Energy for the purpose agreed between GHD and Endeavour Energy as set out in Section 2.1 of this report.

GHD otherwise disclaims responsibility to any person other than Endeavour Energy arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 2.1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

2. About this Community and Stakeholder Engagement Strategy

2.1 Purpose

This Community and Stakeholder Engagement Strategy (CSES) (the strategy) outlines the approach to consultation and engagement for the project during the preparation of the REF. The strategy describes how the engagement process will inform the project, identify community and stakeholder concerns, and integrate feedback into the REF to achieve an environmentally and socially responsible outcome.

Pursuant to Division 1 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021*, consultation with authorities is a required including Blacktown City Council as the project will have an impact on surrounding infrastructure, services and amenity.

The strategy aligns with Endeavour Energy's commitment to proactive and transparent community engagement, ensuring the REF process is inclusive, comprehensive, and supports well-informed decision-making.

The purpose of this strategy is to:

– Provide clear and accessible information about the project to stakeholders and the community.
– Support stakeholders and the community so they understand the REF process and their opportunities to contribute.
– Identify and address community concerns early to shape the project's design and planning outcomes.
– Build trust and maintain positive relationships with stakeholders through open, two-way communication.
– Reduce potential project risks by fostering transparency and accountability throughout the engagement process.

By implementing this strategy, Endeavour Energy aim to balance infrastructure development needs with the priorities and concerns of the local community, ensuring the project delivers long-term benefits while minimising environmental and social impacts.

2.2 Engagement objectives

The community and stakeholder engagement objectives for the preparation of the project are outlined below:

– Build and maintain positive relationships with the community and stakeholders throughout the planning process.
– Inform a broad range of local community members and stakeholders about the project and provide opportunities for meaningful feedback.
– Create opportunities for the community and stakeholders to ask questions and raise concerns about the project.
– Collect and share feedback with the project team to identify concerns and, where possible, develop solutions that align with community priorities.
– Proactively identify and manage potential issues before they escalate into broader concerns.
– Manage stakeholder feedback and complaints promptly and respectfully, maintaining open lines of communication.
– Regularly monitor and assess feedback to evaluate the effectiveness of engagement activities.
– Build community and stakeholder trust in Endeavour Energy by being transparent and responsive during all stages of the project.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

2.3 Key messages

The following key messages outline important information about the project, its purpose, and how potential impacts will be managed to achieve positive outcomes for the community and environment. The engagement key messages are:

- The project involves installing transformers, switchgear, a control room, an amenities building, underground cable conduits, site drainage systems, and completing site works such as stormwater drainage, driveway pavements, gravel yard surfacing and security fencing and landscaping.
- The substation will upgrade the electricity network to support community growth and provide a more reliable power supply, reducing the risk of outages and interruptions.
- The project is in the early planning stage, with an REF being prepared to assess potential impacts on the environment and community.
- The substation will be designed to meet all safety standards, protecting both the community and workers during construction and operation.
- Measures will be put in place to minimise potential disruptions, including noise, dust, and traffic impacts. Construction activities will primarily occur during standard working hours.
- Regular updates will be provided to keep the community and stakeholders informed about the project's progress and key milestones.
- If approved, construction is expected to start in March 2025. Updates will be shared throughout the construction period.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

3. Stakeholder identification and analysis

Identifying the people and groups who may be affected by or interested in the project is an important part of the planning process. Engaging with them early helps the project team understand their concerns and gather feedback to shape the project.

3.1 Government agencies

Table 3.1 lists the key Government agencies, showing who will be involved and how they may be impacted.

Table 3.1 Stakeholder mapping (Government agencies)

Stakeholder category	Stakeholder	Topics of Interest	Key Risk	Stakeholder interest	Engagement effort	IAP2 level of engagement
Federal Government	Hon Michelle Rowland MP (Federal Member for Greenway)	– Economic development – Environmental impact – Community consultation – Job creation and economic development – Energy costs – Stakeholder sentiments – Being kept up to date	– Community sentiment – Health and safety – Environmental concerns – Project delays – Reputational risk – Level of community engagement	Medium	Medium	Inform
State Government	Mr Warren Kirby, MP (State member for Riverstone) Paul Scully (Minister for Planning and Public Spaces) (Penny) Penelope Gail Sharpe (Minister for Energy)	– Economic development – Environmental impact – Community consultation – Grid integration and impact	– Community sentiment – Health and safety – Environmental concerns – Project delays – Reputational risk – Level of community engagement	Medium	Medium	

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Stakeholder category	Stakeholder	Topics of Interest	Key Risk	Stakeholder interest	Engagement effort	IAP2 level of engagement
		– Job creation and economic development – Energy costs – Stakeholder sentiments – Being kept up to date				
Government Agencies	Department of Planning, Housing and Infrastructure NSW Environmental Protection Authority (EPA) Transport for NSW (TfNSW)	– Economic development – Environmental impact – Community consultation – Grid integration and impact – Job creation and economic development – Energy costs – Stakeholder sentiments – Being kept up to date	– Community sentiment – Health and safety – Environmental concerns – Project delays – Reputational risk – Level of community engagement	Medium	Medium	Inform
Local Government	Blacktown City Council – Brad Bunting (Mayor)	– Energy supply and security – Community consultation – Job creation and economic development – Workforce procurement strategy and accommodation – Ratepayer concerns and feedback	– Community sentiment – Health and safety – Environmental concerns – Project delays – Reputational risk – Level of community engagement	High	High	Consult

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Stakeholder category	Stakeholder	Topics of Interest	Key Risk	Stakeholder interest	Engagement effort	IAP2 level of engagement
		– Increased volume of traffic on the local road network as a result of construction				
Emergency services	Fire and Rescue NSW – Blacktown Fire Station NSW State Emergency Service (SES)	– A fire management plan is in place during design, delivery, construction and operation – Fire risks during operation – Impacts and disruption on local roads – Safety	– Fire safety concerns – Site access – Disaster response planning	High	High	Consult

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

3.2 Neighbouring properties

Table 3.2 lists the key neighbouring property groups, showing who will be involved and how they may be impacted.

Table 3.2 Stakeholder mapping (Neighbouring properties)

Stakeholder category	Stakeholder	Topics of Interest	Key Risk	Stakeholder interest	Engagement effort	IAP2 level of engagement
Neighbouring properties	Stakeholders who reside within a 200m radius of the project site along the following roads: - Garfield Road East, Grantham Farm NSW 2765 - Junction Road, Grantham Farm NSW 2765 - Brilliant Street, Grantham Farm NSW 2765 - Gulgong Cresent, Grantham Farm NSW 2765 - Burranah Street, Grantham Farm NSW 2765 - Hornblende Street Grantham Farm NSW 2765 Refer to Appendix A (proposed notification area)	– Visibility of the project (including construction activities) – Property impacts – Noise impacts – Access changes – Community benefits – Could be influenced by misinformation or absence of information – Construction impacts – Safety	– Visual impacts – Noise impacts	High	High	Consult
Indirectly impacts landowners/residents	Neighbours outside the 200m radius	– Impacts on disruptions on local roads – Construction impacts (noise, dust, vibration) – Community consultation – Local jobs – Energy costs – Perceived impacts to property values – Safety	– Opposition to project	High	High	Inform/consult

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Stakeholder category	Stakeholder	Topics of Interest	Key Risk	Stakeholder interest	Engagement effort	IAP2 level of engagement
Utility owners	Sydney Water	– Impacts on local infrastructure – Assessment process – Consideration of impacts – Consideration and mitigation of concerns – Application of standards and framework – Safety	– Access to land and power station	Medium	Medium	Inform

3.3 Community and stakeholder groups

Table 3.3 lists the key community and stakeholder groups, showing who will be involved and how they may be impacted.

Table 3.3 Stakeholder mapping (Community and stakeholder groups)

Stakeholder category	Stakeholder	Contact details	Topics of Interests	Key Risk	Stakeholder interest	Engagement effort	IAP2 level of engagement
Local area residents	Residents within the local area or with a vested interest in the project	Mailing list to be provided by Endeavour energy	– Impacts during construction and operation – Impacts to neighbours – Visual impacts – Environmental impacts – Safety	– Potential opposition due to misinformation	Medium	Medium	Inform
Local area businesses	CPG Estates - Fairwood Rise Rouse Hill	Email: tbc Ph: 02 8851 5351 Project website: https://www.fairwoodrise.com.au	– Impacts during construction and operation – Impacts to neighbours – Visual impacts	– Potential opposition due to misinformation	Medium	Medium	Inform

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Stakeholder category	Stakeholder	Contact details	Topics of Interests	Key Risk	Stakeholder interest	Engagement effort	IAP2 level of engagement
	Clarendon Homes – Fairwood Rise Rouse Hill Estate	Email: tbc Ph: 02 8851 5300 Project website: https://www.clarendon.com.au/nsw/estates/fairwood-rise-rouse-hill	– Safety				
	Domaine Homes – Fairwood Rise Rouse Hill Estate	Email: tbc Ph: 02 8850 9999 Project website: https://www.domainehomes.com.au/estates					
	Landen Property Pty Ltd Housing Development	Email: tbc Ph: 1300 526 336 Project website: https://landen.com.au/property/rouse-hill/					
	North Homes – Rouse Hill	Email: tbc Ph: 1800 191 123 Project website: Rouse Hill Estates | Quality Living | North Homes					
	Blue Sky Cleaning Management	Email: tbc Ph: tbc Project website: tbc					
Community groups	Blacktown & District Environment group (Landcare)	Email: tbc Ph: 02 9621 2105 Project website: https://landcare.nsw.gov.au/groups/blacktown-	– Stakeholder sentiment – Property impacts – Environmental impacts – Noise impacts	– Potential opposition due to misinformation	Medium	Medium	Inform

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Stakeholder category	Stakeholder	Contact details	Topics of Interests	Key Risk	Stakeholder interest	Engagement effort	IAP2 level of engagement
		district-environment-group/	– Access changes – Community benefits – Construction impacts – Safety				
	Bushcare Volunteer Group	Email: katrina.brown@blacktown.nsw.gov.au.					
		Ph: 02 5300 6000					
		Project website: https://www.cityofparramatta.nsw.gov.au/environment/city-in-nature/bushland-and-biodiversity/bushcare-volunteer					
Local action group	Northwest Community Action Group	Email: info@northwestcommunityactiongroup.com.au	– Use of private land – Impacts during construction – Environmental impacts – Noise impacts – Access changes – Community benefits – Construction impacts – Safety	– Potential opposition due to misinformation and previous experience with Transgrid	High	High	Inform
		Ph: 0418 233 466					
		Project website: https://www.northwestcommunityactiongroup.com/					

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

4. Engagement approach

The engagement approach has been designed to keep community and stakeholders informed, listen to their feedback, and address their concerns. It follows Endeavour Energy's guidelines for fair and open consultation and aims to reflect local needs and expectations.

By doing so, stakeholders can expect:

– Clear and timely information: Project details, including purpose and potential impacts, will be shared through letters, emails, and public notices, so landholders know what to expect.
– Accessible feedback channels: A dedicated phone line, email address, and online platform will be available for landholders to ask questions or share their views.
– Respectful and responsive engagement: Feedback and concerns will be taken seriously and considered during the planning process, with responses provided wherever possible.
– Efforts to minimise impacts: Concerns such as noise, visual changes, and access disruptions will be addressed proactively to reduce inconvenience.

4.1 Engagement planning and delivery

The community and stakeholder management approach for the project will be guided by the project objectives and the core values and code of ethics established by the International Association for Public Participation (IAP2). The IAP2 framework, shown in Table 4.1, will guide the engagement approach designed to meet the project objectives and deliver best practice engagement. This approach is designed to build credibility and strengthen the project's reputation.

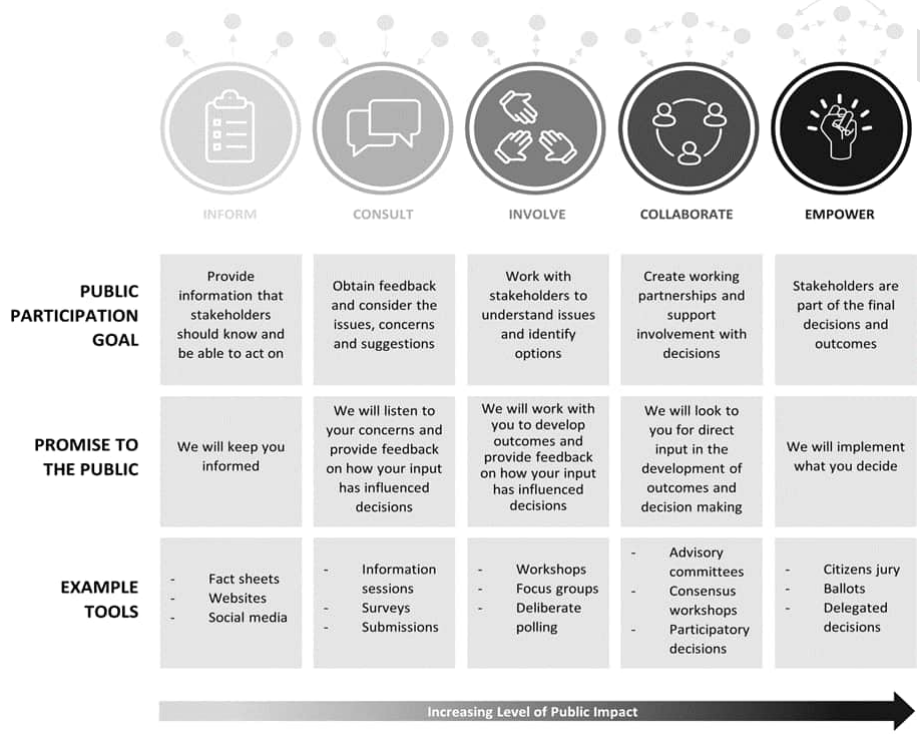


Figure 4.1 International Association for Public Participation engagement spectrum

The level of participation for this project will be to **inform and consult**. By engaging the community and stakeholders at these levels, we will work with the community to ensure that concerns and aspiration are reflected. Engagement will then move into the **consult** stage to understand how the project will impact them and develop outcomes that are mutually beneficial where possible.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

4.2 Communication and engagement tools

A range of consultation and communication tools will be used to achieve the engagement objectives for the project.

A summary of these tools is provided in Table 4.1 below.

Table 4.1 Communication and engagement tools, methods and responsibilities

Tool	Description	Responsibility
Media		
Local newspaper advertisement	Advertisements in local newspapers to inform the community about the project and feedback opportunities.	GHD project team
Website update	Dedicated project page with FAQs, updates, and contact details for community feedback.	GHD project team
Communication collateral		
Notification letters	Letters to Government representatives, residents, businesses, and stakeholders providing project details, purpose, and engagement opportunities.	GHD project team
Frequently Asked Questions (FAQs)	A plain-English document addressing common questions and concerns about the project.	GHD project team
Consultation methods		
Project email	Dedicated email address for inquiries and feedback from the community and stakeholders.	GHD project team
1800-phone line	A dedicated phone line to allow the community to ask questions and share concerns.	GHD project team
Phone and email engagement	Ongoing consultation through direct phone calls and emails to collect feedback.	GHD project team
Feedback database	A system to record and manage all stakeholder and community feedback.	GHD project team

**Note* Collateral (digital and printed) communication material will be plain-English and accessible to a wide audience. All collateral on the website will be Web Content Accessibility Guidelines (WCAG) compliant.*

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

4.3 Communications risk management

GHD has identified potential concerns and/or areas of interest that may arise when engaging with stakeholders and the community. These are identified in Table 4.2 and Table 4.3. This risk matrix will be revised as the project progresses.

Table 4.2 Risk level key

Key	
Low	
Medium	
High	

Table 4.3 Identified risks for engagement

Risk name/rating	Details
Lack of public understanding about the REF and approvals processes. **Rating** – High	**Summary:** Stakeholders do not understand what the REF process involves and how it influences and affects them. **Mitigation**: Develop clear and simple communication tools to provide community and stakeholders with the information they need to participate meaningfully.
Opposition to the project. **Rating** – Medium	**Summary:** Local residents/stakeholders are opposed to the proposed development. **Mitigation**: Identify and understand who the opposition is, reasons for oppositions and address the concerns proactively through clear and simple communication tools.
Decreased stakeholder support. **Rating** – Medium	**Summary:** Stakeholders and community perceive that there are not acceptable opportunities to engage. **Mitigation:** Provide multiple avenues for stakeholders to opt to choose how they would like to participate in a flexible manner.
Stakeholder consultation difficulties. **Rating** – Medium	**Summary:** Opposition for groups may introduce various challenges, including increased regulatory scrutiny, and the need for additional studies and mitigation measures. These factors may contribute to delays in works. **Mitigation:** Early and transparent engagement for the purpose of working towards a balanced resolution that addresses both development and conservation concerns.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

5. Engagement action plan

The engagement and communications proposed during the lifespan of the project are outlined in Table 5.1, Table 5.2 and Table 5.3. These activities focus on sharing clear and accessible information, encouraging community and stakeholder feedback, and addressing any concerns during the REF process.

The engagement action plan is divided into three phases: Inception, Community Consultation, and Project Closeout. Each table provides details on the activities, timing, stakeholders, responsibilities, and current status.

Table 5.1 Inception phase consultation

Activity	Planned completion date	Stakeholder/s	Responsible	Status	Completion date
Develop engagement strategy	Friday 20 December 2024	Endeavour Energy	GHD project team	Underway	Underway

Table 5.2 Community Consultation phase

Activity	Planned completion date	Stakeholder/s	Responsible	Status	Completion date
Prepare and distribute notification letter to Council	Friday 10 January 2025	Council	GHD project team	Completed	Friday 10 January 2025
Distribute 40-day Council Statutory Consultation letter (have to Wednesday 19 February to respond)	Thursday 16 January 2024	Council	GHD project team	Completed	Thursday 16 January 2024
Prepare notification letter to TfNSW	Monday 10 February 2025	TfNSW	GHD project team	Underway	TBC
Prepare notification letter to neighbouring properties	Monday 10 February 2025	Residents within 400m from the project site	GHD project team	Underway	TBC
Prepare notification letter to key utilities	Monday 10 February 2025	Utility providers	GHD project team	Underway	TBC
Website content live	Monday 17 February 2025	All stakeholders	GHD project team	Underway	TBC
Distribute notification letter/s	Wednesday 19 February 2025	Residents and businesses within 400 metres of the site (or as agreed with Endeavour Energy)	GHD project team	Not started	TBC
Prepare Frequently Asked Questions (FAQs)	Monday 17 January 2025	All stakeholders	GHD project team	Not started	TBC

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Activity	Planned completion date	Stakeholder/s	Responsible	Status	Completion date
Establish feedback channels (email, 1800-phone line)	Monday 17 February 2025	All stakeholders	GHD project team	Not started	TBC
Develop stakeholder database	Monday 17 February 2025	Endeavour Energy	GHD project team	Not started	TBC
Discussions with community and stakeholders	Monday 17 February to Friday 4 April 2025	As required	GHD project team	Not started	TBC
Monitor feedback channels (email, 1800-phone line)	Monday 17 February to Friday 4 April 2025	N/a	GHD project team	Not started	TBC
Update stakeholder database	Monday 13 January to Wednesday 19 February 2025	N/a	GHD project team	Not started	TBC
Engagement period concludes	Friday 4 April 2025	N/a			

Table 5.3 Project closeout phase

Activity	Planned completion date	Stakeholder/s	Responsible	Status	Completion date
Prepare and finalise Consultation Outcomes Report	Friday 28 February 2025	N/a	GHD project team	Not started	TBC

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

6. Protocols

6.1 Roles and responsibilities

To provide clarity around key responsibilities, the roles and responsibilities are outlined in Table 6.1.

Table 6.1 Roles and responsibilities

Role	Responsibilities
Endeavour Energy	– Attend key stakeholder meetings, including Council, landowners, neighbours and Aboriginal community, if required. – Provide guidance to the project team on stakeholders, insights and appropriate community engagement session framing. – Provide high quality maps to support the stakeholder identification process and collateral development. – Undertake all media liaison as required – Provide branding guidelines and templates for the project. – Provide staff to support engagement events if required – Approve reports and collateral.
GHD project team	– Prepare Community and Stakeholder Engagement Strategy. – Advise the team on the obligations and requirements for the project. – Consult with relevant stakeholders captured in the engagement plan and maintain positive relationships with key stakeholders. – Draft communication materials and coordinate approvals process – Notification to council – Letter/ email to neighbouring properties within 200 metres – Letters to utilities and key stakeholders– FAQs – Web update – Local paper advertisement – Distribution of letter. – Facilitate stakeholder meetings where necessary.

6.2 Reporting

GHD will formally and informally report on community enquires received, community sentiment and issues/risks. These include:

– Verbal reporting, on an as needed basis, for urgent issues or stakeholder contacts.
– Email notification of key issues or incidents.

6.3 Enquires and complaints management

Responding to enquiries and complaints promptly and effectively is central to effective project communications and building relationships with stakeholders and the community.

Enquiries and complaints may be received directly by members of the Stakeholder and Engagement team via the community information line (1800 810 680) or the project's community email address **cominput@ghd.com**. All project communication materials contain these central contact details.

The GHD project team is responsible for managing enquiries and complaints relating to the project. They will seek input and assistance from key members of the project team as needed, investigate the source of the complaint to ensure an appropriate solution is reached and will remain the point of contact until the issue is resolved.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Appendices

Appendix A

Notification area map (200 m radius)



Figure A.1 Notification area – 200 m radius from project

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

ghd.com

The Power of Commitment

Appendix G

TfNSW noise calculator

The required mitigation measures for your activity are:

	Exceedance of RBL (dBA)															
	Standard Hours				OOHW Period 1 - Day				OOHW Period 1 - Evening				OOHW Period 2 - Night			
	0-20	20-30	>30	>75dBA*	5-10	10-20	20-30	>30	0-10	10-20	20-30	>30	0-10	10-20	20-30	>30
Standard Mitigation Measures (TfNSW CNVS Appendix C)				Yes				Yes				Yes				Yes
Additional Mitigation Measures (TfNSW CNVS Appendix D)																
Periodic notification				Yes				Yes				Yes				Yes
Verification monitoring				Yes				Yes				Yes				Yes
Specific Notification				Yes								Yes				Yes
Respite Offer												Yes				
Respite Period												Yes				Yes
Duration Reduction												Yes				Yes
Alternative Accommodation																Yes

*** Any work above 75dBA regardless of RBL exceedance**

Assessment Summary

Site Locality	0
Construction Scenario	0
User Name and Company	0
Number of Sources and SWL	11 Sources with overall SWL of 121 dBA
Receiver Distance	50 m
Barrier/enclosure attenuation	0 dBA
Assessment Date	14 January 2025

Predicted Noise Level	79 dBA	79 dBA

Period	RBL	NML	+ RBL
Standard Hours	40	50	39
OOHW Period 1 - Day	40	45	39
OHW Period 1 - Evenin	35	40	44
OOHW Period 2 - Night	35	40	44

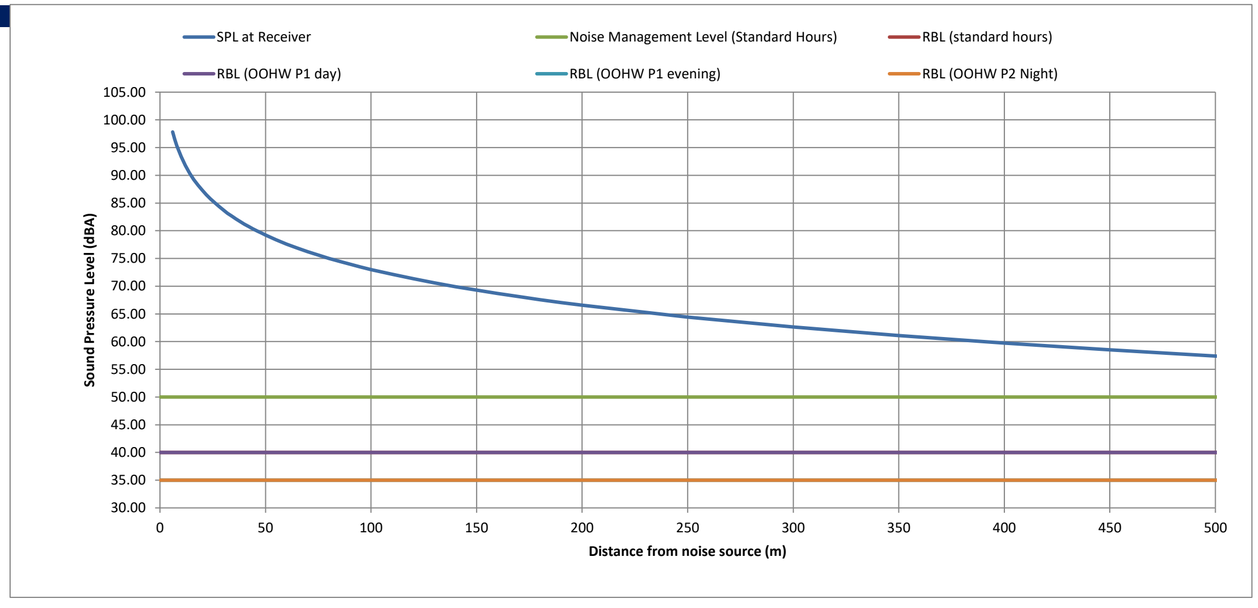
© TfNSW 2019

Noise Estimate Results

	Sound Power Level (dBA)	Distance (m)	Sound Pressure Level (dBA)	Air Attenuation (dBA) Day and Evening	Air Attenuation (dBA) Night	Additional Attenuation (hoarding etc) (dBA)[1]	Predicted Noise level (SPL dBA LAeq) Day and Evening	Predicted Noise level (SPL dBA LAeq) Night
May to Sep	121	50	79.43	0.20	0.21	0	79.22	79.21

	Standard Hours	OOHW P1 Day	OOHW P1 Evening	OOHW P2 Night
Rating Background Level (RBL)	40	40	35	35
RBL Exceedance	39	39	44	44
Noise Management Level (NML)	50	45	40	40

May to Sep



Notes:

Where the SPL line intersects with the RBL line in the graph above demonstrates the total radius (m) of impacted receivers
SPL = SWL(point) - 20log (r) - 8 - Additional Attenuation
Sound Power Level includes +5dBA adjustment for noise with special audible characteristics (if requried)

[1] Continuous, long solid barrier within the project boundary, that breaks line of sight between work area and receiver = 5dBA reduction
Enclosed, solid structure around work area/equipment = 10dBA reduction

© TfNSW 2019

Appendix H

Environmental Noise Impact Assessment (Day Design, 2024)

Appendix 7: Acoustic Report

DAY DESIGN PTY LTD
CONSULTING ACOUSTICAL ENGINEERS

SUITE 17, 808 FOREST ROAD, PEAKHURST 2210 ABN 73 107 291 494
P. 02 9046 3800 ACOUSTICS@DAYDESIGN.COM.AU WWW.DAYDESIGN.COM.AU

Environmental Noise Impact Assessment

Proposed Grantham Farm Zone Substation
Lot 99, Garfield Road East, Grantham Farm
(Riverstone), NSW

REPORT No
7970-1.1R

DATE ISSUED
3 June 2024

Prepared For:
Endeavour Energy
PO Box 811
Seven Hills NSW 1730

Attention: Mr Mohammad Alam



Revision History

Report	Date	Prepared	Checked	Comment
Final	03/06/2024	Sean Julius	Stephen Gauld	

Document R\7970-1.1R 18 pages plus attachments

Disclaimer

The work presented in this document was carried out in accordance with the Day Design Pty Ltd Quality Management System. Day Design is certified to ISO9001.

Day Design Pty Ltd reserves all copyright of intellectual property in any or all of Day Design's documents. No permission, license or authority is granted by Day Design to any person or organisation to use any of Day Design's documents for any purpose without written consent of Day Design.

This report has been prepared for the client identified and cannot be relied or used by any third party. Any representation, statement, opinion or advice, expressed or implied in this report is made in good faith but on the basis that Day Design is not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in any respect of any representation, statement, or advice referred to above.

Recommendations made in this report are intended to resolve acoustical problems only. No claims of expertise in other areas are made and no liability is accepted in respect of design or construction for issues falling outside the specialist field of acoustical engineering including but not limited to structural, fire, thermal, architectural buildability, fit for purpose, waterproofing or other aspects of building construction. Supplementary professional advice should be sought in respect of these issues.

The information in this document should not be reproduced, presented or reviewed except in full. Prior to passing onto a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY 4
2.0 CONSULTING BRIEF 5
3.0 PROJECT DESCRIPTION 6
4.0 NOISE CRITERIA 9
4.1 Background Noise Level 9
4.2 NSW Noise Policy for Industry 10
4.2.1 Intrusiveness Criteria 10
4.2.2 Amenity Criteria 10
4.3 Modifying Factors 12
4.4 Project Specific Noise Criteria 12
4.4.1 Residential receptors: 12
5.0 NOISE EMISSION 13
5.1 Option 1 Transformer 14
5.2 Option 2 Transformer 15
5.3 Option 3 Transformer 16
5.4 Maximum Sound Power Level 16
6.0 CONCLUSION 17

TABLES

Table 1 Noise Sensitive Receptors 6
Table 2 Ambient Noise Levels – 35 Junction Road, Grantham Farm 9
Table 3 Amenity Criteria 11
Table 4 Transformer Type Options 13
Table 5 Option 1 Transformer L_{eq} Sound Power Levels 14
Table 6 Option 1 Predicted L_{eq} Noise Levels 14
Table 7 Option 2 Transformer L_{eq} Sound Power Levels 15
Table 8 Option 2 Predicted L_{eq} Noise Levels 15
Table 9 Option 3 Transformer L_{eq} Sound Power Levels 16
Table 10 Option 3 Predicted L_{eq} Noise Levels 16

1.0 EXECUTIVE SUMMARY

Endeavour Energy has engaged Day Design to prepare an acoustic report that assesses the environmental noise impact of the proposed Grantham Farm Zone Substation at Lot 99 DP1282712, Garfield Road East, Grantham Farm, NSW, on the surrounding area.

The zone substation is proposed to operate 24 hours a day, 7 days a week.

The proposed zone substation will be located on land currently zoned RU4 - Primary Production Small Lots by the Blacktown Local Environment Plan 2010 with R2: Low Density Housing on the opposite side of Garfield Road to the south. Currently, the nearest potentially affected residential premises is located east of the proposed substation at 271 Garfield Road East, Grantham Farm 35 Junction Road, Grantham Farm, which is currently zoned RU4 - Primary Production Small Lots.

Acceptable noise limits are derived from the EPA's Noise Policy for Industry for intrusive noise impacts at each residence, and amenity criterion at the nearest commercial premises.

Noise levels of three possible options for transformers within the proposed zone substation have been calculated at the nearest residential premises and comply with EPA's Noise Policy for Industry.

2.0 CONSULTING BRIEF

Endeavour Energy has engaged Day Design to prepare an acoustic report that assesses the environmental noise impact of an proposed Grantham Farm Zone Substation at Lot 99, Garfield Road East, Grantham Farm, NSW. This commission involves the following:

Scope of Work:

- Inspect the site and environs
- Measure the background noise levels at critical locations and times
- Establish acceptable noise level criterion
- Quantify noise emissions from the proposed Zone Substation
- Calculate the level of noise emission, taking into account building envelope transmission loss, screen walls and distance attenuation
- Prepare a site plan identifying the development and nearby noise sensitive locations
- Provide recommendations for noise control (if necessary)
- Prepare an Environmental Noise Assessment Report.

3.0 PROJECT DESCRIPTION

Endeavour Energy supplies electricity to the greater part of Sydney's west, the Blue Mountains, The Illawarra and the Southern Highlands regions. To sustain this service, they have a number of Substations to convert high voltage electricity to lower voltages. The transformers used for the conversion typically generate a low frequency 'hum' at 100 Hz.

Endeavour Energy is proposing to initially install two 132/11 kV, 45 MVA transformers (TX1 and TX3) at the proposed Grantham Farm Zone Substation. A third 132/11 kV, 45 MVA transformer (TX2) will be added in the second future instalment.

The proposed zone substation will be located on land currently zoned RU4 - Primary Production Small Lots by Blacktown Local Environment Plan 2010 with Low Density Residential zoning directly to the South. Currently, the nearest potentially affected residential premises is located east of the proposed zone substation at 271 Garfield Road East, Grantham Farm.

The nearest noise sensitive receptors to the property, in various directions, are shown in Figure 1, Figure 2 and as follows in Table 1.

Table 1 Noise Sensitive Receptors

Receptor and Type	Address	Direction from site	Distance (m)
R1 – Residential (Existing)	35 Junction Road, Grantham Farm	North	300 m
R2 – Residential (Existing)	271 Garfield Road East, Grantham Farm	East	100 m
R3 – Residential (Future)	36 Gulgong Crescent, Rouse Hill	South	100 m
R4 – Heritage (Existing)	23 Pecan Crescent, Grantham Farm	West	400 m



Figure 1 - Location Plan - Grantham Farm Zone Substation

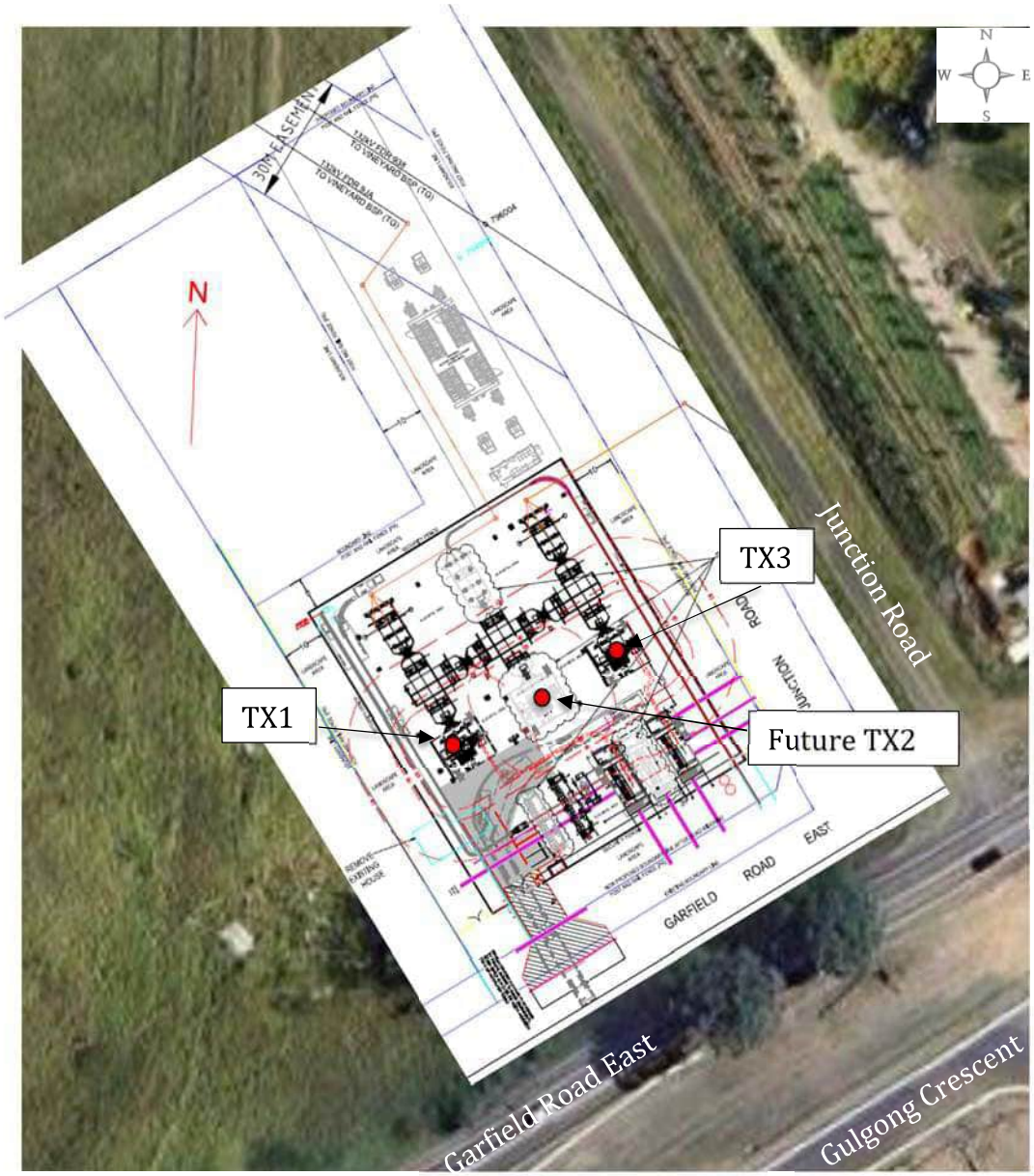


Figure 1 - Site Plan - Grantham Farm Zone Substation

4.0 NOISE CRITERIA

4.1 Background Noise Level

In order to assess the severity of a possible environmental noise problem in a residential area it is necessary to measure the ambient background noise level at the times and locations of worst possible annoyance. The lower the background noise level, the more perceptible the intrusive noise becomes and the more potentially annoying.

The ambient L_{90} background noise level is a statistical measure of the sound pressure level that is exceeded for 90% of the measuring period (typically 15 minutes).

The Rating Background Level (RBL) is defined by the NSW EPA as the median value of the (lower) tenth percentile of L_{90} ambient background noise levels for the day, evening or night time periods, measured over a number of days during the proposed days and times of operation.

The places of worst possible annoyance are the potential future residential premises located to the south of the proposed zone substation. These potentially affected locations can be seen in Figure 1 above. The times of greatest annoyance will be during the night when the proposed zone substation is operating.

An environmental noise logger was placed at 35 Junction Road, Grantham Farm, from Monday 15 April to Monday 22 April 2024, to the north of the proposed zone substation site to determine the Rating Background Level. This location is shown on Figures 1 as Location 'A'.

The measured noise levels are presented in the attached Appendix A and also in Table 1 below.

Table 2 Ambient Noise Levels – 35 Junction Road, Grantham Farm

Location	Time Period	L_{90} Rating Background Level	Existing L_{eq} Noise Level
Location 'A'	Day (7 am to 6 pm)	**40 dBA**	**51 dBA**
	Evening (6 pm to 10 pm)	**43 dBA**	**51 dBA**
	Night (10 pm to 7 am)	**38 dBA**	**45 dBA**

Meteorological conditions during the testing typically consisted of clear skies and a temperature of 9 to 27°C. Atmospheric conditions were ideal for noise monitoring. Rain was recorded during the day on Saturday 20 April and in the evening on Wednesday 17 April. Ambient noise levels affected by rain has been removed from the analysis period. Noise measurements were therefore considered reliable and typical for the receptor area.

4.2 NSW Noise Policy for Industry

The NSW Environment Protection Authority (EPA) published the *Noise Policy for Industry* (NPI) in October 2017. The *NPI* is specifically aimed at assessing noise from industrial noise sources listed in Schedule 1 of the Protection of the Environment Operations Act 1997 (POEO, 1997).

Grantham Farm Zone Substation is not a 'scheduled premises' under the Protection of the Environment Operations Act 1997, as it is not required to hold a licence under that Act for operations at the site.

The *NPI* provides a useful framework to assess noise emission from non-scheduled premises, whether that premises produces intrusive or non-intrusive noise.

The *NPI* in Section 2.3 *Project intrusiveness noise level* provides a guideline for assessing intrusive noise levels where an evening RBL is greater than the daytime RBL. The *NPI* states that it is generally recommended that the project intrusiveness noise level for evening be set at no greater than the project intrusiveness noise level for daytime.

4.2.1 Intrusiveness Criteria

The EPA states in Section 2.3 of its NSW *NPI* (October 2017) that the intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, does not exceed the rating background noise level by more than 5 dB when beyond a minimum threshold. It also states that it is generally recommended that the project intrusiveness noise level for evening be set at no greater than the project intrusiveness noise level for daytime (EPA *NPI*, 2017, Section 2.3).

The Rating Background Level at 35 Junction Road, Grantham Farm was 40 dBA in the day, 43 dBA the evening and 38 dBA at night. Therefore the acceptable L_{eq} noise intrusiveness criteria in this area is:

- (40 + 5 =) 45 dBA during the day;
- (40 + 5 =) 45 dBA in the evening; and
- (38 + 5 =) 43 dBA at night.

4.2.2 Amenity Criteria

Depending on the type of area in which the noise is being made, there is a certain reasonable expectancy for noise amenity. The NSW NPI provides a schedule of recommended L_{eq} industrial noise levels that under normal circumstances should not be exceeded. If successive developments occur near a residential area, each one allowing a criterion of background noise level plus 5 dB, the ambient noise level will gradually creep higher.

The recommended L_{eq} noise levels below in Table 3 are taken from Section 2.4, Table 2.2 of the NPI. Compliance with the amenity criteria will limit ambient noise creep.

Table 3 Amenity Criteria

Receiver	Noise Amenity Area	Time of Day	L_{Aeq} Noise Level, dBA
			Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45
		Night	40
Residential	Suburban	Day	55
		Evening	45
		Night	40

The L_{Aeq} is determined over a 15-minute period for the project intrusiveness noise level and over an assessment period (day, evening and night) for the project amenity noise level. This leads to the situation where, because of the different averaging periods, the same numerical value does not necessarily represent the same amount of noise heard by a person for different time periods. To standardise the time periods for the intrusiveness and amenity noise levels, the *NPI* assumes that the **$L_{Aeq,15min}$** will be taken to be equal to the **$L_{Aeq, period}$ + 3 decibels (dB)** (Section 2.2 NPI).

Compliance with the amenity criteria will limit ambient noise creep. Wherever the proposed L_{eq} noise level from industrial noise sources approaches or exceeds the amenity criteria at a critical receptor location, the intrusive L_{eq} noise from the noise source in question must be reduced to a level that may be as much as 10 dB below the proposed L_{eq} industrial noise level.

The resultant project amenity noise level for industrial developments is set at 5 dB lower than the recommended L_{eq} amenity noise levels set out in Table 2.2 of the NPI. For the residential premises on land zones RU4 - Primary Production Small Lots, the Rural amenity criteria will be used; and for the current and future residential premises in the Low Density Residential zone, the Suburban amenity criteria will be used.

The existing L_{eq} noise level at 35 Junction Road, Grantham Farm was 51 dBA during the day, 51 dBA in the evening and 45 at night. Therefore, the acceptable L_{eq} amenity criteria for residential premises in the RU4 - Primary Production Small Lots zone is:

- (50 + 3 - 5 =) 48 dBA during the day;
- (45 + 3 - 5 =) 43 dBA in the evening; and
- (40 + 3 - 5 =) 38 dBA at night.

The acceptable L_{eq} amenity criteria for residential premises in the R2 - Low Density Residential zone is:

- (55 + 3 - 5 =) 53 dBA during the day;
- (45 + 3 - 5 =) 43 dBA in the evening; and
- (40 + 3 - 5 =) 38 dBA at night.

4.3 Modifying Factors

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. On the other hand, some sources may cause less annoyance where only a single event occurs for a limited duration. Correction factors are to be applied to the noise from the source measured or predicted at the receiver before comparison with the criteria. AC500-10 in the Appendices is extracted from Table C.1 of the *NPI*.

4.4 Project Specific Noise Criteria

When all the above factors are considered, we find that the most stringent noise criterion is:

4.4.1 Residential receptors:

- **45 dBA** during the day;
- **43 dBA** in the evening; and
- **38 dBA** at night.

These criteria apply to the most-affected point on or within the residential property boundary – or, if that is more than 30 metres from the residence, at the most-affected point within 30 metres of the residence. For upper floors, the noise is assessed outside the nearest window.

5.0 NOISE EMISSION

The main sources of noise from the proposed Grantham Farm Zone Substation will be the transformers that operate continually throughout the day and night. The noise level will not change appreciably from the day to the night and therefore the predicted noise level at night will be the worst-case scenario.

Endeavour Energy has provided three transformer options to be assessed for the proposed zone substation as detailed in Table 4.

Table 4 Transformer Type Options

Transformer Options	Transformer	Sound Power Level 132/22kV at 45 MVA
Option 1	At 105% Regulated Voltage (U_r) No-Load with cooling for maximum rating	71 dBA
Option 2	At 105% U_r No-Load with cooling for maximum rating	63 dBA
Option 3	At 105% U_r No-Load and 2/3 rated load with cooling configuration for 2/3 rated load	63 dBA

The proposed zone substation will initially include two transformers with a third transformer added at a later date. For this analysis, the development site will be assessed assuming all three transformers will be in operation at 105% no-load with cooling and 2/3 rated load.

Calculations are based on plans prepared by Endeavour Energy as shown in Appendix C.

5.1 Option 1 Transformer

Option 1 includes three transformers—132/11 kV, 45 MVA—operating at 105% Regulated Voltage (U_r) no-load with cooling which will produce sound powers levels of 71 dBA. When the transformers are at 2/3 rated load, this equates to a sound power level of 78 dBA.

A schedule of the sound power level spectrum of the transformers is given in Table 5.

Table 5 Option 1 Transformer L_{eq} Sound Power Levels

Description	dBA	Sound Power Levels (dB) at Third Octave Band Centre Frequencies (Hz)						
		50	100	200	400	800	1k6	3k15
		63	125	250	500	1k	2k	4k
		80	160	315	630	1k25	2k5	5k
3 x Transformers (TX1, TX2 & TX3) 132/22kV, 45MVA (at 105% Regulated Voltage (U_r) No Load) 2/3 rated load	**78**	85	86	78	74	70	65	60
		76	77	67	66	68	65	58
		85	72	76	65	63	58	57

Knowing the sound power level of a noise source (see Table 5 above), the sound pressure level (as measured with a sound level meter) can be calculated at a remote location using suitable formulae to account for distance losses, sound barriers, etc.

Table 6 shows the predicted sound pressure levels at the nearest receptor locations during operation.

Table 6 Option 1 Predicted L_{eq} Noise Levels

Description	Predicted L_{eq} Noise Level (dBA) at Receptor Locations			
	R1	**R2**	**R3**	**R4**
3 x Transformers	29	36	36	26
Acceptable Noise Limit	**38**	**38**	**38**	**38**
Complies	**Yes**	**Yes**	**Yes**	**Yes**

The predicted level of noise from the Option 1 transformers associated with the proposed zone substation at all adjacent existing and future premises complies with the criteria in Section 4.4 of this report and is therefore acceptable.

5.2 Option 2 Transformer

Option 2 includes three transformers— 132/11 kV, 45 MVA —operating at 105% U_r no-load with cooling which will produce sound powers levels of 63 dBA. When the transformers are at 2/3 rated load, this equates to a sound power level of 70 dBA.

A schedule of the sound power level spectrum of the transformers is given in Table 7.

Table 7 Option 2 Transformer L_{eq} Sound Power Levels

Description	dBA	Sound Power Levels (dB) at Third Octave Band Centre Frequencies (Hz)						
		50	100	200	400	800	1k6	3k15
		63	125	250	500	1k	2k	4k
		80	160	315	630	1k25	2k5	5k
3 x Transformers (TX1, TX2 & TX3)		77	78	70	66	62	57	52
132/22kV, 45MVA (at 105% U_r No Load)	**70**	68	69	59	58	60	57	50
2/3 rated load		77	64	68	57	55	50	49

Table 8 shows the predicted sound pressure levels at the nearest receptor locations during operation.

Table 8 Option 2 Predicted L_{eq} Noise Levels

Description	Predicted L_{eq} Noise Level (dBA) at Receptor Locations			
	R1	R2	R3	R4
3 x Transformers	21	28	28	18
Acceptable Noise Limit	**38**	**38**	**38**	**38**
Complies	**Yes**	**Yes**	**Yes**	**Yes**

The predicted level of noise from the Option 2 transformers associated with the proposed zone substation at all adjacent existing and future premises complies with the criteria in Section 4.4 of this report and is therefore acceptable.

5.3 Option 3 Transformer

Option 3 includes three transformers—132/11 kV, 45 MVA—operating at 105% U_r no-load and 2/3 rated load with cooling configuration which will produce sound power levels of 63 dBA.

A schedule of the sound power level spectrums of the transformers is given in Table 9.

Table 9 Option 3 Transformer L_{eq} Sound Power Levels

Description	dBA	Sound Power Levels (dB) at Third Octave Band Centre Frequencies (Hz)						
		50	100	200	400	800	1k6	3k15
		63	125	250	500	1k	2k	4k
		80	160	315	630	1k25	2k5	5k
3 x Transformers (TX1, TX2 & TX3) 132/22kV, 45MVA (at 105% U_r No Load) 2/3 rated load	**63**	70	71	63	59	55	50	45
		61	62	52	51	53	50	43
		70	57	61	50	48	43	42

Table 10 shows the predicted sound pressure levels at the nearest receptor locations during operation.

Table 10 Option 3 Predicted L_{eq} Noise Levels

Description	Predicted L_{eq} Noise Level (dBA) at Receptor Locations			
	R1	R2	R3	R4
3 x Transformers	14	21	21	11
Acceptable Noise Limit	**38**	**38**	**38**	**38**
Complies	**Yes**	**Yes**	**Yes**	**Yes**

The predicted level of noise from the Option 3 transformers associated with the proposed zone substation at all adjacent existing and future premises complies with the criteria in Section 4.4 of this report and is therefore acceptable.

5.4 Maximum Sound Power Level

As seen in Table 6, Option 1 meets the most stringent noise criteria by a margin of 2dB. Provided the sound power level of the new transformers TX1, TX2 & TX3 are limited to a maximum sound power level of 80 dBA at 66% load (approximately 73 dBA at no load), the noise emission at all nearby existing and future sensitive receivers will meet the acceptable noise limits during the day, evening and night.

6.0 CONCLUSION

Day Design was engaged to assess the level of noise emission from the proposed Grantham Farm, Zone Substation at Lot 99, Garfield Road East, Grantham Farm, NSW.

Measurements and calculations show that the level of noise emitted by all three options proposed for the zone substation will meet the acceptable noise level requirements of The NSW Environment Protection Authority's Noise Policy for Industry as detailed in Section 4.4 of this report and will therefore be acceptable.

Provided the sound power level of the new transformers TX1, TX2 and TX3 are limited to a maximum level of 80 dBA at 66% load (approximately 73 dBA at no load), the noise emission at all nearby existing and future sensitive receivers will meet the acceptable noise limits.

Sean Julius

Sean Julius, BE (Biomedical),
Acoustical Engineer
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP
Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

APPENDICES
Appendix A – Instrumentation
Appendix B – Ambient Noise Survey
Appendix C – Architectural Plans
AC108-1 to 4 – Glossary of Acoustical Terms
AC500-10 – NSW Noise Policy for Industry, Modifying Factor Corrections

NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis in this report were made with instrumentation as follows:

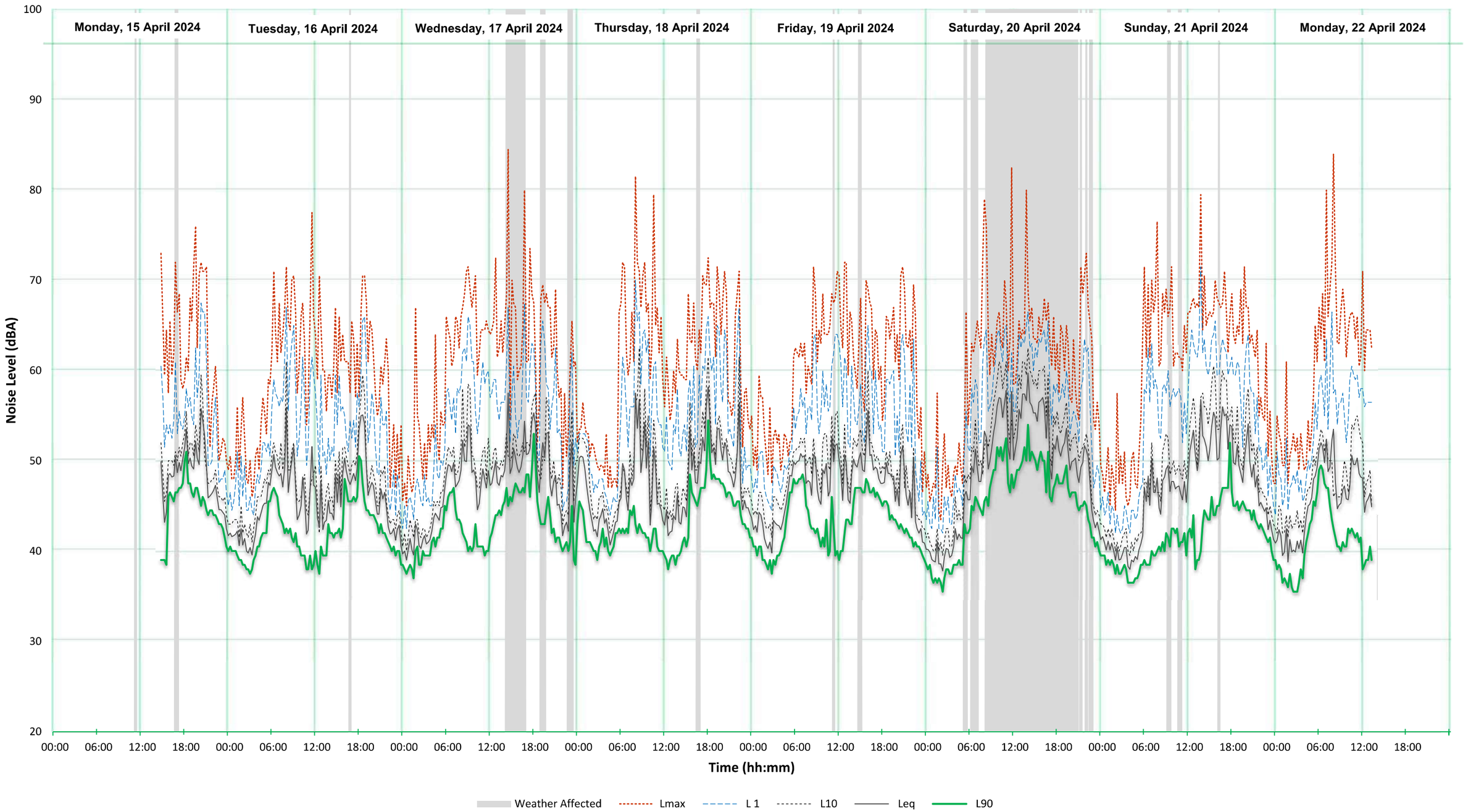
Table A1 Noise Survey Instrumentation

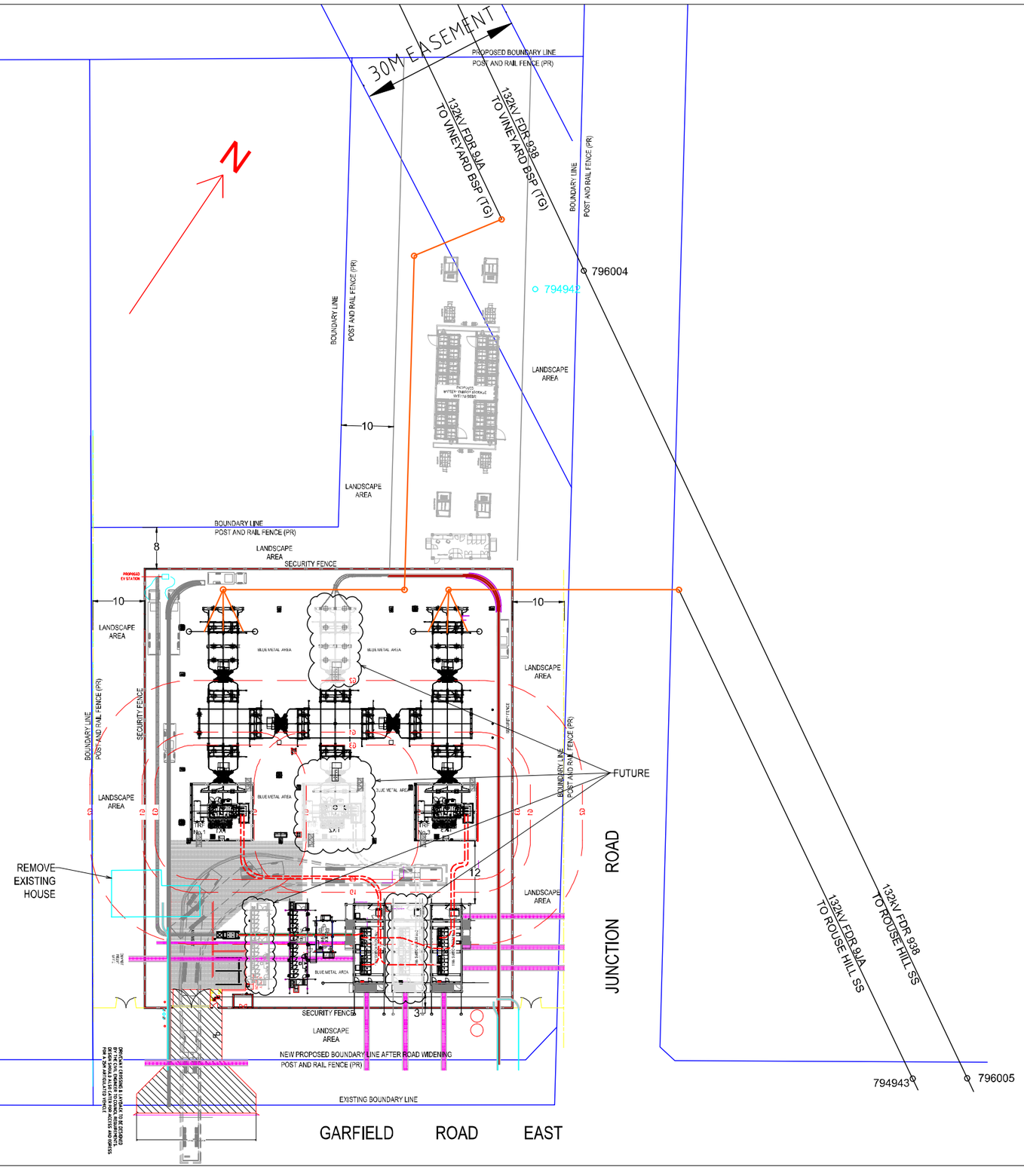
Description	Model No	Calibration Due Date	Serial No
Infobyte Noise Logger (Type 1)	iM4	3 Mar 2024	121
Condenser Microphone 0.5" diameter	MK 250	3 Mar 2024	6595
Acoustical Calibrator	BK4231	8 Dec 2024	3025991

An environmental noise logger is used to continuously monitor ambient noise levels and provide information on the statistical distribution of noise during an extended period of time. The Infobyte Noise Monitor iM4 is a Type 1 precision environmental noise monitor meeting all the applicable requirements of AS1259 for an integrating-averaging sound level meter.

All instrument systems had been laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The measurement system was also field calibrated prior to and after noise surveys. Calibration drift was found to be less than 0.5 dB during unattended measurements. No adjustments for instrument drift during the measurement period were warranted.

Located at 34 Junction Rd, Riverstone, NSW





AMENDMENTS	
JOB No	
DES/DRG	
DWN	RU
CHK	RU
DATE	2/04/24
APP'D	

HISTORY

A

Civil version 5.1

© This drawing and the copyright therein is the property of Endeavour Energy and may not be copied, reproduced, distributed, loaned or used without the written consent of Endeavour Energy.

ORIGINAL SCALE

APPROVED

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE
DIMENSIONS IN MILLIMETRES

AUTHORISED/CERTIFIED

DESIGNED	RU	DATE	3/04/24
DRAWN	RU		
CHECKED	R.U.		

DESIGN MANAGER CIVIL & SECONDARY

RIVERSTONE EAST ZONE SUBSTATION
PROPOSED GENERAL ARRANGEMENT FOR OPTION 3 WITH
132kV OUTDOOR, TWO 45MVA TRFS, RING IN OUT OF 132KV
FDR 9JA NPR-000048 (PR700)

A1 PROPOSED

SHEET No 1 OF 5 SHEETS

ACOUSTICAL – Pertaining to the science of sound, including the generation, propagation, effects and control of both noise and vibration.

AMBIENT NOISE – The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area, both near and far, including road traffic, factories, wind in the trees, birds, insects, animals, etc.

AUDIBLE – means that a sound can be heard. However, there are a wide range of audibility grades, varying from "barely audible" to "just audible", "clearly audible" and "prominent". Chapter 83 of the NSW Environment Protection Authority – Environmental Noise Control Manual (1985) states:
"noise from a particular source might be offensive if it is clearly audible, distinct from the prevailing background noise and of a volume or character that a reasonable person would be conscious of the intrusion and find it annoying or disruptive".

It follows that the word "audible" in an environmental noise context means "clearly audible".

BACKGROUND NOISE LEVEL – Silence does not exist in the natural or the built-environment, only varying degrees of noise. The Background Noise Level is the average minimum dBA level of noise measured in the absence of the noise under investigation and any other short-term noises such as those caused by cicadas, lawnmowers, etc. It is quantified by the L_{A90} or the dBA noise level that is exceeded for 90 % of the measurement period (usually 15 minutes).

- **Assessment Background Level (ABL)** is the single figure background level representing each assessment period – day, evening and night (ie three assessment background levels are determined for each 24hr period of the monitoring period). Determination of the assessment background level is by calculating the tenth percentile (the lowest tenth percent value) of the background levels (L_{A90}) for each period (refer: NSW Industrial Noise Policy, 2000).
- **Rating Background Level (RBL)** as specified by the Environment Protection Authority is the overall single figure (L_{A90}) background noise level representing an assessment period (day, evening or night) over a monitoring period of (normally) three to seven days.

  The RBL for an assessment period is the median of the daily lowest tenth percentile of L_{90} background noise levels.

  If the measured background noise level is less than 30 dBA, then the Rating Background Level (RBL) is considered to be 30 dBA.

DECIBEL – The human ear has a vast sound-sensitivity range of over a thousand billion to one. The decibel is a logarithmic unit that allows this same range to be compressed into a somewhat more comprehensible range of 0 to 120 dB. The decibel is ten times the logarithm of the ratio of a sound level to a reference sound level. See also Sound Pressure Level and Sound Power Level.

Decibel noise levels cannot be added arithmetically since they are logarithmic numbers. If one machine is generating a noise level of 50 dBA, and another similar machine is placed beside it, the level will increase to 53 dBA, not 100 dBA. Ten similar machines placed side by side increase the sound level by 10 dBA, and one hundred machines increase the sound level by 20 dBA.

dBA – The human ear is less sensitive to low frequency sound than high frequency sound. We are most sensitive to high frequency sounds, such as a child's scream. Sound level meters have an inbuilt weighting network, termed the dBA scale, that approximates the human loudness response at quiet sound levels (roughly approximates the 40 phon equal loudness contour).



However, the dBA sound level provides a poor indication of loudness for sounds that are dominated by low frequency components (below 250 Hz). If the difference between the "C" weighted and the "A" weighted sound level is 15 dB or more, then the NSW Industrial Noise Policy recommends a 5 dBA penalty be applied to the measured dBA level.

dBC – The dBC scale of a sound level meter is similar to the dBA scale defined above, except that at high sound intensity levels, the human ear frequency response is more linear. The dBC scale approximates the 100 phon equal loudness contour.

EQUIVALENT CONTINUOUS NOISE LEVEL, L_{Aeq} – Many noises, such as road traffic or construction noise, vary continually in level over a period of time. More sophisticated sound level meters have an integrating electronic device inbuilt, which average the A weighted sound pressure levels over a period of time and then display the energy average or L_{Aeq} sound level. Because the decibel scale is a logarithmic ratio the higher noise levels have far more sound energy, and therefore the L_{Aeq} level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closely to the L_{Aeq} noise level.

FREE FIELD – This is a sound field not subject to significant reflection of acoustical energy. A free field over a reflecting plane is usually outdoors with the noise source resting on hard flat ground, and not closer than 6 metres to any large flat object such as a fence or wall; or inside an anechoic chamber.

FREQUENCY – The number of oscillations or cycles of a wave motion per unit time, the SI unit being the Hertz, or one cycle per second.

IMPACT ISOLATION CLASS (IIC) – The American Society for Testing and Materials (ASTM) has specified that the IIC of a floor/ceiling system shall be determined by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The IIC is a number found by fitting a reference curve to the measured octave band levels and then deducting the sound pressure level at 500 Hz from 110 decibels. Thus the higher the IIC, the better the impact sound isolation.

IMPACT SOUND INSULATION ($L_{nT,w}$) – Australian Standard AS ISO 717.2 – 2004 has specified that the Impact Sound Insulation of a floor/ceiling system be quantified by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The Weighted Standardised Impact Sound Pressure Level ($L_{nT,w}$) is the sound pressure level at 500 Hz for a reference curve fitted to the measured octave band levels. Thus the lower $L_{nT,w}$ the better the impact sound insulation.

IMPULSE NOISE – An impulse noise is typified by a sudden rise time and a rapid sound decay, such as a hammer blow, rifle shot or balloon burst.

INTRUSIVE NOISE LEVEL, L_{Aeq} – The level of noise from a factory, place of entertainment, etc. in NSW is assessed on the basis of the average maximum noise level, or the $L_{Aeq\ (15\ min)}$. This is the energy average A weighted noise level measured over any 15 minute period.

LOUDNESS – The degree to which a sound is audible to a listener is termed the loudness. The human ear perceives a 10 dBA noise level increase as a doubling of loudness and a 20 dBA noise increase as a quadrupling of the loudness.

MAXIMUM NOISE LEVEL, L_{Amax} – The rms maximum sound pressure level measured on the "A" scale of a sound level meter during a noise survey is the L_{Amax} noise level. It may be measured using either the Fast or Slow response time of the meter. This should be stated.

NOISE RATING NUMBERS – A set of empirically developed equal loudness curves has been adopted as Australian Standard AS1469-1983. These curves allow the loudness of a noise to be described with a single NR number. The Noise Rating number is that curve which touches the highest level on the measured spectrum of the subject noise. For broadband noise such as fans and engines, the NR number often equals the dBA level minus five.

NOISE – Noise is unwanted sound. Sound is wave motion within matter, be it gaseous, liquid or solid. "Noise includes sound and vibration".

NOISE REDUCTION COEFFICIENT – See: "Sound Absorption Coefficient".

OFFENSIVE NOISE - (Reference: Dictionary of the Protection of the Environment Operations Act 1997). *"Offensive Noise means noise:*

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or likely to be harmful to) a person who is outside the premise from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulations."

PINK NOISE – Pink noise is a broadband noise with an equal amount of energy in each octave or third octave band width. Because of this, Pink Noise has more energy at the lower frequencies than White Noise and is used widely for Sound Transmission Loss testing.

REVERBERATION TIME, T_{60} – The time in seconds, after a sound signal has ceased, for the sound level inside a room to decay by 60 dB. The first 5 dB decay is often ignored, because of fluctuations that occur while reverberant sound conditions are being established in the room. The decay time for the next 30 dB is measured and the result doubled to determine the T_{60}. The Early Decay Time (EDT) is the slope of the decay curve in the first 10 dB normalised to 60 dB.

SOUND ABSORPTION COEFFICIENT, α – α Sound is absorbed in porous materials by the viscous conversion of sound energy to heat energy as the sound waves pass through it. Sound is similarly absorbed by the flexural bending of internally damped panels. The fraction of incident energy that is absorbed is termed the Sound Absorption Coefficient, α. An absorption coefficient of 0.9 indicates that 90 % of the incident sound energy is absorbed. The average α from 250 to 2000 Hz is termed the Noise Reduction Coefficient (NRC).

SOUND ATTENUATION – If an enclosure is placed around a machine, or a silencer is fitted to a duct, the noise emission is reduced or attenuated. An enclosure that attenuates the noise level by 30 dBA, reduces the sound energy by one thousand times.

SOUND EXPOSURE LEVEL (SEL) – The total sound energy of a single noise event condensed into a one second duration or in other words it is an L_{eq} (1 sec).

SOUND PRESSURE LEVEL, L_p – The level of sound measured on a sound level meter and expressed in decibels, dB, dBA, dBC, etc. $L_p = 20 \times \log (P/P_o)$ ... dB

where P is the rms sound pressure in Pascal and P_o is a reference sound pressure of 20 µPa. L_p varies with distance from a noise source.

SOUND POWER LEVEL, L_w – The Sound Power Level of a noise source is an absolute that does not vary with distance or with a different acoustic environment.

$L_w = L_p + 10 \log A$ ... dB, re: 1pW,
where A is the measurement noise-emission area in square metres in a free field.

SOUND TRANSMISSION CLASS (STC) – An internationally standardised method of rating the sound transmission loss of partition walls to indicate the decibels of noise reduction of a human voice from one side to the other. (Refer: Australian Standard AS1276 – 1979)

SOUND TRANSMISSION LOSS – The amount in decibels by which a random sound is reduced as it passes through a sound barrier. A method for the measurement of airborne Sound Transmission Loss of a building partition is given in Australian Standard AS1191 - 2002.

STATISTICAL EXCEEDENCE SOUND LEVELS, L_{A90}, L_{A10}, L_{A1}, etc – Noise which varies in level over a specific period of time (usually 15 minutes) may be quantified in terms of various statistical descriptors:

The L_{A90} is the dBA level exceeded for 90 % of the time. In NSW the L_{A90} is measured over periods of 15 minutes, and is used to describe the average minimum or background noise level.

The L_{A10} is the dBA level that is exceeded for 10 % of the time. In NSW the L_{A10} measured over a period of 10 to 15 minutes. It was until recently used to describe the average maximum noise level, but has largely been replaced by the L_{Aeq} for describing level-varying noise.

The L_{A1} is the dBA level that is exceeded for 1 % of the time. In NSW the L_{A1} may be used for describing short-term noise levels such as could cause sleep arousal during the night.

STEADY NOISE – Noise, which varies in level by 6 dBA or less, over the period of interest with the time-weighting set to "Fast", is considered to be "steady". (Refer AS 1055.1 1997)

WEIGHTED SOUND REDUCTION INDEX, R_w – This is a single number rating of the airborne sound insulation of a wall, partition or ceiling. The sound reduction is normally measured over a frequency range of 100 to 3,150 Hertz and averaged in accordance with ISO standard weighting curves (Refer AS/NZS 1276.1:1999).

Internal partition wall $R_w + C$ ratings are frequency weighted to simulate insulation from human voice noise. The $R_w + C$ is always similar in value to the STC rating value. External walls, doors and windows may be $R_w + C_{tr}$ rated to simulate insulation from road traffic noise. This is normally a lower number than the STC rating value.

WHITE NOISE – White noise is broadband random noise whose spectral density is constant across its entire frequency range. The sound power is the same for equal bandwidths from low to high frequencies. Because the higher frequency octave bands cover a wider spectrum, white noise has more energy at the higher frequencies and sounds like a hiss.

Table C.1 Modifying factor corrections
(See definitions in Section C2)

Factor	Assessment/ Measurement	When to apply	Correction[1]	Comments
Tonal noise	One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (*ISO1996.2-2007 – Annex D*).	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: • 5 dB or more if the centre frequency of the band containing the tone is in the range 500–10,000 Hz • 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz • 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz.	5 dB [2, 3]	Third octave measurements should be undertaken using unweighted or Z-weighted measurements. **Note:** Narrow-band analysis using the reference method in *ISO1996-2:2007, Annex C* may be required by the consent/regulatory authority where it appears that a tone is not being adequately identified, e.g. where it appears that the tonal energy is at or close to the third octave band limits of contiguous bands.
Low frequency noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10–160 Hz	Measure/assess source contribution C- and A-weighted Leq,T levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: • where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period • where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2dB(A) positive adjustment applies for the daytime period.	2 or 5 dB[2]	A difference of 15 dB or more between C- and A-weighted measurements identifies the potential for an unbalance spectrum and potential increased annoyance. The values in Table C2 are derived from Moorhouse (2011) for DEFRA fluctuating low-frequency noise criteria with corrections to reflect external assessment locations.

Table C.1 Modifying factor corrections – continued

Factor	Assessment/ Measurement	When to apply	Correction[1]	Comments
Intermittent noise	Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level.	The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible.	5 dB	Adjustment to be applied for **night-time only**
Duration	Single-event noise duration may range from 1.5 min to 2.5 h.	One event in any assessment period.	0 to 20 dB(A)	The project noise trigger level may be increased by an adjustment depending on duration of noise (see Table C3).
Maximum Adjustment	Refer to individual modifying factors.	Where two or more modifying factors are indicated.	Maximum correction of 10 dB(A)[2] (excluding duration correction).	

Notes:

1. *Corrections to be added to the measured or predicted levels, except in the case of duration where the adjustment is to be made to the criterion.*
2. *Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.*
3. *Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.*





ghd.com

→ The Power of Commitment