Notice of Determination

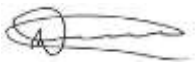
Under Part 5 of the Environmental Planning & Assessment Act 1979

Sussex Inlet Zone Substation Renewal (Stage 2)

This proposal has been approved pursuant to Part 5 Section 111 of the Environmental Planning and Assessment Act 1979 and has been determined as having no significant adverse impact on the environment.

The proposed works must be constructed in accordance with the attached conditions of approval.

Approved under delegated authority

Signed: 

Name: Danny Asvestas

Title: **Manager Asset Standards and Design**
Endeavour Energy

Date: 10/07/2018

Subject Heading	Consent condition
GENERAL - The Environmental Impact Assessment and this Determination	• Prior to the construction work commencing, the Endeavour Energy Project Manager and the Construction Contractor's Project Manager must familiarize themselves with the Review of Environmental Factors (including attachments) and the recommendations/conditions of approval made within the Notice of Determination. • These recommendations/conditions of approval as set out in the Notice of Determination prepared by Endeavour Energy must be implemented and complied with throughout the construction period. • All Recommendations/Conditions of Approval as written in the Notice of Determination must be written into any Construction Environmental Management Plan for the proposed works. • All workers including sub-contractors are to be made aware of the Conditions of Approval and the Construction Environmental Management Plan that has been developed for the proposed works. • A copy of the signed REF, a copy of this NOD/CEMP and any other plans, certificates or documentation to be relied upon will be retained and available on site at all times during construction
BUILDINGS	• All aspects of the building design shall comply with the applicable performance requirements of the Building Code of Australia and relevant Endeavour Energy Standards and Australian Standards so as to achieve and maintain acceptable standards of structural efficiency, safety (including fire safety), health and amenity for the ongoing benefit of the community.
SITE INDUCTION	• A site induction will be carried out for the Construction Contractor and his relevant staff who will be working on the site prior to the commencement of any work on the project site. • This will be carried out by the Endeavour Energy Project Manager /Network Environmental Assessment staff and indicate those environmental approval conditions/constraints or items of note within or near the work site. • The Endeavour Energy Project Manager must ensure that as part of any site induction, that his staff or the contractor and his staff including any sub-contractors working on the site are all made aware of their environmental responsibilities and the environmental conditions of approval pertaining to the site and any surrounds that may be affected by the project works including ancillary works.
APPROVED DESIGN PLANS	• The renewal works of Sussex Inlet Zone Substation will be in accordance with the Certified Plans contained in Appendix 1 of this REF. • The Sussex Inlet Zone Substation renewal activities must be carried out substantially in accordance with the following stamped and approved plans: o DA00 Cover Sheet o DA001 Photomontage 1 and Existing View o DA002 Photomontage 2 and Existing View o DA03 Design and Character Statement o DA004 Locality Plan o DA005 Site and Roof Plan o DA006 Cable Basement Plan o DA0007 Ground Floor Plan o DA008 Building Elevations o DA009 Street Elevations o DA010 Sections o DA111 External Finishes o C00 Locality Map & Drawing Schedule o C01 General Notes o C02 Civil Layout Plan o C03 Stormwater Section o 13221-9259.01 Survey Plan
AMENDMENTS AND RE-DETERMINATION	• Network Environmental Assessment must be notified where any variation or modification from these Certified Plans is proposed during either the detail design and/or construction processes. Any such variations or modifications may require reassessment, re-engagement of consultants, re-notification of

Subject Heading	Consent condition
	Stakeholders, and a revised Determination to be prepared and signed off.
STANDARDS POLICIES AND PROCEDURES	• All construction shall be carried out for this project in accordance with Endeavour Energy's Environmental Management Standard "EMS 0001 Environmental Impact Assessment and Environmental Management Plans" and the site specific Construction Environmental Management Plan that has been developed for this project, EMS 0007 Waste Management and any other pertinent Endeavour Energy EMS. • Copies of Endeavour Energy's Standards are available on Endeavour Energy's Standards and ASP's Websites.
SIGNAGE REQUIREMENTS	A minimum of two signs should be displayed at the construction site at prominent locations and in a manner that can be easily read by pedestrian traffic. These signs are to contain the following details: • The name of the construction company engaged to carry out the construction works. • The construction company's and Endeavour Energy's Project Managers names in charge of the work site and their telephone numbers at which they can be contacted during work hours and the out of hours/emergency telephone numbers of these officers. • That unauthorised entry to the work site is prohibited • The above signage is to be installed prior to the commencement of, and for the full term of the construction works onsite. • All construction signage shall be removed at the completion of the construction works.
COMMUNITY AND STAKEHOLDER ENGAGEMENT	• Written notification shall be provided to all neighbouring residents / landowners as well as Shoalhaven City Council of the intention to commence the proposed substation works. • Notification shall include information on when the construction works are to commence, the anticipated duration of the construction works and the twenty four hour contact details of the project manager or other appropriate contact person in the event of any complaints. • This notification must be given at least 14 days but no more than 30 days prior to the works commencing. • All residents and businesses affected by an outage must be notified in advance of the outage occurring in accordance with NECF requirements.
EASEMENT REQUIREMENTS	• N/A - The Sussex Inlet Zone Substation renewal activities will be carried out within the existing substation site boundaries. No easements are required.
ENVIRONMENTAL MANAGEMENT	• The successful Contractor must prepare a site specific Construction Environmental Management Plan (CEMP). • This CEMP must include all conditions as listed in this Notice of Determination and the mitigating measures identified in the REF. The Plan is to be submitted to the Project Manager who in turn will forward it to Network Environmental Assessment for review and comment prior to work commencing. • The CEMP is to be developed in accordance with: o The Landcom publication; *Managing Urban Stormwater; Soils and Construction 4th Edition*, o Endeavour Energy Environmental Management Standard *EMS 0001 Environmental Impact Assessment and Environmental Management Plans*, o Endeavour Energy Environmental Management Standard *EMS 0007 Waste Management,* o Any other relevant Endeavour Energy Standard(s), o Any local, State and/or Federal laws and regulations. • The Endeavour Energy Project Manager is responsible for ensuring that the Sussex Inlet Zone Substation site is managed in accordance with the conditions outlined in the CEMP and any Safety Management Plan prepared for the site.
DILAPIDATION ASSESSMENT	• A pre-construction (dilapidation) assessment of the condition of any property that could be potentially affected by the project works must be carried out. • A pre-construction dilapidation report relating to the condition of any non-Endeavour Energy assets the vicinity of the construction site that may be potentially affected by the works must be obtained by the Project Manager prior to the project works commencing. • Any management recommendations made within the pre-construction dilapidation report must be employed when carrying out construction works so as to protect any assets identified within the pre-construction dilapidation report.

Subject Heading	Consent condition
	• A post construction dilapidation assessment and report relating to the condition of those same assets identified within the pre-construction dilapidation report shall be obtained by the Endeavour Energy Project Manager. Should damage have occurred to any assets as of a result of the construction works but unanticipated at the commencement of the works or not included within the pre-construction dilapidation report then these assets should be included within the post construction dilapidation report.
RESTORATION	• Full restoration of those items documented in the pre-construction dilapidation report shall be carried out at least to the standard as described in the dilapidation report unless otherwise agreed with the property owner. • Any damage caused to non-Endeavour Energy roadways, footpaths, carparks or other utilities' assets during construction shall be restored immediately to at least a standard that facilitates safe and effective use or access for all users until the completion of the construction works. • At the completion of the construction works any damage caused to non-Endeavour Energy roadways, footpaths, car parks or other utilities' assets during construction shall (if not already completed) be restored to at least the pre-construction standard as indicated by the pre-construction dilapidation report. • Should it be agreed by Endeavour Energy that the damage or destruction of any item (including landscaping both hard or soft) has occurred on any property as a result of the construction works, but was unforeseen prior to those works commencing, and therefore not included in any dilapidation report or photographic documentation, then agreement should be reached in consultation with the property owner as to the original condition of the item and accordingly that item should then be restored to that condition at Endeavour Energy's expense unless otherwise agreed.
HERITAGE	• It is the Endeavour Energy Project Manager's and the construction Project Manager's responsibility to advise all persons working on the site that knowingly disturbing or destroying an aboriginal object is an offence under the National Parks & Wildlife Act 1974. • Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity of the find and the OEH and Aboriginal stakeholders notified. A qualified archaeologist may also be required to assess the find. • If any suspected human remains are discovered during any activity you must immediately contact Network Environmental Assessment and cease all works at that location. The Project Manager must notify the NSW Police and Network Environmental Assessment who will advise OEH's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location. Works cannot recommence at that location unless authorised in writing by OEH. • Relics are historical archaeological resources of local or State significance and are protected in NSW under the Heritage Act 1977. Relics cannot be disturbed except with a permit or exception notification. Should unanticipated relics be discovered during the course of the project, work in the vicinity must cease and Network Environmental Assessment advised. If necessary they will contact an archaeologist to make a preliminary assessment of the find. The Heritage Council will require notification if the find is assessed as a relic.
FLORA, FAUNA AND VEGETATION MANAGEMENT	• All vegetation within the confines of the substation and as specified on the concept plans can be removed. • Prior to clearing existing vegetation, large trees shall be searched for hollows and nests. Where animals or birds and / or their nests are located, WIRES or an authorised wildlife carer shall be contacted to arrange for their removal and relocation. • Under no circumstances is vegetation on adjoining properties to be removed or trimmed without the prior written consent of the landowner a8nd Network Environmental Assessment.
ROADS, PEDESTRIAN AND VEHICULAR TRAFFIC AND ACCESS	• The appropriate roads authority must be consulted with for any proposed works in, on or over any public road in accordance with the Roads Act 1993. For any works affecting a "Classified Road", that road authority is the Roads and Maritime Services (RMS). Any conditions of consent imposed by the road authority or RMS in relation to the implementation of the proposed works affecting such roads must be complied with as part of the construction works • Where necessary, a traffic management plan is to be developed that implements an appropriate suite of measures to ensure the safety of all road users, pedestrians and construction workers and which will also ensure the smooth operation of the road network surrounding the work site. • All vehicles, including passenger vehicles related to the construction works shall be parked legally and in such a way that allows the safe and efficient use of those roadways by motorists or pedestrians. No driveways or access to properties shall be blocked by the parking of such vehicles. No vehicles or machinery shall be parked within the drip line of any trees which are being retained on site.

Subject Heading	Consent condition
	• Safe pedestrian access shall be provided at all times during the construction works. • Notice must be given to Shoalhaven City Council and the NSW Roads and Maritime Services, and appropriate permits obtained where necessary if the temporary partial closure of any traffic lane or road is proposed. E.g. - for the delivery of major items of equipment or where any transmission line works within the roadway are required. • Any damage to public roadways or footpaths that prevents normal use of these by road users shall be restored as a priority to at least a level that provides a safe and temporary access for those residents until permanent restoration can be carried out. • All vehicular footpath/nature strip crossings are to be constructed in accordance with Shoalhaven City Council's standard for commercial/industrial footpath/nature strip crossing. The Project Manager shall seek approval from Shoalhaven City Council for any such vehicle crossings and for any works within the road reserves required by the Roads Act 1993.
MATERIAL STORAGE	• A fenced construction compound shall be established on Endeavour Energy's land adjacent to the substation. This construction compound is to utilise the existing cleared area only and shall not require further removal of any trees. • All building, soil and construction materials, plant and other equipment or the like shall be placed or stored within the fenced construction compound. No such materials are to be placed or stored at any time on land not owned by Endeavour Energy (including Council land, private land, footpaths or roadways) without the prior written consent of the appropriate landowner. • No building, soil or construction materials, plant or other equipment or the like are to be placed or stored at any time within the drip line of any trees that are being retained on the site. All such equipment is to be stored within the secured construction compound adjacent to the construction site.
EROSION AND SEDIMENT CONTROL	• The developed Construction Environmental Management Plan shall include an Erosion and Sediment Control Plan which shall be designed in accordance with the Landcom publication, Managing Urban Stormwater; Soils and Construction 4th Edition. • No works are to commence on site until appropriate sediment controls have been established in accordance with the approved Erosion and Sediment Control Plan. • The construction contractor shall ensure that any erosion and sediment control measures installed are maintained throughout the construction phase of the development until the land that was subject to the erosion has been stabilized or where such a surface's ultimate finish has been installed. • Any soil erosion controls employed during construction are to be removed at the completion of the site works or when any disturbed ground has stabilised. • Any additional sediment control measures employed subsequent to the development of the original erosion and sediment control plan shall be shown marked on that original plan. • Soil stockpiles remaining in situ for any time are to be adequately fenced with sediment control fencing to prevent soil being washed away from the stockpile into any watercourses, drains or onto any adjoining property, including public roads and footpaths. • Care must be taken by the construction contractor to ensure that soil is not tracked along any nearby roadways from the construction site. Any tracked soil must be swept up or cleared from the road pavement by the end of each day's work.
HOURS OF WORK AND NOISE MANAGEMENT	• Any noise generated during the development construction shall not exceed the limits specified in the Protection of the Environment Operations Act 1997. • The hours of work for any noise generating construction associated with the proposed development are to be limited to between 7am and 6pm, Mondays to Fridays inclusive, 8am to 1pm Saturdays with no construction activities to be undertaken on Sundays or public holidays. • In the event that works are required outside of normal working hours, , the need is to be adequately demonstrated and approval is to be sought from Network Environmental Assessment. Where such works is required for more than two nights in any given week, justification must be documented and approval sought from NEA. All nearby affected residents and businesses, including the local Council, must be notified in writing at least 5 to 14 days prior to commencing any out of hours works. The Endeavour Energy Project Manager will be required to forward a copy of the notification letter, mitigation measures and justification to environment@endeavourenergy.com.au. Safety and Environmental Services will notify the EPA as necessary. • Should power generators be required during any stage of the construction works, the Project Manager is to liaise with Network Environmental Assessment so that additional noise studies can be obtained as considered necessary.

Subject Heading	Consent condition
	• Noise from the operation of the substation shall comply with the NSW Industrial Noise Policy. Once commissioned, a noise compliance report may be commissioned to ensure that noise from the substation is operating in accordance with this Policy.
WASTE MANAGEMENT	• All waste generated is to be managed in accordance with Endeavour Energy's Environmental Management Standard EMS0007 – Waste Management. All waste materials including soil stored on-site must be contained in a designated area, such as a waste bay or bin, to ensure that these waste materials are not allowed to enter the stormwater system, neighbouring properties or public roads. The work site shall be left in a clean and tidy state at the end of each working day. • The Contractor shall prepare and submit a Waste Management Plan as part of the CEMP estimating the types and volumes of waste likely to be produced as a result of the works and nominating licensed waste facilities for the disposal of this waste. The contractor will provide supporting documentation (dockets / receipts) to the Endeavour Energy Project Manager. • The Site Supervisor shall complete a daily material tracking checklist which records the registration of all vehicles leaving the site containing any waste materials, the type and approximate volume of the waste and the destination of this waste. These checklists are to be retained and provided to the Endeavour Energy Project Manager on a monthly basis. • Excavated spoil is to be classified prior to disposal and / or reuse. • Where excavated spoil is suspected to be contaminated, works will immediately cease and the Project Manager and Corporate Environment notified. Suspected contaminated spoil will be chemically tested to provide a waste classification for disposal. Spoil may be suspected of being contaminated if it: o Has an odour o Is discoloured or stained o Contains asbestos materials / fragments o Contains buried materials such as drums, underground storage tanks etc o Presence of ash or slag • If Virgin Excavated Natural Material (VENM) is to be disposed of at a site other than a licensed facility, a copy of the authorisation which allows the acceptance of VENM (i.e. an approved Development Application) is to be provided to the Endeavour Energy Project Manager prior to material being sent to the site.
AIR QUALITY	Appropriate dust suppression techniques shall be employed as necessary. These may include dampening down of the site if dry and windy conditions prevail and the site contains large areas of exposed soils, mulching of any disturbed surfaces or restricting vehicle movements to established access tracks or routes where possible.
UTILITIES AND SERVICES	• An application for a Section 73 Compliance Certificate should be made to Sydney Water on behalf of Endeavour Energy to ensure connection to water and sewerage systems are available. • A Dial Before You Dig search of the site should be carried out to determine the location of any underground utilities before construction commences. • The Contractor will be responsible for conducting detailed searches, including Dial Before you Dig searches, prior to construction works commencing. Where necessary, all relevant authorities shall be contacted regarding potential impacts on their facilities. Design and construction will accommodate the results of these searches and consultation. • The Contractor will ensure that all existing services and utilities are located prior to the commencement of the works.
SAFETY AND HAZARDS	• If suspected asbestos containing materials are located, the area is to be closed off and the Endeavour Energy Project Manager advised. An occupational hygienist is to be employed to search the area and determine the extent of remediation works required. • Any asbestos containing soil will be classified and disposed of at an appropriately licensed waste facility. All asbestos is to be managed in accordance with Endeavour Energy's Procedure GSY1065. • All necessary safety measures including signage, barriers, lighting, fencing and the like will be installed and checked on a daily basis to ensure they are in adequate working condition.
FENCING	• Prior to commencement of works on site, a temporary construction fence must be established around the site.

Subject Heading	Consent condition
	• All security fencing must be carried out in accordance with the approved plans and Endeavour Energy's SDI524. • The fences along the common boundary with the adjacent businesses shall be constructed in such a manner so as not to impact upon existing vegetation on their property.
EMF	• Magnetic field emission levels at the boundary of the substation must not exceed the recognised exposure limit of 2000mG.

Review of Environmental Factors

Sussex Inlet Zone Substation Renewal (Stage 2)

In accordance with The Code of Practice for Authorised Network Operators, State Environmental Planning Policy (Infrastructure) 2007 and Part 5 Section 111 of the Environmental Planning and Assessment Act, 1979.

July 2018

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EXECUTIVE SUMMARY

This Environmental Impact Assessment provides background information regarding the need for the project and the head works required for the renewal of the existing Sussex Inlet Zone Substation (ZS), to provide a more reliable electricity supply to customers in the rural and coastal/holiday townships of Sussex Inlet, Swanhaven, Berrara, Wandandian and Bewong.

The key features of the project will involve:

- Construction of a new 11 kV control building with new indoor 11kV switchgear, auxiliaries, protection and control equipment;
- Installation of associated underground cable conduits;
- Installation of a new 11kV auxiliary padmount transformer;
- Replacement of the 33kV support structures in the transformer bunds;
- Installation of firewalls between transformer bays;
- Demolition and removal of the existing 11kV busbar and associated switchgear;
- Demolition and removal of the existing control building including existing protection and control and auxiliary equipment;
- Constructing of new pavements, retaining walls, gravel yard surfacing and security fencing; and
- Installation of building and site stormwater drainage.

This assessment details the possible environmental impacts and identifies mitigating measures to be incorporated into the design, construction and operation of the renewed substation, to minimise environmental impacts.

The works are subject to the provisions of The Code of Practice (The Code) for Authorised Network Operators (ANO), State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) and requires assessment and approval under Part 5 of the Environmental Planning and Assessment Act, 1979 (EP&A) Act.

No significant environmental constraints to the proposal were identified by the assessment process required under Part 5 of the EP&A Act. Relative to this proposal, Endeavour Energy has concluded that there are no aspects of this proposal that have the potential to lead to, or result in, significant adverse impacts on the environment.

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List of Abbreviations and Glossary of Terms

Term	Meaning
A	amp: the unit of measure for current (or load) which is the amount
Aboriginal Heritage	Any deposit, object, place or material evidence relating to Aboriginal habitation or places having significance to Aboriginal culture as declared by the Minister which is protected under the NPW Act and EPBC Act
AFIC	Audio Frequency Injection Control equipment used at Zone Substations
AHIMS	Aboriginal Heritage Information Management System
ANO	Authorised Network Operator under the *Electricity Networks Assets (Authorised Transactions) Act 2015*
ARPANZA	Australian Radiation Protection and Nuclear Safety Agency
BAL	Bushfire Attack Level
CBD	Central Business District
CEMP	Construction Environmental Management Plan
Classified Road	The *Roads Act 1993* provides for roads to be classified as Freeways, Controlled Access Roads, Tollways, State Highways, Main Roads, Secondary Roads, Tourist Roads, Transit ways and State Works
Climate Change	Describes both changed average climatic conditions, such as increased temperature and lower average rainfall, as well as changes in the patterns of extreme events, including increased frequency and intensity of storms
Determining Authority	Minister or public authority by or on whose behalf the activity is or is to be carried out or any Minister or public authority whose approval is required in order to enable the activity to be carried out.
Easement	A collection of rights allowing an entity to undertake certain activities. Easements acquired by Endeavour Energy are created by a lease, a transfer granting easement, an instrument registered with a deposited plan, or by acquisition.
EIS	Environmental Impact Statement
EMF	Electric and Magnetic Fields: are part of the natural environment and are also produced wherever electricity or electrical equipment is in use. Power lines, electrical wiring, household appliances and electrical equipment all produce EMF. The electric field is proportional to the voltage and remains constant. The magnetic field is proportional to the load and varies continually depending on the time of day, week and year. As electric fields are naturally shielded, the electricity network generally contributes very little to the electrical fields measured inside a home or office building. For this reason most discussion on EMF usually focuses on magnetic fields.
ENA	Energy Networks Association
ENM	Excavated natural material
Environmental Impact	Any change in the environment whether adverse or beneficial, wholly or partially resulting from organisation activities, products or services
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW.
EP&A Regulations	*Environmental Planning and Assessment Regulation 2000*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ES Act	*Electricity Supply Act 1995*
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically sustainable development: is development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.
Feeder	A set of electric conductors that distribute electricity
GHG	Greenhouse Gas
GSW	General Solid Waste
ha	hectare
Hz	hertz
ICNG	*Interim Construction Noise Guideline (DECC, 2009)*
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
km	Kilometre

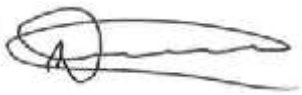
Term	Meaning
kV	Kilovolts
LEP	Local Environmental Plan: a type of EPI made under Part 3 of the EP&A Act.
LGA	Local Government Area
Local Heritage Item	A place, building, work, relic, tree, archaeological site or Aboriginal object that is identified as a heritage item (or by a similar description) in a local or regional environmental plan; or an item of local heritage significance, as defined by the *Heritage Act 1977*, that is the subject of an interim heritage order in force under that Act or is listed as an item of local heritage significance in the State Heritage Inventory under that Act
m	metre
mG	milligaus
MVA	Mega volt ampere
MNES	Matter of National Environmental Significance
NHMRC	National Health and Medical Research Council
Non-Aboriginal Heritage	Any deposit, object or material evidence which relates to the settlement of NSW, not being Aboriginal settlement, with local or state significance under the *Heritage Act 1977*
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service (OEH)
OEH	Office of Environment and Heritage
PAP	Principal's Authorised Person
PBP	Planning for Bushfire Protection
POEO Act	*Protection of the Environment Operations Act 1997*
REF	Review of Environmental Factors
RFS	Rural Fire Service
RMS	Roads and Maritime Services
Road	Includes the airspace above the surface of the road, the soil beneath the surface of the road and any bridge, tunnel, causeway, road-ferry, ford or other work or structure forming part of the road. The road reserve is inclusive of the carriageway and the footpath.
Roadwork	Includes any kind of work, building or structure (such as roadway, footway, bridge, tunnel, road-ferry, rest area, transit way station or service centre or rail infrastructure) that is constructed, installed or relocated in the vicinity of a road for the purpose of facilitating the use of the road as a road, the regulation of traffic on the road or the carriage of utility services across the road, but does not include a traffic control facility. Carry out road work includes any activity in connection with the construction, erection, installation, maintenance, repair, removal or replacement of a road work.
SEPP	State Environmental Planning Policy: a type of EIP made under Part 3 of the EP&A Act
SEPP - Infrastructure	State Environmental Planning Policy (Infrastructure) 2007
SDI	Substation Design Instruction
SER	Summary Environmental Report
SIS	Species Impact Statement
SRGC	Sydney Regional Growth Centres
TCP	Traffic Control Plan
The Code	The Code of Practice for Authorised Network Operators (ANO) designed to regulate the ANOs decision making process as to the appropriate level of environmental assessment required relative to the impacts of a proposed project.
TMP	Traffic Management Plan
TSC Act	*Threatened Species Conservation Act 1995*
UGOH	Underground to overhead construction- a structure which facilitates the transition of underground cabling to aerial (overhead) construction
V	volt: the unit of measure for voltage which is the pressure that electricity is pushed through the wire
VENM	Virgin excavated natural material
WMP	Waste Management Plan
ZS	Zone Substation

Document Control

Revision	Prepared by and Company Name	Date	Reviewed by and Company Name	Comments
V1	Ouerdia Kessal Endeavour Energy	3/07/2018	Patricia Woodbury Endeavour Energy	For review
V2	Ouerdia Kessal Endeavour Energy	10/07/2018	Danny Asvestas	For approval

Document Approval

To the best of the knowledge of the below signatories, this REF has been prepared to be neither false nor misleading and is in accordance with The Code of practice for Authorised Network Operators approved under clause 244K of the Environmental Planning and Assessment Regulation 2000.

Prepared by	Ouerdia Kessal
Signed	
Date	10/07/2018
Title	Environmental Specialist
Checked by	Pat Woodbury
Signed	
Date	10/07/2018
Title	Network Environmental Assessment Manager
Approved By	Danny Asvestas
Signed	
Date	10/07/2018
Title	Manager Asset Standards and Design

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1 INTRODUCTION

This Review of Environmental Factors (REF) provides background information regarding the need for the project and the head works required for the construction of a new control building with new indoor 11kV switchgear, at Sussex Inlet Zone Substation (ZS).

This REF assesses the environmental impacts associated with the renewal of the substation and details the mitigating measures to be incorporated into the design and construction of the new control building and indoor 11kV switchgear, to minimise environmental impacts.

Upon renewal, Sussex Inlet ZS will provide a more reliable electricity supply to customers in the rural and coastal/holiday townships of Sussex Inlet, Swanhaven, Berrara, Wandandian and Bewong.

2 BACKGROUND AND LOCATION

2.1 Background

Sussex Inlet ZS is a rural 33kV/11kV zone substation fed from West Tomerong Transmission Substation via Tomerong ZS. The substation is located in The Springs Road outside of the township of Sussex Inlet and supplies electricity to customers in the rural and coastal/holiday townships of Sussex Inlet, Swanhaven, Berrara, Wandandian and Bewong. The substation is located in an industrial/commercial area; however, currently there is a proposed residential development opposite the substation, on the Springs Road.

The substation is currently equipped with two 33/11kV 15MVA power transformers which were manufactured by Tyree in 1971. These transformers where originally commissioned at Nowra ZS before being moved to Sussex Inlet ZS to replace two 5MVA transformers in 2012 and 2013.

There are two Areva OX36 circuit breakers in the 33kV transformer bays which were manufactured in 2005 and replaced older AEI bulk oil breakers. The substation also includes an outdoor 11kV switchyard which contains four Nulec reclosers which were manufactured between 2001 and 2004 and replaced older Standard Waygood and Westinghouse bulk-oil circuit breakers.

The substation was established in 1968 and therefore, apart from the recently added assets, is 50 years in age.

The need to replace the original power transformers was first identified in a Statement of Asset Need (SAN) prepared by Asset Standards and Design in May 2011. The SAN also recommended the replacement of the 11kV busbar and support structures at Sussex Inlet ZS due to corrosion damage. However, it was resolved at the time that the need to replace the transformers was more urgent due to their deteriorating condition, whilst the 11kV busbars required a lengthier assessment for the most appropriate solution. In October 2015, the 15MVA transformers were moved from Nowra ZS and installed at Sussex Inlet ZS.

Since the initial asset assessment, the condition of the current 11kV busbar and equipment at Sussex Inlet ZS has deteriorated to the point where a second stage of the works was required. The overall staging of the project, therefore, includes the following items:

Stage 1: Replacement of the old 5MVA transformers with 15MVA transformers (decommissioned and sourced from Nowra ZS). This stage of works was completed in October 2015 and was assessed under a separate REF.

Stage 2: Construction of a new control building with new indoor 11kV switchgear. This stage of works is subject to this REF.

2.2 Location of the Zone Substation

Sussex Inlet is a town in the South Coast region of New South Wales, approximately 120Km south of Wollongong. The town lies on the west bank of the Sussex Inlet waterway, which divides New South Wales from the Jervis Bay Territory. The town lies within the City of Shoalhaven LGA (Refer to Figure 1).

The town of Sussex Inlet is located on the west bank of Sussex Inlet, a narrow inlet connecting Wreck Bay to the waterbody of St Georges Basin. The east bank of Sussex Inlet is the Booderee National Park.
Jervis Bay Airport is located about 10 kilometres east of Sussex Inlet (Refer to Figure 2).

Sussex Inlet ZS is located on The Spring Road, south of Sussex Inlet Road, occupying land under Lot 3 DP 536099 (Refer to Figure 3).

Figure 1: Location and regional context of Sussex Inlet ZS, within the Sydney Basin *(Base Map: Six Maps)*

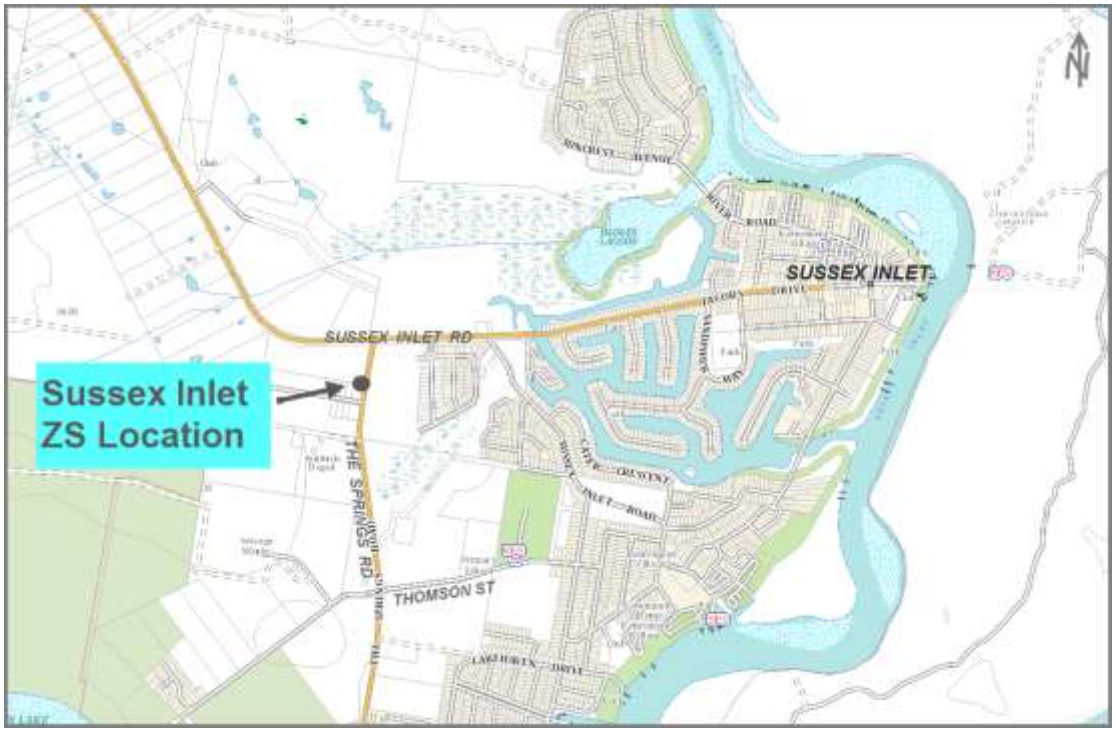

Figure 2: Location and local context of Sussex Inlet ZS (*Base Map: Six Maps*)

Figure 3: Location and Lot details for the existing Sussex Inlet ZS (*Base Map: Six Maps*)

2.3 Existing Environment

Sussex Inlet ZS is located in a commercial and light industrial area with commercial premises adjoining the site to the north, south and west. The nearest existing residence to the site is on the northern side of Sussex Inlet Road, approximately 300 metres to the north. Opposite the site to the east is vacant land, which is currently proposed to be developed as a residential lot (Figure 4).

Figure 4: Location of the existing Sussex Inlet ZS (*Base Map: NearMap)*

The substation site is well vegetated. Northern Coastal Sands Shrub/Fern Forest vegetation community is typical of vegetation in the surrounding area.

Coastal Sand Forest is a coastal eucalypt forest with a mixed understorey of sclerophyll shrubs, ferns, grasses and forbs.

Apart from a few shrubs situated within the substation site, the immediate vicinity is cleared of vegetation.

Refer to Figures 5 to 9 for a view of the existing environment.

Figure 5: An aerial view of Sussex Inlet ZS surrounding environment - Vegetation community predominated by Coastal Sand Forest type (*Base Map: Google Maps*)

Figure 6: A side view of the existing Sussex Inlet ZS, looking from Flood St

Figure 7: A side view of the existing Sussex Inlet ZS, looking from The Spring Rd

Figure 8: Adjacent land to Sussex Inlet ZS

Figure 9: View of Sussex Inlet ZS surrounding environment

3 PROJECT JUSTIFICATION

Endeavour Energy has identified the Sussex Inlet ZS 11kV busbar and associated support structures have corrosion damage and have reached the end of their service. Furthermore, the 11kV busbar is equipped with a single bus-section isolator which cannot be maintained without a complete outage of the substation, and has sub-standard clearances which pose a hazard for operation and maintenance workers. The design and condition of this equipment is a safety issue and will be replaced as part of this project.

This project definition covers the installation of a new control building to house new control panels and 11kV switchgear. The existing 11kV outdoor equipment will be demolished following the installation of the new indoor switchgear.

Figure 10: Corrosion damage on the ZS's support structures

Figure 11: Cable pit subject to flooding

Figure 12: Control building with damaged roof

4 PROJECT DESIGN REQUIREMENTS

Based on the identified network constraints and the context within which the project is to be carried out, the following factors have been identified as key to meeting the project purpose. All of these factors need to be addressed for each identified option, and the ideal project outcome is intended to satisfy all of these requirements:

- Supply Security – ensuring that customers receive the supply security level detailed in Endeavour Energy planning standards.
- Financial / Economic Feasibility – to ensure that requirements of the NER RIT-D process are met.
- Demand Growth – to ensure that the preferred solution continues to be appropriate into the future, given forecast levels of demand growth.
- Long Term Network Strategy – the solution must support and be supported by the long-term plan for network development in the South Coast Area.
- Environmental Feasibility – to ensure that the project does not result in a worse environmental impact than currently exists. Where this is not possible, the project must aim to minimise the additional environmental impact.
- Technical Suitability – all relevant design standards must be met.
- Network Utilisation – the solution proposed makes the best use of the existing capacity of the network.
- Network Safety – the proposed solution does not present any future safety issues for operations and maintenance personnel or members of the public. It addresses any identified current safety concerns.

5 OPTIONS

A number of options were considered and discussed by Endeavour Energy's Asset Strategy and Planning and Asset Standards and Design Branches before a preferred option was eventually selected for this project.

The Sussex Inlet renewal works (subject to this REF), constitutes Stage 2 of the project. Stage 1 having been finalised with the replacement of the old 5MVA transformers with 15MVA transformers (decommissioned and sourced from Nowra ZS) in 2015, the construction of a new control building with new indoor 11kV switchgear will be assessed as part of the current report.

Following are the options which were considered as part of Stage 2 of the project:

5.1 Do Nothing

This option will not satisfy the renewal needs of the 11kV busbar and control building and will give no assurance the risks presented by Sussex Inlet ZS are as low as reasonably practicable (ALARP). This option was therefore not considered further.

5.2 Non Network Options

The main equipment proposed for renewal at Sussex Inlet ZS is the 11kV busbar and control building. This equipment is required at the substation as long as there is a need for the substation itself at the existing site. The current peak demand on the substation is 9.7MVA and therefore a permanent reduction of 9.7MVA will be the required to be provided by non-network solutions to allow the substation to be decommissioned.

The project's business case conducted an assessment of the level of demand proposed for reduction in the Sussex Inlet ZS supply area, by implementing demand management strategies such as reducing swimming pool and air-conditioning loads during peak demand periods. The assessment indicated that the maximum potential demand reduction available was 1.4MVA in the Sussex Inlet ZS supply area.

Therefore, there is insufficient permanent demand reduction available in the Sussex Inlet ZS supply area to meet the level required and non-network options are considered not feasible for this site.

5.3 Network Options – Renewal Strategies

The network options available for candidate assets for renewal at Sussex Inlet ZS include:

- Refurbishment of the existing 11kV busbar;
- Construction of a new outdoor 11kV busbar;
- Construction of a new control building with indoor 11kV switchgear; and
- Construction of a new control building with indoor 33kV and 11kV switchgear.

5.3.1 Refurbishment of the existing 11kV Busbar

This option proposes to maintain the existing 11kV switchyard arrangement and to address the bus-isolator issues by installing a bus-section circuit breaker bay cabled to the ends of the two bus sections, making the existing bus-section isolator redundant.

The 11kV transformer bays could also be modified to include circuit breakers. This will allow all equipment in the arrangement to be effectively maintained and provide operational flexibility to run the substation with a solid 11kV busbar as required.

The corrosion of the busbar support structures would be repaired by cutting out the corroded sections and welding in new sections and by paint treatment.

The 11kV/415V auxiliary transformer would also be replaced.

Whilst this option is technically feasible, it is a short-term patch-up approach which does not address the safety risks presented by the poor clearances and congested design of the existing 11kV busbar arrangement. Accordingly, this option does not reduce the risks posed by the substation to ALARP. Therefore this option is not considered to be sufficiently adequate to warrant further assessment.

5.3.2 Construction of a new outdoor 11kV Busbar

This option includes construction of a new 11kV busbar in the switchyard adjacent the existing 11kV busbar.

The new design would include a bus-section circuit breaker, two transformer breakers and four feeder breakers. However, a new 11kV busbar with appropriate bay clearances to current standards will consume a large portion of the available space in the substation yard and will constrain any future augmentation of the substation. Additionally, this option does not provide for 33kV circuit breaker failure protection.

A review of this option concluded non feasibility due to space constraints in the substation switchyard; however, this option addresses the principal risks identified at the substation and is considered appropriate for further assessment.

5.3.3 Construction of a new control building with indoor 11kV switchgear

This option proposes to replace the existing outdoor 11kV arrangement with a new indoor switchboard to be hosted within a control building, which will also include new protection, control and auxiliary equipment.

This option also does not provide 33kV circuit breaker failure protection due to space constraints in the substation switchyard; however it will address the 11kV busbar risks and the existing control building risks and is therefore considered appropriate for further assessment.

5.3.4 Construction of a new control building with indoor 33kV and 11kV switchgear

This option proposes to replace the existing outdoor 33kV and 11kV arrangements with new indoor 33kV and 11kV switchboards, in a new control building which will also include new protection and control and auxiliary equipment.

Additionally, this option will provide for the future needs of the substation which are likely to involve a second incoming 33kV feeder. This will require a 33kV busbar arrangement with two transformer breakers, one bus-section breaker, one feeder breaker and provision for a further 33kV feeder breaker.

The 33kV busbar will not be effectively utilised until the second feeder breaker is installed in the future. In the meantime, the substation will remain radially fed.

This option has the potential to address all of the risks identified at the substation and provide for 33kV circuit breaker failure protection, but is likely to be significantly more costly than the new 11KV control building option.

This option provides additional benefits in converting the 33kV switchgear to an indoor arrangement and therefore will be further assessed against the other viable options.

6 ASSESSMENT OF RENEWAL STRATEGIES OPTIONS

In order to determine the preferred option, the three identified renewal strategy options candidate for further valuation have been assessed against a number of key risk indicators as well as present cost and value of benefits they provide versus the risk-costs they address. The key risk indicators, based on the Endeavour Energy's risk assessment procedure, Board Policy 2.0.5, include:

- Safety impact;
- Environmental impact;
- Construction risk;
- Operating and maintenance requirements;
- Reliability and supply security impact;
- Sustainability impact.

Following are the three identified renewal strategy options candidate for further assessment:

6.1.1 **Option 1** – Construction of a new outdoor 11kV busbar

- This option retains an outdoor arrangement with open air-insulated busbars and equipment. Additionally, the construction of the 11kV circuit breaker bays will be close to the existing live 11kV switchyard, which presents potential risks for workers. Therefore this option scores a poor rating for the safety impact indicator.

- The retention of the outdoor 11kV switchyard scores poorly due to its unappealing visual impact compared to the new indoor arrangements provided by *Options 2 and 3*.

- The 11kV feeder and bus-section breakers will be built clear of the live equipment. However the transformer breakers will be built near the existing transformers and 11kV yard requiring restrictive work methods to ensure safety. Furthermore, there will be space constraints in this option due to the clearance requirements for the new 11kV bays and the limited availability of space on the site. In addition, the existing fire hydrant must be relocated. This will lead to accessibility issues with a subsequent risk of delays to the project

- The retention of an outdoor 11kV switchyard presents an ongoing maintenance cost (and supply reliability) risk. Whilst the existing corrosion issues will be addressed in the short term, the new equipment will experience greater corrosion damage due to the outdoor arrangement.
- The retention of an outdoor 11kV switchyard will pose a greater risk of unplanned outages in the event of storm damage, lightning strike, birds and possum intrusion, as well as vandalism. There is also the risk of an inadvertent trip of the 11kV busbar due to work taking place in close proximity to the live busbars.

- There will only be sufficient space around the new 11kV switchyard for two extra feeder circuit breakers. Any more circuit breakers will have to be installed in the vicinity of the existing 11kV switchyard. These bays will need to be

cabled from the switchyard. This would compromise space requirement for maintenance activities on the transformers and 33kV equipment in the future. Therefore, this option scores poorly for the sustainability indicator.

6.1.2 **Option 2:** Construction of a new control building with indoor 11kV switchgear

- This option includes a new indoor 11kV solution with fully enclosed and arc-fault contained switchgear with the Underground to Overhead (UGOH) connections to the power transformers and the 33kV switchgear as the exposed live parts. This option will also provide improved design of access ways and avoidance of trip hazards which will provide a safer work environment as opposed to Option 1.

- This option provides no connections to the existing live equipment, except during the final change-over activity. Additionally, there is sufficient space to construct the new control building, clear of the existing live equipment, and allowing for a single stage works. Therefore, this option presents a much lower construction risk than Option 1.

- As part of Option 2, the removal of the existing outdoor switchyard and replacing it with new indoor equipment will require minimal maintenance works. Therefore, this option presents a minimal risk in terms of operating and maintenance costs.

- Options 2 involve the construction of the indoor 11kV substation in a clear area, which significantly reduces the risk of an inadvertent trip of the busbar during the construction works. Furthermore, indoor equipment will reduce the risk of loss of supply due to equipment failure when compared to the outdoor 11kV equipment in Option 1.

- Option 2 will allow the renewal of the aged assets within the substation and provide sufficient space for future switchgear extensions and transformer replacements if required. Accordingly, this option presents a low risk in terms of the sustainability indicator.

- Generally, indoor assets provide a more appealing visual impact compared to outdoor asset arrangement (Option 1).

6.1.3 **Option 3:** Construction of a new control building with indoor 33kV and 11kV switchgear

- Similar to Option 2, Option 3 includes a new indoor 11kV solution with fully enclosed and arc-fault contained switchgear with the Underground to Overhead (UGOH) connections to the power transformers and the 33kV switchgear as the exposed live parts. This option will also provide improved design of access ways and avoidance of trip hazards which will provide a safer work environment, as opposed to Option 1.

- Option 3 also involves the construction of the indoor 11kV substation in a clear area, which significantly reduces the risk of an inadvertent trip of the busbar during the construction works. Furthermore, indoor equipment will reduce the risk of loss of supply due to equipment failure when compared to the outdoor 11kV equipment in Option 1. In addition, this option minimises this risk further by including indoor 33kV switchgear.

- This option has the advantage of the 33kV switchgear being converted to an indoor arrangement. However, there is minimal 33kV switchgear in the existing 33kV arrangement which is retained in Option 2. Therefore, this option will only provide a minor risk improvement over Option 2.

- Similar to Option 2, this option provides no connections to the existing live equipment, except during the final change-over activity. Additionally, there is sufficient space to construct the new control building, clear of the existing live equipment, and allowing for a single stage works. Therefore, this option presents a much lower construction risk than Option 1.

- Option 3 will also allow the renewal of the aged assets within the substation and provide sufficient space for future switchgear extensions and transformer replacements if required. Accordingly, this option presents a low risk in terms of the sustainability indicator.

- Option 3 will provide 33kV circuit breaker fail protection. This will reduce the risk of a fire in a power transformer due an uncleared high impedance fault. Option 3 also replaces the 33kV outdoor equipment including the existing 33kV circuit breakers which are at risk of developing SF6 leak issues due to their type and therefore scores the most favourably for this indicator.

6.2 Preferred Option

6.2.1 Summary of Risks

Based on the above analysis Table 1 provides a visual representation of the risks presented by each of the ptions.

The table indicates that Option 2 and Option 3 provide improvements to safety, environmental impact, construction feasibility and customer reliability as well as a significant improvement in sustainability, compared to Option 1.

The operating and maintenance risk is higher in Option 1 compared to Option 2; however, they are both considered of moderate risk while Option 3 scores a low risk for the same indicator.

Accordingly, Option 3, which includes construction of a new control building with a new 33kV and 11kV switchgear, is the preferred redevelopment approach from a risk perspective.

Table 1: Sussex inlet ZS qualitative Risk Assessment

Option	Option detail	Safety	Environment	Construction	Operating & maintenance	Reliability	Sustainability
1	New 11kV busbar						
2	New 11kV control building						
3	New indoor 33kV substation						
Code	Extreme risk	High risk	Moderate risk	Low risk			

6.2.2 Option Cost Estimate

Following is a summary of cost estimate for each listed option:

1. **Option 1:** Construction of a new outdoor 11kV busbar.
   Option Cost Estimate: $5,586,000

2. **Option 2:** Construction of a new control building with indoor 11kV switchgear:
   Option Cost Estimate: $5,791,000

3. **Option 3:** Construction of a new control building with indoor 33kV and 11kV switchgear.
   Option Cost Estimate: $7,983,000

6.2.3 Conclusion

As shown in the summary of risks as well as cost estimate for each option, Option 2 provides a significant reduction in risk compared to Option 1, for a modest increase in initial capital cost.

Furthermore, Option 2 provides the lowest cost estimate of the three options when the safety risk cost of the outdoor 11kV assets in the substation is taken into account.

Option 3 provides a similar reduction in risk as Option 2, but at a higher initial capital cost and a higher overall present cost.

Therefore, **Option 2** is recommended as the preferred approach to address the risks and renewal needs at Sussex Inlet ZS.

7 CONSULTATION

As stated previously, Stage 1 works in the Sussex Inlet ZS, including the replacement of two transformers, were carried out and completed in 2015. Stage 2 of the works is the subject of this REF.

Consultation for the renewal of Sussex Inlet ZS (Stage 2) has been undertaken as part of the draft REF, in accordance with the requirements of the Infrastructure SEPP, Part 5 of the EP&A Act and the Code of Practice for Authorised Network Operators (The Code), and a letter outlining the Proposal (also attached in Appendix 7) was sent to the following stakeholders:

- Shoalhaven City Council.
- Sussex Rise Developers'.
- Local MP - The Hon Shelly Hancock.
- Adjacent businesses, namely:
    - Ocean and Earth
    - Bosun Wholesellers PTY Ltd
    - NRMA Insurance
- Resident at property No 1023 Sussex Inlet Road, Sussex Inlet.

A copy of the draft REF was provided to the relevant government authorities and also published on Endeavour Energy's Corporate Website.

An advertisement was also placed in the local newspaper – Sussex Inletter, in their weekly edition dated 23 may 2018 (a copy of the newspaper page in attached in Appendix 7).

All interested stakeholders were invited to submit any comments on the Proposal via a written submission within a period of 30 business days, by 29 June 2018.

The due date of 29 June 2018 for potential submissions has been reached with no comments or submissions on the Proposal by any of the aforementioned stakeholders.

8 PROJECT DESCRIPTION

8.1 Project Scope

Following is a summary of activities proposed to be undertaken at Sussex Inlet ZS:

(A more detailed project description is included in the Project Definition prepared by Asset Standards & Design, attached in Appendix 5).

- Construction of a new 11kV control building with new indoor 11kV switchgear, auxiliaries and protection and control equipment, with cable basement and loading dock and amenities.
- Installation of associated underground cable conduits.
- Installation of a new 11kV auxiliary padmount transformer.
- Replacement of the 33kV support structures in the transformer bunds.
- Installation of firewalls between transformer bays.
- Other minor refurbishment works in the substation (such as raising Transformer No. 1 control box, and replacing corroded operator earth mats, 33kV low busbar barrier, and faded safety signage).
- Demolition and removal of the existing 11kV busbar and associated switch gear.
- Demolition and removal of the existing control building including existing protection and control and auxiliary equipment.

- Constructing all related site-works including driveway pavements, retaining walls, gravel yard surfacing and security fencing.
- Installation of building and site stormwater drainage.

Note: A conceptual general arrangement of the proposed works is also attached in Appendix 1.

8.2 Architectural Building Design

Endeavour Energy has engaged Brewster Murray Pty Ltd to deliver the conceptual and detail control building architectural design. The proposed conceptual design is anticipated to comply with the Code of Practice for Authorised Network Operators. (Refer to Appendix 1 for a detailed Project Concept Design).

8.2.1 Substation Access

The site access will be designed to allow unrestricted 24-hour all-weather access for all vehicles and staff who may be required to carry out maintenance (including emergency repairs), and operation of the substation.

8.2.2 Fencing

The existing security fence will be modified for Sussex Inlet ZS to prevent access to all unauthorised persons. The fence will be designed so that it cannot be scaled with a ladder or other devices or tools and cannot readily be cut through with hand tools.

Fences will be designed to allow sight through the switchyard to improve security and safety for staff.

Figure 13: Proposed Sussex Inlet ZS new layout

9 ENVIRONMENTAL LEGISLATION

9.1 Environmental Planning

9.1.1 Status of Endeavour Energy under the Code of Practice for Authorised Network Operators (ANO) and the Environmental Planning and Assessment Act, 1979

The Code for ANOs and the EP& A Act provides the statutory planning context for environmental assessment and approval of works to be undertaken by an ANO.

The EP&A Act defines two approval processes depending on whether a proposal, or components of it, is considered an "Activity" (addressed under Part 5 of the EP&A Act) or a "Development" (addressed under Part 4 of the EP&A Act).

The Code requires an ANO to classify its proposals into one of six possible assessment classes. The Code applies to Class 3, 4, 5 and 6 proposals, only.

Class 3:- requires the preparation of a Summary Environmental Report (SER) refers to projects which are expected on a reasonable basis to be minor and neither extensive or complex.

Class 4:- requires the preparation of an REF and refers to projects which are expected on a reasonable basis to have impacts which go beyond minor, can be extensive and/or complex and at the discretion of the ANO be a project for which it is deemed appropriate to prepare, such as a project which may generate considerable public interest.

Class 5:- refers to projects as defined in Class 4 above, but also require the preparation of a Species Impact Statement (SIS)

Class 6:- refers to projects which are "likely to significantly affect the environment" and therefore an EIS is required.

On 14 June 2017 Endeavour Energy was transacted and became an ANO. This means that Endeavour Energy is now a privately managed network business in accordance with the *Electricity Networks Assets (Authorised Transactions) Act 2015,* and is subject to "*The Code of Practice for Authorised Network Operators"* gazetted in September 2015 under Clause 244k of the Environmental Planning and Assessment Regulation, 2000 (EP&A Regulation). The Code is deemed to be in force until it is revoked or varied in accordance with the EP&A Regulation.

The NSW Government has prescribed the ANOs as a "prescribed Determining Authorities" for the purposes of Part 5 Section 111A of the EP&A Act and the definition of "public authority" under section 4(1) of that Act.

This prescription allows an ANO to be a Part 5 Determining Authority for the purposes of an electricity transmission or distribution network.

While Part 5 Activities do not require development consent under Part 4 of the EP&A Act, consideration of an Activity's environmental impact is required under Section 111 of that Act. This is accompanied by Section 112, which requires an EIS to be prepared if an Activity is likely to likely to significantly affect the environment.

The Authorised Transactions Act inserted Division 9 into Part 14 of the EP&A Regulation. Clause 244K in Division 9 provides that The Code may make provision for or with respect to the exercise by an ANO of its functions under Part 5 Section 111 of the EP&A Act in respect of *"an activity for the purposes of a transacted electricity transmission or distribution network".* These words are defined non- exhaustively in Clause 244J as including:-

…….activities (within the meaning of Part 5 of the EP&A Act), for any one or more of the following purposes:-

a) Development for the purposes of the construction, maintenance or operation of a transacted electricity transmission or distribution network

b) Geotechnical investigations relating to a transacted electricity transmission or distribution network

c) Environmental management and pollution control relating to a transacted electricity transmission or distribution network

d) Access for the purposes of the construction, maintenance or operation of a transacted electricity transmission or distribution network

e) Temporary construction sites and storage areas, including batching plants, the storage of plant and equipment and the stockpiling of excavated material.

As a Determining Authority, an ANO can assess and self-determine Activities that are not likely to significantly affect the environment and are conducted for and on behalf of the ANO for the purposes of electricity transmission or distribution.

By virtue of an ANO's status under the Infrastructure SEPP, certain of its activities will be subject to Part 3 Division 5 Subdivision 1- *Electricity Transmission or Distribution Networks* - of the Infrastructure SEPP for the purposes of development connected with electricity transmission or distribution.

These are outlined below:-

Under "Clause 41 Development permitted without consent"

(1) "Development for the purpose of an electricity transmission or distribution network may be carried out by or on behalf of an electricity supply authority or public authority without consent on any land….." excluding land reserved under the National Parks and Wildlife Act.

The Infrastructure SEPP's definition of an "electricity transmission or distribution network" includes the following components:

(a) Above or below ground electricity transmission or distribution lines (and related bridges, cables, conductors, conduits, poles, towers, trenches, tunnels, ventilation and access structures)

(b) Above or below ground electricity kiosks or electricity substations, feeder pillars or transformer housing, substation yards or substation buildings……..

The aim of this Policy is to facilitate the effective delivery of infrastructure across the State through increased regulatory certainty, improved efficiency and flexibility in the location of infrastructure and service facilities, while still providing adequate stakeholder consultation.

Subclause 8(1) of the Infrastructure SEPP provides that the SEPP prevails over all other Environmental Planning Instruments including Local Environmental Plans (LEPs) and SEPPs except in the case where clause 8(2) provides that the following SEPPs override all the requirements of the Infrastructure SEPP to the extent of any inconsistency:

- *State Environmental Planning Policy No. 14- Coastal Wetlands (SEPP 14)*
- *State Environmental Planning Policy No. 26 – Littoral Rainforests (SEPP 26) or*
- *State Environmental Planning Policy (Major Development) 2005 – Major Development SEPP.*

It should be noted that none of the above SEPPs apply to this project.

Since this project can be classified as an "Activity" under Part 5, Endeavour Energy therefore will not be required to submit a Development Application to Shoalhaven City Council (since Development Applications are assessed under Part 4 of the EP&A Act). However, Shoalhaven City Council will be given written notice of the intention to carry out the proposed works and Endeavour Energy will consider any response received from the Council.

The works at the Sussex Inlet ZS will be conducted within the existing substation perimeter; therefore there is no requirement for any further assessment of impacts to threatened species, populations or endangered ecological communities listed under the TSC Act 1995.

In view of the above, this project is being assessed as a **Class 4 Proposal** under the Code.

Since this project is classified as an activity in accordance with Part 5 of the EP&A Act 1979 it must also be assessed under Clause 228(2) of the Environmental Planning and Assessment Regulation 2000.

Under the Energy Services Corporation Act, 1995 Endeavour Energy is also required '*to protect the environment by conducting its operations in compliance with the principles of ecologically sustainable development'.*

Clause 228(2) and ESD factors which are required to be considered are listed below.

There would appear to be no other planning instruments or legislation that would restrict the activity in this location.

9.2 Environment Protection and Biodiversity Conservation Act, 1999. (EPBC Act)

The EPBC outlines the Commonwealth Government's role in regards to environmental assessment, biodiversity conservation, the management of protected species, populations and communities and heritage items.

The EPBC Act lists nine matters of national environmental significance (MNES) which must be considered when assessing the impacts of a proposal. An assessment of how this project may impact on these matters is shown in the Table 2 below.

Table 2: Consideration of MNES

MNES	Comment	Likely Impact
World Heritage Property	No world heritage properties would be potentially affected by this proposal	Nil
National Heritage Places	No national heritage places would be potentially affected by this proposal	Nil
Wetlands of International Importance	No wetlands of international importance would be potentially affected by this proposal	Nil
Commonwealth listed Threatened Species and Ecological Communities	No threatened species, populations or ecological communities listed within Commonwealth (or State) legislation would be potentially affected by this proposal	Nil
Commonwealth Listed Migratory Species	No migratory species would be potentially affected by this proposal	Nil
Nuclear Action	This proposal would not result in any nuclear action nor would it require any nuclear action for it to be undertaken	Nil
Commonwealth Marine Areas	No Commonwealth Marine Areas would be potentially affected by this proposal	Nil
Great Barrier Reef Marine Park	The Great Barrier Reef Marine Park would not be affected by this proposal because the Park is not located within Endeavour Energy's Franchise Area	Nil
Water resources in relation to coal seam gas development and large coal mining development	Water resources would not be affected by this proposal because it does not involve coal seam gas or coal mining development	Nil

Note: A detailed EPBC Act Protected Matters Report for the substation site within 1Km buffer is attached in Appendix 4.

9.3 Electricity Supply Act, 1995 (ES Act)

The ES Act defines Endeavour Energy's licencing requirements and provides a framework for the development and maintenance of electrical infrastructure. In summary, it allows Endeavour Energy to trim and remove trees, carry out works on public roads and acquire land. This Act also requires that works (other than routine repairs or maintenance works) must not be undertaken unless a minimum of 40 days' notice is supplied to the relevant local council. Any submission received must be considered by Endeavour Energy.

9.4 Protection of the Environment Operations Act, 1997 (POEO Act)

The Protection of the Environment Operations Act 1997 (POEO Act) provides a framework for the licensing of certain activities and is administered by the Office of Environment and Heritage (OEH) (Formerly NSW EPA). Under this Act, the construction and operation of the new substation must be conducted in such a manner that they:

- do not pollute the environment;
- any waste generated must be classified, handled, transported and disposed appropriately; and
- environmental incidents involving actual or potential harm to human health or the environment must be reported to OEH.

9.5 Threatened Species Conservation Act, 1995 (TSC Act)

Section 111(4) of the EP&A Act requires that assessment of an activity must consider its impact on threatened species, populations, ecological communities or their habitats. Schedules 1 and 2 of the TSC Act lists species, populations and ecological communities of native flora and fauna considered to be threatened in NSW. The TSC Act also lists a number of factors to be taken into account in deciding whether this proposal is likely to significantly affect the environment. If an activity potentially affects any flora or fauna species, population or ecological community listed by the TSC Act, a test of significance is required. The test of significance, referred to in s. 94 (2) of the TSC Act and section 5A of the EP&A Act, determines whether the proposal is likely to have a significant impact. If a significant impact is determined, a SIS is required and a Class 5 environmental assessment under The Code is required to be conducted.

The works at the Sussex Inlet ZS will be conducted within the existing substation perimeter; therefore there is no requirement for any further assessment of impacts to threatened species, populations or endangered ecological communities listed under the TSC Act 1995.

9.6 Summary of Legislative Requirements

Additional legislation which also applies to Endeavour Energy's Franchise area and its relevance was considered in relation to this proposal, namely:

NSW
Coastal Protection Act, 1979
Contaminated Land Management Act, 1997
Crown Lands Act, 1989
Fisheries Management Act, 1994
Forestry Act, 1916
Heritage Act, 1977
Mine Subsidence Compensation Act, 1961
National Greenhouse and Energy Reporting Act, 2007
National Parks and Wildlife Act, 1974
Noxious Weeds Act, 1993
Roads Act, 1993
Rural Fires Act, 1997
Sydney Water Catchment Management Act, 1998
Water Act, 1912
Water Management Act, 2000
Wilderness Act, 1987
Commonwealth
Native Title Act, 1993.

Legislative requirements specific to this proposal, are summarised in Table 3 below.

Table 3: **Summary of legislative requirements pertinent to the construction, maintenance and operation of this proposal:**

Legislation	Authority	Responsibility	Requirement	Comment
Contaminated Land Management Act 1997	OEH	Principal Contractor/Endeavour Energy	**Notification-** under s60 by a person whose activities have contaminated land or a landowner whose land has been contaminated is required to notify OEH when they become aware of the contamination	If contamination is discovered the duty to report would be determined
EP & A Regulation	Endeavour Energy	Endeavour Energy	**Consideration-** under Cl228 (2) of the factors to take into account regarding the impact of an activity on the environment	Refer Clause 228(2) considerations directly below
ES Act	Local Council	Endeavour Energy	**Notification-** under s45, of 40 days'	Notified as part of REF

Legislation	Authority	Responsibility	Requirement	Comment
			notice for proposed electricity works	notification process. Refer Section 7 – Consultation.
Heritage Act 1977	OEH / Heritage Branch	Endeavour Energy/Principal Contractor	**Consideration-** under s139 as to whether a permit to excavate or disturb land is required.	No Heritage items impact by works. Refer Section 11.5 - Heritage and Archaeology.
Infrastructure SEPP	Local Council	Endeavour Energy	**Notification-** under s13-15, 21 days' notice of substantial impact on council related infrastructure and local heritage or works in flood liable land that will change flood patterns other than to a minor extent	Notified as part of REF notification process. Refer Section 7 – Consultation.
Infrastructure SEPP	Local Council/ adjoining land occupiers	Endeavour Energy	**Notification-** under s42 of 21 days' notice for works involving new or existing substations	Notified as part of REF notification process. Refer Section 7 – Consultation.
National Greenhouse and Energy Reporting Act 2007	Clean Energy Regulator	Endeavour Energy	**Reporting-** under s19 a registered corporation is required to report information on energy production, energy consumption, and the amount of greenhouse gas emissions for the facilities under their operational control on an annual basis by 31 October following the financial year for which they are reporting	Reporting will be undertaken each year by 31 October.
National Parks and Wildlife Act 1974	OEH	Principal Contractor	**Consideration/Approval-** Under s90 to harm or desecrate Aboriginal Objects or places	There are no Aboriginal sites within the area where the substation will be renewed. Refer Section 11.5 - Heritage and Archaeology.
POEO Act	OEH	Principal Contractor	**General-** under s120 no "dirty water" discharge into stormwater drains	Refer Section 11.6 and 11.13
POEO Waste Regulation	OEH	Principal Contractor	**General-** under cl24 transportation of certain waste must be tracked	Refer Section 11.13 – Waste Management
Roads Act,1993	RMS	Principal Contractor	**Approval-** maybe required for Transformer transportation.	Approval will be obtained by the Principal Contractor before commencing works
Rural Fires Act 1997	NSW Rural Fire Service	Principal Contractor/ Endeavour Energy	**Consideration-** under s63 public authorities must take all reasonable steps to prevent the occurrence and minimise the spread of bushfires on or from lands vested in or under its control/management	Refer Section 11.9 - Bushfire
TSC Act	OEH	Endeavour Energy	**Consideration-**under s94(2) carry out a test of significance to determine whether the proposal is likely to have a significant impact or not, which requires a species impact statement	Refer Section 10.6 - TSC Act.
Water Act 1912	Water NSW	Principal Contractor	**Consideration/Permit –** under s113 to extract groundwater via any type of bore, well or excavation	It is not expected that a permit would be required for these works. To be addressed as part of the CEMP.

10 ENVIRONMENTAL IMPACT ASSESSMENT

10.1 Clause 228 (2) Considerations

For the purposes of Part 5 of the Environmental Planning and Assessment Act 1979, and in accordance with the requirements of The Code, the factors to be taken into account when consideration is being given to the likely impact of an activity in the environment include:

a) Any environmental impact on a community

The proposed renewal works will be carried out within the existing substation perimeter. Short term impacts may occur while the work is being undertaken; however long-term impacts will be minimal as, apart from the new appearance, the substation site will stay the same.

b) Any transformation of a locality

Sussex Inlet ZS has been in this location for 50 years and is adjoined by industrial/commercial factory units; therefore the changes to the site appearance are not anticipated to have impact on the locality.

c) Any environmental impact on the ecosystems of the locality

The substation and all land in the vicinity of the site are of industrial/commercial use. Much of the vegetation in the vicinity of the substation has already been cleared, therefore the impact on the ecosystems is considered to be minimal.

d) Any reduction of the aesthetic, recreational, scientific, or other environmental quality or value of a locality

The substation is located on land zoned and used for industrial/commercial purposes, therefore the renewal of the site will unlikely alter the visual appearance of the area. The new proposed design for the new building and associated assets will in fact ameliorate the aesthetic value of the site.

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

No impact on any item having these values is anticipated to occur, as described in section (d), above.

f) Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act, 1974)

There are no known habitats of protected or endangered fauna within the substation area.

g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air

The substation renewal will be conducted within the existing substation perimeter; therefore there is no species of animal, plant or other form of life will be endangered as a result of the works.

h) Any long-term effects on the environment

The impacts of the construction of the substation will be short-term only and of a minor nature as described in section “a”, above.

i) Any degradation of the quality of the environment

The renewal of the substation could be considered to have a potential minor temporary degradation to the amenity of the area as the works are being undertaken. Mitigating measures have been devised to prevent further degradation.

j) Any risk to the safety of the environment

Any potential risks to the environment from the activity will be managed and mitigated in accordance with the mitigation measures outlined in this REF. renewal works will be undertaken in accordance with the consent conditions outlined in the Notice of Determination prepared for this project and in accordance with the CEMP to be prepared by the principal contractor appointed to undertake the works at the substation.

k) Any reduction in the range of beneficial uses of the environment

The project will not adversely affect present land use activities in the wider area as the renewal works will be carried out within the existing substation perimeter.

l) Any pollution of the environment

Any potential risk of pollution from the substation renewal works or operation will be mitigated by the works being implemented in accordance with the various requirements of this REF and the Endeavour Energy Environmental Management Standards.

m) Any environmental problems associated with the disposal of waste

All waste associated with the substation construction works and operation will be disposed of at an approved facility and in accordance with Endeavour Energy Environmental Management Standard EMS 0007 Waste Management contained.

n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply

There would be no demand on resources that are in short supply. All of the materials required for the renewal of the substation are readily commercially available and considered to be generally abundant.

o) Any cumulative environmental effect with other existing or likely future activities

The proposed impacts associated with the renewal of the substation are considered minimal given the works are contained within the existing substation within an established commercial area.

p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions

The renewal activity will have no impact on coastal processes as the works will be contained within the existing and established substation site.

10.2 Noise Management

10.2.1 Construction

The construction works will result in some noise generation. Typical noises would be associated with excavation machinery, small machinery typical of building contractors, hand tools, compression equipment and generators as well as small and large trucks. All equipment will be fitted with appropriate noise suppression equipment.

Construction noise will be controlled by the guidelines specified in the *Interim Construction Noise Guideline* published by DECCW. In accordance with this guideline, work will generally be carried out during the following hours:

Mondays to Fridays:	7am to 6pm
Saturdays:	8am to 1pm
Sundays and Public Holidays:	No work

At the planning stage of this project, no work is envisaged to be carried out on Sundays or public holidays or outside the above hours. There may however be requirements imposed by other authorities, such as Council, Roads and Maritime Services or NSW Police, where works are required outside of these hours (e.g. delivery of substation assets to site). Where such works are required, Shoalhaven City Council and the adjoining businesses will be notified of such works at least 5 days prior.

Given the distance between the work site and existing residential premises (Figure 13), it is considered unlikely that the noise generated by the construction works will have a significant impact on noise levels within the surrounding area or at any neighbouring residential properties.

Figure 14: Nearest Noise Receptors to the Sussex Inlet ZS location

10.2.2 Operation

Transformers used to convert high voltage electricity to lower voltages, tend to generate a low frequency hum at 100Hz. Endeavour Energy engaged Day Design Consulting Acoustical Engineers to undertake an Environmental Noise Impact Study as part of Stage 1 of works, to ascertain the effect of this noise anticipated to be generated by the two transformers on existing residential and commercial properties

A copy of the Noise report is provided in Appendix 2.

It should be noted that the substation is not a 'scheduled premise' under the POEO Act and therefore Endeavour Energy is not required to hold a licence under the Act for operations at the site. Accordingly the noise limits specified in the NSW EPA Industrial Noise Policy do not apply. However, in the absence of other relevant standards Endeavour Energy has adopted the limits specified in the Industrial Noise Policy as a guide when determining acceptable noise emissions from the site.

The noise study assessed the operation of the two 15MVA transformers and compared the predicted noise levels to the relative noise criteria for existing and future residential premises as well as future industrial land uses.

The results indicated that the predicted level of noise emitted by the two 15MVA transformers will meet the Environment Protection Authority acceptable noise level requirements for existing residential and commercial properties, and are therefore considered acceptable.

For potential future residences, noise controls maybe required and will depend on the location of future dwellings, their height, any residential boundary screening, etc.

10.2.3 Noise Mitigation Measures

- All surrounding properties are to be notified prior to construction works commencing. Details are to include the likely duration of the works and a contact number of the appropriate construction contractor;
- Works must be carried out in accordance with the standard work hours unless otherwise approved. The standard working hours are:
  - 7am to 6pm Monday to Friday
  - 8am to 1pm Saturdays
  - No work on Sundays or public holidays

- Works and activities may only be undertaken outside of these hours where required by other approval authorities such as the RMS, Police and Council or where the works have been justified and approved by Network Environmental Assessment (NEA).
- All residents / businesses that may be affected by any out of hour works must be notified in writing at least 5 days but no more than 14 days prior to such works occurring. Out of hours works that occurs more than two nights in any week must be justified and approved by Network Environmental Assessment (NEA). The Endeavour Energy Project Manager is responsible for emailing a copy of the notification letter, mitigation measures and justification for the works to environment@endeavourenergy.com.au. Notification to the EPA will be carried out by Endeavour Energy Safety and Environmental Services if considered necessary.

10.3 **Traffic and Access Impacts**

The substation site is located at The Spring Road, Sussex Inlet.

Figure 15: The Spring Rd at the location of the existing Sussex Inlet ZS

Access to the substation during the construction works will be available directly from The Spring Road, via the existing temporary substation gates. There will be a temporary increase in traffic levels associated with the construction works, particularly with the removal of spoil from the site and delivery of equipment and materials to site. This is not, however, expected to have a significant impact on traffic flows given the light volume of traffic currently using The Spring Road.

The delivery of some equipment to the site may be limited by restrictions imposed by the NSW RMS on the movement of oversize vehicles on roads within the Sydney Metropolitan area. The delivery of such equipment will be restricted to before 6am on weekdays so as to minimise impacts to traffic on these roads.

A site compound area will be set up in the cleared area on the eastern side of the substation. This compound will be available for site sheds, material storage and parking.

As per existing arrangements for the substation, once the renewal works have been completed, access to the site will remain from The Spring Road. The substation has been designed to accommodate sufficient parking on site for maintenance vehicles which would require access to the substation. The site will operate as an unmanned facility and as such, will generate very minor levels of traffic. Traffic movements will generally be due to maintenance and inspection requirements which usually occur every 8 weeks. With the exception of fault and emergency works, the majority of routine works will be conducted during normal working hours.

10.3.1 Traffic Impact Mitigation Measures

- Where required, a Traffic Management Plan shall be developed and approved by the relevant roads authority prior to construction works commencing;
- All construction vehicles shall be legally parked at all times;
- Vehicular access to adjoining properties shall be maintained at all times;
- Worksites are to be restored to a safe condition immediately on completion of works at that site.
- Traffic control is to be used when required.

10.4 Flora and Fauna

The proposed renewal works will be wholly undertaken within the existing Sussex Inlet ZS perimeter; therefore requirement for vegetation removal will be minimal. The initial project planning has identified a total of four shrubs that would require clearing within the substation premises, to allow necessary space for newly added assets.

Based on the above, there is a minimal requirement for any further assessment of impacts to threatened species, populations or endangered ecological communities listed under the TSC Act 1995.

Figure 16: Four shrubs identified for removal as part of the renewal works at the Sussex Inlet ZS

10.4.1 Flora and Fauna Mitigation Measures

Although minimal, prior to clearing, any trees shall be searched for hollows and nests. Where animals or birds and/or their nests are located, WIRES or an authorised wildlife carer shall be contacted to arrange for their removal and relocation.

10.5 Heritage and Archaeology

10.5.1 Non Aboriginal Heritage

The Shoalhaven Local Environment Plan (LEP) lists no items of Environmental Heritage associated with the substation vicinity.

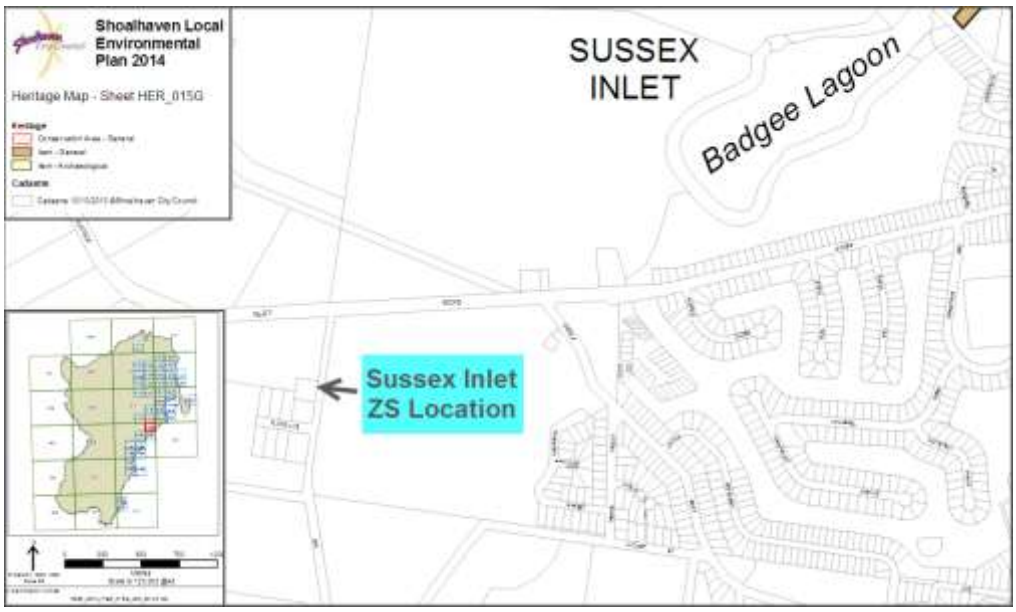

Figure 17: Extract from the Heritage Map from Shoalhaven LEP 2014- No heritage items in the vicinity of the substation

10.5.2 Aboriginal Heritage

A search using Aboriginal Heritage Information Management System (AHIMS) has been conducted in the vicinity of the substation site and the report has shown no presence of Aboriginal heritage sites of significance in the area (Refer to Appendix 6 for the AHIMS Search report).

Furthermore, it is contended that given the highly disturbed nature of the site and surrounding area, the nature of the project the likelihood of damaging any items of archaeological significance is extremely low.

10.5.3 Heritage and Archaeology Mitigation Measures

The following standard mitigating measures shall apply:

- In the event that any Aboriginal archaeological evidence or objects were to be discovered as a result of the works, all works in the area must cease and the project manager and Endeavour Energy's Network Environmental Assessment contacted. OEH must be notified under Section 91 of the NPW Act and a suitable procedure negotiated. Further assessment or documentation may be required before works could recommence in the affected area/s;
- In the unlikely event that human remains are discovered at the site, the project manager and Endeavour Energy's Network Environmental Assessment contacted. The findings should immediately be reported to the NSW Coroner's Office and the NSW Police. If the remains are suspected to the Aboriginal, the OEH should also be contacted and a specialist consulted to determine the nature of the remains.

10.6 Soil and Water Quality Management

The proposed works do not involve any significant level of ground disturbance. The risk of impacting on water quality in the immediate and wider area is low.

Some of the construction works, however, will require excavation and earth works associated with the basement and site levelling

It will be necessary to establish erosion and sediment controls around the substation site prior to construction works commencing. Excavated spoil, which is not being reused on site, should be classified and removed from site for disposal each day. Where spoil is required to be stored on site, sediment fencing should be constructed downstream of these stockpiles as necessary.

A concept Erosion and Sediment Control Plan (ESCP) has been provided as part of the concept design drawings for Stage 1 of the project. The Contractor will be required to prepare a similar detailed ESCP as part of the site specific Construction Environmental Management Plan (CEMP) for this project.

No Acid Sulphate soils were identified on the site.

Figure 18: Typical soil type in the vicinity of the Sussex Inlet ZS

10.6.1 Soil and Water Quality Mitigation Measures

- A site specific Construction Environmental Management Plan incorporating an Erosion and Sediment Control Plan is to be developed by the Construction Contractor;
- Disturbed areas will be resurfaced or revegetated as soon as possible after works have been completed;
- Sediment fences / silt bags are to be used as necessary;
- Sediment tracked on to roads will be swept on a daily basis. Where necessary, a street sweeper will be engaged on a regular or as required basis;
- Spill response kits are to be provided and easily accessible at the work site;
- Excavated materials and other stockpiles which are to be stored on site shall be protected with sediment fences and / or covered with a tarpaulin;
- Concrete trucks are not to wash out on site. Excess concrete slurry material is to be appropriately disposed of off-site and disposal receipts retained;

- Procedures for dewatering of excavations are to be included in the CEMP and all necessary dewatering materials provided to on site personnel.
- Vehicle movement and construction activities will be minimised where necessary
- Soil tracked onto roadways is to swept and cleaned up regularly.
- Spoil Management and dewatering of worksites are all to be managed in accordance with the following Endeavour Energy Standards and the Environmental Guidelines Handbook which are all available on the Endeavour Energy's Standards Website on the Intranet for internal staff, and ASP Website for external staff.

  EMS 0007 – Waste Management
  EMS 0008 – Environmental Incidence Response and Management
  EMS 0013 – Spoil Management
  EMS 0014 - Dewatering Worksites

10.7 Visual Impacts

Currently, the substation is located within a commercial/light industrial neighbourhood, with the closest residence being approximately 250m from the premises.

The substation renewal is considered unlikely to have an adverse visual impact on any future industrial/residential premises as there will be no extension of the existing substation perimeter. On the contrary, the proposed design and selected colour palette for the control building, walls and associated assets have the potential to ameliorate the visual aspect of the site (Figures 19 & 20).

Figure 19: A side view of the current Sussex Inlet ZS

Figure 20: A photo montage of the side view of the proposed renewed Sussex Inlet ZS

10.8 Safety and Hazards

Safety precautions will need to be implemented throughout the construction period for the workers' protection as well as the surrounding community. Standard procedures will be followed to ensure the safety of the workers and general public during the construction works. This includes use of appropriate construction fencing, locks on gates and wearing of appropriate personal protection equipment (PPE).

Endeavour Energy has strict security and fencing standards for its electricity substations. These standards have been upgraded over the recent years, as a result of both international events and the findings of the NSW Coroner on the death of a person at an Ausgrid substation. Similarly Endeavour Energy has strict standards for design, construction and operation of its electricity transmission assets.

In the event that any buried asbestos materials are located on the site during the earthworks, the removal and disposal of this material is to be carried out in accordance with Safe Work NSW requirements and Endeavour Energy Company Procedure GSY 1065 available on Endeavour Energy's Business Management System website.

10.9 Bushfire

On request from Endeavour Energy, a bushfire assessment has been undertaken by Harris Environmental Consulting in May 2018 for the proposed renewal of the Sussex Inlet ZS.

The substation site is identified as having bushfire prone land within 100m, by Shoalhaven City Council (Figure 21). The bushfire protection of the proposed substation was assessed under the NSW Rural Fire Service (2006) - *Planning for Bushfire Protection (PBP*) and Standards Australia (2009) AS3959 - *Construction of buildings in bushfire-prone areas.* (Refer to Appendix 3 for the full Bushfire Assessment report).

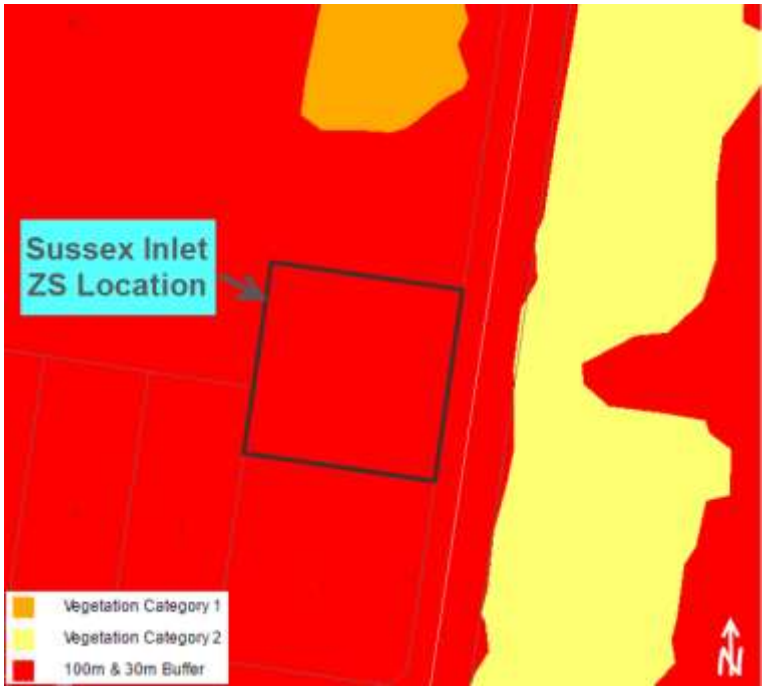

Figure 21: Bushfire prone land in the vicinity of Sussex Inlet ZS

The assessment indicates the proposed control building is classified as a Class 8 building under the Building Code of Australia (BCA) classification, and calculations undertaken as part of the assessment found the site to be rated under the following Bushfire Attack Levels (BAL):

- BAL 40 on the southern elevation.
- BAL 29 on the northern, eastern and western elevations.

Following are the RFS definitions of BAL 29 and BAL 40:

BAL 29
"Attack by burning debris is significant and radiant heat levels (not greater than 29kW/m2) can threaten building integrity. Specific construction requirements for protection against embers and higher radiant heat are warranted. Some flame contact is possible".

BAL 40
"*Increased attack from burning debris with significant radiant heat and the potential for flame contact. The extreme radiant heat and potential flame contact could threaten building integrity. Buildings must be designed and constructed in a manner that can withstand the extreme heat and potential flame contact".*

The land on the southern elevation of the Sussex Inlet ZS site is currently managed for 9 m from the proposed control building. As the site is located within a bushfire prone area, Endeavour Energy's Standard 'MMI 0013 - Vegetation Clearance Management' stipulates the substation must have a 10 m clearance out from the fence boundary.

Further findings as part of the assessment, as well as recommendations are covered below, under "Bushfire Mitigation Measures".

10.9.1 Bushfire Mitigation Measures

Endeavour Energy's Company Procedure '*GAM 0011 - Works Performed During Bushfire Danger Period'* restricts hot works during total fire bans and requires risk assessments to be undertaken and precautions to be put in place to minimise the risk of causing a bushfire. These precautions would apply to construction and maintenance for the

life of the substation. A copy of this procedure is available on Endeavour Energy's Business Management System website.

As a part of the Sussex Inlet ZS site (along the southern elevation) was rated under BAL40 and as per RFS requirement, the proposed building must be designed and constructed in a manner that can withstand the extreme heat and potential flame contact.

The bushfire assessment undertaken by Harris Environmental Consulting for Endeavour Energy has provided the following recommendations, mainly to cater for requirements of BAL 40 (and BAL29, to some extent):

- The proposed control building will be constructed on a slab, with non-combustible external walls.
- All joints in the external surface material of the walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm.
- Any vents or weepholes shall be screened with a mesh with a maximum aperture of 2 mm, made of corrosion–resistant steel, bronze or aluminium, except where the vents and weepholes have an aperture less than 3 mm.
- Window assemblies and doors shall comply with AS 3959 2009 requirements for BAL 40.
- The roof is required to be non-combustible and wall junctions sealed to prevent openings greater than 3 mm. roof ventilation openings such as gable ort roof vents are to be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze.
- Sheet roofs shall be fully sarked with breather –type sarking complying with AS/NZS 4200.1 and with a flammability index of not more than 5 (see AS 1530.2), and sarked on the outside of the frame with no gaps greater than 3 mm (under corrugations or ribs of sheet roofing and between roof components) sealed at fascia or wall line and at valleys, hips and ridges.
- Shoalhaven Council will be notified in regards to the BAL40 rating for substation site, as part of the REF consultation and notification process.

In addition, the following standard measures will apply to the Sussex Inlet ZS renewal works:

- Fire resistance ratings for the external walls and doors of the substation control building are to be in accordance with the Building Code of Australia.

- All service penetrations including control and power cable openings, trenches and ducts will be filled with approved fire stopping techniques and products in accordance with AS4027.

- The ZS control building will have a fire detection system designed and installed in accordance with Endeavour Energy Standard SDI 503.

- A fire hydrant system will be installed immediately adjacent to the property in accordance with AS 2419 and Endeavour Energy Standard SDI 509. Portable fire extinguishers will be provided in accordance with AS2444. Heat and smoke detectors will be installed in the control building in accordance with AS 1670.

- Currently, the land on the southern elevation from the substation is managed for 9 m. The land located 9 m away is considered level and classified "Remnant".
  As the substation is located within a bushfire prone area, Endeavour Energy's Standard MMI 0013 - Vegetation Clearance Management stipulates the substation must have a **10 m** clearance out from the fence boundary. This clearance is required to be clear to the sky and the area must be cleared of fall-in vegetation hazard defects. Within the substation fence no vegetation (including grass and weeds) is permitted. Surrounding the boundary fence, up until the clearance distance, only mown grass is permitted.
  It is suggested Endeavour Energy approach the owners of the adjoining property to discuss vegetation management options required to achieve 10 m APZ to the sky from the substation fence.

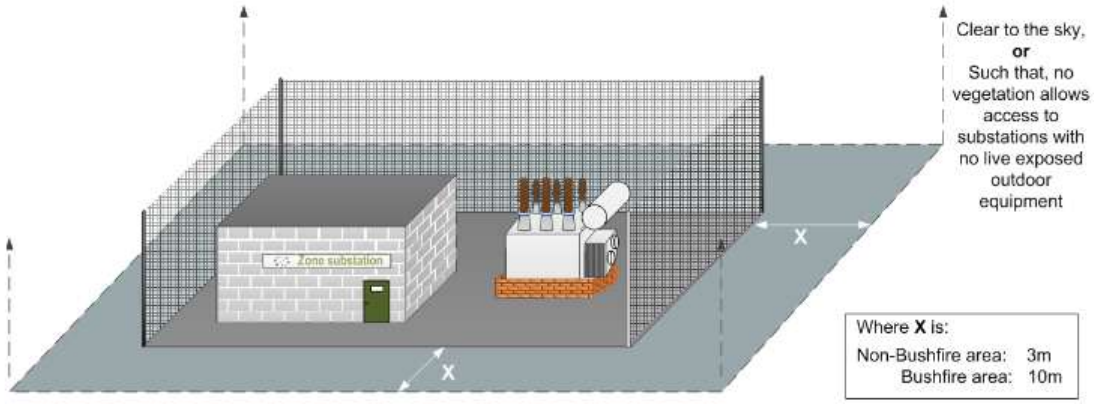

Figure 22: Clearances required around and above a Substation (Source: Endeavour Energy's MMI 0013)

10.10 Electric and Magnetic Fields (EMF)

Electric and magnetic fields (EMF) are generated by all electrical equipment, including components of the electricity network, such as transformers or overhead and underground power lines that have current flowing through them.

Electric fields can be present in electrical appliances that are switched on, however electric fields are shielded by most objects including trees and buildings. Magnetic fields are present only when current is flowing. The strength of a magnetic field is dependent on the size of the current. Similar to electric fields, the strength of magnetic fields reduces rapidly as you move away from the source. Magnetic fields however, pass through most materials and are not naturally shielded. For this reason, most EMF studies generally focus on magnetic fields.

The National Health and Medical Research Council (NHMRC) have adopted the Australian Radiation Protection and Nuclear Safety Agency (APANZA) guidelines for the exposure of humans to Electric and Magnetic Fields.

The Sussex Inlet ZS will be within the limits set in these guidelines and will not cause a significant increase in EMF near residential or sensitive land uses.

Endeavour Energy has an ongoing commitment to the policy of 'prudent avoidance' endorsed by the Electricity Supply Association of Australia with regards to the location of assets and electromagnetic fields. Prudent avoidance is defined as 'taking reasonable steps to minimise exposure to electric and magnetic fields where this can be done without undue inconvenience or undue expense'.

10.11 Air Quality

Dust and other air emissions may be generated as a result of earthworks, excavation, material stockpiling and delivery of materials during renewal works of the substation and/or removal of the existing assets. Dust is more likely to occur during certain weather conditions (e.g. dry and windy conditions) and dust suppression, in the form of water spraying may be required to manage this issue and reduce the impact of dust on road users and nearby residents.

Impacts arising from exhaust emissions from vehicles and machinery are expected to be minimal, with no sensitive properties within close proximity to the works site.

Given the small scale and nature of the construction works the associated emissions and dust impacts are considered to be minimal.

10.11.1 Air Quality Mitigating Measures

- All loads will be covered when carrying loose materials to and from the site;
- Disturbed surfaces / loose stockpiles will be dampened with water as necessary.

10.12 Light Pollution

The substation will operate as an unmanned facility and therefore the premises will not be brightly lit at night. Lighting is however required in the switchyard for the unlikely event that Endeavour Energy staff are required to access the facility at night for emergency works.

Lighting at the substation will be directed onto the electrical equipment within the substation yard in order to provide a safe working environment. All lighting will be controlled by a switch located within the substation yard. A sensor light will be provided at the pedestrian entrance gate which will only be triggered by a person walking up close to the gate to unlock it.

The proposed lighting levels will result in minimal light spillage onto adjoining properties. In the inadvertent possibility that the lights are left on at the substation, there will be minimal pollution on the adjoining properties.

10.12.1 Light Pollution Mitigation Measures

- Light from the substation shall be directed onto the electrical equipment so as not to cause a nuisance to adjoining properties;
- All lights (with the exception of the pedestrian entry gate) are to be operated by a switch within the substation facility. No sensor lights are to be used within the switchyard.

10.13 Waste Management

As part of the renewal works scope, a new stormwater system will also be installed to collect all stormwater runoff from the site.

Activities associated with the construction phase of the control building and associated new assets as well as the removal of the existing decommissioned assets have the potential to generate waste materials, including surplus construction materials, general waste and excess excavated materials. If not managed properly, these wastes have the potential to impact upon the local environment including the visual amenity and aesthetic quality of the site, water quality of the local stormwater systems and waterways as well as the health and safety of local residents and road users.

All waste generated by the construction of the proposed substation will be managed in accordance with Endeavour Energy's EMS 0007 – Waste Management. A Waste Management Plan will be developed as part of the CEMP to estimate the volume and destination of expected wastes. EMS 0007 is available on the Endeavour Energy's Standards Website on the Intranet for internal staff, and ASP Website for external staff.
The substation is designed to operate unmanned, and therefore once operational the facility will not generate waste. Any putrescible waste which may be generated during maintenance works will be removed at the completion of the days' work. Paper waste and general littler will be removed as part of the routine 8 week maintenance cycle.

10.13.1 Waste Management Mitigating Measures

- A Waste Management Plan is to be developed as part of the CEMP.
- All waste is to be reused and recycled wherever possible.
- Waste is to be managed in accordance with Endeavour Energy Standard EMS 0007 Waste Management available on the Endeavour Energy's Standards Website on the Intranet for internal staff, and ASP Website for external staff.
- Any soil identified as VENM or ENM is to be reused if possible.
- Any soil suspected of being contaminated is to be stored and sampled separately, then disposed of to an appropriately licenced facility.
- All waste is to be disposed of at a facility appropriately licenced to accept that waste.
- Waste data records will be kept for the project.
- Waste Classification Certificates and Waste disposal dockets are to be retained for audit purposed.

10.14 Utilities and Services

The renewal works will be carried out within the existing substation perimeter, however, the following standard mitigation measures will need to be observed, whenever applicable.

10.14.1 Utilities and Services Mitigation Measures

- The Contractor will be responsible for conducting detailed searches, including Dial Before you Dig searches, prior to construction works commencing. Where necessary, all relevant authorities shall be contacted regarding potential impacts on their facilities. Design and construction will accommodate the results of these searches and consultation.
- The Contractor will ensure that all existing services and utilities are located prior to the commencement of the works.

10.15 Socio-economic Impacts

The project will in the short term potentially provide employment for local suppliers and contractors.

Furthermore, the development of the substation will provide a safe and guaranteed electricity supply to the Sussex Inlet area to ensure the increasing required electricity demand is met through the upgrade of the existing substation. It is contended that no adverse socio-economic impacts will result from this project.

10.16 Ecologically Sustainable Development (ESD)

The materials chosen for the renewal of the existing substation ensure reduced maintenance and reduced consumption of resources and improved insulation through the selection of materials with improved thermal mass and effective roof insulation. (Refer to Appendix 1 for Substation Design)

10.16.1 Precautionary principle

The precautionary principles (s. 6 (2) (a)) states that: *'If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'.*

For the precautionary principle to be applicable two pre-conditions must be satisfied; "first it is not necessary that serious or irreversible environmental damage has actually occurred – it is the threat of such damage that is required. Secondly, the environmental damage threatened must attain the threshold of being serious or irreversible". When the precautionary principle applies, measures taken must be proportionate to the level of threat. In assessing the level of threat and determining a proportional response, Endeavour Energy is guided by the relevant regulators and health authorities who are charged with the responsibility for providing such advice.

EMF mitigation measures are discussed in section 11.10

A range of environmental issues have been considered during the preparation of this REF to ensure that the potential environmental impacts are understood. The design for the substation has evolved to avoid environmental impacts where practical and mitigation measures have been recommended to minimise adverse impacts.

The proposal is therefore considered to be consistent with the precautionary principle.

10.16.2 Inter-generational equity

The principle of inter-generational equity (s. 6 (2) (b)) states that: *'The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.'*

Social Equity requires that all sectors of the community have access to their basic needs and there is a fairer distribution of costs and benefits to improve the wellbeing and welfare of the community, population or society.

Intergenerational Equity requires that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

The substation upgrade will ensure that a reliable electricity supply can be provided to the Sussex Inlet, which in turn will provide employment opportunities into the future.

The proposal is considered to be consistent with the principle of inter-generational equity.

10.16.3 Biodiversity

The principle of biological diversity and ecological integrity (s. 6 (2) (c)) states that: *'Conservation of biological diversity and ecological integrity should be a fundamental consideration.'*

The proposed renewal works will be wholly undertaken within the existing Sussex Inlet ZS perimeter; therefore requirement for vegetation removal will be minimal.

Based on the above, there is a minimal requirement for any further assessment of impacts to threatened species, populations or endangered ecological communities listed under the TSC Act 1995.

Therefore, the proposal is considered to be consistent with the principle of biological diversity.

10.16.4 Improved valuation of resources

The principle of improved valuation of environmental resources (s. 6 (2) (d)) states that: - *'Environmental factors should be included in the valuation of assets and services.'* This principle explains that those who generate pollution and waste should bear the cost of containment, avoidance and abatement; the users of goods and services should pay prices based on the full life cycle of costs; and environmental goals should be pursued in the most cost-effective way.

All costs associated with the containment, avoidance and abatement of pollution have been factored into the design of this proposal and Endeavour Energy's operations generally.

The proposal is considered to be consistent with the principle of improved valuation of environmental resources.

11 Climate Change and Greenhouse Gas (GHG) Emissions

Climate change describes both changed average climatic conditions, such as increased temperature and lower average rainfall, as well as changes in the patterns of extreme weather events, including increased frequency and intensity of storms.

Greenhouse gas (GHG) emissions are defined by the GHG Protocol3 and international standards4 as scope 1 (direct emissions), scope 2 (indirect emissions from the consumption of purchased energy) and scope 3 (other indirect emissions).

This project is not located in low-lying areas near coastal locations.

Key risks to power infrastructure could include extreme weather events, accelerated degradation of materials and structures, and resource demand pressures. In relation to the project, it is expected that the likely impact of extreme weather events would be low. Similarly, impacts related to the accelerated degradation of materials and structures would be low, as all the electrical equipment would be enclosed within the substation site. However, exposed equipment and structures would be covered by specified epoxy paint and/or be of galvanised steel to reduce or eliminate accelerated degradation.
The renewal of the Sussex Inlet ZS works with new assets will benefit the adjacent businesses as well as residents living in the vicinity of the site.

Scope 1 emissions are direct GHG emissions produced from sources within the boundary of the proposal and as a result of the proposal's activities. Emissions arising from the construction of the proposal include those from vehicles and machinery used for materials delivery and handling, excavation, rehabilitation works, waste transport and general construction activities. The major contributor would be the consumption of fuel by transport vehicles.

Endeavour Energy's assets are subject to regular maintenance and monitoring to ensure all equipment is operating effectively. Minimal staff would be required to attend the asset thus limiting associated vehicle use and scope 1 emissions.

Scope 2 emissions are GHG emissions generated from the production of electricity, heat or steam that a proposal consumes, but which is physically produced by another facility. These emissions would arise primarily from the consumption of electricity through network losses when the proposal is in operation. Electrical losses are an inevitable consequence of the transmission of electricity through the transmission and distribution network, and the energy consumed in these losses must be generated by power stations.

The construction of the permanent substation would not result in a change in the capacity of the electricity supply network and hence in scope 2 GHG emissions.

Scope 3 emissions are those GHG generated in the wider economy that are related to a proposal but are physically produced by another facility. The main source of scope 3 emissions related to this proposal is from power stations supplying the National Electricity Market (currently predominantly coal fired) that supply the electricity retailers who sell power to customers in the area supplied by this proposal.

As stated previously, the renewal of the substation will serve the Sussex Inlet area and would not result in a change in the capacity of the electricity supply network and hence in scope 3 GHG emissions.

Under the *National Greenhouse and Energy Reporting Act 2007*, Endeavour Energy is required to report information on energy production, energy consumption and the amount of greenhouse gas emissions for the facilities under their operational control on an annual basis by 31 October following the financial year for which they are reporting.

It is considered that the renewal of the substation will not significantly affect the environment in relation to climate change because:-

- Construction related impacts would be minor and short term
- The Endeavour Energy network is designed to comply with Endeavour Energy design, construction, environmental and maintenance standards and with the relevant Australian Standards.
- In the context of existing GHG, the proposal would result in an insignificant increase to GHG emissions.
- Issues such as electricity demand on the network and the location of existing electrical infrastructure have been considered in selecting the proposed substation location.
- Mitigation measures listed in Table 1 below are considered suitable to manage any impacts

12 Summary of Mitigation Measures

Table 1: Summary of Mitigation Measures to be implemented during the substation construction:

Aspect	Issue	Suggested Mitigation Measures
Environmental Management	CEMP Excluded from this REF- Site Compounds and Laydown areas; Noise Studies associated with out of hours works	• The successful construction contractor will be required to prepare a site specific CEMP for this project. • As a minimum, this CEMP is to include a ESCP, a Waste Management Plan and a Traffic Management and Control Plan. • This CEMP is to address any environmental issues associated with the site chosen for establishment of site compounds and laydown areas • The CEMP must include a Noise Study/ Noise and Vibration Management Plan for the management of noise impacts associated with out of hours/night works • The CEMP must be approved by Endeavour Energy prior to commencing construction. **Responsibility- Construction Contractor**
Consultation	Ensuring interested/impacted parties are consulted with	• Construction Notification is to be provided to:- Shoalhaven City Council and / or other public authorities. • Responses from these authorities and Council must be considered before undertaking the activity. • Sufficient notice is to be provided in advance of construction commencing, particularly where access to properties is going to be impeded or blocked. • Refer Endeavour Energy Environmental Guidelines Handbook for process to be followed. **Responsibility- Construction Contractor**
Noise Management	Offensive noise to local residents from construction Possible out of hours works – to comply with provisions of road permits	* **REFER CONSULTATION**, above • Works must be carried out in accordance with the standard work hours unless otherwise approved. • For Out Of Hours works, contact NEA and refer to Environmental Guidelines Handbook for process to be followed should Out Of Hours works be required. **Responsibility- Construction Contractor**
Traffic and Access	Traffic delays Partial road closures Consent not obtained/not complied with Road occupancy permits not obtained/not complied with Possible damage to roadways and footpaths	***REFER CONSULTATION and NOISE MANAGEMENT**, above • A Traffic Management and Control Plan is to be included in the CEMP prepared for the project • Where necessary, a Traffic Management Plan shall be developed and approved by the relevant road authority prior to construction works commencing. • Vehicular access to all properties shall be maintained at all times. • All construction vehicles shall be legally parked at all times. • Vehicles, machinery and the like shall be parked / stored within the construction site compound. **Responsibility- Construction Contractor**
Flora and Fauna	Possibility of impacting vegetation in the vicinity of the substation site	• Prior to clearing existing vegetation, trees shall be searched for hollows and nests. Where animals or birds and / or their nests are located, WIRES or an authorised wildlife carer shall be contacted to arrange for their removal and relocation. **Responsibility- Construction Contractor**
Heritage and Archaeology	Potential for Aboriginal and Non-Aboriginal heritage items to be impacted	• In the event that any Aboriginal archaeological evidence or objects were to be discovered as a result of the works, all works in the area must cease and the project manager and Endeavour Energy's Network

Aspect	Issue	Suggested Mitigation Measures
		Environmental Assessment contacted. OEH must be notified under Section 91 of the NPW Act and a suitable procedure negotiated. Further assessment or documentation may be required before works could recommence in the affected area/s; • In the unlikely event that human remains are discovered at the site, the project manager and Endeavour Energy's Network Environmental Assessment contacted. The findings should immediately be reported to the NSW Coroner's Office and the NSW Police. If the remains are suspected to the Aboriginal, the OEH should also be contacted and a specialist consulted to determine the nature of the remains. **Responsibility- Construction Contractor**
Soil and Water Quality	Stockpile Management Sedimentation of waterways Tracking of soil onto roadways	**REFER- Environmental Management - CEMP** • A site specific Construction Environmental Management Plan (CEMP) incorporating an Erosion and Sediment Control Plan is to be developed by the Construction Contractor. • Disturbed areas will be resurfaced or revegetated as soon as possible after works have been completed. • Sediment fences / silt bags are to be used as necessary. • Sediment tracked on to roads will be swept on a daily basis. Where necessary, a street sweeper will be engaged on a regular or as required basis. • Spill response kits are to be provided and easily accessible at the work site. • Excavated materials are to be taken off site each day. Where it is necessary to store spoil or other loose materials on site, sediment fences are to be constructed on the down slope side of the stockpile. • Concrete trucks are not to wash out on site. Excess concrete slurry material is to be appropriately disposed of off-site and disposal receipts retained. • Spoil Management and dewatering of worksites are all to be managed in accordance with the following Endeavour Energy Standards and the Environmental Guidelines Handbook which are all available on the Endeavour Energy's Standards Website on the Intranet for internal staff, and ASP Website for external staff. ➢ EMS 0007 – Waste Management ➢ EMS 0008 – Environmental Incidence Response and Management ➢ EMS 0013 – Spoil Management ➢ EMS 0014 - Dewatering Worksites **Responsibility- Construction Contractor**
Visual Impact	Visual Impact – worksite restoration	• The proposed design and selected colour palette for the control building, walls and associated assets will ameliorate the visual aspect of the site. **Responsibility- Construction Contractor**
Safety and Hazards	Safety to workers and residents	• Standard OH&S working procedures will be followed • Approved signage is to be erected at the entrance to the worksites. • Traffic Management and Control Plans are to be implemented. • Safe pedestrian pathways are to be established. • An appropriate project specific risk assessment is to be prepared and submitted to Endeavour Energy for approval prior to construction commencing. • Works are to be conducted in accordance with all relevant Endeavour Energy HS&E procedures, Endeavour Energy standards and in accordance with

Aspect	Issue	Suggested Mitigation Measures
		relevant Australian Standards. • In the event that any buried asbestos materials are located on the site during the earthworks the removal and disposal of this material is to be carried out in accordance with NSW WorkCover requirements. **Responsibility- Construction Contractor**
Bushfire	Managing bushfire risk	• During a Total Fire Ban, no open fires or hot works are to be undertaken, unless they are in accordance with an exemption granted by the NSW RFS. Endeavour Energy's Company Procedure GAM 0011 Works Performed during Bushfire Danger Period restricts hot works during total fire bans and requires risk assessments to be undertaken and precautions to be put in place to minimise the risk of causing a bushfire. These precautions would apply to construction and maintenance for the life of the substation. • In addition, the following design measures are to be incorporated into the design and construction of the control room to limit the entry of embers (the site being, in part rated as BAL40) a. The proposed control building will be constructed on a slab, with non-combustible external walls. b. All joints in the external surface material of the walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm. c. Any vents or weepholes shall be screened with a mesh with a maximum aperture of 2 mm, made of corrosion–resistant steel, bronze or aluminium, except where the vents and weepholes have an aperture less than 3 mm. d. Window assemblies and doors shall comply with AS 3959 2009 requirements for BAL 40. e. The roof is required to be non-combustible and wall junctions sealed to prevent openings greater than 3 mm. roof ventilation openings such as gable ort roof vents are to be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze. f. Sheet roofs shall be fully sarked with breather – type sarking complying with AS/NZS 4200.1 and with a flammability index of not more than 5 (see AS 1530.2), and sarked on the outside of the frame with no gaps greater than 3 mm (under corrugations or ribs of sheet roofing and between roof components) sealed at fascia or wall line and at valleys, hips and ridges. • It is suggested Endeavour Energy approach the owners of the adjoining property to discuss vegetation management options required to achieve 10 m APZ to the sky from the substation fence. **Responsibility- Construction Contractor**
Air Quality	Dust generation during construction	• All loads will be covered when carrying loose materials to and from the site; • Disturbed surfaces / loose stockpiles will be dampened with water as necessary. **Responsibility- Construction Contractor**
Waste Management	Waste generated as a result of works	• A Waste Management Plan is to be prepared as part of the CEMP • All waste is to be reused and recycled wherever possible. • Waste is to be managed in accordance with Endeavour Energy Standard EMS 0007 Waste Management.

Aspect	Issue	Suggested Mitigation Measures
		• Any soil identified as VENM or ENM is to be reused if possible. • Any soil suspected of being contaminated is to be stored and sampled separately, then disposed of to an appropriately licenced facility. • All waste is to be disposed of at a facility appropriately licenced to accept that waste. • Waste data records will be kept for the project. • Waste Classification Certificates and Waste disposal dockets are to be retained for audit purposed. **Responsibility- Construction Contractor**
Material Storage	Impact on neighbouring properties and traffic	• A fenced construction compound shall be established on Endeavour Energy's land adjacent to the substation. This construction compound is to utilise the existing cleared area only and shall not require further removal of any trees. • All building, soil and construction materials, plant and other equipment or the like shall be placed or stored within the fenced construction compound. No such materials are to be placed or stored at any time on land not owned by Endeavour Energy (including Council land, private land, footpaths or roadways) without the prior written consent of the appropriate landowner. • No building, soil or construction materials, plant or other equipment or the like are to be placed or stored at any time within the drip line of any trees that are being retained on the site. All such equipment is to be stored within the secured construction compound adjacent to the construction site. **Responsibility- Construction Contractor**
Utilities and Services	Disruption to other Utilities services	• Dial Before you dig searches are to be completed prior to commencing construction. • Requirements of the utility owners are to be complied with in relation to their assets. **Responsibility- Construction Contractor**
Climate Change and Greenhouse Gas emissions	Potential to influence Climate Change and GHG emissions	• Recycled materials to be considered used where cost effective and have no effect on engineering properties of the works. • Materials sourced on local suppliers where cost effective and have no effect on engineering properties of the works. • All plant and equipment to be turned off when not in use • Fulfil reporting requirements to the Clean Energy Regulator **Responsibility- Endeavour Energy and Construction Contractor**

13 ENVIRONMENTAL MANAGEMENT

To ensure that appropriate steps are taken to manage environmental aspects of infrastructure projects, Endeavour Energy has developed a number of Environmental Management Standards.

The Environmental Management Standard EMS0001 has the stated purpose of ensuring that "all work on Endeavour Energy's electricity supply network is undertaken in such a manner as to manage any actual or potential environmental impacts." Activities are to be carried out using a due diligence approach and are designed and are to be constructed in accordance with industry and other appropriate standards to ensure positive environmental outcomes and compliance with relevant standards.

The construction of the substation will be subject to audits by Endeavour Energy to ensure that the works are carried out in an environmentally satisfactory manner.

The successful tenderer for the substation's renewal works contracts will be required to produce a CEMP prior to commencing any work at the site. This CEMP must be reviewed and approved by and Endeavour Energy prior to any works commencing.

This project has also been considered in accordance with Clause 228 (2) of the Environmental Planning and Assessment Regulation 2000 and is addressed in Section 11.1 of this REF. This assessment concludes that the renewal works of Sussex Inlet ZS will not have a significant effect on the environment.

14 RECOMMENDATIONS AND CONCLUSIONS

The investigations undertaken as part of this REF have shown that once construction has been completed and the worksites restored, the construction of the substation will have minimal environmental impacts, and should proceed subject to the conditions outlined herein and the Notice of Determination prepared for this project.

The environmental assessment has concluded that the project will not have a significant effect on the environment. It is therefore concluded that:

- An EIS is not required for the project
- Endeavour Energy makes a formal Determination in relation to the project.

It is required that all work be undertaken in accordance with this REF, the Notice of Determination made in relation to this REF and the associated CEMP that is required to be produced by the project contractor and any other specific mitigation measures that have been developed for this project.

15 REFERENCES

Day Design Pty Ltd, 2013, *Environmental Noise Assessment – Sussex Inlet Zone Substation at Sussex Inlet, NSW.* Prepared for Endeavour Energy

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Google Maps, 2017*, Googlemaps.com*

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Shoalhaven Interactive SLEP 2014 Web Maps, *http://maps2.shoalhaven.nsw.gov.au/slep2014/*

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Six Maps, 2018, *maps.six.nsw.gov.au*

State Environmental Planning Policy (Infrastructure), 2007

The Code of Practice for Authorised Network Operators, September 2015

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Appendix 1

Concept Design Plans

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SUSSEX INLET ZONE SUBSTATION

D.P. 536099
The Springs Road, Sussex Inlet NSW

APRIL 2018

DRAWING LIST - REVISION D

DWG No:	SCALE	DWG TITLE
DA000	N/A	COVERSHEET
DA001	NTS	PHOTOMONTAGE 1 AND EXISTING VIEW
DA002	NTS	PHOTOMONTAGE 2 AND EXISTING VIEW
DA003	NTS	DESIGN AND CHARACTER STATEMENT
DA004	1:2000@A3	LOCALITY PLAN
DA005	1:500@A3	SITE & ROOF PLAN
DA006	1:200@A3	CABLE BASEMENT PLAN
DA007	1:200@A3	GROUND FLOOR PLAN
DA008	1:200@A3	BUILDING ELEVATIONS
DA009	1:200@A3	STREET ELEVATIONS
DA110	1:200@A3	SECTIONS
DA111	NTS	EXTERNAL FINISHES
C00	NTS	LOCALITY MAP & DRAWING SCHEDULE
C01	NTS	GENERAL NOTES
C02	1:100	CIVIL LAYOUT PLAN
C03	1:20	STORMWATER SECTION
13221-9259.01	1:200@A3	SURVEY PLAN

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Rev

Issue	Date	Description
A	22/02/18	Issue for Information
B	06/03/18	Revised Sketch Design
C	15/03/18	Final REF Issue
D	10/04/18	Revised REF

Consultants

Client

Endeavour Energy

Project

Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing

Photomontage 1 and Existing View Looking from Flood Ave.

North

Scale: NTS

Date: APRIL.18

Project No.: 18-5957

Drawing No.: DA001 D

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Consultants

Client
Endeavour Energy

Project
Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing
Photomontage 2 and Existing View Looking from The Springs Road

North	Scale	Date	Project No.	Drawing No.
	NTS	APRIL.18	18-5957	DA002 D

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The Proposal
Sussex Inlet Zone Substation is located on The Springs Road at Sussex Inlet, NSW.

The proposed renewal of the substation will generally comprise:

Asset Renewal
- Constructing a new 11kV control building with cable basement and loading dock and amenities.
- Installing all associated underground cable conduits
- Constructing all related site-works including driveway pavements, retaining walls, gravel yard surfacing and security fencing .
- Installing building and site stormwater drainage
- Installing new firewalls to existing transformer bays
- Demolish existing 11kV outdoor switchyard

Design Verification
The following design Verification Statement was prepared by Mr Steven Christoforidis, Associate Director of Brewster Murray Pty Ltd – Architects, Interior & Urban Designers.

Context
Sussex Inlet Substation is located within a commercial setting at The Springs Road, Sussex Inlet, NSW.

The site has road frontage to The Springs Road to the east.
- Eastern Boundary – The Springs Road / Future residential development
- Northern Boundary – Sussex Inlet Road
- Western Boundary – Commercial
- Southern Boundary – Commercial

Design Response
In response to the above context, the following special measures have been applied to the design of the Sussex Inlet zone substation:

- The proposed design utilises steel frame walls with lightweight metal cladding and louvres including trims and metal roof sheeting.
- Painted pre-cast concrete wall panels to the new transformer bays to ensure high quality finish and uniform paint colour.
- Only high quality, low maintenance durable external materials and colours have been selected.
- A metal mesh security fence and gates will surround the substation.
- A new stormwater system will be installed to collect all stormwater runoff from the site.

Schedule of Exterior Colours and Materials

Control Building
Wall Cladding
WC1 - Lightweight metal cladding – Alucobond 'Seafoam Green Metallic'
WC2 - Lightweight metal cladding – Alucobond 'Bronze Metallic'
WC3 - Lightweight metal cladding – Alucobond 'Signal Grey'

Metal Roof Cladding
MD - Metal Deck Cladding – Profile and Colour - Custom Orb Colorbond 'Shale Grey'
MC1 - Metal Cladding - Profile and Colour -Mini Orb "Shale Grey'
Gutters – Colorbond 'Shale Grey'
Downpipes – Colorbond 'Shale Grey'

Exposed Concrete Walls
Natural Finish

External Door Frames, Ventilation louvers & A/C Screen Louvres:
P1 – Powder coated paint finish – Colour: 'Shale Grey'

Transformers
Fire Walls – Pre-cast concrete + Paint Finish
PF1 - Paint colour to match 'Seafoam Green Metallic'
PF2 - Paint colour to match 'Bronze Metallic'
PF3 - Paint colour to match 'Signal Grey'

Refer to finishes board for examples of the proposed materials.

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Consultants

Client
Endeavour Energy

Project
Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing
Design and Character Statement

North | Scale: NTS | Date: APRIL.18 | Project No.: 18-5957 | Drawing No.: DA003 D

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Consultants

Client

Endeavour Energy

Project

Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing

Locality Plan

North	Scale	Date	Project No.	Drawing No.
	1:2000@A3	APRIL.18	18-5957	DA004 D

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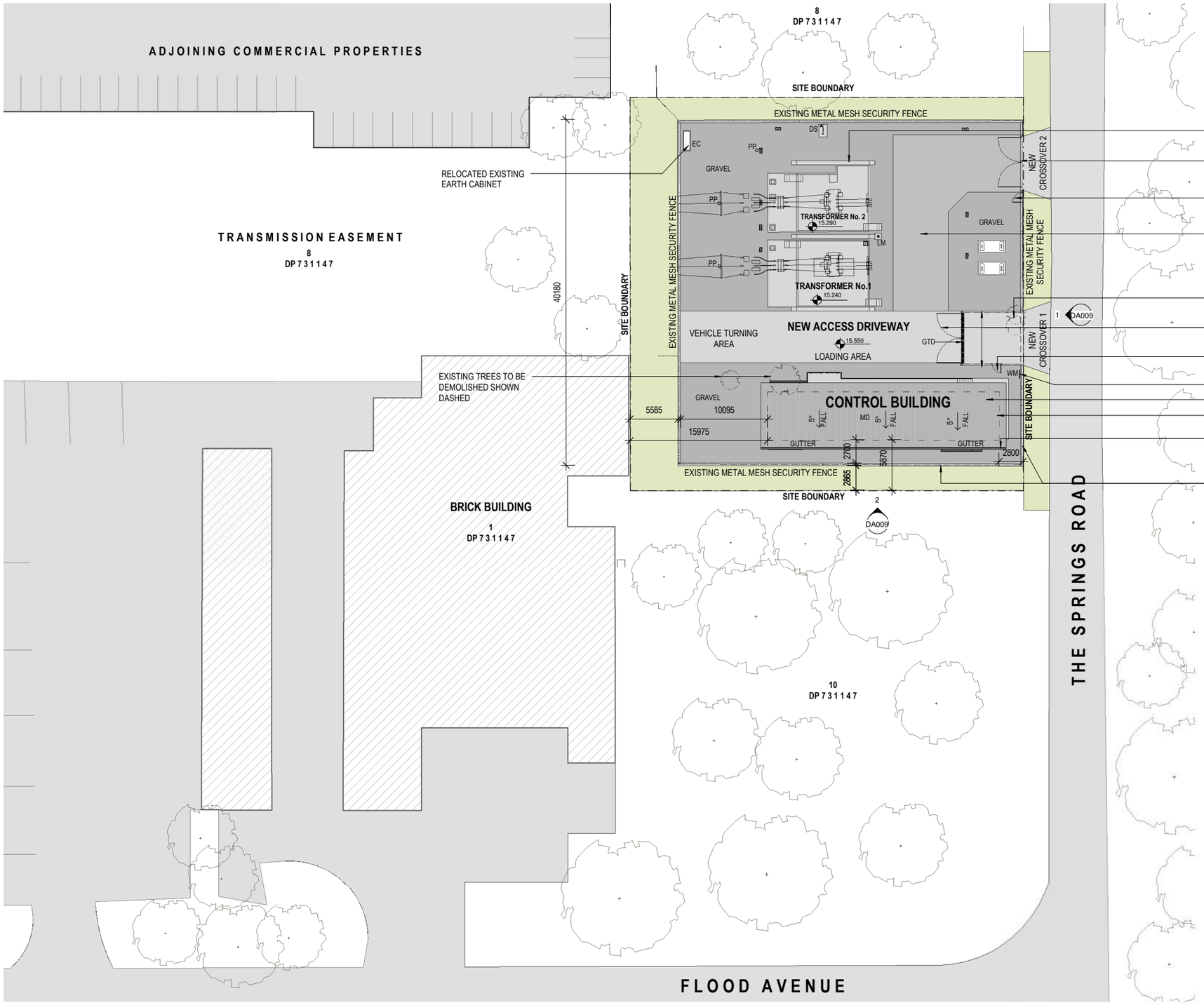

LEGEND

- SITE BOUNDARY
- METAL MESH SECURITY FENCE
- EXISTING DEMOLISHED
- EXISTING LANDSCAPED AREA
- TREES RETAINED
- TREES DEMOLISHED
- EP — EXISTING ELECTRICAL PIT
- PP — EXISTING POWER POLE RETAINED
- 34.56 — EXISTING CONTOUR LEVELS
- 51.675 — PROPOSED LEVELS

GENERAL ABBREVIATION LEGEND:

A/C	AIR CONDITIONING UNIT
AP	ACCESS PANEL
BS	BOOT SCRAPER
CL	CLEANERS
CONC.	CONCRETE FINISH
DS	EMERGENCY DELUGE SHOWER
EC	EARTH CABINET
EP	ELECTRICAL JOINT PIT
GB	GLASS BLOCK WINDOW
GTD	GRATED TRENCH DRAIN
LM	LIGHTNING MAST (TBC)
LVR	LOUVRE
MC1	METAL CLADDING TYPE 1
MD	METAL DECK ROOF
PP	POWERPOLE
SW	STORMWATER PITT
TX	TRANSFORMER
WC1, 2, 3	WALL CLADDING TYPE1, 2, 3.
WM	WATER METER

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Consultants

Client: Endeavour Energy

Project: Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing: Site & Roof Plan

North

Scale	Date	Project No.	Drawing No.
1:500@A3	APRIL.18	18-5957	DA005 D

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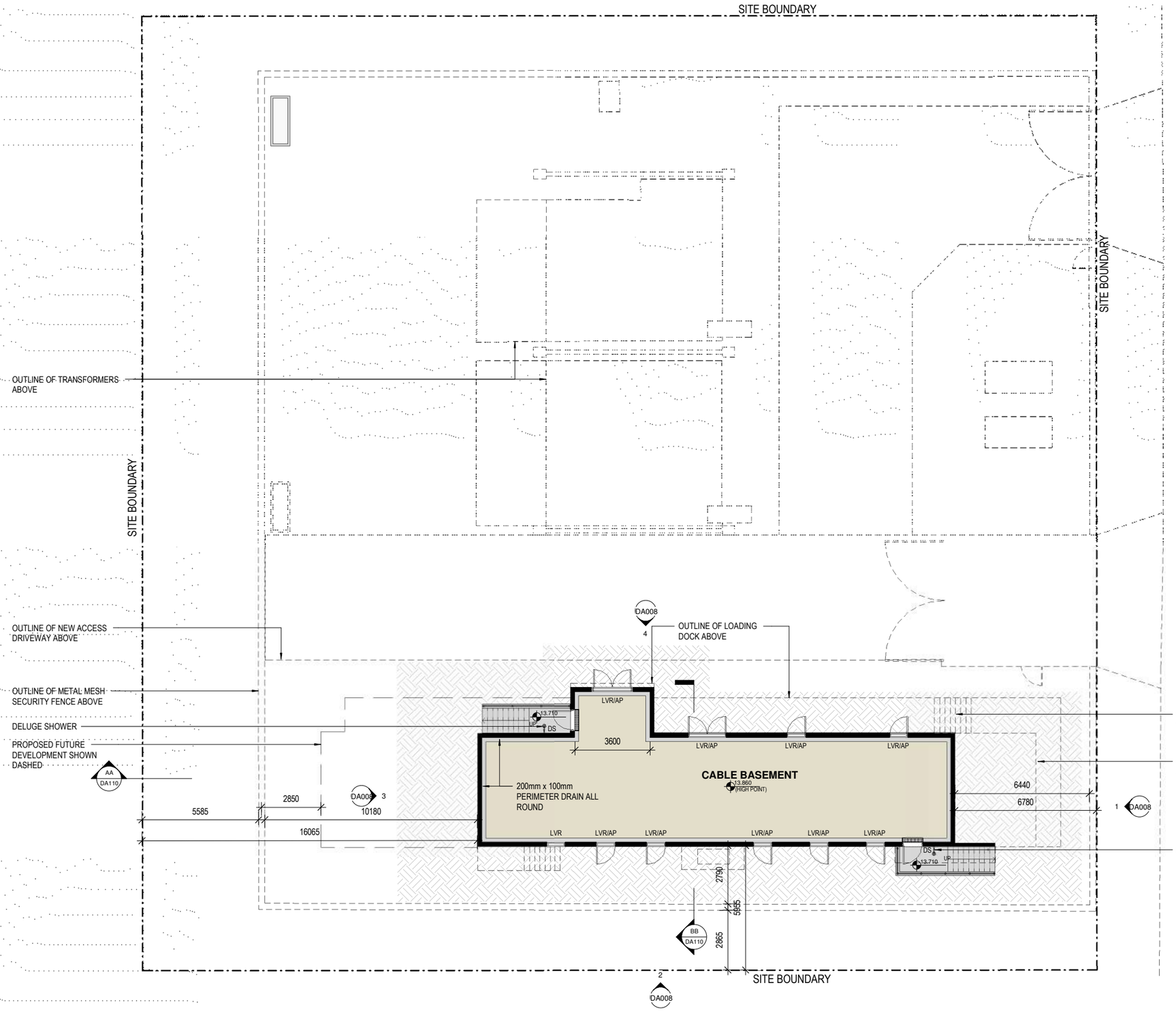

GENERAL ABBREVIATION LEGEND:

A/C	AIR CONDITIONING UNIT
AP	ACCESS PANEL
BS	BOOT SCRAPER
CL	CLEANERS
CONC.	CONCRETE FINISH
DS	EMERGENCY DELUGE SHOWER
EC	EARTH CABINET
EP	ELECTRICAL JOINT PIT.
GB	GLASS BLOCK WINDOW
GTD	GRATED TRENCH DRAIN
LM	LIGHTNING MAST (TBC)
LVR	LOUVRE
MC1	METAL CLADDING TYPE 1
MD	METAL DECK ROOF
PP	POWERPOLE
SW	STORMWATER PITT
TX	TRANSFORMER
WC1, 2, 3	WALL CLADDING TYPE1, 2, 3.
WM	WATER METER

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Rev

Issue	Date	Description
A	22/02/18	Issue for Information
B	06/03/18	Revised Sketch Design
C	15/03/18	Final REF Issue
D	10/04/18	Revised REF

Consultants

Client: Endeavour Energy

Project: Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing: Cable Basement

North

Scale: 1:200@A3

Date: APRIL.18

Project No.: 18-5957

Drawing No.: DA006 D

Issued for: APPROVAL

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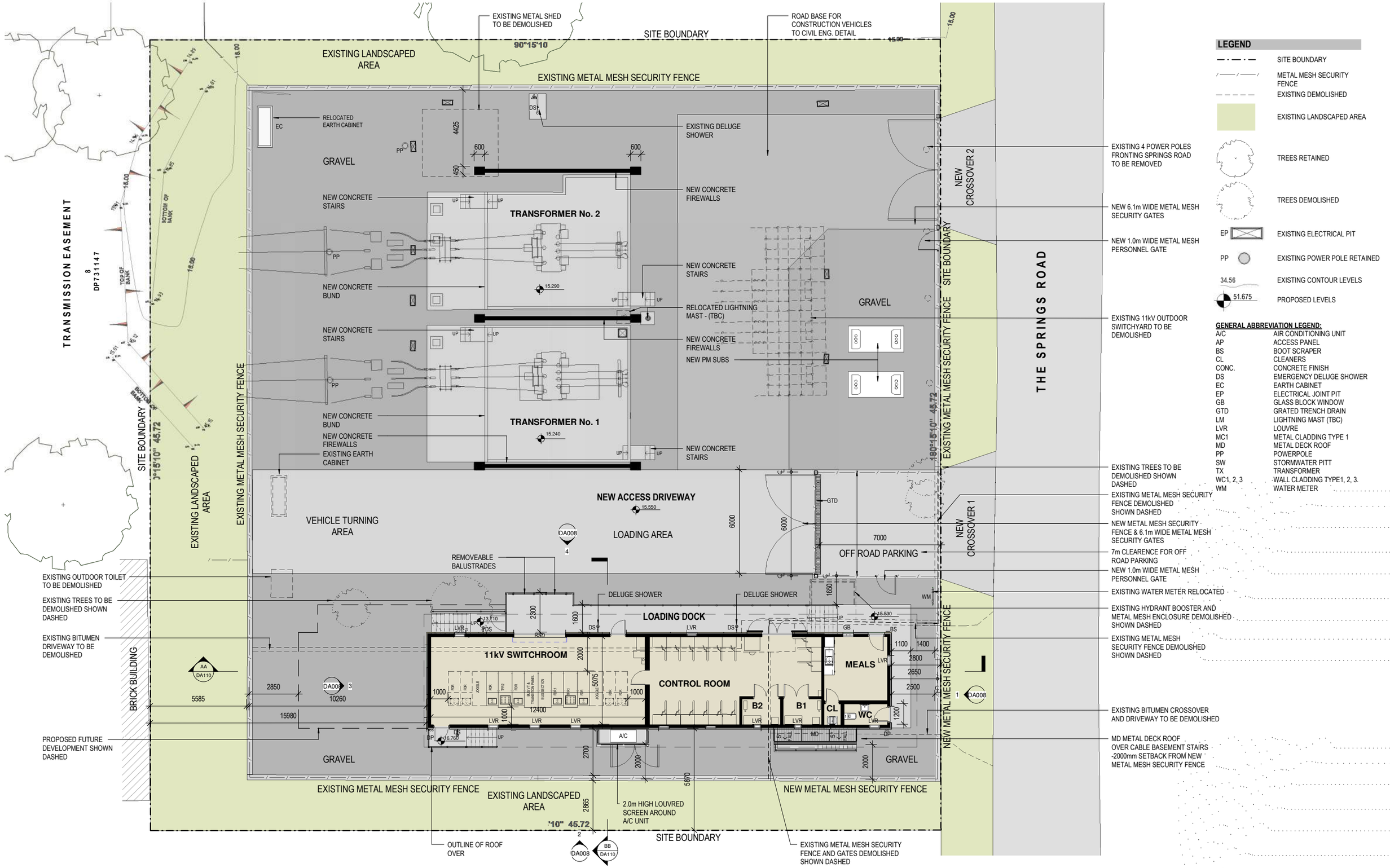

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Consultants

Client

Endeavour Energy

Project

Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing

Ground Floor Plan

North	Scale	Date	Project No.	Drawing No.
	1:200@A3	APRIL.18	18-5957	DA007 D

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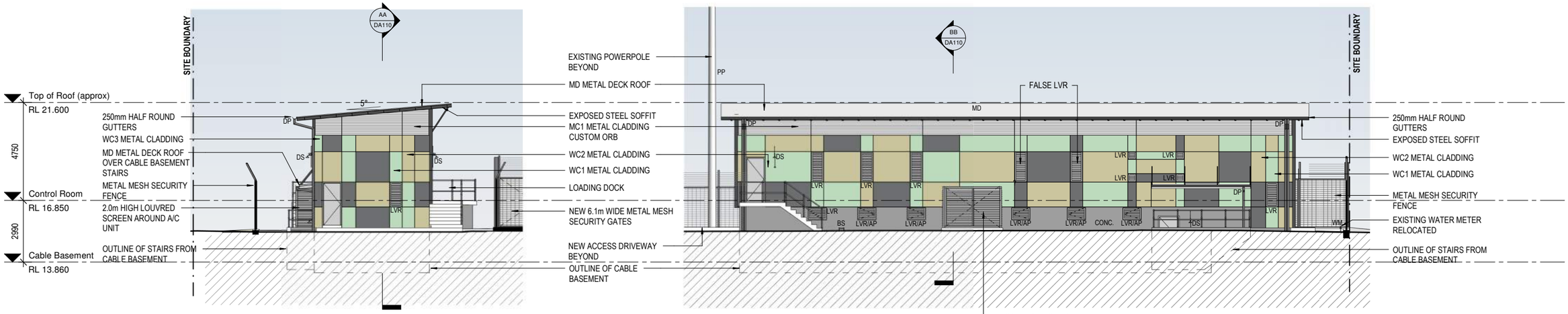
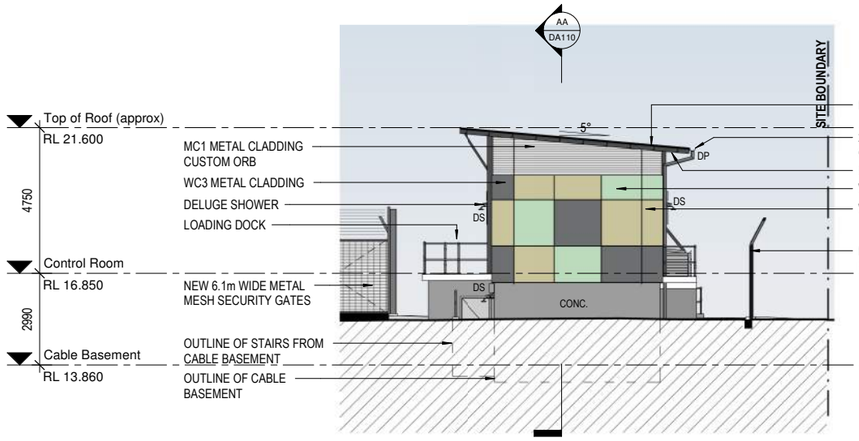


1 EAST ELEVATION TO THE SPRING ROAD

2 SOUTH ELEVATION



3 WEST ELEVATION

4 NORTH ELEVATION

GENERAL ABBREVIATION LEGEND:

A/C	AIR CONDITIONING UNIT
AP	ACCESS PANEL
BS	BOOT SCRAPER
CL	CLEANERS
CONC.	CONCRETE FINISH
DS	EMERGENCY DELUGE SHOWER
EC	EARTH CABINET
EP	ELECTRICAL JOINT PIT
GB	GLASS BLOCK WINDOW
GTD	GRATED TRENCH DRAIN
LM	LIGHTNING MAST (TBC)
LVR	LOUVRE
MC1	METAL CLADDING TYPE 1
MD	METAL DECK ROOF
PP	POWERPOLE
SW	STORMWATER PITT
TX	TRANSFORMER
WC1, 2, 3	WALL CLADDING TYPE1, 2, 3
WM	WATER METER

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D	10/04/18	Revised REF

Consultants

Client

Endeavour Energy

Project

Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing

Building Elevations

North

Scale: 1:200@A3

Date: APRIL.18

Project No.: 18-5957

Drawing No.: DA008 D

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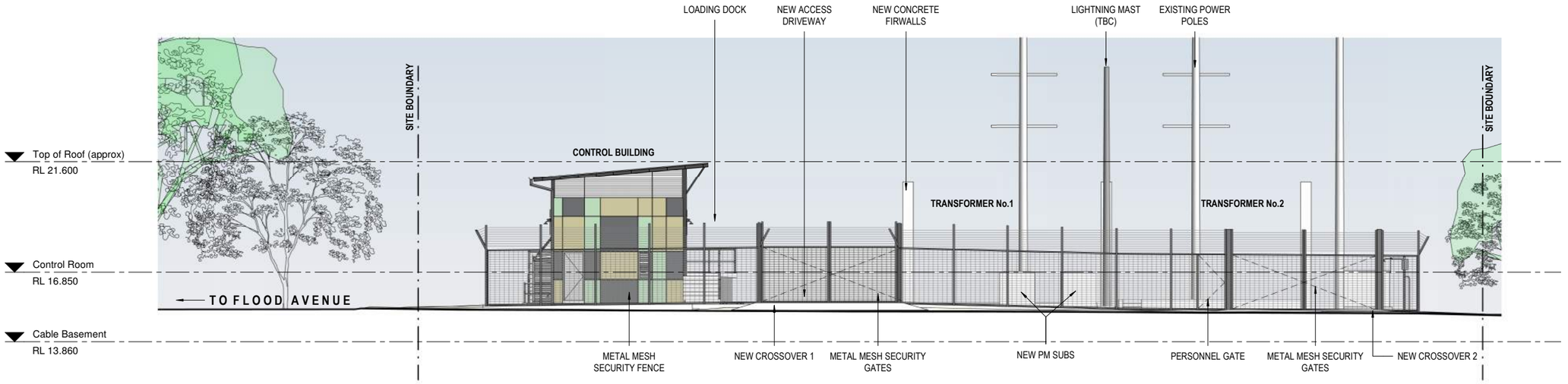
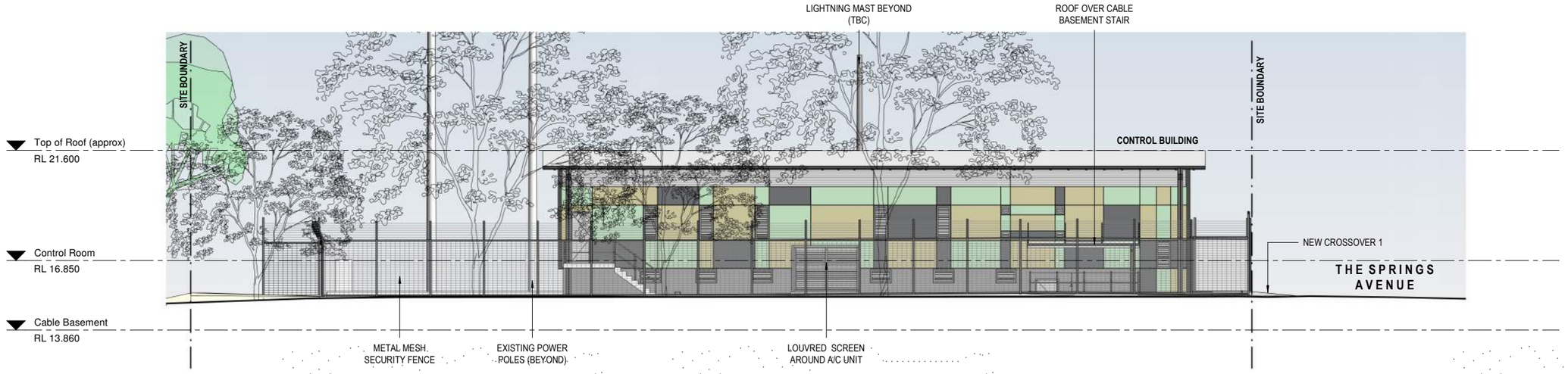


1 STREETSCAPE ELEVATION TO THE SPRINGS ROAD



2 STREETSCAPE ELEVATION TO FLOOD AVENUE

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Consultants

Client

Endeavour Energy

Project

Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing

Street Elevations

North

Scale
1:200@A3

Date
APRIL.18

Project No.
18-5957

Drawing No.
DA009 D

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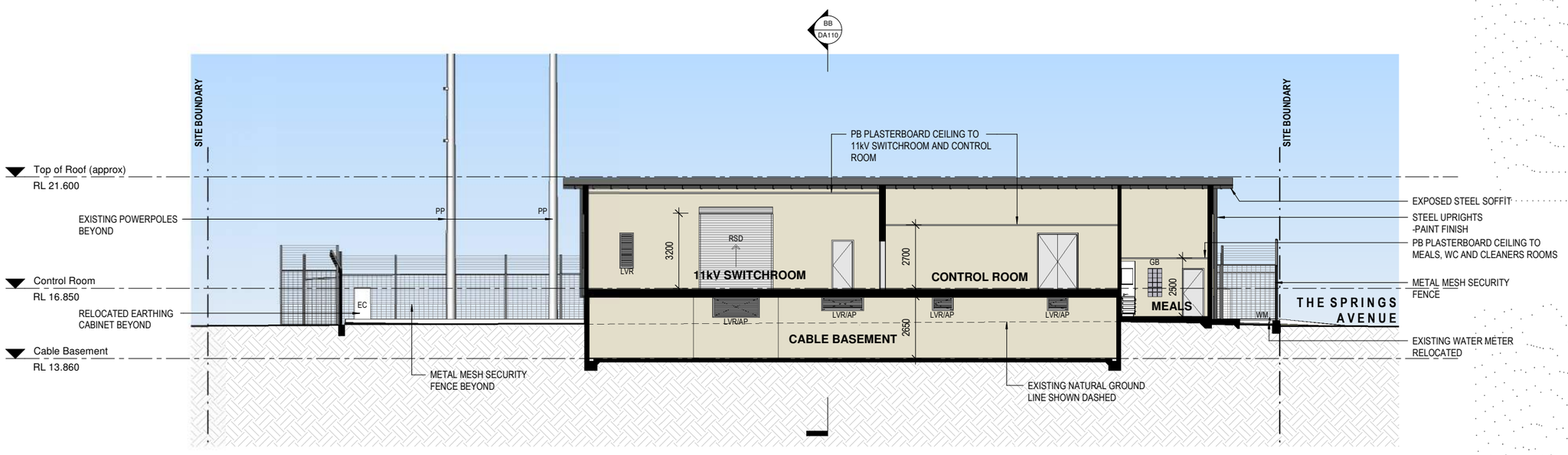
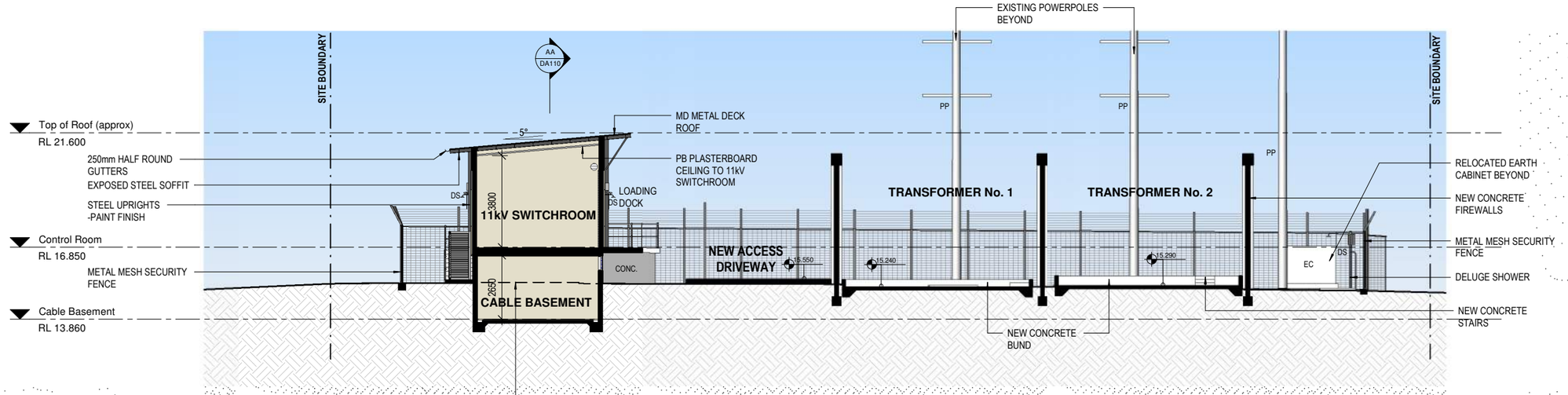


AA SECTION 1



BB SECTION 2

GENERAL ABBREVIATION LEGEND:

A/C	AIR CONDITIONING UNIT
AP	ACCESS PANEL
BS	BOOT SCRAPER
CL	CLEANERS
CONC.	CONCRETE FINISH
DS	EMERGENCY DELUGE SHOWER
EC	EARTH CABINET
EP	ELECTRICAL JOINT PIT
GB	GLASS BLOCK WINDOW
GTD	GRATED TRENCH DRAIN
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WC1, 2, 3	WALL CLADDING TYPE1, 2, 3
WM	WATER METER

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Consultants

Client

Endeavour Energy

Project

Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing

Sections

North

Scale: 1:200@A3

Date: APRIL.18

Project No.: 18-5957

Drawing No.: DA110 D

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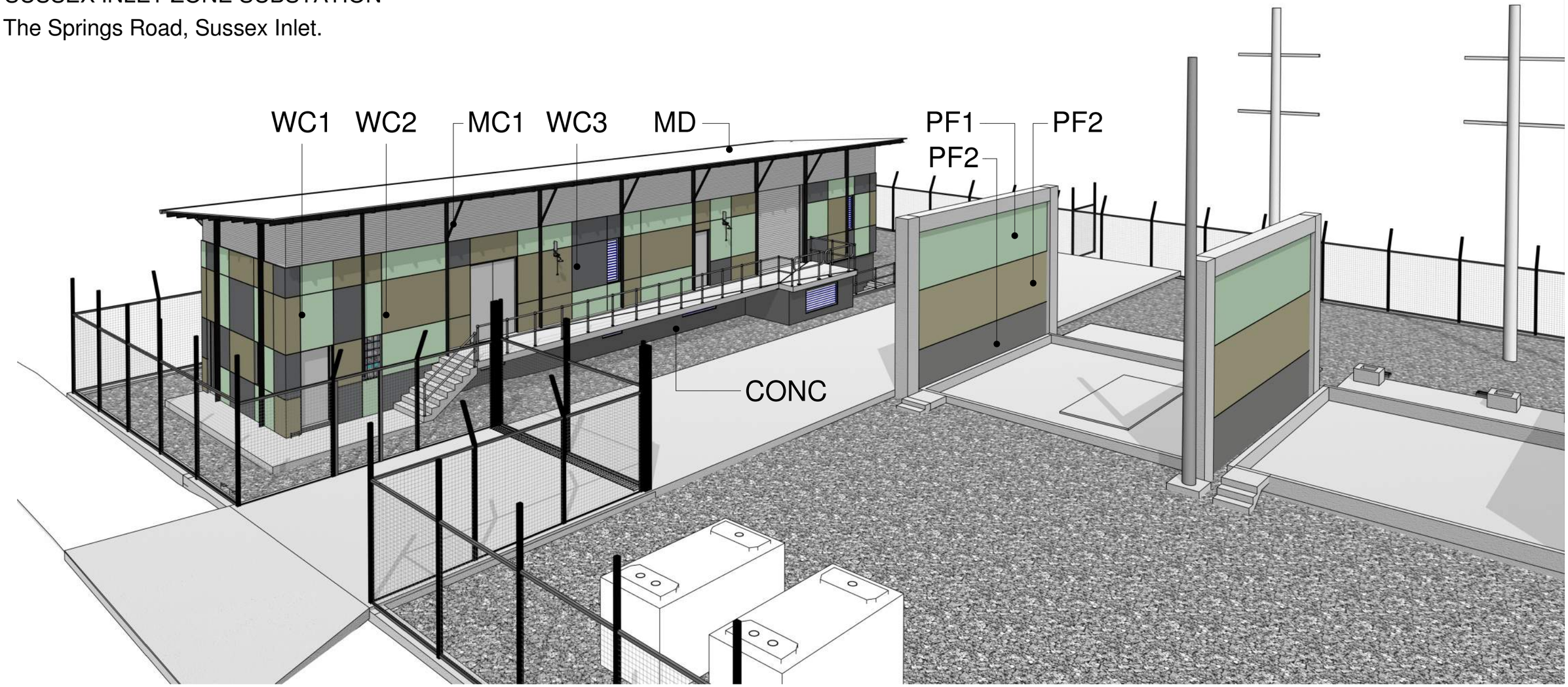
PROPOSED EXTERNAL FINISHES

SUSSEX INLET ZONE SUBSTATION

The Springs Road, Sussex Inlet.



WC1 - ALUCOBOND METALLIC
'SEAFOAM GREEN METALLIC'

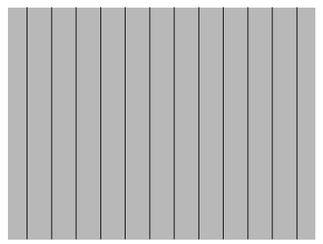
PF1 - To match 'Seafoam Green Metallic'

WC2 - ALUCOBOND METALLIC
'BRONZE METALLIC'

PF2 - To match 'Bronze Metallic'

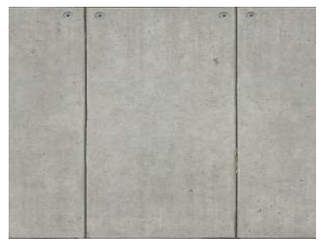
WC3 - ALUCOBOND
'SIGNAL GREY'

PF3 - To match 'Signal Grey'



MC1- COLORBOND STEEL
'SHALE GREY'

MD - COLORBOND STEEL
'SHALE GREY'



CONC - CONCRETE WALLS
NATURAL FINISH

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Consultants

Client

Endeavour Energy

Project

Sussex Inlet ZS Renewal
The Springs Road, Sussex Inlet

Drawing

External Finishes

North

Scale: NTS

Date: APRIL.18

Project No.: 18-5957

Drawing No.: DA111 D

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CONCEPT CIVIL ENGINEERING

PROJECT:
PROPOSED ELECTRICAL SUBSTATION

AT:
SUSSEX INLET, NSW 2540

CLIENT:
ENDEAVOUR ENERGY

PROJECT No:
171212

DRAWING SCHEDULE	
DRAWING No.	DRAWING TITLE
C00	LOCALITY MAP & DRAWING SCHEDULE
C01	GENERAL NOTES
C02	CIVIL LAYOUT PLAN
C03	STORMWATER SECTION

LOCALITY MAP
NOT TO SCALE

REV.	DATE	BY	DESCRIPTION	REV.	DATE	BY	DESCRIPTION
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----	----	----	----				
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A	28.03.18	DV	ISSUED FOR APPROVAL				

DESIGN: SK
DRAWN: DV
SCALE: N.T.S.
SIZE: A1

greenview CONSULTING

APPROVED
ALISTAIR McKERRON CPEng NPER

PROPOSED ELECTRICAL SUBSTATION
SUSSEX INLET, NSW 2540
ENDEAVOUR ENERGY
LOCALITY MAP & DRAWING SCHEDULE

171212
DA
C00

GENERAL NOTES

1. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE NOMINATED OR APPLICABLE COUNCIL SPECIFICATION.
2. THE CONTRACTOR SHOULD REPORT ANY DISCREPANCIES ON THE DRAWINGS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN.
3. CONTRACTOR IS NOT TO ENTER UPON NOR DO ANY WORK WITHIN ADJACENT LANDS WITHOUT THE PERMISSION OF THE OWNER.
4. SURPLUS EXCAVATED MATERIAL SHALL BE PLACED WHERE DIRECTED OR REMOVED FROM SITE.
5. ALL NEW WORKS SHALL MAKE A SMOOTH JUNCTION WITH EXISTING.
6. ALL DRAINAGE LINES THOUGH ADJACENT LOTS SHALL BE CONTAINED WITHIN EASEMENTS CONFORMING TO COUNCIL'S STANDARDS.
7. PRIOR TO COMMENCEMENT OF WORK, THE CONTRACTOR SHALL PROVIDE A TRAFFIC MANAGEMENT PLAN PREPARED BY AN ACCREDITED PERSON IN ACCORDANCE WITH RMS REQUIREMENTS, FOR ANY WORK ON OR ADJACENT TO PUBLIC ROADS, PLAN TO BE SUBMITTED TO COUNCIL & RMS AS REQUIRED.
8. THESE PLANS SHALL BE READ IN CONJUNCTION WITH OTHER RELEVANT CONSULTANTS' PLANS, SPECIFICATIONS, CONDITIONS OF DEVELOPMENT CONSENT AND CONSTRUCTION CERTIFICATE REQUIREMENTS.
9. THE BUILDER/CONTRACTOR SHALL LOCATE ALL EXISTING PUBLIC UTILITY SERVICES WITHIN THE SITE, FOOTPATH AREA AND ROAD RESERVE PRIOR TO THE COMMENCEMENT OF ANY WORKS.
10. ALL LOCATIONS AND LEVELS OF SERVICES SHALL BE REPORTED TO THE STORMWATER ENGINEER PRIOR TO THE COMMENCEMENT OF ANY WORKS TO ENSURE THERE ARE NO OBSTRUCTIONS IN THE LINE OF THE DRAINAGE DISCHARGE PIPES.
11. THE BUILDER IS TO VERIFY ALL LEVELS ON SITE PRIOR TO COMMENCING CONSTRUCTION.
12. ALL THE CLEANING EYES (OR INSPECTION EYES) FOR THE 11. UNDERGROUND PIPES HAVE TO BE TAKEN UP TO THE FINISHED GROUND LEVEL FOR EASY IDENTIFICATION AND MAINTENANCE PURPOSES.
13. ALL TERRACE FLOOR AND PLANTER GRATES TO HAVE FIRE COLLARS FITTED.
14. ALL PITS HAVING AN INTERNAL DEPTH THAT EXCEEDS 1.0m SHALL BE PROVIDED WITH GALVANIZED STEP IRON'S AT 300mm CENTRES PLACED IN A STAGGERED PATTERN AND SHALL BE IN ACCORDANCE WITH THE AUSTRALIAN STANDARDS AS4198-1994.
15. ALL MULCHING TO BE USED WITHIN THE AREA DESIGNATED AS ON SITE DETENTION STORAGE SHALL BE OF A NON-FLOATABLE MATERIAL SUCH AS DECORATIVE RIVER GRAVEL. BARK MULCHING SHALL NOT BE USED WITHIN THE DETENTION STORAGE AREA.
16. PRIOR TO COMMENCING ANY WORKS ON THE SITE, THE BUILDER SHALL ENSURE THAT THE INVERT LEVELS OF WHERE THE SITE STORMWATER SYSTEM CONNECTION INTO COUNCIL'S KERB/DRAINAGE SYSTEM MATCH THE DESIGN LEVELS. ANY DISCREPANCIES SHALL BE REPORTED TO THE DESIGN ENGINEER IMMEDIATELY
17. GREENVIEW IS NOT RESPONSIBLE FOR THE ACCURACY OF ANY SURVEY INFORMATION PROVIDED ON THIS DRAWING.
18. ALL LEVELS SHOWN ARE EXPECTED TO BE TO A.H.D.
19. ALL CHAINAGES AND LEVELS ARE IN METERS, AND DIMENSIONS IN MILLIMETRES, UNLESS NOTED OTHERWISE.
20. THE SURVEY INFORMATION ON THIS DRAWING HAS BEEN PROVIDED BY THE ARCHITECT.
21. CONTRACTORS SHALL ARRANGE FOR THE WORKS TO BE SET OUT BY A REGISTERED SURVEYOR.
22. W.A.E DRAWINGS BY A REGISTERED SURVEYOR ARE REQUIRED PRIOR TO CERTIFICATION OF DRAINAGE.
23. WHERE THESE PLANS ARE NOTED FOR DEVELOPMENT APPLICATION PURPOSES ONLY, THEY SHALL NOT BE USED FOR OBTAINING A CONSTRUCTION CERTIFICATE NOR USED FOR CONSTRUCTION PURPOSES WITHOUT WRITTEN APPROVAL.

RAINWATER REUSE SYSTEM NOTES

1. RAINWATER SUPPLY PLUMBING TO BE CONNECTED TO OUTLETS 1. WHERE REQUIRED BY BASIX CERTIFICATE (BY OTHERS)
2. NO DIRECT CONNECTION BETWEEN TOWN WATER SUPPLY AND THE RAINWATER SUPPLY
3. PROVIDE AN APPROVED STOP VALVE AND/OR PRESSURE LIMITING VALVE AT THE RAINWATER TANK
4. PROVIDE AT LEAST ONE EXTERNAL HOSE COCK ON THE TOWN WATER SUPPLY FOR FIRE FIGHTING.
5. PROVIDE APPROPRIATE FLOAT VALVE AND/OR SOLENOID VALVES TO CONTROL TOWN WATER SUPPLY INLET TO TANK IN ORDER TO ACHIEVE THE TOP-UP INDICATED ON THE TYPICAL DETAIL.
6. ALL PLUMBING WORKS ARE TO BE CARRIED OUT BY LICENSED PLUMBERS IN ACCORDANCE WITH AS/NZ3500.1 NATIONAL PLUMBING AND DRAINAGE CODE.
7. PRESSURE PUMP ELECTRICAL CONNECTION TO BE CARRIED OUT BY A LICENSED ELECTRICIAN.
8. ONLY ROOF RUN-OFF IS TO BE DIRECTED TO THE RAINWATER TANK, SURFACE WATER INLETS ARE NOT TO BE CONNECTED.
9. PIPE MATERIALS FOR RAINWATER SUPPLY PLUMPING ARE TO BE APPROVED MATERIALS TO AS/NZ3500 PART 1 SECTION 2 AND TO BE CLEARLY AND PERMANENTLY IDENTIFIED AS 'RAINWATER'. THIS MAY BE ACHIEVED FOR BELOW GROUND PIPES USING IDENTIFICATION TAPE (MADE IN ACCORDANCE WITH AS2648) OR FOR ABOVE GROUND PIPES BY USING ADHESIVE PIPE MARKERS (MADE IN ACCORDANCE WITH AS1345)
10. EVERY RAINWATER SUPPLY OUTLET POINT AND THE RAINWATER TANK ARE TO BE LABELED 'RAINWATER' ON A METALLIC SIGN IN ACCORDANCE WITH AS1319
11. ALL INLETS AND OUTLETS TO THE RAINWATER TANK ARE TO HAVE SUITABLE MEASURES PROVIDED TO PREVENT MOSQUITO AND VERMIN ENTRY.
12. ALL DOWNPIPES CHARGED TO THE RAINWATER TANK ARE TO BE SEALED UP TO GUTTER LEVEL AND BE PRESSURE TESTED AND CERTIFIED
13. TOWN WATER CONNECTION TO RAINWATER TANK TO BE TO THE SATISFACTION OF THE REGULATORY AUTHORITY. THIS MAY REQUIRE PROVISION OF
    a. PERMANENT AIR GAP
    b. BACKFLOW PREVENTION DEVICE

EARTHWORK NOTES

1. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE AND LEVEL ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY EARTHWORKS
2. THE CONTRACTOR SHALL CLEAR THE SITE BY REMOVING ALL RUBBISH, FENCES AND DEBRIS ETC. TO THE EXTENT OF THE PROPOSED DEVELOPED AREA.
3. PROVIDE PROTECTION BARRIERS TO PROTECTED/SENSITIVE AREAS PRIOR TO ANY BULK EXCAVATION.
4. OVER FULL AREA OF EARTHWORKS, CLEAR VEGETATION, RUBBISH, SLABS ETC. AND STRIP TOP SOIL. AVERAGE 200mm THICK. REMOVE FROM SITE, EXCEPT TOP SOIL FOR RE-USE.
5. CUT AND FILL OVER THE SITE TO LEVELS REQUIRED.
6. PRIOR TO ANY FILLING IN AREAS OF CUT OR IN EXISTING GROUND, 6. PROOF ROLL THE EXPOSED SURFACE WITH A ROLLER OF MINIMUM WEIGHT OF 5 TONNES WITH A MINIMUM OF 10 PASSES.
7. EXCAVATE AND REMOVE ANY SOFT SPOTS ENCOUNTERED DURING PROOF ROLLING AND REPLACE WITH APPROVED FILL COMPACTED IN LAYERS.
8. THE WHOLE OF THE EXPOSED SUBGRADE AND FILL SHALL BE COMPACTED TO 98% STANDARD MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT ± 2%.
9. FOR ON SITE FILLING AREAS, THE CONTRACTOR SHALL TAKE LEVELS OF EXISTING SURFACE AFTER STRIPPING TOPSOIL AND PRIOR TO COMMENCING FILL OPERATIONS.
10. WHERE HARD ROCK IS EXPOSED IN THE EXCAVATED SUB-GRADE, THIS WILL BE INSPECTED AND A DECISION MADE ON THE LEVEL TO WHICH EXCAVATION IS TAKEN.
11. FILL IN 200mm MAXIMUM (LOOSE THICKNESS) LAYERS TO UNDERSIDE OF BASECOURSE USING THE EXCAVATED MATERIAL AND COMPACTED TO 98% STANDARD (AS 1289 5.1.1). MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT ± 2%. SHOULD THERE BE INSUFFICIENT MATERIAL FROM SITE EXCAVATIONS, IMPORT AS NECESSARY CLEAN GRANULAR FILL TO APPROVAL.
12. COMPACTION TESTING SHALL BE CARRIED OUT AT THE RATE OF 2 TESTS PER 1000SQ METRES PER LAYER BY A REGISTERED NATA LABORATORY. THE COSTS OF TESTING AND RE-TESTING ARE TO BE ALLOWED FOR BY THE BUILDER.
13. BATTERS TO BE AS SHOWN, OR MAXIMUM 1 VERT : 4 HORIZ.
14. ALL CONDUITS AND MAINS SHALL BE LAID PRIOR TO LAYING FINAL PAVEMENT.
15. ALL BATTERS AND FOOTPATHS ADJACENT TO ROADS SHALL BE TOP SOILED WITH 150mm APPROVED LOAM AND SEEDED UNLESS OTHERWISE SPECIFIED.

SAFETY IN DESIGN NOTES

THERE ARE INHERENT RISKS WITH CONSTRUCTING, MAINTAINING, OPERATING, DEMOLISHING, DISMANTLING AND DISPOSING. WE NOTE THIS DESIGN IS TYPICAL OF SIMILAR DESIGNS. AS FAR AS IS REASONABLY PRACTICABLE RISKS HAVE BEEN ELIMINATED OR MINIMISED THROUGH THE DESIGN PROCESS. HAZARD CONTROLS MUST STILL BE IMPLEMENTED BY THE CONTRACTOR, OWNER OR OPERATOR TO ENSURE THE SAFETY OF WORKERS. GREENVIEW ASSESSMENT DID NOT IDENTIFY ANY UNIQUE RISKS ASSOCIATED WITH THE DESIGN.

DRAINAGE INSTALLATION, RCP CONVENTIONAL INSTALLATIONS & ROAD CROSSINGS

1. SUPPLY & INSTALLATION OF DRAINAGE WORKS TO BE IN ACCORDANCE WITH THESE DRAWINGS, THE COUNCIL SPECIFICATION AND THE CURRENT APPLICABLE AUSTRALIAN STANDARDS.
2. BACKFILL SHALL BE PLACED & COMPACTED IN ACCORDANCE WITH THE SPECIFICATION. A GRANULAR GRAVEL AGGREGATE MATERIAL (<10mm) BACKFILL IS RECOMMENDED FOR THE BEDDING, HAUNCH SUPPORT AND SIDE ZONE DUE TO IT'S SELF COMPACTING ABILITY.
3. A MINIMUM OF 150mm CLEARANCE IS TO BE PROVIDED BETWEEN THE OUTSIDE OF THE PIPE BARREL AND THE TRENCH WALL FOR PIPES < 600 DIA. 200mm CLEARANCE FOR PIPES 600 TO 1200 DIA AND D/6 CLEARANCE FOR PIPES > 1200 DIA.
4. BEDDING OF THE PIPELINES IS TO BE TYPE 'HS2' IN ACCORDANCE WITH THE STANDARDS AND AS FOLLOWS:
    a. COMPACTED GRANULAR MATERIAL IS TO COMPLY WITH THE FOLLOWING GRADINGS:

MM	19	2.3600	0.6000	0.3000	0.1500	0.0750
% MASS PASSING	100	50-100	20-90	10-60	0-25	0-10

    -AND THE MATERIAL PASSING THE 0.075 SIEVE HAVING LOW AS DESCRIBED IN APPENDIX D OF AS1726. PLASTICITY
    b. BEDDING DEPTH UNDER THE PIPE TO BE 100mm.
    c. BEDDING MATERIAL TO BE EXTENDED FROM THE TOP OF THE BEDDING ZONE UP TO 0.3 TIMES PIPE OUTSIDE DIAMETER. THIS REPRESENTS THE 'HAUNCH ZONE.'
    d. THE BEDDING & HAUNCH ZONE MATERIAL IS TO BE COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 98% WITHIN ROAD RESERVES AND TRAFFICABLE AREAS AND 95% ELSEWHERE FOR COHESIVE MATERIAL OR A MINIMUM DENSITY INDEX OF 70% IN ACCORDANCE WITH THE STANDARDS FOR COHESIONLESS MATERIAL.
    e. COMPACTION TESTING SHALL BE CARRIED OUT BY AN APPROVED ORGANISATION WITH A NATA CERTIFIED LABORATORY FOR ALL DRAINAGE LINES LAID WHOLLY OR IN PART UNDER THE KERB & GUTTER OR PAVEMENT

STORMWATER DRAINAGE NOTES

1. STORMWATER DRAINAGE SHALL BE GENERALLY IN ACCORDANCE WITH CURRENT AUSTRALIAN STANDARDS INCLUDING AS3500.3 , NCC AND COUNCIL'S SPECIFICATION.
2. PIPES OF 225mm DIA. AND UNDER SHALL BE UPVC
3. PIPES OF 300mm DIA. AND LARGER SHALL BE FRC OR CONCRETE CLASS 2 RUBBER RING JOINTED UNO.
4. ALL FRC OR RCP STORMWATER PIPES WITHIN ROAD RESERVE AREAS TO BE CLASS 3 U.N.O. BY COUNCILS SPECIFICATION.
5. PIPES SHALL GENERALLY BE LAID AT THE GRADES INDICATED ON THE DRAWINGS.
6. MINIMUM COVER TO PIPES 300mm DIA. AND OVER GENERALLY SHALL BE 600mm IN CARPARK & ROADWAY AREAS UNO.
7. ALL PIPES LOCATED IN LANDSCAPE AREAS TO HAVE 300mm COVER. WHERE NOT POSSIBLE AND COVER IS BETWEEN 150mm AND 300mm USE SEWER GRADE PIPE.
8. PIPES 225mm DIA AND OVER SHALL BE LAID AT 0.5% MIN. GRADE U.N.O.
9. PIPES UP TO 150mm DIA SHALL BE LAID AT 1.0% MIN. GRADE U.N.O
10. BACKFILL TRENCHES WITH APPROVED FILL COMPACTED IN 200mm LAYERS TO 98% OF STANDARD DENSITY.
11. ANY PIPES OVER 16% GRADE SHALL HAVE CONCRETE BULKHEADS AT ALL JOINTS
12. THE MINIMUM SIZES OF THE STORMWATER DRAINAGE PIPES SHALL NOT BE LESS THAN 90mm DIA FOR CLASS 1 BUILDINGS AND 100mm DIA FOR OTHER CLASSES OF BUILDING OR AS REQUIRED BY THE REGULATORY AUTHORITY.
13. DOWNPIPES SHOWN ARE INDICATIVE ONLY. REFER ARCHITECTURALS FOR FINAL LOCATIONS.
14. ALL ROOF GUTTERING AND DOWNPIPES TO THE CURRENT AUSTRALIAN STANDARDS. ALL DOWNPIPES TO BE CONSTRUCTED OF ONE MATERIAL FOR AESTHETICS REASONS AND PAINTED TO PROTECT THEM AGAINST ULTRA-VIOLET LIGHT DAMAGE. UNLESS APPROVED OTHERWISE BY HE PROJECT ARCHITECT.
15. BUILD INTO UPSTREAM FACE OF ALL PITS A 3.0m SUBSOIL LINE ALLING TO PITS TO MATCH PIT INVERTS.
16. ALL COURTYARD & LANDSCAPED PITS TO BE 450 SQUARE UNLESS NOTED OTHERWISE.
17. ALL DRIVEWAY & OSD PITS TO BE 600 SQUARE UNLESS NOTED OTHERWISE.
18. ALL PLANTER BOXES AND BALCONIES TO BE CONNECTED TO THE PROPOSED STORMWATER DRAINAGE LINE.
19. ALL STORMWATER DRAINAGE WORK TO AVOID TREE ROOTS. WHERE NOT POSSIBLE, ALL EXCAVATIONS IN VICINITY OF TREE ROOTS ARE TO BE HAND DUG.
20. GEOTEXTILE FABRIC TO BE PLACED UNDER RIP RAP SCOUR PROTECTION WHERE APPLICABLE.
21. ALL BASES OF PITS TO BE BENCHED (TO HALF PIPE DEPTH) TO THE INVERT OF THE OUTLET PIPE AND PROVIDE GALVANISED ANGLE SURROUNDINGS TO GRATE.
22. ANY VARIATION TO THE WORKS AS SHOWN ON THE APPROVED DRAWINGS ARE TO BE CONFIRMED BY THE ENGINEER PRIOR TO THE COMMENCEMENT.
23. ALL BALCONIES AND ROOFS TO BE DRAINED AND TO HAVE SAFETY OVERFLOWS IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS.
24. ALL GRATES TO HAVE CHILDPROOF LOCKS
25. ALL DOWNPIPES TO HAVE LEAF GUARDS
26. ALL WORK WITHIN COUNCIL RESERVE AREAS TO BE INSPECTED BY COUNCIL PRIOR TO BACKFILLING.
27. COUNCIL'S ISSUED FOOTWAY DESIGN LEVELS TO BE INCORPORATED INTO THE FINISHED LEVELS ONCE ISSUED BY COUNCIL.
28. WATER PROOF ALL CONCRETE BALCONIES & ROOFS TO ARCHITECTS DETAILS
29. ALL BALCONIES TO HAVE FLOOR WASTE AND 1% FALL WITH SAFETY OVERFLOW.
30. ALL SUBSOIL DRAINAGE SHALL BE A MINIMUM OF Ø65mm AND SHALL BE PROVIDED WITH A FILTER SOCK. THE SUBSOIL DRAINAGE SHALL BE INSTALLED IN ACCORDANCE WITH DETAILS TO BE PROVIDED BY THE LANDSCAPE CONSULTANT.
31. SUBSOIL DRAINAGE PIPES AND FITTINGS SHALL BE PERFORATED PLASTIC TO CURRENT AUSTRALIAN STANDARDS. LAY PIPES ON FLOOR OF TRENCH GRADED AT 1% MIN. AND OVERLAY WITH FILTER MATERIAL EXTENDING TO WITHIN 200mm OF SURFACE. PROVIDE FILTER FABRIC OF PERMEABLE POLYPROPYLENE BETWEEN FILTER MATERIAL AND TOPSOIL. PROVIDE FLUSHING EYE'S AT HIGH POINTS OR TO COUNCILS REQUIREMENTS.
32. GRATES TO BE IN ACCORDANCE WITH TABLE BELOW:

PIT GRATE INLINE TYPE

GRATE TYPE	TRAFFIC CONDITIONS
A - EXTRA LIGHT DUTY	FOOTWAYS AND AREAS ACCESSIBLE ONLY TO PEDESTRUANS AND PEDAL CYCLISTS.
B - LIGHT DUTY	FOOTWAYS THAT CAN BE MOUNTED BY VEHICLES.
C - MEDIUM DUTY	MALLS AND PEDESTRIAN AREAS OPEN TO SLOW MOVING COMMERCIAL VEHICLES.
D - HEAVY DUTY	CARRIGEWAYS OF ROADS AND AREAS OPEN TO COMMERCIAL VEHICHLES.
TABLE AS PER AS3996 - 2006. ENGINEER TO BE NOTIFIED IF LOAD CONDITIONS LISTED ABOVE ARE EXCEEDED.	

33. COVER TO PIPE TO BE AS PER TABLE BELOW:

COVER TABLE

LOCATION	PIPE TYPE	COVER
LANDSCAPE	PVC	300
LANDSCAPE (SINGLE DWELLING)	PVC	100
UNDER TRAFFICABLE AREA	PVC	100 BELOW UNDERSIDE OF PAVEMENT
CONCRETE	STEEL	NIL BELOW UNDERSIDE OF PAVEMENT
ROADS	RCP	500 BELOW UNDERSIDE OF PAVEMENT

RECOMMENDED SAFETY SIGNS

BASEMENT PUMP OUT FAILURE WARNING SIGN

1. SIGN SHALL BE PLACED IN A CLEAR AND VISABLE LOCATION WHERE VEHICLES ENTER THE BASEMENT

CONFINED SPACE DANGER SIGN

1. A CONFINED SPACE DANGER SIGN SHALL BE POSITIONED IN A 1. LOCATION AT ALL ACCESS POINTS, SUCH THAT IT IS CLEARLY VISIBLE TO PERSONS PROPOSING TO ENTER THE BELOW GROUND TANKS CONFINED SPACE. MINIMUM DIMENSIONS OF THE SIGN:
    - 300mm x 450mm (LARGE ENTRIES, SUCH AS DOORS)
    - 250mm x 180mm (SMALL ENTRIES SUCH AS GRATES & MANHOLES)
2. THE SIGN SHALL BE MANUFACTURED FROM COLOUR BONDED ALUMINUM OR POLYPROPYLENE
3. SIGN SHALL BE AFFIXED USING SCREWS AT EACH CORNER OF THE SIGN.

EXISTING SERVICES

REV.	DATE	BY	DESCRIPTION	REV.	DATE	BY	DESCRIPTION
----	----	----	----				
----	----	----	----				
----	----	----	----				
----	----	----	----				
----	----	----	----				
A	28.03.18	DV	ISSUED FOR APPROVAL				

DESIGN: SK
DRAWN: DV
SCALE: N/A
SIZE: A1

greenview CONSULTING

APPROVED
ALISTAIR McKERRON
CPEng NPER

PROPOSED ELECTRICAL SUBSTATION
SUSSEX INLET, NSW 2540
ENDEAVOUR ENERGY

GENERAL NOTES

171212
DA
C01

EMERGENCY SURCHARGE TO ADJOINING PROPERTY

PROVIDE 1200 x 1200 FIELD INLET PIT WITH GROSS POLLUTANT TRAP INSERT FOR WATER QUALITY

PROVIDE DIVERSION SWALES ALONG PRIVATE BOUNDARIES TO REDIRECT FLOWS TO TREATMENT AND DETENTION

8 D.P.731147

1% MIN

PROPOSED 6.1m WIDE VEHICLE CROSSING, IN ACCORDANCE WITH COUNCIL STANDARDS.

BIO-RETENTION BASIN WITH BELOW GROUND ABSORPTION TRENCH FOR STORMWATER MITIGATION AND TREATMENT IN ACCORDANCE WITH COUNCILS REQUIREMENTS. VOLUME TO BE DETERMINED FOLLOWING DETAILED DESIGN

TRANSFORMER No.2

TRANSFORMER No.1

PROPOSED PM SUB

RELOCATED EARTH CABINET

RELOCATED FIRE HYDRANT BOOSTER ENCLOSURE TO HYD.ENGINEERS DESIGN.

EASEMENT FOR TRANSMISSION LINE (VIDE W386324)

8 D.P.731147

1% MIN LANDSCAPED AREA

PROPOSED CONCRETE ACCESS DRIVEWAY

6.1m WIDE ENTRY GATE

PROPOSED 6.1m WIDE VEHICLE CROSSING, IN ACCORDANCE WITH COUNCIL STANDARDS.

BM NAIL IN WALL RL.15.68

1 D.P.731147

PROPOSED NEW SUBSTATION

THE SPRING SROAD

45.72

10 D.P.731147

LEGEND:

- EXISTING CONTOURS
- EXISTING FENCE
- EXISTING TELSTRA
- EXISTING WATER
- PROPOSED FENCE
- PROPOSED BUILDING
- PROPOSED KERB OF DRIVEWAY
- PROPOSED FIREWALL
- PROPOSED SWALE
- POWER POLE
- ELECTRIC SYSTEM
- EXISTING SHEET FLOW TO REMAIN
- SITE BOUNDARY

NOTES

1. SUBJECT TO DETAILED DESIGN.
2. THERE PLAN ARE NOT TO BE USED FOR CONSTRUCTION PURPOSES.
3. PROPOSED SWALE AND BIO-RETENTION ARE TO PROVIDE WATER TREATMENT.
4. PROPOSED ABSORPTION TRENCH IS TO BE SIZED IN ACCORDANCE WITH GEOTECHNICAL REPORT AND COUNCILS REQUIREMENTS.

SCALE 0 30 60 Meters
1:100 (A1), 1:200 (A3)

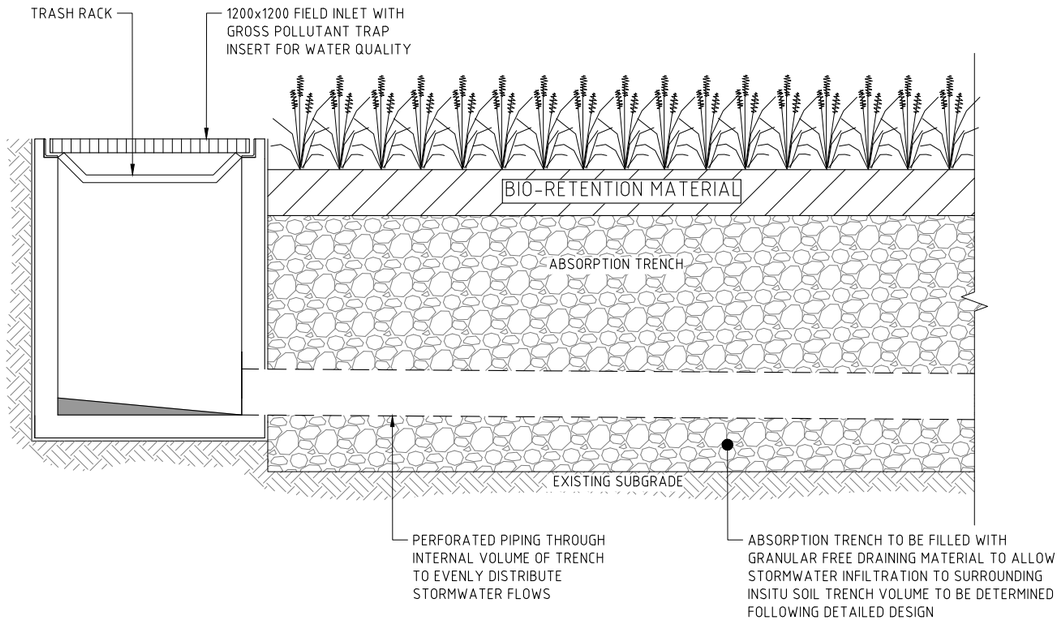
REV.	DATE	BY	DESCRIPTION	REV.	DATE	BY	DESCRIPTION
A	28.03.18	DV	ISSUED FOR APPROVAL				

DESIGN: SK
DRAWN: DV
SCALE: 1:100
SIZE: A1

greenview CONSULTING

PROPOSED ELECTRICAL SUBSTATION
SUSSEX INLET, NSW 2540
ENDEAVOUR ENERGY
CIVIL LAYOUT PLAN

171212
DA
C02



SECTION A - C002
SCALE 1:20

NOTES

1. SUBJECT TO DETAILED DESIGN.
2. THERE PLAN ARE NOT TO BE USED FOR CONSTRUCTION PURPOSES.
3. PROPOSED SWALE AND BIO-RETENTION ARE TO PROVIDE WATER TREATMENT.
4. PROPOSED ABSORPTION TRENCH IS TO BE SIZED IN ACCORDANCE WITH GEOTECHNICAL REPORT AND COUNCILS REQUIREMENTS.

SCALE 0 6 12 Meters
1:20 (A1), 1:40 (A3)

REV.	DATE	BY	DESCRIPTION	REV.	DATE	BY	DESCRIPTION
----	----	----	----				
----	----	----	----				
----	----	----	----				
----	----	----	----				
----	----	----	----				
A	28.03.18	DV	ISSUED FOR APPROVAL				

DESIGN: SK
DRAWN: DV
SCALE: 1:20
SIZE: A1

greenview CONSULTING

PROPOSED ELECTRICAL SUBSTATION
SUSSEX INLET, NSW 2540
ENDEAVOUR ENERGY
STORMWATER SECTIONS AND DETAILS

171212
DA
C03

UNDERGROUND SERVICES, WHERE SHOWN, ARE BASED UPON SURFACE INSPECTION OR SERVICE DIAGRAMS SUPPLIED BY RELEVANT AUTHORITIES. CONTRACTORS MUST MAKE THEIR OWN ENQUIRIES.

Schedule of Trees				
Tag No	Canopy Rad (m)	Trunk (cm)	Height (m)	Code
#1	1	10	3	SHRUB
#2	2	30	3	SHRUB
#3	1	30	3	SHRUB
#4	2	30	5	SHRUB

LEGEND

- Bollard
- Elec joint pit
- PP Power pole
- Hydrant
- WM Water meter
- Mast/pole
- Pit
- Gate
- Fence
- Gas line
- Sewer line
- Telecomms
- Water
- TW. Top of Wall

8
D.P.731147

90°15'10" 45.72

MANPROOF METAL MESH FENCE

EDGE OF CONCRETE

DRY LOCK SHOWER

CONTROL BUILDING

STEPS

CONCRETE BUND

LIGHTNING MAST

3
D.P.536099
2087m²

OVERHEAD SWITCH GEAR

EDGE OF BITUMEN

EASEMENT FOR TRANSMISSION LINE (VIDE W386324)

TOP OF BANK

BOTTOM OF BANK

EDGE OF CONCRETE STRIP

8
D.P.731147

0°15'10" 45.72

MANPROOF METAL MESH FENCE

11kV UG CONCUCTORS

GRAVEL SWITCHYARD

SUSSEX INLET
ZONE SUBSTATION

W/C

DELUGE SHOWER

HYDRANT & BOOSTER

EDGE OF CONCRETE STRIP

BITUMEN

EDGE OF CONCRETE

BM NAIL IN WALL
RL.15.68

1
D.P.731147

270°15'10" 45.72

10
D.P.731147

THE SPRINGS ROAD

M.M.

M.G.A.

INDICATIVE LOCATION ONLY-DETERMINABLE FROM SURVEY. DIAGRAM

NOTE:

1. CONTOURS ARE AN INDICATION OF THE TOPOGRAPHY AND SHOULD ONLY BE USED FOR PLANNING PURPOSES. IF DETAILED DESIGN IS TO BE UNDERTAKEN SPOT LEVELS SHOULD BE USED.
2. BOUNDARIES HAVE NOT BEEN SURVEYED AND DIMENSIONS AND AREA ARE BY TITLE ONLY.
3. BEARINGS ARE ON M.M. MERIDIAN.
4. THE ELECTRONIC VERSION OF THIS PLAN HAS BEEN PREPARED TO APPROXIMATE M.G.A.
5. RELATIONSHIP OF IMPROVEMENTS TO BOUNDARIES IS DIAGRAMMATIC AND IF CRITICAL SHOULD BE CONFIRMED BY A FURTHER SURVEY.
6. UNDERGROUND SERVICES, WHERE SHOWN, ARE BASED UPON SURFACE INSPECTION OR SERVICE DIAGRAMS SUPPLIED BY RELEVANT AUTHORITIES.
7. ORIGIN OF DATUM: SS43982 - RL.15.553 A.H.D. (SCIMS - JAN 2018)

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ISSUE	DATE	AMENDMENT	BY

CLIENT: BREWSTER MURRAY - ARCHITECTS

NOTES:

TITLE: PLAN OF DETAIL AND LEVELS OF SUSSEX INLET ZONE SUBSTATION. THE SPRINGS ROAD, SUSSEX INLET. LOT 3 D.P.536099.

FLEGG & ISHERWOOD PTY LTD
CONSULTING SURVEYORS
7/1 MAITLAND PLACE, BAULKHAM HILLS
Ph: 9659-7222 Email : admin@fai.net.au

REDUCTION RATIO
PLAN: A1: 1:100 A3:
LONG. SECT.: H: 1: - V: 1: -
CROSS SECT.: H: 1: - V: 1: -
1:100 0 1 2 4 6 8 10

SHEET 1 OF 1 SHEETS

DATE: 23-JAN-2018	DWG No.: 13231-9259.01.dwg	REF: 13231-9259.01	
SURVEY: JMI	DESIGN: -	DRAWN: JMI	CHECKED: JMI
DATUM: SEE NOTE	CONTOUR INTERVAL: MAJOR: 1m MINOR: 0.2m	ISSUE 01	A1

Appendix 2

Noise Impact Assessment

DAY DESIGN PTY LTD

A.B.N. 73 107 291 494

CONSULTING ACOUSTICAL ENGINEERS

Suite 17, 808 Forest Road
Peakhurst Sydney NSW 2210
Phone: (02) 9584 2639 Fax: (02) 9584 2619
Email: acoustics@daydesign.com.au
www.daydesign.com.au

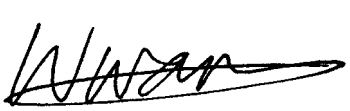
ENVIRONMENTAL NOISE IMPACT
SUSSEX INLET ZONE SUBSTATION
AT SUSSEX INLET, NSW

REPORT NUMBER: **4665-2**

PREPARED FOR: Endeavour Energy Pty Ltd
PO Box 6366
Blacktown NSW 2148

Attention: Mr Stephen Douglas
Telephone: 4252 2838

DATE ISSUED: 9 August 2013

Report Status	Prepared by: William Wang	Approved by: Stephen Gauld
Final		

Document R\4665-r2, 12 pages plus attachments

TABLE OF CONTENTS

1.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by Endeavour Energy Pty Ltd to investigate the environmental noise impact of their Sussex Inlet Zone Substation at Sussex Inlet. This commission involves the following:

Scope of Work:

- Inspect the site and environs.
- Measure the background noise levels at critical locations and times.
- Establish the acceptable noise level criteria.
- Quantify noise emissions from the Zone Substation.
- Calculate the level of noise emission, taking into account distance attenuation and natural topography.
- Prepare a site plan identifying the development and nearby noise sensitive locations.
- Provide reasonable and feasible recommendations for noise control (if necessary).
- Prepare an Environmental Noise Impact Report.

2.0 PROJECT DESCRIPTION & SUMMARY OF FINDINGS

Endeavour Energy supplies electricity to the greater part of Sydney's west, the Blue Mountains, the Illawarra, the Shoalhaven and Southern Highlands regions. To sustain this service they have a number of Substations to convert high voltage electricity to standard 240 volt supply. The transformers used for the conversion typically generate a low frequency 'hum' at 100 Hz.

Sussex Inlet Zone Substation is located on The Springs Road, Sussex Inlet and has two 33 / 11 kV, 15 MVA transformers recently relocated from Nowra Zone Substation.

The Zone Substation is located in a commercial and light industrial area with commercial premises adjoining the site to the north, south and west. The nearest existing residence to the site is on the northern side of Sussex Inlet Road, approximately 300 metres to the north. Opposite the site to the east is vacant land, which is to be developed as a residential development in the future. Details of the proposed development are not known at this stage, however the closest potential lots are at a distance of approximately 40 metres from the existing transformers. The nearest commercial and residential premises and vacant residential land are shown on the attached site plan in Figure 1.

Ambient background noise measurements were carried out near to the vacant residential land and the results are detailed in Section 4 of this report.

Noise control measures have been recommended in Section 7 of this report to reduce the noise emission from the Sussex Inlet Zone Substation to comply with the NSW Environment Protection Authority's Industrial Noise Policy guidelines at all future residences.

3.0 NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis were made with sound instrumentation as follows:

Table 3.1 Noise Instrumentation

Description	Model No.	Serial No.
Infobyte Noise Logger	iM4	105
Condenser Microphone 0.5" diameter	MK 250	3357

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 within 1 dB for long-term measurements. No adjustments for instrument drift during the measurement period were warranted.

4.0 MEASURED AMBIENT NOISE LEVELS

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 Environment Protection Authority as the median value of the (lower) tenth percentile of L_{90} ambient background noise levels for day, evening or night periods, measured over 7 days during the proposed days and times of operation (EPA, 2000).

The places of worst possible annoyance are future residences to be located on vacant land to the east of the Zone Substation. The times of worst possible annoyance will be during night time hours when ambient noise levels are typically at their lowest. Consideration is also given to the nearest existing residence and neighbouring commercial premises to the Zone Substation.

Ambient L_{90} background noise levels were measured at Location 'A' shown on the Site Plan over seven (7) days from Tuesday 19 July 2011 to Wednesday 27 July 2011. These levels are presented in the attached Figure 2 and also in Table 4.1 below.

Table 4.1 Rating Background Level

Noise Measurement Location	Time Period	Rating Background Level
Location 'A' –	Day (7am to 6 pm)	**34 dBA**
Ocean & Earth Factory,	Evening (6 pm to 10 pm)	**34 dBA**
The Springs Road, Sussex Inlet	Night (10 pm to 7 am)	**32 dBA**

Meteorological conditions during the testing consisted of heavy rain and strong winds for the majority of the week. Consequently weather affected data has been excluded from the results. Meteorological conditions during the final days of monitoring consisted of clear skies with negligible wind and this data has been used to determine rating background noise levels in the vicinity of the Zone Substation.

The rating background noise levels shown in Table 4.1 are consistent with a quiet, semi-rural location as is the case at The Springs Road, Sussex Inlet and are therefore considered reliable for the receptor area.

5.0 ACCEPTABLE NOISE LEVELS

5.1 NSW Industrial Noise Policy

The NSW Environment Protection Authority (EPA) published their Industrial Noise Policy in January 2000. The Industrial Noise Policy is specifically aimed at assessing noise from industrial noise sources scheduled under the Protection of the Environment Operations Act 1997 (POEO, 1997).

Sussex Inlet Zone Substation is not a 'scheduled premises' under the Protection of the Environment Operations Act 1997 as Endeavour Energy Pty Ltd is not required to hold a licence under that Act for operations at the site.

The appropriate regulatory authority may, by notice in writing given to such a person, prohibit the person from causing, permitting or allowing:

(a) any specified activity to be carried on at the premises, or
(b) any specified article to be used or operated at the premises,

or both, in such a manner as to cause the emission from the premises, at all times or on specified days, or between specified times on all days or on specified days, of noise that, when measured at any specified point (whether within or outside the premises,) is in excess of a specified level.

It is an offence to contravene a noise control notice. Prior to being issued with a noise control notice, no offence has been committed.

The Industrial Noise Policy provides a useful framework to assess noise emission from non-scheduled premises, whether that premises produces offensive or non-offensive noise.

The Protection of the Environment Operations Act 1997 defines "Offensive Noise" as 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 is likely to be harmful to) a person who is outside the premises 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 regulation.

The limits set out in the NSW Industrial Noise Policy were used as a guide for determining whether predicted levels of noise were considered offensive or not.

5.2 Residential Receptor Noise Intrusiveness Criteria

The EPA states in Section 2.1 of the Industrial Noise Policy that the L_{eq} level of noise intrusion from broad-band industrial noise sources may be up to 5 dB above the L_{90} background noise level at the receptor without being considered offensive.

The Rating Background Level at The Springs Road, Sussex Inlet was 32 dBA at night and 34 dBA in the evening and daytime. Therefore the acceptable L_{eq} noise intrusiveness criteria for **broadband noise** in this area are:

- (34 + 5 =) 39 dBA during the day and evening, and
- (32 + 5 =) 37 dBA at night.

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. Correction factors may be applied to the noise intrusiveness criteria to determine the project specific criteria.

Each of the Nowra Transformers displays tonal characteristics and modifying factors are applicable and are presented in the attached Datasheet AC 500-9.

Therefore the acceptable L_{eq} noise intrusiveness criteria for **tonal and/or low frequency noise** in this area are:

- (34 + 5 – 5 =) 34 dBA during the day and evening, and
- (32 + 5 – 5 =) 32 dBA at night.

5.3 Residential Noise Amenity Criterion

Depending on the type of area in which the noise is being made, there is a certain reasonable expectancy for noise amenity. Table 2.1 of the NSW Industrial Noise Policy 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.

Compliance with the Noise Amenity levels in Table 2.1 will limit ambient noise creep. For example in a rural residential area, the L_{eq} noise emission level may not exceed 50 to 55 dBA in the daytime (7 am to 6 pm), 45 to 50 dBA in the evening (6 pm to 10 pm) and 40 to 45 dBA during the night (10 pm to 7 am).

Wherever the existing L_{eq} noise level from industrial noise sources approaches or exceeds the Amenity criterion 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 existing L_{eq} industrial noise level.

5.4 Commercial Receptor Noise Amenity Criterion

The L_{eq} intrusive noise level criterion at nearby commercial premises is 65 dBA.

5.5 Project Specific Noise Criteria

When all the above factors are considered, we find that the most stringent noise criterion is:

- **39 dBA** for **broadband noise** sources**,** and **34 dBA** for **tonal noise** sources during the day and evening; and
- **37 dBA** for **broadband noise** sources**,** and **32 dBA for tonal noise** sources at night.

These criteria apply at 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.

In addition, the following criteria also apply at the boundary of non-residential areas:

- **65 dBA** at nearby **commercial premises**

6.0 SUSSEX INLET ZONE SUBSTATION NOISE EMISSION

The main sources of noise from the Sussex Inlet Zone Substation are the transformers that operate continually throughout the day and night. The transformer noise level does not change appreciably from the day to the night and therefore the predicted noise level at night will be the worst-case scenario. Two transformers from Nowra Zone Substation have been relocated to the Sussex Inlet Zone Substation.

6.1 Measured Sound Power Levels

Day Design has measured the sound power level of each of the transformers located at the Sussex Inlet Zone Substation.

A schedule of the sound power levels is given in Table 6.1 below with the tonal components shown in bold, typically at 100 Hz and a harmonic at 200 Hz.

Table 6.1 Sussex Inlet ZS 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**
No 1 Transformer 33/11 kV, 15 MVA (16% load)	**84**	67	**90**	**90**	74	73	64	55
		68	72	73	75	67	61	50
		72	70	**82**	77	66	61	48
No 2 Transformer 33/11 kV, 15 MVA (5% load)	**82**	68	**91**	**90**	72	72	56	49
		70	73	73	65	67	55	46
		72	70	**82**	71	60	53	47

Knowing the sound power level of a noise source (see above Table 6.1), 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, ground absorption, sound barriers, atmospheric effects, etc.

6.2 Predicted Sound Pressure Levels

Table 6.2 shows the predicted Sound Pressure Levels at nearby receptors.

Table 6.2 Predicted L_{eq} Sound Pressure Levels at Receptor Locations

Receptor Location	Acceptable Noise Level	Calculated Noise Level	Tonal	Compliance
Nearest Existing Residence 1023 Sussex Inlet Road	32 dBA	28 dBA	Yes	Yes
Vacant Residential Land Potential Nearest Residential Boundary	32 dBA	46 dBA	Yes	**No**
Northern Commercial Boundary Boundary of Zone Substation	65 dBA	56 dBA	Yes	Yes
South / West Commercial Boundary Boundary of Zone Substation	65 dBA	52 dBA	Yes	Yes

The predicted level of noise from the Sussex Inlet Zone Substation is below the acceptable noise limits at each of the nearest existing receiver locations. However, the noise emission from the transformers will exceed the acceptable noise limit of 32 dBA at the nearest future residences in the proposed residential development to the east of the site.

7.0 NOISE CONTROL RECOMMENDATIONS

The Sussex Inlet Zone Substation will meet the noise criteria at all existing residences and no noise controls are required.

However, for the future proposed residences of the adjacent subdivision, the extent of noise controls required will depend on the location of future dwellings, their height, any residential boundary screening, etc. Section 7.1 below provides recommendations for an assumed worst-case scenario of the proposed residences being two-storey buildings at a distance of 40 metres from either transformer.

7.1 Masonry Barriers

- Construct masonry barriers around each of the transformers to a minimum height of 1.5 metres above the main transformer tanks (approximately 6 metres from the ground);
- Masonry barriers should be constructed on the southern, northern and eastern side of each transformer without holes or gaps. (see Figure 3)
- Sound absorptive insulation on the inside faces of the masonry barrier (facing the transformer). The sound absorptive insulation should consist of 100 mm thick polyester insulation (density 32 kg/m^3) such as Tontine Acoustisorb fitted between 100 mm deep battens or purlins and faced with perforated galvanised steel (minimum open area 20%).

7.2 Predicted Noise Levels Following Noise Controls

Table 7.1 below shows the predicted noise level at each receiver location following the noise controls recommended in Section 7.1.

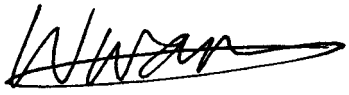
Table 7.1 Predicted L_{eq} Sound Pressure Levels at Receptor Locations – Following Noise Controls

Receptor Location	Calculated L_{eq} Noise Level	Tonal	Acceptable L_{eq} Noise Level	Compliance
Proposed Residential Subdivision Potential Nearest Lot Boundary	32 dBA	Yes	32 dBA	Yes

8.0 NOISE IMPACT STATEMENT

Provided recommendations made in Section 7 of this report are implemented, measurements and calculations show that the level of noise emitted by the Sussex Inlet Zone Substation will meet the Environmental Protection Authority's acceptable noise levels as outlined in the NSW Environmental Noise Policy.

We are of the opinion that sound emitted from this development will not cause "offensive noise" as defined by the Protection of the Environment Operations Act 1997.



William Wang, BE (Mechatronics), MIEAust., MAAS

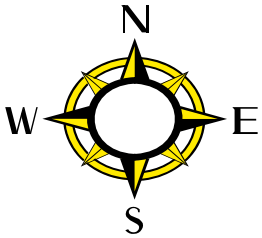
Consulting Acoustical Engineer

for and on behalf of Day Design Pty Ltd.

A.A.A.C. MEMBERSHIP
Day Design Pty Ltd is a member company of the Association of Australian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

Attachments:
- Figure 1 – Site Plan
- Figure 2 – Ambient Noise Survey
- Figure 3 – Noise Control Recommendation
- AC 108-1 to 4 – Glossary of Acoustic Terms
- AC 500-9 – Modifying Factor Correction

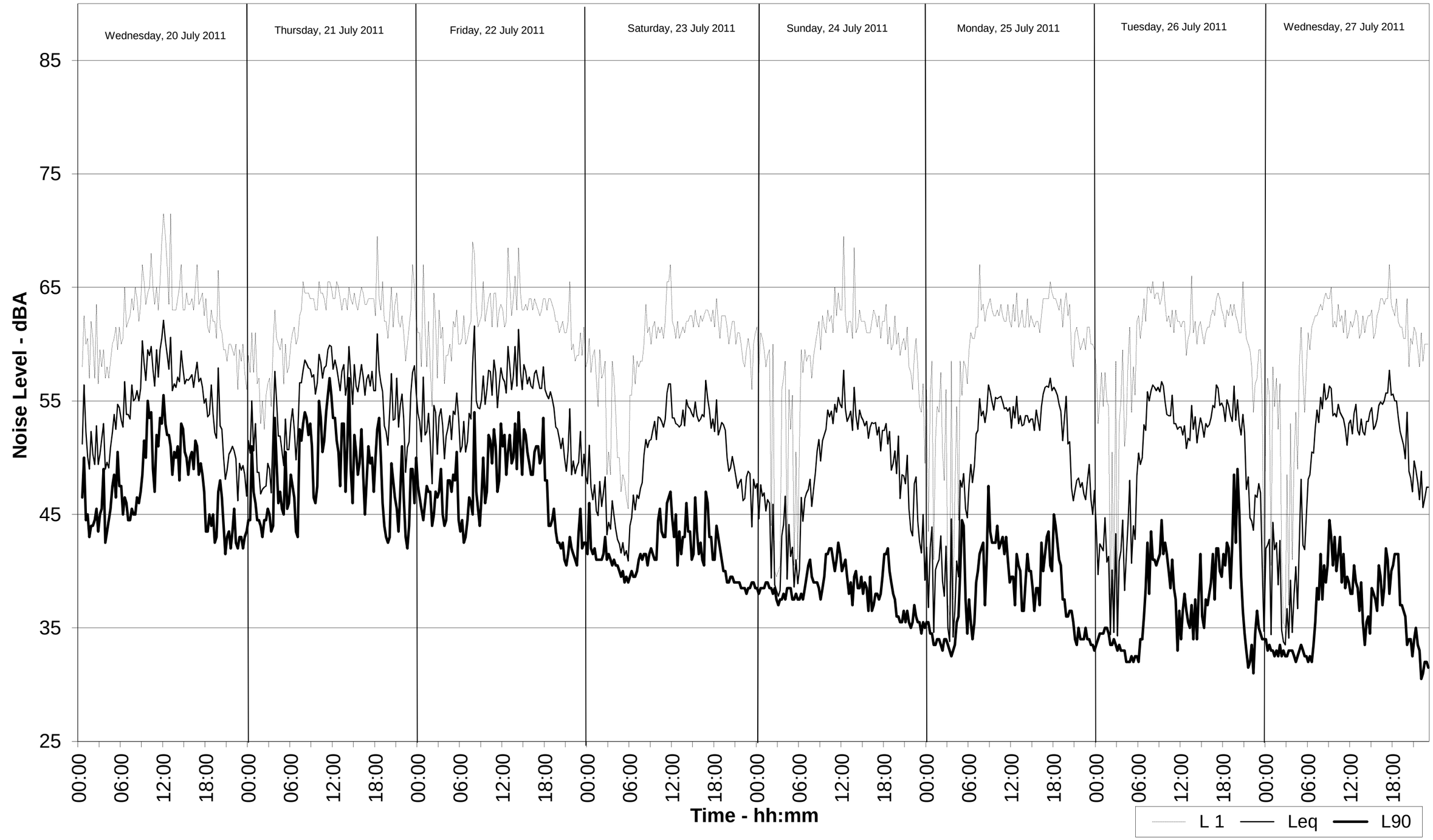
DAY DESIGN	Site Plan Sussex Inlet Zone Substation – Sussex Inlet, NSW	4665 FIGURE 1



Report 4665
Figure 2

Ambient Noise Survey

Located at Ocean and Earth Sussex Inlet Drive, Sussex Inlet, NSW



DAY DESIGN PTY LTD

DAY DESIGN	Sussex Inlet Zone Substation Noise Control Options	4665-2 Figure 3

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 (i.e. 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.

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.

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.

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 – αSound 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 4.1 Modifying factor corrections

(See definitions in Section 4.2)

Factor	Assessment/ Measurement	When to apply	Correction[1]	Comments
Tonal noise	One-third octave or narrow band analysis	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 above 400 Hz - **8 dB** or more if the centre frequency of the band containing the tone is 160 to 400 Hz inclusive - **15 dB** or more if the centre frequency of the band containing the tone is below 160 Hz	5 dB[2]	Narrow-band frequency analysis may be required to precisely detect occurrence
Low frequency noise	Measurement of C-weighted and A-weighted level	Measure/assess C- and A-weighted levels over same time period. Correction to be applied if the difference between the two levels is 15 dB or more	5 dB[2]	C-weighting is designed to be more responsive to low-frequency noise
Impulsive noise	A-weighted fast response and impulse response	If difference in A-weighted maximum noise levels between fast response and impulse response is greater than 2 dB	Apply difference in measured levels as the correction, up to a maximum of 5 dB.	Characterised by a short rise time of 35 milliseconds (ms) and decay time of 1.5s
Intermittent noise	Subjectively assessed	Level varies by more than 5 dB	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 24-hour period	0 to –20 dB(A)	The acceptable noise level may be increased by an adjustment depending on duration of noise. *(See Table 4.2)*
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.*
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.*

Appendix 3

Bushfire Assessment Report

REF: 2823BF

MAY 10, 2018

PROPOSED SUSSEX INLET ZS RENEWAL BUSHFIRE ASSESSMENT REPORT

THE SPRINGS ROAD, SUSSEX INLET, NSW

LGA: Shoalhaven

Lot 3 DP 536099

Endeavour Energy

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BPAD Bushfire Planning & Design Accredited Practitioner Level 3

BUSHFIRE ASSESSMENT REPORT FOR REF

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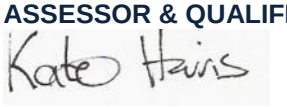
PREPARED BY

BENVSC (HONS)

ASSESSOR & QUALIFICATIONS



BPAD-L3-26927
GRAD DIP BUSH FIRE PROTECTION, UWS
GRAD DIP ENVIRO MANG HERTS, UK,
GRAD DIP NAT RES UNE,
BSC APP SC, AGRICULTURE HAC

Report prepared by Letara Judd
Site Inspection, Report check and Approved by Kate Harris

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This report aims to achieve the objectives of the PBP (2006):

1. Afford occupants of any building adequate protection from exposure to bushfire;
2. Provide for a defensible space to be located around buildings;
3. Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;
4. Ensure that safe operational access and egress for emergency service personnel and residents is available;
5. Provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in the asset protection zone (APZ);
6. Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bush firefighting).

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FIGURES

EXECUTIVE SUMMARY

This Bushfire Hazard Assessment was prepared for the proposed upgrade of the existing Sussex Inlet Endeavor Energy Zone Substation at Lot 3, The Springs Road, Sussex Inlet.

The proposal involves the construction of a new Class 8 Control Building with Cable Basement, loading dock and amenities. There are also two new firewalls proposed to be constructed adjacent to the existing transformers.

In accordance with AS3959 -2009 *Construction for Buildings in Bushfire Prone Areas* and *Planning for Bushfire Protection 2006* the following Bushfire Attack Levels (BAL) for the proposed substation are:

- Bushfire Attack Level (BAL) 40 on the southern façade;
- Bushfire Attack Level (BAL) 29 on the northern, eastern and western facades.

This assessment identifies the main bushfire threat to the proposed new control building be:

ELEVATION	VEGETATION CLASSIFICATION	DISTANCE
Southern	*Remnant* : Level within the adjacent commercial grounds *Forest* : Downslope 0-5 degrees	9 m 68 m
Northern	*Remnant* : Level within the adjacent commercial grounds *Forest* : Downslope 0-5 degrees	33 m 65 m
Eastern	*Remnant* : Downslope 0-5 degrees along the roadside reserve on the opposite side of The Springs Road	21 m

The substation will have an outdoor switchyard and therefore according to the MMI 0013 Vegetation Clearance Management (Endeavour Energy 2017) section 5.6.7 requires a 10 m clearance out from the fence boundary. This clearance is required to be clear to the sky and the area must be cleared of fall-in vegetation hazard defects. Within the zone substation fence no vegetation (including grass and weeds) is permitted. Surrounding the boundary fence, up until the clearance distance, only mown grass is permitted.

In relation to the substation, there are two small clusters of unmanaged remnant forest with the trunks and overhanging branches located within 10 m from the boundary fence of the substation. If these remnants sustained a fire, there is an increased likelihood of exposure of the substation to flame as well as increased risk of burning debris ignited by windborne embers. It is recommended in this assessment that these clusters be managed for fuel load and removed.

Larger potential fire fronts are located on the western, northern and southern elevations which are located over 60 m away and should a bushfire event occur, the subject site would be vulnerable to ember attack.

Reticulated water is supplied to the subject site and a fire hydrant is provided on the northern side of the entry gate.

1. PROPOSAL

Endeavour Energy proposes to upgrade the existing Sussex Inlet Zone Substation. The proposed design has been prepared by Brewster Murray Pty Ltd and involves:

- Constructing a new 11kV control building with cable basement and loading dock and amenities;
- Installing all associated underground cable conduits;
- Constructing all related site works including driveway pavements, retaining walls, gravel yard surfacing and security fencing;
- Installing building and site stormwater drainage;
- Installing new firewalls to existing transformer bays;
- Demolish existing 11kV outdoor switchyard.

Harris Environmental Consulting was commissioned to provide this bushfire assessment for the Review of Environmental Factors (REF).

Figure 1 shows the subject site location. Figure 2 shows the proposed plan. Figure 3 shows an aerial view of the subject site and proposed plan. The subject site is located on The Springs Road and is approximately 1940 m^2 in size.

FIGURE 1 LOCATION OF SUBJECT SITE (SOURCE: SIXMAPS)

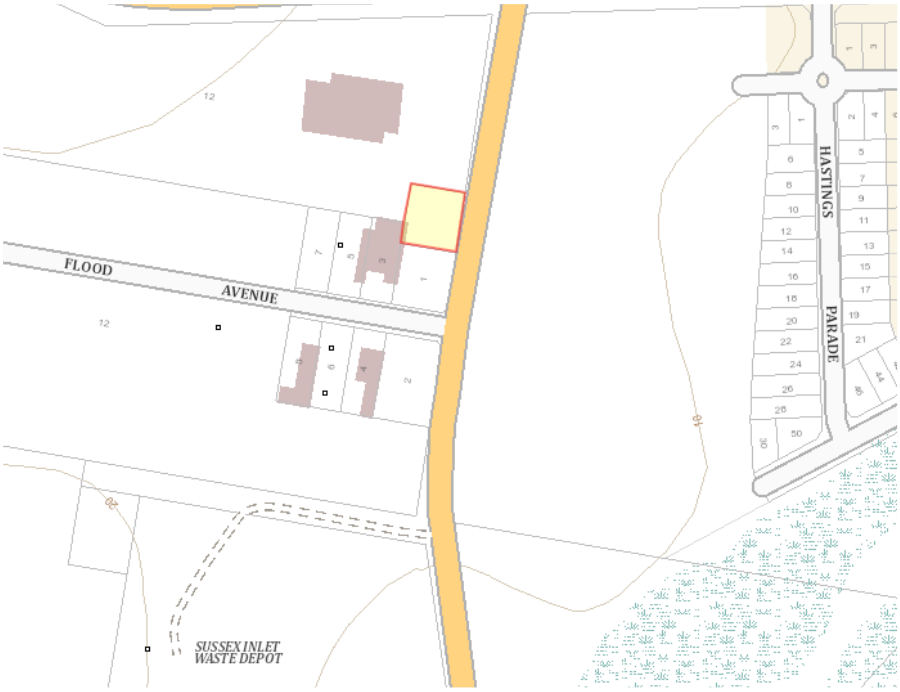


FIGURE 2 PROPOSED SITE PLAN AERIAL

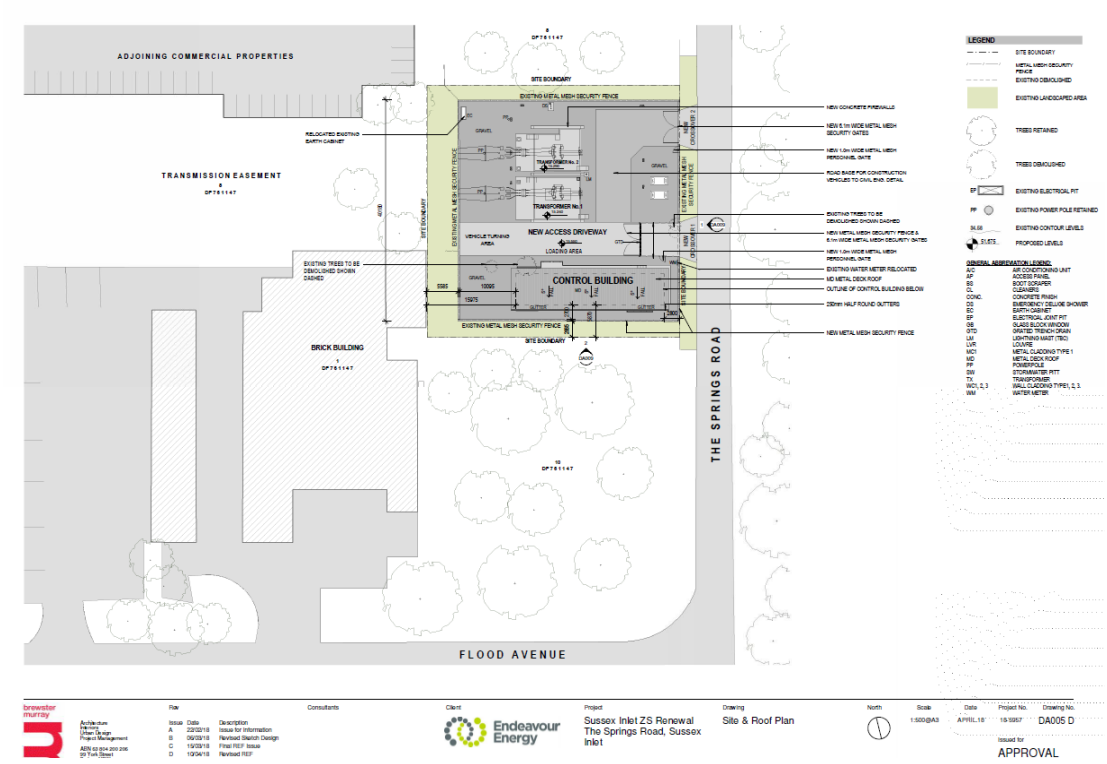


FIGURE 3 PROPOSED PLANS IMPOSED ON AERIAL

2. PROPERTY DESCRIPTION

The existing Zone Substation contains electrical infrastructure consisting of power transformers, an outdoor switchyard and an existing control building on the northern side of the subject lot. The Substation is located on the western outskirts of Sussex Inlet within a commercial estate. Recently a housing development has commenced on the eastern side of The Springs Road.

Figure 4 shows the broadscale aerial view of the site and the large unmanaged areas of vegetation located more than 100 m away on the north, west and south. The Bushfire Prone Land Map from Shoalhaven City Council is provided in Figure 5. The subject site is mapped Vegetation Buffer. Figure 6 shows the Shoalhaven LEP Zone Map and shows the subject site is mapped "SP2 Infrastructure".

Figure 4 Aerial view of Subject Site (NEARMAP, 2018)

Figure 5 Bushfire Prone Land Map

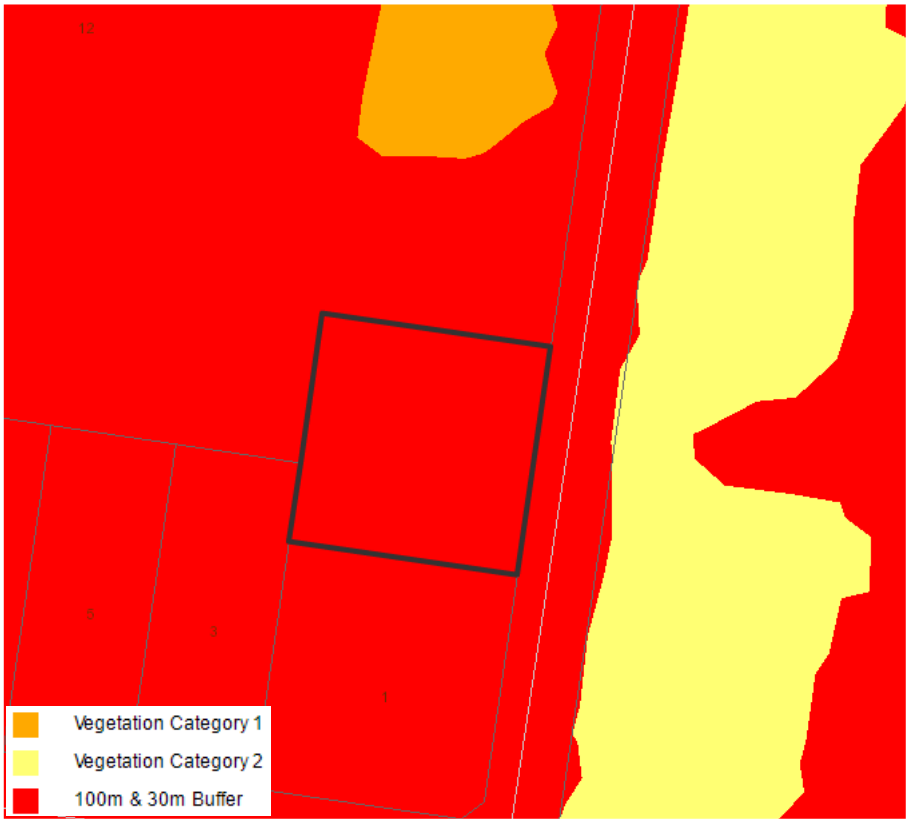
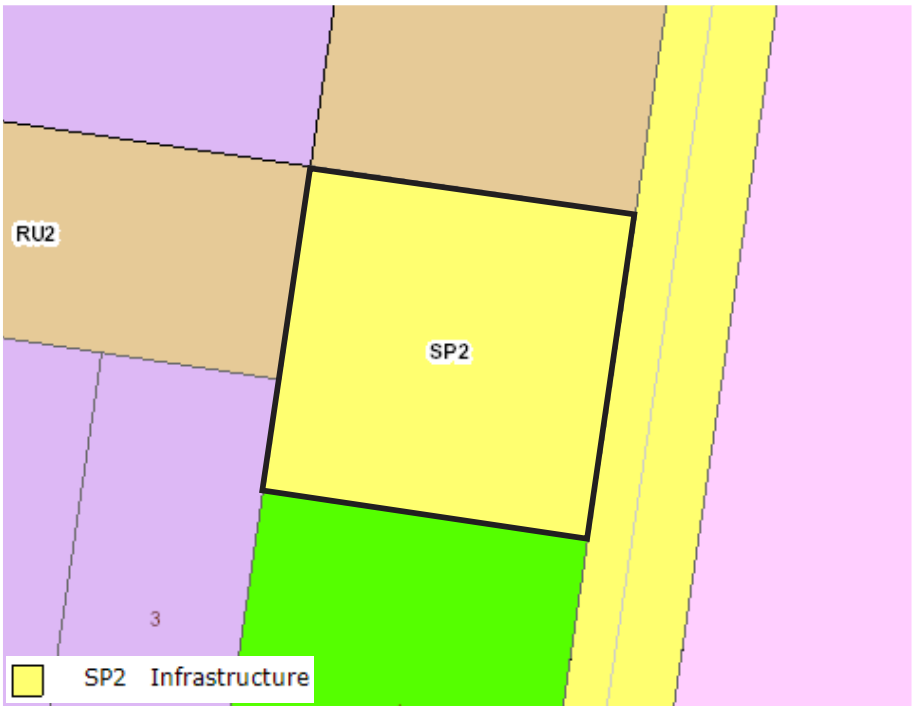


Figure 6 LEP Zone Map



3. BUSHFIRE HAZARD ASSESSMENT REQUIREMENTS

The substation is a non-habitable building and therefore classified as Class 8 under the Building Code of Australia. For development approval, Endeavor Energy will self-determine the proposed development under the State Environmental Planning Policy (Infrastructure) 2007. The design of the project shall go through a public consultation process and wherever practical shall meet the requirements of the current Local Environmental Plan (LEP) and Development Control Plans (DCP). The design and construction of buildings in bushfire prone areas shall conform to AS 3959:2009. The floors of permanent buildings shall be concrete.

The major issue in these situations is to determine whether staff have a capacity for firefighting response and/or adequate emergency and evacuation planning in place.

Consideration of the following is relevant:

- An adequate APZ (defendable space) is provided;
- Mechanisms are in place to provide for the maintenance of the Asset Protection Zones (APZ) over the life of the development, is wholly within the boundaries of the development site;
- Buildings are sited and designed to minimise the risk of bush fire attack;
- Safe operational access is provided (and maintained) for emergency services personnel in suppressing bushfire while residents are seeking to relocate, in advance of a bushfire;
- Adequate water and utility services are provided for firefighting operations. Electricity assets are located so as not to contribute to the risk of fire to a building;
- Any staff located on site are provided for with safe emergency evacuation procedures with a bush fire emergency management plan;
- Landscaping is designed and managed to minimise flame contact and radiant heat to buildings and the potential for wind driven embers to cause ignitions.

The Fire Rating Index (FDI) is determined by the NSW RFS for fire areas and council areas across NSW and assumed for a 1 in 50 year event (Table A2.3, RFS 2006). The Shoalhaven region has been determined to have an **FDI rating of 100** for a 1 in 50 year event.

Effective slope is calculated as the gradient within the hazard which will most significantly influence the fire behavior of the site. The Australian Standard AS3959-2009 identifies that the slope of the land under the classified vegetation is much more important than the slope between the site and the edge of the classified vegetation.

4. APZ ASSESSMENT

4.1 VEGETATION FORMATIONS

Figure 6 shows the landscape within 140 m distance of the subject site. The vegetation formations are described below:

Northern Elevation
The land on the northern elevation is managed for 33 m from the proposed control building. The land located 33 m away is considered level and classified “Remnant”. This is shown in Photo 1. The land located 65 m away is considered downslope 0-5 degrees and classified “Forest”. Photo 2 shows a view looking towards vegetation separated by a driveway for a factory complex.

Southern Elevation
The land on the southern elevation is managed for 9 m from the proposed control building. The land located 9 m away is considered level and classified “Remnant”. This is shown in Photo 2. The land located 68 m away is considered downslope 0-5 degrees and classified “Forest”. The Forest and Remnant vegetation is separated by, Flood Avenue, a public road.

Eastern Elevation
The land located on the eastern elevation is managed for 21 m from the proposed control building. This includes The Springs Road, a public road. The Road Side Reserve located 21 m away is considered downslope 0-5 degrees and classified “Remnant”. This is shown in Photo 4.

Western Elevation
The land on the western elevation consists of a cleared, managed electricity easement containing existing power lines and an existing factory complex. The warehouse directly west of the subject lot is within 3 m of the boundary fence but also within 3 m of the unmanaged remnant.

Figure 7 Bushfire vegetation formations within 140m of Sussex Inlet ZS

Photo 1 View of managed land and Remnant on northern elevation

Photo 2 View of remnant on northern elevation with driveway and forest

Photo 3 View of managed land and Remnant on southern elevation

Photo 4 View of remnant roadside reserve on eastern elevation

4.2 TOPOGRAPHY

The slope that would most significantly influence fire behavior was determined over a distance of 100m out from the proposed building footprints. This assessment was made using digital contour map with 10 metre contour intervals and field inspection. These contours are also shown in Figure 8.

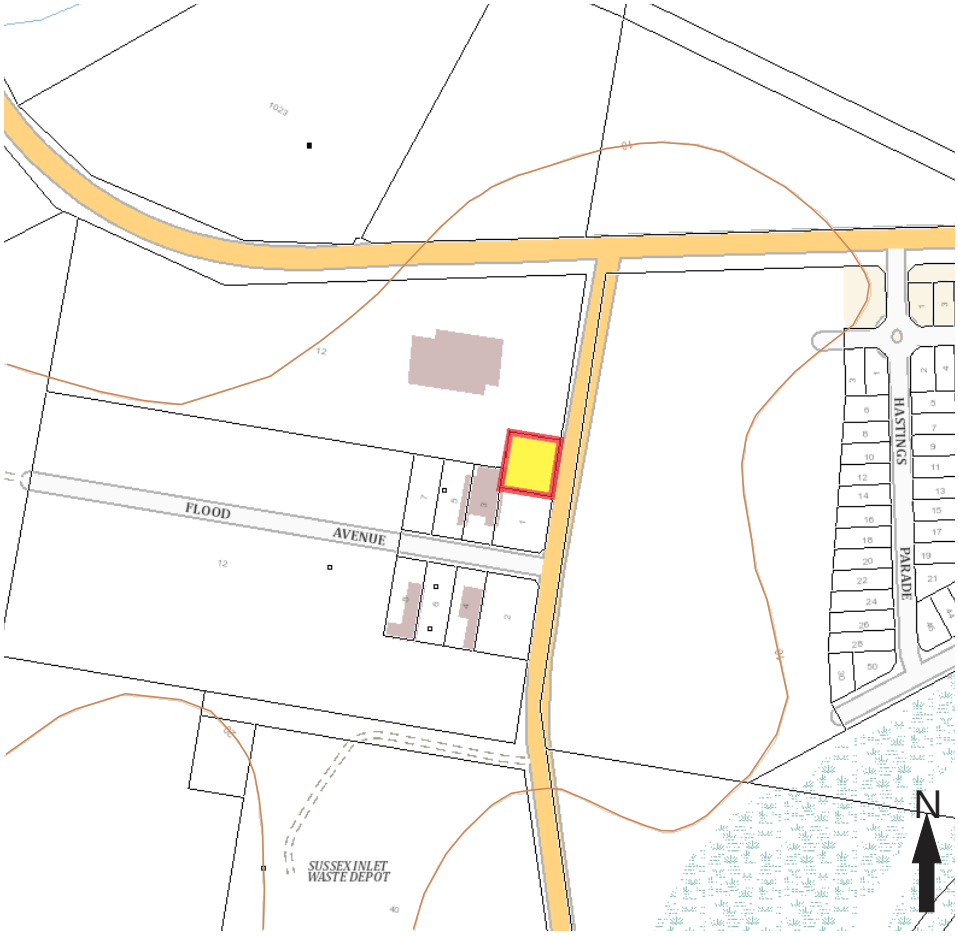
Field measurements were made using a hand-held clinometer. Table 1 summarises the identified effective slope in accordance with the PBP (2006) to a distance of 100m.

The subject site is located on land that is considered level. Table 1 provides the effective slope for the elevations.

Table 1 Effective Slope

ELEVATION	North	South	East	West
TOPOGRAPHY	Downslope 0-5 degrees	Downslope 0-5 degrees	Downslope 0-5 degrees	Level

Figure 8 Topographic map from SIX maps with subject site highlighted



4.3 IDENTIFICATION OF SIGNIFICANT ENVIRONMENTAL FEATURES

Endeavour Energy has provided a copy of their preliminary design plans for the proposal. Since the works will be fully confined to the existing cleared ZS site, the documentation provided did not contain any studies of environmental significance.

The substation site is currently devoid of vegetation and will be maintained in this condition into the future. Endeavour Energy's land between the substation fence and the property boundary is cleared of vegetation.

Ideally, the vegetation on both adjoining properties to the north and south require management to provide vegetation clearing clear to the sky for at least 10 m to protect the substation, however this vegetation is located on neighbouring property. It is suggested that the adjoining property owners could be approached in regards to this matter.

4.4 MINIMUM APZ REQUIRED

Table A2.4.2 from AS 3959- 2009 has been used to determine the width of the required APZ using the vegetation and slope data identified. Sussex Inlet is located in the Shoalhaven Fire Area and is set by the Planning for Bushfire Protection (RFS, 2006) as a Fire Danger Index of 100.

Table 2 provides the APZ and BAL determination for the proposed Control Building.

The existing APZ should be maintained for perpetuity over the subject lot.

Table 2 APZ and BAL Determination for proposed Control Building

	NORTH	***NORTH***	***SOUTH***	***SOUTH***	***WEST***	***EAST***
GRADIENT	Level	Downslope 0-5 degrees	Level	Downslope 0-5 degrees	Level	Downslope 0-5 degrees
VEG	Remnant	Forest	Remnant	Forest	Forest	Remnant
Distance between building subject site and hazard	33 m	65 m	9 m	68 m	80 m	20 m
Table 2.4.2 AS3959 for BAL 40			8-<11 m			
Table 2.4.2 AS3959 for BAL 29						
Table 2.4.2 AS3959 for BAL 19						20-<29 m
Table 2.4.2 AS3959 for BAL 12.5	23-<100 m	57-<100 m		57-<100 m	48-<100 m	
BAL Required	**BAL 29**	**BAL 29**	**BAL 40**	**BAL 29**	**BAL 29**	**BAL 29**

5. RELEVANT CONSTRUCTION STANDARD

As stated previously, the proposed Control Building is a Class 8 under the Building Code of Australia classification and will be required to built to:

- BAL 40 on the southern elevation;
- BAL 29 on the northern, eastern and western elevations.

BAL 40 is primarily concerned with protection of the building from ember attack and burning debris ignited by wind borne embers and exposure to a high level of radiant heat up to and including 40 kW/m^2. There is also some likelihood of direct exposure to flames from the fire front.

The proposed building will be constructed on a slab, with non-combustible external walls. The following provides some of the requirements of BAL 40:

- All joints in the external surface material of the walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm.
- Any vents or weepholes shall be screened with a mesh with a maximum aperture of 2 mm ,made of corrosion –resistant steel, bronze or aluminum ,except where the vents and weepholes have an aperture less than 3 mm.
- Window assemblies and doors shall comply with AS 3959 2009 requirements for BAL 40.
- The roof is required to be non-combustible and wall junctions sealed to prevent openings greater than 3 mm. roof ventilation openings such as gable ort roof vents are to be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze.
- Sheet roofs shall be fully sarked with sarking which is breather –type sarking complyiong with AS/NZS 4200.1 and with a flammability index of not more than 5 (see AS 1530.2) and sarked onn the outside of the frame with no gaps greater than 3 mm (under corrugations or ribs of sheet roofing and between roof components,) sealed at fascia or wall line and at valleys, hips and ridges.

6. SUMMARY

- As specified by AS3959 -2009 Construction for Buildings in Bushfire Prone Areas the proposed Control Building will be required to be constructed to:
    - BAL 40 on the southern elevation;
    - BAL 29 on the northern, eastern and western elevations;

- It is suggested Endeavour Energy approach the owners of the adjoining property to the north and south to discuss vegetation management options required to achieve 10 m APZ to the sky from the substation fence;

- Within the zone substation fence no vegetation (including grass and weeds) is permitted. Surrounding the boundary fence, up until the clearance distance, only mown grass is permitted.

7. REFERENCES

Endeavour Energy (2016) *Substation Design Instruction,* Po Box 811 Seven Hills 1730

Endeavour Energy (2017) *Vegetation Clearance Management*, Po Box 811 ,Seven Hills 1730

Keith, D. (2004) "Ocean Shores to Desert Dunes" Department of Environment and Conservation, Sydney

NSW Rural Fire Service (2006) *Planning for Bushfire Protection. A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners*.

Standards Australia (2009) *AS3959, Construction of buildings in bushfire-prone areas.*

Appendix 4

EPBC Act Protected Matters Report

Australian Government
Department of the Environment and Energy

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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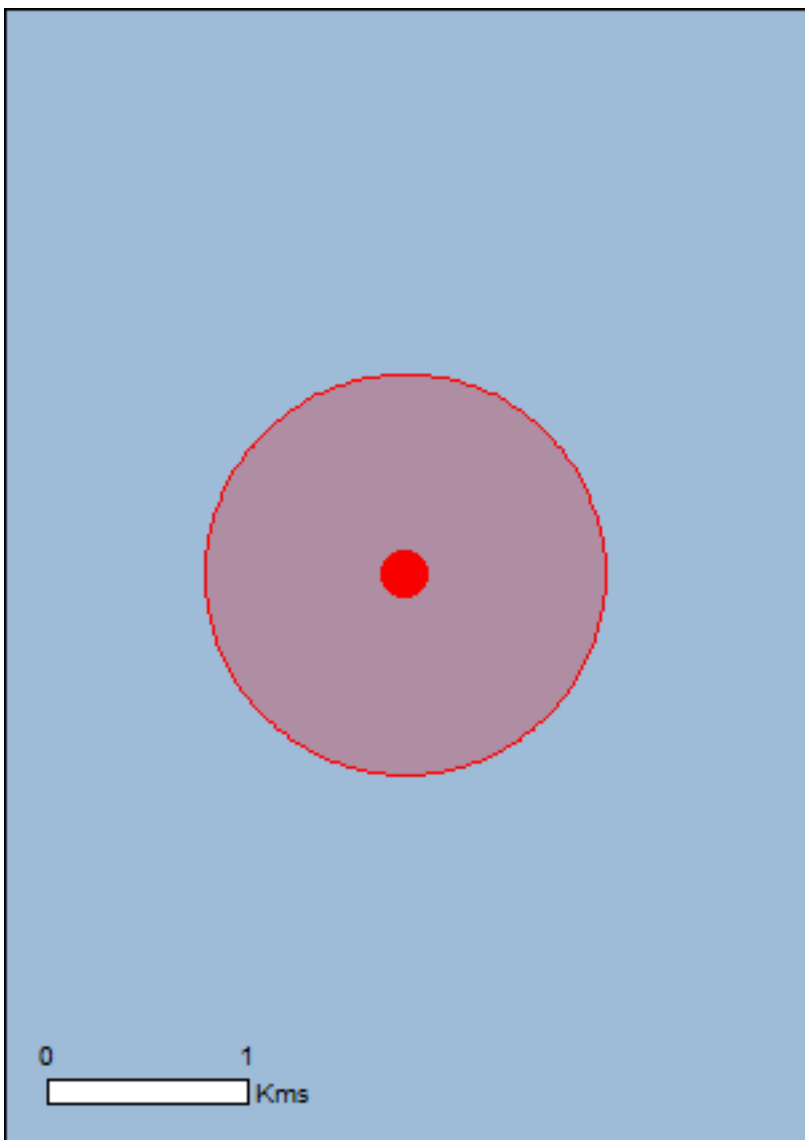
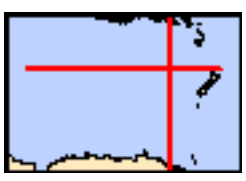


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 1.0Km



Summary

Matters of National Environmental 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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	32
Listed Migratory Species:	17

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 http://www.environment.gov.au/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 Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	25
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	28
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	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.

Name	Status	Type of Presence
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Fish		
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
Heleioporus australiacus		
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat may occur within area
Litoria aurea		
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni		
Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Isoodon obesulus obesulus		
Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat may occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Caladenia tessellata		
Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat known to occur within area
Cynanchum elegans		
White-flowered Wax Plant [12533]	Endangered	Species or species habitat may occur within area
Genoplesium baueri		
Yellow Gnat-orchid [7528]	Endangered	Species or species habitat may occur within area
Melaleuca biconvexa		
Biconvex Paperbark [5583]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Pterostylis gibbosa		
Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
Syzygium paniculatum		
Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Hoplocephalus bungaroides		
Broad-headed Snake [1182]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Hirundapus caudacutus](#) White-throated Needletail [682]		Species or species habitat known to occur within area
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area
[Monarcha trivirgatus](#) Spectacled Monarch [610]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area
[Neophema chrysogaster](#) Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
[Pachyptila turtur](#) Fairy Prion [1066]		Species or species habitat likely to occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat likely to occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Conjola	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Southern RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

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

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-35.16014 150.57887

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.

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Appendix 5

Project Definition

TS155

ASSET STANDARDS & DESIGN

PROJECT DEFINITION
T – 1797

SUSSEX INLET ZS
STAGE 2 RENEWAL

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1 PURPOSE

The project is required to satisfy the renewal requirements as stated and approved in Business Case TS155. These works shall be done in accordance with SAMP item TS155.

2 BACKGROUND

Asset Strategy & Planning Branch has identified that the 11kV busbar and associated support structures have corrosion damage and have reached the end of their service life at Sussex inlet ZS as per the Business Case attached as Appendix 9. Furthermore, the 11kV busbar is equipped with a single bus-section isolator which cannot be maintained without a complete outage of the substation and has sub-standard clearances which are a hazard for operation and maintenance workers. The design and condition of this equipment is a safety issue and will be replaced as part of this project.

This project definition covers the installation of a new control building to house new control panels and 11kV switchgear. The existing 11kV outdoor equipment will be demolished following the installation of the new indoor switchgear.

3 BUDGET

The budget provision for the total project associated with SAMP project TS155 is $6M plus a contingency of $600k (refer to Appendix 10 and 11).

Note
The above budget only provides Gate 2 approval as per Company Procedure GRM 0051 which allows for the following tasks to occur:

- *Completion of project/program design.*
- *Placing orders for long lead time standard inventory.*
- *Seeking pricing from the market for externally delivered works.*

*Gate 2 approval does **not** provide approval to award non-recoverable contracts, ie. civil/construction or low consumption materials such as 11kV cables where the likely use may not be evident in the immediate future.*

At the completion of Gate 2 tasks, the Project Manager shall request a review of the project budget by Substation Design Section and develop a business case seeking Gate 3 approval. This business case shall be endorsed and approved as per the delegations outlined in Company Procedure GRM 0051.

4 STANDARDS AND SAFETY REQUIREMENTS

The work shall be in accordance with the Substation Design Instructions SDI501 – 547, Protection Design Instructions PDI1000 – 5000, Mains Design Instructions MDI0024 - MDI0050, Environmental Management Standards EMS0001 – 0014, Earthing Design Instructions EDI001 – 516, Automatic Design Instruction ADI0001 – 0012, Equipment Technical Specification ETS0001 – 0086, ENA Industry Guidelines and the Australian Standards as appropriate.

Where the Australian Standards and the Endeavour Energy Network's standards conflict, the latter shall be used.

The Project Manager, Subcontractors and their employees shall abide by the Electricity Supply (Safety & Network Management) Regulation 2008, Work Health and Safety Regulation 2011 and the Endeavour Energy Electrical Safety Rules and Environmental Management Standards (EMS) during this project. The Project Manager shall have the appropriate work place instructions and contingency plans in place to cover related safety, environmental and operational issues as outlined in Endeavour's Corporate Procedures (Safety - Electrical) and Corporate Procedures (Safety - General) and in accordance with the relevant EMS's.

The Project Manager shall ensure that a safe work method statement (SWMS) is produced to cover all works in line with WorkCover requirements.

The Project Manager shall advise the Disposal Co-Ordinator of the redundant goods and equipment to be disposed. If required by the Disposal Co-Ordinator, the Project Manager shall request a Business Case for the disposal from the relevant Regional Transmission Manager. (All equipment to be disposed shall be disposed in accordance with Business Procedure GSU0006, GSU0009 and GSU0012.

A risk evaluation process must be completed which includes an analysis based on the principals of Company Procedure GRM003 – "Risk Analysis" and also a "Safety in Design" process (required under the NSW Work Health Safety Act 2011) must be completed as per Branch Procedure TTB 0046 – Safe Design In Project Development, before completing the design. This process must identify all risks and provide treatment options to manage the risks.

The risk evaluation and "Safety In Design" processes must be completed before Gate 3 approval as this will provide a process to raise additional funds for works to be performed to eliminate or reduce any safety risks which are not covered by the scope of the project definition.

Note: The design for this project shall be based on Endeavour Energy standards that were current as per the following table unless the standards have been amended for safety reasons:

STANDARD No.	***DESCRIPTION***	***DATE ISSUED***
	Automation Design Instruction	
ADI0001	Radio Communications Site Requirements	30/5/16
ADI0002	Requirements For SCADA And Communication In Customer Funded Installations	25/6/14
ADI0006	Substation Communications Systems	31/3/16
ADI0012	Automation Design Instruction	30/1/15
	Earthing Design Instruction	
EDI001	Earthing Risk Assessment	13/2/17
EDI004	Earthing Design, Construction & Testing Of Overhead Transmission Mains	27/3/15
EDI006	Earthing Construction Standard	4/7/17
EDI516	Major Substation Earthing	26/4/17
	Environmental Management Standards	
EMS0001	Environmental Impact Assessment & Environmental Management Plans	11/10/17
EMS0004	Managing Vegetation Near Electrical Infrastructure & Pest, Weed & Disease Mitigation	10/2/17
EMS0005	Substation Landscaping	29/5/15
EMS0006	Maintenance & Construction Of Access Tracks	5/3/15

EMS0007	Oil Management	25/9/17
EMS0008	Environmental Incident Response & Management	30/1/17
EMS0012	Notification Of Access To National Parks & Water NSW Special & Controlled Areas	30/5/17
EMS0013	Spoil Management	23/12/15
EMS0014	De-watering Worksites	6/3/17
EMS0016	Industrial & Construction Noise	14/9/17
Equipment Technical Specification		
ETS0003	11kV, 22kV & 33kV Indoor Metal-Enclosed Switchgear	11/9/14
ETS0004	11kV To 132kV Single Core Power Cables	21/6/12
ETS0005	15MVA, 25MVA & 35MVA Power Transformers	30/10/12
ETS0006	45MVA, 60MVA & 120MVA Power Transformers	30/10/12
ETS0007	33kV/66kV/132kV Outdoor Disconnectors & Earthing Switches	14/3/17
ETS0008	OPGW – Optical Ground Wire	24/7/17
ETS0009	33kV, 66kV & 132kV Outdoor Post Instrument Transformers	27/2/15
ETS0010	Insulating Oil	4/7/16
ETS0011	132kV/66kV/33kV/22kV/11kV Transmission Surge Arresters	15/5/17
ETS0012	66 & 132kV Indoor GIS	21/12/15
ETS0014	Protection & Control Panels	3/1/13
ETS0018	Audio Frequency Injection Control Equipment	14/11/14
ETS0020	Portable Earthing & Short Circuiting Equipment	15/7/15
ETS0022	33kV, 66kV & 132kV Outdoor Dead Tank Circuit Breakers	3/12/14
ETS0025	33kV to 11kV Package Substation	12/11/13
ETS0027	33kV, 66kV & 132kV Shunt Capacitors Banks	17/4/15
ETS0028	5MVA & 10MVA 66/11kV Power Transformers	22/3/16
ETS0029	Regenerated Mineral Insulating Oil	16/7/14
ETS0030	15MVA 132/11kV Power Transformer	1/8/14
ETS0031	11kV Vacuum CB Truck Retrofits For Bulk Oil CB's	12/2/15
ETS0032	Natural Ester Insulating Oil	13/12/15
ETS0043	Underground Fibre Optic Cable Specification	29/1/15
ETS0052	Timber Poles	27/11/17
ETS0062	Line Fault Indicators	24/7/17
ETS0063	Electrical Conduit, Conduit Fittings, Cable Protection Covers and Marker Tape	15/12/17
ETS0064	Bare Overhead Conductors	10/5/12
ETS0068	Distribution Indoor & Padmount Substation 12-24kV Switchgear	17/11/16
ETS0081	Installation Conduits Using Trenchless Techniques	11/1/13
ETS0084	11kV & 22kV Distribution Cable Joints & Terminations	1/12/15
ETS0085	Battery Systems	11/4/16
ETS0086	Cable Clamps	28/3/14
ETS0089	Earthing Cables	15/7/15
ETS0103	33kV, 66kV & 132kV Transmission Cable Joints & Terminations	24/10/16
ETS0104	Steel Pole	28/8/17
ETS0106	Overhead Line Fittings	22/11/17
Mains Design Instructions		
MDI0024	Installation Of Non-Network Attachments On EE Structures	29/2/16
MDI0031	Overhead Line Design	4/10/17
MDI0042	Overhead Conductor Rating	2/8/16
MDI0044	Easement & Property Tenure Rights	6/03/17
MDI0045	Cable Sheath Bonding Design	30/10/17
MDI0046	Transmission Underground Cables – Continues Current Ratings	16/10/17
MDI0050	Network Power Quality Limits & Levels	28/5/15
MDI0051	Underground Transmission Mains Design	28/11/17

Protection Design Instructions		
PDI1000	Protection Of High Voltage Plant	3/5/16
PDI4002	Current Transformers For Protection	29/1/16
PDI4003	Protection CT & Link Design Layout, & Wiring Specifications	20/2/14
PDI4005	Protection Of High Voltage Customer Substations	26/6/15
PDI4009	Protection Relay Flagging Codes	5/2/14
PDI5000	Protection Of Embedded Generation Systems	9/3/16
Standard Asset Data		
SAD001	Project Drawings Standards	20/11/17
SAD006	Transmission Substation Design	11/3/14
SAD009	Network Asset Numbering	15/12/16
Substation Design Instructions		
SDI501	Network Configuration	14/3/17
SDI503	Transmission & Zone Substation Fire Detection, Control & Suppression	6/7/17
SDI505	Minimum Design & Construction Requirements For Transmission & Zone Substations & Switching Stations	25/11/15
SDI509	Fire Hydrants	29/9/15
SDI510	Buildings	27/6/16
SDI511	Auxiliary AC Supplies & Switchgear	12/5/16
SDI513	Substation Batteries & Battery Chargers	30/11/16
SDI514	Access Roads & Driveways	6/2/15
SDI515	Drawings	11/1/16
SDI517	Busbar & Support Insulators	9/3/16
SDI518	Support Structures	21/4/16
SDI520	Lightning Protection & Insulation Co-Ordination	5/2/15
SDI522	Emergency Deluge Showers	3/7//17
SDI523	Switchyard Surfaces	30/4/15
SDI524	Fencing & Perimeter Security At Zone & Transmission Substations, & Switching Stations	18/6/14
SDI526	Control Cabling, Panels & Terminations	18/12/14
SDI527	Clearances	11/10/13
SDI528	Substation Signs & Equipment Labels	25/11/16
SDI529	Light & Power	27/4/17
SDI531	Installation Of Conduits In Transmission/Zone Substations & Switching Stations	27/5/16
SDI532	Plumbing & Drainage	24/6/16
SDI533	Toilets	29/1/15
SDI534	Manuals, Test Reports & Photographs	17/3/16
SDI535	Testing & Commissioning	25/6/15
SDI536	Environmental Considerations For Transmission/Zone Substations & Switching Stations	29/1/16
SDI537	Security Systems In Transmission/Zone Substations & Switching Stations	17/5/16
SDI539	Substation Address, Phone & Swipe Card Reader Details	20/2/17
SDI540	Transformer Oil Containment	4/3/15
SDI545	Acceptable Purity Limits For SF6 Gas	4/9/14
SDI547	Alarm & Tripping Requirements In SF6 Equipment	29/1/14

5 ENVIRONMENTAL REQUIREMENTS

An environmental assessment including an environmental management plan (EMP) to demonstrate compliance with the Code of Practice for Authorised Network Operators (the Code) must be prepared for this project.

The Project Manager must contact the Network Environmental Assessment (NEA) section of EE to obtain advice regarding the appropriate Class of environmental assessment required under the Code.

NEA must be contacted with sufficient lead-time to satisfy the assessment requirements, including undertaking the appropriate level of community/stakeholder consultation and monitoring as required by the Code prior to and during construction.

The Project Manager must liaise with NEA to determine an appropriate auditing schedule for the project. This must include audits at site establishment/set-up, during works if required depending on the project scope and timeframe and at the practical completion of the project. These audits may be undertaken in conjunction with EE's Safety Auditor. Audit scheduling must be noted in the project timeline.

The Project Manager is responsible for appropriately addressing/rectifying matters of environmental non-compliance that are identified by the audits.

The audits findings must be included in the Post Commissioning Review of the project.

A minimum of three month's notice shall be given by the Project Manager to the Network Environment Assessment Section when environmental assessments are required.

6 NETWORK ACCESS

The works program shall be coordinated well in advance with System Control by the Project Manager. This will ensure that operating requirements are met and that outages of the substation for work including testing and commissioning are kept to a minimum.

The project outage requirements shall be confirmed with the System Control Branch before issuing the project timeline.

7 NETWORK REQUIREMENTS AND STAGING

Planned outages shall be restricted to light load periods with mild weather. The sequence of work shall be:

- Transfer one 11kV feeder (existing Berrara or Wandandian) to the new 11kV switchboard with a cross zone tie.
- Transfer one 33/11kV power transformer feeder to the new switchboard.
- Transfer 11kV feeders Sussex South and Sussex North to the new 11kV switchboard without a cross zone tie.
- Transfer the remaining power transformer feeder to the new indoor switchboard.
- Transfer the remaining 11kV feeder to the new 11kV switchboard with a cross zone tie.

Reference shall be made to the proposed and existing single line diagrams attached as Appendix 1 and 2 respectively. The staging shall be confirmed with the Network Security Manager prior to any staging plan.

8 HAZARDOUS MATERIALS ASSESSMENT

For managing hazardous materials, refer to the following standards:

Hazardous Material	Standard No.	Standard Name
Asbestos	GSY1065	Asbestos Management
	GNV1115	Asbestos Management Plan For Asbestos Concrete Ducts & Pits
	EMS0007	Waste Management
Lead	GSY0089	Working With Lead
	EMS0007	Waste Management
PCB's	EMS0007	Waste Management
SF6	SMI122	Use & Handling Of Sulphur Hexafluoride
	WRG0526	Handling Of Sulphur Hexafluoride

9 CONSTRUCTION RISK

The associated work is within a live switchyard and may constrain works.

10 REDUNDANT ASSETS

All redundant equipment shall be disposed via the Disposal Co-ordinator as stated in Section 5.

11 SCOPE OF WORKS

11.1 General

The work includes all design, detail specification, procurement, construction, hiring of Subcontractors, liaising with other authorities and statutory bodies (and obtaining approvals as required) and the testing and commissioning of the completed works.

All concept general arrangement drawings, selection of all electrical equipment and components (referred to in this PD) are subject to specific approval by the Substation Design Section.

Reference shall be made to the proposed single line diagram attached as Appendix 1.

11.2 Details

The works at Sussex Inlet ZS are as follows:

- Relocate the existing dual head fire hydrant and the fire hydrant booster to accommodate the construction of the new access road. Refer to the proposed general arrangement drawing attached as Appendix 3.

- Demolish the existing fibro toilet.

- Relocate the existing earth cabinet as per EDI516 and the existing deluge shower as per SDI522 to accommodate the construction of a new access road.

- Remove and relocate the existing double and single gates and modify and extend the existing security fence to accommodate the construction of the new control building as per the proposed general arrangement drawing attached as Appendix 3.

- Construct a new access road, entry gates and security fence extensions in the location shown on the proposed general arrangement drawing attached as Appendix 3.

- Establish a new control building in the location shown on the proposed general arrangement drawing attached as Appendix 3. Note that space shall be allocated for a future 33kV indoor switchroom.

- Install a new 11kV switchboard with two bus sections in the new control building. Refer to Section 12.4 for details.

- Install new control and protection equipment, SCADA equipment, charger and batteries inside the new control building to facilitate the changeover between the existing and new control and protection schemes and allow the existing control building to be demolished.

- Remove and dispose of the existing outdoor 11kV voltage transformers and the structures to accommodate for the installation of the new 11kV cable sealing end structures.

- Install new 11kV transformer cables from the existing power transformers to the new 11kV switchboard located in the new control building to energise the new 11kV switchboard. This shall include establishing new cable sealing end structures and surge arrestors on the eastern side of the power transformers. Refer to the proposed general arrangement drawing attached as Appendix 3.

- Remove the existing 11kV transformer cable sealing end structures and cables.

- The lightning study will determine if the existing lightning mast located between the two power transformer bunds is still required. If it is required, relocate as per SDI520 and the lightning study recommendations.

- Install new firewalls for the power transformers as shown on the proposed general arrangement drawing attached as Appendix 3. Refer to Section 15.1 for details.

- Remove the metering panel located between the two power transformer bunds following the installation of the new metering in the new control room.

- Relabel the existing No.1 33/11kV 15MVA transformer to No.2 Transformer and the existing No.2 33/11kV 15MVA transformer to No.1 Transformer.

- Install two new auxiliary padmount type substations and connect them via new 11kV cables to the respective 11kV indoor switchgear as per the proposed single line diagram attached as Appendix 1.

- Install a new double gate on the north eastern side. Refer to the proposed general arrangement drawing attached as Appendix 3.

- Raise the existing No.1 Transformer (relabeled No. 2 Transformer as per this PD) control box at it is positioned low in the bund resulting in flooding when the bund is full. The Project Manager shall liaise with the Transmission Asset Engineer South for details. Note that similar works were done for the existing No.2 (relabeled No. 1 Transformer as per this PD) control box.

- Decommission and dispose the existing outdoor 11kV equipment and restore gravel cover to the switchyard surface.

- Remove and dispose the existing pole mounted auxiliary 33kV /415V 63kVA and the 11kV/415V 25kVA transformers located within the substation.

- Replace the existing concrete 33kV busbar support structures within both the existing power transformer bunds. Refer to the proposed general arrangement drawing attached as Appendix 3.

- Remove the control and protection panels, batteries and charger and SCADA equipment from the existing control building. All equipment shall be assessed by the Transmission Substation Manager South to determine if it can be utilised for spares or to be disposed. If the equipment is to be disposed, this shall be done via the Disposal Co-ordinator as stated in Section 5.

- Demolish the existing control metal shed following the removal of all equipment including the associated foundation. Install gravel to cover the removed foundation.

- Replace corroded operator earth mats, faded safety signage and corroded 33kV low busbar barrier.

- Redirect all of the existing 11kV feeders from the existing outdoor 11kV bays to the new 11kV switchboard. Refer to the distribution works program attached as Appendix 8. Note that the new UGOH's shall be located exterior and clear of the eastern side security fence.

- Install new core balance current transformers on the 11kV feeders. Refer to Section 28.3 for details.

- Relabel the existing switchgear and number the new equipment in accordance with the proposed single line diagram attached as Appendix 1.This shall also include all of the associated design drawings.

- Test and commission the new 11kV protection control, protection and SCADA equipment and energise the new equipment.

12 11kV EQUIPMENT

12.1 General

The 11kV equipment at the new Sussex Inlet ZS shall be located as indicated on the proposed control building layout attached as Appendix 5.

12.2 11kV Surge Arrestors

A total of six (6) 11kV surge arresters are required. A set of three (3) surge arresters are to be installed in each of the No.1 and No.2 transformer 11kV cable sealing end structures as indicated on the proposed single line drawing attached as Appendix 1.

The surge arrestors can be obtained from Stores via VOCAB number 1543644.

12.3 Auxiliary Transformers

Two (2) new 11kV/415V 315kVA Dyn11 auxiliary transformers are required at Sussex Inlet ZS and located as per the proposed general arrangement drawing attached as Appendix 3. A padmount type transformer and cubicle shall be utilised with an associated culvert foundation. The auxiliary transformer shall be supplied with a Siemens type 22kV 8DJH model RT incomer switches (non-motorised)/fuse switch combination unit (VOCAB number 1547843) and a "Weber" type Cat 2 or similar low voltage distribution board. Refer to the proposed single line diagram attached as Appendix 1.

The auxiliary transformer shall be connected to the 22kV RT unit via a 35mm^2 copper single core XLPE cable.

The 22kV RT unit shall be connected to the 11kV switchboard within the new control room via the 240mm^2 copper three core XLPE cables and connected to their respective circuit breakers. Refer to the proposed single line diagram and the Mains Schedule attached as Appendix 1 and 6 respectively.

12.4 11kV Switchboard

The 11kV switchboard shall be indoor type installed as indicated on the proposed single line diagram attached as Appendix 1. The initial configuration requires two (2) sections of 11kV busbar with one (1) bus section circuit breaker, two (2) transformer circuit breakers and two (2) feeder circuit breakers on each section.

Provision shall be made in the building design for two (2) additional 11kV circuit breakers on each bus section. Refer to the proposed single line diagram and the proposed control building layout attached as Appendix 1 and 3 respectively.

The rating of the 11kV switchboard is as follows:

Transformer circuit breaker - rated normal current	2000A
Bus section circuit breaker - rated normal current	2000A
Feeder circuit breaker - rated normal current	630A
Rated short time withstand current for 3 seconds	25kA

The Project Manager shall purchase this equipment from Tamco under Contract No. 7508/15C. The status of this contract shall be confirmed by the Substation Assets Section before proceeding with the equipment purchase.

13 11kV CABLE WORKS

13.1 General

All power cables in the basement shall be provided with supports which present no sharp edges to the cable, minimise physical stress on the cable and preserve the minimum bending radius of each cable.

13.2 11kV Transformer Cables

The 11kV transformer cables shall be 11kV single core 800mm^2 copper XLPE heavy-duty screen cables with one (1) cable per phase. Refer to Mains Schedule attached as Appendix 6.

13.3 11kV Feeder Cables

The new 11kV feeder cables exiting the substation shall be 11kV three core 240mm^2 Cu XLPE heavy-duty screen cables.

They shall be connected to their respective circuit breakers as shown on the single line diagram attached as Appendix 1. Also refer to the distribution works program attached as Appendix 8.

14 ANCILLARY EQUIPMENT

14.1 120VDC Substation Battery

Two (2) substation battery system with a nominal 110V DC 200Ah at 10hr rate batteries with a 25A chargers (240V AC input) are required.

It shall be located as indicated on the proposed control building layout attached as Appendix 5.

The battery charger DC output will normally supply the battery bank in parallel with the continual substation base load of approximately 8A to 10A DC consisting of protection and SCADA equipment.

Facilities shall be provided to disconnect each of the stations batteries from their load to allow discharge tests to be performed and to also allow the temporary connection of a mobile battery. Battery isolation strips shall be installed to provide this facility.

The Project Manager shall purchase this equipment from Exide under Contract No. C10431. The status of this contract is to be confirmed by the Substation Assets Section before proceeding with the equipment purchase.

All the alarms from the battery chargers shall be wired to the SCADA system for monitoring.

14.2 Lighting

14.2.1 Control Building Lighting

The new control building shall have the following lighting levels as per SDI 529:

- 240 lux in control rooms.
- 160 lux in switch rooms and all other rooms associated with the building (excluding control rooms).
- 160 lux in designated walkways within cable basements, with 40 lux throughout the remainder of the cable basement.
- 160 lux on stairways, ramps and landings within buildings.

14.2.2 DC Lighting

The new control room, switch room and the cable basement shall have a DC lighting system to provide minimal lighting to facilitate the safe passage of personnel to the exit doors in the event of AC lighting failure. Exit doors shall be fitted with “Exit Signs” as indicated in the following section.

The DC lighting system shall be non-maintained and designed and installed to the requirements of the BCA and AS2293. A “Single Point System” shall be installed incorporating self-contained emergency luminaries and an AS2293 compliant maintenance test facility.

The DC lighting shall automatically activate in the area where the normal local lighting has failed.

An emergency luminaire such as the “Spit-Fire emergency LED lighting system or equivalent shall be used for this purpose.

The DC lighting is intended for exiting from the building during the event of AC supply failure and is not intended for use as a lighting source during work.

14.2.3 Exit Signs

The new control building personnel exit doors, including the cable basement personnel exit doors, shall be fitted with exit lights that are clearly visible to persons approaching the exit. They shall be installed above or adjacent to each exit door.

The emergency exits signs shall be sustained and designed and installed to the requirements of the BCA and AS2293. A “Single Point System” shall be installed incorporating self-contained emergency luminaries and an AS2293 compliant maintenance test facility.

14.3 Security/Fire System

The substation control building shall have a fully functional intruder alarm in accordance with SDI537. During the process of the architectural design of the control building, the Project Manager shall organise with the Security Manager to provide a design and specification for the security system. The Transmission Civil Development Manager shall liaise with the Security Manager to establish cable conduits and control panels in various locations for these services. The security design and specification shall be submitted to the architect for inclusion in the building specification.

The Project Manager shall organise a start up meeting with the Security Manager, security installer and builder to co-ordinate the installation, inspection and testing of the security system. Note that only companies on Endeavour Energy's security panel shall be selected for these works.

The substation control building shall have a fire detection system in accordance with SDI503. The Project Manager shall supply a fire system specification to the architect to include these works in the building specification. Note that only companies on Endeavour Energy's fire panel shall be selected for these works.

The relocated fire hydrant system shall be installed in accordance with AS2419 and SDI509. Portable fire extinguishers shall be provided as per AS2444.

15 TRANSFORMER ENCLOSURES & ASSOCIATED EQUIPMENT

15.1 Fire Walls

New firewalls are required at Sussex Inlet ZS as per the proposed general arrangement drawing attached as Appendix 3. The transformers shall be separated from each other by a 4-hour (minimum) fire rated wall which extends a minimum of 300mm above the highest point of the transformer. Each side of the wall shall return across the front of the enclosure for 600mm.

A 4-hour (minimum) fire rated wall shall be provided between the transformers and the control building. The fire wall should extend a minimum of 300mm beyond the top of the building roof to shield the roof from heat radiation.

Note
Section 7 of the environmental noise impact study attached as Appendix E in the Business Case (refer to Appendix 9) states that the existing transformer noise levels are compliant. However, the report also states that when the future residential development on the eastern side is established, the transformer noise levels will need to be reassessed. This may entail modifying the proposed firewalls as stated in Section 7.1 of this noise report and therefore the design of the proposed firewalls shall be able to accommodate the future noise control recommendations.

15.2 Fire Protection

All joints within a bunded area shall be sealed with fire rated sealant (Sikaflex 852 FR or equivalent).

All exposed cables within a bunded area shall be coated with an approved cable coating (KBS Cable Coating or equivalent). The minimum dry film thickness required is 1.6mm.

16 SAFETY

The Sussex Inlet ZS control building shall be designed to the relevant Australian Safety Standards, Building Code of Australia requirements and shall include the following safety devices as identified in SDI510:

- Medical emergency signalling system via SCADA
- Telephone
- Deluge Showers

- Fire Blankets
- Fire Extinguishers
- Appropriate application of fire exit doors and access to control rooms and switchrooms.

The design shall consider the appropriate application of fire exit doors and access to control and switchrooms ensuring compliance to the relevant standards.

17 DELUGE SHOWERS

Deluge showers shall be installed in accordance with SDI522.

18 PORTABLE EARTHING CABINETS

The existing portable earthing cabinet shall be relocated in accordance with EDI516 to accommodate construction of the new access way.

19 EARTHING

19.1 Design & Construction

Substation Primary Design Section has engaged SafeEarth Consulting to provide the design for the earthing system at the Sussex Inlet ZS. The Substation Primary Design Manager shall approve this design.

Substation earthing systems shall be designed to EDI516 and to safely carry prospective maximum earth fault currents. Generally all metallic components associated with the substation shall be bonded to a common earth.

The protective earthing systems shall be designed to limit step and touch voltages and transferred earth potentials in and around the substation to safe values. The earthing system shall include on site earthing grids, earthing stakes and the earthing of associated overhead lines and underground cables in order to achieve these objectives.

All services entering the substation shall be electrically isolated to a power frequency withstand level of 15kV as a minimum.

The Project Manager shall construct the earthing system in accordance with the concept design and the requirements of EDI516.

19.2 MEN

The earthing design report shall determine if the earthing system shall not be connected to the MEN system.

19.3 Testing

An earthing system design verification test is required at the completion of the works. The earthing consultant shall witness this test.

It is expected that Telstra Power Coordination will want to carry out their own measurements to verify levels of earth potential rise adjacent to the substation. Accordingly Telstra Power Coordination shall be advised four weeks prior to the test.

The Project Manager shall organise all hazards determined by the earthing system design verification test to be mitigated by the earthing consultant. The Project Manager shall also organise a re-test of the earthing system after the mitigating solutions have been implemented.

20 LIGHTNING PROTECTION

Substation Primary Design Section has engaged Safearth Consulting to provide the lightning design for Sussex Inlet ZS. The outdoor equipment shall be shielded by new lightning masts in accordance with AS1768 and SDI520. Generally the rolling sphere technique with sphere radius of 45m shall be used to determine the degree of shielding. The masts shall be designed to reduce visual impact from the adjacent residential area.

21 INSULATION POLLUTION LEVELS

Station post insulators are to have a minimum creepage of 45mm/kV as per AS1824.2.

22 UNDER-FREQUENCY LOAD SHEDDING

Implementation of Under-Frequency Load Shedding (UFLS) is required by the National Electricity Code. Feeders supplying critical loads such as hospitals shall be shed as a last resort.

An UFLS scheme shall be installed on the 11kV feeders at Sussex Inlet ZS.

23 ARCHITECTURAL BUILDING DESIGN

The Substation Design Section has engaged Brewster Murray Pty Ltd to provide the conceptual and detail control building architectural design. The Network Environment Assessment Section shall approve and utilise the conceptual design for providing compliance with the Code of Practice for Authorised Network Operators and submit them to Shoalhaven City Council for comment.

The Substation Design Section shall forward the approved conceptual design to the Transmission Civil Development Manager and the Project Manager. The Transmission Civil Development Manager will then organise the architect to begin the detail building design.

The Transmission Civil Development Manager shall forward the final building design to the Substation Design Section to verify equipment locations and floor penetrations and then to the Mains & Civil Design Manager for final approval.

24 BUILDING & LANDSCAPING

Reference is to be made to the proposed control building layout attached as Appendix 5.

The building shall be:

- Permanent construction as per SDI510.
- Designed to provide the following temperature conditions:
  - Control Room less than 25^{o}C
  - Battery room, less than 30^{o}C

- Switchgear & other electrical equipment areas less than 40^{o}C

  This can be achieved by natural ventilation, forced ventilation or air-conditioning.
- Complement the surrounding environment and comply with all building codes and local council requirements.
- Designed to be secure against unauthorised entry, vandalism and theft and provide a safe operating environment for staff.

The building basement floor and ceiling shall be fitted with “Unistrut” type rail to accommodate the cable support steelwork. The building basement shall be designed with a minimum of two access doors and ventilation such that the basement will not be considered as a confined space. The basement shall have a minimum 2.5 metre high ceiling and the ceiling shall be partly above ground level as to allow for natural ventilation.

All areas where HV switchgear are installed shall be provided with pressure relief panels. Where these panels are used in external walls that are open to the weather, a spring return louvre such as Holyoake Model OHL.F.45 or similar should be used in conjunction with the pressure relief shutter. To prevent vermin gaining access to the space between the shutter and the louvre, a galvanised wire mesh shall be fixed to the rear of the fixed louvre.

The substation shall be designed and located so that the risk from fire external to the substation is minimised.

All service penetrations including control and power cable openings, trenches and ducts shall be filled with approved fire stopping techniques and products in accordance with AS 4072.

Separation shall be provided between control cabling and power cables.

All required conduits shall be laid prior to pouring the concrete access roadway and parking area.

25 SUBSTATION ACCESS

The new access road shall be designed to allow unrestricted 24-hour all-weather access for all vehicles and staff who may be required to carry out maintenance (including emergency repairs) and operation of the substation.

26 FENCING

The security fence shall be modified at Sussex Inlet ZS to prevent access to all unauthorised persons. The fence shall be designed so that it cannot be scaled with a ladder or other devices or tools and cannot readily be cut through with hand tools. The security fence shall be constructed in accordance with SDI524.

Fences shall be designed to allow sight through the switchyard to improve security and safety for staff. Screening vegetation shall be located so as not to obscure the sight lines.

Locking on single person entry gates shall be designed to permit the gate to be locked and unlocked and operated from both inside and outside of the switchyard/building in accordance with Corporate Procedure GSY1031 – Endeavour Energy Electrical Safety Rules.

27 EQUIPMENT LABELLING

New labelling of all equipment shall be in accordance with SDI528.

28 PROTECTION REQUIREMENTS

28.1 Protection and Indication Equipment Schedule

A minimum of six weeks notice shall be given by the Project Manager to the Protection Section for the Protection and Indication Equipment Schedule (PIES).

The protection relays are on VOCAB and the Project Manager shall obtain these relays from stores. The Project Manager shall confirm the relay requirements with the Protection Manager before obtaining the relays.

28.2 Protection Settings

A minimum of two months notice shall be given by the Project Manager to the Protection Section for the protection settings.

28.3 Core Balance Current Transformers for SEF Protection

A total of four (4) core balance current transformers are required for Sussex Inlet ZS. Refer to the proposed single line diagram attached as Appendix 1.

The core balance current transformer on each of the 11kV feeder cable shall encompass the following:

- All three cores of the feeder cable.
- Cable screen earthing conductor: Pass the cable screen earthing conductor through the new core balance current transformer and terminate onto the earth bar.

Core balance current transformer details are as follows:

0.72kV 100/1 0.005PX0.1R0.21 0.1VA ISF<20

The core balance current transformers can be obtained from Stores via VOCAB number 001567015.

29 SCADA REQUIREMENTS

29.1 General

A new SCADA system shall be installed at Sussex Inlet ZS in the new control building.

A minimum of six months notice shall be given by the Project Manager to the SCADA Section when software updates are required.

Local control routines including voltage regulation, transformer auto-standby, under voltage changeover, substation integrated load control functions and auto reclose with 10 second delay on all outgoing feeders shall be provided.

All manual operations other than from SCADA shall be by push buttons or control switches located on the equipment's respective control panels.

SCADA shall be supplied from the 120V station battery DC supply and shall be filtered to remove any induced signals and spikes.

All control cabling shall be in accordance with SDI526, using the appropriate sizes and shielding.

29.2 SCADA & Automation Hardware

The Project Manager shall negotiate with the SCADA Section for a delivery date for the SCADA Hardware Schedule and associated scan list.

The new RTU for this site shall be a CGI type MD303.

29.3 Functional Requirements

The functional requirements are provided in ADI 0012.

30 METERING REQUIREMENTS

Provision shall be made for dedicated statistical metering with revenue class on the output of all power transformers.

The metering requirements for Sussex Inlet ZS are contained in the Metering Schedule attached as Appendix 7. This equipment shall be installed in the new control building.

31 POWER QUALITY METERS

One (1) power quality meter is required at Sussex Inlet ZS. The meter shall be installed on the new metering panel and monitor the summated 11kV transformer currents in three phases and the three 11kV phase to phase voltages from the metering voltage selection scheme.

The meter shall have a dedicated DC supply and communicate either by mobile phone or ethernet connection to Head Office at Huntingwood.

Power quality monitor can be obtained from Stores via VOCAB number 1557925.

32 COMMUNICATIONS

Substation Design Section shall engage the SCADA & Program Manager and the Telecommunications Manager to determine the method of connecting communications to Sussex Inlet ZS and arrange for the installation of the associated communications equipment.

The Transmission Civil Development Manager shall liaise with the SCADA & Program Manager and the Telecommunications Manager to determine the building and conduit requirements for connecting the communications system.

If an UHF radio system is required then an AC/DC failure alarm shall be provided and the associated antenna shall be earthed to the same earth point on the substation earth grid as the radio and SCADA equipment.

Substation Telephone

A telephone line and a suitable hand set are required in the substation control room. Work on telephone and the associated isolation devices shall be conducted by ACMA registered telecommunication technicians in conformity with the relevant telecommunications industry standards, specifically AS/ACIF S009:2006 and AS3835: 2006.

Telephone instrument

The telephone instrument shall conform to AS/CA S002:2010 for connection to an analogue public switched network.

Line isolation device

Telephone isolation units are generally positioned on the wall near the substation telephone in the control room.

A line isolation device providing at least 15kV isolation shall be interposed between the telephone instrument and the copper wires leading in from the exchange. The line isolation device shall be installed in the control room close to the main instrument described in SDI 510. The line isolation device shall conform to AS3835: 2006 for isolation requirements and AS/CA S002:2010 for connection to an analogue public switched network. The isolation device shall:

- Use isolation techniques described in AS3835: 2006 part 2, section 7.5.2.2.4, with a line powered exchange side and a locally powered customer equipment (telephone instrument) side. The customer equipment side shall incorporate 24 hour battery back-up, provided through a replaceable battery.
- Be supplied from an adjacent general power outlet wired according to SDI 529.
- Have 15kV isolating links on the telephone exchange side.

A rubber mat or insulated platform shall be installed in front of the isolation equipment (similar to the type used in the Pilot Cable Isolation Cubicles) for maintenance purposes.

Lead-in cable

The incoming lead-in telephone cable must be installed in white conduit designated for telecommunication and go directly to the cabinet of the telephone isolation equipment.

33 TESTING AND COMMISSIONING

33.1 General

Outages, including those for work, testing and commissioning, shall be coordinated with System Control to minimise any disruptive effect on the network.

33.2 Commissioning

The appointed responsible officer shall provide written clearance to the Network Security Manager, advising that the work is ready for commissioning and must follow implicitly the requirements of the following corporate procedures:

- GNV 1044 – “Commissioning Of Network Electrical Assets”
- FNV 1043 – “Certificate of Availability for Service for Network Electrical Assets”
- FNV 1045 – “Commissioning Advice/Authority to Energise System High Voltage Electrical Apparatus”

The Transmission Manager and the Network Security Manager or their nominated representatives shall be advised prior to the commissioning works and where appropriate, provided with instructions in maintenance and training for operation of the equipment.

33.3 Testing

All testing and commissioning shall be carried out in accordance with the requirements of SDI535, MMI0025 and the "Standards & Safety Requirements" section of this project definition.

The appointed responsible officer shall arrange installation, testing and commissioning of the SCADA. Substation and Master Station functionality shall be tested on site.

33.4 Test Plans

The Project Manager shall co-ordinate the completion of the inspection and test plan (ITP) that addresses the logical steps of commissioning all apparatus. The ITP should be the framework that contains the required pre-commissioning sheets and HV test reports to be supplied by Transmission Operations Managers or qualified assessor that are required to confirm that apparatus is ready to connect to the network.

The completion of the steps outlined in the ITP are required in order for the appointed responsible officer to issue clearance for the energisation of the associated apparatus.

34 EQUIPMENT MANUALS / TEST REPORTS AND TRAINING

The Project Manager shall obtain one (1) hard copies and two (2) electronic copies of the equipment manuals and factory test reports from the equipment suppliers. However, for identical equipment, the same manual can be used provided that the serial numbers of the equipment along with any differences such as test reports can be clearly identified. In circumstances where large quantities of identical equipment are supplied, the Network Substations Manager shall be asked by the Project Manager to decide on the number of manuals required.

The Project Manager shall distribute copies of the equipment manuals and factory test reports in accordance with SDI534 as follows:

- Relevant Regional Transmission Manager – one (1) hard copies.
- Substations Assets Manager – one (1) electronic copy.
- Records Manager for uploading into the "Records Management System" – one (1) electronic copy.

Prior to commissioning the project, the Project Manager shall organise, if required, familiarising and training of Maintenance Staff and District Operators in the operation of new equipment.

35 APPROVALS

As stated in the 'Scope of Works' section, the following requires prior approval from the Substation Design Section:

- All general arrangement drawings
- All electrical equipment and components
- Conceptual and final building designs

36 SINGLE LINE DIAGRAM

The single line diagram has been amended to include the proposed works, refer to Appendix 1.

At the completion of the works, the Project Manager shall mark up the single line diagram as per the final arrangement and submit this drawing to Substation Design Section to organise the drawing to be placed into the Endeavour Energy Drawing Management System. The Project Manager shall place a hardcopy of the single line diagram in the associated substation control room.

37 OPERATING DIAGRAM

Prior to commissioning, the Project Manager shall complete a "Notification of HV System Alterations" forms (FCL0143 MARCH 2011 pink sheet) so that the system operating diagrams can be amended to display the final arrangement. Also the Project Manager shall send a copy of this form to the relevant Transmission Manager to provide notification of the new works.

38 DRAWINGS & DATABASES

The Project Manager is to arrange for a design handover meeting to discuss the design for the project and distribution of electrical and Civil drawings. The Substation Secondary Design Manager, Transmission Civil Development Manager and Mains & Civil Design Manager shall provide a drawing register of their respective design drawings for the project and their revision to the Project Manager. Additionally, a Design Validation Form will be included with this documentation for completion after commissioning by the field staff or the Project Manager.

The Project Manager is to ensure that any changes to the design are approved by the Designer. When re-issuing amended drawings, the Designers are to issue a WIP design change notice detailing the changes required and an updated drawing register to the Project Manager. The Project Manager is to ensure that construction staff are working from the current drawing revision.

After the completion of the project, as per the Work Packet Agreement, the Project Manager shall organise a total package of "work as executed" drawings and drawing registers as follows:

- Electrical Drawings are sent to the Substation Secondary Design Manager.
- Substation single line diagram is sent to Substation Design Manager.
- Civil Drawings are sent to the Transmission Civil Development Manager.
- Transmission Mains Drawings are sent to the Mains & Civil Design Manager.
- Architect Drawings are sent to the Transmission Civil Development Manager.

The Substation Secondary Design Manager, Transmission Civil Development Manager and Mains & Civil Design Manager shall organise the final amendment of the associated drawings and place them in the Drawing Management System.

The Substation Secondary Design Manager, Transmission Civil Development Manager and Mains & Civil Design Manager shall send a set of completed substation related drawings to the Project Manager to file at the associated substation.

In projects where the commissioning is staged over a long periods of time, this may require a staging of the returning of the "work as executed" drawings.

The Project Manager shall notify the Manager Asset & Metering Data approximately 16 weeks prior to commissioning so that amended SOPS diagrams can be delivered to the Control Room and asset information can be amended before commissioning.

The Project Manager shall organise all new equipment details to be entered into ELLIPSE as detailed in SMI119.

39 COMPLETION

Completion of the project shall include the following works by the Project Manager:

1 All “work as executed” drawings sent to Asset Standards & Design for final amendment.

2 The Commissioning Staff or Project Manager have validated the design.

3 A set of the completed substation related drawings have been stored at the associated substation.

4 All equipment information entered into ELLIPSE in accordance with SMI119.

5 Equipment manuals, test reports and photographs have been distributed in accordance with SDI534.

6 A “work as executed” single line diagram sent to the Substation Design Section for final amendment.

7 The Project Manager has placed a hardcopy of the single line diagram in the associated substation control room.

8 The Project Manager has sent an email to the Substation Design Manager confirming that the above items have been completed.

40 APPENDICES

Appendix 1: Proposed Single Line Drawing
Appendix 2: Existing Single Line Drawing
Appendix 3: Proposed General arrangement Drawing
Appendix 4: Existing General Arrangement Drawing
Appendix 5: Proposed Control Building Layout
Appendix 6: Mains Schedule
Appendix 7: Metering Schedule
Appendix 8: Distribution Works Program
Appendix 9: Business Case
Appendix 10: Gate 2 Preliminary Approval
Appendix 11: Project Estimate

Appendix 1 Proposed Single Line Drawing

Appendix 2 Existing Single Line Drawing

Appendix 3 Proposed General arrangement Drawing

Appendix 4 Existing General Arrangement Drawing

Appendix 5 Proposed Control Building Layout

Appendix 6 Mains Schedule

Appendix 7 Metering Schedule

Appendix 8 Distribution Works Program

Appendix 9 Business Case

Appendix 10 Gate 2 Preliminary Approval

Appendix 11 Project Estimate

Appendix 6

AHIMS Report

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Sussex Inlet ZS

Client Service ID : 356442

Endeavour Energy

Date: 10 July 2018

51 Huntingwood Drive
Huntingwood New South Wales 2148

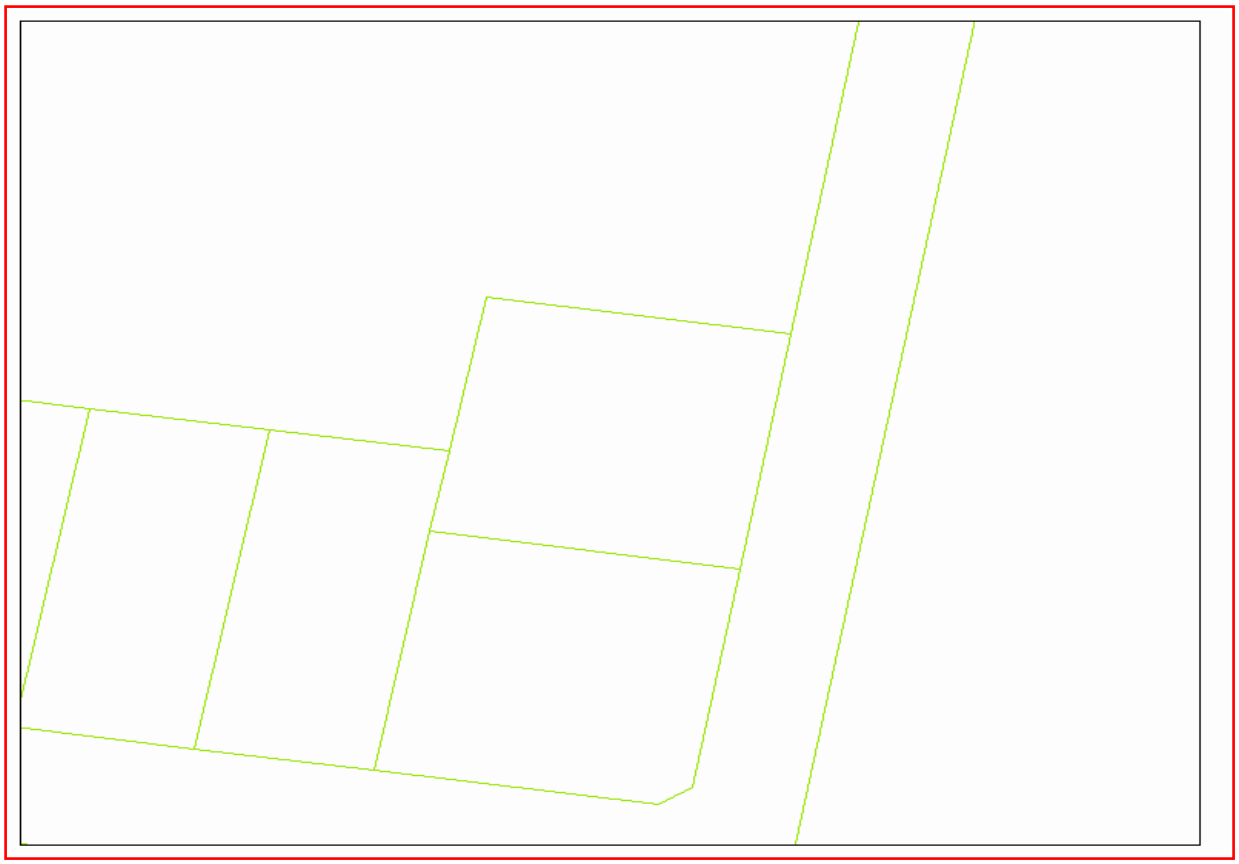
Attention: Ouerdia Kessal

Email: ouerdia.kessal@endeavourenergy.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 3, DP:DP536099 with a Buffer of 50 meters, conducted by Ouerdia Kessal on 10 July 2018.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Appendix 7

Consultation

Sussex Inlet Mechanical Services

4 Flood Ave, Sussex Inlet – Ph :- (02) 44411955 - Licence No – 035252

Motor Vehicles
- Comprehensive Mechanical Repairs
- LPG installation. service
- Registration Checks

Marine Repairs
- Outboard Servicing
- Boat Trailer Repairs

Lawn Mowers
- Mower, Brushcutter & Chain Saw Servicing

NOTICE TO ADVERTISERS

NSW FAIR TRADING REQUIRES BUILDING AND TRADES ADVERTISEMENTS TO INCLUDE:

- **Licensee's name (individual company or business name)**
- **Licence number with correct category of work and**
- **Business telephone number**

New Shared Pathway

New Shared Pathway adjoining Sussex Rise to Seaberry Street under construction. Another section of pathways in the network to better connect our town

PROPOSAL TO UPGRADE THE EXISTING SUSSEX INLET ZONE SUBSTATION

Endeavour Energy

To provide a more affordable, safe and reliable electricity supply to Sussex Inlet, Swanhaven, Berrara, Wandandian and Bewong, and also support future growth in the Shoalhaven area, Endeavour Energy plans to upgrade the existing Sussex Inlet Zone Substation at Lot 3 The Springs Road. Key features of the proposal include:

- constructing a new control building
- installing associated underground cable conduits
- installing firewalls between transformer bays
- demolishing and removing ageing electrical infrastructure
- demolishing and removing the existing control building
- new pavements, retaining walls and security fencing
- installing building and site stormwater drainage.

Written submissions to a draft Review of Environmental Factors (REF) associated with the proposal will be received until **Friday 29 June 2018**. The REF outlines project benefits, plus potential environmental impacts and mitigation measures to manage those impacts, should the project proceed.

All submissions will be considered as part of the project assessment process.

The REF is available at www.endeavourenergy.com.au/SIZS.

To make a submission please contact:
Ouerdia Kessal
Environmental Specialist
Endeavour Energy
E:ouerdia.kessal@endeavourenergy.com.au

Call 131 081 (24hrs) and put safety first.
www.endeavourenergy.com.au

Photomontage of proposed substation from The Springs Road

16 May 2018

The resident
1023 Sussex Inlet Road
SUSSEX INLET NSW 2540

Dear Sir/Madam,

NOTIFICATION OF DRAFT REVIEW OF ENVIRONMENTAL FACTORS FOR THE UPGRADE THE EXISTING SUSSEX INLET ZONE SUBSTATION

I am writing to inform you of Endeavour Energy's plans to upgrade the existing Sussex Inlet Zone Substation, located at Lot 3 (DP536099) - The Springs Road, Sussex Inlet, to provide a more reliable electricity supply to customers in the rural and coastal/holiday townships of Sussex Inlet, Swanhaven, Berrara, Wandandian and Bewong.

The upgrade scope of works will be confined within the existing substation site boundaries and will not involve an extension of the existing substation perimeter.

The key features of the proposal involve:

- Construction of a new 11 kV control building with new indoor 11kV equipment;
- Installation of associated underground cable conduits;
- Installation of a new 11kV auxiliary padmount transformer;
- Replacement of the 33kV support structures in the transformer bunds;
- Installation of firewalls between transformer bays;
- Demolition and removal of the existing 11kV busbar and associated switchgear;
- Demolition and removal of the existing control building ;
- Constructing of new pavements, retaining walls, gravel yard surfacing and security fencing; and
- Installation of building and site stormwater drainage.

A photo montage of the proposed Sussex Inlet Zone Substation upgrade at Lot 3 - The Springs Rd, Sussex Inlet.

Endeavour Energy has prepared a draft Review of Environmental Factors for these works, in accordance with Part 5 of the *Environmental Planning and Assessment Act* 1979. A copy of the draft REF and concept plans is available on our corporate website:

www.endeavourenergy.com.au/SIZS. Concept Design Plans are included in Appendix 1.

Endeavour Energy is the determining authority for these works in accordance with the *State Environmental Planning Policy (Infrastructure)* 2007, and we are currently inviting comment from relevant stakeholders and adjoining landowners on this proposal for consideration, prior to making a final determination on this Project.

Should you wish to make a written submission in relation to this project, please forward your comments to ouerdia.kessal@endeavourenergy.com.au. The closing date for written submissions is **29 June 2018**

Should you require any further information regarding this proposal please do not hesitate to contact me on 9853 4135.

Yours faithfully,

Ouerdia Kessal
Environmental Specialist
Network Environmental Assessment

Translating and Interpreting Service: 131 450

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Serbisyo sa Pagsasalin–wika at Pag-iinterprete: 131 450

Dịch Vụ Thông Ngôn Và Phiên Dịch: 131 450