



Infrastructure Requirement Report - HV Supplementary Assessment

**78 LOCKWOOD ROAD DATA CENTRE
(SSD-82211208)**

Client:
STACK Infrastructure

Revision:
C

Date:
24/03/2026



REPORT INFORMATION

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1 Preface

1.1 Executive Summary

This supplementary report to the Infrastructure Requirements & Utilities Report has been prepared by LCI Consultants on behalf of Stack Infrastructure to accompany a detailed State Significant Development Application (SSDA-82211208) for the data centre development at 78 Lockwood Road, Erskine Park.

This report addresses the external HV cable connection route which will be required as part of the greater Data Centre works and associated Data Centre Switchyard (EP Substation). The HV route follows the existing roadways from the SSDA site, commencing at Stack SYD01 Switchyard, traversing via Lenore Drive and terminate at point of entry (POE) to TransGrid Sydney West Substation. All works within Sydney West Substation will be managed by TransGrid. This report concludes that the proposed external HV cable works are suitable and warrants approval subject to the implementation of the following mitigation measures:

- Utility Crossing Designs as approved by the relevant utilities
- Acoustic and Vibration measures are put in place during construction to limit noise and vibration
- Air Quality impacts because of construction dust are mitigated and managed

Following the implementation of the above mitigation measures, the remaining impacts are deemed appropriate.

After exhibition of the SSDA, the project has been refined in response to submissions from the authorities and ongoing design development. This has necessitated an update to the Backup Power Systems Report as outlined below:

- Section 2.2 The Supplementary Works- Updated supplementary works description to include key components of the project in addition to the associated works required to facilitate the project construction. All information regarding the general arrangement of the Sydney West Transmission Substation has been removed.

1.1.1 Abbreviations and Glossary

Table 1: Abbreviations List

AIS	Air insulated switchgear
GIS	Gas insulated switchgear
GRP	Glass Reinforced Polymer
HV	High Voltage
kV	Kilo Volt
kW	Kilo Watt
LV	Low Voltage (415V)
MV	Medium Voltage (11kV)
MVA	Mega Volt Ampere
MW	Mega Watt
PoE	Point of Entry
PP	Polypropylene
SWMS	Safe Work Method Statements
UG	Underground

No.	Number of
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2 Introduction

2.1 Purpose

This supplementary report has been prepared by LCI Consultants on behalf of STACK Infrastructure (STACK, the **applicant**) to accompany a State Significant Development Application (**SSDA**) for a proposed data centre development at 78 Lockwood Road, Erskine Park (the **site**).

This Report has been developed to support the SSDA to be submitted to NSW Department of Planning, Housing, and Infrastructure (NSW DPHI) and details the proposed offsite utility requirements for the data centre.

This report identifies and assesses the associated works related to the provision of the two HV cables, from the Data Centre Switchyard, via road reserve within Lenore Drive. Total route length is approximately 2.1km. The cable route extends across two LGAs, Penrith City Council and Blacktown City Council, Crown land, TfNSW State Road reserve. The works will require road closures and traffic control for its construction.

The key features of the supplementary works include:

- Civil Preparation works
- Staged construction of 2.1km long backfilled trenches along Leonore Drive for the 2 off 330kV feeders from Sydney West Transmission Substation. This design and construction will be facilitated through Lumea, a subsidiary company of Transgrid.

This report will outline the technical impacts of the proposal on the existing public utilities within the route. To satisfy the Secretary's Environmental Assessment Requirements (SEARs), this report contains the following information:

- Overview of existing utility services within the proposed boundary.
- Description of infrastructure staging and delivery
- Summary of any consultation undertaken with each service provider

2.2 The Supplementary Works

The amended project includes the installation of two HV cables, from STACK SYD01 Switchyard, via road reserve within Lenore Drive to the TransGrid Sydney West Substation. The total route length is approximately 2.1km. The cable route extends across two LGAs, Penrith City Council and Blacktown City Council, as well as Crown land and a TfNSW State Road reserve.

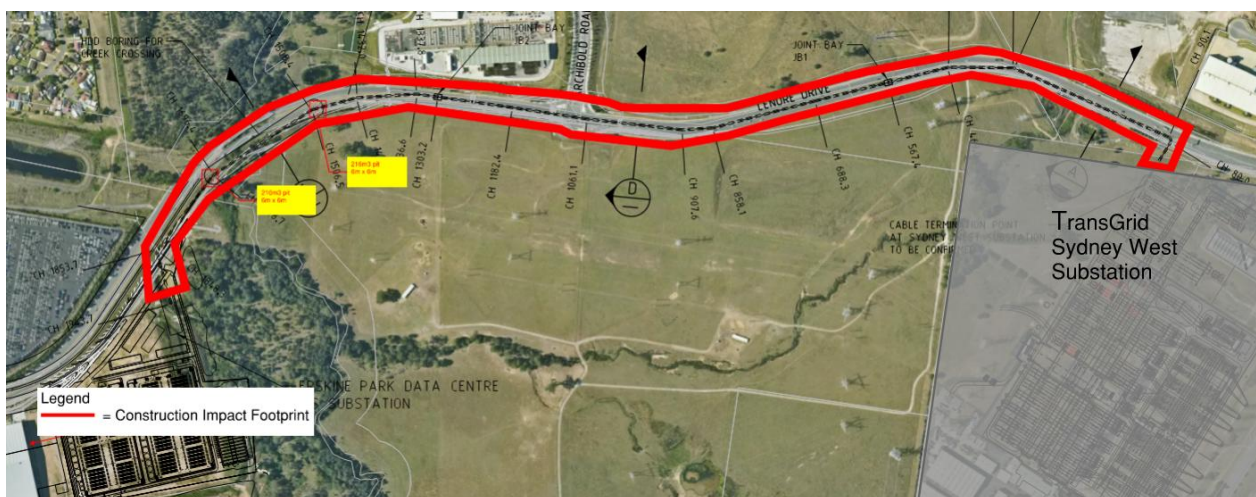
Key components of the project include:

- 1) External HV Cable works extending from the STACK SYD01 Switchyard to the TransGrid Sydney West Substation, including:
 - Two x 330kV underground transmission cable circuits comprising six cables installed within six conduits

- Two smaller conduits for optical fibre infrastructure
 - Approximately 2-4 joint bays per circuit, located at intervals of approximately 600-800 metres along the transmission route
 - Associated link boxes and sensor boxes at each joint bay to enable testing and maintenance
- 2) STACK SYD01 Customer Switchyard
- Two x GIS buildings approximately 75 x 50 metres
 - Three x 250 MVA transformers and eight x 90 MVA transformers
 - Auxiliary electrical equipment

Associated works required to facilitate the construction of the project, such as potential utility relocations have been considered. No major utility relocations are anticipated. Where minor services require adjustment to accommodate the transmission cable circuits, these works would be limited to within the project area assessed in this EIS.

Figure 2-1 shows the aerial alignment of the dual 330kV HV feeder route. The feeders will run from the two switch bays at Transgrid Sydney West primarily along Leonore Drive, before entering Lot 101.



3 Policy and Planning Context

This section highlights the relevant regulation, legislation and policy governing the management of public utilities, related to the proposal.

3.1 Legislative Context

- Telecommunications Act 1997
- Security and Critical Infrastructure Act 2018

3.2 New South Wales Legislation

- State Environmental Planning Policy (Transport and Infrastructure) 2021
- Protection of the Environment Operations Act 1997
- Electricity Supply Act 1995
- Gas Supply Act 1996
- Water Management Act 2000

3.3 Guidelines

- Building over and adjacent to pipe assets, Sydney Water 2015
- Fire Safety guideline, access for fire brigade vehicles and firefighters, Fire and Rescue NSW (FRNSW) v05.01, November 2020

4 Methodology

This section outlines the methodology used to define the baseline and undertake the environmental assessment of potential impacts of the proposal on existing assets within the study area used as the basis for the assessment.

4.1 Study Area

The assessment will be limited to the route identified, the surrounding roads and the Transgrid Sydney West 330kV Substation.

4.2 Methods of Assessment

To address the project SEARs as well as any items raised by the utilities, the following methodology is adopted:

- Collate and review the latest Dial Before You Dig Australia (DBYDA) information, as well as any other publicly available utility data.
- Assess the proposed route layout against any public utility infrastructure within the proposal route and identify any necessary changes or protection works.

5 Existing Environment

5.1 Electrical Services

There are currently Endeavour Energy buried assets on the Northwestern side of the site (Lot 101), along Leonore Drive, as well as to the South of the site along Lockwood Road. The services along Leonore Drive switch to overhead services towards the Northern part of the development.

Along the proposed cable route, there are extensive existing electrical services based on DBYD (Dial before you Dig) from Endeavour Energy (refer to the figure below). The strategy for delivery has Lumea (as a subsidiary of Transgrid) doing the design and construction of the route.

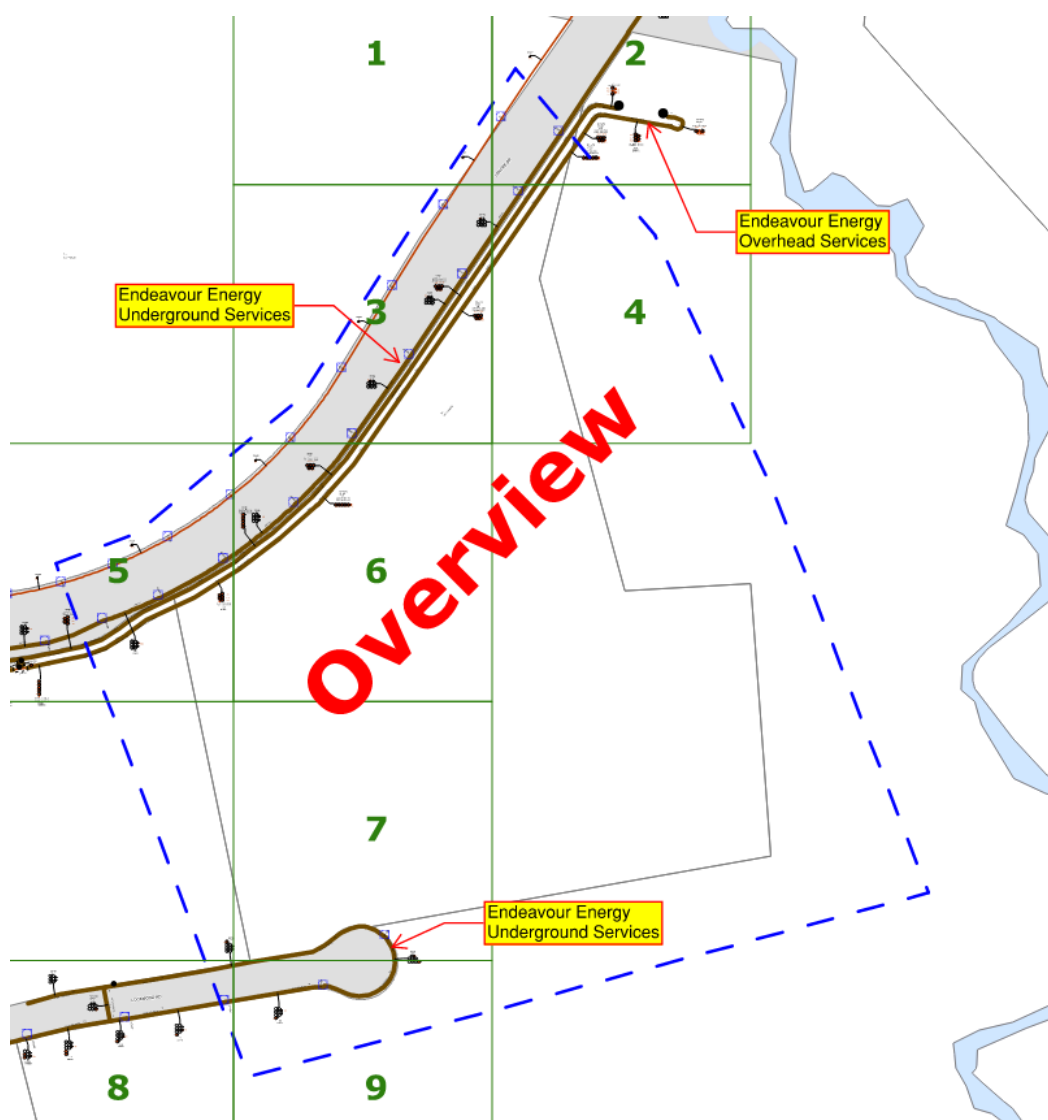


Figure 5-1: Endeavour Energy Assets DBYD

Engagement with Endeavour Energy has already commenced as Transgrid is doing the design and construction of the route, it is expected that the process will be completed before any construction commences.

As all the works within the Sydney West Transmission Substation will be procured and managed by Transgrid, through Lumea, with the impact on Transgrid's infrastructure to be catered to.

The data centre site (Lot 101) is located approximately 1.5km to the East of the Transgrid Sydney West 330kV substation. The surrounding Transgrid network operates at 330kV with outgoing feeders from the transmission substation. Refer to Appendix 1 (Concept Cable Route Assessment Report by Transgrid) for further information on surrounding Transgrid services.

5.2 Water Services – Sydney Water

Based on DBYD information from Sydney Water, the route crosses an existing 300mm diameter PVC Sydney Water trunk main located along Lenore Drive. The image below indicates the location of the existing Sydney Water asset(s).

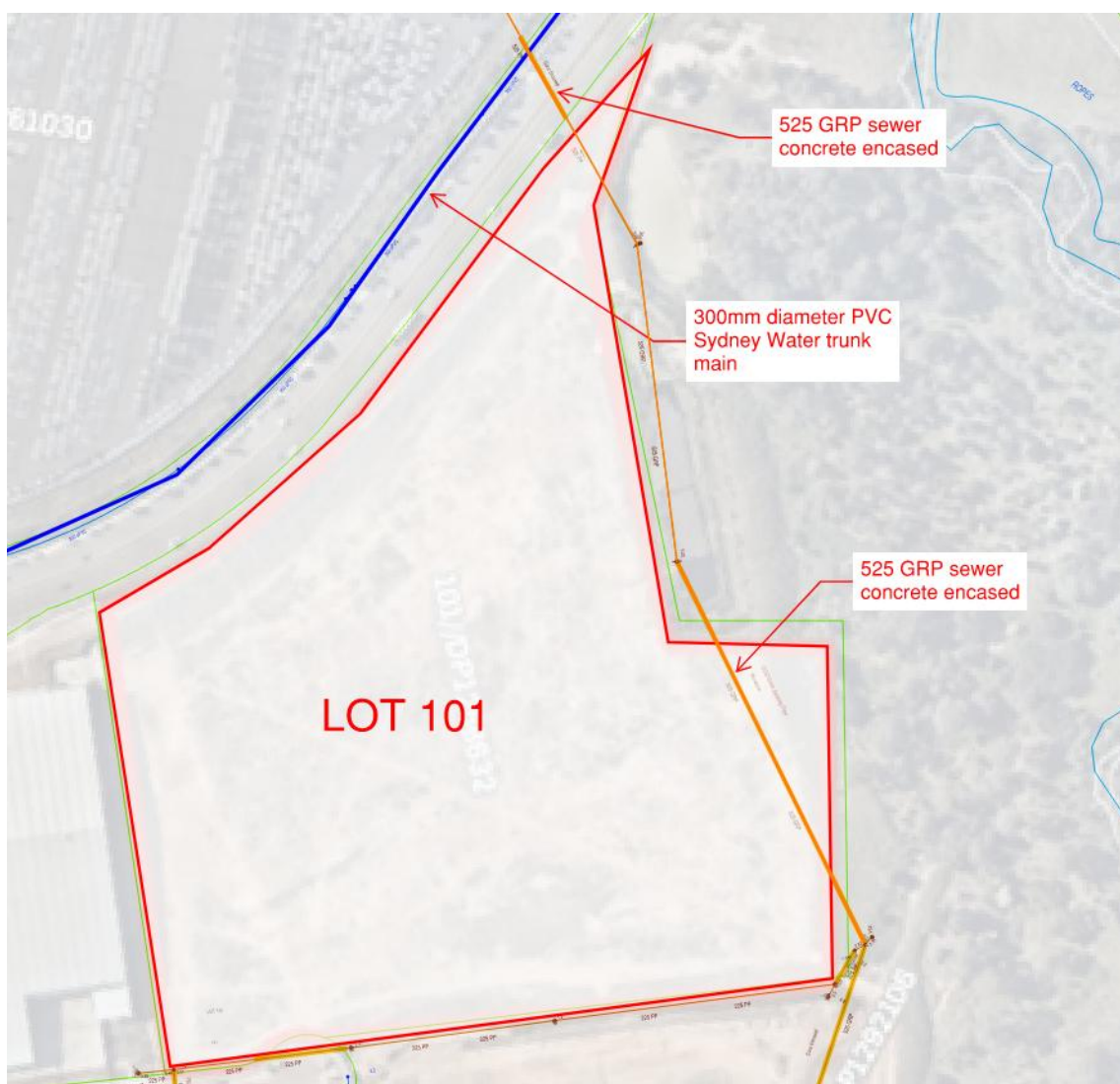


Figure 5-2: Sydney Water assets in proximity of the site

5.3 Sewer Services – Sydney Water

Based on DBYD information from Sydney Water, the route crosses a 375mm PP concrete encased and a 525mm GRP concrete encased sewer main. The image below indicates the existing Sydney Water Sewer asset relevant to the site.

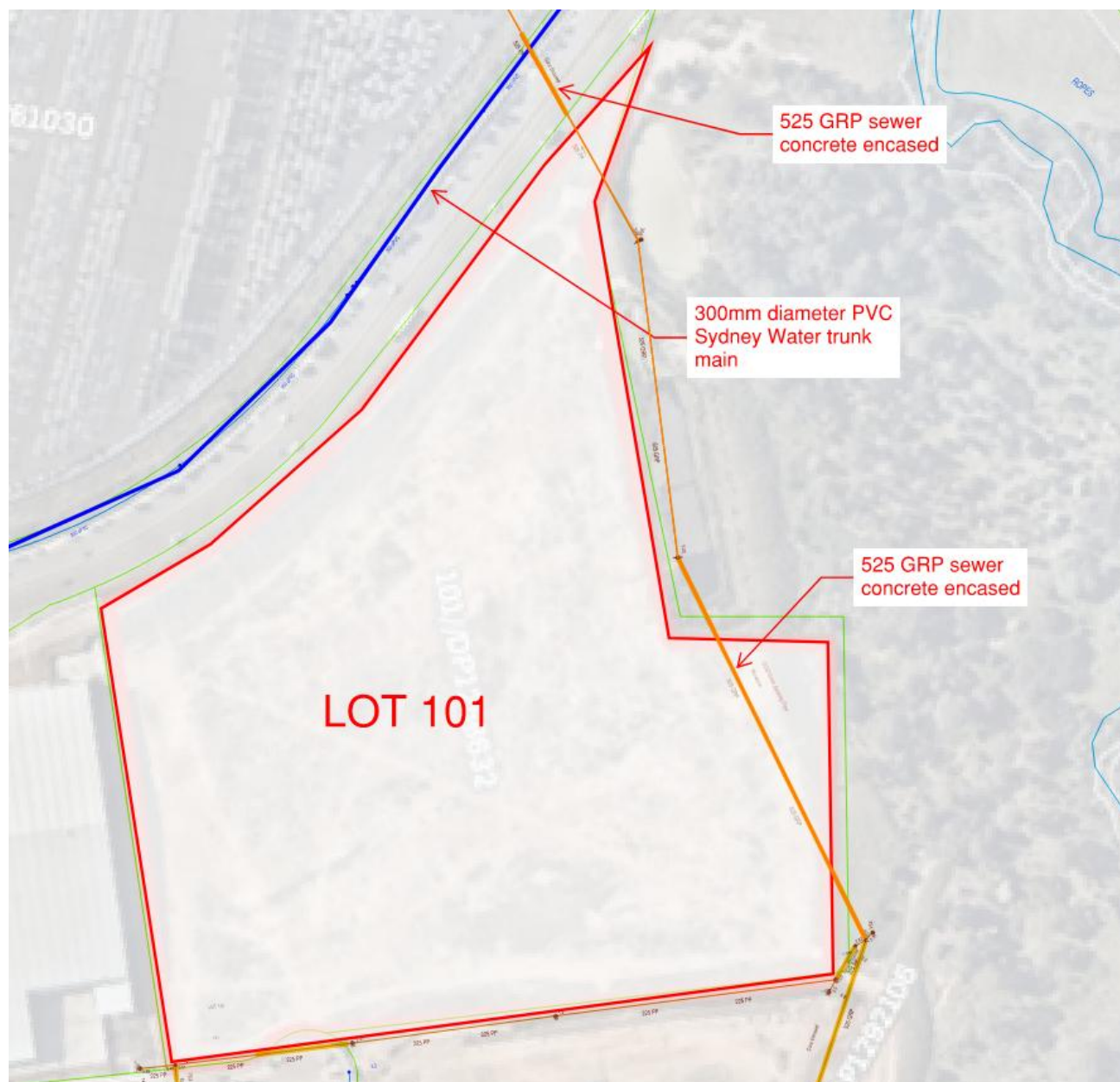


Figure 5-3: Sewer assets in proximity of the site

5.4 Gas Services

DBYD information received from Jemena shows a medium-pressure gas pipeline (210kPa) running along Leonore Drive (starting from the corner of Leonore Drive and Archibold Road) and continuing along the North of the project

site (Lot 101). Jemena deems this as a secondary mains and hence does not require a Pipeline Hazard Assessment as per AS 2885. An Electrical Hazard Assessment would be required as per AS4853 requirements, which will be developed during the detail design of the crossing. Refer to the figure below for the location of the gas main relative to the site.

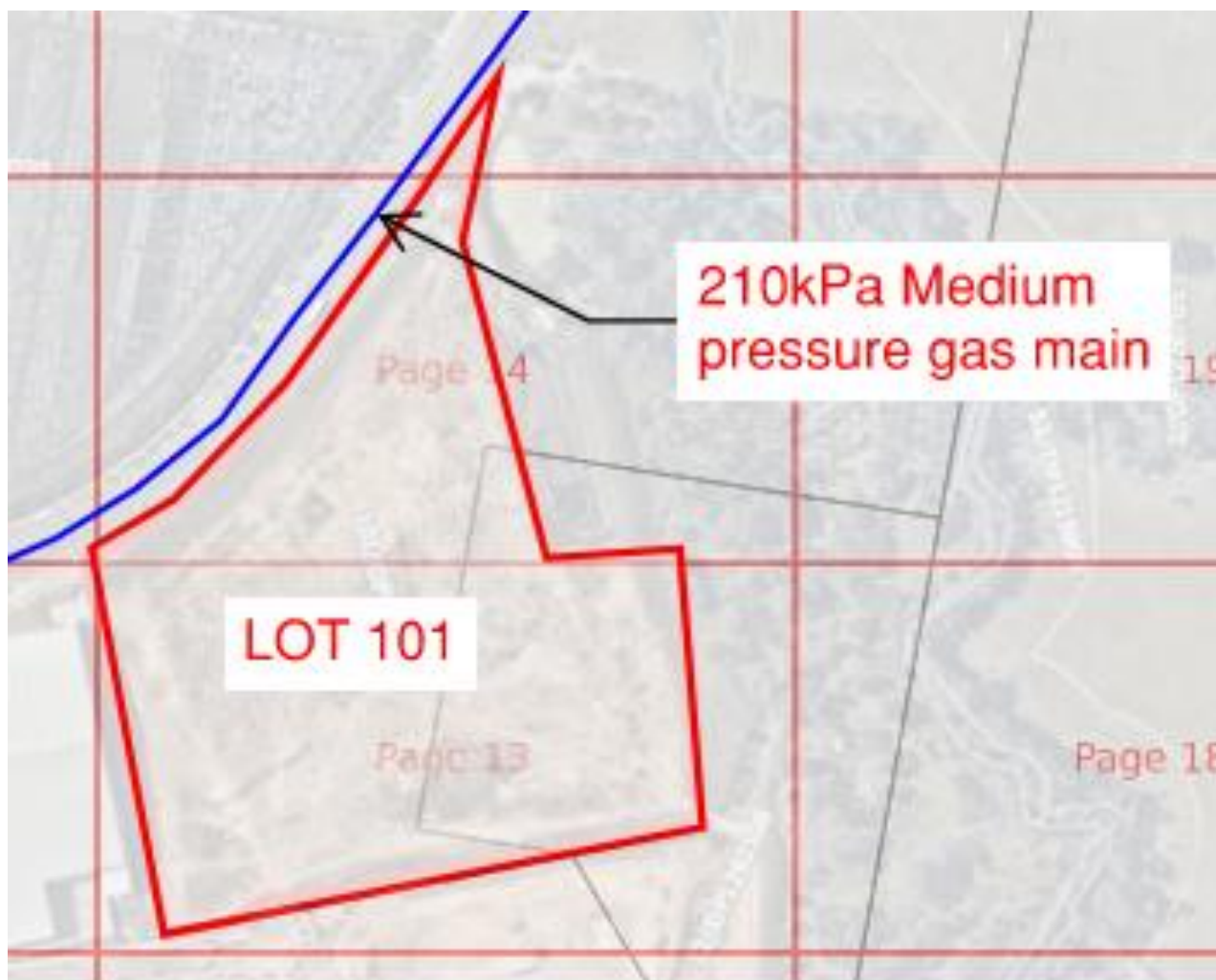


Figure 5-4: Existing Gas Services

5.5 Existing Stormwater Assets

There are various stormwater crossings along the route. Engagement with the Council is ongoing with regards to crossings.

5.6 Traffic Signals

Refer to the Traffic Report for information regarding Traffic Signals.

6 Summary of Potential Construction Impacts

6.1 Electrical and Telecommunications Services

There is anticipated impact to the surrounding electrical and telecom services on the route. Measures to avoid impact and damage to electrical services will be developed during detail design and implemented according to utility requirements and coordinated with the relevant construction teams. Refer to Appendix 1 for further information.

6.2 Water and Sewer Services

There is anticipated impact to the surrounding water and sewer services on the route. Measures to avoid impact and damage to electrical services will be developed during detail design and implemented according to utility requirements and coordinated with the relevant construction teams. Refer to Appendix 1 for further information.

6.3 Gas Services

There is anticipated impact to the surrounding gas services on the route. Measures to avoid impact and damage to electrical services will be developed during detail design and implemented according to utility requirements and coordinated with the relevant construction teams.

As part of construction, the contractor will need to follow Jemena procedures for working in proximity to high pressure gas mains. The contractor will be responsible for the following:

- Preparing a suitable plan in accordance with the Jemena guideline “Designing, Constructing and operating assets near Jemena gas pipelines” (GAS-960-GL-PL-001),
- Submissions and obtaining the necessary approvals from Jemena.
- Arranging for a pipeline operator from Jemena to be present as required by the proposed plan and approvals.

7 Summary of Residual Impacts

A summary of the main construction and operational risks, both pre and post mitigation measures highlighted in the sections above are summarised in the table below:

Table 2: Residual Risk Summary Table

Potential Adverse Impact	Relevant management Measures	Potential Residual Impact	Comments around management of residual impact
Construction Phase			
Damage to critical infrastructure	Utilise the utility approved channels and procedures to ensure damage to existing assets is mitigated	Low risk of damage during construction works	Specialist engineering assessment to be developed prior to the commencement of construction, aligning with utility requirements and industry best practices.
Construction noise exceeding the maximum limit	Construction noise management plan to be implemented to ensure levels remain below the required threshold	Low risk of noise exceedance during construction	Contractor to ensure compliance to the Construction Noise Management Plan
Damage to medium pressure gas line along the services route and adjacent to the site	Plan to be prepared by the contractor, to be approved by the utility (Jemena). Spotters to be arranged with Jemena as required during construction.	Low risk of damage to pipe during construction	Contractor to ensure the Jemena approved plan is followed during construction and conducting in-depth surveys prior to any digging to minimise residual risk.
Spillage of on-site liquid waste during construction phase	On-site storage tanks (such as septic tanks) to be provided in accordance with the relevant Australian standards	Low risk of spillage during loading	Contractor to use a licensed and certified waste disposal company, as well as providing relevant SWMS for filling operations. Storage tanks to be maintained and regularly inspected during operation for damages that may cause leakage.
Operational			
None identified	-	-	-

Appendix A Transgrid Cable Route Assessment Concept Report

Erskine Park Data Centre - 330kV UG Cable Connection

Cable Route Assessment Concept Report

This report describes the cable route assessment concept design for two x 330kV underground circuits to connect from Transgrid 330kV Sydney West switchyard to 330/132kV Erskine Park substation.

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Approver	Rita Bu- Team Leader - Transmission Line Design			

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1. Summary

1.1. Project Overview

Transgrid's Transmission Lines and Cable Design (TLCD) group has been commissioned by Lumea to develop the concept design for a new 330 kV underground cable connection between the 330 kV Transgrid's Sydney West AIS Substation and the 330 kV GIS substation at Erskine Park Data Centre.

The connection will supply the Erskine Park Data Centre via a route following Lenore Drive with an approximate total length of 2.1 km. Cables are generally located within the road reserve, with some parts of the route to be located within an easement inside private properties or within median strips.

Each 330kV circuit is designed for a nominal continuous rating of 500 MVA, allowing one circuit to be taken out of service at any time for routine maintenance or repair without affecting ratings capability. The 330 kV cables will be installed through PVC conduits in a double circuit trench.

Trench construction will also include additional conduits for communication fibre optic cables and other ancillary services.

Where crossings of man-made and natural obstructions are required, the crossings will be achieved using trenchless technologies (HDD – Horizontal Directional Drilling), with the cables being housed in polyethylene pipes. Ropes Creek is an example of such a crossing.

The preliminary route assessment has assumed a nominal 700 m section length for each cable section per circuit. The preliminary design requires the construction of two cable jointing locations along the route, subdividing the cable system into three minor sections and one major section to achieve a fully cross-bonded arrangement for cable sheath bonding.

Cable joints will be housed in buried joint bays. It is preferred these are installed outside of trafficable carriageways; however, they may be installed under road pavements. To facilitate access for routine maintenance, associated equipment pits must be installed in the road shoulder or within adjacent property.

The route traverses two council areas and TfNSW state roads, and some private property.

1.2. Roles and Responsibilities

Client (STACK Infrastructure Australia Top Pty Ltd) will be responsible for:

- Final selection of the circuit route.
- Management of stakeholder and utility negotiations.
- Planning approvals of cable route from local councils and TfNSW.
- Easement negotiations for installation within private property.(if required).

Transgrid (TLCD) shall be responsible for:

- Definition of terminal connection coordinates.
- Preliminary design of cable specifications and installation configurations.
- Preparation of Request for Tender (RFT) documentation, including interface requirements between the civil contractor and cable supplier.

This report provides a high-level cable route assessment inclusive of:

- Proposed 330kV cable specification to achieve customer load rating and comply with Transgrid underground cable standard “Extra High Voltage Cable Design and Installation Manual - latest Revision”.
- Review of proposed cable circuit route
- Preliminary trench cross-sections and service crossings
- Constructability review.
- Key risks addressed in the concept route assessment include ensuring supply security through redundancy, providing sufficient cable rating headroom to meet client expectations, and identifying alternative construction methods at pinch points. Remaining risks involve final cable system design, conduit installation, and cable operational quality. The cable supplier should manage the final design to align responsibility with manufacturing expertise and secure robust warranty coverage. Installation risks are best mitigated by engaging the client’s civil contractor for both conduit and cable works. The RFT must clearly define the interface between the cable supplier and civil contractor(s).

The cable asset will be owned by STACK and operated and maintained by Lumea/Transgrid.

2. Project Specification

The client specification for the 330kV u/g cable connection is as follows [7]:

- 500MVA continuous load
- 330kV normal operating line voltage
- Two underground cable circuits
 - i) Each cable to be suitably rated for a minimum continuous rating of 900A (500MVA)
- Fault rating capability of the cable system shall be designed to meet 50kA for 1 sec.
- 2100m nominal circuit length
- N-1 level of redundancy
- Nominal route from new 330kV switchbays located in Transgrid's Sydney West Substation, along Lenore Drive and entry to new Erskine Park substation via client property.
- The geotechnical and thermal resistivity (TR) field investigation have not been completed along the route to determine thermal properties of the existing native soil. The route assessment has been based on assumptions of native soil TR of 2.0Km/W.
- Each cable circuit is to be equipped with an optical fibre cable for the communications system. The optical fibres are also required to carry protection signalling functions associated with the cable system.
- It is recommended that a distributed temperature sensing (DTS) system be installed in a conduit to monitor the temperature and thermal performance of the cable along the entire route length.

3. Cable Route Assessment

3.1. Cable Route

The proposed 330kV cable route is located within a commercial/industrial urban area, following Lenore Drive, extending from Transgrid's Sydney West Substation to the Erskine Park Data Centre. The two 330kV circuits will be installed into a double circuit trench beneath the trafficable carriageway. The cables will only cross the median strip at joint bay entry and exit locations to avoid impacts on existing vegetation.

The route traverses two local government areas, Penrith City Council and Blacktown City Council, TfNSW state road reserve and private properties (if required).

The total length is approximately 2.1 km (measured at the substation boundaries). Along the cable alignment, the route will cross Ropes Creek along Lenore Drive. Joint bays will be installed along the route to facilitate cable jointing and pulling. Two joint bay locations have been identified for the route; joint bays are required at approximately 700m – 800m intervals. Equipment pits (earthing, communications, etc.) will also be installed alongside the joint bays. The cable route is shown in Figure 1. The route plan drawing CAB-ERSKINE PARK-SKT 1 is attached in Appendix B.

An initial Before You Dig Australia (BYDA) enquiry has identified third-party utilities along the alignment. Details are shown in Appendix C. The concept cable routes are based on desktop BYDA data. The location of some/all of these assets will need to be confirmed prior to completion of final cable system design. This task will be included separately in the scope for the civil contractor and will entail potholing by vac-trucks and GPR survey or other means to prevent damage to those assets. Critical services that may impact cable system design and civil works include Endeavour Energy sub-transmission and distribution cables, Sydney Water and Jemena pipelines and council stormwater assets.

The Client is responsible for negotiations with third-party utilities and confirming nominal horizontal and vertical separation distances from the proposed 330kV connections. Please refer to Guide to Codes and Practices for Street Opening - NSW Streets Opening Coordination Council in section 8 for the recommend clearances referenced to Guide to Codes and Practices for Streets Opening. Effects of the new 330kV cables on existing assets will be evaluated by detailed cable system design performed by the cable supplier; mitigation actions will need to be negotiated with asset owners at that time.

Easements are not required within road reserves. Easements may be required for cables and joint bays located within a private property to provide legal access for construction, routine inspection and maintenance. It is noted control protocols for access, and third-party construction activities, adjacent to buried cable assets within road reserves is less stringent than within registered easements creating a greater risk of damage.



Fig 1. Cable Route

3.2. Erskine Park Data Centre

The Erskine Park Data Centre is located at Lot 101 DP1268632, 78 Lockwood Road Erskine Park, as referenced in the Planning Schedule for Erskine Park Data Centre.

The two 330 kV cable circuits will diverge from Lenore Drive and turn south towards the data centre site. The cables will terminate within the Erskine Park 330/132 kV GIS substation, the exact cable termination location to be confirmed in detailed design. The 330 kV cables are to be located within a designated cable easement inside the data centre property to allow future Transgrid access and maintenance.

3.3. Lenore Drive

Lenore Drive is a Transport for NSW (TfNSW) state road, it's a divided road with four road lanes. There are numerous utilities along Lenore Drive including Endeavour Energy cables, water and gas pipelines, communication cables, council stormwater assets etc. There is also Transgrid and Endeavour Energy overhead powerline corridors crossing Lenore Drive at several locations. There is potential to install the 330 kV cables within the northern side lanes and median strip of Lenore Drive, subject to available space and utility clearance requirements.

There is an existing road bridge along Lenore Drive crosses over Ropes Creek. It is proposed to install the 330 kV cables underneath Ropes Creek using the HDD technique. The 330 kV cable alignment will need to deviate off the Lenore Drive carriageway for a sufficient distance before reaching the bridge structure to allow for the HDD setup and installation. The two circuits are suggested to be located on south side of the bridge. The creek crossing and the approaching cables may be located within a private property. The client is responsible for negotiating with the property owner for approvals to place Transgrid cables inside a private property.

The 330 kV cables will cross an existing concrete sewer pipeline at approximately 100m east side of the Ropes Creek along Lenore Drive.

Three joint bay locations are proposed along Lenore Drive.

- Joint bay JB1 is projected to be located on the south side of Lot 1 DP 1266682, within the median strip of Lenore Drive.
- Joint bay JB2 is projected to be located on the south side of Lot 31 DP 1264694, within the median strip of Lenore Drive.

Each joint bay must maintain adequate separation from existing utilities, the minimum required distance subject to the detailed earthing design for the joint bay. Consideration should also be given to locating the joint bays away from existing overhead powerlines to avoid or minimise potential impacts during installation and delivery of joint bays.

Access to link pits is of particular importance and the location of these pits should be such that the connecting bonding cables are not longer than 10 metres.

3.4. Transgrid Sydney West Substation

The two 330 kV circuits will traverse cross Lenore Drive and turn south to enter the Sydney West AIS Substation at separate locations. Each circuit will follow a different route and terminate at a separate feeder bay. The final termination locations will be confirmed based on high-voltage (HV) design advice.

The 330 kV cables will cross existing and future underground cables within the Sydney West Substation; sufficient separation must be maintained during installation and operation. A deeper than standard trench may be required for the cables to cross the new bench extension in a perpendicular direction. A concrete barrier may be required as additional the mechanical protection for the 330kV cables. The Transgrid project team will liaise with relevant internal stakeholders (e.g. Asset Management and Substation team for detailed requirements and approval.)

The existing Sydney West Substation BESS site is located on northeast side of Sydney West substation, and this may result in the 330 kV cable circuits needing to be trenched around the existing BESS site to avoid possible impacts on the BESS installation. It may be possible to install cables along the access way within switchyard to minimise the impact on existing adjacent trees, subject to proposed general arrangement of substation. Tree root guards will be required if the cable trench is located within 5m of the trees or under the tree canopy.

3.5. Potential Constraints

The following constraints have been identified in the proposed cable route between Transgrid Sydney West Substation and Erskine Park data centre:

Traffic management

- > Works along Lenore Drive will require significant traffic control measures, potential partial road closures and permits from Local Council and TfNSW. Limited detour options and property access will need to be managed in consultation with affected stakeholders.
- > Works at Lenore Drive will require TfNSW S138 approval as well as Road Occupancy Licence (ROL). Traffic control measures need to be implemented in accordance with TfNSW requirements.

Working hours

- > After-hours or night works may be required to minimise traffic impact; such works requiring prior approval and community consultation.
- > Noise and vibration from trenching, thrust-boring and compaction activities must be managed through appropriate equipment selection and scheduling.

EMF

- > Compliance with ARPANSA/ICNIRP public exposure limits shall be satisfied.
- > Optimised phasing arrangements of the three-phase circuits shall be implemented.
- > Maintain as much horizontal separation from dwellings and sensitive receptors as practicable.
- > It is noted that trefoil arrangement proposed for this project will generate significantly lower magnetic field strengths than other cable configurations.

Utility interface

- > Highly congested utility corridor with Endeavour Energy, Jemena, NBN, Sydney Water, Telstra assets, etc identified along the whole cable route.
- > Non-destructive digging (NDD) is required to safely and physically expose existing underground utilities
- > Separation requirements to be discussed with relevant stakeholders
 - Physical separation to prevent accidental damage during installation or for future maintenance. Alternative locations for 330kV cables need to be considered should separation clearance not be achievable with other utilities.
 - A cable ratings study is required to ensure the cables rating meets the Client's requirements and does not negatively impact on Endeavour Energy infrastructure.
 - Cable operation will result in localised heating of the ground at the crossing, effectively increasing ambient ground temperature.

Any sections where the circuits are in parallel will result in induced currents in the cable sheaths, also impacting rating of all cable assets.

Council Drainage

- > Sufficient clearance needs to be maintained to council drainage assets.

Vegetation clearance in undeveloped land

- > Where possible the cable trench shall be located to avoid impacting the Structural Root Zone (SZ) or more than 10% of the Tree Protection Zone (TPZ) as defined in AS 4970. For any impact which exceeds these requirements, the client shall obtain an arborist's report and treatment measures where trees are encountered. Cable trenches installed within the TPZ shall include an assessment by an arborist to determine if any additional protection measures of the cable system are required due to the proximity of the tree.
- > Trees outside of the easement may still not comply with the CDIM requirement, requiring off easement tree removal. The environmental assessment shall take this into consideration.

HDD conduits installation

- > HDD conduits are required at several locations along the cable route to facilitate 330 kV cable crossings beneath major existing services. The feasibility of each HDD installation is

subject to geotechnical investigation results and confirmation of sufficient space for HDD setup and installation.

Cable easement creation

- > Cable easements need to be created for sections of the 330 kV cable located within private properties. Due to the congested utilities corridor along the proposed route, portions of the 330 kV cable may need to be installed within private land to maintain adequate separation from existing utilities.

These constraints will be reviewed and refined during detailed design and construction planning.

4. Cable Type & Accessories

4.1. Cable & Accessories

i) Phase cable:

- > single core cable
- > 2500mm² nominal cross-section copper conductor - Milliken construction (To be confirmed by cable rating calculation)
- > XLPE insulation rated for Extra High Voltage (super clean) Semi-conductive tape water swellable tape at insulation/metallic sheath interface
- > Smooth or Corrugated Aluminium Sheath
- > Anti-corrosion layer (MDPE)
- > Termite barrier (Nylon)
- > HDPE sacrificial layer
- > Extruded semi-conductive outer covering for sheath insulation resistance testing
- > Dynamic Bending radius < 6m

ii) Accessories required for each circuit are:

- > 3 x GIS sealing end; 3x AIS sealing end.
- > 3 x single phase earthing link boxes at outdoor sealing ends
- > 1 x three phase earthing link box at GIS terminations (dependent on switchgear arrangement).
- > 2 x cross bonding link boxes incorporating SVL's (Sheath Voltage Limiters)
- > 6 x Cable Joints
- > 2 x Fibre Optic Pits
- > PD detection at joints and cable terminations
- > Capability for future DTS monitoring system.

4.2. Prequalified Cable

The cable system to be supplied shall be prequalified in accordance with IEC 62067 [1] and the Transgrid EHV Cable Design and Installation manual [2].

Where the cable design offered does not have a compliant PQ test certificate, an extension to pre-qualification certificate shall be provided in accordance with IEC 62067 and CIGRE TB 303.

4.3. Cable Civil Works

4.3.1. General

In general, phase cable shall be installed in PVC conduits that has been buried in an open trench excavation. At major crossings of natural and man-made impediments, a trenchless technology technique such as HDD using HDPE conduits may be required. Cable circuit phase configuration for each circuit will be in a trefoil formation beneath trafficable carriageways to minimise trench width/construction footprint. This arrangement provides the advantage of reducing EMF effects on surrounding environment and assets, particularly when one circuit arrangement is inverted in its formation. A flat configuration may be adopted for substation entries and in locations where spatial constraints or existing utilities necessitate an alternative arrangement. Conduits for communication system shall not be located at the outside edge of the cable trench. The optical fibre cable shall have a suitable thermal rating to enable this placement between the power cables. Additional conduits for DTS are essential, unless the cable has integral fibres.

The depth of cover requirements shall be as specified in the EHV CDIM (Reference 1.1) Section 7.17.1.

- 900mm in sealed roads.
- 1200mm in RMS controlled or other major roads, and
- 1000mm in parks and reserves.

The trench shall be backfilled with FTSB (fluidised thermally stable backfill) attaining a compressive strength of less than 5MPa (at 28 days) whilst maintaining a thermal resistivity less than 0.9 K.m/W.

Trenches shall include mechanical protection comprising overlapping polyethylene sheets to AS 4072 Warning tape shall be fitted within the trench above the polyethylene sheets, generally at road base level, but covering the entire trench width.

The cable trench is preferred to be located 4 metres away from adjacent underground power cable assets, unless otherwise agreed with the relevant asset owner.

For each instance of proximity or potential interaction with existing power cable assets, a cable rating review shall be undertaken in consultation with the asset owner to assess any potential de-rating or required remediation measures. Where thermal interference between cable systems is identified, remediation measures may be required, such as additional thermal backfill with a thermal resistivity (TR) value of 0.65 K·m/W between the existing power cable assets and the proposed cable trench.

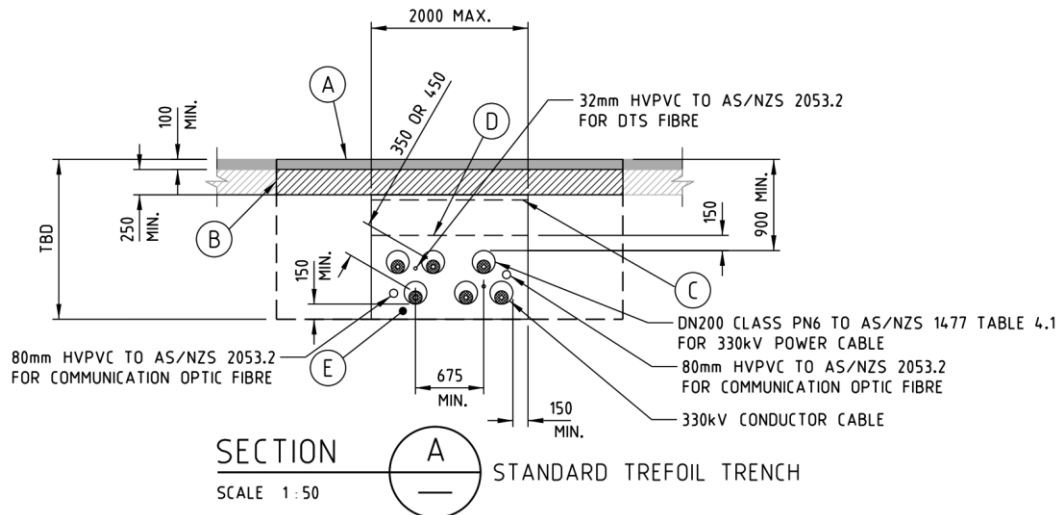
Minimum separation distances between the proposed cable and other underground services shall comply with Transgrid standards and be confirmed through consultation with the respective asset owners.

Conduit shall be temporarily sealed during construction to prevent water and debris ingress.

Four trench configurations are proposed to suit the different environments/constraints expected to be encountered along the cable route. Please note that sketches shown below are indicative only.

Arrangement subject to detailed assessment, Transgrid Asset Management & 3rd party utility approval.

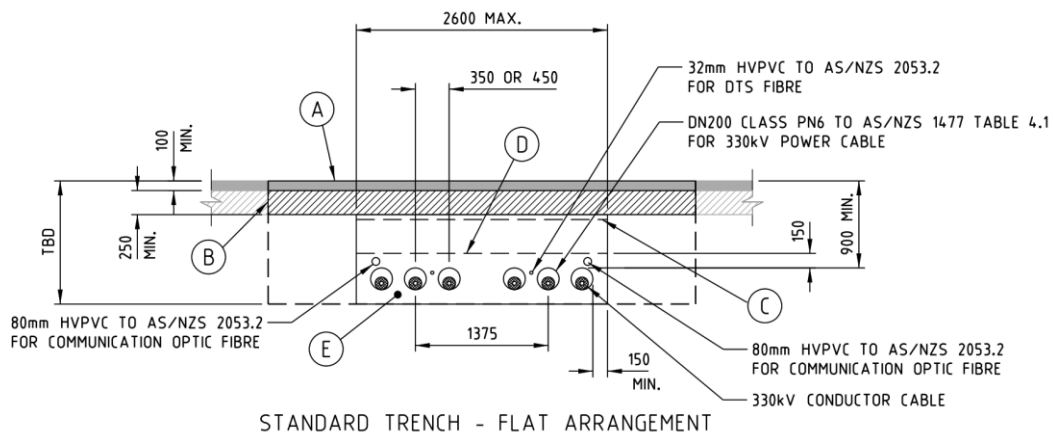
4.3.2. Type 1 Trafficable carriageway – double circuit trench



- i) Cover to cable conduit = minimum 900mm.
- ii) Phase distance 350mm or 450mm.
- iii) Circuit axial distance to be minimum 675mm.
- iv) Trench width (2 circuits) = up to maximum 2000mm.
- v) Assumption Native Soil TR=2 K.m/W (Dried out)
- vi) Deep undercrossing is typically required for large stormwater, gravity sewer, and large diameter transmission gas pipe
- vii) Shoring will be required if it is deep trench for service crossing (capable of supporting adjacent traffic loads)
- viii) Relevant conduit spacer is to be selected in detailed design.

4.3.3. Type 2: Joint Bay Entry / Service undercrossing – shallow conduit/flat configuration – double circuit trench

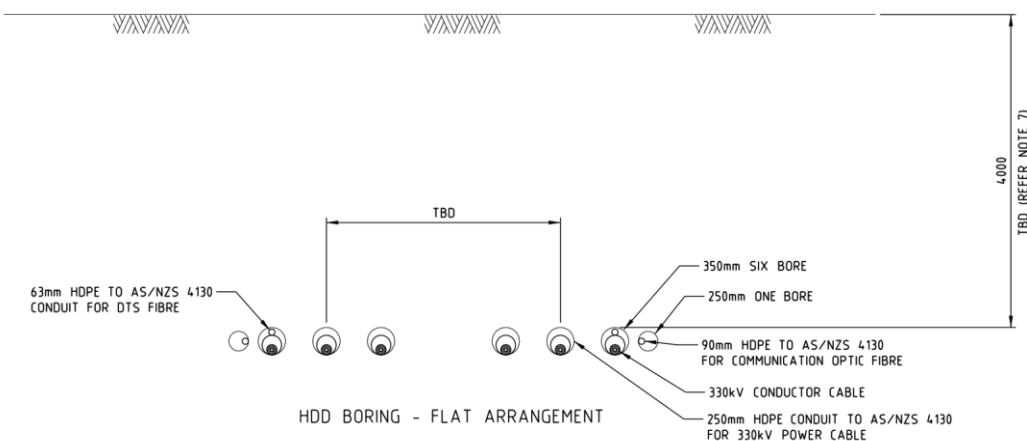
Cable crossings can be installed above large gravity drains or other services subject to depth to existing asset.



- Cover to cable conduit = 900mm minimum wherever it is possible.
- Phase cable configuration: flat
- Phase distance 350mm to 450mm.
- Circuit axial spacing minimum 1375mm.
- Trench width (2 circuits) = up to maximum 2600mm.
- Refer to SOCC guideline for recommended clearance section 5.5.

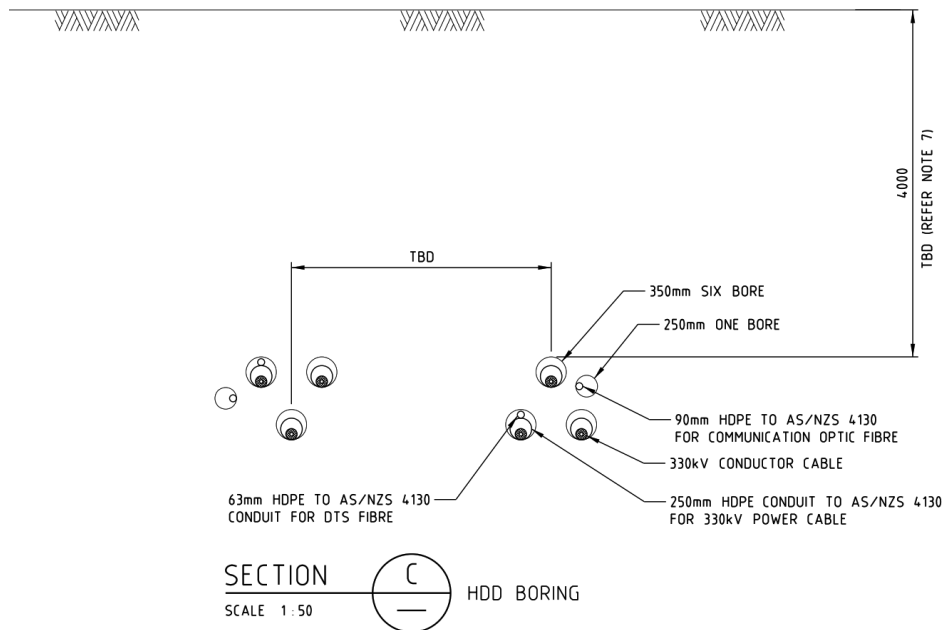
4.3.4. Type 3: HDD under the Ropes Creek

The route assessment has been undertaken based on desktop Before You Dig Australia (BYDA) data only. Consequently, three bore arrangements have been proposed at this stage. The final determination of which arrangement will be adopted will be made during detailed design, following the results of the Ground Penetrating Radar (GPR) and geotechnical investigations and detailed rating assessment.



- Each phase sits in 350mm Bore Hole.
- Cover depth to be up to be minimum 4m, subject to detailed design.
- Flat Configuration Phase distance to be determined in detailed design.
- Circuit axial spacing up to be determined in detailed design.
- Secure DTS conduit to the top of the power cable conduit at 3m intervals with duct tape to maintain position

- vi) Communication fibre cable sits in 250mm Bore Hole for each circuit.



- i) Each phase sits in 350mm Bore Hole.
- ii) Cover depth to be up to minimum 4m, subject to detailed design.
- iii) Trefoil Configuration Phase distance to be determined in detailed design.
- iv) Circuit distance up to be determined in detailed design.
- v) Secure DTS conduit to the top of the power cable conduit at 3m intervals with duct tape to maintain position
- vi) Communication fibre cable sits in 250mm Bore Hole for each circuit.

4.3.5. Type 4: Transition trench at substation entry.

- i) Single circuit
- ii) Cable flat configuration.
- iii) Nominal cover to cable = 1100mm. (subject to further coordination with substation building design)
- iv) Nominal trench depth = 1500mm. (subject to further coordination with substation building design)

4.4. Equipment Pits

The proposed underground cable system shall include the following types of equipment pits:

- i) Link box pit
- ii) Communications pit

- iii) Caterpillar pit –if necessary, the pits are in line with the conduits and used to assist in cable pulling. Once installed, the cables are covered with split conduits, and the pit backfilled.
- iv) Partial discharge monitoring pits (depending on the system used)
- v) DTS fibre pit.

General Requirements

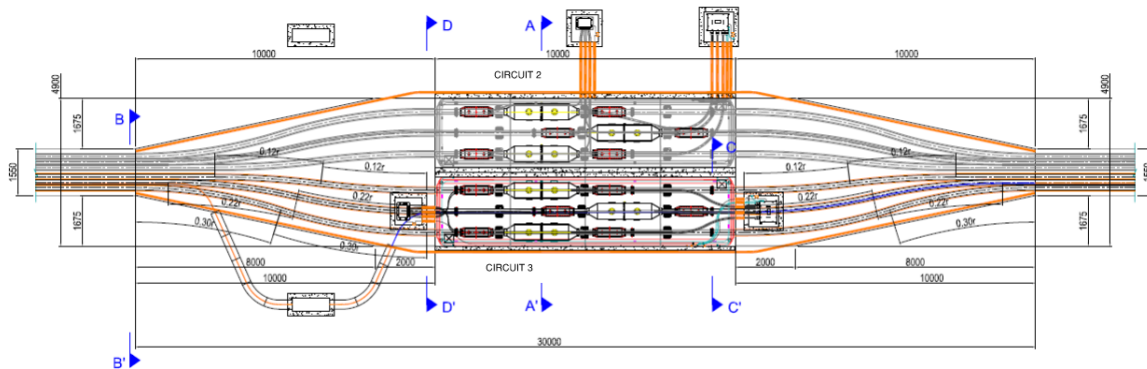
- i) Joint bays shall not be installed within carriageway of state or regionally classified roads.
- ii) For double-circuit installations, joint bays shall be designed and installed to allow maintenance on one circuit without the need to de-energise the other circuit.
- iii) Cable joints shall be installed in concrete joint bays.
- iv) Caterpillar pits shall be of sufficient size to allow for the insertion and extraction of a caterpillar to assist with cable installation.
- v) Typical joint bay sketches are attached.

Link Box Pits

- i) Link box pits shall be located off-road in areas that are safe and easily accessible during maintenance, without requiring third-party permissions, permits, or traffic control.
- ii) Link box shall be installed in pits suitable for Class D Gatic lids.
- iii) The bonding cable length shall be less than 10 metres.
- iv) The locations of link box pits and bonding leads shall be recorded on Work-As-Executed (WAE) route plan drawings suitable for inclusion in the Before You Dig Australia (BYDA) system.

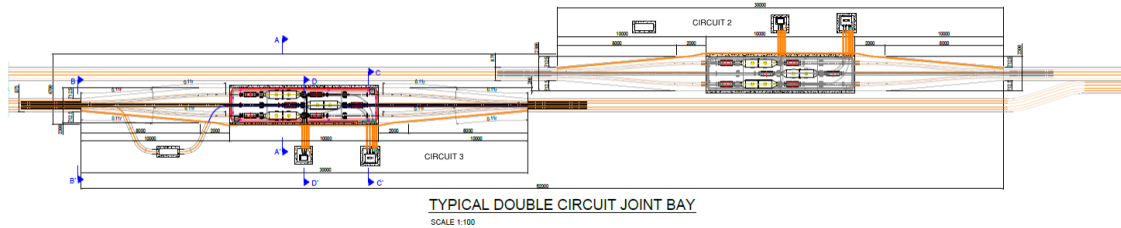
Fibre Optic Pits

- i) Fibre optic pits shall be designed and installed for the proposed circuits.
- ii) Any temporary cable haul pits used during optical fibre installation shall be backfilled and retained.
- iii) The locations of fibre haul and joint pits shall also be recorded in the WAE route plan drawings for inclusion in the BYDA system.



TYPICAL DOUBLE CIRCUIT JOINT BAY

SCALE 1:100



4.5. Cable interface at sealing ends connection

Exposed cable above ground at terminations shall be shaded from direct solar radiation.

4.6. Cable Route Markers

Refer Transgrid EHV Cable Design and Installation manual latest revision Section 8.18.

4.7. Other services

Cable trench to include PVC conduits for following services:

- 1-off DTS conduit per circuit
- 1-off Communications PVC conduit per circuit.

5. Constructability

5.1. General

This section evaluates likely construction issues associated with cable pulling, trench construction, and locations of caterpillar pits and cable storage/laydown footprint.

Trench widths are given by cable ampacity rating models that calculate minimum separation distance of phases for heat dissipation.

It is recommended feedback is sought from civil contractors on practicality of some of the more difficult configurations and detailed constructability assessment undertaken prior to development of preliminary design and issue of RFT.

5.2. Cable Pulling

The cable route includes number of large horizontal bends and numerous vertical changes in level to avoid existing assets at service crossings.

Cable hauling tensions are limited by the ultimate tension and side-wall pressure generated as the cable is forced around bends. To reduce the winching tension, intermediate caterpillar units (with push/pull) capability may be used. Cable pulling calculation is required, temporary haul pits may be necessary

5.3. Trench Construction

5.3.1. Type 1 Trafficable carriageway

For works along roadways, temporary road closures and traffic management will be needed.

Standard trench construction practice along roadways it is to undertake works overnight. For each shift and a single cable circuit, up to 30m of trench is excavated, conduits laid and FTSB poured. The trench is then protected with steel road plates and road re-opened for day traffic. Asphalt pavement is subsequently reinstated.

The trench construction footprint includes 1m buffer either side for construction access, bollards and traffic management signage. An enlarged footprint will be needed for benching should trench depths exceed 1.5m depth.

5.3.2. Type 2: Road Reserve (unsealed surface)

This is a common construction arrangement, and no significant issues have been identified.

Issues to be considered are:

Coordination of excavation works to prevent hinderance for other construction activities (eg OHL cut-ins, access to the substations etc).

Removal of trees

Need for root guards.

5.3.3. Type 3: HDD

One location has been identified where the route crosses Ropes Creek. It is not possible to relocate such natural obstruction so it will be necessary to install HDD to pass underneath.

5.3.4. Type 4: Transition trench at substation termination

This comprises a flat cable construction arrangement, and no significant issues have been identified.

Issues to be considered are

- Coordination of excavation works to prevent hinderance for other construction activities (eg. OHL cut-ins, access to the substations etc).
- Coordination of cable installation and commissioning within substation yard.

5.4. Joint Bays

It is estimated that 2 joint bays sites will be needed for double circuit bays. Joint bays in the median strip may cause a flood risk due to the existing drain, the risk needs to be managed during construction.

The joint bays will need continual access during cable pulling operations. The caterpillar pits can be backfilled with sand and then reinstated on a temporary basis to allow re-opening of roads if required.

5.5. Cable drum site

A total of 18 drums of cable will be needed for installation of the Erskine Park circuits. A secure site will be needed for storage of cables and equipment, with cable drums delivered to site as required

during construction. The construction footprint will need to accommodate the storage area and laydown. It is recommended an area not less than 80m x 80m be provided.

It is most likely the best location will be adjacent to the northern boundary of the Sydney West switchyard. This will avoid placing materials under OHL cut-ins and cable trench alignment.

6. Conclusion & Recommendations

6.1. Conclusion

The cable route analysis has confirmed a technically feasible solution is possible for the proposed 330 kV underground cable connection between Transgrid Sydney West 330/132kV AIS substation and the Erskine Park GIS substation to supply the Data Centre load.

The proposed arrangement shall satisfy the functional, operational, and safety objectives of Transgrid's network standards and aligns with relevant Australian and international design practices for 330 kV underground systems.

The concept design has established the following key outcomes:

1. The preferred cable route between Sydney West Substation and the Erskine Park substation GIS was selected, with the alternative not seen as viable. As previously mentioned, this route traverses Lenore Drive. No other routes have been investigated.
2. The required two (2) 330 kV circuits have been confirmed as technically feasible, adopting a nominal 2500 mm² copper cable configuration to support a continuous ultimate load demand of 500 MVA (N-1), consistent with system studies and redundancy requirements.
3. Cable and trench configurations have been defined for varying route conditions, taking into account mechanical and electrical performance of the cables, including current rating and thermal performance, environmental requirements, constructability constraints, site conditions and third-party asset crossings.
4. There are two joint bay locations required along the proposed route, number to be confirmed during detailed design.
5. High-level requirements of cable and accessories, and cable system criteria have been established.
6. Project and operational risks have been identified for management in subsequent design and delivery phases.

The concept design provides a sound basis for progressing the project to the detailed design and delivery phases.

6.2. Recommendations

This route assessment confirms that the proposed 330 kV underground connection between Sydney West AIS Substation and the Erskine GIS Substation is technically and operationally feasible, and

suitable for progression to detailed design and subsequent delivery to support the Erskine Park Data Centre supply requirements.

7. References

1. IEC 60267 Power Cables with Extruded Insulation and their Accessories for Rated Voltages above 150 kV ($U_m = 170$ kV) up to 500 kV ($U_m = 550$ kV) – Test Methods and Requirements
2. Transgrid EHV Cable Design and Installation manual (latest revision)
3. ESAA C(b)2-1989 Guide to the Installation of Cables Underground
4. Transgrid easement guidelines
5. Requirements for Working in the Vicinity of Transgrid Underground Cables
<https://www.transgrid.com.au/media/la1cmkh0/work-near-cables.pdf>
6. PlanningSchd_Erskine Park
7. SYW-857788 v00 model
8. Erskine Park – KOM
9. Guide to Codes and Practices for Street Opening - NSW Streets Opening Coordination Council
10. W-A0300-SITE PLAN
11. W-A0310-SITE FENCING & MOVEMENT PLAM

Appendix A Drawing List

Proposed List of Drawings for RFT:

1. Cable route plan
2. Trench cross-sections

Appendix B Cable Route Plan



CAB-ERSKINE
PARK-SKT 1 06-01-26

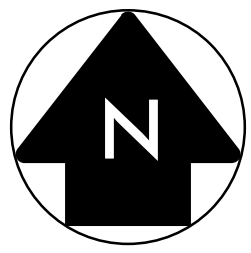
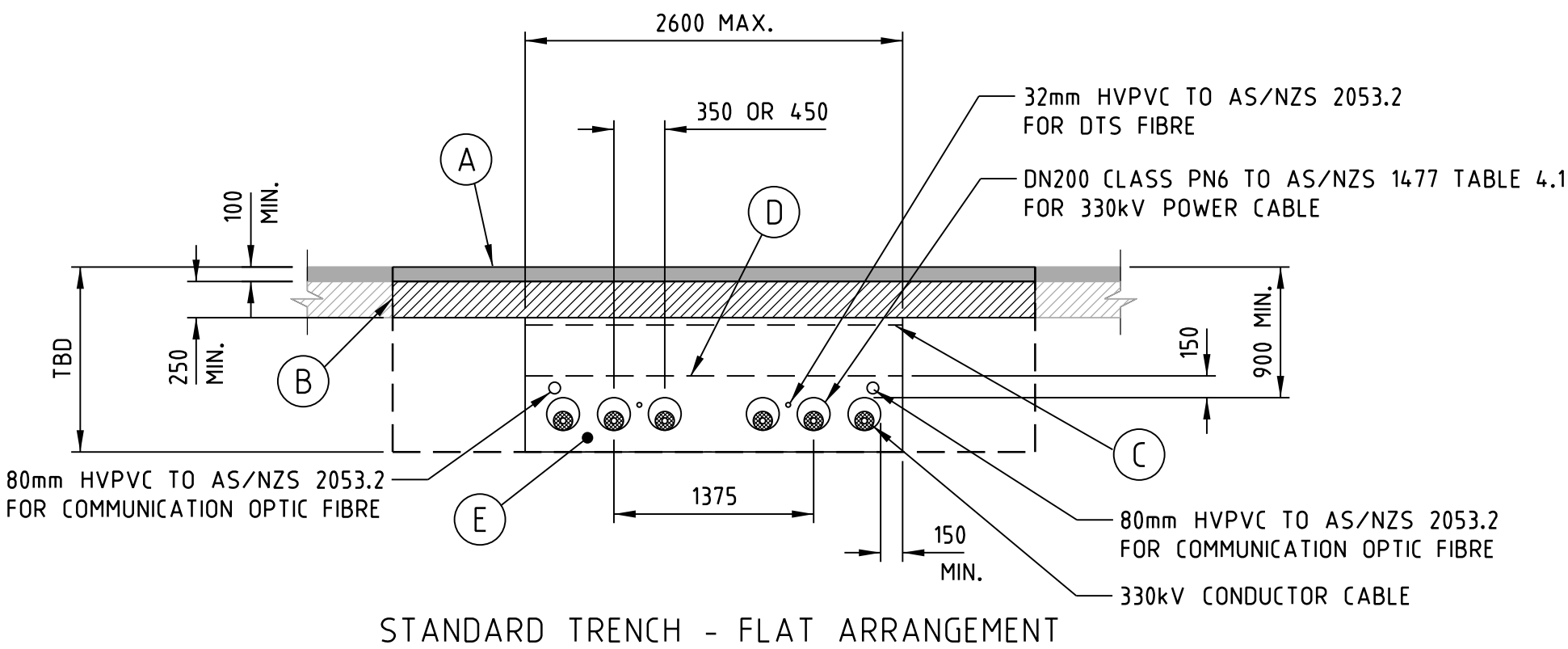
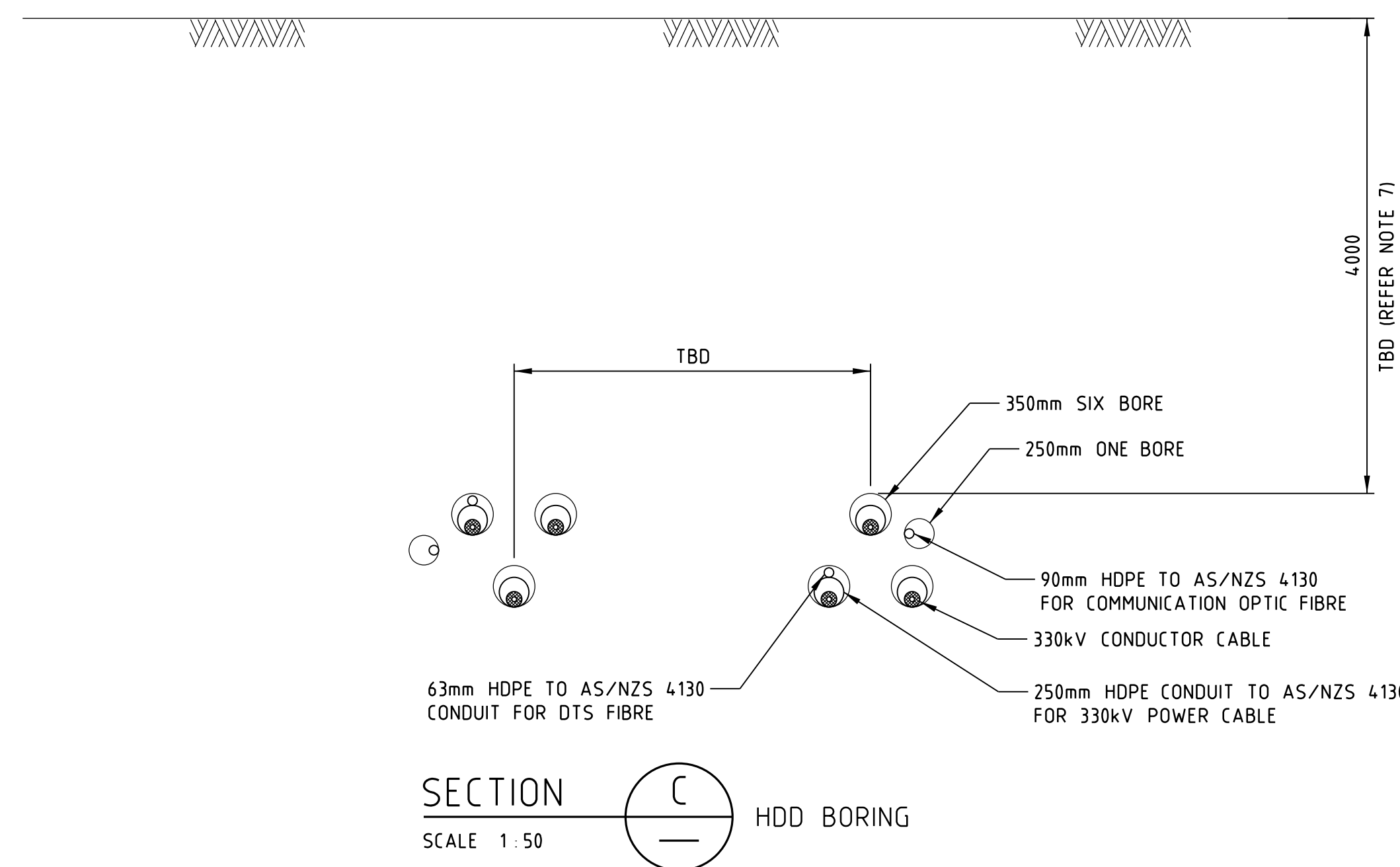
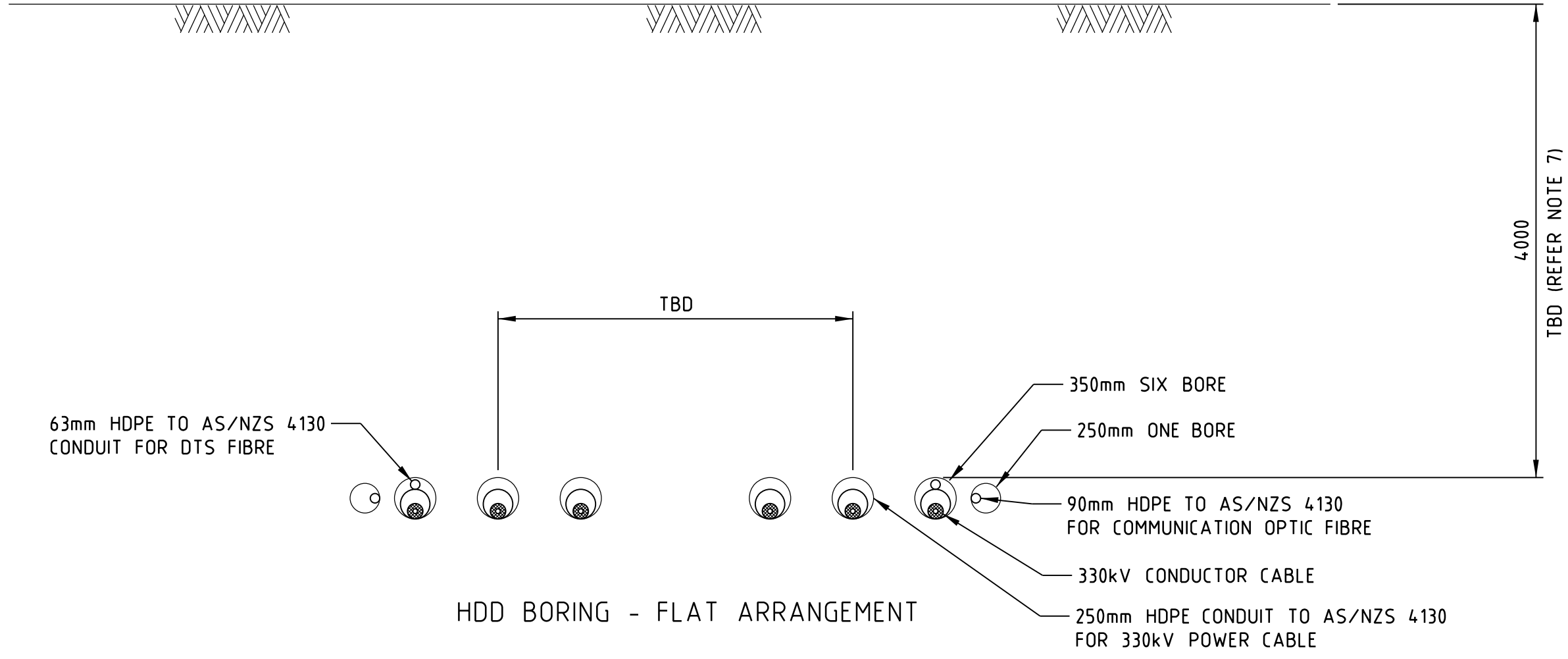
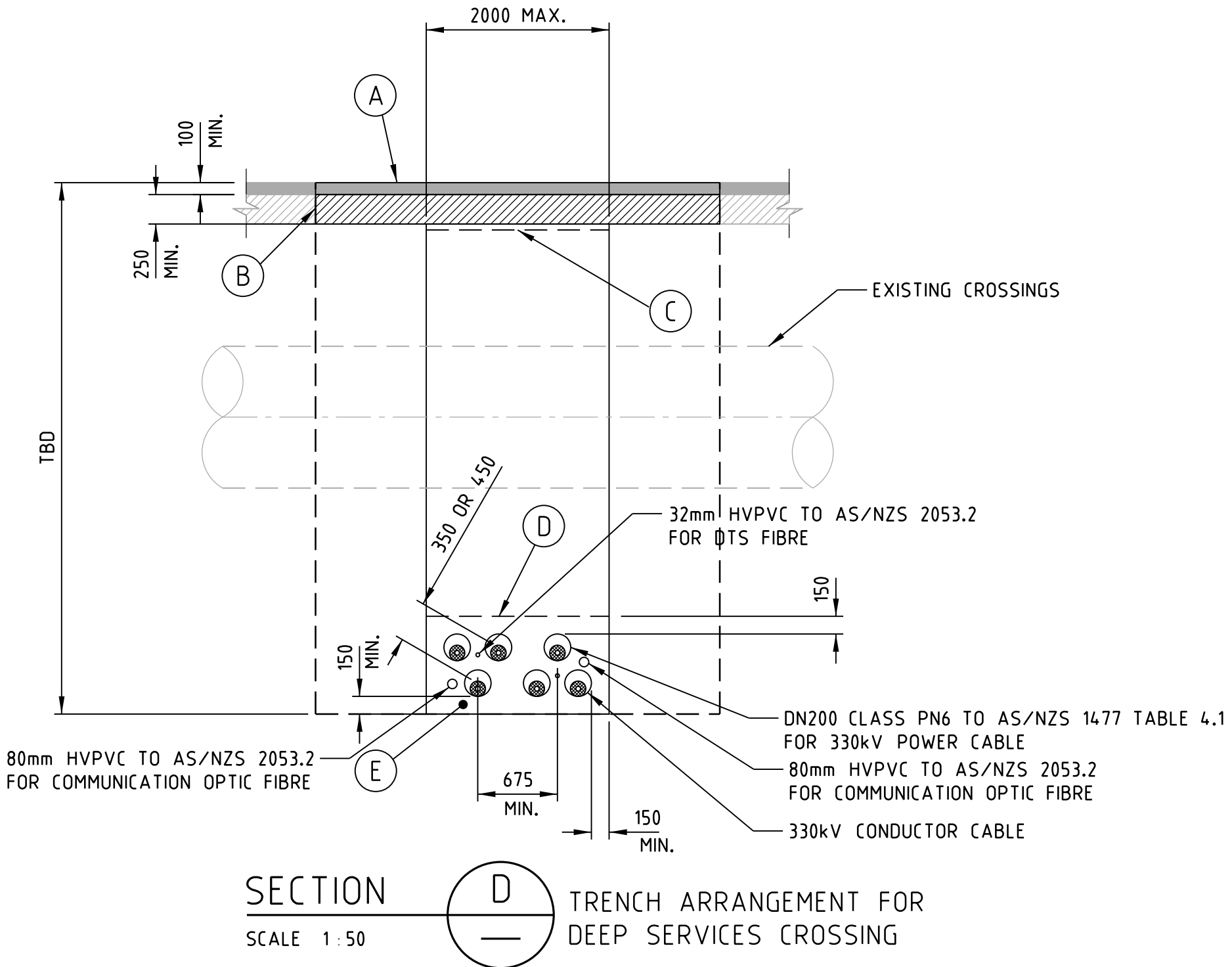
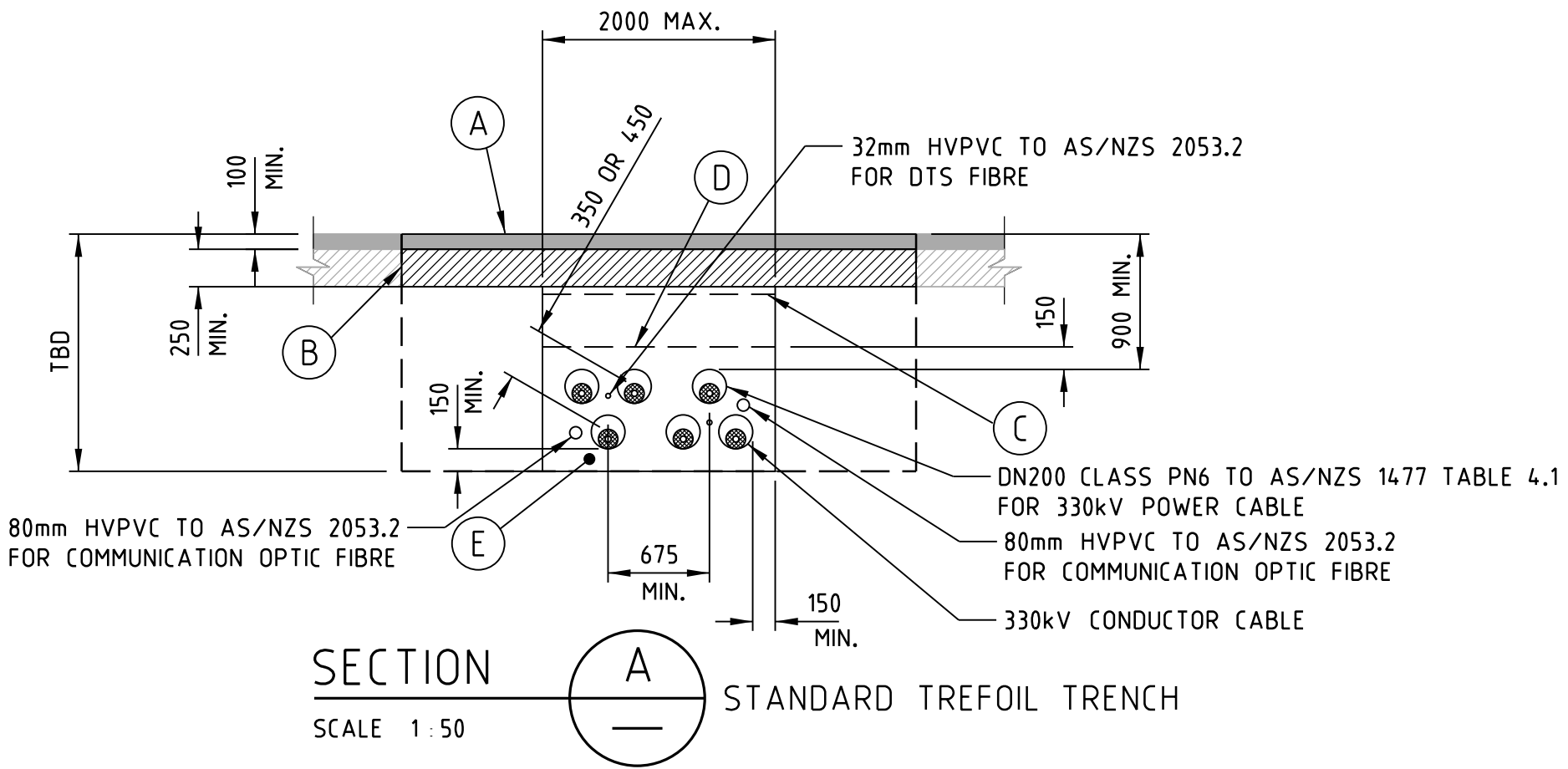


TABLE 1

TRENCH COORDINATES (COORDINATE SYSTEM IS MGA2020-56)			
CHAINAGE	COORDINATE	CHAINAGE	COORDINATE
CH 0m	E 299070.918 N 6256472.765	CH 1303.2m	E 297937.254 N 6256613.618
CH 80.0m	E 299113.316 N 6256540.606	CH 1336.6m	E 297904.134 N 6256618.271
CH 90.1m	E 299110.795 N 6256549.210	CH 1337.8m	E 297902.933 N 6256618.318
CH 361.7m	E 298892.813 N 6256659.885	CH 1432.0m	E 297807.727 N 6256612.486
CH 364.2m	E 298860.422 N 6256660.406	CH 1433.2m	E 297806.542 N 6256612.293
CH 467.5m	E 298755.587 N 6256661.149	CH 1506.5m	E 297734.009 N 6256592.545
CH 469.0m	E 298755.587 N 6256661.039	CH 1508.4m	E 297735.774 N 6256593.341
CH 567.4m	E 298660.186 N 6256637.039	CH 1698.7m	E 297577.376 N 6256488.632
CH 688.3m	E 298542.958 N 6256607.412	CH 1696.4m	E 297575.907 N 6256487.251
CH 858.1m	E 298378.740 N 6256564.150	CH 1848.3m	E 297487.639 N 6256367.459
CH 907.6m	E 298329.295 N 6256561.033	CH 1853.7m	E 297486.748 N 6256362.451
CH 1061.1m	E 298176.764 N 6256578.382	CH 1943.7m	E 297509.330 N 6256282.250
CH 1182.4m	E 298056.879 N 6256596.814		

CABLE ROUTE PLAN

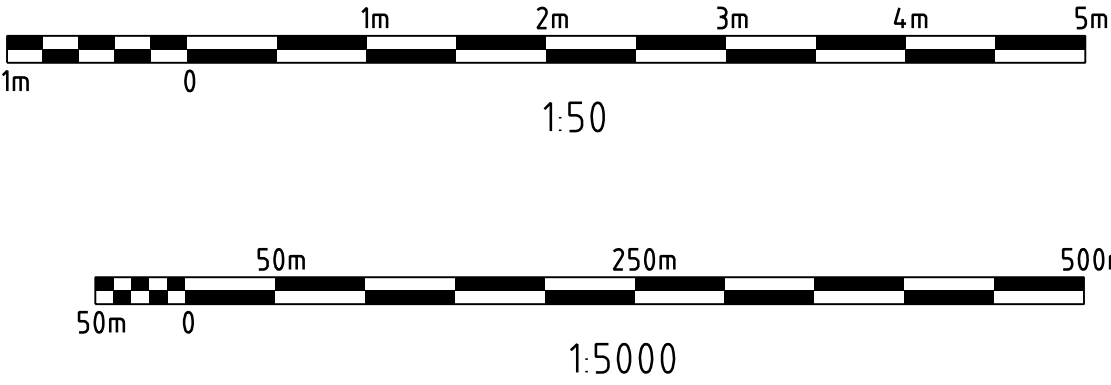


NOTES:

1. THE PROPOSED CABLE ROUTE IS INDICATIVE ONLY AND DOES NOT REPRESENT THE ACTUAL LOCATION.
2. TRANSGRID CABLE DESIGN AND INSTALLATION MANUAL (CDIM) REQUIRES MINIMUM 6m RADIUS BENDS.
3. TRANSGRID EASEMENT IS REQUIRED ON A PRIVATE PROPERTY.
4. ROAD TRAFFIC, STORMWATER DRAINAGE, SYDNEY WATER MAIN & ENDEAVOUR ENERGY UNDERGROUND CABLES TO BE MANAGED.
5. ALLOW A MINIMUM DEPTH OF 3.3m TO THE TOP COVER OF THE CONDUIT IN THE TRENCH FOR UNDERNEATH THE NEW BENCH.
6. CONDUITS FOR ECC ARE NOT SHOWN IN THE DRAWING, THEY ARE TO BE DETERMINED AT DETAILED DESIGN. CONDUITS FOR THE ECC SHALL BE 63mm (OR 80mm) HDPCV TO AS/NZS 2053.2.
7. FINAL TRENCH AND BORING DEPTHS TO BE DETERMINED DURING DETAILED DESIGN.

LEGEND:

- (A) AC14 (100mm MIN.) OR MATCH EXISTING, WHICHEVER IS GREATER
- (B) COMPACTED ROAD BASE DGB20 TO RMS 3051
- (C) 150mm WIDE WARNING TAPE TO AS2648.1
- (D) 300mm WIDE POLYMERIC CABLE COVER STRIPS TO AS4702
- (E) THERMALLY STABLE BACKFILL



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AMENDMENT:



TBA		ERSKINE PARK SUBSTATION GA		DRAWN	SCAD	05-02-26	© Transgrid				
				REVIEWED			TRANSMISSION LINES ERSKINE PARK DATA CENTRE 330kV CABLE CABLE ROUTE PLAN & SECTIONS - OPTION 1				
				VERIFIED							
				APPROVED							
				FOR INFORMATION			A1	CAB-ERSKINE PARK DC-SKT 1		A	
				APPROVAL STATUS							
				SCALE							
				REFERENCE DRAWINGS							
				SUPERSEDES							
				SUPERSEDED BY							
							PREFIX		NUMBER	SHEET	AMDT
									INDEX CLASSN		

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