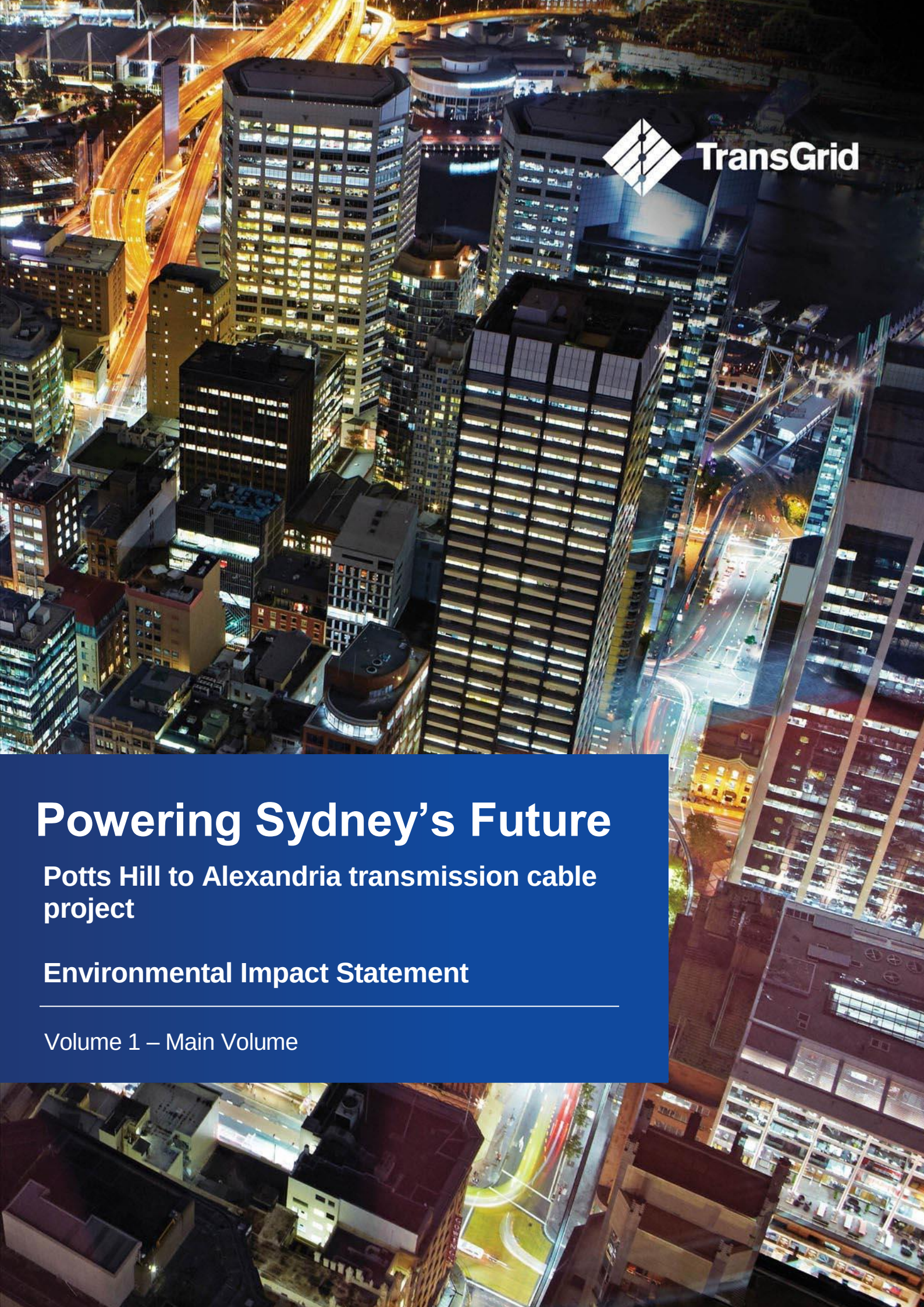

Powering Sydney's Future

Potts Hill to Alexandria transmission cable project

Environmental Impact Statement

Volume 1 – Main Volume

Volume 1

MAIN ENVIRONMENTAL IMPACT STATEMENT

Potts Hill to Alexandria transmission cable project

Environmental Impact Statement

Client: TransGrid

Co No.: 609 169 959

Prepared by

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Certification

Submission of Environmental Impact Statement

Prepared under Division 5.2 of the New South Wales *Environmental Planning and Assessment Act 1979* (NSW).

Environmental Impact Statement prepared by:

Name: Sumaya Osman

Qualifications: Bachelor of Science - Environmental and Geographical Science and Zoology Majors & Bachelor of Science (Honours) Environmental and Geographical Science

Address: AECOM, Level 21
420 George Street
Sydney NSW 2000

Responsible person: Gerard Reiter
Executive Manager, Network Planning & Operations
TransGrid
180 Thomas Street
Haymarket NSW 2000

Address of the land to which the statement relates:

Land within the Canterbury-Bankstown, Strathfield, Inner West and City of Sydney local government areas as described within the Environmental Impact Statement.

Description of the infrastructure to which this statement relates:

Construction and operation of a new 330 kilovolt (kV) underground transmission cable circuit between the existing Rookwood Road substation in Potts Hill and the Beaconsfield West substation in Alexandria. The transmission cable circuit would be about 20 kilometres long and would generally be located within existing road reserves.

Environmental Impact Statement:

An Environmental Impact Statement is attached addressing all matters in accordance with Division 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW) and Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (NSW).

Declaration:

I certify that I have prepared this Environmental Impact Statement in accordance with the Secretary's Environmental Assessment Requirements as issued on 20 August 2019. The Environmental Impact Statement contains all available information that is relevant to the environmental assessment of the infrastructure to which the statement relates. To the best of my knowledge, the information contained in the environmental impact statement is neither false nor misleading.

Signature:

Name: Sumaya Osman

Date: 11 October 2019

Executive summary

TransGrid is the manager and operator of the major high-voltage electricity transmission network in New South Wales (NSW) and the Australian Capital Territory. TransGrid is seeking approval under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the construction and operation of a new 330 kilovolt (kV) underground transmission cable circuit between the existing Rookwood Road substation in Potts Hill and the Beaconsfield West substation in Alexandria (the project) to ensure reliable electricity supply to the Sydney central business district (CBD) and Inner Sydney. The transmission cable circuit would be about 20 kilometres long and would generally be located within existing road reserves. The project also involves installing conduits (pipes) for a second transmission cable circuit that may be delivered in the future. To facilitate the new transmission cable circuit, work would also be required at the existing Rookwood Road, Beaconsfield West and Sydney South substations.

The project is State Significant Infrastructure under clause 14 of *State Environmental Planning Policy (State and Regional Development) 2011* and is permissible without development consent. However, TransGrid, as a determining authority for this type of development, has formed the view that an Environmental Impact Statement (EIS) is required under section 5.7 of the EP&A Act.

This EIS has therefore been prepared in accordance with the requirements of Division 5.2 of the EP&A Act, the Environmental Planning and Assessment Regulation 2000 and the Secretary's Environmental Assessment Requirements issued for the project by the Planning Secretary of the NSW Department of Planning, Industry and Environment (DPIE).

Project need

The project is needed to address existing issues in the electricity supply network in the inner Sydney area. A reliable, affordable and sustainable electricity supply is essential for our way of life and a secure electricity network is critical to support the growth of Sydney. Inner Sydney (which includes the Sydney CBD) is one of the most critical parts of the NSW electricity network. However, parts of the transmission and distribution networks which supply electricity to the inner Sydney area are ageing and approaching the end of their serviceable lives. As such, these assets are unable to operate at full capacity and there are plans to retire some assets. Furthermore, rapid development in the inner Sydney area is spurring an increase in the demand for energy. Analysis undertaken by TransGrid and Ausgrid shows a significant forecast increase in the electricity that may be demanded by consumers. This demand may not be able to be supplied to the inner Sydney area, due to an increase in the probability of failure of some cable assets and an increasing customer demand. Electricity consumers in the inner Sydney area are therefore becoming increasingly vulnerable in terms of the expected level of disruption to their electricity supply.

To address this concern, TransGrid and Ausgrid initiated the Powering Sydney's Future program to investigate and deliver solutions that are economically viable, minimise community and environmental impacts, and consider engineering and program constraints. As part of this program, TransGrid identified the project as the preferred solution to address these issues in the electricity supply network.

Strategic context

The project has been accepted by the Australian Energy Regulator in its 2018 revenue determination for TransGrid, stating that it is satisfied that the timing and scope are likely to be prudent and efficient. The project meets the requirements of the *National Electricity Rules*, and also assists in meeting the findings of the *National Transmission Network Development Plan* (NTDP) (Australian Energy Market Operator, 2016). The 2016 NTDP identified specific projected reliability limitations within inner Sydney. Without a network solution, such as a new transmission cable circuit, TransGrid would not be able to provide a reliable energy supply.

The project is consistent with relevant strategic NSW planning and policy documents including *A Plan for Growing Sydney* (NSW Government, 2014), the *Greater Sydney Region Plan – A Metropolis of Three Cities* (Greater Sydney Commission, 2018a) and the *Eastern City District Plan* (Greater Sydney Commission, 2018b).

Project objectives

Based on the identified need for the project within the inner Sydney area, the project has the following objectives:

- provide additional capacity to cater for future forecast increased energy demand in the inner Sydney area;
- meet TransGrid's operational requirements for the provision of a safe, reliable and secure transmission supply to the inner Sydney area;
- be consistent with the principles in TransGrid's *Environment Policy*[1], which includes the integration of *"environmental management considerations into the planning, design, siting, construction, maintenance, operation, decommissioning and disposal of all TransGrid assets"*; and
- take into account and address key stakeholder and community needs and expectations with respect to the protection of the environment and local amenity.

Project development and alternatives

In 2012, recognising the upcoming deterioration and retirement of a number of transmission cables, TransGrid commenced a series of studies to investigate improvements to the transmission network across the inner Sydney area. Improvements to the transmission network have since included a number of cable connections, substation upgrades, and demand management and energy storage solutions, as well as the investigation of additional network (infrastructure) and non-network (technology) options.

Further investment in a network solution (i.e. a new transmission cable circuit) was identified as the preferred option, specifically a connection between Rookwood Road and Beaconsfield West substations. Non-network solutions would also be implemented, however, this would only defer the need to build new network infrastructure by one year.

Following the identification of the network solution, a detailed route selection study was completed in 2017 with consideration given to environmental, land use and engineering constraints, infrastructure mode options (e.g. underground, overhead, tunnels or a combination of these), cost, avoidance of sensitive areas, community impact, and feedback from key stakeholders.

A preferred route option was selected between Potts Hill and Alexandria that was subsequently refined to address issues including constructability challenges associated with coordination with existing major infrastructure, other major infrastructure projects and constraints due to existing services within the road corridor. Assessment of this preferred route was undertaken in 2018 and involved extensive consultation with key stakeholders and communities. In early 2019, based on a combination of additional stakeholder feedback and further constructability challenges, a revised route was identified. This revised route, comprising a 20 kilometre, 330 kV transmission cable circuit between Rookwood Road and Beaconsfield West substations, is the project assessed in this EIS.

Project description

The project is described in detail in **Chapter 4 Project description**. Key components of the project are listed below:

- cable works connecting Rookwood Road substation with the Beaconsfield West substation comprising:
  - a 330 kV underground transmission cable circuit comprising three cables installed in three conduits;
  - another set of three conduits for a possible future 330 kV transmission cable circuit if it is required;

[1] https://transgrid.com.au/being-responsible/environment/Documents/Environment%20Policy.pdf

  - four smaller conduits for carrying optical fibres;
  - around 24-32 joint bays, per circuit, where sections of cable would be joined together, located approximately every 600-800 metres along the transmission cable route;
  - link boxes and sensor boxes associated with each joint bay would be installed in a concrete pit with a removable lid to allow cable testing and maintenance;
  - optical fibre cable pits for optical fibre cable maintenance;
- seven special crossings of infrastructure or watercourses including two rail lines (at Chullora and St Peters), one freight rail line (Enfield Intermodal rail line at Belfield), one light rail line (at Dulwich Hill), the Cooks River and its associated cycleway (at Campsie/Croydon Park and Ashbury), a playground (at Marrickville) and the southern wetland at Sydney Park (at Alexandria);
- upgrade works at the Rookwood Road and Beaconsfield West substations to facilitate the new 330 kV transmission cable circuit;
- conversion works at the Beaconsfield West and Sydney South substations to transition the existing Cable 41[2] from a 330 kV connection to a 132 kV connection; and
- five temporary construction laydown areas to facilitate construction of the project.

Several localised route options and alternative construction methods are being considered as part of the project and are assessed in the EIS.

While the project includes the construction and installation of conduits for a possible future transmission cable circuit, it does not include the cable pulling and jointing works for the second circuit. This activity, should it be required (i.e. based on future demand), would be subject to separate assessment and approval. The second circuit is not expected to be required within five years of the first circuit becoming operational.

No major utility relocations are anticipated and where smaller services may need to be moved to accommodate the transmission cable circuit, this relocation would be restricted to within the project area assessed in this EIS (defined below).

While TransGrid is committed to avoiding tree removal wherever feasible and reasonable, some trees would need to be removed during site preparation and excavation works for the transmission cable circuit and special crossings due to resulting impacts on the trees and their roots, and to ensure tree roots do not encroach on the transmission cable circuit once operational. TransGrid are committed to avoiding tree removal in the parklands of Sydney Park in Alexandria, Constitution Road in Dulwich Hill and at the Johnson Park Bushcare site in Dulwich Hill. TransGrid will work with local councils to identify suitable locations for replanting of street trees.

A summary of the project is provided in **Table 1** and an overview of the project is shown in **Figure 1**.

Table 1 Project summary

Project element	Summary of the project
Excavation method	Trenching – up to 3 metres wide and up to 1.6 metres deep
Cable life	Minimum of 40 years
Cable length	Around 20 kilometres
Key components	330 kV cables, conduits, joint bays, cable bridges, underbores, substation upgrades and temporary construction laydown areas
Timing and duration	Around a 24 month construction period, proposed to commence in 2020 (subject to project approval). Operations to commence in 2022/2023
Workforce	Peak construction workforce of around 70 personnel (excludes traffic management personnel)

[2] Cable 41 is an existing cable between the Beaconsfield West and Sydney South substations which is being converted from a 330 kV connection to a 132 kV connection as part of the project.

Project element	Summary of the project
Estimated spoil volume	Approximately 225,000 cubic metres of spoil would be removed during excavation and trenching
Hours of construction	Standard construction hours would be adopted where reasonable and feasible: • Monday to Friday 7:00 am to 6:00 pm; • Saturday 8:00 am to 1:00 pm; and • No works on Sundays and public holidays. Work outside of standard construction hours (including night works and 24 hours) may be required on major roads, at signalised intersections and at special crossings, cable jointing locations (24 hours), and other locations where required or requested by relevant authorities
Capital investment	Around $285 million

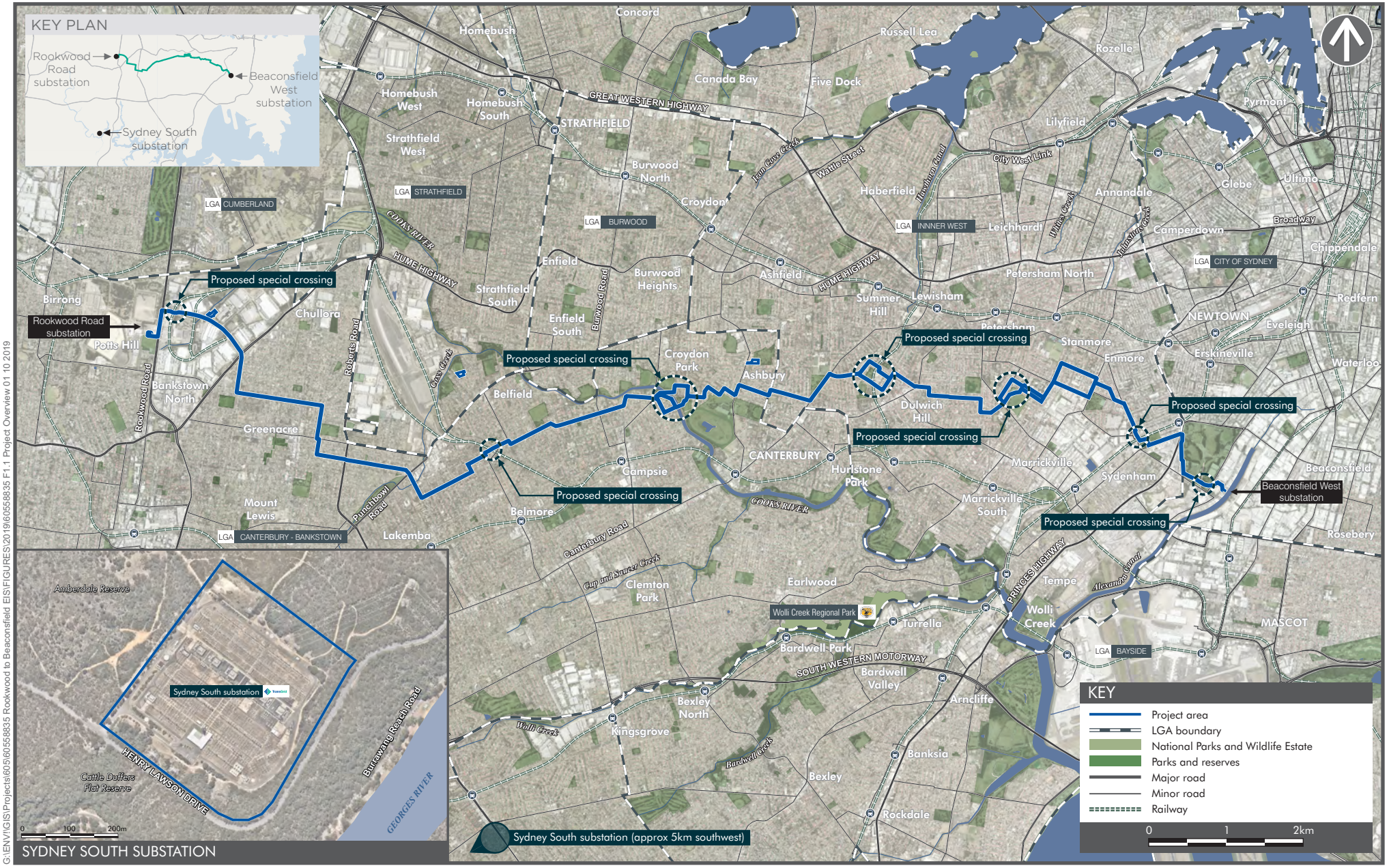
Project location

The project would be located in the suburbs of Potts Hill, Yagoona, Chullora, Greenacre, Lakemba, Belmore, Belfield, Campsie, Croydon Park, Ashbury, Ashfield, Dulwich Hill, Marrickville, Newtown, St Peters, Alexandria and Picnic Point.

The project is located in the following local government areas (LGAs):

- City of Canterbury-Bankstown;
- Strathfield;
- Inner West; and
- City of Sydney.

The project would be located primarily within road reserves, at existing electrical infrastructure sites, within public open space and on previously disturbed areas. The main land uses within the project include industrial, residential, commercial and public recreation.



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PROJECT OVERVIEW

Powering Sydney's Future

Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 1

G:\ENVIGIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\2019\60558835 F1.1 Project Overview 01 10 2019

Project area

The project area assessed in the EIS comprises the overall potential area of direct disturbance by the project, which may be temporary (for construction) or permanent (for operational infrastructure) and extends below the ground surface. It includes all route and construction method options under consideration for the project and therefore presents a larger area than would be needed for the final project design.

The project area includes the location of operational infrastructure and construction work sites for:

- the transmission cable route including the entire road reserve of roads traversed;
- special crossings of infrastructure or watercourses;
- substation sites requiring upgrades (noting that all works would be contained within the existing site boundaries); and
- construction laydown areas.

While the boundaries of the project area represent the physical extent of where project infrastructure may be located or construction works undertaken, it does not mean that this entire area would be physically disturbed or that indirect impacts would not be experienced beyond this area. Should the project be approved, the detailed design would aim to refine the location of project infrastructure and work sites within the boundaries of the project area assessed in this EIS.

Options under consideration

The project includes route options and alternative construction methods in several locations along the transmission cable route as summarised below:

- three options for the transmission cable route in the vicinity of the Cooks River at Campsie/Croydon Park and Ashbury including two locations for a special crossing either via underboring or cable bridge with underboring the preferred construction method at this location;
- two options for the transmission cable route crossing under the Dulwich Hill Light Rail corridor in the vicinity of the Arlington Light Rail station, Dulwich Hill;
- two options for the transmission cable route in the vicinity of Henson Park, Marrickville; and
- two options for the transmission cable route in the vicinity of Addison Road, Marrickville.

Construction

Construction of the project is expected to take up to 24 months to complete with around 15 months for civil construction works and conduit installation and about nine months for cable pulling and jointing, testing and commissioning.

Construction activities would typically include:

- site preparation including establishment and securing of work sites and construction laydown areas;
- confirming the location of services/utilities and relocation of minor services/utilities where necessary;
- trenching and excavation along the transmission cable route;
- conduit installation and backfilling;
- excavation and establishment of joint bays and concrete pits for ancillary infrastructure;
- cable pulling and jointing;
- permanent road restoration;
- installation of cable markers;
- construction of special crossings including via underboring (i.e. an underground crossing) or cable bridges; and

- substation upgrades.

The project would involve the construction of seven special crossings that would involve either the installation of a cable bridge or underboring. The locations of the proposed special crossings are presented in **Table 2**. In all other locations, trenching is the preferred method of conduit installation, however, should locations be identified during detailed design where underboring would be more suitable (such as at stormwater culverts), the location specific impacts of this approach would be assessed further as outlined in **Chapter 5 Statutory planning and approval process**.

Table 2 Location of proposed special crossings

Location	Crossing type	Infrastructure or watercourse crossed
Muir Road, Chullora	Cable bridge	Rail line
Enfield Intermodal, Belfield	Underbore	Freight rail line
Cooks River, Campsie/Croydon Park/Ashbury	Cable bridge or underbore (preferred)	Cooks River and cycleway
Arlington Light Rail Station, Dulwich Hill	Underbore	Dulwich Hill light rail line or station
Amy Street, Marrickville	Underbore	Playground near Henson Park
Bedwin Road, St Peters	Cable bridge	Rail line
Sydney Park, Alexandria	Underbore	Wetland

The existing Rookwood Road, Beaconsfield West and Sydney South substations would be upgraded to enable the connections and operation of the proposed transmission cable circuit. The upgrade works would occur within the existing footprint of these substation sites.

As part of the construction of the project, temporary construction laydown areas would be required to store materials, equipment, excavated spoil and provide space for other ancillary facilities such as site offices. Five locations have been investigated as potential construction laydown areas, as listed in **Table 3**. The final number and location is subject to ongoing consultation with the relevant landowners and would be determined during detailed design. Construction laydown areas would be required for the full duration of the project (up to 24 months) and the sites would be reinstated following construction, in consultation with the landowner.

Table 3 Potential construction laydown areas

Potential construction laydown area	LGA	Potential area (hectares)
12 Muir Road, Chullora	City of Canterbury-Bankstown	0.48
Cooke Park, Belfield	Strathfield	0.37
Peace Park, Ashfield	Inner West Council	0.45
Camdenville Park, St Peters	Inner West Council	0.18
Beaconsfield West substation, Alexandria	City of Sydney	0.85

Land and property requirements

The proposed transmission cable route has been primarily limited to road reserves. However, in some instances, the transmission cable route passes through public open space and some industrial land. While the project does not require any freehold property acquisition, TransGrid would require an easement (or other agreement) to protect the new underground transmission infrastructure across private land that is not within the road reserve. The easements would limit certain activities and future

land uses to ensure the safe operation of the infrastructure and to maintain public safety. The project would not result in any permanent change to property access arrangements along the length of the transmission cable route.

Temporary use of private properties during construction (such as for construction laydown areas or work site access) would be in agreement with the relevant landowner.

Cable operation and maintenance

Once the transmission cables have been installed, generally only visual inspections would be required. This would involve regularly driving along the transmission cable route to check for hazards or activities (such as excavation works in the vicinity) that could impact the underground cables or cable bridges. Ongoing physical access to the transmission cables is not required however ongoing monitoring of the cable for damage (missing/worn cable markers) and outages would occur. This would be through access to the link boxes and sensor boxes located near the joint bays. Optical fibre cables installed alongside the transmission cables would be monitored at the optical fibre cable pits.

Regular checks would ensure that link boxes are accessible and that the pit does not contain water or tree roots. Cable bridge structures would be inspected to ensure structural integrity and aesthetics are being maintained.

Consultation

Community and stakeholder consultation has played an integral role in informing the ongoing design of the project and in scoping the content of the EIS. Consultation has been continuous during various stages of the project, with ongoing consultation planned for future project stages, should the project be approved.

The following community and stakeholder groups have been consulted:

- impacted stakeholders including schools, child care centres, businesses, property/landowners, residents, healthcare providers, consumer groups, emergency services and religious institutions;
- Aboriginal stakeholders, including Local Aboriginal Land Councils;
- elected government officials and local government, including councils in the local government areas of Sydney, Canterbury-Bankstown, Inner West, and Strathfield;
- government authorities including Roads and Maritime Services, NSW Environment Protection Authority, NSW Office of Environment and Heritage, Department of Industry – Water, Water NSW, Transport for NSW, Greater Sydney Commission, NSW CBD Coordination Office, Department of Education NSW;
- major development proponents/transport operators including Sydney Motorway Corporation, Sydney Metro, Sydney Light Rail, Sydney Trains, Australian Rail Track Corporation;
- utility providers including Ausgrid, Sydney Water, Telstra, Optus, Jemena, Viva Energy, Sydney Metropolitan Pipeline;
- special interest groups, including community, environmental, pedestrian and bicycle user groups;
- directly impacted communities (within 100 metres of the project area); and
- the broader community.

Consultation carried out to date

Consultation activities that have been carried out to date for the project, including prior to commencement of the EIS, include planning workshops with stakeholders and consultation on the preferred route, targeted meetings and briefings, community information sessions, online engagement, newsletters and doorknocking.

Consultation during public exhibition of the EIS

This EIS will be placed on public exhibition by DPIE for six weeks during October and November 2019. During this period, stakeholders and the community will be able to view the EIS and are invited to

make written submissions to DPIE. TransGrid will consider feedback provided during the exhibition period in the further development of the project.

During the exhibition period, a project information line (1800 222 537) and email address (psf@transgrid.com.au) will also be available to community members and stakeholders to contact TransGrid for any questions or information about the project.

Future consultation

A Submissions Report will be prepared documenting submissions received on the EIS and TransGrid's responses. This report will be made publicly available on DPIE and TransGrid's websites, supported by communications to inform stakeholders and the community that the report is available.

TransGrid would continue community and stakeholder consultation during design development and construction of the project. A Community Consultation Framework (CCF) has been prepared, which has been informed by consultation during the preparation of the EIS. The CCF would be updated based on feedback received during the exhibition of the EIS and during detailed design. A Community and Stakeholder Reference Group (CSRG) would also be established prior to construction of the project, formed of representatives from the community, relevant councils and the project team. The purpose of the CSRG is to provide advice on the management and mitigation of issues related to the construction of the project, and the management of complaints.

Assessment of environmental impacts

The EIS identified the following as key environmental aspects of the project:

- traffic and transport;
- noise and vibration;
- air quality;
- electric and magnetic fields;
- landscape character and visual amenity; and
- soils and contamination.

The technical assessments in this EIS have adopted conservative assumptions and therefore present worst case scenarios. The actual impacts from the project are expected to be, in at least some cases, less than those presented in the EIS.

The outcomes from the assessment of these key environmental aspects are discussed in more detail below. Environmental management and mitigation measures are proposed to minimise potential impacts. These measures are discussed in each relevant technical chapter of the EIS and summarised in **Chapter 23 Environmental management and mitigation measures**.

Other relevant environmental aspects considered for the project are discussed in the main body of the EIS. These issues include:

- surface water and flooding;
- groundwater;
- biodiversity;
- land use and property;
- Aboriginal heritage;
- non-Aboriginal heritage;
- social and economic;
- hazards and risks;
- waste management; and

- cumulative impacts.

Significant impacts for the above environmental aspects are not anticipated for the project, however environmental management and mitigation measures are still proposed for implementation as good practice.

Traffic and transport

The majority of the project follows road reserves and traverses public open space. As such, the project would interact with public and active transport corridors, including bus routes, rail infrastructure, and pedestrian and cycle pathways.

Construction impacts

A number of potential diversion routes or lane closures would be required during construction. At locations that experience significant through traffic, diversions would likely be restricted to outside of standard construction hours (including night-time) or off-peak times to minimise disruption. On local, residential streets, diversion routes may be implemented during the day while diverting through traffic. Diversion routes and lane closures could result in reduced road network performance, delays in travel time, temporary loss of on-road parking and disruptions to property access. However, where diversion routes or lane closures are required, these would only be in operation for short sections of the local road network at any one time. Decisions on proposed diversion routes would be made in consultation with relevant road authorities.

During construction, vehicle access to properties will be retained and obstruction of driveways will be avoided where possible, however it is likely that there will be driveways impacted during different stages of construction, which may result in minor disruptions to access. For example, during cable jointing near driveways, access to these properties would not be possible. Affected owners/occupants would be informed and feasible and reasonable solutions for access to their specific location discussed. This is explained further in **Chapter 7 Traffic and transport**.

Potential impacts on pedestrian and cycle pathways would be minimal and include temporary route modifications or short term closures with diversions provided and access maintained. This would occur at parts of the Cooks River cycleway at Campsie, the Greenway shared path at Johnson Park, Dulwich Hill, the shared path along May Street (between Campbell Street and Applebee Street), St Peters and shared pathways within Sydney Park. Construction activity in any one location would be temporary and any impacted pedestrian or cycle pathways would be reinstated following construction.

The assessment found that some bus routes would be impacted through diversion routes and temporary relocation of bus stops. Potential impacts from a temporary bus stop relocation and/or bus route diversion could include increased walking distance to a bus stop, temporary changes to timetables and increased journey time. TransGrid will work with Transport for NSW and bus operators to ensure that sufficient lead time and comprehensive public notification regarding changes to bus stops and services is provided.

Consultation with rail authorities would be undertaken to ensure that construction works for special crossings are planned to align with scheduled rail maintenance periods, where required, so that impacts to rail and light rail services would be minimised.

The assessment found that construction traffic volumes generated by the project (for light and heavy vehicles) are expected to be low and could be accommodated within the existing road network.

Existing on-road parking may need to be temporarily restricted at work sites along the transmission cable route and the western car park at Sydney Park would need to be partially closed during construction in this area. However, these impacts would be temporary and for the duration of construction only. At the substations, parking for the workforce would generally be made available on-site to ensure impacts to on-road parking are kept to a minimum.

Access for special needs, vulnerable or disabled people who may require emergency or mobility vehicle access would be identified during detailed design and considered further during construction planning. Access for emergency service vehicles will be maintained at all times.

Operational impacts

During operation, the project is likely to have minimal impacts on traffic and transport networks. Ongoing monitoring and maintenance tasks would generally be by light vehicles only and require access to pits installed in footpath areas adjacent to the joint bays. These would be accessible within the verge and would not require detailed traffic management. Relevant management measures would be implemented to allow pedestrians to safely pass the work site.

Inspections of cable bridges would involve maintenance crews and appropriate traffic management measures when undertaking work at the roadside, including barricades to restrict approach by the public as required. Work within rail corridors would be planned, coordinated and executed in close consultation with the relevant rail network authority, with all relevant access and safety requirements met. Operation and maintenance at the substations would be within the existing operating footprint.

Noise and vibration

The existing acoustic environment in the project area is primarily dominated by traffic noise and is typical of an urban environment. The construction noise and vibration impact assessment considered various construction noise scenarios associated with typical construction activities for the project including site preparation, trenching and excavation, excavation of joint bays, special crossings, restoration of road surfaces and use of construction laydown areas. Works were assessed for both standard construction hours and outside of standard construction hours (including night-time).

The assessment identified a large number of residential and non-residential receivers that would likely be impacted by construction noise from the project. The greatest impacts to residential receivers were identified to occur at night-time. The scenarios considered in the noise assessment represent 'reasonable worst case scenarios' based on location of proposed plant and numbers of plant in operation at any one time. Therefore, the numbers of potentially affected receivers are considered to be conservative. Construction impacts identified would be largely temporary in nature and move along the transmission cable route progressively, limiting the amount of time a receiver is exposed to noise impacts at any one location. However, receivers close to construction laydown areas would experience potential impacts for the full duration of the construction period (up to two years).

A sleep disturbance assessment found that the awakening reaction criteria (i.e. noise levels above 65 dB(A) which may cause awakening) would be exceeded during night-time construction works. In cases of ongoing disturbance, consideration will be given to implementing reasonable and feasible mitigation measures to minimise impacts, including respite periods, noise monitoring, selection of equipment and plant, scheduling of works, and stationary noise shields.

Minimum working distances for vibration-intensive works have been identified to protect off-site receivers in terms of human comfort or prevention of cosmetic damage to buildings/structures, including heritage items. Where vibration-intensive works are required within the minimum working distances identified, receivers will be notified and mitigation measures implemented.

Operational impacts

The project does not include the installation of noise generating plant, and operational traffic during operational maintenance would result in a negligible increase in vehicular traffic and associated noise. Noise generated during operation of the project is therefore expected to be negligible.

Air quality

Sensitive receivers along the length of the transmission cable route include private residences, commercial businesses, and community facilities including schools, child care centres, healthcare providers and parks/recreational areas. Many of these receivers are located within about 20 metres of the project area, and as a result, are likely to be impacted by changes to air quality due to their proximity.

Construction impacts

During construction, the main potential impact to air quality would be the generation of dust. A qualitative air quality risk assessment undertaken for the project identified that the project poses a Medium Risk of dust soiling, and a Medium Risk of associated human health impacts. The project is not considered to have significant impact related to dust soiling and human health impacts as it

involves standard construction methodologies for an urban linear construction project and would involve the implementation of mitigation measures that are proven to manage dust impacts. Construction air quality impacts would also be temporary in nature.

There is the potential that landfill gas may be encountered during excavation in several areas across the project area including near Arlington Oval and Marrickville Park; and through Henson Park, Camdenville Park and Sydney Park. The assessment found that should landfill gas be encountered, odour impacts are not considered likely. However, precautionary measures would be adopted including landfill gas monitoring to assess the presence of odour and to allow for early on-site detection should it be encountered.

Operational impacts

No odour emissions are anticipated during operation of the project. Air quality emissions are not anticipated during operation of the project except possibly during maintenance activities or emergency works, which would be infrequent and minor, therefore potential impacts would be limited.

Electric and magnetic fields

Electric and magnetic fields (EMF) exist wherever electric current flows such as in overhead and underground electrical cables, substations, residential wiring and electrical appliances (e.g. toasters, televisions, hair-dryers and computers).

An EMF study was undertaken to calculate the magnetic fields likely to be generated during operation of the project. Magnetic fields would not be generated during construction as the cable would not be energised. Electric fields were not assessed as the transmission cables would be shielded by a metallic sheath and from being buried in the ground. The magnetic field predictions from the project were compared to the reference levels for human exposure to magnetic fields as outlined in the guidelines from the International Commission on Non-Ionizing Radiation Protection (ICNIRP). The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), a Federal Government body whose responsibilities include protecting the health and safety of people, and the environment, from Extremely Low Frequency (ELF) EMF have adopted the ICNIRP 2010 Guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz to 100 kHz) for application in Australia.

The assessment found that the highest level of magnetic fields are expected to occur directly above the transmission cable circuit, joint bay or cable bridge. Magnetic fields are relatively higher at the cable bridges than above the trench. The assessment also found that the level of EMF exposure would be short term and below the ICNIRP guideline reference levels for assessing compliance of human exposure to magnetic fields.

The assessment also showed that magnetic fields reduce rapidly with increasing distance from the trench.

Overall, the study found that during operation of the transmission cable circuit, magnetic fields generated would be well within the recommended reference levels for human exposure.

While no risk to human health has been established from long-term magnetic field exposure, TransGrid has adopted an approach of ‘prudent avoidance’ in accordance with good industry practice. Taking a prudent avoidance approach includes designing and siting electricity infrastructure to reduce long-term public exposure to EMF. TransGrid will continue to consider the following during the project design development:

- maximise cable separation to property boundaries, in particular normally occupied buildings (such as businesses and residences) by locating the cable in the centre of the roadway where practical;
- optimise the trench cross-section (i.e. the conduit arrangement with the trench) to maximise the cancellation of magnetic fields by adopting a trefoil cable arrangement where practical; and
- maximise the magnetic field cancellation effect, such as by reducing the spacing between individual cable phases as far as technically practical through the use of thermally engineered backfill along the route and installing field cancellation measures at non-typical trench configuration locations, such as joint bays, where practical.

Visual amenity

An assessment of landscape character was undertaken to determine the impact the project could have on the overall character of the area while a visual impact assessment was undertaken to identify the day-to-day visual effects the project could have on receivers.

Landscape character impacts

Construction impacts

Overall, the project would have the greatest impact on landscape character during the construction period, as much of the construction activity is uncharacteristic with the landscape character zones identified for the project. This is particularly true within the most sensitive landscape character zone (Recreational Open Space), where there is a high scenic quality to the landscape and where construction work (including night lighting) would be new and atypical, although also temporary. Construction of up to three cable bridges would have the potential to affect views where they are situated within public open spaces or where they are close to residential properties. However, they would be adjacent to existing bridges and would therefore not change the landscape character of the area.

The construction period is short-term (up to two years) and in most cases the impact on landscape character is reduced during operation. The work sites make up only a very small proportion of the overall landscape character zones within the study area, and although in some instances they may change the character of the immediate area surrounding the project, the impact on the overall character is of the study area is limited.

Operational impacts

The greatest potential impact of the project on landscape character during operation would be due to the removal of street trees during construction. This would depend on the number, area and type of trees removed. Where trees are required to be removed, a tree replanting strategy/landscape plan would be developed in consultation with the relevant councils. Similar species would be replanted (where feasible) and where this is not possible, suitable trees for specific local conditions would be determined. Opportunities to retain trees would be investigated during detailed design and construction. Trees may also be replaced in other suitable locations, where feasible, in consultation with the local council and other relevant stakeholders.

Visual impacts

Construction impacts

The locations most sensitive to visual impacts were found to be those that are associated with public open space, particularly where a construction laydown area is positioned within a park. However, as per the assessment of landscape character, the changes during the construction phase of the project would be short-term, with work sites and construction laydown areas reinstated following construction.

Operational impacts

The greatest potential operational impacts on views are due to the possible removal of street trees during construction and the installation of cable bridges. Where tree removal is required, this would affect views of the streetscape. Tree replacement and augmentation planting within affected road reserves (where feasible) would, over time, reduce the visual impact of tree removal, although the speed at which the view would be improved depends on the growth rate of the tree species and the maturity (pot size) of the street trees replanted.

The cable bridges would be permanent project infrastructure visible from multiple observer locations. Even though they will be designed to integrate into the surrounding landscape, potential impacts on visual amenity for residential receivers could be moderate to high.

Soils and contamination

Within the project area, high contamination risk was identified in the following areas:

- where the project would intersect the former landfill in Camdenville Park; and

- the area from Sydney Park at the Princes Highway to (and including) Beaconsfield West substation.

Construction impacts

The construction works are likely to encounter areas of contaminated soil, groundwater, soil vapour, and landfill gas. The potential contamination impacts from the works are related to excavating and managing soil, stockpiling, dewatering groundwater and surface water runoff and importing fill materials for backfilling excavations. Contaminated or acid sulfate soil may be mobilised by the construction of the project and transported into surface water or stormwater networks. This has the potential to impact water quality in the Cooks River and Parramatta River unless suitable mitigation measures are implemented.

If not managed appropriately, these potential contamination impacts could impact on human health and ecological receptors. With the implementation of the proposed management and mitigation measures, the potential impacts on human and environmental receptors during the construction would be low.

Potential contamination impacts from the use of construction laydown areas would be primarily from the disturbance of existing contamination in surface soils from plant and vehicle movements and from sedimentation and run-off associated with stockpiles.

Other construction activities that could result in contamination include spills of fuels when refuelling plant and equipment and hydraulic oil spills. Spills and leaks could contaminate soil or enter surface water runoff, the stormwater system and ultimately a local waterway.

Operational impacts

The potential operational contamination impacts of the project would be managed through the design and location of the link box pits to prevent the accumulation of gases. This includes emissions and migration of landfill gas and migration of leachate in Sydney Park and Camdenville Park. There would also be potential operational risk at the link box pits within or in close proximity to former landfills due to the risk of accumulation of landfill gases.

Following completion of the project there are not expected to be any new contaminant sources or additional activities that could result in further land contamination as a result of the operation of the project.

Environmental management and mitigation measures

The environmental management and mitigation measures included in the EIS are proposed to avoid or minimise impacts to the surrounding environment and communities. These measures would be implemented throughout all stages of the project including detailed design, construction (including construction planning) and operation (including maintenance activities).

Should the project be approved, a Construction Environmental Management Plan (CEMP) will be prepared prior to the commencement of construction and in consultation with key stakeholders. The CEMP would demonstrate an understanding of the environmental objectives and outcomes described within the EIS and the requirements set out in the conditions of approval for the project and any other legislative requirements. The CEMP will include a number of sub-plans and/or Work Method Statements to manage potential environmental issues, including site specific plans. These sub-plans or method statements would also outline any monitoring requirements including method, frequency and associated reporting. **Figure 2** shows the relationship between the construction management plans and sub-plans.

Operational environmental management and mitigation measures would be addressed through the practices, procedures and processes within TransGrid's existing Environment Management System (EMS). The EMS provides the means for TransGrid to identify, manage and monitor the environmental risks and impacts associated with the organisations activities and assets including the operation and routine maintenance of assets. It provides mechanisms for improving management practices, continuous improvement in environmental performance and demonstrates ongoing environmental compliance.

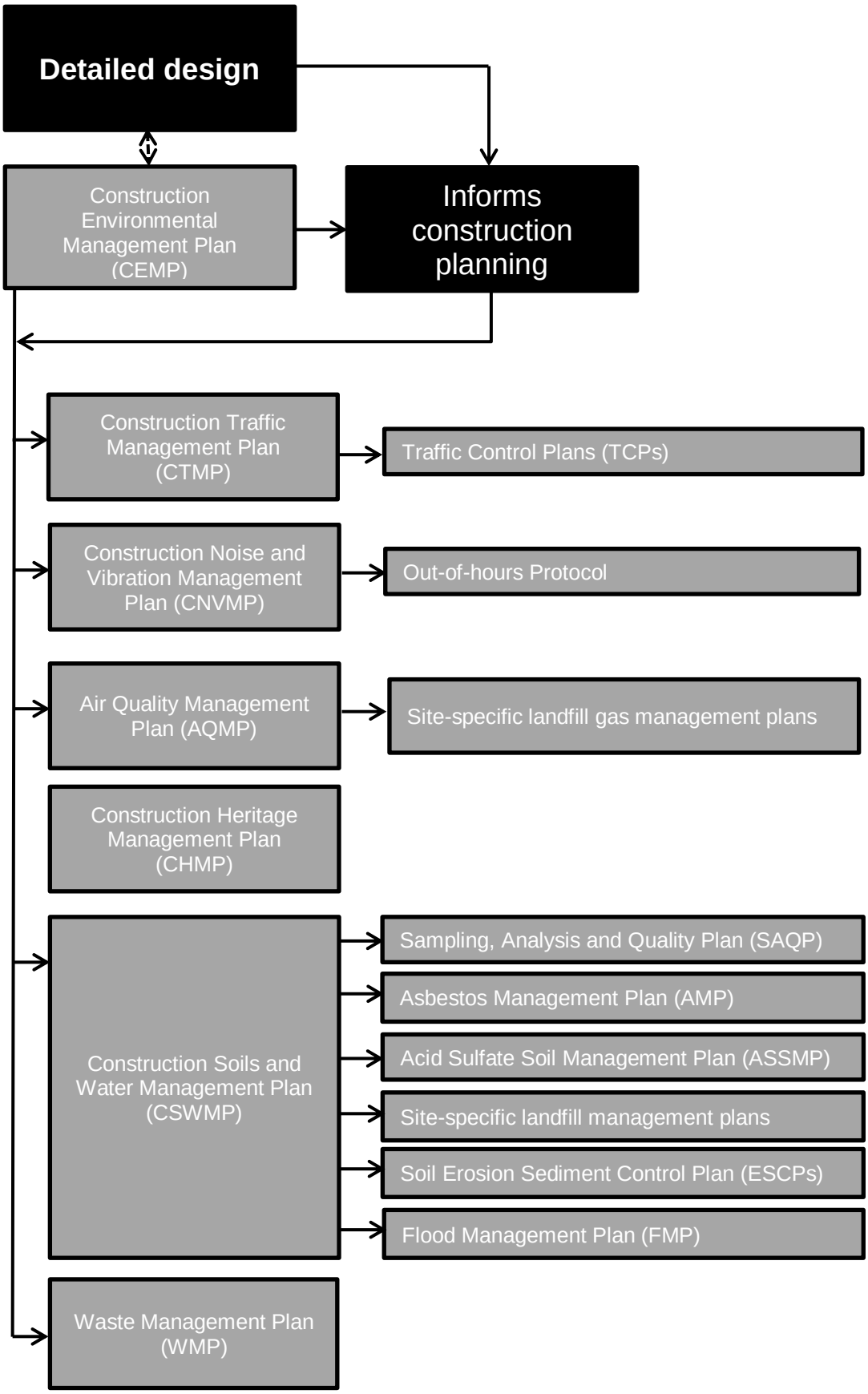


Figure 2 Project construction management plans and sub-plans

Project justification and conclusions

The project has been designed, to the extent practicable, to minimise impacts and address the issues and concerns raised by the community and stakeholders. This EIS is based on an initial concept design and provides a comprehensive assessment of the project, including assessment of various environmental issues and the identification of project benefits and potential environmental impacts. This EIS has identified a range of issues which would be addressed further during detailed design and construction planning. The technical assessments in this EIS have adopted a conservative Approach therefore the actual impacts from the project are expected to be, in at least some cases, less than those presented in the EIS.

Environmental management objectives have been identified which aim to avoid, minimise and mitigate potential impacts. A number of commitments and environmental management and mitigation measures have been proposed in the EIS, as described above, to manage the environmental impacts identified during construction and operation of the project.

This EIS has concluded that the project should proceed because it would:

- provide continuity and reliability benefits to electricity consumers within the inner Sydney area which includes the Sydney CBD);
- provide additional security for periods of peak demand and therefore reduce the risk of network failure;
- have a manageable short-term construction impact on the environment and surrounding residences and businesses; and
- have a manageable impact on the environment and community during construction and operation.

On the basis of the findings detailed in the assessments within this EIS and with the implementation of the proposed management and mitigation measures, the project is considered justified.

1.0 Introduction

This chapter introduces the Potts Hill to Alexandria transmission cable project (the project), providing a brief outline of its need, key components and location. It also summarises the need for and purpose of this Environmental Impact Statement (EIS) and outlines its structure.

This EIS has been prepared in accordance with the requirements of Division 5.2 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act), the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) and the Secretary's Environmental Assessment Requirements (SEARs) issued for the project by the Planning Secretary of the NSW Department of Planning, Industry and Environment (DPIE).

1.1 Project overview

TransGrid is the manager and operator of the major high-voltage electricity transmission network in NSW and the Australian Capital Territory (ACT). TransGrid is seeking approval under Division 5.2 of the EP&A Act for the construction and operation of a new 330 kilovolt (kV) underground transmission cable circuit between the existing Rookwood Road substation in Potts Hill and the Beaconsfield West substation in Alexandria. The transmission cable circuit would be about 20 kilometres long and would generally be located within existing road reserves. The project is located across four local government areas (LGAs) as shown on **Figure 1-1**.

1.1.1 Project background

The project is needed to address existing issues in the electricity supply network for inner Sydney. A reliable, affordable and sustainable electricity supply is essential for our way of life and a secure electricity network is critical to support the growth of Sydney.

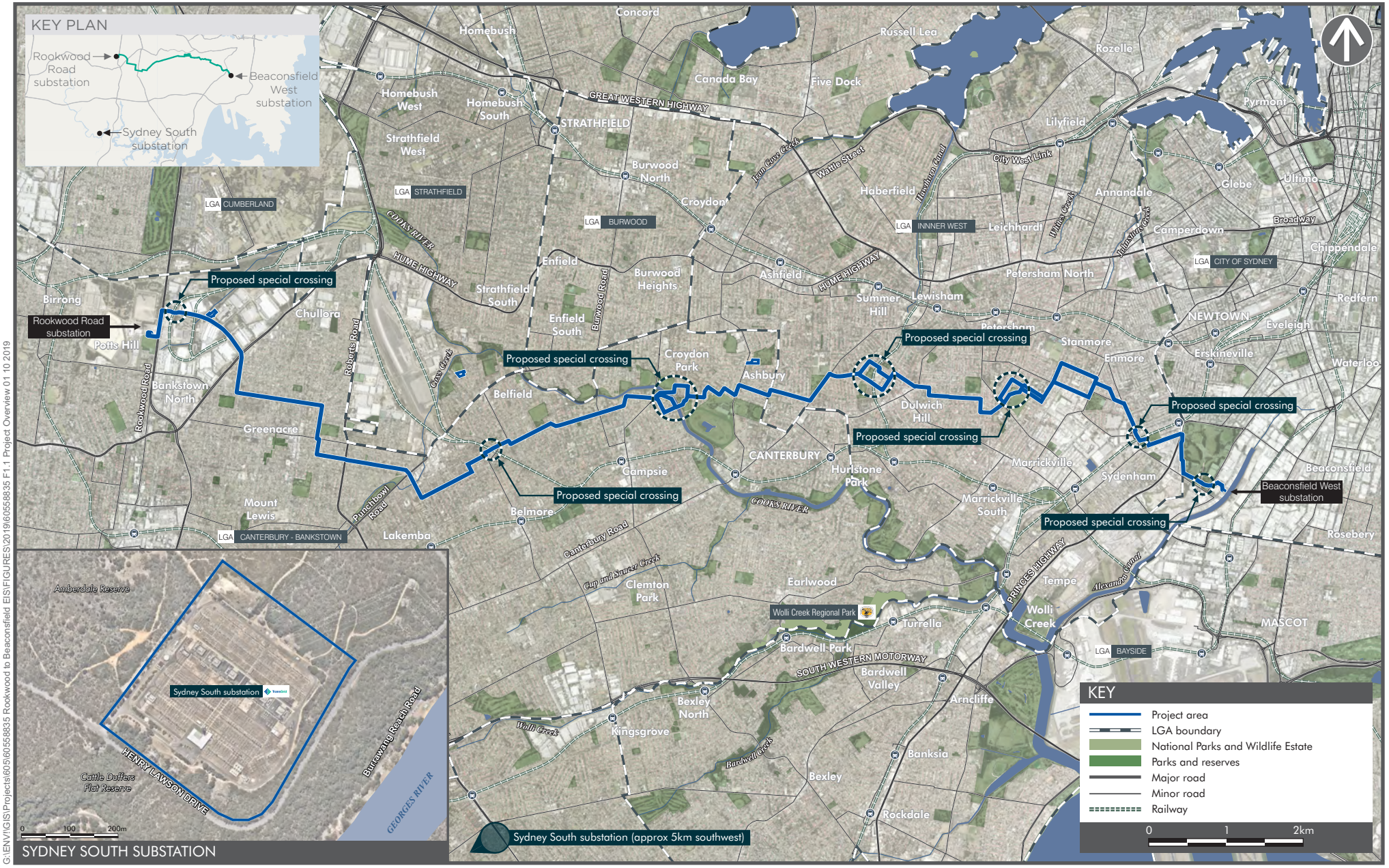
Inner Sydney is one of the most critical parts of the NSW electricity network. However, parts of the transmission and distribution networks which supply electricity to the inner Sydney area were built in the 1960s and 1970s. Some of these assets are ageing and approaching the end of their serviceable lives. To address this concern, TransGrid and Ausgrid initiated the Powering Sydney's Future program to work together to secure an ongoing reliable electricity supply to the inner Sydney area. The program would deliver solutions that are economically viable, minimise community and environmental impacts, and consider engineering and program constraints.

The key drivers for the Powering Sydney's Future program are:

- the deteriorating condition of ageing fluid-filled underground cables in the existing network, resulting in the derating[1] of the 330 kV Cable 41 operated by TransGrid, and the derating of a number of existing 132 kV cables operated by Ausgrid;
- impending retirement of three 132 kV fluid-filled underground cables in inner Sydney;
- the age related deteriorating condition of a further eight 132 kV fluid-filled Ausgrid underground cables in inner Sydney; and
- forecast increases in consumer demand due to renewed economic activity within inner Sydney.

As part of the Powering Sydney's Future program, TransGrid identified this project as a solution to address these issues in the electricity supply network.

[1] Derating refers to operating the cables at less than their optimum capacity



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PROJECT OVERVIEW

Powering Sydney's Future
Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 1-1

1.1.2 Project components

The project would comprise the following key components:

- cable works connecting Rookwood Road substation with the Beaconsfield West substation;
- special crossings (cable bridges and underboring) of infrastructure or watercourses;
- upgrade works at the Rookwood Road and Beaconsfield West substations;
- conversion works at the Beaconsfield West and Sydney South substations; and
- temporary construction laydown areas to facilitate construction of the project.

Chapter 4 Project description describes each of the key components and the construction methodology for the project in more detail.

1.2 Project location

The project would be located in the suburbs of Potts Hill, Yagoona, Chullora, Greenacre, Lakemba, Belmore, Belfield, Campsie, Croydon Park, Ashbury, Canterbury, Ashfield, Summer Hill, Dulwich Hill, Marrickville, Newtown, St Peters, Alexandria and Picnic Point. The location of the project is shown on **Figure 1-1**.

The project would be located primarily within road reserves, at existing electrical infrastructure sites, within public open space and on previously disturbed areas. The project has been, and would continue to be designed to avoid impacts to private property and open spaces where possible; however due to significant existing constraints in the road reserve, the transmission cable route would traverse some private commercial properties and public open space. Land uses adjacent to the road reserves in which the project would be located are mainly residential, with relatively short sections of commercial development around Ashfield and Dulwich Hill. The project would be located close to industrial areas at the western and eastern ends of the project around Potts Hill, Chullora, Greenacre, Marrickville, St Peters and Alexandria. The existing Sydney South substation at Picnic Point is surrounded by the George's River National Park.

At Croydon Park, Campsie and Ashbury, the project would cross the Cooks River, the main watercourse within the project area. There are a number of transport corridors that would be crossed by the project including the Hume Highway, the Sydney Trains network, the Dulwich Hill Light Rail corridor and freight rail infrastructure at Belfield.

1.3 Purpose of this Environmental Impact Statement

This EIS has been prepared in accordance with Division 5.2 of the EP&A Act. It has been prepared to address the SEARs for the project and the relevant provisions of Schedule 2 of the EP&A Regulation.

This EIS documents the environmental assessments that have been completed. Prior to requesting SEARs, TransGrid undertook a scoping assessment to identify potential impacts on the community and environment. The conclusions of the scoping assessment were provided to DPIE as part of the State Significant Infrastructure (SSI) application process. This information was considered by DPIE and SEARs for the project were issued on 20 August 2019. The SEARs are presented in **Appendix A**. **Appendix A** also identifies the relevant section of the EIS that addresses each requirement.

The environmental assessments documented within this EIS focus on the environmental issues presented in the SEARs. Each assessment considers the areas directly and indirectly affected by construction and operation of the project, as relevant to each technical assessment. Further details on the assessment process for the project are provided in **Chapter 5 Statutory planning and approval process**.

The EIS also documents the range of consultation activities that TransGrid has undertaken to consult with the community and stakeholders about the project. The public exhibition of this EIS further provides an opportunity for the community, government agencies and other interested parties to gain a better understanding of the project and allows those parties to provide comment. TransGrid will consider feedback (provided during the exhibition period) in the further development of the project.

1.4 Structure of this Environmental Impact Statement

This EIS is presented in three volumes. Volume 1 comprises the main document, which outlines the project description, the main findings of the technical assessments and a summary of the proposed environmental management measures for the project.

Volume 2 and Volume 3 contain the appendices which include supporting non-technical information as well as the technical specialist assessment reports for: traffic and transport, noise and vibration, air quality, landscape character and visual amenity, biodiversity, Aboriginal heritage, non-Aboriginal heritage, contamination, surface water and flooding, groundwater, arboriculture, and social and economic.

The environmental assessments (refer to **Chapters 7** to **22**) include discussion of the existing environment, potential impacts and proposed mitigation measures.

2.0 Strategic context and project need

This chapter outlines the need for the project within the context of the existing electricity supply network and discusses the relationship of the project with national, state and local strategic planning and policy documents. The objectives of the project are also described.

2.1 Introduction

As discussed in **Chapter 1 Introduction**, a large part of TransGrid's and Ausgrid's inner Sydney network is aging and deteriorating in condition. As such, these assets are unable to operate at full capacity and there are plans to retire some assets. Furthermore, development in the inner Sydney area has been occurring at a rapid pace, spurring an increase in the demand for energy. A reliable electricity supply to the inner Sydney area, which includes the Sydney central business district (CBD) and eastern suburbs, is of crucial importance to customers and businesses located in these areas, as well as more broadly to New South Wales (NSW). This is due to the importance of the CBD in contributing to the wider economy.

TransGrid and Ausgrid have been working together to identify the most economically viable solution, through Powering Sydney's Future. The Powering Sydney's Future program investigated feasible options to address the forecast shortfall in network capacity. The following sections discuss the drivers of the project and the regulatory tests used to identify an acceptable option. **Chapter 3 Project development and alternatives** provides more information on the strategic alternatives and project options that were investigated as part of the program.

2.2 Project need

A number of key drivers contribute to the project need, including:

- the deteriorating condition of ageing fluid-filled underground cables in the existing network, resulting in the derating[1] of the 330 kV Cable 41 operated by TransGrid, and the derating of a number of existing 132 kV cables operated by Ausgrid;
- planned retirement of three Ausgrid 132 kV fluid-filled underground cables in inner Sydney;
- the age-related deteriorating condition of a further eight 132 kV fluid-filled Ausgrid underground cables in inner Sydney; and
- forecast increases in customer demand due to renewed economic activity within inner Sydney.

Each of these factors is described in more detail below.

2.2.1 Ageing electricity infrastructure presents an increasing risk to consumers

Key elements of the current electricity transmission network supplying the inner Sydney area are ageing. In particular, there are a number of fluid-filled cables that have been in operation since the 1960s and 1970s. TransGrid and Ausgrid have identified issues with these assets that are compromising their operating performance. After testing the backfill material in the cable trenches, TransGrid and Ausgrid have both had to downgrade the capacity that some cables can provide.

These ageing fluid-filled cables are also at a stage in their service life where they have an increasing likelihood of failure. When a failure occurs, the cable is required to be out of service for lengthy periods to enable repairs. This is generally up to two months but can be longer in difficult locations. This increases the likelihood that these network elements are out of service when failure of another network element occurs, which may result in unserved energy to consumers. Unserved energy essentially means that some consumers will not be able to be supplied electricity i.e. they may experience a blackout or loss of supply. Electricity consumers in the inner Sydney area are therefore becoming increasingly vulnerable in terms of the expected level of disruption to their electricity supply.

[1] Derating refers to operating the cables at less than their optimum capacity

2.2.2 Increased energy demand

Customer demand in the inner Sydney area continues to increase due to renewed economic activity. This is evident in the observed summer 2016/17 peak demand, committed new customer connections and anticipated customer connections.

Figure 2-1 shows the historical peak demand for the inner Sydney area and the forecast for the next 10 years. Although the updated forecast shows more flattened long-term demand growth, the need year for the project is unchanged based on the latest 2018 POE50[2] or medium demand forecast.

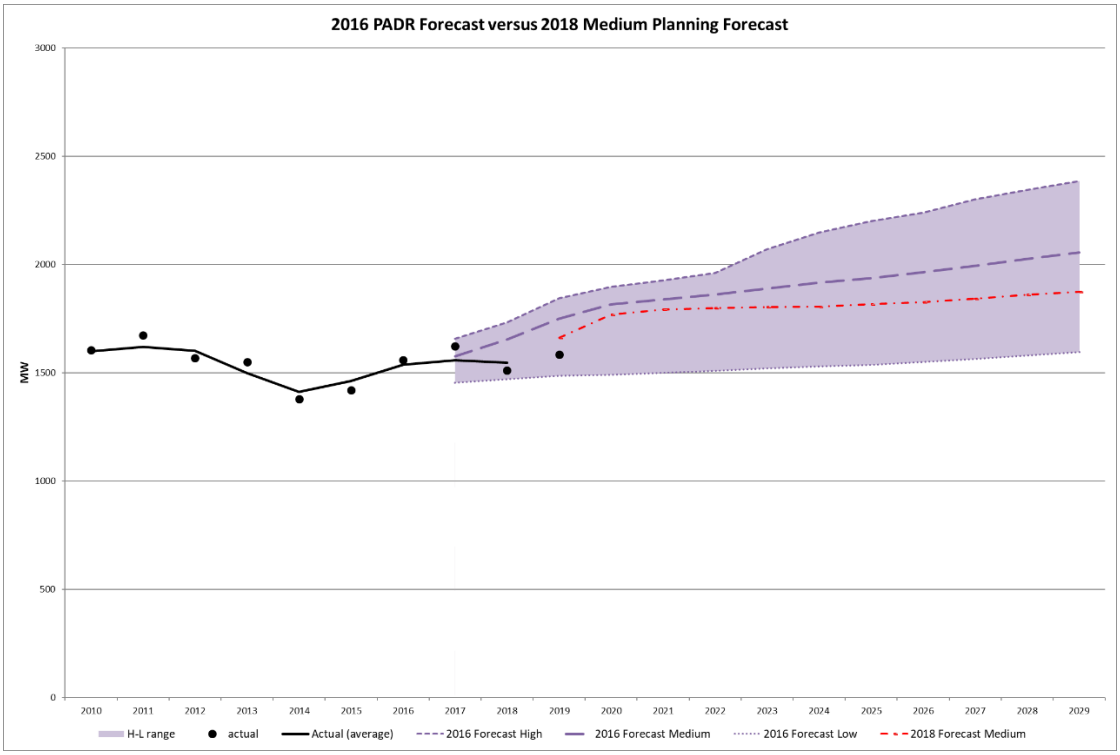


Figure 2-1 Historical and forecast energy growth - inner Sydney area

These forecasts are continually updated and have taken into account load growth trends and the results of economic assessments. The 2018 demand forecast remains consistent with the range shown in **Figure 2-1**. The largest contribution to demand growth is from future spot loads, mainly composed of large transport, infrastructure and residential development projects currently underway. A number of large-scale infrastructure projects (these projects include multiple stages of WestConnex and Sydney Metro – both of which are currently under construction) have been proposed for the inner Sydney area over the next 10 years.

Load transfers also contribute to the load growth in inner Sydney. Ausgrid will transfer a total of about 60 MW of demand by 2023 to the inner Sydney area due to the retirement of aged zone substations.

2.2.3 Analysis and conclusions

Analysis undertaken by TransGrid and Ausgrid shows a significant forecast increase in the electricity that may be demanded by consumers. This demand may not be able to be supplied to the inner Sydney area, due to an increase in the probability of failure of some cable assets and an increasing customer demand.

In particular, if a forced outage of two or more significant transmission elements occurred, the impact of loss of supply, particularly for inner Sydney, would be significant. **Figure 2-2** shows the amount of energy demand that would be unserved during failure scenarios of the electricity network inclusive of

[2] POE means Probability of Exceedance. This is the probability that a forecast would be met or exceeded e.g. a 50% POE demand forecast implies there is a 50% probability of the forecast being met or exceeded and represents a medium demand forecast. POE10, for example, represents a high demand forecast and POE90 represents a low demand forecast.

N-1 events (one failure in the network) up to and including N-5 events (in which there are five simultaneous failures) for a period of 10 years. Without a solution in place, the amount of energy demand unserved during these events increases substantially year on year.

The Regulatory investment test for transmission (RIT-T) process outlined in **Section 2.3** identified the optimal solution to meet unserved energy.

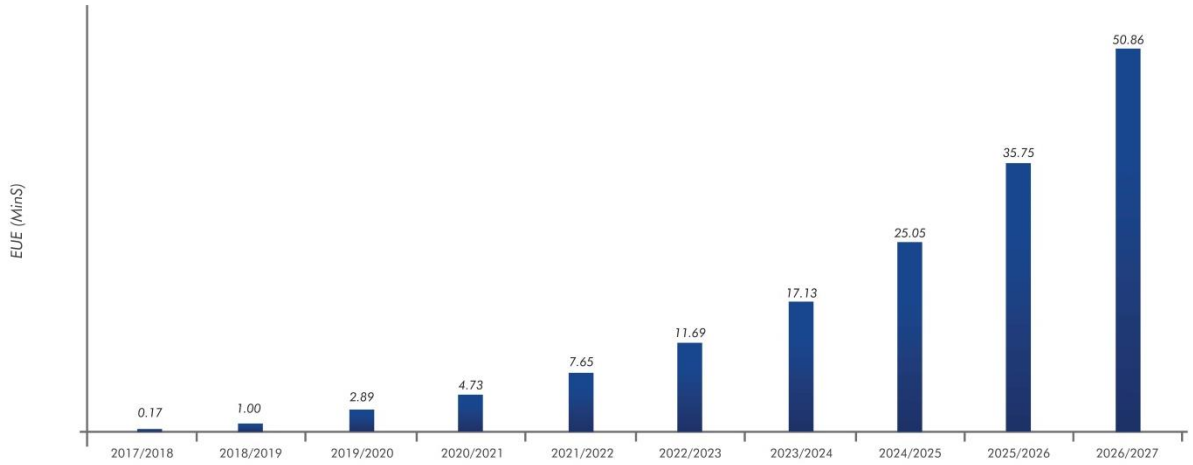


Figure 2-2 Forecast of expected unserved energy in inner Sydney area, 2017/18 to 2026/27
Source: RIT-T: Project Assessment Conclusions Report, 2017

2.3 Regulatory investment test for transmission (RIT-T)

A formal Regulatory Investment Test for Transmission (RIT-T) process was undertaken jointly by TransGrid and Ausgrid as required by the Australian Energy Regulator. The purpose of the RIT-T is to identify the transmission investment option which maximises net economic benefits and, where applicable, meets the relevant jurisdictional or Electricity Rule based reliability standards. The overall RIT-T process is designed to directly engage with parties on the problem and propose alternatives for consideration. Alternatives for this project included both network and non-network solutions[3] (refer to **Chapter 3 Project development and alternatives** for further discussion).

As part of the RIT-T process, TransGrid and Ausgrid valued reductions in expected unserved energy, network losses and repair/maintenance and environmental costs associated with each option, compared to the do nothing option. The joint planning efforts of TransGrid and Ausgrid identified the most efficient solution across the respective networks.

The Project Assessment Conclusions Report (TransGrid, 2017) outlines TransGrid and Ausgrid's assessment of the increasing risk to supply electricity to consumers from ageing electricity infrastructure in inner Sydney. The report identified the future value of unserved energy and other costs to electricity consumers associated with the increasing likelihood of failure of fluid-filled cables exceed the cost of investment to avoid these failures.

The RIT-T process identified the preferred network option to be implemented. That option is consistent with the project described in this EIS (i.e. installing two 330 kV cable circuits in stages, with commissioning of the first cable circuit in time for the 2022/2023 summer). Non-network solutions will be implemented to defer the network build by one year from when it would need to be commissioned without this support (i.e. from 2021/22).

[3]A network solution involves the construction of infrastructure (i.e. transmission cable, substation). Non-network solutions are alternatives to network solutions which still address potential shortfall in electricity supply (i.e. demand management, energy conservation initiatives).

2.4 Australian Energy Regulator (AER) determination 2018

The AER regulates the revenues of transmission businesses, such as TransGrid, by setting the maximum allowed revenue it may recover from its customers as outlined in revenue determinations. The AERs work is guided by the National Electricity Objective which promotes efficient investment in, and operation and use of, electricity services in the long term interests of consumers.

In its revenue determination for TransGrid (TransGrid transmission determination 2018 to 2023, AER, 2018) the AER has accepted the project and stated that they are satisfied that the timing and scope are likely to be prudent and efficient.

2.5 National network planning context

2.5.1 National Transmission Network Development Plan

The Australian Energy Market Operator (AEMO) is responsible for operating Australia's largest gas and electricity markets and produces national plans as part of its role as national transmission planner. The *National Transmission Network Development Plan* (NTNDP) (AEMO, 2016) assesses the transmission grid infrastructure over a 20-year period (from 2016 up to 2036). The plan focuses on finding a balance between reliability, security and cost. The plan notes that in the future, the expansion of transmission networks will be required to maintain a reliable and secure energy supply, including the supplemental use of non-network solutions (i.e. technology options such as demand management and energy storage solutions).

The 2016 NTNDP identified[4] specific projected reliability limitations within the inner Sydney area including deterioration and reduced capacity of assets, planned retirement of cables and a renewed growth leading to increased energy usage projections. Without a network transmission solution to address potential shortfalls in supply, TransGrid would not be able to provide a reliable energy supply.

2.5.1.1 National electricity rules

As a Transmission Network Service Provider, TransGrid is obligated to meet the requirements of the *National Electricity Rules*, in which TransGrid must plan, design, maintain and operate their transmission networks to allow the transfer of power to customers. The *National Electricity Rules* set out the required processes (e.g. RIT-T) for developing networks as well as the minimum performance requirements of the network including:

- adherence with reliability standards ensuring that the electricity system is adequately planned to meet licencing requirements as a Transmission Network Service Provider in NSW;
- meeting community expectations in the supply of electricity;
- undertaking development in a socially and environmentally responsible manner; and
- network planning considering non-network options such as demand response/management as part of the planning process.

2.6 Strategic planning and policy framework

The project aligns with and supports the strategic planning and policy framework of NSW. The NSW state government strategic plans noted below recognise the importance of implementing solutions to cater for future growth. The project aims to provide continuity and reliability benefits to consumers within the inner Sydney area including additional security for periods of peak demand. By providing additional security and reliability, the project reduces the risk of a network failure.

In January 2016, the *Greater Sydney Commission Act 2015* established the Greater Sydney Commission and added new provisions for strategic planning (Part 3B) to the *Environmental Planning and Assessment Act 1979* (EP&A Act). Part 3B declared *A Plan for Growing Sydney* to be the initial Greater Sydney Region plan and set the statutory requirement for the Greater Sydney Commission to

[4] Refer to Section 3.3.2 of the 2016 NTNDP

review the initial Greater Sydney Region plan "before the end of 2017 and at the end of every subsequent period of 5 years".

The Greater Sydney Commission aims to coordinate and align planning across the Greater Sydney area, including carrying forward recommendations and considerations from previous planning documents such as *A Plan for Growing Sydney* (NSW Government, 2014) and *NSW 2021 – A Plan to Make NSW Number One* (NSW Government, 2011).

The Greater Sydney Commission has drafted an overarching plan for Sydney and district plans. These plans are discussed in the sections below. These plans help prioritise and guide development to ensure consistency with overarching goals, directions and strategies for Greater Sydney.

2.6.1 A Plan for Growing Sydney

A Plan for Growing Sydney (NSW Government, 2014) outlines how delivering new infrastructure in growth centres (such as the inner Sydney area) can strengthen local communities and the economy.

Several 'Directions' outlined in the Plan recognise the need to improve and provide new supply for electricity connections including:

- Direction 3.1: Revitalise existing suburbs – providing utilities such as water, sewerage, electricity and gas can serve to help revitalise local communities; and
- Direction 4.2: Build Sydney's resilience to natural hazards – natural hazards can cause 'major disruption to transport routes and utilities'. Future projects need to consider natural hazards and the potential disruption they pose.

A review of *A Plan for Growing Sydney* by the Greater Sydney Commission identified that while most of the directions in *A Plan for Growing Sydney* were still relevant, they required updating or strengthening to respond to new challenges for planning Greater Sydney to 2056. Strategic planning for Greater Sydney is now captured in the Greater Sydney Region Plan, as discussed in the next section.

2.6.2 Greater Sydney Region Plan – A Metropolis of Three Cities

The *Greater Sydney Region Plan – A Metropolis of Three Cities* (Greater Sydney Commission, 2018a) has been prepared to 'meet the needs of a growing and changing population'. The plan establishes a 40-year vision for Greater Sydney, including consideration of land use, transportation, housing, infrastructure, community programs and economic/employment opportunities. The plan is an update to *A Plan for Growing Sydney* (NSW Government, 2014) (refer to **Section 2.6.1**).

Ten 'Directions' have been identified for Greater Sydney to help better integrate and facilitate positive land use and infrastructure outcomes with the overall intent of making Sydney a more productive, liveable and sustainable city.

Two of the 'Directions' specifically relate to the need for future investment in infrastructure to help support a growing and changing population including:

- "A city supported by infrastructure"
  - it is recognised that providing adequate infrastructure to assist growth in population is needed to create strong communities. The plan aims to review required infrastructure in accordance with identified growth areas, allowing timely integration and effective expenditure on infrastructure;
  - in considering the increase in energy demand that would result from a growing population, further provision of energy infrastructure will be required to support this Direction;
- "A resilient city"
  - resilient cities are those with the capacity to be able to survive, adapt and grow notwithstanding chronic stresses and acute shocks. There is a need to build this capacity through investment to help improve quality of life and productivity; and
  - deteriorating electricity infrastructure in the inner Sydney area could potentially lead to a risk of the loss of electricity supply and providing a secure transmission supply would help ensure a reliable electricity supply and ultimately, a more resilient Sydney.

2.6.3 Eastern City District Plan – Connecting communities

To further provide planning guidance at a local level, 'district plans' were developed including the *Eastern City District Plan* (Greater Sydney Commission, 2018b). This plan recognises that the eastern Sydney city, which includes the Sydney CBD, serves as the driver of the Greater Sydney's economy. A priority action (Planning Priority 1: Planning for a city supported by infrastructure) for this district is required to account for the expected increase in both employment and population. The priority action plan would also support the development of local communities and planning for infrastructure, including a need to update ageing and constrained energy infrastructure.

Action 6, contained within Planning Priority 1, aims to 'maximise the utility of existing infrastructure assets and to consider strategies to influence behaviour changes, to reduce the demand for new infrastructure, including supporting the development of adaptive and flexible regulations to allow decentralised utilities'. This action relates to both strengthening existing infrastructure and upgrading/refurbishing existing infrastructure to avoid replacement where practicable. It is further recognised that provision of infrastructure alone would not fully support this Priority, but also that energy management within the inner Sydney area would require some form of demand management and/or storage devices to fully support this action.

2.7 Project objectives

Based on the identified need for the project within the inner Sydney area, the project has the following objectives:

- provide additional capacity to cater for future forecast increased energy demand in the inner Sydney area;
- meet TransGrid's operational requirements for the provision of a safe, reliable and secure transmission supply to the inner Sydney area;
- be consistent with the principles in TransGrid's *Environment Policy* (January 2018), including the integration of 'environmental management considerations into the planning, design, siting, construction, maintenance, operation, decommissioning and disposal of all TransGrid assets'; and
- take into account and address key stakeholder and community needs and expectations with respect to the protection of the environment and local amenity.

3.0 Project development and alternatives

This chapter describes the alternatives that were considered as part of the project development process and explains how and why the project was selected as the preferred option. It also describes refinements to the project design and the rationale for the changes.

3.1 Overview

TransGrid continually plan and deliver the solutions needed to upgrade and replace ageing electricity infrastructure, while maintaining a high level of reliability within the Sydney metropolitan area. In 2012, recognising the upcoming deterioration and retirement of a number of transmission cables, TransGrid commenced a series of studies to investigate improvements to the transmission network across the inner Sydney area. Improvements to the transmission network have since included a number of cable connections, substation upgrades and demand management and energy storage solutions, as well as the investigation of additional network (infrastructure) and non-network (technology) options.

As noted in **Chapter 2 Strategic context and project need**, further investment in network infrastructure improvements (i.e. a new transmission cable) was identified in the RIT-T process as being required by 2021/2022 with the Rookwood Road to Beaconsfield West substation connection (the subject of this Environmental Impact Statement (EIS)) being the preferred transmission supply connection.

Table 3-1 outlines the history and progression of the Rookwood Road to Beaconsfield West substation connection as well as other project development activities that have been undertaken to date. The project development and alternatives process is further discussed in **Section 3.2**.

Table 3-1 Overview of the Rookwood Road substation to Beaconsfield West substation connection

2014 – 2015
• Route selection study examined substation connection options and substation entry/exit options between the Rookwood Road substation and Beaconsfield West substation; and • Community and stakeholder consultation undertaken.
2016
• RIT-T process initiated; investigated network and non-network solutions through the Project Specification Consultation Report (PSCR) – October 2016; • Route selection report recommended a preferred connection option; and • Further coordination with stakeholders undertaken to identify preferred substation entry and exit options.
2017

• RIT-T process initiated; investigated network and non-network solutions through the
  o Project Assessment Draft Report (PADR) – May 2017;
  o Project Assessment Conclusions Report (PACR) – December 2017;
• Preferred route selection report published June 2017;
• Preliminary Environmental Assessment prepared in support of State Significant Infrastructure application; and
• Environmental Impact Statement commenced to understand impacts as a result of construction and operation of the network solution (transmission cable).

2018
• Preferred route refined due to constructability challenges associated with coordination with other major infrastructure projects and constraints due to existing services within the road corridor; • Consultation undertaken with key stakeholders and communities around the preferred route; and • Environmental investigations undertaken for the preferred route.

2019
• Stakeholder and community feedback and constructability challenges resulted in the identification of a revised route; • Scoping Report prepared to support a revised State Significant Infrastructure application to account for the amendments to the project; and • Environmental assessment process re-commenced to evaluate impacts as a result of construction and operation of the revised project (the subject of this EIS).

3.2 Alternatives to the project

As part of the RIT-T process and the Powering Sydney's Future program, TransGrid and Ausgrid considered a range of alternatives to address the risk of supply disruption for consumers in the inner Sydney area (refer to **Chapter 2 Strategic context and project need**). These alternatives are discussed in the following sections.

3.2.1 The 'do nothing' alternative

Overall, the 'do nothing' alternative would not involve any improvements to strengthen the network such as upgrades to existing infrastructure (substations), or the construction of a new cable connection. The 'do nothing' alternative would still allow for TransGrid's currently planned non-network solutions.

It was determined that the 'do nothing' alternative would not afford the existing transmission network the security and continuity of supply to meet the forecast increase in consumer demand expected by the early 2020s (impacting on business continuity and customer quality of life). This alternative was therefore discounted as it does not meet the project objectives outlined in **Section 2.7**, nor would this scenario be acceptable to customers.

3.2.2 Non-network alternatives

A non-network alternative would involve solely implementing a combined use of various non-network solutions to meet expected shortfalls in demand within the inner Sydney area. A key consideration for all potential non-network solutions is that they meet the level of reliability set by the NSW Government. The technologies considered included:

- energy storage devices – involving the use of batteries combined with other electricity generation sources such as solar PV;
- demand response – involving systems implemented for industrial and commercial buildings to trigger the release of stored energy (batteries) during times of peak demand; and
- geo-spatial mapping – involving the mapping of constraints within the electricity network to identify opportunities to manage demand and implement solutions to better serve customers.

Non-network solutions were considered prior to network solutions in an effort to defer the need for major capital expenditure (i.e. for construction of a transmission cable circuit). An analysis within stage 2 of the RIT-T process identified the prospect of deferring construction of a new cable circuit by one year using non-network solutions. While deferring construction for one year was determined to be feasible, deferring construction beyond one year was not considered to be cost-effective.

The use of a non-network only alternative is therefore not feasible as it would not secure an ongoing reliable electricity supply, would not be cost-effective nor would it fully satisfy and address key stakeholder and community needs identified during the RIT-T process. This alternative has therefore not been progressed as it does not meet the project objectives outlined in **Section 2.7**.

3.2.3 Network alternatives

Understanding that the use of non-network solutions only would not provide the level of reliability and security required, numerous network alternatives were progressed further.

These alternatives included the construction of transmission cable connections between existing substations in the Sydney metropolitan area. Potential network supply options from the following substations into the inner Sydney area were investigated:

- Sydney North at Dural;
- Sydney East at Belrose;
- Sydney West at Eastern Creek;
- Holroyd at Greystanes;
- Rookwood Road at Potts Hill;
- Sydney South at Picnic Point;
- Beaconsfield West at Alexandria; and
- Haymarket at Ultimo.

These investigations took into account environmental, engineering, social and cost implications at a high level, whether existing cables could be remediated, operated without remediation, or retired; and considered various supply modes (trenched, tunnel and overhead modes for transmission infrastructure). Modes are further discussed in **Section 3.3.1**.

A feasibility study determined that supply from the Rookwood Road substation to the Beaconsfield West substation was the most feasible in terms of relative benefit to the environment and community as well as cost. More specifically, this supply option was preferred as it:

- provided the shortest connection option between existing substations that could support a new 330 kV transmission cable circuit;
- avoided connections (from the east and north) through the heavily constrained Sydney CBD area; and
- utilised previously upgraded/constructed sections of transmission cables, connections and infrastructure (such as GIS buildings and busbars), providing a secured, long-term solution.

As the start and end point of a possible transmission cable connection had been identified, further work could be progressed on a detailed route selection process, as outlined in **Section 3.3**.

3.3 Route selection process

A route selection study was completed in 2017 to identify a preferred route option for the Rookwood Road substation to Beaconsfield West substation network connection (AECOM, 2017). The route selection report and related documents are available on the TransGrid website[1]. The route selection study considered potential options for establishing a new transmission supply connection and involved:

- stakeholder consultation;
- field inspections;
- identification of preliminary route options using guiding principles;
- a comparative evaluation of route options; and
- confirmation of shortlisted route options including the preferred option(s).

Route options between the Rookwood Road substation in Potts Hill and the Beaconsfield West substation in Alexandria were developed with the aim of minimising environmental, land use, social and community impacts, and engineering constraints, while taking into account high-level cost considerations and avoiding sensitive areas (e.g. cemeteries, conservation areas, airports, major roadways). **Section 3.3.1** provides additional information about the route selection study including the

[1] https://www.transgrid.com.au/psf

process, modes and options considered as well as the option ultimately identified to be carried forward as the preferred option.

Targeted consultation with key stakeholders (State government agencies, local councils and utility and service providers) occurred throughout the route selection study (refer to **Chapter 6 Consultation**).

3.3.1 Route and mode options investigated

An important part of identifying route options is the consideration of modes in the context of the area where the transmission supply will be located. Modes are the type of transmission infrastructure that could be used. Options include trenched (i.e. underground), overhead (requiring the installation of towers or poles), tunnels (requiring boring a tunnel and associated tunnel shafts or co-locating where possible with other infrastructure projects (e.g. WestConnex)), or a combination of these (hybrid). Key considerations for choosing the appropriate mode largely relate to spacing requirements, cost and disruption to the environment (both built and natural). Refer to **Section 3.3.1.1** for opportunities and constraints by mode option. In general, the various modes can be described as:

- **trenched mode** – this mode would involve trench excavation, typically around 3 metres wide and about 1.5 metres deep in which transmission cables are installed;
- **overhead mode** – this mode would involve the installation of towers or poles up to around 40 metres in height at approximate intervals of between 250 to 400 metres, depending on clearance requirements. The standard easement width of 330 kV overhead transmission lines is 60 metres;
- **tunnel mode** – this mode would involve the boring of a tunnel around one to three metres in diameter to house transmission cables. Tunnel depth would be between 10 to 40 metres depending on geological conditions, while access shafts would be required every 2 to 3 kilometres; and
- **hybrid mode** – this would involve a combination of trench, tunnel and/or overhead modes that have been identified to be viable.

As part of the route selection study, potential route options based on the various modes were investigated and screened to identify a preferred connection between the Rookwood Road substation and the Beaconsfield West substation.

3.3.1.1 Route options identification

Based on an assessment of associated constraints and opportunities, route options (with corresponding mode option) were identified for further analysis. These options included:

- 31 options connecting the Rookwood Road substation and the Beaconsfield West substation, including:
  - 19 options involving only a trenched connection mode;
  - two options involving only a tunnel connection mode[2];
  - 10 options involving a combination of trenched, overhead and tunnel modes (hybrid);
- four exit mode options from the Rookwood Road substation, all of which involved a trenched exit mode; and
- five entry mode options for entering the Beaconsfield West substation, all of which involved a trenched entry mode.

No viable options for transmission network connections were identified using only the overhead mode to establish the 45 metre easement for the transmission towers, without significant land acquisition/

[2] Two options involving a tunnel only connection (H1 and H2) were investigated as part of the Route Selection Report. The two options largely adopted an 'as-the-crow-flies' route to minimise the distance required for tunnelling between the two substations and leveraged local parks, reserves and open spaces every two to three kilometres to facilitate construction and maintenance access points. The routes shared a common alignment from Rookwood Road to Enfield South, where one route deviated slightly north (connecting through Pratten Park), while the other traversed south (connecting through Peace Park), before rejoining in Dulwich Hill and continuing to Beaconsfield West.

demolition to establish an appropriate easement. Therefore, no overhead only options were progressed for further analysis.

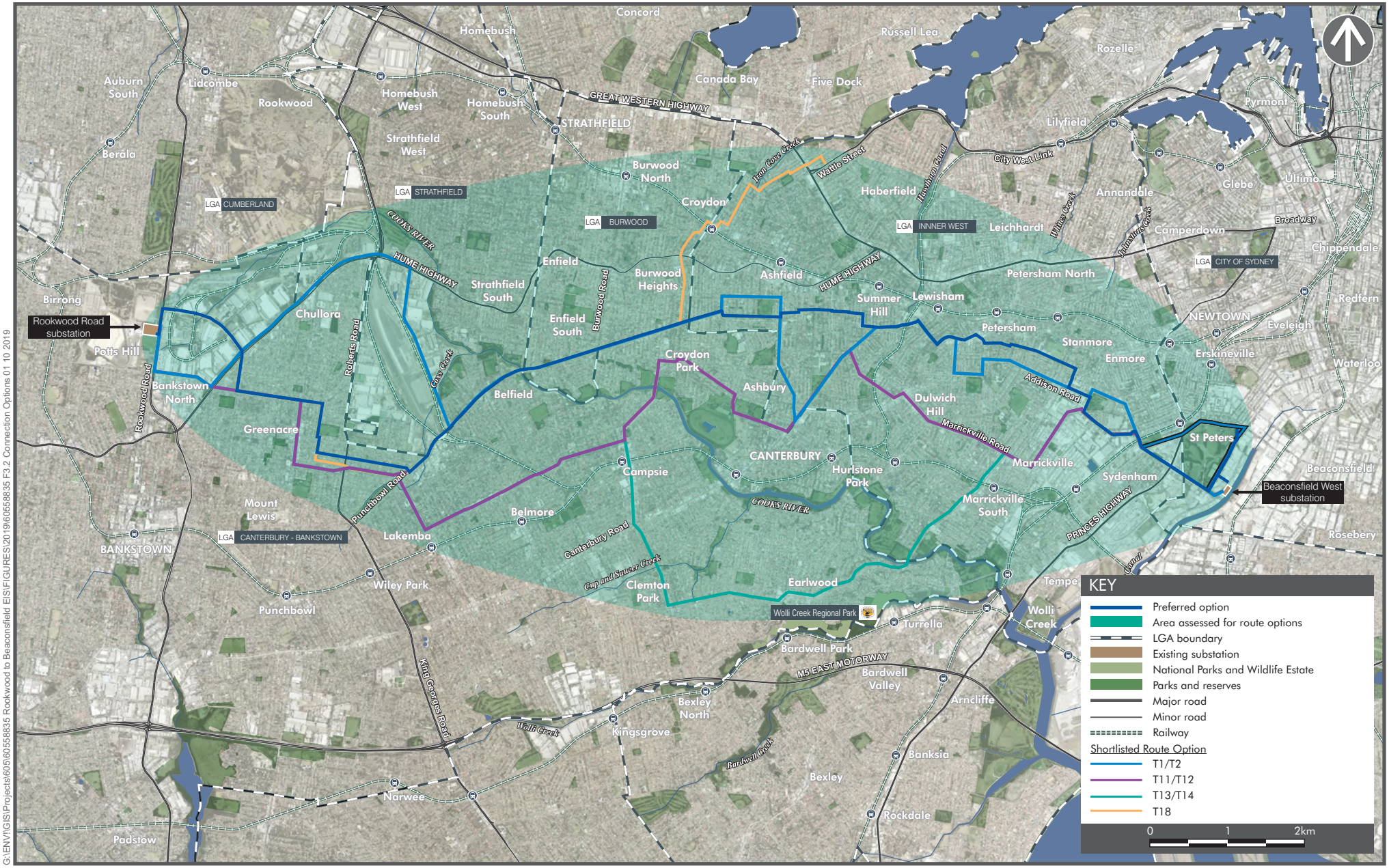
3.3.1.2 Route options evaluation

Route options were evaluated based on a risk assessment approach consistent with *AS/NZ 31000:2009 Risk Management – Principles and Guidelines* (Standards Australia/Standards New Zealand, 2009b). Each option was evaluated based on the following categories:

- environmental and land use implications during construction;
- environmental and land use implications during operation;
- engineering implications;
- cost implications;
- program implications; and
- potential community and stakeholder response.

In considering these categories, the aim was to provide a consistent basis against which to evaluate route options. Various metrics were used to evaluate environmental and land use implications for route options including number of properties affected, number of infrastructure crossings, proximity to heritage items and extent of potential vegetation clearing, amongst others.

Of the 31 connection options, eight were shortlisted for further analysis. These eight options are shown on **Figure 3-1**. The eight shortlisted options were all trenched options as these represented the lowest risk and highest performing route options. A full ranking and detailed risk table for each route option can be found in the *Route Selection Report: Powering Sydney's Future – Rookwood to Beaconsfield West* (AECOM, 2017). In general, tunnel options and hybrid options with tunnels were deemed too costly from a construction and operational perspective, as well as representing an unacceptable risk to the community given the loss of open/recreational space for the tunnel shafts and overhead wire connections.



G:\ENV\GIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\2019\60558835 F3.2 Connection Options 01 10 2019

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CONNECTION OPTIONS

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Potts Hill to Alexandria Transmission Cable Project

Note: Short-list options discussed further in Route Selection Study

Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

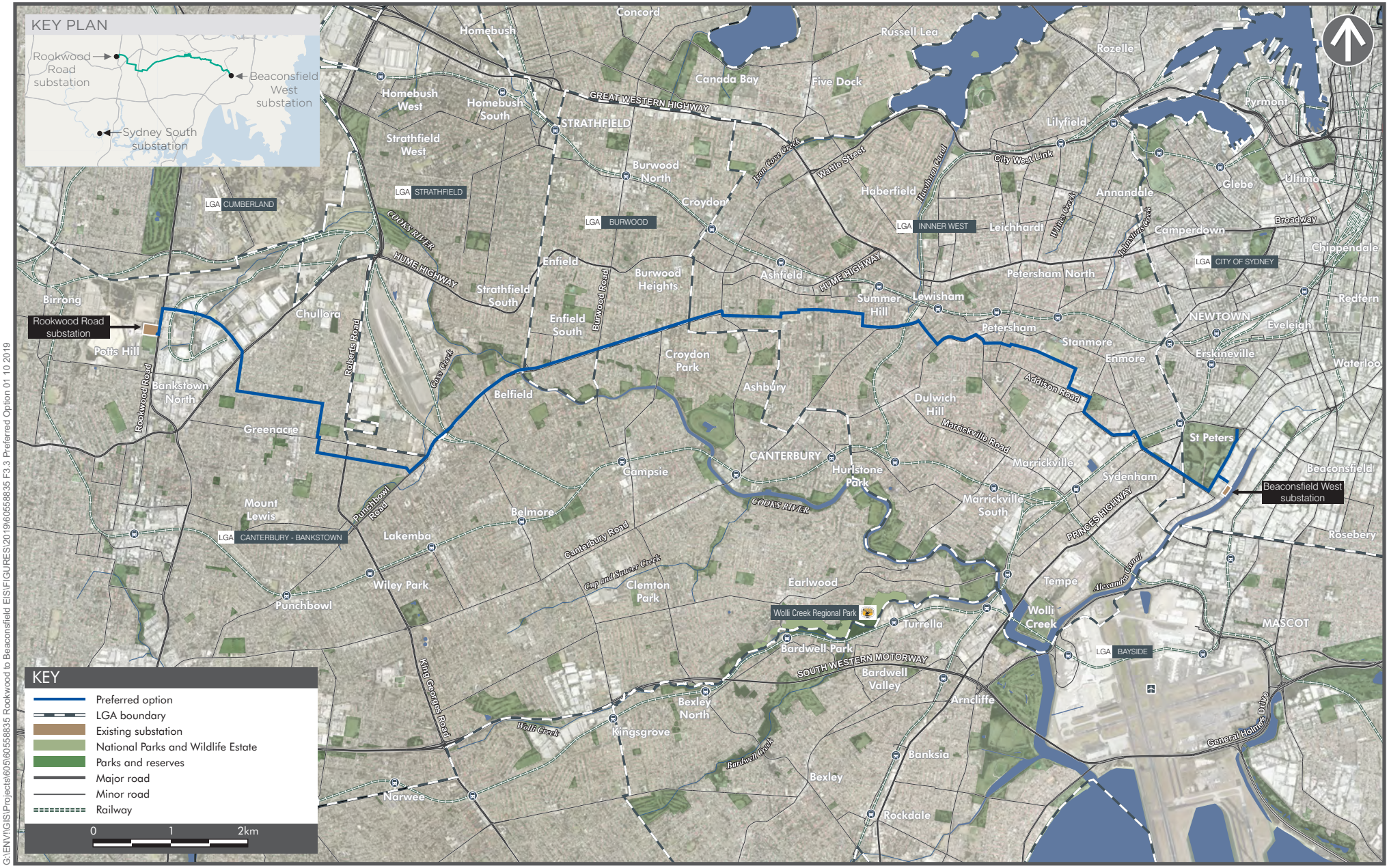
FIGURE 3-1

3.3.2 Preferred option from the route selection study

During the route selection study, feedback from stakeholders was considered and further investigation, including additional site inspections and desktop analysis was undertaken to identify constraints at key points along the eight shortlisted route options. The inspections focused on specific investigation areas (including recommendations from councils and other stakeholders), as well as opportunistic observations to identify potential modifications to the shortlisted route options. Where lower risk deviations were identified to be feasible and reasonable, they were incorporated into the preferred route option.

Figure 3-2 shows the preferred option from the route selection report.

This option presented the lowest overall risk from an environmental, engineering and cost perspective.



G:\ENVIGIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\2019\60558835 F3.3 Preferred Option 01 10 2019

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PREFERRED OPTION FROM THE ROUTE SELECTION STUDY

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Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 3-2

3.3.3 Refinements to the preferred route

The preferred route identified in the route selection study was subjected to further design and engineering investigation.

3.3.3.1 Potential for co-location with other infrastructure corridors

Throughout the evolution of route options identification and evaluation, opportunities have been sought to co-locate the proposed transmission cable circuit within other infrastructure corridors such as roads, railway lines or cycleways. As the design of the project progressed, none of the co-location options were shown to be feasible due to the following:

- co-location within rail corridors presented challenges including:
  - insufficient available land to construct and safely operate the transmission cable circuit;
  - non-compliance with Sydney Trains safety standards;
  - potential interference between the transmission cables and rail signalling and communication systems;
- co-location with the Cooks River cycleway was constrained by:
  - the cycleway corridor contained unavoidable riparian vegetation along its length, a number of public parks and the Sydney Metropolitan Pipeline, amongst other utilities, making the option less viable than other identified alternatives;
  - feedback received from Inner West Council, WaterNSW and the Cooks Rivers Alliance, which recognised the restoration activities and ecological diversity of the Cooks River corridor (also known as the Greenway);
- co-location with WestConnex, specifically co-location with the permanent infrastructure in the vicinity of the Beaconsfield West substation and Sydney Park (associated with the New M5 and M4-M5 Link projects) was limited by:
  - New M5 St Peters interchange – this option, which included the use of Campbell Road and/or Euston Road was constrained by design integration challenges, construction timing and construction feasibility; and
  - M4-M5 Link tunnel – this option, which included co-location with the proposed tunnel between Haberfield and St Peters, had a number of constraints associated with timing of tunnel construction and completion; and technical integration with the tunnel design.

3.3.3.2 Route refinements

Based on the identification of various constraints (such as other utilities and future capital works) in the project area, a number of refinements to the transmission cable route were required. The key changes included:

- split in the double transmission cable circuit around Robert Street due to insufficient space for a dual circuit between Holden Street and Prospect Road;
- from Newington Road turning south on Bright Street (instead of via Perry Street), until the intersection with Addison Road. Perry Street was too narrow to accommodate a double transmission cable circuit; and
- traversing Camdenville Park and Sydney Park prior to entry to Beaconsfield West substation as the previous route along Campbell Road and/or Euston Road was not feasible.

The need for the transmission cable route to traverse Sydney Park was investigated further. Two options were identified and evaluated. The options included:

- Option A – a trenched route diagonally traversing Sydney Park, mostly following existing footpaths and requiring a cable bridge crossing over a wetland in the southern part of the park; and

- Option B – a trenched route that is partly within Barwon Park Road before crossing into the park and following the western and southern park boundaries. This route avoids the need for a cable bridge crossing over the wetland.

Option B was selected as it would avoid a wetland crossing and would result in less disruption to park users (as it more closely follows the park boundaries).

These route refinements became part the project that was then subject to environmental assessment and is shown in **Figure 3-3**. This route is referred to as the 'original route' in subsequent sections of this EIS. The original route was communicated to key stakeholders and the community throughout 2018. Further details on consultation activities are presented in **Chapter 6 Consultation**.

3.3.4 Identification of a revised route

In early 2019, TransGrid decided to proceed with a revised route for the project. About 40% of the revised route is the same as the original route, mainly at either ends, closest to the substations. The main difference is from around Punchbowl Road in the west to Edgeware Road in the east.

Other changes to the project include the following:

- the original route had six special crossings over infrastructure and watercourses whereas the revised route has seven; and
- nine construction laydown areas were assessed for the original route whereas only five are assessed for the revised route.

The original and revised routes are shown in **Figure 3-3**.

The revised route and other changes described above comprise the project assessed in this EIS and detailed further in **Chapter 4 Project description**.

The main reasons for revising the route are due to the following:

- requirements of key stakeholders including government agencies; and
- challenges with the constructability of the project in some areas, including cost considerations.

The following sections expand on the above reasons for revising the route.

3.3.4.1 Key stakeholder requirements

Key stakeholders consulted with during the development of the EIS on the original route raised a number of concerns and requirements, as outlined below:

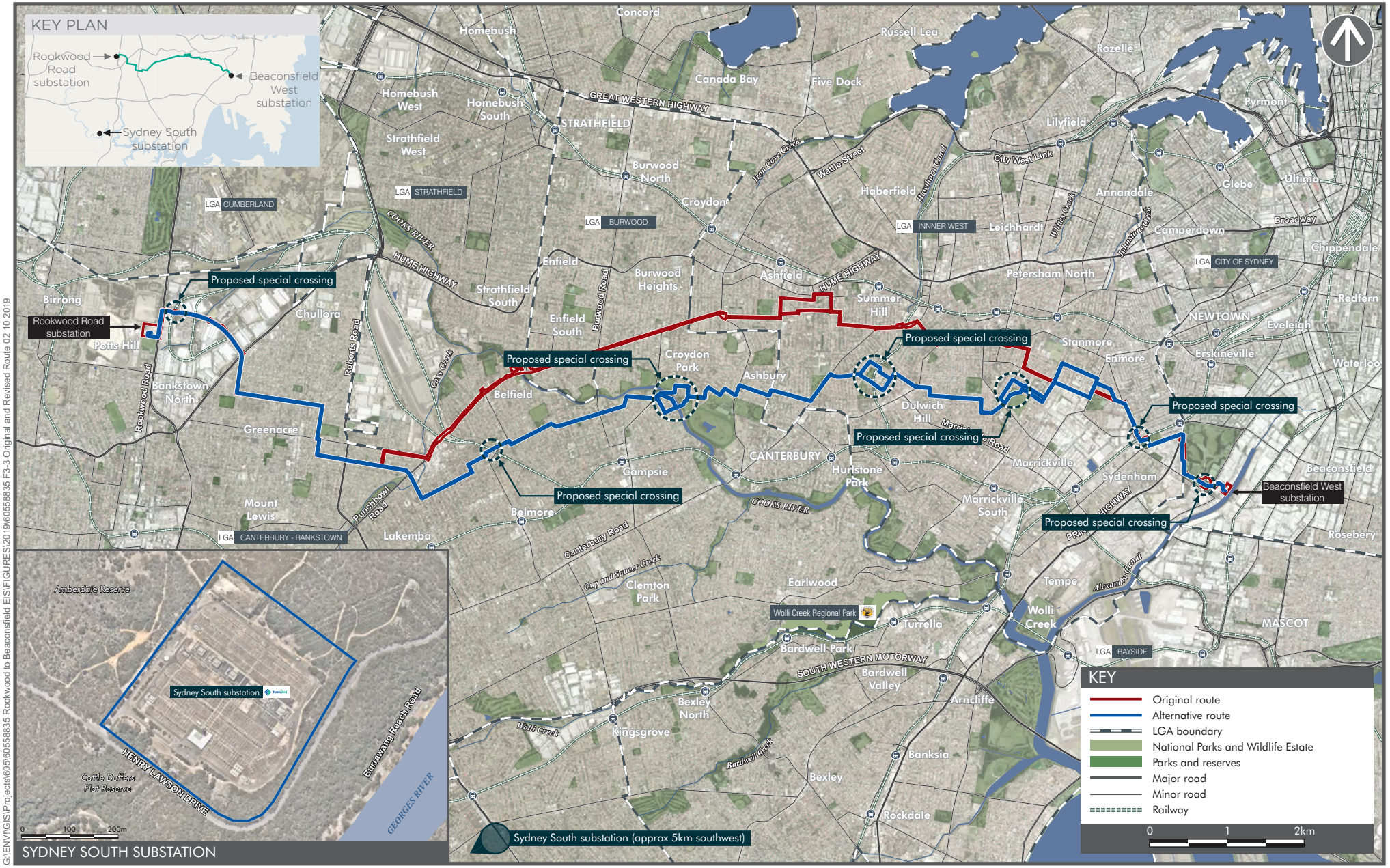
- the Transport Management Centre are likely to impose highly restrictive working hours at night-time for work on State roads or at signalised intersections to minimise traffic disruption;
- Roads and Maritime Services prefer no works along State roads such as Punchbowl Road and Georges River Road to avoid traffic disruption;
- the Australian Rail Track Corporation do not support the rail corridor crossing at the Enfield Intermodal Terminal location due to the potential for construction to disrupt operations/services;
- Sydney Water require a disused water main on Addison Road in Marrickville that was proposed for relocation to be retained for possible future use; and
- the City of Sydney Council require minimal impacts on Sydney Park in Alexandria which is a well used recreational area.

3.3.4.2 Constructability challenges

The following constructability and associated cost constraints were identified as significantly impacting the feasibility of the original route:

- the proposed cable bridge design at the Enfield Intermodal Terminal was too large (spanning six rail racks) with inadequate space for work sites for equipment or materials storage, resulting in potentially significant impacts to traffic movement on Georges River Road;

- the project would directly interface with the retaining walls and levels of an approved new garden centre near the Cooks River cable bridge crossing, with the uncertainty around construction timing potentially impacting the project program; and
- permanent road restoration of large sections of concrete roads (such as Punchbowl Road and Georges River Road) would be required at night-time, thereby extending the construction program and significantly increasing the costs of the project.



G:\ENV\GIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\2019\60558835 F3-3 Original and Revised Route 02 10 2019

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ORIGINAL AND REVISED ROUTE

Powering Sydney's Future
Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and special crossings
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 3-3

3.6 Cable circuit installation

As part of the RIT-T process, an evaluation of cable circuit installation was undertaken. The two options under consideration involved either installing the two new 330 kV cable circuits at the same time or in two stages (with the second stage occurring up to 10 years in the future).

In evaluating the two installation approaches, TransGrid and Ausgrid considered the balance between:

- the longer period of community disruption but lower initial capital cost associated with constructing the two cable circuits separately; and
- the shorter period of community disruption and higher network security but higher initial capital cost from constructing both circuits at the same time.

Based on concerns raised by the Australian Energy Regulators (AER) and the Consumer Challenge Panel (CCP), including a lack of flexibility with the preferred option, options were reviewed to consider the appropriate balance between retaining optionality, decreasing the initial capital cost and minimising community disruption.

Consequently, a refined option was developed. Feedback from customers and stakeholders noted support for a two-stage option. The refined option would allow the installation of the second 330 kV cable circuit to be delayed if demand growth is slower than forecast and/or a higher quantity of lower cost non-network options emerges. Should the opposite occur, i.e. there is a rapid growth in forecast need; TransGrid would already have the infrastructure in place to install a second cable circuit.

The two-stage process further allows TransGrid to flexibly procure more demand management should demand forecasts or cable conditions change, and to procure more efficient lower cost solutions should the demand management market further improve with more non-network providers.

The project, as detailed in **Chapter 4 Project description** therefore includes the construction of one 330 kV transmission cable circuit and the provision of infrastructure for a second future 330 kV transmission cable circuit, should it be required.

3.7 Construction options for special crossings

Several methodologies were investigated for the crossing of infrastructure and watercourses within the project area. This included cable bridges and underboring options such as thrust boring and horizontal directional drilling (HDD).

Table 3-2 summarises the construction methods that were considered further at each crossing location. These are also described in more detail below. The final type of crossing selected would be informed by local site constraints (including access and current land use), potential construction duration, costs and minimising impacts (through limiting the disturbance footprint).

Table 3-2 Location of proposed special crossings

Proposed crossing location	Crossing methods considered
Muir Road, Chullora	Cable bridge
Enfield Intermodal, Belfield	Underbore
Cooks River, Campsie/Croydon Park/Ashbury	Cable bridge or underbore (preferred)
Arlington Light Rail Station, Dulwich Hill	Underbore
Amy Street, Marrickville	Underbore
Bedwin Road, St Peters	Cable bridge
Sydney Park, Alexandria	Underbore

3.7.1 Cable bridges

Cable bridges may be concrete trough structures into which the cables would be pulled and covered for protection or may be modular (pre-cast) with integrated conduits for the cables. For the project, the

pre-cast design is preferred as this would be easier to install in a constrained environment, leading to less disruption to existing land uses. Cable bridges would be part of the permanent operational infrastructure for the project.

3.7.2 Underboring

Underboring (i.e. an underground crossing) is a trenchless construction method for installing conduits that is associated with less surface ground disturbance than trenching. Two methods of underboring, thrust boring and HDD, are being considered for the project. The preferred method of underboring would be confirmed during detailed design.

Further details on cable bridges and underboring are presented in **Chapter 4 Project description**.

4.0 Project description

This chapter describes the operational project components including the transmission cable route, special crossings, cable system components and substation upgrades. It also describes the temporary facilities required during construction as well as the proposed construction methodology and program.

The project description for this Environmental Impact Statement (EIS) is based on an initial concept design which takes into account potential environmental and community impacts as well as other key constraints. A detailed design will be developed by an appointed design and construction contractor, should the project be approved. The detailed design will build on the concept design, taking into account impacts and mitigation measures identified in the EIS, community and stakeholder feedback on the EIS captured in the Response to Submissions Report and the conditions of approval for the project.

The detailed design would also consider other requirements identified during the assessment of the project by the NSW Department of Planning, Industry and Environment (DPIE). Opportunities to further minimise impacts will continue to be investigated by TransGrid as the design of the project progresses.

4.1 Overview of the project

TransGrid is proposing to construct and operate a 330 kV underground transmission cable circuit between the Rookwood Road substation in Potts Hill and the Beaconsfield West substation in Alexandria, and to install conduits (pipes) for a second transmission cable circuit that may be delivered in the future, subject to demand. To facilitate the new transmission cable circuit, work is also required at the existing Rookwood Road, Beaconsfield West and Sydney South substations.

A summary of the project is provided in **Table 4-1**.

Table 4-1 Project summary

Project element	Summary of the project
Excavation method	Trenching – up to around 3 metres wide and up to 1.6 metres deep
Cable life	Minimum of 40 years
Cable length	Around 20 kilometres
Key components	330 kV cables, conduits, joint bays, cable bridges, underbores, substation upgrades and temporary construction laydown areas
Timing and duration	Around a 24 month construction period, proposed to commence in 2020 (subject to project approval). Operations to commence in 2022/2023
Workforce	Peak construction workforce of around 70 personnel (excludes traffic management personnel)
Estimated spoil volume	Approximately 115,000 cubic metres of spoil would be removed during excavation and trenching
Hours of construction	Standard construction hours would be adopted where reasonable and feasible: • Monday to Friday 7:00 am to 6:00 pm; • Saturday 8:00 am to 1:00 pm; and • No works on Sundays and public holidays. Work outside of standard construction hours (including night works and 24 hours) maybe required on major roads, at signalised intersections and at special crossings, cable jointing locations (24 hours), and other locations where required or requested by relevant authorities
Capital investment	Around $285 million

4.1.1 Project location

The project would be located in the suburbs of Potts Hill, Yagoona, Chullora, Greenacre, Lakemba, Belmore, Belfield, Campsie, Croydon Park, Ashbury, Ashfield, Dulwich Hill, Marrickville, Newtown, St Peters, Alexandria and Picnic Point.

The project is located in the following local government areas (LGAs):

- City of Canterbury-Bankstown;
- Strathfield;
- Inner West; and
- City of Sydney.

The project would be located primarily within road reserves, at existing electrical infrastructure sites, within public open space and on previously disturbed areas. The location of the project is shown in **Figure 4-1**.

4.1.2 Key components of the project

Key components of the project include:

- cable works connecting Rookwood Road substation with the Beaconsfield West substation comprising:
    - a 330 kV underground transmission cable circuit comprising three cables installed in three conduits;
    - another set of three conduits for a possible future 330 kV transmission cable circuit if it is required;
    - four smaller conduits for carrying optical fibres;
    - around 26-30 joint bays, per circuit, where sections of cable would be joined together, located approximately every 600-800 metres along the transmission cable route;
    - link boxes and sensor boxes associated with each joint bay to allow cable testing and maintenance;
- seven special crossings of infrastructure or watercourses including two rail lines (at Chullora and St Peters), one freight rail line (Enfield Intermodal rail line at Belfield), one light rail line (at Dulwich Hill), the Cooks River and its associated cycleway (at Campsie/Croydon Park), a playground (at Marrickville) and the southern wetland at Sydney Park (at Alexandria);
- upgrade works at the Rookwood Road and Beaconsfield West substations to facilitate the new 330 kV transmission cable circuit;
- conversion works at the Beaconsfield West and Sydney South substations to transition the existing Cable 41 from a 330 kV connection to a 132 kV connection; and
- five temporary construction laydown areas to facilitate construction of the project.

Several route options and alternative construction methods are being considered as part of the project. These are described further in **Section 4.1.5**.

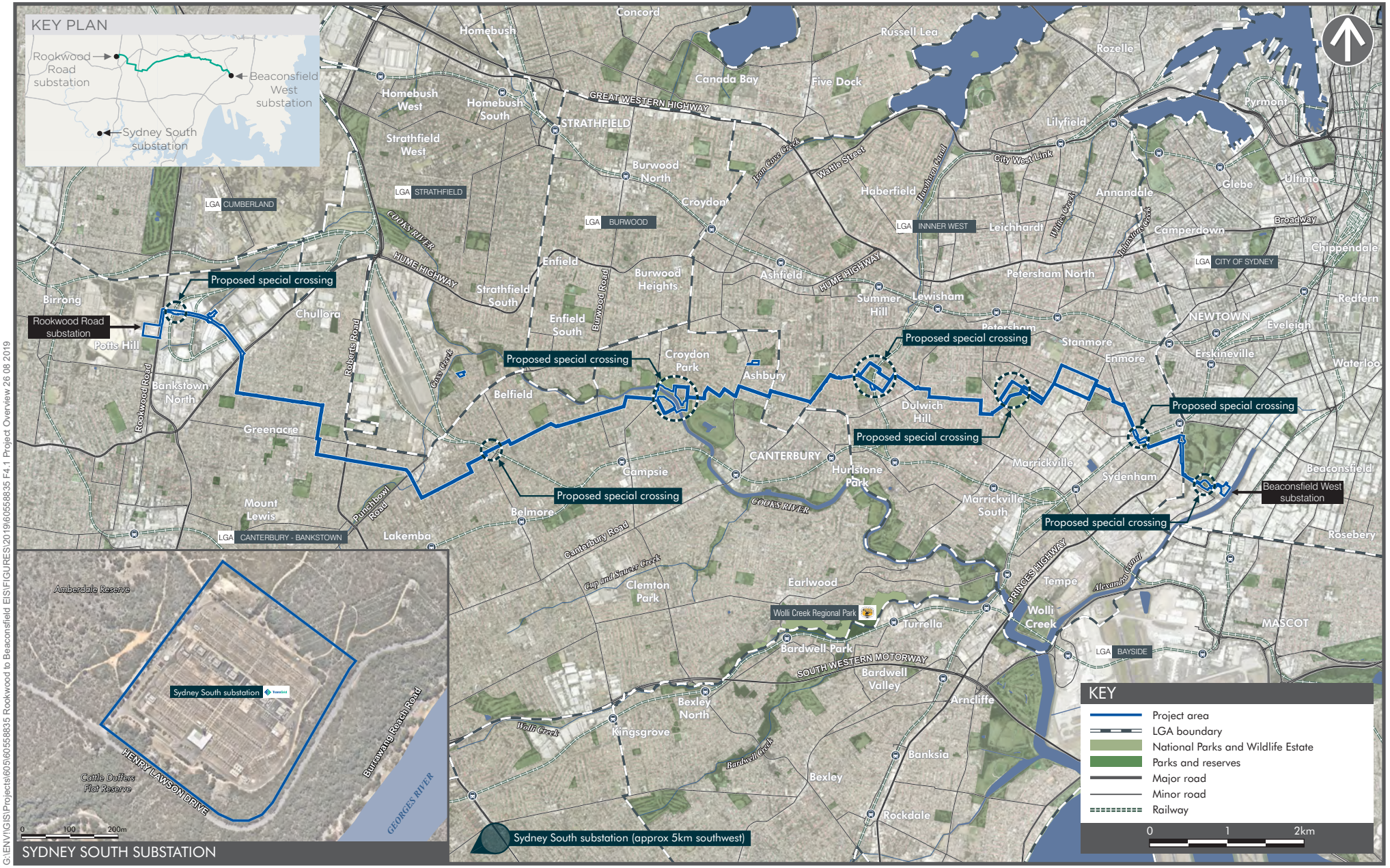
Associated works required to facilitate the construction of the project, such as potential utility relocations, have been considered. No major utility relocations are anticipated and where smaller services may need to be moved to accommodate the transmission cable circuit, this relocation would be restricted to within the project area assessed in this EIS.

The project does not include the cable pulling and jointing works for a possible future second transmission cable circuit. This activity, should it be required, would be subject to separate assessment and approval as per the requirements of the *Environmental Planning and Assessment Act 1979*.

4.1.3 Program and schedule

Construction of the project is expected to take up to 24 months to complete (around 15 months for civil construction works and conduit installation and about nine months for cable pulling and jointing, testing and commissioning). This schedule would be refined following engagement of the design and construction contractor, should the project be approved. Further detail on construction staging is provided in **Section 4.4.4**.

The proposed 330 kV transmission cable circuit is expected to be completed and commissioned in 2022/23. The second transmission cable circuit would be completed subject to future demand. The second circuit is not expected to be required within five years of the first circuit becoming operational.



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PROJECT OVERVIEW

Powering Sydney's Future

Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 4-1

4.1.4 The project area

The project area comprises the overall potential area of direct disturbance by the project, which may be temporary (for construction) or permanent (for operational infrastructure) and extend below the ground surface. It includes all options under consideration for the project, as described in **Section 4.1.5**.

The project area includes the location of operational infrastructure and construction work sites for:

- the transmission cable route (including the entire road reserve of roads traversed);
- special crossings of infrastructure or watercourses;
- substation sites requiring upgrades (noting that all works would be contained within the existing site boundaries); and
- construction laydown areas.

The project area is shown in **Figure 4-2** to **Figure 4-5**.

While the boundaries of the project area represent the physical extent of where project infrastructure may be located or construction works undertaken, it does not mean that this entire area would be physically disturbed or that indirect impacts would not be experienced beyond this area. Should the project be approved, the detailed design would aim to refine the location of project infrastructure and work sites within the boundaries of the project area assessed in this EIS.

There is a possibility that to minimise impacts on other utilities or transport corridors (roads and rail), that deviations from the assessed project area may be required. In this event, specific impacts of this approach would be assessed further. Future changes to the project may require additional assessment and approval as described in more detail in **Chapter 5 Statutory planning and approval process**.

The location of joint bays and the location of the transmission cable circuit within the road reserve (e.g. kerbside or non-kerbside) is yet to be determined and is subject to detailed design.

4.1.5 Options under consideration

The project includes route options and alternative construction methods in locations as outlined below and shown in **Figure 4-6**. As the project design develops, a preferred option would be selected for each location. However, approval may be sought for some options where further design and engineering information is required before a preferred option can be selected.

The project options are discussed below by geographical area, from west to east.

4.1.5.1 Cooks River

There are three options for the transmission cable route in the vicinity of the Cooks River at Campsie/Croydon Park and two options for special crossing methods including:

- Option 1: the transmission cable route travels in a south-easterly direction along Cowper Street from the intersection with Brighton Avenue, Campsie and then east on Lindsay Street. At the cul-de-sac at the end of Lindsay Street, there are two special crossing options of the Cooks River into Lees Park before the cable route continues on to Harmony Street, Ashbury:
  - Option 1a: construct a cable bridge parallel to and to the north of the existing Lindsay Street pedestrian bridge. A description of cable bridges is provided in **Section 4.1.9.1** and **Section 4.4.3.9**; or
  - Option 1b: install the conduits under the Cooks River via underboring (this is the preferred option). Underboring is discussed further in **Section 4.1.9.2** and **Section 4.4.3.10**; or
- Option 2: the transmission cable route travels in a north-easterly direction from Byron Street at the intersection with Brighton Avenue, Campsie, through Mildura Reserve. From this parkland, the conduits would be underbored beneath the Cooks River, surfacing in Croydon Park near the cul-de-sac of Croydon Avenue in Croydon Park. The cable route then travels north along Croydon Avenue, east along Dunstan Street, and south along Hay Street, before continuing east along Harmony Street; or

- Option 3: the transmission cable route travels in an easterly direction from Byron Street at the intersection with Brighton Avenue, Campsie, then in a south-easterly direction through Mildura Reserve, between residences and the Cooks River until the cul-de-sac at Lindsay Street. From here, there are two special crossing options of the Cooks River into Lees Park before the cable route continues on to Harmony Street, Ashbury, which are the same for Option 1:
  - Option 3a: construct a cable bridge parallel to and to the north of the existing Lindsay Street pedestrian bridge; or
  - Option 3b: install the conduits under the Cooks River via underboring.

4.1.5.2 Dulwich Hill light rail corridor

There are two options for the transmission cable route crossing of the Dulwich Hill Light Rail corridor in the vicinity of the Arlington Light Rail station, Dulwich Hill. This includes:

- Option 4a: the transmission cable route travels northeast along Windsor Road from the intersection with Arlington Street, then east on Terry Road. At the Terry Road cul-de-sac, the conduits would be underbored beneath the rail corridor, surfacing at the Hill Street cul-de-sac. From here the cable route continues along Hill Street to Denison Road; or
- Option 4b: the transmission cable route travels southeast along Constitution Road from the intersection with Arlington Street, before crossing into the southern end of Johnson Park. From here, the conduits would be underbored beneath the rail corridor near the Arlington light rail station. The transmission cable route then continues along Constitution Road and then north on Denison Road.

4.1.5.3 Henson Park

There are two options for the transmission cable route crossing in the vicinity of Henson Park, Marrickville including:

- Option 5a: the transmission cable route continues northeast on Centennial Street to a car park. From here it travels in an easterly direction through a grassed verge between the tennis courts and Henson Park oval to near the Amy Street playground. The conduits would be underbored beneath the playground, surfacing at Amy Street. The transmission cable route then turns east on to Horton Street; or
- Option 5b: the transmission cable route travels north on Sydenham Road from Centennial Street, turning northeast on to Neville Street, then southeast on Surrey Street to Amy Street before continuing along Charles Street.

4.1.5.4 Marrickville

There are two options for the transmission cable route in the vicinity of Addison Road, Marrickville. Note that the project may include one or both options at this location including:

- Option 6a: the transmission cable route travels north along Agar Street from the intersection with Illawarra Road, then east on to Newington Road and south down Enmore Road to the intersection with Scouller Street; and/or
- Option 6b: splitting the two circuits as there is insufficient space along Addison Road to accommodate both circuits. One circuit would travel along Newington Road (as for Option 6a) and one circuit would travel east on Addison Road from the intersection with Illawarra Road, then north on Enmore Road to the intersection with Scouller Street.

G:\ENV\GIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\2019\60558835 F4.2 Project Area - Map 1 01 10 2019

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PROJECT AREA - MAP 1

Powering Sydney's Future
Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 4-2

G:\ENV\GIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\2019\60558835 F4.3 Project Area - Map 2 01 10 2019

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PROJECT AREA - MAP 2

Powering Sydney's Future
Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 4-3

G:\ENV\GIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\2019\60558835 F4.4 Project Area - Map 3 01 10 2019

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PROJECT AREA - MAP 3

Powering Sydney's Future
Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 4-4

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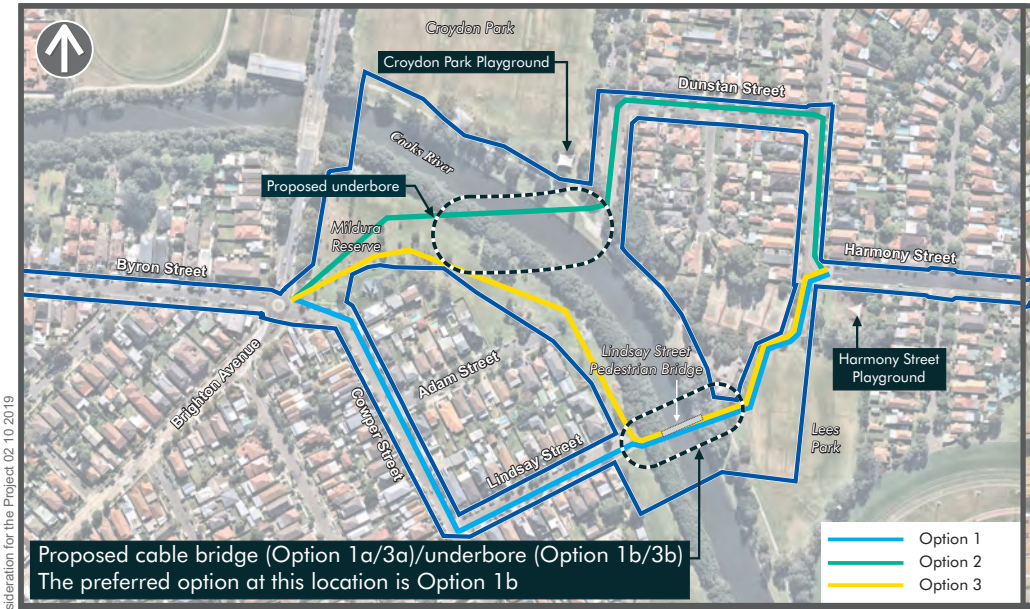
PROJECT AREA - MAP 4

Powering Sydney's Future
Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 4-5



TRANSMISSION CABLE ROUTE AND METHODOLOGY OPTIONS FOR CROSSING THE COOKS RIVER

TRANSMISSION CABLE ROUTE OPTIONS FOR CROSSING THE DULWICH HILL LIGHT RAIL CORRIDOR

TRANSMISSION CABLE ROUTE OPTIONS IN THE VICINITY OF HENSON PARK, MARRICKVILLE

TRANSMISSION CABLE ROUTE OPTIONS IN THE VICINITY OF ADDISON ROAD, MARRICKVILLE

(Option 6b shows the splitting of the two circuits as there is insufficient space along Addison Road to accommodate both circuits)

G:\ENV\GIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\60558835 F4.6 Options for Consideration for the Project 02 10 2019

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OPTIONS UNDER CONSIDERATION FOR THE PROJECT

Powering Sydney's Future

Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations

Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 4-6

4.1.6 Conduit and cable circuit arrangement

As described in **Section 4.1**, the project involves the installation of two sets of conduits. The proposed 330 kV transmission cable circuit comprises cables within one set of conduits (i.e. three cables in three conduits), with a second set of conduits being installed for possible future use (i.e. three conduits with no cables). The diameter of each transmission cable conduit would be up to 250 millimetres. There would be four smaller ancillary conduits also installed amongst these transmission cable conduits for optical fibre cables. The small conduits for the optical fibres would be up to 80 millimetres in diameter.

The six conduits would be arranged in a trench in either a flat formation as shown in **Figure 4-7** and **Figure 4-9** or a layered formation (such as a trefoil (triangular) or stacked configuration), as shown in **Figure 4-8**, where other infrastructure and services constrain available space within the roadway.

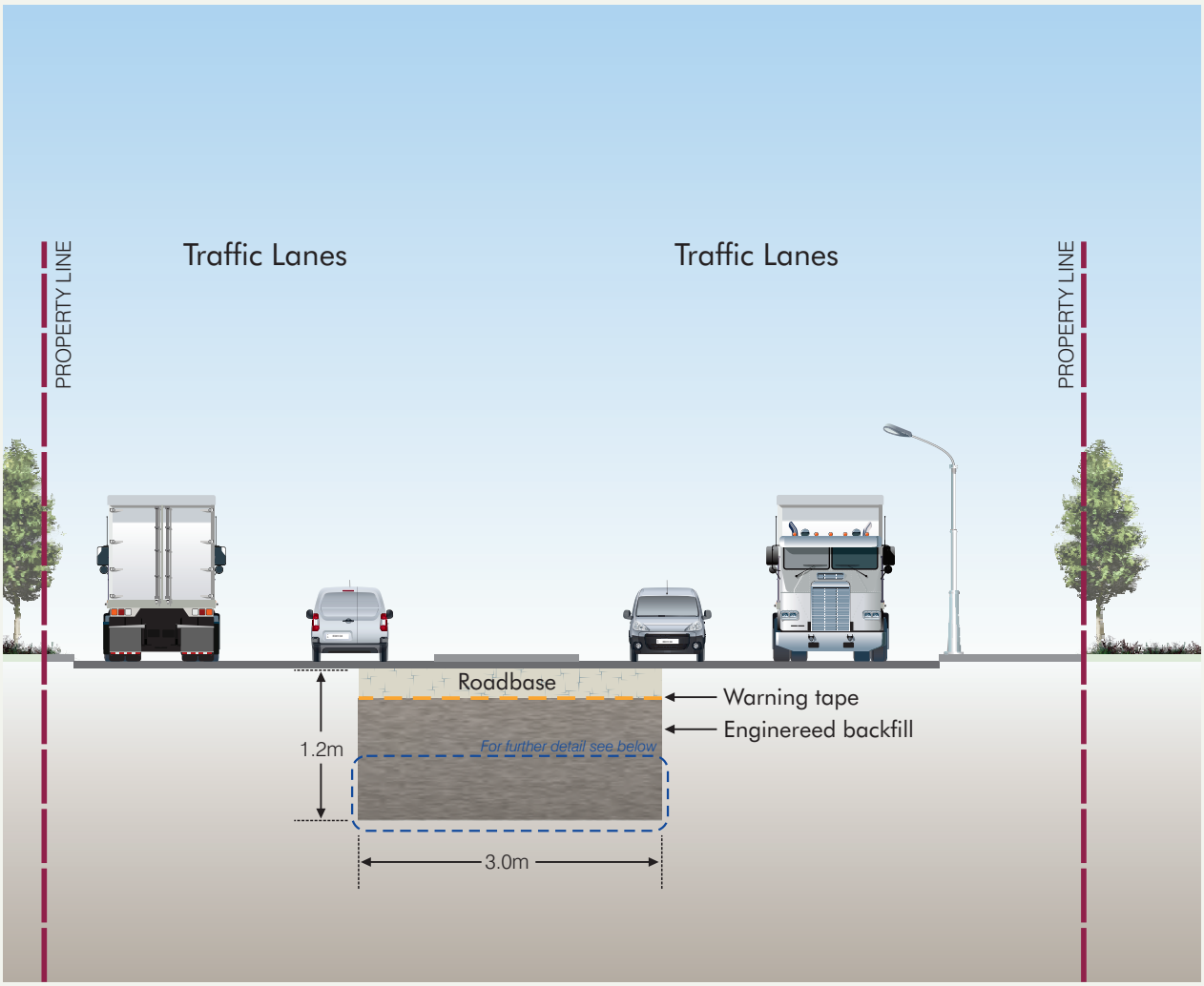
A flat formation trench would likely be around 3 metres wide and typically up to 1.2 metres deep (with the upper surface of the conduit being around 750-900 millimetres below the surface). In some cases, such as where there is other infrastructure or utilities, the depth of cover over the conduits may need to be greater.

A trefoil configuration would require a narrower but slightly deeper trench, typically around 1.6 metres wide and 1.6 metres deep (refer to **Figure 4-10**). As the flat formation has a larger footprint, it has been assessed as the worst case in the EIS.

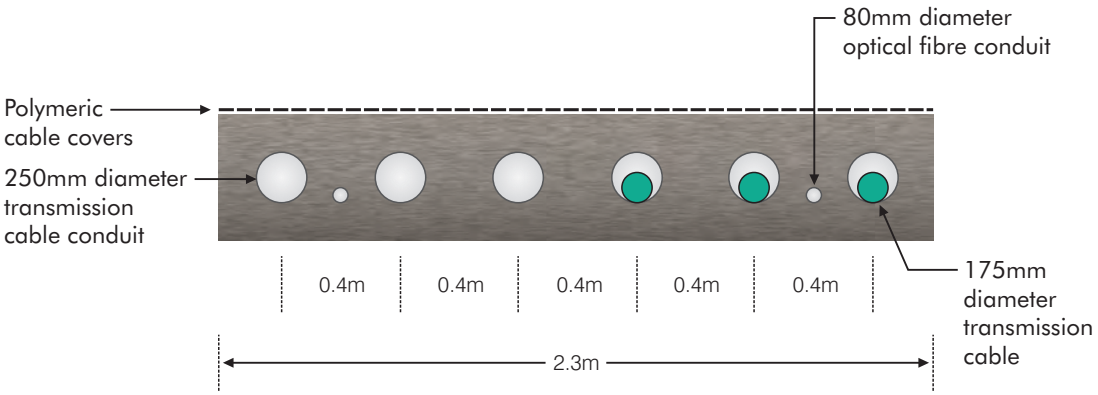
In areas where there is significant existing infrastructure and space is limited within the road reserve, the two circuits may need to be separated. Separating the groups of conduits for the proposed transmission cable circuit and possible future transmission cable circuit would require two separate trenches (of around 1.3 metres wide) along separate routes. One area at Addison and Newington roads in Marrickville has been identified where the groups of conduits may need to be separated (refer to **Figure 4-4**).

Figure 4-7 Typical double circuit flat conduit arrangement

Figure 4-8 Typical double circuit trefoil conduit arrangement



TYPICAL CONDUIT LAYOUT



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TYPICAL FLAT TRENCH CONFIGURATION FOR TWO CABLE CIRCUITS

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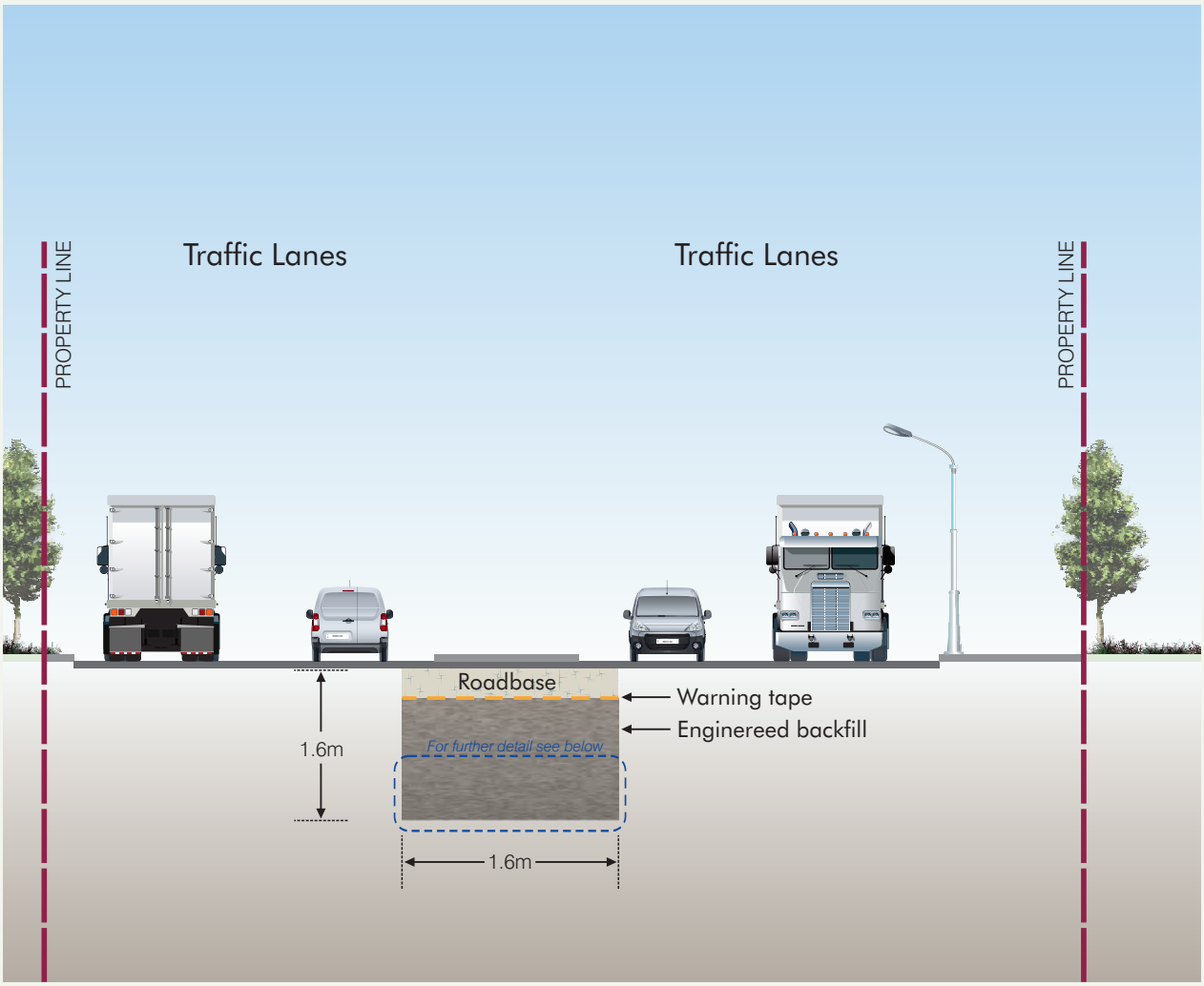
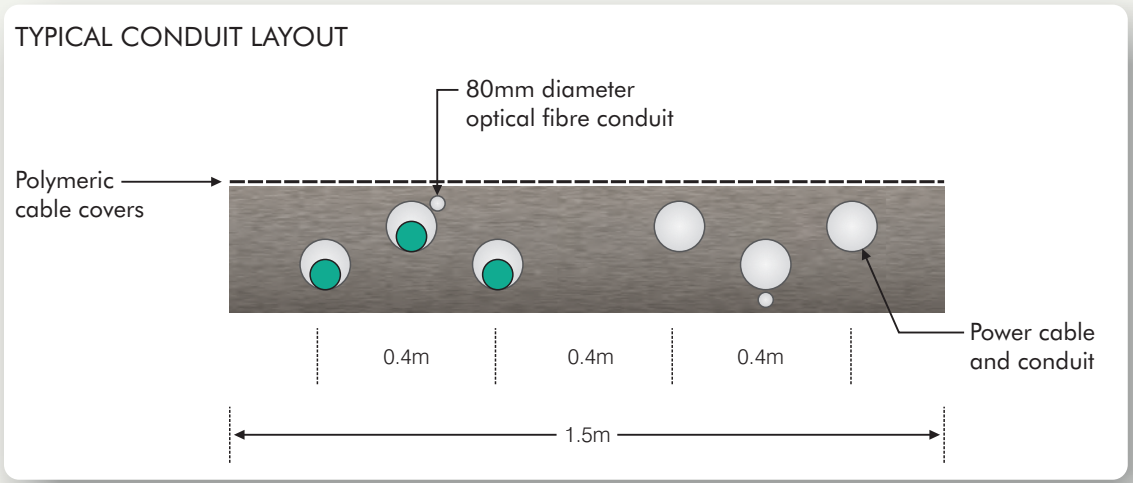
Potts Hill to Alexandria Transmission Cable Project

FIGURE 4-9





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TYPICAL TREFOIL TRENCH CONFIGURATION FOR TWO CABLE CIRCUITS

Powering Sydney's Future

Potts Hill to Alexandria Transmission Cable Project

FIGURE 4-10

4.1.6.1 Cable circuit components

Each cable circuit comprises three single transmission cables. Additionally, smaller conduits would be installed alongside the cable conduits to carry optical fibres required for communication (i.e. for cable control and protection) and cable monitoring systems (refer to **Figure 4-9**).

Each transmission cable would have a diameter of up to 175 millimetres, with four main cable components being the conductor, insulation, sheath and serving.

4.1.6.2 Design requirements

A number of factors can constrain and affect the location of transmission cables and method of construction and installation. **Table 4-2** presents the technical factors that have informed the transmission cable route and concept design for the project.

Table 4-2 Constraints to cable design

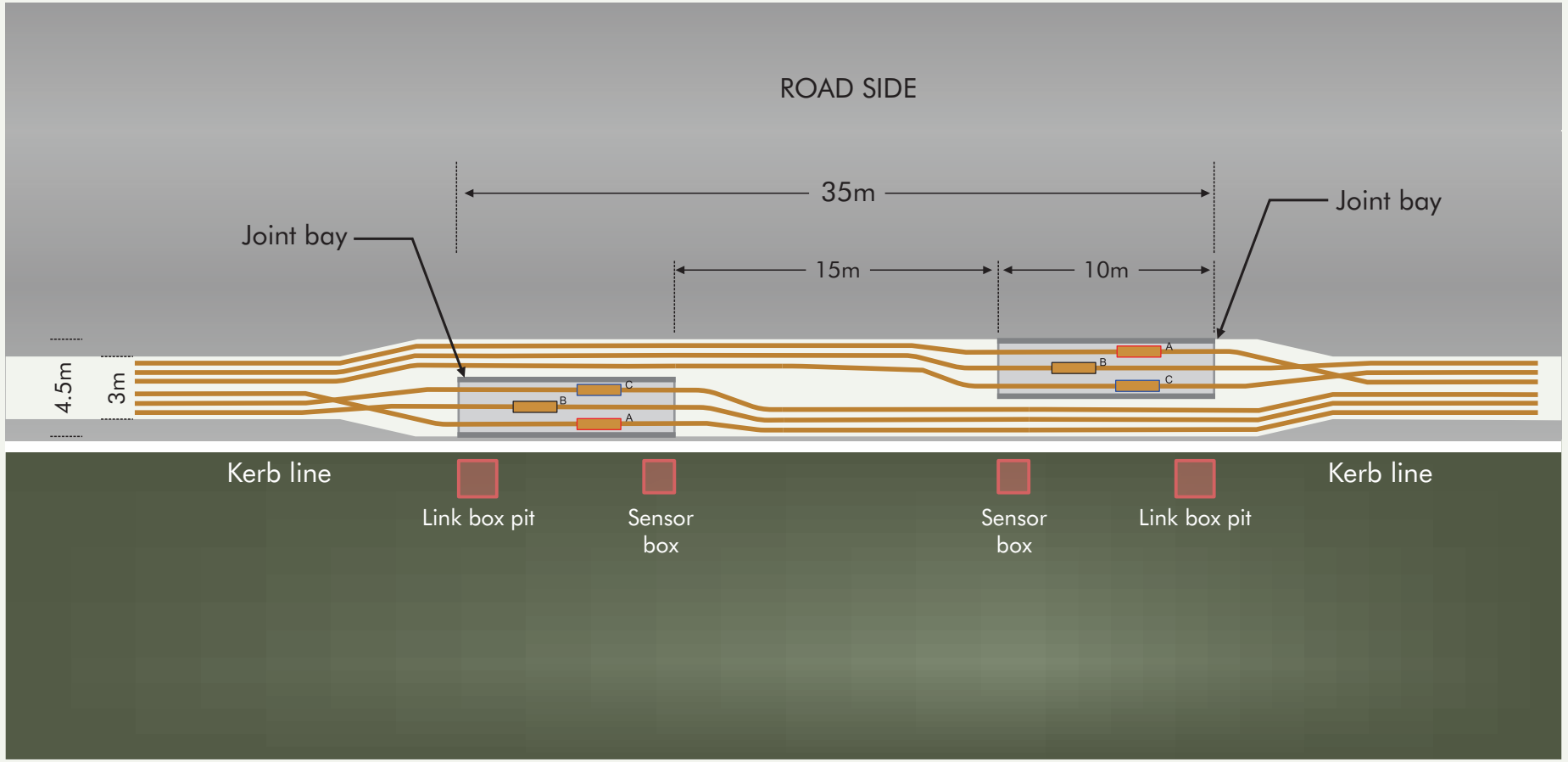
Design constraint	Additional detail	Implications for the project
Minimum bending radius	The transmission cable route generally allows 6 metres for the cables to make a turn as the rigid nature of the cables do not allow bending at small angles.	Determines the relative alignment of the transmission cable route as well as potential impacts where it crosses intersections.
Maximum pulling tension and sidewall pressure	Limits the length of cable that can be pulled through conduits to between 600-800 metres without risking damage to the cable.	Determines how far apart joint bays are located along the transmission cable route.
Drum size and weight	Cable lengths would be limited to 600-800 metres. Cables weigh around 37 kilograms per metre, requiring heavy vehicles and cranes to transport and arrange the cable drums (each weighing around 22-30 tonnes) at individual work sites.	Determines how far apart joint bays are located along the transmission cable route as well as the area required for construction laydown areas.
Standard trench depth	Around 1.2 metres is the typical required trench depth, but this may be shallower or deeper depending on the presence of other constraints, such as utilities.	Determines the amount of spoil generated and extent of excavations.
Maximum operating temperature and soil properties	Operating transmission cables give off heat. To dissipate (i.e. disperse) heat, laying the conduits deeper than 900 millimetres below the surface would reduce the effectiveness of heat dissipation through the soil. In certain cases where cables are required to be deeper, a wider trench may be required to dissipate heat.	Determines the relative trench dimensions and enables constraint analysis against other infrastructure in the vicinity.

The proposed transmission cables have a minimum design life of 40 years but are likely to remain in service for a considerably longer period due to regular monitoring and maintenance.

4.1.7 Joint bays

Joint bays are concrete lined pits, generally located every 600-800 metres along the transmission cable route, where sections of the transmission cable are connected. Joint bays are typically around 10 metres long, 3 metres wide and 2 metres deep (refer to **Figure 4-11**). The project allows for two cable circuits with each circuit having its own joint bays (around 26-30 per circuit). The joints for each circuit need to be separated by around 15 metres (refer to **Figure 4-11**).

The exact number and location of joint bays would be determined during detailed design.



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JOINT BAY SEPARATION FOR EACH TRANSMISSION CABLE CIRCUIT

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Potts Hill to Alexandria Transmission Cable Project

FIGURE 4-11

4.1.8 Ancillary infrastructure

4.1.8.1 Link and sensor boxes

To enable access and routine maintenance on the cable, link boxes and sensor boxes would be installed near each joint bay. The link box would be installed in a concrete pit, around 1.5 metres wide, 1.4 metres long and 1 metre deep, with a removable metal lid for access (refer to **Figure 4-12**). The link box is used to manage the cable earthing system and for future maintenance and testing of the transmission cables. Similarly, a sensor box would also be installed near the joint bay in a separate concrete pit, around a similar size to the link box pit, with a removable metal lid for access (refer to **Figure 4-13**). The sensor boxes are required to test the integrity of the insulation on the cables.

It is proposed to locate the link and sensor boxes in the footpath to avoid disruption to road traffic during maintenance. However, in some cases, space constraints on the footpath or technical constraints may require the link and sensor boxes to be located in the roadway, next to the joint bays. The exact number and location of link boxes and sensor boxes would be determined during detailed design.

Figure 4-12 Typical link box pit

Figure 4-13 Covered sensor box pit

4.1.8.2 Optical fibre cable pits

As described in Section 4.1.6, optical fibre cables would also be installed in the trench. These cables are associated with cable control and protection signals and communications between equipment located at each substation. Optical fibre cable pits are required where the optical fibre cables are joined. The pits are also required to provide access to the optical fibre cables for maintenance. It is estimated that between seven and 23 pits would be required. The number of pits depends on, but it is not limited to, the length of the optical fibre cable sections, the size of the cable, and the installation technique.

Similar to the link and sensor box pits, these pits would comprise a concrete pit around 1.5 metres wide, 1.4 metres long and 1 metre deep, with a removable metal lid for access. Access would only be required during planned maintenance or if there is an unplanned failure of equipment i.e. a fault. Wherever possible, these optical fibre cable pits would be located in the footpath, however, some may be required to be installed in the roadway due to space constraints. The exact number and location of optical fibre cable pits would be determined during detailed design.

4.1.9 Special crossings

The project would involve the construction of seven special crossings that would involve either the installation of a cable bridge or underboring (i.e. an underground crossing). Two methods of underboring) are being investigated including thrust boring and horizontal directional drilling (HDD). A description of these options is presented in **Section 4.4.3.9** and **Section 4.4.3.10**. The locations of the proposed special crossings are presented in **Table 4-3** and shown in **Figure 4-2** to **Figure 4-5**.

While trenching is the preferred method of conduit installation, should locations be identified during detailed design where underboring would be more suitable (such as at stormwater culverts), the location specific impacts of this approach would be assessed further.

Table 4-3 Location of proposed special crossings

Location	Crossing type	Infrastructure or watercourse crossed
Muir Road, Chullora	Cable bridge	Rail line
Enfield Intermodal, Belfield	Underbore	Freight rail line
Cooks River, Campsie/Croydon Park/Ashbury	Cable bridge or underbore (preferred)	Cooks River and cycleway
Arlington Light Rail Station, Dulwich Hill	Underbore	Dulwich Hill light rail line or station
Amy Street, Marrickville	Underbore	Playground near Henson Park
Bedwin Road, St Peters	Cable bridge	Rail line
Sydney Park, Alexandria	Underbore	Wetland

4.1.9.1 Cable bridges

Cable bridges may be concrete trough structures into which the cables would be pulled and covered for protection or may be modular (pre-cast) with integrated conduits for the cables (refer to **Figure 4-14** for an example of a cable bridge structure with cage). Some cable bridges may allow for public access while others would have security gates to prevent unauthorised access. The final form and structure of the cable bridges would be determined during detailed design.

Where cable bridges are required, the following design objectives would be applied:

- minimise the number of bridge spans and the need for intermediate supports; and
- some vegetation clearance may be required to facilitate access and construction. However, to minimise impacts as far as practicable, opportunities to retain trees would be investigated during detailed design, or trees would be replaced in other suitable locations, where feasible and reasonable, in consultation with the local council and other relevant stakeholders.

Figure 4-14 Typical cable bridge structure

4.1.9.2 Underboring

Following installation of the transmission cables via an underboring construction methodology, disturbed areas would be reinstated similar to their pre-construction state. No permanent aboveground infrastructure would be required at underboring sites.

4.1.10 Cable operation and maintenance

Once the transmission cables have been installed, generally only visual inspections would be required. This would involve regularly driving along the transmission cable route to check for hazards or activities (such as excavation works in the vicinity) that could impact the underground cables or cable bridges and to check for missing or warn cable markers. Ongoing physical access to the transmission cables is not required. Routine maintenance would be through access to the link and sensor boxes located near the joint bays.

Where the transmission cable circuit would be located in a roadway, link boxes and sensor boxes would be located in the nature strip or footpath, where possible, to enable technicians to undertake routine testing work without exposure to passing traffic or requiring disruption to traffic movements. Regular checks would ensure that link boxes are accessible and that the pit does not contain water or tree roots. Cable bridge structures would be inspected to ensure their structural integrity and aesthetics are being maintained.

Maintenance crews would utilise appropriate traffic management measures when undertaking work at the roadside to ensure public and worker safety. This may include erecting temporary barricades to restrict access by the public. Appropriate signage would be put in place and traffic controllers used, where necessary.

4.2 Substation upgrades

As part of the project, the existing Rookwood Road, Beaconsfield West and Sydney South substations, operated by TransGrid, would be upgraded to enable the connections and operation of the proposed transmission cable circuit. Each substation typically includes a range of electrical infrastructure such as transformers, switchgear, reactors, control buildings and ancillary infrastructure.

Additional works would be required at Sydney South and Beaconsfield West substations to repurpose an existing cable (Cable 41) that connects these two substations. This would result in operating Cable 41 at a lower voltage (reduced from 330 kV to 132 kV).

The following sections detail the upgrade requirements at each substation. The upgrade works would occur within the existing footprint of these substation sites.

Following construction of the project, operation and maintenance activities at the substations would be undertaken as part of the current maintenance program, with no special requirements related to the project alone.

4.2.1 Rookwood Road substation

The Rookwood Road substation is located at the intersection of William Holmes Street and Rookwood Road in Potts Hill. To facilitate the installation of the new 330 kV transmission cable circuit, the following minor upgrade works would be required:

- modification of the existing 330 kV GIS switchbay within the existing GIS building to allow connection of the cable;
- installation and modification of secondary systems (control and protection equipment), as required; and
- cabling and cable connections within the substation site.

The site includes an existing driveway to the south onto William Holmes Street that would be used for the exit of the new 330 kV conduits from the substation.

The existing site location and infrastructure as well as location of works required are shown in **Figure 4-15**.

4.2.2 Beaconsfield West substation

The Beaconsfield West substation is located between Burrows Road and the Alexandra Canal in Alexandria. Electricity infrastructure currently connects to the site from the west via trenched cables and from the east via an existing cable bridge over Alexandra Canal.

To facilitate the installation of the new 330 kV transmission cable circuit, the following upgrade works would be required:

- installation of a new cable sealing ends;
- modifications to the 330 kV switchgear;
- installation and modification of secondary systems (control and protection equipment), as required; and
- cabling and cable connections within the substation site.

Additional works are also required along Burrows Road and at the substation to convert the voltage of the existing Cable 41 (which links to the Sydney South substation). This would involve conversion of the existing Cable 41 to 132 kV operation, requiring modifications to existing high voltage equipment or replacement of switchgear.

The substation upgrades would occur within the footprint of the existing substation. No new building works are proposed. The existing site location and infrastructure and the location of the proposed works required are shown in **Figure 4-16**.

4.2.3 Sydney South substation

The Sydney South substation is located at Picnic Point, surrounded by Georges River National Park. To facilitate the conversion of Cable 41 from 330 kV to 132 kV operation, the following works would be required:

- installation of a new set of three cable sealing ends;
- installation of a new section of 132 kV cable connecting into the existing series reactor; and
- installation of a 132 kV switchbay for connection of the new section of 132 kV cable.

Cable 41 would continue to be used for 132 kV operation and no new building works are proposed at the substation. The existing site location and infrastructure as well as location of works required are shown in **Figure 4-17**.

G:\ENV\GIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\2019\60558835 F4.13 Rookwood Substation and Proposed Upgrades 26 08 2019

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ROOKWOOD ROAD SUBSTATION LAYOUT AND PROPOSED UPGRADES

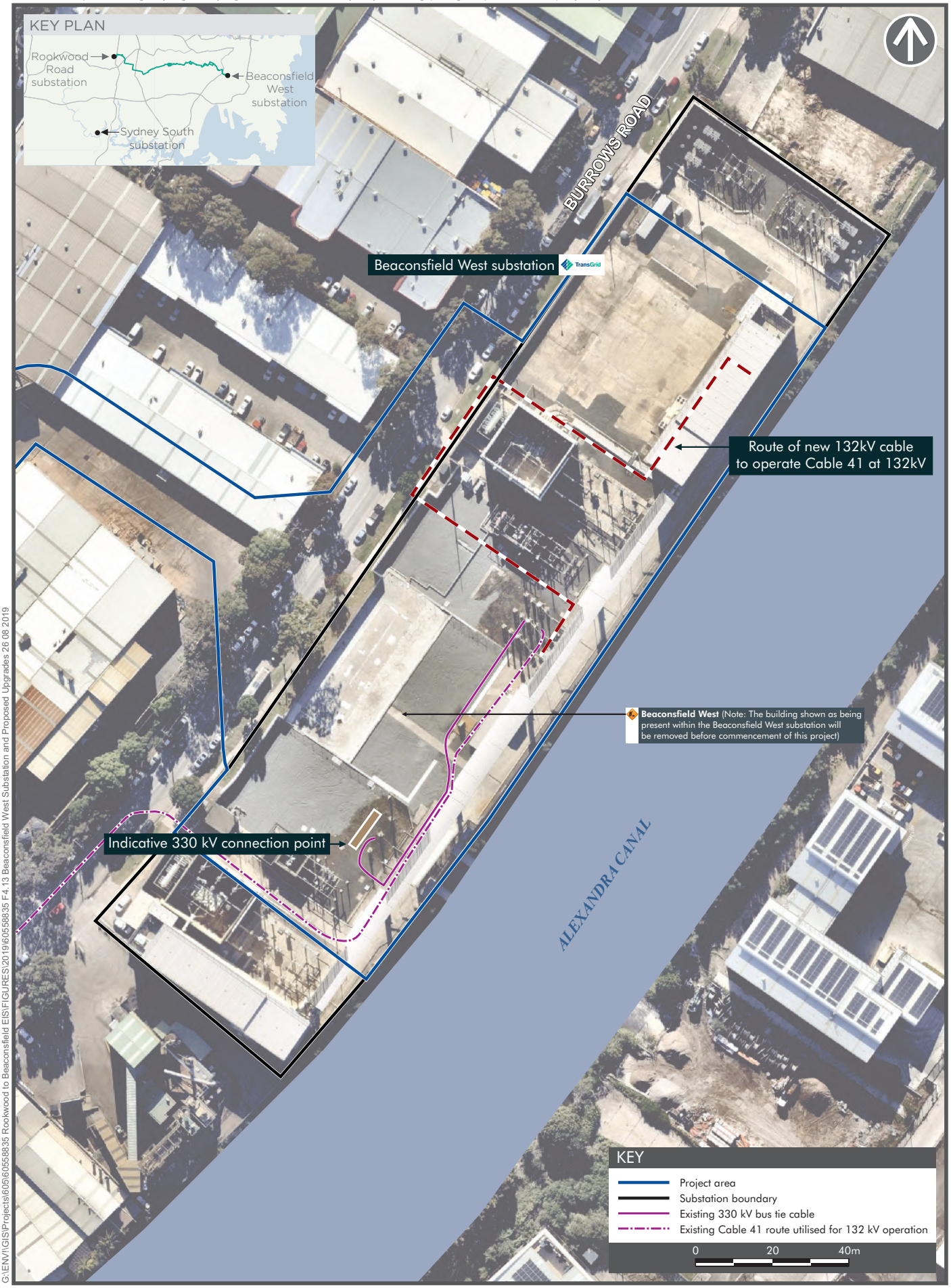
Powering Sydneys Future

Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations

Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 4-15



G:\ENV\GIS\Projects\605\60558835 Rockwood to Beaconsfield EIS\FIGURES\2019\60558835 F4.13 Beaconsfield West Substation and Proposed Upgrades 26 08 2019

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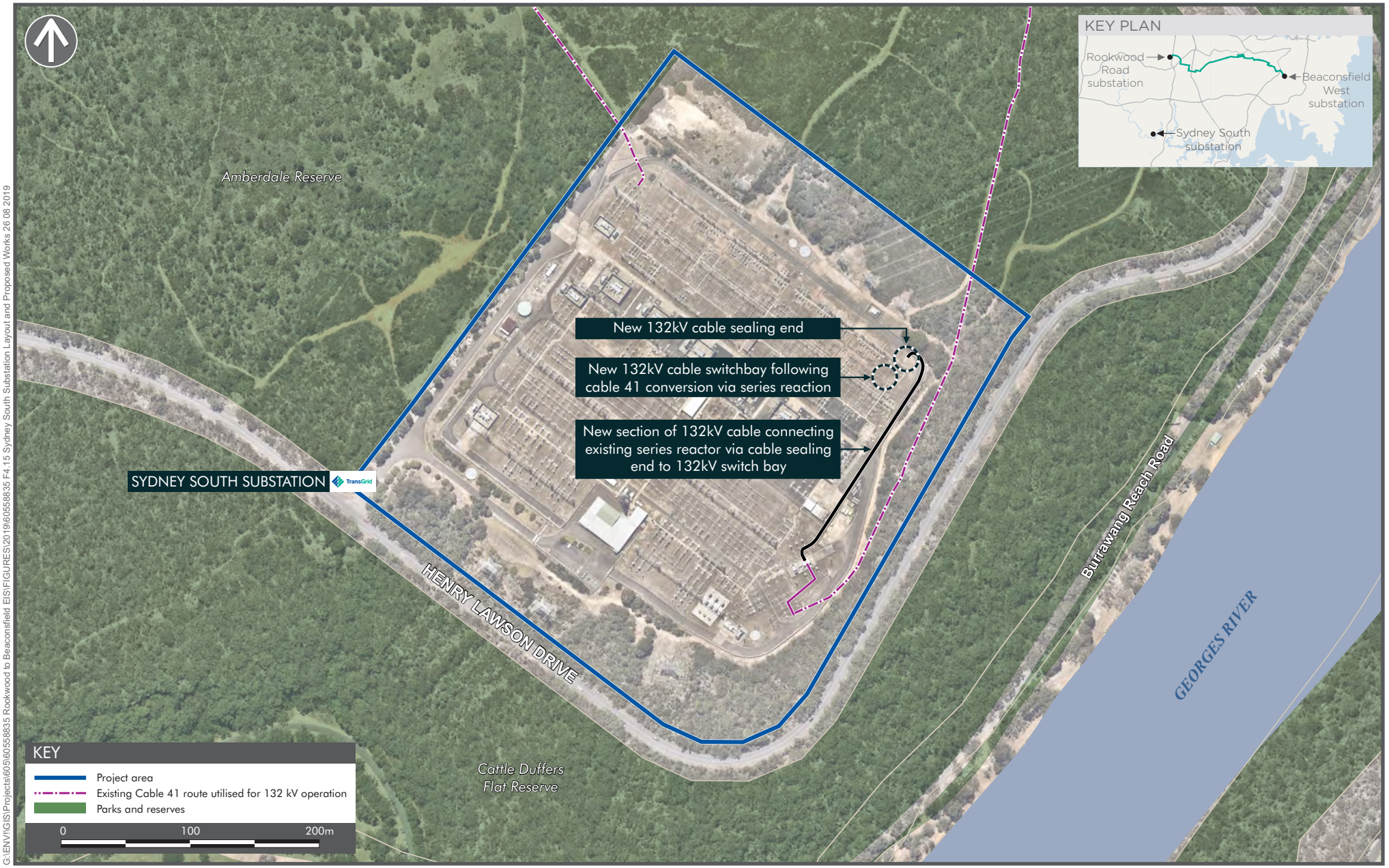
BEACONSFIELD WEST SUBSTATION LAYOUT AND PROPOSED UPGRADES

Powering Sydney's Future

Potts Hill to Alexandria Transmission Cable Project

Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 4-16



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SYDNEY SOUTH SUBSTATION LAYOUT AND PROPOSED WORKS

Powering Sydney's Future

Potts Hill to Alexandria Transmission Cable Project

Note: The project area is confined to the roadway reserve with the exception of parks and existing substations
Source: Department of Finance, Services and Innovation - Spatial Services (2018), Nearmap (2018)

FIGURE 4-17

4.3 Land, property and access requirements

As a result of previous investigations into route options and design development, the project has:

- minimised the need for land acquisition through the use of trenching in existing infrastructure corridors wherever possible; and
- avoided the temporary use of land where sterilisation or isolation would result post-construction.

The proposed transmission cable route has been primarily limited to road reserves. However, in some instances, the transmission cable route passes through public open space and some industrial land. While no freehold property would be acquired, TransGrid would require an easement (or other agreement) to protect the new underground transmission infrastructure across private land that is not within the road reserve. The easements would limit certain activities and future land uses to ensure the safe operation of the infrastructure and to maintain public safety.

Temporary use of private properties during construction (for laydown areas or work site access) would require agreement with the relevant landowner. For temporary use of public and private property, such as open space/recreational areas, TransGrid would enter into agreements with the relevant landowner.

Further information on potential land use and property impacts is provided in **Chapter 20 Land use and property**.

The project would not result in any permanent change to property access arrangements along the length of the transmission cable route.

During construction, vehicle access to properties will be retained and obstruction of driveways will be avoided where possible, however it is likely that there will be driveways impacted during different stages of construction, which may result in minor disruptions to access. For example, during cable jointing near driveways, access to these properties would not be possible. Affected owners/occupants would be informed and feasible and reasonable solutions for access to their specific location discussed. This is explained further in **Chapter 7 Traffic and transport**.

4.4 Construction of the project

The construction of the project would require a number of work sites along the transmission cable route and at special crossings. Each work site represents an area of disturbance required to undertake the construction activity (e.g. trenching, cable bridge installation, underboring). The work site would take into consideration existing road infrastructure, plant and equipment needed, location of street trees (including extent of tree root zones), traffic management and the safety of the workforce and public. The size of each work site would depend on local conditions and the type of work being undertaken. For example, the establishment of joint bays and special crossings would typically require a larger work site than trenching and excavation along the roadway.

4.4.1 Construction precincts

For the purposes of assessing construction impacts and to assist with community and stakeholder consultation, the transmission cable route has been divided into five construction precincts. These precincts broadly align with similar land uses. They allow for the presentation of the assessment in terms of similar types of impacts that would potentially occur within each precinct. The identification of precincts also helps to consolidate information relevant to stakeholders within these areas. The boundaries of each precinct are shown in **Figure 4-2** to **Figure 4-5** and a description of each precinct follows:

- **Precinct 1** includes the areas between the Rookwood Road substation and the Hume Highway, including the industrial area of Chullora along Muir Road;
- **Precinct 2** includes the areas between the Hume Highway and Brighton Avenue near the Cooks River including the residential areas of Greenacre, Lakemba, Belmore, Belfield and Campsie;
- **Precinct 3** includes the areas from the Cooks River to Illawarra Road including the residential areas of Croydon Park, Ashbury, Ashfield, Dulwich Hill and Marrickville;

- **Precinct 4** includes the area between Illawarra Road and the Bankstown rail line including the residential areas of Marrickville, Enmore and Newtown; and
- **Precinct 5** includes the areas between the Bankstown rail line and the Beaconsfield West substation including the residential areas of St Peters and the recreational area of Sydney Park in Alexandria.

4.4.2 Construction laydown areas

As part of the construction of the project, temporary construction laydown areas would be required to store materials, equipment, excavated spoil and provide space for other ancillary facilities such as site offices. Five locations have been investigated as potential construction laydown areas. The final number and location is subject to ongoing consultation with the relevant landowners and would be determined during detailed design. The locations and area identified for each construction laydown area is listed in **Table 4-4** and shown in **Figure 4-2** to **Figure 4-5**.

Table 4-4 Potential construction laydown areas

Potential construction laydown area	LGA	Potential area (hectares)
12 Muir Road, Chullora	City of Canterbury-Bankstown	0.48
Cooke Park, Belfield	Strathfield	0.37
Peace Park, Ashbury	Inner West Council	0.45
Camdenville Park, St Peters	Inner West Council	0.18
Beaconsfield West substation, Alexandria	City of Sydney	0.85

Stockpiling of excavated spoil at the construction laydown areas would be ongoing for the duration of the civil works (around 15 months). Stockpiling would be managed by erosion and sediment controls in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) (The Blue Book). **Chapter 16 Soils and contamination** provides more information on the management of stockpiles.

While it is expected that construction would require the use of transportable roadside facilities for individual work sites, provision for temporary site offices would be located within construction laydown areas for the duration of construction (up to two years).

Construction laydown areas would be fenced and would have lighting for security and to facilitate night works.

Driveways may need to be created from gravel or similar material to enable heavy vehicles to enter/exit the site. At construction laydown areas at Cooke Park and Peace Park, extended driveways would be required to access the laydown area. The construction of these driveways would require ground disturbance and potentially tree removal.

Temporary infrastructure at the construction laydown areas, including noise mitigation controls (such as hoardings), driveways and stockpile areas, would involve minimal subsurface ground disturbance (i.e. excavation) and would be removed once construction is complete.

For works at the Rookwood Road and Sydney South substation sites, sufficient space exists at each location to store materials and equipment; therefore, no additional laydown areas would be required.

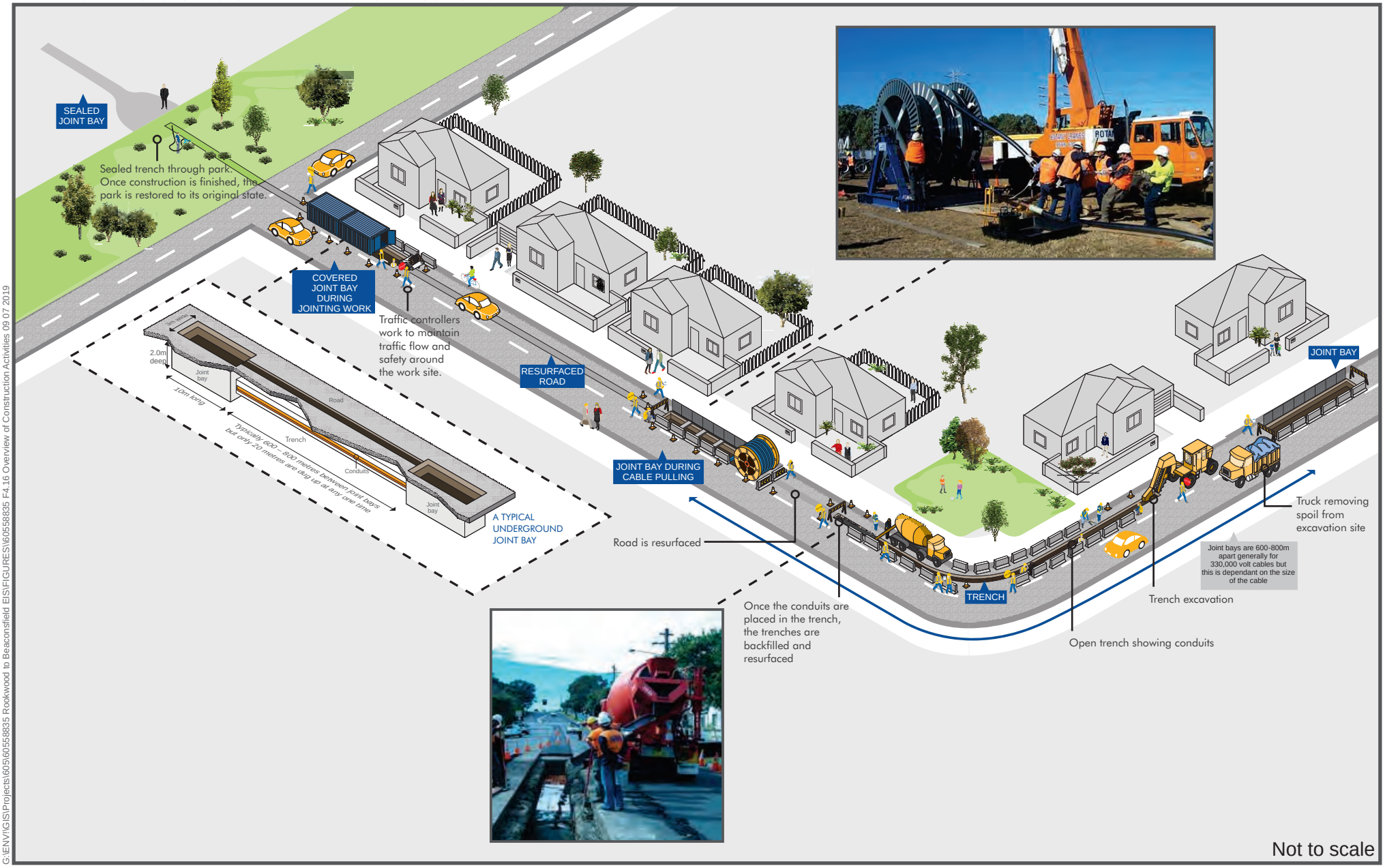
4.4.3 Construction activities

Construction activities would typically include:

- site preparation including establishment and securing of work sites and construction laydown areas;
- trenching and excavation of the transmission cable route;
- confirming the location of services/utilities and relocating these where necessary;
- conduit installation;

- restoration of trenched surfaces including backfill, reinstatement and rehabilitation activities;
- excavation and establishment of joint bays and concrete pits for ancillary infrastructure;
- cable pulling and jointing;
- construction of special crossings; and
- substation upgrades.

An overview of typical construction activities is shown in **Figure 4-18**, and described further in the sections below. Indicative durations to complete these work activities is provided in **Section 4.4.4**.



G:\ENV\GIS\Projects\605\60558835 Rookwood to Beaconsfield EIS\FIGURES\605588835 F4.16 Overview of Construction Activities 09 07 2019

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Source: AusGrid (2018)

OVERVIEW OF CONSTRUCTION ACTIVITIES

Powering Sydney's Future

Potts Hill to Alexandria Transmission Cable Project

FIGURE 4-18

4.4.3.1 Site preparation

Prior to construction of the trench, site preparation activities would be undertaken. These works would include:

- implementation of traffic management changes (such as safety barriers and road signage) to facilitate access and egress to/from the work sites;
- installation of environmental control measures (such as sediment barriers);
- minor clearing works (such as vegetation/tree removal);
- establishing construction laydown areas and ancillary facilities including temporary offices and worker amenities, site fencing and provision of power/services; and
- delivery and storage of plant and equipment at construction laydown areas and work sites.

Before excavation commences at each work site within the road reserve, the location of the trench would be marked (with chalk or spray paint) and if required, any surface vegetation would be cleared.

Non-destructive identification of utilities and services along the route would be undertaken. The recorded location of known existing services crossing the trench would be marked for reference.

There is the potential for trees to be removed to access construction laydown areas or at the special crossings. Opportunities to retain trees would be investigated during detailed design and construction. Where tree removal is unavoidable, trees may be replaced in other suitable locations, where feasible, in consultation with the relevant council.

4.4.3.2 Trenching and excavation

In order to minimise impacts on the surrounding environment and to simplify the construction process, a substantial portion of the transmission cables would be installed using pre-laid conduits. The trench could be up to 3 metres wide and up to 1.6 metres deep but could be narrower and shallower depending on the presence of utilities. Conduit installation would only require the opening of short sections of trench at a time (on average around 20 metres at any one location), with backfilling occurring as soon as each section of the conduits has been installed (refer to **Section 4.4.3.5**).Road plates would be placed over the backfilled trench until temporary road surface restoration, typically the following day while the next section of trench is excavated. Depending on the number of work crews, it is expected that trenching and excavation would occur concurrently at multiple work sites along the transmission cable route. A 20 metre long trench would generally require a work site of between 55-95 metres depending on the speed of the road. Potential traffic impacts are described in **Chapter 7 Traffic and transport**.

Tree removal and pruning would be required along the transmission cable route, prior to trench excavation, to allow for the underground cables to be installed and to establish and maintain minimum separation distances between the cables and tree roots. Potential impacts on street trees and biodiversity are described in **Chapter 13 Biodiversity**. The final number and location of trees to be removed would be determined during detailed design, once the transmission cable route is finalised and the location of tree roots are known.

Prior to trenching commencing, saw cutting of the road surface/pavement would be undertaken to expose the underlying material. A backhoe/front end loader would be used to lift up these materials (generally asphalt or concrete) and to scoop up any topsoil or spilled spoil material. If hard material or rock is encountered, it may be loosened through use of a rock breaker.

Following the identification and relocation of services (if required), an excavator would be used to remove materials down to the base of the trench (refer to **Figure 4-19**). Spoil would not be stockpiled at work sites but rather placed directly into trucks for transport to either the construction laydown areas for temporary storage or to an off-site appropriately licensed waste facility for disposal. The excavator would typically be positioned directly over the trench with the spoil trucks located in the lane adjacent to the trench. In constrained locations such as narrow roadways where full road closure is not possible, the truck may be positioned behind the excavator. This method results in a slower rate of progress. This approach would mean impacts in that location would be experienced over a longer period but would be balanced against the traffic disruption associated with road closure.

Figure 4-19 Example of trenching within a two lane roadway

As the trench is excavated, an assessment would be made of the stability of the sides of the trench. Where necessary, shoring would be installed as a precaution against slump or collapse, particularly where deeper sections of trench are required, such as excavations deeper than 1.4 metres. Barricades would be placed around open excavations whenever work is not being carried out at that location for an extended period of time. Barricades and safety lights would be monitored and maintained, particularly during and following adverse weather conditions, to ensure adequate protection is provided to road users and the community.

Excavation of trenches in roadways would generally occupy up to two traffic lanes and depending on the width of the roadway, may require lanes to be closed, or road closures with diversion routes implemented, while excavation is in progress. The transmission cable route would vary from a kerbside lane to a non-kerbside lane arrangement depending on various factors (such as the presence of subsurface utilities and services), with the final alignment determined during detailed design. Refer to **Figure 4-20** for a possible trench configuration.

Where feasible and reasonable, works would be undertaken during low traffic periods, to minimise traffic impacts. Traffic management measures during construction would be outlined in a traffic management plan as part of the overarching Construction Environmental Management Plan (CEMP) for the project (refer to **Chapter 7 Traffic and transport** for more information on management of potential traffic impacts).

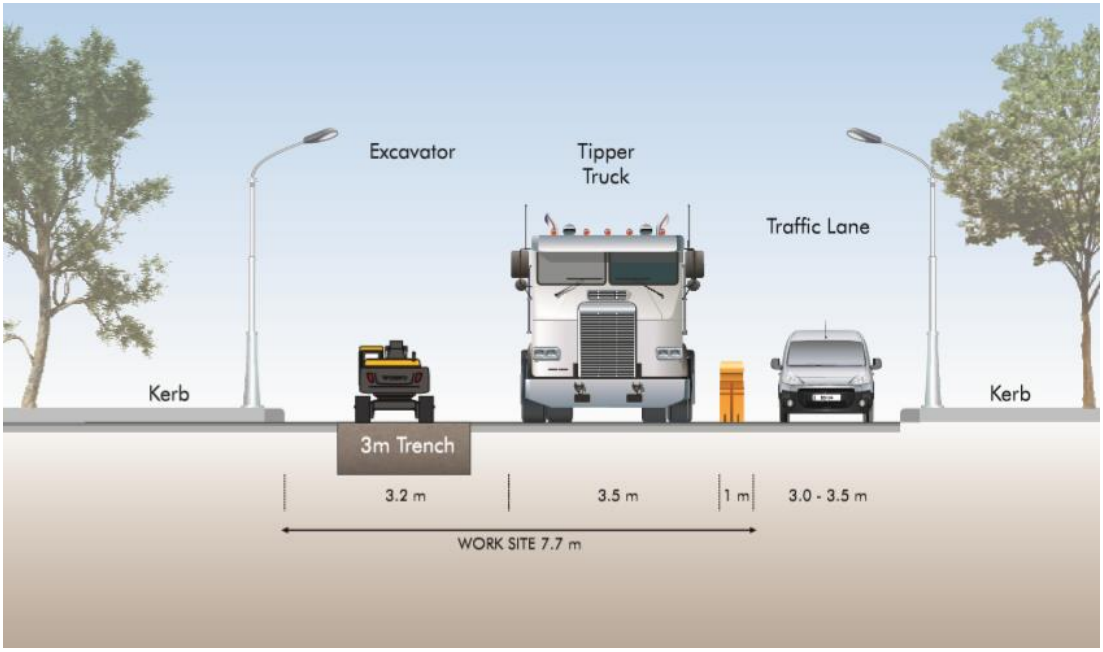


Figure 4-20 Schematic description of the kerbside trenching and excavation construction methodology

4.4.3.3 Service/utility relocation

Relevant service/utility providers within the project area have been engaged with regarding the possible interaction with and relocation of services and utilities during the construction of the project (refer to **Chapter 6 Consultation** for an outline of the consultation undertaken to date). This includes consultation with other energy providers (Ausgrid, Jemena), telecommunication providers (Telstra, Optus) and other major service providers (Sydney Water, Viva Energy).

The need for major service/utility relocation would be minimised through the design of the transmission cable route, with the conduits planned to go over or under existing services (see **Figure 4-21**). Minor relocations, if required, would occur within the road reserve and would be subject to consultation with the relevant asset owner/operator. During construction, TransGrid would liaise closely with other asset owners to ensure the safety and security of services.

Figure 4-21 Typical arrangement with transmission cable conduits (orange pipes) installed below other services

4.4.3.4 Conduit installation

Installation of the conduits for the proposed and possible future transmission cable circuits would generally involve:

- laying the conduits on plastic spacers to provide the required clearance from the side walls and bottom of the trench;
- placing the optic fibre communication cable conduits into position;
- covering the conduits and backfilling the trench with engineered backfill material. Backfilling would occur as soon as practicable following conduit installation to minimise the risk of erosion; and
- laying polymeric covers and warning tape (at various levels over the conduits) marked with appropriate warnings in case of accidental excavation.

Figure 4-22 provides an example of conduit installation within a trench in a roadway and **Figure 4-23** shows backfilling a trench.

Figure 4-22 Conduit installation within a trench in the roadway

Figure 4-23 Backfilling of a trench

4.4.3.5 Restoration of surfaces

Restoration activities within the road reserve would be:

- temporary, while trenching and cable pulling is still underway; and
- permanent, once cable pulling is complete.

The initial restoration of the road surface would include installing road base and a temporary road surface to allow vehicles and other road users to safely travel across the area. The temporary road surface can be used for a period of up to six months.

Permanent restoration of the road surface would involve:

- removing the temporary road surface;
- backfilling with road base up to surface level, where required;
- reinstating the road surface; and
- reinstating the remaining areas with spoil or other fill material to pre-construction levels and final finishing as appropriate (including footpath and/or kerb and gutter).

The restored road surface would match what was there previously i.e. an asphalt or concrete roadway, or as otherwise agreed with the relevant roads authority. TransGrid would only reinstate the area that was excavated and not entire lanes or roadways. Reinstating an asphalt type surface could occur at an average rate of about 50 metres per day while reinstatement of a concrete road surface would be an average of around 30 metres per day. TransGrid would work with Roads and Maritime Services and local councils to ensure the requirements for road reinstatement are met.

Areas disturbed by construction of the project would be reinstated, in consultation with relevant stakeholders. Where sections of grassland (such as at construction laydown areas or work sites in public open space) would be disturbed by the project, the restored surface would be turfed or seeded to match the adjoining grassed areas as closely as possible.

Restored areas would be monitored for a period of about 12 months, with particular focus on any locations where deterioration of restoration work is evident, such as trench consolidation, failure of vegetation regrowth or erosion. Special attention would be paid to the restored banks of watercourses. Where evidence of deterioration is present, works to rectify these areas would be undertaken.

4.4.3.6 Cable markers

Once restoration activities have been completed, cable markers would be installed along the transmission cable route to provide warning of the presence of the cables and the need to make enquiries with TransGrid before undertaking any excavation. The location of the cable circuit will also be registered on Dial-Before-You-Dig prior to construction commencing. Markers may include:

- small signs attached to road kerbs;
- concrete marker posts (between 800-900 millimetres tall) along the transmission cable route in vegetated areas where surface markers would be difficult to see; or
- flush markers constructed of concrete that are around 50-100 millimetres thick (see **Figure 4-24**).

Figure 4-24 Example of a flush marker

4.4.3.7 Excavation and establishment of joint bays

Joint bays would be excavated via open trenching. Erosion and stormwater flow controls would be installed around the work site to prevent inundation, while hard barriers would be installed to protect the work site from traffic movements and unauthorised pedestrian access. During detailed design, the exact location of joint bays would be determined, with the aim of avoiding driveways and other access points wherever possible. However, where this is not possible and vehicle access to adjacent properties is required across open joint bays, they would be temporarily covered with trafficable steel plates.

The joint bay sites would also require provision for construction vehicle parking as well as worker amenities and equipment storage space. Depending on the location and available space around the joint bay, a security fence may be installed around the work site in addition to hard safety barriers.

Link box and sensor box pits would be also be excavated and equipment installed (refer to **Figure 4-25**).

Figure 4-25 Joint bay establishment with link and sensor boxes to the left

4.4.3.8 Cable pulling and jointing

Once the joint bays have been established, the cables can be pulled through the conduits. The cables are fed from large cable drums holding around 600-800 metres of cable (refer to **Figure 4-26**). The sections of cable on either side of the joint bays are then connected at the joint bays.

As jointing of cables is very precise and must be carried out in clean and environmentally controlled working conditions, a tent or demountable building would be installed over the joint bay to provide a controlled work environment and dry work space (refer to **Figure 4-27**). Jointing works could include work at night and could take up to three weeks to complete, however jointing is not a high noise generating activity (refer to **Chapter 8 Noise and vibration** for a discussion of potential night-time noise impacts). The locations of joint bays would be confirmed during detailed design to optimise cable lengths and minimise impacts during construction.

Figure 4-26 Cable pulling

Figure 4-27 Example of cable jointing works occurring under cover

4.4.3.9 Cable bridges

Typical activities for the construction of cable bridges would include the following:

- establishment of the work site and access including vegetation clearing (where required);
- boring and earthworks for the bridge piers;
- installation of pier footings;
- installation of the pre-cast cable bridge and steel cage (where required) by crane (refer to **Figure 4-28**);
- integration with the conduits in the road reserve; and
- reinstatement of the work site.

The cable bridges proposed over the rail corridor at Muir Road and Bedwin Road would be a single span, meaning that it does not require the installation of supporting piers in the middle of the span, only at the ends, on the embankments. This would limit the footprint of disturbance and potential

disruption of rail services. At the proposed cable bridge crossing of the Cooks River, supporting piers would be required in the channel, in a similar location to those of the existing Lindsay Street pedestrian bridge. The bridge footings or embankments would be located on the banks of the river, which would require some vegetation clearing.

Figure 4-28 Example of a cable bridge being lifted into place as part of TransGrid's Holroyd to Rookwood project

4.4.3.10 Underboring

Underboring is a trenchless method for installing conduits that usually has less surface ground disturbance than trenching. Two methods of underboring, thrust boring and HDD, are being considered for the project. The preferred method of underboring would be confirmed by the appointed design and construction contractor during detailed design and would depend on factors such as local geotechnical conditions, location of utilities, discussions with property owners, proximity of sensitive receivers and general engineering constructability.

The underbore would typically occur around 4 to 10 metres below the ground surface.

Thrust boring involves forcing a concrete type carrier pipe containing the conduits through the section of substrate under the crossing location, while HDD involves using a surface-launched drilling rig to drill a pilot bore under the crossing location and then passing the conduits through the bore hole.

For thrust boring, two excavations would be required at either end of the crossing (usually called launch and receive pits) to facilitate construction plant and equipment access. Launch and receive pit depths for thrust boring would generally be at least four metres deep. The work site required at the launch pit would be up to around 800 square metres to accommodate plant and equipment, vehicle entry and parking, worker amenities and sediment containers. A smaller work site would be required at the receive pit, around 100 square metres. Work sites would be restricted to the road reserve and public open space areas where feasible and reasonable to limit the need for vegetation removal.

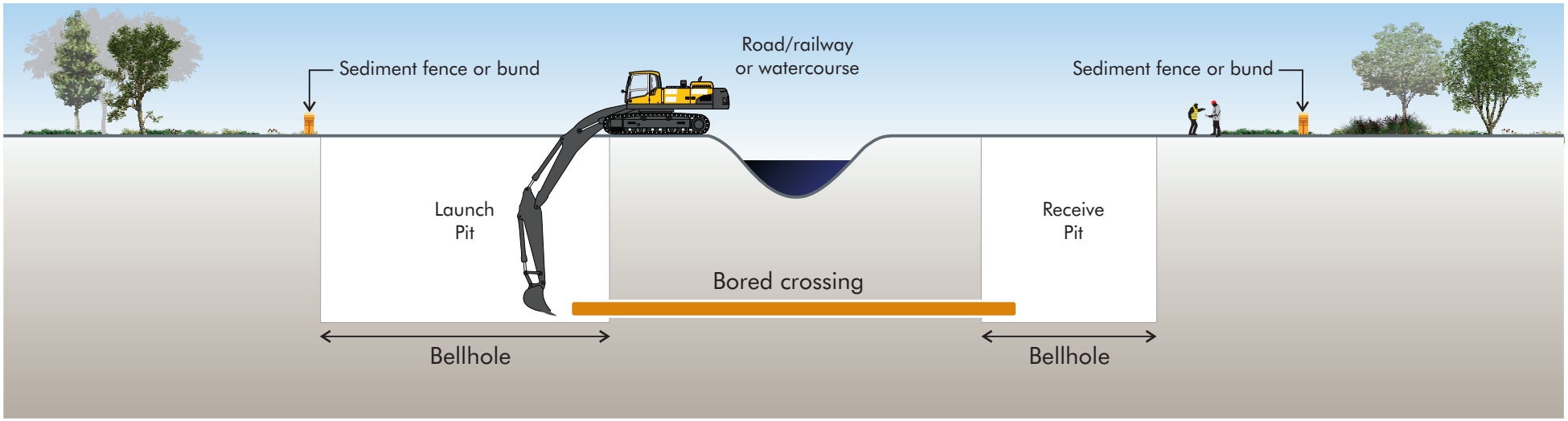
For HDD, only a receive pit would be required to a depth of around 1.5 metres for the drill exit location. The work site required at the launch end is at the surface and would be up to around 800 square metres to accommodate plant and equipment including an area to lay out the boring pipes and the drill rig, vehicle entry and parking, worker amenities, a water management plant and sediment containers.

The drill rig is used to bore an opening in the substrate through which a pipe is passed through. The hole is opened by passing progressively larger pipes through the bore hole until a sufficient diameter is reached to allow the conduits to be passed through.

Drilling fluid is used in the process of HDD, which comprises a mixture of water and drill additives (such as bentonite or polymer). This fluid is continuously pumped through the bore and serves multiple purposes, including cooling the drill cutting head, removing cuttings, stabilising the bore hole and lubricating the passage of the conduits. Waste slurry is generated from the drilling fluid which would be collected and appropriately disposed of.

An indicative schematic for thrust boring and HDD is shown in **Figure 4-29**.

SCHEMATIC PROFILE OF THRUST BORING



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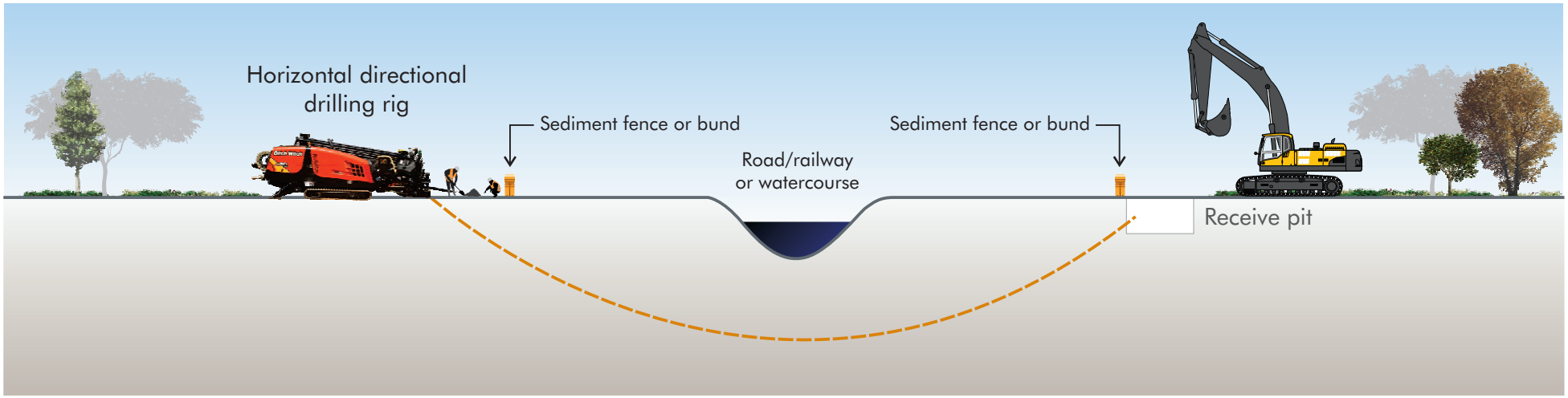
SCHEMATIC PROFILE OF HORIZONTAL DIRECTIONAL DRILLING



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INDICATIVE SCHEMATIC FOR DIRECTIONAL DRILLING AND THRUST BORING METHODS

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Potts Hill to Alexandria Transmission Cable Project

FIGURE 4-29

4.4.3.11 Substation upgrades

To facilitate the installation of new or upgraded substation infrastructure, equipment would be trucked into each of the three existing substation sites on a low loader and offloaded into place through the use of a mobile crane. Works at each of the substation sites would generally include:

- site establishment;
- earthworks and excavations needed for cable entries and footings for new equipment;
- installation of new infrastructure (such as switchbays and busbars);
- removal of redundant infrastructure;
- installation and connection of new cables;
- commissioning; and
- demobilisation.

Additional excavation works at Sydney South substation are associated with the installation of the new section of 132 kV cable. This cable would require a trench of around 1 metre wide by around 1.3 metres deep. The cable connection into the existing series reactor would also require excavation of around 5 cubic metres (of not more than 1 metre deep). The installation of the new switchbay would require an area of around 20 cubic metres to be excavated at a depth of no more than 1 metre. These excavation works would be restricted to the existing substation site and would not occur in the vicinity of any sensitive receptors.

With respect to the timing of the substation upgrades at the Rookwood Road and Beaconsfield West substations, works at these substation sites would occur in advance of cable pulling along the transmission cable route, to avoid delays when cable pulling reaches the substations.

4.4.4 Staging and timing of construction activities

Project construction is expected to take up to 24 months from commencement of site establishment to completion of commissioning.

4.4.4.1 Transmission cable route

Some activities, such as the trenching and excavation of the transmission cable route, would be staged (i.e. multiple work crews working concurrently) to maximise efficiencies in work activities and reduce the overall project construction duration. The duration of construction activities for the transmission cable route are outlined in **Table 4-5**. These timings are indicative only and would be subject to:

- local conditions at each work site;
- the final approach and methods adopted by the design and construction contractor;
- approval of works outside of standard construction hours;
- requirements of relevant government agencies/councils regarding road closures and working near sensitive receptors; and
- weather conditions.

Table 4-5 Indicative timing of typical transmission cable route construction activities

Construction activity	Indicative duration
Excavation, conduit (pipe) installation and trench backfilling	Conduits for each 600-800 metre cable section would take up to eight weeks to install (with most properties exposed to around two weeks of trench excavation activity).
Joint bay construction	Each individual joint bay would take up to three weeks to establish (in addition to trenching works).
Cable pulling	Cable pulling for each 600-800 metre cable section would typically take up to two weeks to complete.
Cable jointing	Cable jointing would typically take up to three weeks to complete at each joint bay.

4.4.4.2 Cable bridges

It is anticipated that construction works for the cable bridges would be undertaken independently of construction works along the transmission cable route and could occur concurrently with other project activities. However, cable bridges would need to be scheduled and completed before conduit installation is completed on either side of the crossing.

Each cable bridge crossing is expected to take around 10 weeks to complete in total, however works would be staged and not continuous over a 10 week period.

4.4.4.3 Underboring

Each underbore is expected to take around eight to 10 weeks to complete in total, however works would be staged and not continuous over this period.

Underboring would occur concurrently with other construction activities. Underboring at rail corridors would be planned and undertaken in consultation with the relevant rail authorities.

4.4.4.4 Substation works

Construction works at each of the substation sites would be undertaken independently of construction works along the transmission cable route so there may be an overlap in the timing of project activities along the transmission cable route and at the substations during construction and commissioning. Construction works at the Rookwood Road substation is expected to take around four to six months, while works at the Beaconsfield West and Sydney South substations are expected to take around six to nine months at each site.

4.4.4.5 Construction hours

Construction works would be undertaken during standard daytime construction hours as specified in the *Interim Construction Noise Guideline* (DECC, 2009) where reasonable and feasible to do so. However, it is expected that works outside standard construction hours would also be required, as described below.

Standard construction hours are:

- Monday to Friday 7am to 6pm;
- Saturday 8am to 1pm; and
- No work on Sundays and public holidays.

It is likely that construction works would be required at night time (after 10pm) due to the requirements of relevant road and rail authorities. These works could include, but are not limited to, works within major road reserves (i.e. on State and regional roads such as Rookwood Road and Old Canterbury Road), through signalised intersections, or at special crossings. Work outside standard construction hours may be required for safety reasons and/or to limit disruption to road traffic and rail services.

Cable jointing works at each joint bay would need to be undertaken continuously i.e. 24 hours. Some works at the substation sites may also need to be undertaken outside of standard construction hours

due to outage constraints on the existing infrastructure (i.e. the need to maintain power supply to customers).

Cable bridges and underboring at rail corridors would be timed with other rail works to limit disruption to freight and/or passenger rail services. These works could be undertaken outside of standard construction hours including at night time or over weekends, subject to approval of the relevant rail authority.

Scheduled construction activities, work hours and duration would be further refined through consultation with relevant government agencies and would be outlined in the CEMP for the project.

4.4.5 Resource use and waste minimisation

4.4.5.1 Spoil handling and waste management

Based on a flat formation trench configuration along the entire transmission cable route, approximately 115,000 cubic metres of spoil would be removed during excavation and trenching. Should a majority trefoil arrangement be adopted, the spoil volumes would be reduced.

Spoil would be classified in accordance with the NSW EPA *Waste Classification Guidelines: Part 1 Classifying Waste* (NSW EPA, 2014) and managed in accordance with relevant legislation and guidelines. Waste classification for the project falls within four categories:

- general solid (non-putrescible) waste, including spoil, metal, timber, paper and cardboard, glass, plastic, etc.;
- general solid (putrescible) waste; including food waste, other organic matter;
- liquid waste; including sewage effluent and construction wastewater; and
- special waste, restricted or hazardous waste depending on contaminant, may include contaminated soil and waste water.

Opportunities to reuse spoil generated by the project (if it can be achieved safely) elsewhere within the project area would be investigated further during detailed design and construction planning.

Further details on waste management are provided in **Chapter 19 Waste management**.

4.4.5.2 Refuelling

Daily refuelling would be required on-site for mobile plant and static machinery such as excavators, pumps, generators, backhoes and drilling machines. Refuelling would be carried out by mobile tanker, dispensing directly into the items of plant being refuelled. Refuelling would not be undertaken within 100 metres of a watercourse, nor would fuel be stored along the transmission cable route. Other vehicles such as staff vehicles would be taken off-site for refuelling.

4.4.5.3 Water management

Sediment and erosion control devices would be installed and maintained, in accordance with the CEMP, to manage stormwater during the construction of the project. Standard pollution control measures would also be implemented to ensure that water leaving work sites is of a suitable quality for discharge to the environment. Runoff that does not meet the water quality requirements would be captured and sent for off-site treatment or disposal in accordance with the requirements of the *Protection of the Environment Operations Act 1997* (POEO Act).

Sediment and erosion control devices would be implemented in accordance with *The Blue Book* (Landcom, 2004) and would include the use of:

- sediment barriers and bunds to direct wastewater to basins and prevent spills and sediment from entering watercourses;
- trench stops (within open excavations) to minimise sediment mobilisation as a result of water flowing inside the excavation; and
- basins or low point sumps to collect surface runoff generated during construction prior to discharge or disposal.

The final water treatment and disposal method would be determined during detailed design and would be consistent with the conditions of approval for the project and other licence requirements.

Further details on water management are provided in **Chapter 17 Surface water and flooding**.

4.4.6 Plant and equipment

The following typical plant and equipment are likely to be used during construction of the project:

- chainsaws;
- diamond saws;
- jackhammers;
- rock breakers;
- hand tools;
- hydraulic excavators;
- drill rig;
- spoil haulage trucks;
- mobile cranes and elevated working platforms;
- piling rigs;
- concrete trucks;
- winch trucks;
- low loaders;
- vacuum tankers/trucks;
- light vehicles;
- temporary generators;
- compressors;
- backhoes/front-end loaders;
- mixing plant;
- road millers;
- asphalt machine; and
- heavy rollers.

4.4.7 Site access and traffic movements

Access for heavy vehicles would be required throughout the project area. The standard of access along the transmission cable route would be sufficient to permit passage of excavators, spoil haulage trucks, concrete trucks, low loaders and mobile cranes. The estimated vehicle movements required for construction is outlined in **Table 4-6**. The vehicle numbers estimated do not include private vehicles used by the workforce to arrive at the work site, or traffic management vehicles. The vehicle numbers for the 'transmission cable route' assume four work crews operating concurrently at multiple locations within the project area. The final number of work crews, materials and vehicle movements would be determined during detailed design and construction planning.

Table 4-6 Anticipated vehicle movements

Location	Activity	Number of vehicle movements per day
Construction laydown areas	Delivery/pickup of plant and materials, spoil transfer	Vehicle movements per construction laydown area, per day: • Light: 3-4 • Heavy: 12
Transmission cable route – trenching and joint bay excavation	Delivery of plant and materials, removal of spoil, general construction	Vehicle movements for four work sites, per day: • Light: 16 • Heavy: 96
Special crossings	Delivery of plant and materials, removal of spoil, general construction	• Light: 10-12 • Heavy: 8-10
Substation upgrade – Rookwood Road	Delivery of plant and materials, removal of spoil	• Light: 3-4 • Heavy: 4
Substation upgrade – Beaconsfield West	Delivery of plant and materials, removal of spoil	• Light: 3-4 • Heavy: 4
Substation upgrade – Sydney South	Delivery of plant and materials, removal of spoil	• Light: 5-6 • Heavy: 6

Equipment and materials would be held in storage at the laydown areas until needed and delivered to the relevant work sites. Larger plant and cable materials may be delivered at night to avoid disrupting daytime traffic. Materials such as the cable drums may be temporarily stored near the trench and would be securely stored and barricaded.

Where the trench intersects another road or access to properties is required to enable construction works, vehicle and pedestrian passage would be restored as soon as possible after excavation has passed the intersection or access point.

4.4.8 Workforce

Typical workforce requirements are set out in **Table 4-7**. The numbers presented in **Table 4-7** are an estimate only of the number of workers likely needed to undertake construction activities. Additional workers would be required for traffic management. It is expected that multiple work crews would be spread along the transmission cable route and at the substation sites. A peak construction workforce of around 70 personnel is expected to be required for the project, assuming four work crews operating concurrently on works associated with the transmission cable route (i.e. excluding substation upgrades and special crossings).

Table 4-7 Typical workforce requirements

Construction activity	Workforce estimate (per work site)
Trenching and backfilling	4 to 6
Cable pulling	12 to 15
Permanent road restoration	4 to 6
Cable jointing	4 to 6
Cable bridge construction	8 to 10
Underboring	4 to 6
Substation upgrades	20 to 30

4.5 Cable operation and maintenance

Once the transmission cables have been installed, generally only visual inspections would be required. This would involve regularly driving along the transmission cable route to check for hazards or activities (such as excavation works in the vicinity) that could impact the underground cables or cable bridges. Ongoing physical access to the transmission cables is not required however ongoing monitoring of the cable for damage (missing/worn cable markers) and outages would occur. This would be through access to the link boxes and sensor boxes located near the joint bays. Optical fibre cables installed alongside the transmission cables would be monitored at the optical fibre cable pits.

Pits for link and sensor boxes and optical fibre cables would generally be located in the footpath/road verge but in some cases where there is insufficient space, they may be required in the roadway. Roadway access would be managed with standard traffic controls.

Regular checks of the pits would ensure they are accessible and that the pit does not contain water or tree roots. Cable bridge structures would be inspected to ensure structural integrity and aesthetics are being maintained.

5.0 Statutory planning and approval process

This chapter describes the relevant statutory planning and approval process for the project.

5.1 Environmental planning framework

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the primary legislation that governs land use, provides a framework for development control in NSW and sets out the requirements and guidelines for Environmental Impact Assessment. The EP&A Act is supported by the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) and a number of environmental planning instruments (EPIs) which include State Environmental Planning Polices (SEPPs) and Local Environment Plans (LEPs).

TransGrid is seeking approval for the project from the NSW Minister for Planning and Public Spaces under Division 5.2, Part 5 of the EP&A Act.

5.1.1 Permissibility

State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) aims to facilitate the effective delivery of infrastructure across NSW. Clause 41 of the Infrastructure SEPP applies to development for the purpose of 'an electricity transmission or distribution network.' It provides that these types of works are development which is permissible without consent, if undertaken by or on behalf of an electricity supply authority or public authority.

The project is permissible without development consent under clause 41 of the Infrastructure SEPP because it meets the definition of an electricity transmission network. Further, TransGrid is defined as an electricity supply authority under the Infrastructure SEPP because it is a transmission operator under the *Electricity Supply Act 1995*.

TransGrid is an Authorised Network Operator (ANO) under the *Electricity Network Assets (Authorised Transactions) Act 2015* and the carrying out of development by or on behalf of an ANO for the purpose of an electricity transmission or distribution network constitutes the carrying out of that development as an electricity supply authority and public authority (section 41 (2) of the *Electricity Network Assets (Authorised Transactions) Act 2015*).

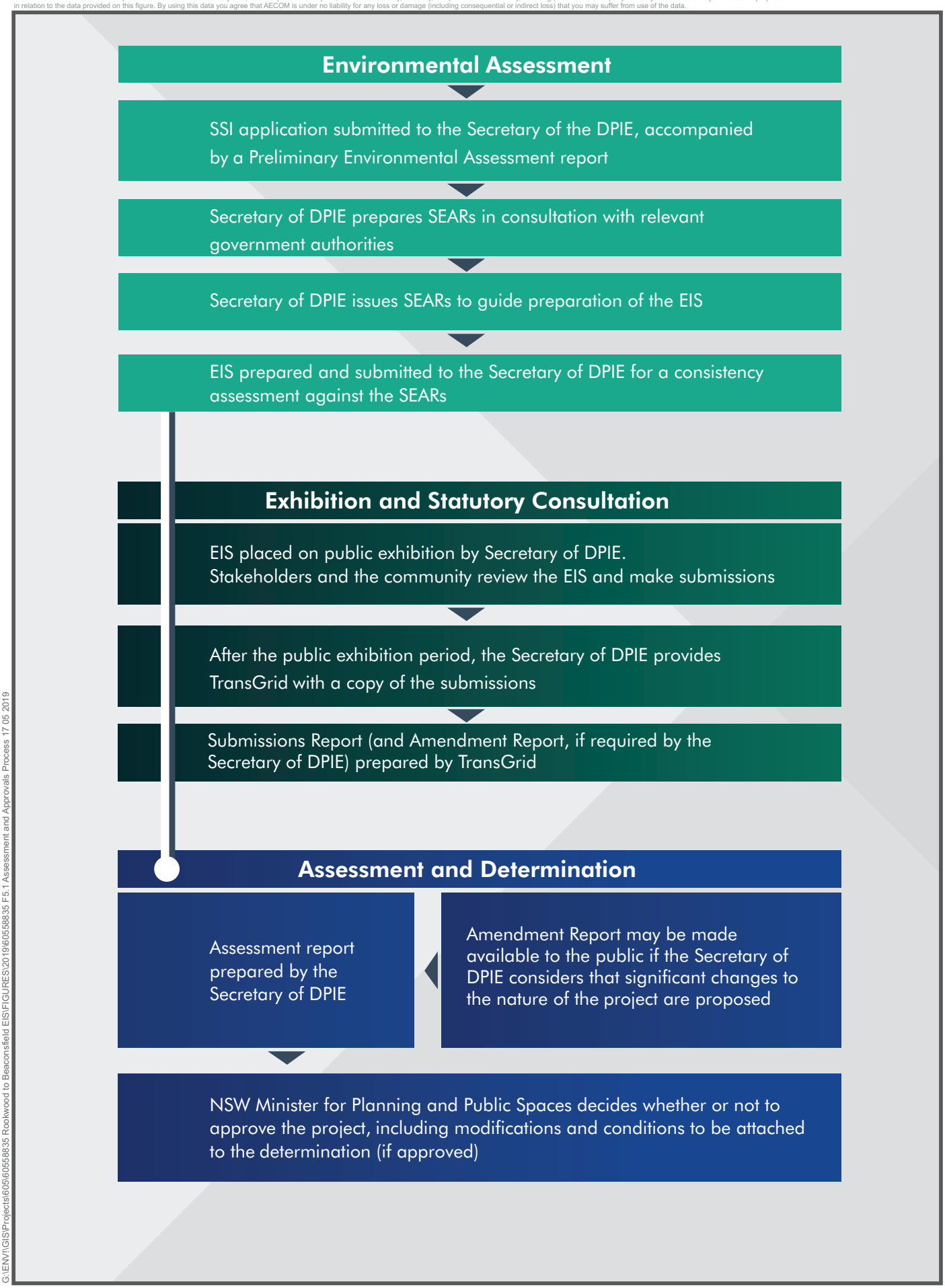
5.1.2 State significant infrastructure

The project is state significant infrastructure under clause 14 and Schedule 3 of *State Environmental Planning Policy (State and Regional Development) 2011* (State and Regional Development SEPP) and is permissible without development consent. Clause 1 (1) of Schedule 3 of the State and Regional Development SEPP states that "*Infrastructure or other development that (but for Division 5.2 of the Act and within the meaning of Part 5 of the Act) would be an activity for which the proponent is also the determining authority and would, in the opinion of the proponent, require an environmental impact statement to be obtained under Part 5 of the Act.*" TransGrid, as a determining authority for this type of development, has formed the view that an Environmental Impact Statement (EIS) is required under section 5.7 of the EP&A Act.

Division 5.2, Part 5 of the EP&A Act requires that an application is made to the NSW Minister for Planning and Public Spaces and that the Planning Secretary of the NSW Department of Planning, Industry and Environment (DPIE) prepare environmental assessment requirements and provide them to the proponent.

This EIS has been prepared in line with the revised Secretary's Environmental Assessment Requirements (SEARs) issued on 20 August 2019 and Schedule 2 of the EP&A Regulation. The SEARs for the project are provided in **Appendix A**.

The environmental assessment and approval process for State Significant Infrastructure is shown on **Figure 5-1**.



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ASSESSMENT AND APPROVALS PROCESS

Powering Sydney's Future

Potts Hill to Alexandria Transmission Cable Project

FIGURE 5-1

5.1.3 Exclusions from the project

While the project would include the construction and operation of one transmission cable circuit, it also includes the installation and construction of infrastructure (conduits and joint bays respectively) for a second transmission cable circuit, should it be required in the future. However, the cable laying and jointing works and operation of the second cable does not form part of the project.

The project also includes potential minor utility and service relocations where these occur within the road reserve or other areas identified as the 'project area' within **Chapter 4 Project description**. While no major utility relocations are expected, should these be required, these may require separate approval.

Further, the project area assessed in the EIS outlines the footprint for operational infrastructure and supporting construction ancillary facilities such as construction laydown areas. Should any new or additional areas outside the project area be identified post-approval of the EIS, these may require separate assessment and approval.

5.1.4 Post-approval modifications

Following approval of the project (if so determined by the NSW Minister for Planning and Public Spaces), changes may be required to the project during detailed design, construction and/or operation. Section 5.25 of the EP&A Act provides the process by which proponents may modify the terms of approval for the project. Changes may:

- be permissible under the original terms of approval; or
- be subject to additional assessment, requiring a modification application to DPIE to modify the existing approval: or
- be considered not to be a modification and therefore preparation of a new project application would be required.

Project changes that are within the terms of approval (i.e. are consistent) would be considered permissible and would not require further consent. The rationale and evidence for whether any changes are consistent within the terms of approval (i.e. does not change an 'underlying and essential' component of the approval) would be reviewed and documented to determine whether they are consistent or not with the terms of approval.

Project changes that are not consistent with the terms of approval would require a modification application and may require additional assessment and approval under the EP&A Act. Depending on the classification of the project change, the Secretary of DPIE may provide additional environmental assessment requirements to be addressed prior to consideration of the modification application by the NSW Minister for Planning and Public Spaces.

5.2 Environmental planning instruments

Section 5.22 of the EP&A Act provides that environmental planning instruments (such as LEPs and SEPPs) do not apply to state significant infrastructure projects (except as they may apply to the declaration of infrastructure as state significant infrastructure or critical state significant infrastructure – refer to **Section 5.1**). However, consistent with good environmental assessment practice, relevant environmental planning instruments have been considered.

5.2.1 State environmental planning policies

SEPPs specify planning controls for certain areas and/or development types. SEPPs including matters relevant to the scope and environmental impact assessment of the project include:

- *State Environmental Planning Policy No. 55 – Remediation of Land;*
- *State Environmental Planning Policy No. 19 – Bushland in Urban Areas; and*
- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.*

In addition to the Infrastructure SEPP (refer to **Section 5.1.1**) and State and Regional Development SEPP (refer to **Section 5.1.2**) the relevant provisions of these SEPPs have been considered.

5.2.1.1 State Environmental Planning Policy No. 19 – Bushland in Urban Areas

State Environmental Planning Policy No. 19 – Bushland in Urban Areas (SEPP 19) aims to protect and preserve bushland within urban areas to which the policy applies because of:

"(a) its value to the community as part of the natural heritage,

(b) its aesthetic value, and

(c) its value as a recreational, educational and scientific resource."

The project has been developed with the aim of avoiding or otherwise minimising impacts on native vegetation. The potential direct and indirect impacts of the project on areas of remnant native vegetation have been considered in **Chapter 13 Biodiversity**, taking into account the relevant matters specified under SEPP 19.

5.2.1.2 State Environmental Planning Policy No. 55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) provides a decision-making framework and considerations to be taken into account when assessing proposals for development or subdivision of land that may be contaminated.

In accordance with clause 7(1) of SEPP 55, a consent authority must not consent to the carrying out of any development on land unless:

- it has considered whether the land is contaminated;
- if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or would be suitable, after remediation) for the purpose for which the development is proposed to be carried out; and
- if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

A preliminary site investigation (PSI) has been carried out for the project to inform the ongoing project design, the assessments within the EIS and to ensure the relevant provisions of SEPP 55 have been considered. The PSI identified areas of potential contamination risk (low, medium and high) within the project area. The PSI indicated that further investigations would be required in some locations (such as geotechnical investigations and pre-construction soil sampling) during detailed design and/or prior to construction, and that precinct specific mitigation measures to protect workers, the public and the surrounding environment may be required. The outcomes of the PSI and the proposed management and mitigation measures are presented in **Chapter 16 Soils and contamination**.

5.2.1.3 State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

State Environmental Planning Policy (Vegetation in Non-Rural Areas) aims to protect the biodiversity values of trees and other vegetation in non-rural areas and to preserve the amenity of non-rural areas through preservation of trees and other vegetation. While the project will result in the removal of some vegetation and trees, an authority to clear vegetation under the SEPP is not required.

The impact assessment has considered areas of biodiversity, including trees and vegetation, in the Biodiversity Development Assessment Report (BDAR) (refer to **Section 5.3.4**) and aims to limit impacts through design development and through implementation of mitigation measures where possible.

5.2.2 Local environmental plans

LEPs do not apply to state significant infrastructure projects (refer to **Section 5.2**), however, the NSW Minister for Planning and Public Spaces may take into account the provisions of the LEPs when deciding whether or not to approve the project.

The project is proposed within four local government areas (LGAs): Canterbury-Bankstown, Strathfield, Inner West and City of Sydney. Both the Canterbury-Bankstown and Inner West LGAs were formed in 2016 as a result of the amalgamation of the Canterbury and Bankstown LGAs and former Ashfield, Leichhardt and Marrickville LGAs, respectively. Existing LEPs for these four LGAs remain in force until combined LEPs have been gazetted.

The provisions of the relevant LEPs of these LGAs are discussed in **Chapter 20 Land use and property**.

5.3 Other relevant NSW legislation

Under section 5.23 of the EP&A Act, certain separate environmental approvals would not be required for the project. Approvals not required for the project under section 5.23 of the EP&A Act include:

- a permit under section 201, 205 or 219 of the *Fisheries Management Act 1994* (FM Act) to carry out dredging and reclamation works, to harm marine vegetation in a protected area or to block fish passage;
- approvals under Part 4 to disturb or excavate a place, building, work, relic, moveable object, precinct or land to which an interim heritage order or listing on the State Heritage Register applies and an excavation permit under section 139 of the *Heritage Act 1977*;
- an Aboriginal heritage impact permit to harm an Aboriginal object or place under section 90 of the *National Parks and Wildlife Act 1974*; and
- a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than a groundwater interference approval) under section 91 of the *Water Management Act 2000*.

Section 5.24 of the EP&A Act identifies approvals and other requirements that must be applied consistently, but cannot be refused if those activities are necessary for carrying out an approved state significant infrastructure project. These approvals include consent under section 138 of the *Roads Act 1993*.

Other NSW legislation that applies to the project is summarised in the following sections.

5.3.1 Roads Act 1993

Section 138 of the *Roads Act 1993* (Roads Act) requires that a person obtain the consent of the appropriate roads authority for the erection of a structure, or the carrying out of work in, on or over a public road, or the digging up or disturbance of the surface of a public road. Approval from the relevant roads authority is required under section 138 of the Roads Act as the project would involve works within public road reserves on both classified and unclassified roads.

In the case of classified roads, consent is required from Roads and Maritime Services (Roads and Maritime). Approval is obtained in the form of a Road Occupancy Licence (ROL). The Transport Management Centre (TMC) assesses, manages and issues ROLs for state roads within the Sydney region on behalf of Roads and Maritime. The project would require ROLs for works conducted on state roads.

In the case of unclassified roads, consent from the road authority (local council) is not required, as under Clause 5 of Schedule 2, TransGrid is an Authorised Network Operator under the *Electricity Supply Act 1995* and can therefore carry out works as part of network operator functions, in, on or over an unclassified road, other than a Crown road.

5.3.2 Electricity Supply Act

TransGrid is considered a network operator under the *Electricity Supply Act 1995*. Clause 45(2) states that a network operator may erect, install, alter, extend, maintain and remove electricity works including on a public road or reserve, and is exempt from the requirement for an approval under the *Local Government Act 1993,* except in relation to buildings. Although approval is not required from local council, under clause 45(4), the local council must be notified of works (on local roads and reserves) and given reasonable opportunity (being not less than 40 days from the date on which the notice was given) to make submissions in relation to the proposed works. The network operator must then give due consideration to any submissions made.

5.3.3 Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (CLM Act) aims to establish a process for investigating and remediating land where contamination presents a significant risk of harm to human

health or the environment. There is likely to be residual contamination along the transmission cable route due to historical use of land within and adjacent to the route for commercial/industrial purposes and the presence of unclassified fill. The areas assessed as high contamination risk were located where the transmission cable route would intersect former landfills in Camdenville Park and Sydney Park, as well as a metal refinery site between Euston Road and Burrows Road. A PSI has been carried out for the project to inform the initial design and assessment within the EIS. The outcomes of the PSI, including identification of areas of potentially contaminated land and recommended environmental management and mitigation measures are provided in **Chapter 16 Soils and contamination**.

5.3.4 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) identifies threatened species, ecological communities and key threatening processes and establishes a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity. Under section 7.9 of the BC Act, any state significant infrastructure application is to be accompanied by a BDAR, unless it is determined by the Planning and Environment Agency Heads that the proposed development is not likely to have any significant impact on biodiversity values. A BDAR has been prepared and is provided in **Appendix H**. A summary of the assessment is provided in **Chapter 13 Biodiversity**.

5.3.5 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (PoEO Act) provides for the issue of an Environment Protection Licence (EPL) for premises-based scheduled activities pursuant to section 48 of the PoEO Act, and non-premises based scheduled activities pursuant to section 49 of the PoEO Act. Activities requiring an EPL are listed in Schedule 1 of the PoEO Act. The project would not involve any scheduled activities and therefore would not require an EPL.

5.3.6 Protection of the Environment Operations Legislation Amendment (Waste) Regulation 2018

The Protection of the Environment Operations Legislation Amendment (Waste) Regulation 2018 requires written consent to be obtained from the NSW EPA before the exhumation of waste within a landfill site (such as Sydney Park). Prior to excavation activities at Sydney Park, the NSW EPA would be notified in accordance with Clause 110A of the Regulation and excavation activities would not commence until written approval is received from the NSW EPA.

5.3.7 Water Management Act 2000

The *NSW Aquifer Interference Policy* (Department of Primary Industries, 2012b) outlines the requirement for approval of 'aquifer interference activities' under the *Water Management Act 2000*. The project would likely intercept the Botany Sands and Sydney Basin central aquifers managed under the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011. An assessment of potential groundwater impacts was undertaken in accordance with the *NSW Aquifer Interference Policy* (refer to the Groundwater Technical Report in **Appendix N**). The groundwater assessment notes that temporary dewatering may be required during construction. Licensing of groundwater extraction through Department of Industry-Water in accordance with the *NSW Aquifer Interference Policy* will be required if the extracted groundwater exceeds three megalitres/year. The outcomes of this assessment as well as proposed management and mitigation measures are provided in **Chapter 18 Groundwater**.

5.3.8 Land Acquisition (Just Terms Compensation) Act 1991

The *Land Acquisition (Just Terms Compensation) Act 1991* would apply to the acquisition of easements required for the project. While the project is primarily located within road reserves and public land, there are two sections of the transmission cable route that would cross private properties.

An easement would be required to provide adequate clearance and access along the transmission cable route for construction, operation and maintenance work and to preserve certain property rights in perpetuity. Where the transmission cable route crosses private lands, it is TransGrid's policy to obtain easements by negotiating with the landowner. Easements also ensure that future land development does not impede access to the cable, while the landowner retains ownership of the easement land and

the right to undertake certain permitted activities within the easement area. No freehold land acquisitions are required. Refer to **Chapter 20 Land use and property** for more detail.

Where TransGrid would need to acquire an easement on private property, the landowner would be entitled to compensation under the *Land Acquisition (Just Terms Compensation) Act 1991.*

5.4 Commonwealth legislation

5.4.1 Environment Protection and Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) provides a framework to protect and manage matters of national environmental significance (MNES) and impacts on Commonwealth land. The Act identifies the following as MNES:

- World Heritage properties;
- National Heritage places;
- wetlands of international importance (including Ramsar Wetlands);
- listed threatened species and ecological communities;
- listed migratory species protected under international agreements;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mines); and
- water resources, in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, a referral to the Commonwealth is required for proposed actions that have the potential to significantly impact MNES or Commonwealth land. If the project is declared a 'controlled action', approval from the Commonwealth Minister for the Environment and Energy would be required, in addition to the approval required from the NSW Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act.

One MNES, the Grey-headed Flying-fox (*Pteropus poliocephalus*), listed as Vulnerable under the EPBC Act, was identified as potentially affected by the project. As discussed in **Chapter 13 Biodiversity**, the impact assessment indicates that the project would not result in a significant impact on this or any other MNES or on Commonwealth land. Accordingly, the project has not been referred to the Commonwealth Department of the Environment and Energy for further assessment or approval.

5.4.2 Airports Act 1996

Under section 183 of the *Airports Act 1996*, a controlled activity must not be undertaken in relation to 'prescribed airspace' without the approval of the Secretary of the Commonwealth Department of Infrastructure, Transport, Cities and Regional Development (DITCRD). Controlled activities include:

- the construction of buildings and structures that intrude into prescribed airspace; and
- any other activity that causes a thing attached to, or in physical contact with, the ground to intrude into the prescribed airspace.

'Prescribed airspace' is the airspace above any part of either an Obstruction Limitation Surface (OLS) or a 'procedures for air navigation systems – aircraft operations' surface for an airport. The project would include the use of cranes at Beaconsfield West substation, however, as the boom height of cranes are likely to be less than 50 metres, the OLS is unlikely to be penetrated and airport authority approval is not required. In the event that cranes with boom heights of 50 metres Australian Height Datum (AHD) or greater are required, approval/permits would be required.

6.0 Consultation

Community and stakeholder consultation has played an important role in informing the ongoing design of the project and studies for the Environmental Impact Statement (EIS). This chapter outlines the consultation with the community and stakeholders, including activities carried out to date, issues raised, and how these issues have been addressed in the EIS. The chapter also details the consultation proposed for and after EIS exhibition.

For this project, engagement is used to describe the overarching approach to public participation; while consultation refers to communication activities carried out to obtain community and stakeholder feedback on key project milestones or decisions.

6.1 Consultation overview

Community and stakeholder consultation has been ongoing during various stages of the project.

Consultation for the project began in late 2016, with key stakeholders, including relevant NSW and local government agencies, large energy users, renewable generators, energy consumer and energy user advocacy groups, and large businesses to assist in the identification, evaluation and selection of a preferred route option. Stakeholders considered of a range of factors, including environmental, land use, social and community impacts, engineering constraints, cost and programming as part of the route selection process.

A series of community consultation events were also carried out in mid-2017 to inform the community about the preferred route selection.

TransGrid started consultation to assist EIS development in late 2017. In early 2019, a revised route was identified - the rationale for the revised route is described in **Chapter 3 Project development and alternatives**. Community consultation on the revised route commenced in early 2019.

Consultation will be carried out during and after the public exhibition of the EIS, and will be ongoing during detailed design and construction, should the project be approved.

Figure 6-1 provides an overview of consultation activities.

Late 2016	• Stakeholder consultation on route selection study (Completed)
Mid-2017	• Community consultation on preferred route (Completed)
Early 2018	• Consultation to assist EIS development (Completed)
Early 2019	• Consultation on the revised route using feedback received during EIS development (Completed)
October 2019	• Consultation during EIS exhibition
From 2020	• Consultation during detailed design
From 2020	• Consultation during construction
From 2022	• Communication with community and stakeholders during operation

Figure 6-1 Community and stakeholder consultation overview

Key stakeholders for the project include (but are not limited to):

- government authorities, major development proponents/transport operators and utility providers;
- elected government officials and local government, including councils in the local government areas of Canterbury-Bankstown, Strathfield, Inner West and Sydney;

- impacted stakeholders, including schools, child care centres, businesses, property/landowners, residents, healthcare providers, consumer groups, emergency services and religious institutions;
- special interest groups, including community, environmental, pedestrian and bicycle user groups;
- Aboriginal stakeholders, including Local Aboriginal Land Councils (LALC);
- directly impacted communities (within 100 metres of project area); and
- the broader community.

TransGrid's Community and Stakeholder Engagement Strategy (CSES) provides a framework for communication and engagement with the community and stakeholders for Powering Sydney's Future. The CSES is supported by stage-specific Community and Stakeholder Engagement Plans, tailored to each phase of the project.

6.2 Consultation objectives and approach

The CSES outlines a communications approach focused on early consultation and providing up-to-date information to the community and stakeholders. The project consultation objectives are to:

- establish and build stakeholder relationships;
- identify and consider issues with potential influence on project outcomes and timeframes;
- encourage open and honest feedback from all parties;
- proactively develop two-way communications tailored to the needs of stakeholders;
- maintain ongoing communication with stakeholders;
- encourage inclusiveness throughout the whole project; and
- integrate the interests and feedback of community members and stakeholders into the EIS and development of the project design.

These consultation objectives also meet the consultation requirements of the Secretary's Environmental Assessment Requirements (SEARs) issued for the project by the Planning Secretary of the NSW Department of Planning, Industry and Environment (DPIE), which are presented in **Appendix A**.

As per the SEARs, consultation has been carried out with relevant local, State and Commonwealth government authorities, infrastructure and service providers, special interest groups, including Aboriginal stakeholders, pedestrian and bicycle user groups, affected landowners, businesses and the local community. TG also identified other stakeholders, and has carried out consultation with elected government officials, major development proponents/transport operators, utilities, schools, child care centres, healthcare providers, consumer groups, emergency services, religious institutions, community and environmental groups and media.

Also, as part of the SEARs requirements, a Community Consultation Framework (CCF) (refer to **Appendix C**) has been developed to identify stakeholders, and outline community and stakeholder consultation procedures during the construction and operation of the project.

6.2.1 Consultation groups

Consultation groups are a key part of the Powering Sydney's Future engagement approach, to ensure community members and stakeholders are consulted early at each relevant project phase and are provided up-to-date information. The consultation groups are described below.

6.2.1.1 TransGrid Advisory Council

The TransGrid Advisory Council (the Council) is a key stakeholder advisory body to TransGrid and offers consumer insights to improve the value of TransGrid's transmission services to NSW. The Council meets on a quarterly basis and is an executive level forum consisting of representatives from TransGrid's directly connected customers, consumer and industry representatives and large energy consumers. In providing advice and consumer views on strategic policy topics and TransGrid's

business plans, the Council ensures that customer and consumer perspectives are consistently included in TransGrid's decision making processes.

The Council has been extensively involved in Powering Sydney's Future, both as a group and on an individual member basis, throughout the development and approvals process for the project.

Consultation with the Council has had a material impact on the development of the project, including the creation of the Powering Sydney's Future Stakeholder Monitoring Committee which provides a dedicated consumer consultation committee for the project.

6.2.1.2 Powering Sydney's Future Stakeholder Monitoring Committee

The Powering Sydney's Future Stakeholder Monitoring Committee (PSF SMC) is a consumer consultation committee that provides an opportunity for ongoing engagement for the implementation of Powering Sydney's Future. The PSF SMC was created by TransGrid, in partnership with Energy Consumers Australia, to facilitate ongoing consultation on key aspects of Power Sydney's Future. The creation of the PSF SMC is part of TransGrid's commitment to ensure that the best interests of consumers are at the forefront of decision making processes.

The PSF SMC is independently chaired by Energy Consumers Australia and is provided with in-depth project information from TransGrid. The PSF SMC meets with TransGrid bi-annually to monitor project costs, timings and development, and to provide feedback and recommendations to TransGrid.

Two meetings have been held to date on:

- 3 December 2018; and
- 30 May 2019.

It is proposed that meetings will at least continue throughout the construction of the project, with the SMC to decide if there is a need to meet beyond construction.

6.2.1.3 Community and Stakeholder Reference Group

TransGrid intends to establish a Community and Stakeholder Reference Group for future consultation purposes, as per the CCF. Refer to **Section 6.7** for more information.

6.3 Consultation during route selection: late 2016

During the development of Powering Sydney's Future, more than 30 potential transmission cable route options were considered.

6.3.1 Key planning workshops

TransGrid and Ausgrid facilitated a stakeholder workshop in November 2016 for Powering Sydney's Future to discuss ideas and explore the feasibility of potential network and non-network solutions with stakeholders. In total, 92 stakeholders from government, energy suppliers and regulators, large power users, industry and others attended the workshop. The workshop included presentations, and issue identification and brainstorming activities on potential network and non-network solutions.

6.3.2 Community consultation activities

In mid-2017, TransGrid carried out a series of consultation activities to inform the community about the preferred route selection. A summary of these community and stakeholder activities is presented in **Table 6-1**.

Table 6-1 Summary of communication and consultation activities in mid-2017

Activity	Details	Stakeholders
Meetings and briefings	Information about the project was provided to stakeholders to show how proposed options would impact or interface with various assets such as roads, footpaths, trees, water or other utilities.	• Local councils • Utility providers • Transport organisations/asset owners
Information sessions	General information was provided at staffed display sessions held at five different locations along the transmission cable route between 24 May and 1 June 2017. The information sessions were held at: • Summer Hill Church; • Campsie Centre; • Bankstown Central Shopping Centre; • Sydney Park; and • Marrickville Metro Shopping Centre. The information sessions were promoted via letterbox drops to potentially impacted residents along the transmission cable route and via the TransGrid website[1]. There were 25 visitors in total across all information sessions.	• All stakeholders • Community and interest groups • Residents, businesses and organisations along the transmission cable route • Consumers
Interactive feedback portal	A dedicated online engagement platform was established using Social Pinpoint. Users were able to submit their concerns and "pin" them to a specific area along the transmission cable route. This engagement platform could be accessed via the TransGrid website. The platform was open for comment from 8 May to 2 June 2017. There were 323 unique visits to the site and approximately 23 comments.	• All stakeholders

[1] www.transgrid.com.au/psf

Activity	Details	Stakeholders
Letterbox drops	Over 6,000 newsletters were delivered to properties in close proximity to the transmission cable route. The newsletter highlighted some of the key project areas, and invited recipients to information sessions held in May and June 2017. The newsletter was also translated into six key languages prevalent along the route, including Arabic, Greek, Italian, Vietnamese, and Simplified and Traditional Chinese.	• Residents, businesses and organisations along the transmission cable route
Phone/email	To ensure that project information was conveniently available, TransGrid established a dedicated phone number, email and postal address: Phone: 1800 222 537 Email: psf@transgrid.com.au Postage: PO Box A1000, Sydney South, NSW, 1235 During the consultation period from 8 May to 2 June 2017, 27 calls and 43 emails were recorded.	• Community interest groups • Residents, businesses and organisations along the transmission cable route • Consumers
TransGrid website	A project webpage, on the TransGrid website, contained project information, documents and links to resources. During the consultation period, 125 webpage visits were recorded.	• All stakeholders
Social media	A social media campaign ran on TransGrid's existing Facebook page. The campaign encouraged viewers to visit the TransGrid website, use the interactive portal and attend the information sessions. During the consultation period, TransGrid utilised both organic and paid posts on Facebook. The paid social media posts ran for four days, 17 May – 20 May 2017, targeting Sydney suburbs along the transmission cable route. The social media statistics for this period included: • 18,354 users reached; • 103,210 impressions; and • 33 link clicks.	• All stakeholders • Stakeholders specifically in the Sydney suburbs along the transmission cable route
Print advertisements	Print advertisements ran in the Inner West Courier and Canterbury-Bankstown Torch local newspapers for three consecutive weeks during the consultation period.	• Community and interest groups • Residents, businesses and organisations along the transmission cable route • Consumers

6.4 Consultation during preparation of the EIS: early 2018

TransGrid started consultation during the preparation of the EIS in early 2018. A summary of the consultation activities carried out during this phase is detailed below.

6.4.1 Stakeholder identification

Using desktop searches and field visits, TransGrid identified stakeholders directly impacted by and next to the transmission cable route, as well as stakeholder groups in the wider community likely to have an interest in the construction and operation of the project.

6.4.2 Community and stakeholder contact and information tools

TransGrid continued to use several community contact points and information tools, listed in **Table 6-3**. These were available to all stakeholders to ask questions or request information about the project.

Table 6-2 Contact points available during the preparation of the EIS

Information point	Details
Project information line (toll free)	1800 222 537
Project email address	psf@transgrid.com.au
Website	www.transgrid.com.au/psf The website contained up to date project information.
Postage	PO Box A1000, Sydney South, NSW, 1235

6.4.3 Project update newsletters

Project update newsletters were distributed during the preparation of the EIS to keep stakeholders and the community informed about the project. Between 8 June and 11 June 2018, 16,950 newsletters were distributed via letterbox drop to residents:

- 200 metres either side of the proposed route;
- 100 metres around any construction laydown area; and
- 100 metres around Sydney Park.

Project update newsletters were:

- available digitally on the project webpage as accessible web version PDF files;
- translated into six languages (refer to **Table 6-1** above for translated languages);
- emailed to stakeholders and businesses; and
- made available at community information sessions as hard copies.

6.4.4 Social media

A targeted social media campaign on TransGrid's Facebook page was used to raise awareness of the project and encourage community members to attend a community information session. The campaign was also used to promote TransGrid's online engagement platform, Social Pinpoint. This targeted social media campaign ran between 31 May and 7 June 2018.

The social media statistics for this period included:

- 21,940 users reached;
- 47,173 impressions; and
- 19 link clicks.

6.4.5 Social Pinpoint

The interactive feedback portal, Social Pinpoint, was used to capture issues of concern from community members and stakeholders. Users were able to submit their concerns and "pin" them to a specific area along the transmission cable route.

Between early 2018 and early 2019, Social Pinpoint received 641 total visits by 582 unique users, who provided their feedback by leaving 31 comments and 79 comment endorsements from other users in the form of likes/dislikes.

6.4.6 Media releases

A media release regarding regulatory funding approval for the project was published on 18 May 2018 to keep the wider community and stakeholders informed about the project.

6.4.7 Newspaper advertisements

Newspaper advertisements were used to increase awareness of the project, advertise community information sessions and encourage community members to provide feedback on the project.

Newspaper advertisements were published on 19 June 2018 in the:

- Canterbury Bankstown Express; and
- Inner West Courier.

6.4.8 Postcards

Between 8 June and 11 June 2018, 16,950 postcards were distributed via letterbox drop to residents:

- 200 metres either side of the proposed route;
- 100 metres around any construction laydown area; and
- 100 metres around Sydney Park.

The postcard was also available digitally on the project webpage on the TransGrid website. Postcards were also emailed to stakeholders and businesses, when requested.

6.4.9 Community and stakeholder briefings

Community and stakeholder briefings were organised to focus on stakeholders who had concerns about the project and potential impacts. Face-to-face meetings were offered via email and phone to individuals from the following community groups and stakeholders in May and June 2018:

- local councils, including City of Sydney, City of Canterbury-Bankstown, Inner West Council, Burwood Council and Strathfield Council;
- local schools, including Camdenville Public School, Christian Brothers High School, Croydon Park Public School, Greenacre Public School, Lewisham Public School, Newington College, Petersham Primary School, St John Vianney Catholic Primary School, St Michael's Catholic Primary School, St Patrick's Catholic Primary School, St Pius Catholic Primary School and Summer Hill Public School;
- businesses, property/landowners, residents, child care centres, hospitals and healthcare providers, parents and citizens groups, religious institutions, resident action groups, and precinct committees along the transmission cable route;
- local environment groups, including Cooks River Alliance River Association, Mudcrabs – Cooks River, Inner West Environmental Group, GreenWay and SES Bankstown;
- bicycle safety groups, including Bike Sydney, Bike Marrickville, Ashfield Bicycle Group, Bike NSW, Art Cycle Sydney and Bike South West;
- local community groups, including Greenacre Area Community Centre, Summer Hill Community Centre, Chinese Elderly Welfare Association Inc., Burwood Chinese Activity Group, Ashfield Activity Group, Greek Speaking Men's Group, Indonesian Activity Group (Mandarin & Indonesian speaking), Vietnamese – Vietnamese Sr. Association and Health Literacy and Language Group; and

- chambers of commerce, including South West Bankstown Chamber of Commerce, Marrickville Chamber of Commerce, Burwood Business Chamber NSW, Strathfield Chamber of Commerce and NSW Business Chamber – Sydney West.

Over 180 individuals from 74 community and stakeholder groups were briefed on the project and given an opportunity to provide feedback.

6.4.10 Workshops and meetings

Workshops were organised to brief stakeholders and understand the project concerns of different stakeholder groups. Where this was not possible, separate meetings were organised. The following stakeholders were invited to workshops via email, mail and phone in May and June 2018:

- government authorities including Roads and Maritime Services (Roads and Maritime) (Asset Management and Motorways Division), NSW Environment Protection Authority (NSW EPA), Office of Environment and Heritage (OEH), WaterNSW, Transport for NSW (TfNSW); Greater Sydney Commission (GSC), Sydney Coordination Office, NSW Department of Education, Australian Rail Track Corporation (ARTC);
- major development proponents/transport operators including Sydney Motorway Corporation, Sydney Metro, Sydney Light Rail, Pacific National Freight Terminal, Sydney Trains; and
- utility providers including Telstra, Optus, Jemena, Viva Energy, Sydney Metropolitan Pipeline, NBN Co and Ausgrid.

A workshop was held with six utility stakeholders on 25 July 2018. Separate meetings were also held with nine government authorities and three utility stakeholders.

6.4.11 Community information sessions

Community information sessions were an opportunity for stakeholders and the community to understand the project and input into the EIS.

Four community information sessions were held at various locations along the proposed route.

Community members were able to talk one-on-one with the project team. To maximise the opportunity for community members to attend, sessions were held at varying times and days:

- Bankstown Central Shopping Centre: Thursday 21 June 2018, 9:00 am – 9:00 pm;
- Campsie Centre: Saturday 23 June 2018, 9:00 am – 3:00 pm;
- Marrickville Organic Food Markets: Sunday 24 June 2018, 9:00 am – 3:00 pm (refer to **Figure 6-2**); and
- Ashfield Mall: Thursday 28 June 2018, 9:00 am – 9:00 pm.

At the information sessions:

- communication material available included posters and project update newsletters, in hard and soft copies, available in six languages other than English (refer to **Table 6-1** above for translated languages);
- TransGrid's Social Pinpoint map was available on iPads for community members to view the proposed route and provide feedback;
- interactive technology was available on iPads for community members to view a 3D simulation of three project construction activities: trench excavation, conduit installation and road restoration; and
- community members were encouraged to complete a feedback form or sign up to the email distribution list to receive project updates.

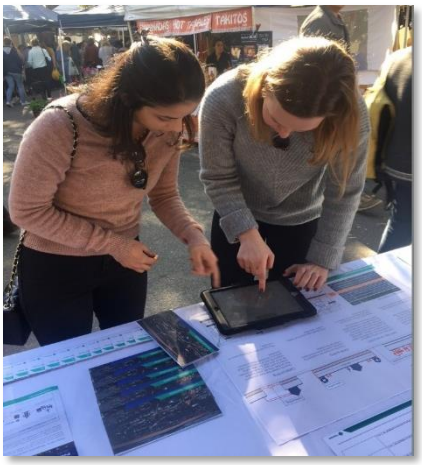

Figure 6-2 Community member using interactive technology at a community information session

A total of 47 community members attended the four community information sessions.

6.4.12 Emails

Emails were sent to stakeholders to introduce the project and organise meetings, briefings and workshops. A total of 289 emails were sent to 428 unique stakeholders during the pre-EIS consultation phase.

Emails were received from stakeholders and community members to organise meetings and provide feedback on the project. Stakeholders' email addresses were included in the stakeholder database and added to the email distribution list to keep them informed and updated on the project, where requested.

A total of 188 emails were received by 143 unique stakeholders.

6.4.13 Phone calls

Phone calls were made to stakeholders to introduce the project and follow up on letters and email invitations for meetings, workshops and briefings.

A total of 120 phone calls were made to 117 unique stakeholders.

Phone calls were received from stakeholders and community members to organise meetings, enquire about the project and provide feedback on the project.

A total of 13 phone calls were received by 11 unique stakeholders.

6.4.14 Doorknocking

Businesses and residential properties located along the proposed route were doorknocked by the project team to provide project information, capture concerns, distribute project update newsletters and answer questions about the project. Project update newsletters and business cards were left in letterboxes of unavailable owners/occupants.

Between 6 July and 9 July 2018, 24 businesses were doorknocked by the project team. Of these, 22 businesses were briefed on the project.

Between 17 August and 20 August 2018, 16 businesses and 19 residential properties were doorknocked by the project team. Of these, 15 businesses and two residents were briefed on the project.

6.4.15 Results of consultation relevant to the EIS

A number of issues were raised by stakeholders and community members during the preparation of the EIS. **Table 6-3** outlines the key issues raised during meetings, briefings, door knocks, and via Social Pinpoint, email and phone, that are relevant to the EIS preparation.

Table 6-3 Key issues raised by stakeholders and the community during preparation of the EIS

Key issues raised	Government agencies	Transport providers	Utilities	Impacted residents/ businesses	Wider community	Aboriginal stakeholders
Project description	✓	✓	✓	✓	✓	
Project justification and need				✓	✓	
Operation of the project	✓	✓	✓		✓	
Construction	✓		✓	✓	✓	
Traffic and transport	✓	✓		✓	✓	
Noise and vibration	✓	✓	✓	✓	✓	
Air quality	✓			✓	✓	
Hazards and risks	✓		✓		✓	
Visual amenity	✓			✓	✓	

Key issues raised	Government agencies	Transport providers	Utilities	Impacted residents/ businesses	Wider community	Aboriginal stakeholders
Biodiversity	✓			✓	✓	
Heritage				✓	✓	✓
Soils					✓	
Waste management					✓	
Social and economic	✓				✓	
Public safety			✓		✓	
Electric and magnetic fields (EMF)	✓			✓	✓	
Consultation	✓			✓		

Table 6-4 outlines the topics and the key issues raised, and where they are addressed in the EIS.

Table 6-4 Topics and issues raised

Topic	Issues raised	Where addressed in the EIS
Project description	Preferred route and route selection process	Chapter 3 Project development and alternatives
	Co-location with other major infrastructure projects	Chapter 3 Project development and alternatives
	Diversity of electricity supply	Chapter 3 Project development and alternatives
	Cable route selection	Chapter 3 Project development and alternatives
	Cable route refinements	Chapter 3 Project development and alternatives
	Impacts to existing utility assets	Chapter 11 Hazards and risks; Chapter 20 Land use and property
	Location of cables in the road reserve	Chapter 4 Project description
	Conduit casing material	Chapter 4 Project description
	Length of sections of trench	Chapter 4 Project description
Project justification and need	Project need	Chapter 2 Strategic context and project need
Operation of the project	Access to joint bays during operation	Chapter 4 Project description
Construction	Construction timeline	Chapter 4 Project description
	Impacts to electricity and water supply	Chapter 11 Hazards and risks
	Restoration of road surface	Chapter 4 Project description
	Frequency and use of construction laydown areas	Chapter 4 Project description
Traffic and transport	Disruption to traffic during construction	Chapter 7 Traffic and transport
	Traffic management plans	
	Disruption to public transport	

Topic	Issues raised	Where addressed in the EIS
	Night works	
	Disruption to bike paths and pedestrian walkways	
	Detours and road closures	
	Maintaining access to properties and businesses during construction	Chapter 7 Traffic and transport; Chapter 20 Land use and property
Noise and vibration	Impacts of noise during construction for residents and businesses	Chapter 8 Noise and vibration
	Impacts of vibration to structural integrity of buildings	
	Impacts of noise to park areas	
Air quality	Air pollution during construction	Chapter 9 Air quality
Hazards and risks	Hazards relating to traffic and transport	Chapter 11 Hazards and risks
Visual amenity	Removal of/damage to street trees	Chapter 12 Visual amenity
	Impacts to visual amenity of parklands	
	Reinstating landscape following construction	
	Mitigation measures to reduce impacts to trees	
Biodiversity	Impacts to wetlands in Sydney Park	Chapter 13 Biodiversity; Chapter 16 Soils and water
	Impacts to vegetation in parks and public areas	Chapter 12 Visual amenity; Chapter 13 Biodiversity
Heritage	Impacts to established trees along Park Avenue	Chapter 15 Non-Aboriginal heritage
	Protection of Aboriginal artefacts during construction and operation/maintenance	Chapter 14 Aboriginal heritage
Soils	Encountering soil contamination during construction in Sydney Park	Chapter 16 Soils and contamination
Waste management	Encountering contaminated materials during construction in Sydney Park	Chapter 19 Waste management
Social and economic	Social implications of construction in Sydney Park	Chapter 21 Social and economic
	Social and economic implications of impacts to property access during construction	
Public safety	Impacts to public safety during construction	Chapter 11 Hazards and risks
	Impacts to public safety during operation	
EMF	Level of EMF during operation	Chapter 10 Electric and magnetic fields
	Health impacts of EMF	
Consultation	Consultation process during pre-EIS period	Chapter 6 Consultation

6.5 Consultation on the revised route: early 2019

A revised route was identified in early 2019 that would meet key stakeholder requirements, address concerns raised by communities and improve constructability of the project.

The environmental assessment process and community consultation on the revised route commenced in January 2019. This is outlined further in **Chapter 3 Project development and alternatives**.

6.5.1 Stakeholder identification

Using desktop searches and field visits, TransGrid identified new stakeholders directly along or next to the revised transmission cable route, as well as newly affected stakeholder groups in the wider community likely to have an interest in the construction and operation of the project.

6.5.2 Community and stakeholder contact and information tools

TransGrid continued to use several community contact points and information tools which are listed in **Table 6-2**. These were available to all stakeholders to enable direct contact with the project team, provide feedback or request information about the project.

6.5.3 Project update newsletters

Between 11 May and 13 May 2019, approximately 24,000 project update newsletters were distributed via letterbox drop to:

- newly affected stakeholders advising them of the revised route;
- stakeholders in areas where the route remained the same advising them about the EIS public display delay; and
- stakeholders no longer affected advising them that the revised route would no longer pass through their area.

Newsletters were distributed to properties:

- 200 metres either side of the revised and previous routes;
- 100 metres around any construction laydown area; and
- 100 metres around Sydney Park.

Project update newsletters were:

- available digitally on the project webpage as PDF files;
- translated into six languages (refer to **Table 6-1** above for translated languages) and provided contact details of an interpreter service;
- emailed to stakeholders and businesses; and
- made available at community information sessions as hard copies.

6.5.4 Social media

A geo-targeted social media campaign using TransGrid's Facebook platform was used to raise awareness of the project and encourage community members to attend a community information session. This targeted campaign promoting an event page ran between 3 June and 16 June 2019.

The social media statistics for this period included:

- 3,500 users reached;
- 94 event page views; and
- 13 link clicks.

6.5.5 Social Pinpoint

The interactive feedback platform, Social Pinpoint, was used to capture issues of concern from community members and stakeholders. Users were able to submit their concerns and "pin" them to a specific area along the transmission cable route.

Between 10 May and 24 July 2019, Social Pinpoint received 2845 total visits by 917 unique users. Forty unique stakeholders provided their feedback by leaving 64 comments and 79 comment endorsements from other users in the form of 77 likes and two dislikes (refer to **Figure 6-3**).

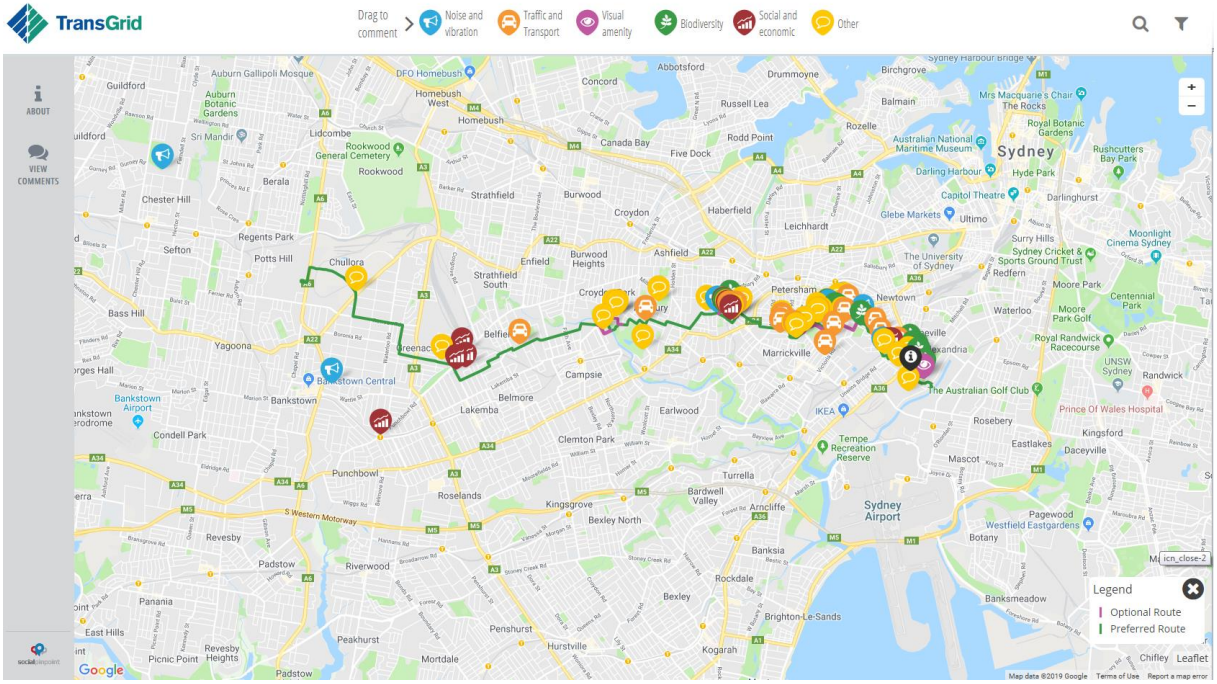

Figure 6-3 Powering Sydney's Future Social Pinpoint webpage

6.5.6 Newspaper advertisements

Newspaper advertisements were used to increase awareness of the project, advertise community information sessions and encourage community members to provide feedback on the project.

Newspaper advertisements were published on 21 May and 28 May 2019 in the:

- Canterbury Bankstown Express; and
- Inner West Courier.

6.5.7 Postcards

On 20 May 2019, approximately 22,700 postcards advertising community information sessions were distributed via letterbox drop to residents along the revised route. The distribution area included properties:

- 200 metres either side of the revised route;
- 100 metres around any construction laydown area; and
- 100 metres around Sydney Park.

The postcard was also available on the TransGrid website (refer to **Figure 6-4**).

Figure 6-4 Postcard distributed to residents along project route

6.5.8 Community and stakeholder briefings

Community and stakeholder briefings were organised to discuss the potential impact of the revised route. Meetings were offered, via email and phone, to individuals from:

- government authorities, including Roads and Maritime, TfNSW, ARTC, Transport Management Centre, Sydney Coordination Office;
- major development proponents/transport operators, including Transdev, ALTRAC, Sydney Light Rail, Sydney Trains;
- utility providers, including Telstra, NBN Co., Optus, Uecomm, Vocus Communications, Sydney Water, Viva Energy, Caltex, Jemena and Ausgrid;

- local councils, including City of Sydney, City of Canterbury-Bankstown, Inner West Council and Strathfield Council;
- local schools, including Canterbury Vale School, Hampden Park Public School, Rissalah College, Canterbury Boys High School, Trinity Grammar, Dulwich Hill School of Visual Arts and Design, Marrickville High School and Newington College;
- businesses, child care centres, healthcare providers, religious institutions, resident action groups and cultural groups;
- local environment groups, including Cooks River Alliance River Association, Mudcrabs – Cooks River, Inner West Environmental Group, Cooks River Valley Association, Cooks River Sustainability Centre & Riverside Parklands and GreenWay;
- bicycle groups, including Bicycle NSW, Bike Sydney, Bike Marrickville, Ashfield Bicycle Group, Art Cycle Sydney and Bike South West;
- community groups, including Pedestrian Council of Australia, Physical Disability Council of NSW, Hellenic Art Theatre/Greek Cultural Association, NSW Chinese Association, CASS Care; Canterbury Marrickville Sector Support Forum, Physical Disability Council of NSW, Lebanese Muslim Association, Muslim Women Association, Ethnic Community Service Co-operative and Ethnic Communities Council; and
- chambers of commerce, including South West Bankstown Chamber of Commerce, Marrickville Chamber of Commerce, Croydon Park Business Chamber and NSW Business Chamber – Sydney West.

During the consultation on the revised route, 120 community or stakeholder groups were briefed about the project and offered an opportunity to provide feedback.

6.5.9 Community information sessions

Community information sessions were an opportunity for newly affected community members and stakeholders to understand the project and input into the EIS.

Three community information sessions were held at various locations along the revised route.

Community members were able to talk one-on-one with the project team. To maximise the opportunity for community members to attend, sessions were held at varying times and days:

- Canterbury Plaza, Canterbury (outside Woolworths): Thursday 13 June 2019, 4.00 pm – 7.00 pm (refer to **Figure 6-5**);
- Broadway Plaza, Punchbowl (outside Woolworths): Saturday 15 June 2019, 9.00 am – 3.00 pm; and
- Marrickville Organic Food Markets, Marrickville: Sunday 16 June 2019, 9.00 am – 3.00 pm.

At the information sessions:

- communication material available included project update newsletters, both hard and soft copies, available in six languages other than English (refer to **Table 6-1** above for translated languages);
- TransGrid's Social Pinpoint map was available on iPads for community members to view the revised route and provide feedback;
- interactive technology was available on iPads for community members to view a 3D simulation of three project construction activities including trench excavation, conduit installation and road restoration; and
- community members were encouraged to complete a feedback form or sign up to the email distribution list to receive project updates.

A total of 26 community members attended the three community information sessions.

Figure 6-5 Community information session at Canterbury Plaza on 13 June 2019

6.5.10 Emails

Emails were sent to stakeholders to re-introduce the project and organise meetings and briefings. A total of 135 emails were sent to 162 unique stakeholders.

Emails were received from stakeholders and community members to organise meetings and provide feedback to the project team. A total of 95 emails were received from 97 unique stakeholders.

6.5.11 Phone calls

Phone calls were made to stakeholders to provide briefings and follow up on letters and email invitations for meetings. A total of 154 phone calls were made to 111 unique stakeholders.

Phone calls were received from stakeholders and community members to organise meetings, provide feedback and make project-related complaints. A total of 27 phone calls were received from 26 unique stakeholders.

6.5.12 Doorknocking

Between 23 May and 29 May 2019, a total of 610 properties in key locations along the revised route were door knocked by the project team. Of these, 206 stakeholders were briefed about the project.

The purpose of the door knocks was to provide project information, capture issues, distribute project update newsletters and answer questions about the project. Project update newsletters and business cards were left in letterboxes of unavailable owners/occupants.

Stakeholders that were briefed during door knocking consisted of:

- 153 residential properties;
- 48 businesses;
- 3 childcare centres;
- 1 religious institution; and
- 1 charity.

6.5.13 Results of consultation on the revised route

Feedback provided by community members and key stakeholders during consultation on the revised route has been grouped into themes. **Table 6-5** outlines the themes identified during meetings, briefings, door knocks, via Social Pinpoint, email and phone

Table 6-5 Themes identified during consultation on the revised route

Key themes identified	Government agencies	Transport stakeholders	Utilities	Impacted residents/ businesses	Wider community	Aboriginal stakeholders
Project description	✓	✓	✓	✓	✓	
Project justification and need				✓	✓	
Statutory planning and approval process					✓	
Operation of the project			✓	✓	✓	
Construction	✓	✓	✓	✓	✓	
Traffic and transport	✓	✓		✓	✓	
Noise and vibration		✓		✓	✓	
Air quality				✓	✓	
Hazards and risks	✓	✓	✓	✓	✓	
Visual amenity	✓			✓	✓	
Biodiversity				✓	✓	
Heritage						✓
Soils and contamination						
Surface water and flooding					✓	
Groundwater						
Land use and property	✓			✓		
Waste management						
Social and economic	✓	✓		✓	✓	
Cumulative impacts		✓		✓	✓	
EMF				✓	✓	
Consultation	✓			✓	✓	

Stakeholders and community members raised a number of topics during consultation on the revised route. **Table 6-6** outlines the topics raised and where they are addressed in the EIS.

Table 6-6 Themes and topics from consultation on the revised route and where addressed in the EIS

Themes	Topics raised	Where addressed in the EIS
Project description including construction	Road restoration upon project completion	Chapter 4 Project description
	Restoration of traffic signals and feedback loops	
	Construction hours and noise impacts	
	Lifespan of conduits	
	Location of joint bays along the route	
	Whether the cable is Direct Current (DC) or Alternating Current (AC)	
	Deregulation of electricity as part of the project	
	Disruption to power supply during construction	
	Maintaining access to and protecting existing utilities during construction	
	Location of joint bays	
	Construction program and timeline	
	Ownership of cable bridges	
Approval process	Project approval process and whether the preferred route could change	Chapter 5 Statutory planning and approval process
Project justification and need	Ownership of TransGrid and whether it is an Australian company	Chapter 2 Strategic context and project need
	Locations of other 330kV cables in Sydney	
	Electricity prices increasing because of the project	
	Location of cables being replaced	
	Lack of benefit to suburbs impacted by construction	
	Alignment of revised route	
	Revised route does not utilise parks and public reserves enough	
	Revised route should utilise industrial areas	
	Revised route should follow Bankstown train line corridor	
	Public health not listed as a consideration in the Route Selection Study	Chapter 3 Project development and alternatives
Traffic and transport	Maintaining property access during construction	Chapter 20 Land use and property Chapter 7 Traffic and transport
	Traffic impact associated with a number of roads in revised route	Chapter 7 Traffic and transport
	Impact to disabled parking spaces	
	Loss of street parking	

Themes	Topics raised	Where addressed in the EIS
	Impact to parking at Roslyn Street near Holmes Avenue, Ashbury	
	Impact to light rail operations at Arlington during construction	
	Impacts to bus services during construction	
	Permanent re-routing of cycleway along Surrey Street	
	Impact to partially approved cycle pathway under Davis Street to Constitution Road, Dulwich Hill	
	Impact to Hume Highway	
	Suggestion to avoid construction on Fridays in Lakemba area (due to increased traffic on prayer day)	
	Disruption to school and public bus routes	
	Construction near schools should occur during school holidays to avoid traffic congestion	
	Minimising impacts to bicycle riders during construction	
Cumulative impacts	Cumulative traffic impacts as a result of coinciding transport infrastructure projects	Chapter 22 Cumulative impacts
Heritage	Impacts to Aboriginal heritage	Chapter 14 Aboriginal heritage
Noise and vibration	Impacts from vibration during construction on houses over 100 years old in Marrickville	Chapter 15 Non-Aboriginal heritage Chapter 8 Noise and vibration
	Noise impacts during construction	Chapter 8 Noise and vibration
Air quality	Dust produced during construction	Chapter 9 Air quality
Hazards and risks Property and land use	Changes to council Development Application process or building management once cable has been installed	Chapter 11 Hazards and risks Chapter 20 Land use and property
Visual amenity	Impact to street trees	Chapter 12 Visual amenity
	Potential removal of street trees along Muir Road	
Biodiversity	Potential impacts to brush box trees and tree root systems in Johnson Park, Dulwich Hill	Chapter 13 Biodiversity
	Potential impacts to fauna habitats in Johnson Park, Dulwich Hill	
	Impacts to verge gardens at Hill Street, Dulwich Hill	Chapter 13 Biodiversity Chapter 12 Visual amenity
	Impacts to the GreenWay	
Soils and water	Flood zones as a consideration for the EIS	Chapter 17 Surface water and flooding
	Route passes through areas prone to flooding	
EMF	EMF levels associated with the project	

Themes	Topics raised	Where addressed in the EIS
	Health impacts from EMF	Chapter 10 Electric and magnetic fields
	EMF diagram showing time weighted average should also show maximum and minimum levels	
	Preference for cables to be installed away from residential properties due to potential EMF exposure	
	Proposed minimum distance of cable from homes	
Social and economic	Removal of street trees	Chapter 21 Social and Economic
	Business and economic impacts associated with the construction of the project	
	Amenity impacts on local businesses, including effects on the ability of customers, employees or business owners to enjoy and have access to their workplace and daily activities	
	Impact to communities during religious celebrations (e.g. Eid)	
	Social impact to communities during construction in parks and public reserves	
Land use	Use of council-owned parks and reserves as laydown areas during construction	Chapter 20 Land use and property
Consultation	Lack of notification for investigation works	Chapter 6 Consultation
	Lack of trust in consultation process	
	Level of contractor-led consultation with councils during construction phase	

6.6 Consultation during exhibition of the EIS: October 2019

The EIS will be placed on public exhibition by DPIE for six weeks during October and November 2019. During this period, stakeholders and the community will be able to view the EIS at the following locations:

- City of Canterbury Bankstown Council offices at Bankstown and Campsie;
- Emanuel Tsardoulias Community Library, Dulwich Hill;
- Inner West Council Petersham Service Centre, Petersham; and
- Green Square Library, Zetland.

Electronic copies of the EIS will also be available to view and download from the DPIE Major Projects website.

TransGrid will continue to consult with key stakeholders during this period, to discuss the EIS, before stakeholders make a formal submission to DPIE.

A description of the consultation activities to be carried out during the public exhibition period is provided below.

6.6.1 Community and stakeholder contact and information tools

TransGrid will continue to use contact points and information tools established for the project. These will be available for all stakeholders to directly contact the project team and request project information.

6.6.2 Project update newsletters

Project update newsletters will be sent, via mail and email, to stakeholders and the community to keep them informed about the project. Project update newsletters will contain information about EIS display locations and upcoming community information sessions.

The newsletters will be provided in English and translated into six languages as per previous stages of the project (refer to **Table 6-1** for a list of translated languages). Project update newsletters will also be available digitally on the project webpage.

6.6.3 Project webpage update and social media posts

An update on the project webpage and a social media campaign using Facebook, LinkedIn and Twitter will be used to notify stakeholders and the community about the EIS exhibition period. The website update and social media posts will contain information about EIS display locations and upcoming community information sessions.

6.6.4 Emails

Emails will be sent to community members and stakeholders captured in the email distribution list notifying them of the EIS exhibition dates. The email will contain information about EIS display locations and upcoming community information sessions.

6.6.5 Social Pinpoint

Social Pinpoint will not be available for comments during the EIS exhibition. All submissions on the EIS should be sent to DPIE, who will then forward the submissions to TransGrid for consideration and review.

6.6.6 Meetings

One-on-one meetings will be offered to stakeholders who request additional information about the EIS.

6.6.7 Community information sessions

Five community information sessions will be held to discuss the project with community members and answer questions on the EIS.

During these sessions, community members will have the opportunity to discuss the EIS with technical specialists. Communication material available will include a community guide to the EIS, maps, posters, and iPads with 3D simulations of three project construction activities.

Community information sessions will be held at representative locations within the project area.

6.7 Future consultation: from 2020

6.7.1 Submissions Report

Written submissions received by DPIE during the EIS exhibition period will be forwarded to TransGrid for consideration and review. After reviewing the submissions, TransGrid will prepare a Submissions Report documenting all the submissions received and TransGrid's response. This report will be made publicly available on the DPIE major projects website in 2020.

6.7.2 Community consultation for the Submissions Report

Once the Submissions Report has been published, TransGrid's project webpage will be updated and social media posts will be published to inform the community and stakeholders that the Submissions Report for the project is available to view.

A newsletter will also be distributed to the community and stakeholders when the Submissions Report is published.

6.7.3 Consultation during detailed design and construction

TransGrid would continue community and stakeholder consultation to ensure the community and stakeholders are informed about the project and have opportunities to provide feedback to the project team during detailed design and construction.

Ongoing consultation will be carried out during:

- Detailed design, from 2020; and
- Construction, from 2020 to 2022.

Ongoing community and stakeholder consultation will be guided by the CCF. The CCF has been informed by community and stakeholder consultation during the preparation of the EIS and will be updated based on feedback received during the exhibition of the EIS and future consultation phases.

The CCF outlines:

- stakeholders relevant to the project;
- procedures for distributing information and receiving/responding to feedback;
- procedures for resolving community and stakeholder complaints during construction and operation; and
- key issues including traffic management (including property access, pedestrian and bicycle access), construction activities (including work outside of standard construction hours), and noise and vibration mitigation and management.

The consultation objectives of the CCF are aligned with TransGrid's guiding principles for engagement and a set of commitments TransGrid upholds in all consultation activities, which include:

- providing consistent engagement and communication with the community and stakeholders to ensure they are aware of activities associated with the project;
- ensuring information is dispersed to the community and stakeholders in a timely manner;
- ensuring the community and stakeholders have opportunities to provide feedback to the project team;
- providing responses to enquiries and complaints in a timely manner; and
- resolving enquiries and complaints in a timely manner.

As per the *Community Consultative Committee Guideline for State Significant Projects, January 2019,* referenced in the SEARs, community consultative committees are encouraged for state significant projects. As outlined in the CCF, TransGrid intends to establish a Community and Stakeholder Reference Group (CSRG).

This CSRG would be established prior to construction of the project, and formed of representatives from the community, councils and the project team. The purpose of the CSRG would be to provide advice on the management and mitigation of issues related to the construction of the project, and the management of complaints.