NSW GOVERNMENT | Planning & Infrastructure

MAJOR PROJECT ASSESSMENT:
Sydney CityGrid Stage 2D
City East and City South Cable Tunnels
(MP10_0141)

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

July 2011

ABBREVIATIONS

CECT	City East Cable Tunnel
CSCT	City South Cable Tunnel
CIV	Capital Investment Value
Department	Department of Planning & Infrastructure
DGRs	Director-General's Requirements
Director-General	Director-General of the Department of Planning & Infrastructure
EA	Environmental Assessment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPI	Environmental Planning Instrument
MD SEPP	State Environmental Planning Policy (Major Development) 2005
Minister	Minister for Planning & Infrastructure
Part 3A	Part 3A of the *Environmental Planning and Assessment Act 1979*
PEA	Preliminary Environmental Assessment
PFM	Planning Focus Meeting
PPR	Preferred Project Report
Proponent	Ausgrid
RtS	Response to Submissions
STSS	Subtransmission Switching Station

Cover Photograph: Cable Tunnel (Ausgrid 2011)

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NSW Government
Department of Planning & Infrastructure

EXECUTIVE SUMMARY

Ausgrid (the Proponent), formerly EnergyAustralia, proposes to upgrade electricity supply to the Sydney Central Business District to meet future demand, ensure the continuation of a reliable supply to this area, and meet its N-2 Licence obligations imposed by the then Department of Water and Energy. This N-2 obligation is defined as the ability to meet peak electricity demand with two major network elements out of service. The project, known as Sydney CityGrid, includes new/upgraded/refurbished substations and the replacement of old high voltage cables. The project is subject to Part 3A of the *Environmental Planning and Assessment Act 1979* (the EP&A Act), by virtue of an Order made by the then Minister for Planning under section 75B of the Act on 11 February 2008. On 21 April 2008, the then Minister for Planning authorised the submission of a Concept Plan for the proposal. The Concept Plan includes the following components:

1. Stage 1A being the construction and operation of the Belmore Park Zone substation building and stub tunnel connection from the existing City South Cable Tunnel to the Belmore Park Zone substation;

2. Stage 1B being commercial/retail development on the corner of Pitt, Campbell and Hay Streets to be integrated with works comprising Stage 1A;

3. Stage 2A being the construction and operation of the City East Zone substation with potential commercial/retail development in the vicinity of Philip, Bent, Bligh and O'Connell Streets;

4. Stage 2B being refurbishment of the existing Dalley Street Zone substation, or construction of a new building adjacent to the existing site;

5. Stage 2C being the construction and operation of a sub-transmission switching station (STSS) at Riley Street;

6. Stage 2D being the City East Cable Tunnel (CECT) to be constructed between Riley Street STSS and the City North Zone substation, with connections to the proposed City East and existing Dalley Street Zone substations, and a potential services control room adjacent to the Riley Street STSS; and

7. Stage 2E being extension to the City South Cable Tunnel (CSCT) from Wade Place to Riley Street, Surry Hills.

Concept Plan Approval and Project Approval for Stage 1 were granted on 20 September 2009.

The Proponent now seeks project approval for Stages 2B, 2D and 2E. For the purpose of this application these three stages are collectively known as Stage 2D.

The Project Application for Stage 2D originally included the refurbishment of the existing Dalley Street Zone substation. However, as outlined in the Preferred Project Report, it is no longer proposed to refurbish the substation, or construct the shaft to connect to the CECT. As a result the alignment of the CECT was altered to run south of Dalley Street.

The entire project has a capital cost of $800 million, with Stage 2D of the project having a capital cost of approximately $200 million. Stage 2D is estimated to take approximately 4 – 5 years to complete.

The Department considers that the cable tunnels and associated works are necessary for the completion of the overall Sydney CityGrid project and would therefore be in the public interest as they would facilitate a required major upgrade to the Sydney CBD's electricity

supply infrastructure over the next decade and would support the ongoing growth and economic importance of Australia's major city.

During the exhibition period of the Environmental Assessment, the Department received a total of sixteen submissions. These comprised of 7 submissions from public authorities and 9 submissions from the general public and special interest groups.

The submissions raised a number of key issues including noise and vibration, archaeology/heritage, traffic, groundwater/drainage and spoil and waste management. The Department is satisfied that the impacts of the proposal would be minimal and can be appropriately managed.

The Department therefore recommends approval of the project, subject to conditions.

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1. BACKGROUND

Ausgrid (the Proponent), formerly EnergyAustralia, proposes to upgrade electricity supply to the Sydney Central Business District (CBD) to meet future demand, ensure the continuation of a reliable supply to this area, and meet its N-2* Licence obligations imposed by the then Department of Water and Energy.

The Proponent developed the Sydney CityGrid Project as an integrated program of works to upgrade critical electricity infrastructure in Sydney's CBD in order to meet its licence requirements. The project includes new/upgraded/refurbished substations and the replacement of old high voltage cables.

On 20 September 2009, the then Minister for Planning granted Concept Plan Approval for the Sydney CityGrid Project and Project Approval for Stage 1A and 1B (comprising the construction and operation of Belmore Park Zone Substation, and the integration of a commercial development and stub tunnel connection from the existing City South Cable Tunnel to Belmore Park Zone substation).

The Proponent has now sought Project Approval for Stage 2B, 2D and 2E of the Sydney CityGrid Project which are collectively referred to as Stage 2D. The project location and layout as originally proposed are shown in Figure 1.

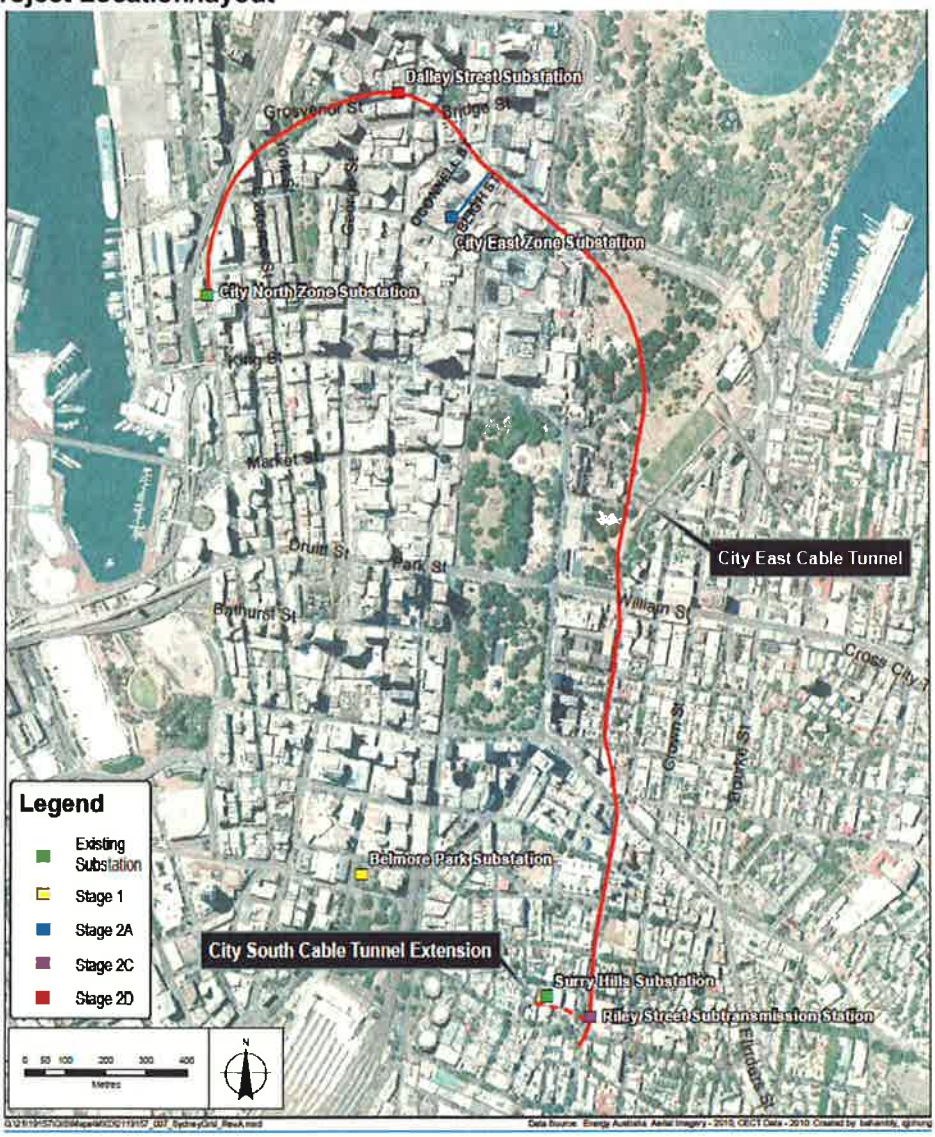
The project application seeks approval to construct and operate infrastructure which is a critical component to the overall Sydney CityGrid Project including:

- Construction of the 3.2 km CECT between a site on the corner of Albion Street and Riley Street, Surry Hills, and the City North Zone Substation at the northern end of the CBD, with connections to the proposed City East Substation and existing Dalley Street Zone Substation;
- Extension of the existing CSCT by approximately 150 m between the existing Surry Hills shaft at Wade Place, Surry Hills, and the site proposed for the Riley Street STSS on the corner of Albion and Riley Streets, Surry Hills; and
- If required, refurbishment of the existing Dalley Street Zone Substation involving replacement of equipment such as switchgear. This would require a shaft in Dalley Street to connect the CECT to the Dalley Street Zone Substation.

The Preferred Project Report amended the proposal so that approval is no longer sought to refurbish the Dalley Street Zone Substation and consequently the alignment of the CECT has been refined to accommodate this change (refer to Figure 2).

* The Minister for Energy added a condition to Ausgrid's operating licence in December 2007 to adopt 'N-2' reliability. The new licence requirement specifies that all city zone substations and transmission feeders must be able to supply the full electricity demand with any two transformers or feeders out of service. This is to be achieved by 2014.

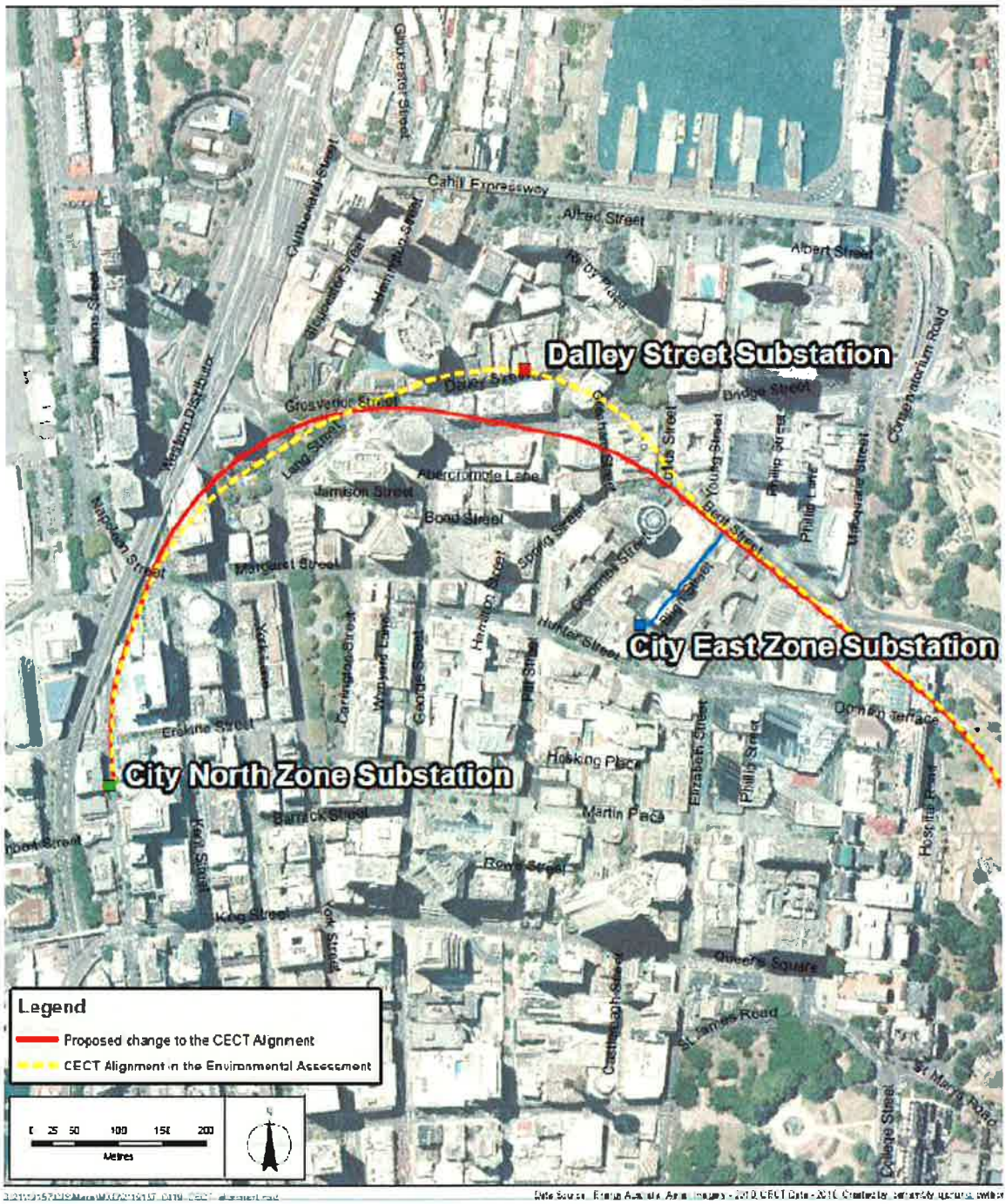
Figure 1: Project Location/layout



(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

The site is located within Sydney's CBD which is characterised by a highly urbanised built form including high rise commercial, retail and residential developments. The CECT and CSCT (see Figure 1) would pass under a range of land uses including residential, commercial, recreational and public services.

Figure 2: Revised components of the Sydney CityGrid Project



(Source: EnergyAustralia Stage 2D of the Sydney CityGrid Project Submissions Response and Preferred Project Report (EnergyAustralia February 2011))

2. PROPOSED PROJECT

2.1. Project Description

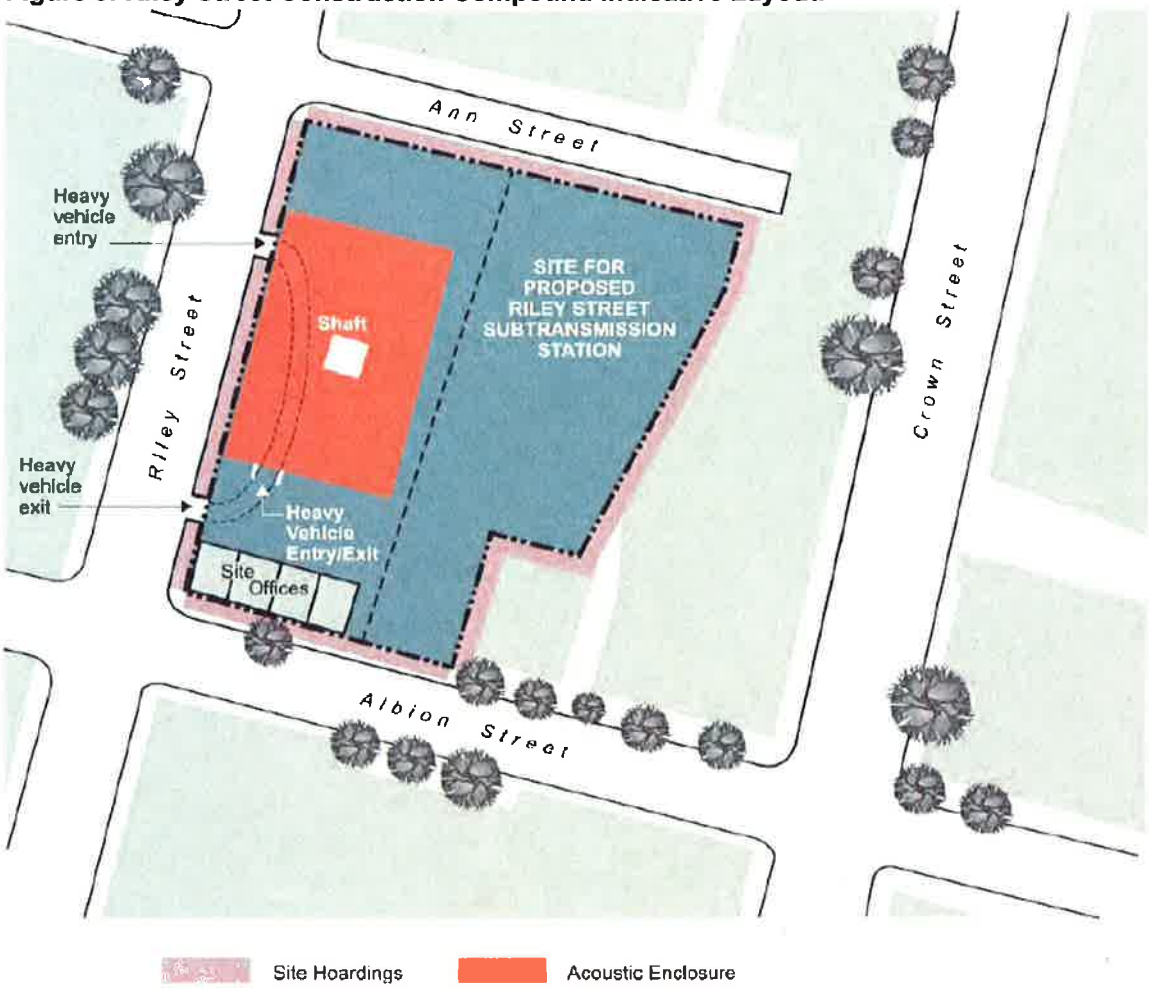
The Proponent is seeking project approval to develop Stage 2D which is an essential component of the overall Sydney CityGrid Project. Table 1 describes the key features of the works proposed as part of the Proponent's Project Application. The construction activities are expected to take approximately 4 years. The project layout is shown in Figure 1. Amendments to the alignment as a result of the PPR are shown Figure 2. The key components of the project are listed in Table 1.

Table 1: Key Project Components

Aspect	*Description*
Project Summary	• **Site establishment of the Riley Street compound;** • **Tunnel Construction process involving detailed surveys, dilapidation survey, shaft excavation, construction of the CSCT extension, construction of the CECT, groundwater management and tunnel ventilation and dust control;** • **Fitout and commissioning; and** • **Ancillary works.**
Site establishment of the Riley Street compound	The establishment of the Riley Street compound including: • installation of hoardings (see Figure 3); • site amenities; • construction facilities including an acoustic enclosure and gantry crane over tunnel shaft, a temporary groundwater treatment plant, a temporary storage area, temporary tunnel ventilation equipment, temporary site amenities; • dilapidation surveys; and • site access.
Tunnel Construction	The tunnel construction process would include: • surveys of existing services and utilities; • dilapidation surveys; • shaft excavation using a rock breaker, excavation of the tunnel cavern using a road header, installation of mesh and rock bolts, and installation of shotcrete on the walls; • construction of the 3.2km CECT using a tunnel boring machine between a site on the corner of Albion Street and Riley Street, Surry Hills, and the City North Zone Substation at the north end of the CBD, with connections to the proposed City East Substation; • construction of the CSCT extension using a road header, extending the existing CSCT by approximately 150m between the existing Surry Hills shaft at Wade Place, Surry Hills, and the site proposed for the Riley Street STSS on the corner of Albion and Riley Streets, Surry Hills; • construction of groundwater management measures; and • tunnel ventilation and dust control.
Ancillary Works	Ancillary works would include, but are not limited to, the construction of shafts at the following location: • within Yurong Parkway to connect to the CECT and facilitate 33kV feeders entering/leaving the tunnel; and • within Little Albion Street to connect the CSCT extension to facilitate 33kV feeders entering/leaving the tunnel. Compounds would be present at the shaft locations to provide access to

Aspect	Description
	subsurface works associated with construction of the shafts, including installation of lining and fit out.
Spoil volumes, handling and removal.	Spoil is to be removed during excavation of the shafts and construction of the tunnels. The total expected spoil generated from the project would be approximately 50,000m³.
Fit-out of the CECT, CSCT extension and associated connection tunnels	Fit-out would commence in parallel but lagging behind excavation. This would include: • installation of steel cable support posts and arms on either side of the tunnel; • installation of access platforms and stairs; • electrical, communication and lighting services required for operation of the tunnel; and • installation of the supervisory control and data acquisition system (SCADA), to operate and record tunnel operations.

Figure 3: Riley Street Construction Compound Indicative Layout.



(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

2.2. Project Need and Justification

Concept Approval for the Sydney CityGrid project has been granted. Stage 2D is to construct and operate infrastructure which is a critical component to the overall CityGrid Project. Failure to construct the CECT and CSCT would mean failure to complete the overall Sydney CityGrid Project. The Proponent states that in order to provide a reliable and secure supply of energy in Sydney's CBD, the existing infrastructure requires refurbishment, replacement and augmentation which complies with its "N-2" licensing requirement. The licence requirement specifies that all city zone substations and transmission feeders must achieve "N-2" capacity. This means they must be able to provide electricity at peak demand with two transformers or feeders offline. The Proponent has found that this increased level of security cannot be applied to existing 33/11 kV zone substations without reducing their ratings. As such, it is necessary to change the design and operating arrangements of the Sydney CBD supply network in order to provide additional capacity to meet the imposed N-2 security criteria.

The main electricity supply to the Sydney CBD is derived from five zone substations (City North, City East, Dalley Street, City South and New City Central), which range in age from three years to more than 50 years old. The Proponent states that the reliability performance of its equipment and infrastructure is managed through maintenance and replacement of that infrastructure. For the Proponent, the decision to replace infrastructure is based on an assessment of equipment condition and consideration of the strategic replacement needs of the electricity supply network. This Project encompasses the Proponent's long term strategy to replace and/or refurbish its infrastructure. It takes into account the need to ensure that security of supply is maintained to the Sydney CBD, while equipment is removed from service for refurbishment or replacement.

The current total capacity of the zone substations in the Sydney CBD is 664 Megavolt Ampere (MVA)[†], however the Proponent's city load forecast has shown that the demand will reach existing capacity by the year 2012. The forecast indicates an expected average annual growth rate of 1.6 per cent (11 MVA) up to the year 2020, with an upper limit of 2.2 per cent (15MVA) per annum. The Proponent states that the modification of the electricity supply and operating arrangements of existing zone substations and sub-transmission feeders is required to provide additional capacity, to meet its obligations under the N-2 licence criteria.

Construction of the CECT would enable 4 feeders to connect the City East Substation to the City North Substation. A new subtransmission switching station (STSS) is required at Riley Street, Surry Hills, to connect the Eastern CBD electricity network to the 132kV supply to the Eastern Suburbs. The STSS would also provide 132kV connections to a future Bulk Supply Point to be constructed on the same site post 2020. The STSS is part of Stage 2C and therefore is subject to a separate future Project Application.

The CSCT extension is required to connect the Surry Hill STS in Ann Street to the future Riley Street STSS and would additionally connect to existing 33kV feeders and new 132kV feeders connecting to the Rose Bay Substation.

The Department also considers that the Project is consistent with the Priorities and Targets in the State Plan of 'achiev[ing] electricity reliability for NSW of 99.98% by 2016'. The Project is also consistent with the State Plan target to 'maintain and invest in infrastructure'.

The Department also notes that overall project benefits such as an increase in the capacity of electricity distribution in the Sydney region would mean that adequate power supply can be maintained and improved in circumstances where new commercial and residential

[†] Measure of electrical capacity equal to the product of the voltage times the current.

developments are approved, in furtherance of housing and employment targets contained in the Metropolitan Strategy and the draft Sydney City Subregional Strategy.

3. STATUTORY CONTEXT

3.1. Major Project

On 11 February 2008 the then Minister for Planning declared the project to be subject to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) under section 75B of that Act. Therefore the Minister for Planning & Infrastructure is the approval authority.

On 25 January 2010, the then Minister for Planning delegated responsibility for the determination of project applications under Part 3A of the *Environmental Planning and Assessment Act 1979* to the Director-General where there are fewer than 25 submissions in the nature of objections in respect of the project application; and the project is not a critical infrastructure project under section 75C of the EP&A Act. The Director-General can therefore determine the project under delegated authority. The Minister for Planning and Infrastructure has confirmed this delegation subject also to the local council not objecting to the proposal.

3.2. Concept Pan

Concept approval for the Sydney CityGrid Project and Project Approval for Stage 1 of the Belmore Park Zone Substation were granted by the then Minister for Planning under Part 3A of the EP&A Act 1979 on 20 September 2009.

3.3. Permissibility

The proposed development is located wholly within the City of Sydney Local Government Area, within the Sydney CBD. The proposed project is permissible without development consent as clause 41 of the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) provides that development for the purpose of an electricity transmission or distribution network may be carried out by or on behalf of an electricity supply authority or public authority without development consent on any land. The Proponent is a statutory state-owned corporation owned by the NSW Government and is an electricity distributor.

3.4. Environmental Planning Instruments

There are no environmental planning instruments that substantially govern the carrying out of the project.

3.5. Objects of the EP&A Act

Decisions made under the EP&A Act must have regard to the objects of the Act, as set out in Section 5 of the Act. The relevant objects are:

(a) to encourage:

- *(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
- *(ii) the promotion and co-ordination of the orderly and economic use and development of land,*
- *(iii) the protection, provision and co-ordination of communication and utility services,*

(iv) the provision of land for public purposes,
(v) the provision and co-ordination of community services and facilities, and
(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and
(vii) ecologically sustainable development, and
(viii) the provision and maintenance of affordable housing, and

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and

(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

It is important to recognise that while the EP&A Act requires that the principles of ecologically sustainable development be encouraged, it provides other objects that must be equally included in the decision-making process for the subject proposal. The Department's assessment has given due consideration to relevant objects of the Act in its assessment including:

- the proper management and development of cities for the purpose of promoting the social and economic welfare of the community and a better environment – the Department's assessment of the need for the project (Section 2.2) has considered the need for ensuring reliable electricity supply to facilitate the ongoing efficient functioning, development and social and economic welfare of the Sydney CBD;
- the protection, provision and co-ordination of communication and utility services and provision of land for public purposes – has been considered in the Department's assessment of the need for the project (Section 2.2) which has considered the need for public utility infrastructure; and
- the need to encourage the principles of ecologically sustainable development (refer to Section 3.6).

In addition to the above, the agency and community consultation undertaken as part of the assessment process (see Section 4 of this report), address objects 5(b) and (c) of the Act.

3.6. Ecologically Sustainable Development

The EP&A Act adopts the definition of Ecologically Sustainable Development (ESD) found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental considerations in decision-making processes and that ESD can be achieved through the implementation of:

(a) the precautionary principle,
(b) inter-generational equity,
(c) conservation of biological diversity and ecological integrity,
(d) improved valuation, pricing and incentive mechanisms.

The Department's assessment of the need for the project (Section 2.2) has considered the need to ensure secure and reliable electricity supply to meet the needs of existing and future demand consistent with the principles of inter-generational equity. The Department's assessment of non- indigenous heritage, noise and vibration impacts, groundwater/drainage, traffic management, waste and air quality (Sections 5.1-5.6) has considered all reasonable and feasible measures to minimise impacts consistent with the principles of appropriate valuation and pricing mechanisms. In addition, the Department is satisfied that the project would not pose any significant risks to the conservation of biological diversity and ecological integrity as the project would be undertaken on already developed sites (Riley Street, Yurong Parkway and Little Albion Street), within an already built up area with little ecological value. The Department's assessment of impacts of the project is based on a conservative and

rigorous assessment to ensure that appropriate and adequate measures are put in place to prevent the threats of serious or irreversible environmental damage, consistent with the precautionary principle.

The majority of potential impacts of the proposal are likely to be localised and would not diminish options regarding land and resource uses. The proposal would not require large scale above ground earthworks and the locations of surface works are located within a highly modified urban environment with a high degree of landform modification so further ecological impacts would be minimal. The development has significant social and economic benefits on a local, state and federal level and would contribute to essential electricity upgrades in order to maintain a reliable supply of electricity to the CBD, cater for future electricity demand and introduce new technologies that are likely to reduce electricity 'losses', by reducing the resistance of the electricity network. With assessed benefits of the proposal and the assessed impacts on the environment and their ability to be managed, it is considered that the development would be ecologically sustainable within the context of the above principles.

3.7. Statement of Compliance

In accordance with section 75I of the EP&A Act, the Department is satisfied that the Director-General's environmental assessment requirements have been complied with.

4. CONSULTATION AND SUBMISSIONS

4.1. Exhibition

Under section 75H(3) of the EP&A Act, the Director-General is required to make the environmental assessment (EA) of an application publicly available for at least 30 days. After accepting the EA, the Department publicly exhibited it from 11 November 2010 until the 10 December 2010 (30 days) and again from 15 December 2010 until 21 January 2011 (38 days) on the Department's website, and at the Department of Planning Information Centre, the Nature Conservation Council of NSW and the City of Sydney Council. The Department also advertised the public exhibition in the *Sydney Central Courier, Daily Telegraph* and the *Sydney Morning Herald* on Wednesday 10 November 2010 and again on Wednesday 15 December 2010 and notified relevant State and local government authorities in writing.

The Department received 16 submissions during the exhibition of the EA - 7 submissions from public authorities and 9 submissions from the general public.

A summary of the issues raised in submissions is provided below.

4.2. Public Authority Submissions

7 submissions were received from public authorities: NSW Office of Water, the then Heritage Branch of the Department of Planning, City of Sydney Council, NSW Transport, Department of Environment, Climate Change and Water (now Office of Environment and Heritage), RailCorp, and the RTA.

None of the agencies objected to the proposal, however raised issues for the Department's consideration.

NSW Office of Water

- In order to assess the need for a water licence the extent of dewatering, including pumping volumes, flow rates and water quality need to be known. Pending further information on the magnitude of groundwater inflows a licence under Part 5 of the

Water Act 1972 may be required. NOW requested to be provided with a copy of the Water Quality Management Sub-Plan.

Heritage Branch (now part of OEH)

- The NSW Heritage Council supports mitigation measures proposed in relation to the archaeological and built heritage as well as Aboriginal heritage significance and recommended a number of conditions relating to archaeological heritage, built heritage and indigenous heritage.

City of Sydney

- Raised concern regarding impacts upon potential non indigenous archaeological deposits.
- Raised issues regarding the management of traffic during construction and requests Traffic Management Plans to be submitted to Council for approval.
- raised concern regarding noise and vibration impacts, and recommended noise criteria to be referred to within project design selection criteria.
- Requested additional information regarding construction and noise management to be submitted to Council prior to determination, including selection and maintenance of all mechanical plant, verified noise levels, community consultation plan, work schedules and work phases, review process, site induction details, formal complaint management system and community involvement plan.
- Requested tree removal to be detailed within appropriate plans and documentation and Council and community to be advised of any tree removal.
- As the proposal will potentially affect the public domain where shafts are proposed to be located, requested the Proponent to obtain approval from Council's Public Domain Unit prior to the commencement of works and that the public way is reinstated to Council satisfaction.
- Ausgrid should consult with Council to identify opportunities for undertaking joint capital (e.g. installation of green infrastructure) works that may minimise cost and disruption to the local environment.

NSW Transport

- Raised concerns about the interaction between the project and the approved metro, particularly during construction of the metro as the proposed CityGrid tunnel runs directly below the approved Interim Metro Corridor.
- Satisfied that the development can proceed without having an adverse effect on the viability of a future Interim Metro Corridor subject to the imposition of recommended conditions. These conditions require Ausgrid to enter into an agreement with Transport NSW that will ensure the proposal is designed, excavated and constructed in a manner that does not impact on the future structural integrity, operations or constructability of the Interim Metro Corridor.

Department of Environment, Climate Change and Water (now OEH)

- Recommended conditions of approval including a detailed Construction Noise and Vibration Management Plan (CNVMP).
- Conditions of approval recommended in relation to noise and vibration including reduced hours for rock breaking activities from 9am to 12pm Monday to Saturday and between 2pm to 5pm Monday to Friday and no time on Sundays and public holidays. All other construction work other than below ground tunnelling works and noise intensive activities such as rock breaking may be conducted between 7am and 7pm Monday to Friday and between 7am and 5pm Saturdays.
- Provided comments/conditions regarding the construction noise objective including any activities that have potential for noise emissions that exceed the objective must be identified and managed in accordance with the CNVMP. The Proponent must

implement all feasible and reasonable noise mitigation measures in order to achieve the objective.
- Specified noise criteria to be included in the conditions of approval. Vibration is to be assessed against the guideline contained in the DECCW publication "Environmental Noise Management – Assessing Vibration: a technical guideline" and in accordance with the CNVMP.
- Recommended a number of conditions in regards to encountering Aboriginal objects during construction, stormwater including the implementation of a Water Management Plan, and in relation to cumulative impacts and coordination, requiring Ausgrid to coordinate planned works in the area to reduce the impacts on both the community and the environment.

RailCorp
- The proposal will pose a number of impacts on existing and future RailCorp tunnels and infrastructure (e.g. excavation impacts), however these could be mitigated through entering an agreement/deed with RailCorp via recommended conditions of approval.
- RailCorp requests a number of amended commitments or conditions in order for RailCorp to protect its rail assets.

RTA
- Raised concerns regarding the location of the proposed City East Cable Tunnel (CECT) and its proximity to the Cross City Tunnel (CCT) and associated foundations/rock anchors.
- Ausgrid is currently consulting with the RTA's Motorways Management section and CCT operator to resolve operational, contractual and legal issues associated with this development. Until this is resolved the RTA does not have adequate information to grant its concurrence to the application under Section 138 of the *Roads Act 1993.*

4.3. Public Submissions

9 submissions were received from the public. Of the 9 public submissions, 3 objected to the project, 1 supported the overall project (but raised concerns regarding construction impacts on their home) and 5 did not object but raised concerns. The key issues raised in public submissions are listed in Table 2.

Table 2: Summary of Issues Raised in Public Submissions

Issue	Number of submissions
Noise and vibration	5
Stress relief in rock and settlement	1
Effect on water table	1
Electromagnetic radiation and corrosion	1
Traffic	2
Consultation / Lack of information	7
Structural damage/	2
Infrastructure damage	2
Planning Approval Process	1
Spoil Removal/Management	3

Issue	Number of submissions
Dust	1
Above ground infrastructure and design and character	3

The Department has considered the issues raised in submissions in its assessment of the project (refer to Table 3).

Table 3: Department's consideration of issues raised in Submissions

Issue	Department's Consideration
Non-indigenous Heritage Impacts	Section 5.2
Noise and Vibration (including structural integrity and infrastructure damage)	Section 5.1
Traffic Management	Section 5.3
Spoil & Waste Management	Section 5.5
Electromagnetic fields and Corrosion	The Proponent has committed to incorporating electromagnetic fields into the design of Stage 2D and will design its infrastructure to comply with national and international guidelines and standards on electric and magnetic fields. To minimise impacts, the design and mitigation measures have been designed in accordance with the principle of prudent avoidance. The EA states the cables would be located in a concrete lined tunnel at a depth of 10 to 55 metres below ground level, and therefore the EMF from these cables would not be discernable from typical background levels. The Proponent's development of design took into account corrosion through 'stray currents' and found it unlikely that any corrosion would occur to infrastructure foundations as the concrete lining would be constructed with steel fibre reinforcement rather than conventional steel bar, which prevents electric current being conducted.
Design and Character	The design and character of aboveground infrastructure can be adequately managed through proposed control measures. The Department has recommended a condition requiring an Urban Design and Landscape Sub-Plan to be submitted prior to construction for the Riley Street construction site in consultation with Council and all affected landowners. Ausgrid will be working with existing private property owners and Council and has committed to replacing any damaged street tree if required.
Groundwater/Water Quality	Section 5.4
Landuse	The Department has recommended a condition of approval requiring a Site Management Plan to manage public safety, ensure visual amenity, monitor and minimise soil erosion and the discharge of sediment and other pollutants and manage surface run-off.

	The Department is satisfied that these matters have been adequately addressed in the Conditions of Approval, Proponent's PPR and / or Statement of Commitments.
Consultation	The Department is satisfied that these matters have been adequately addressed in the Proponent's PPR and / or Statement of Commitments.
Construction/amenity issues (dust, air quality)	Impacts can be adequately managed through proposed control measures and in the CEMP. The Proponent is required to prepare an Air Quality Sub Plan which outlines measures to ensure that airborne dust does not cause problems to neighbouring properties.

All other issues are considered to be adequately addressed by the Proponent's Statement of Commitments.

4.4. Proponent's Response to Submissions

Ausgrid provided a response to the issues raised in submissions (see Appendix C). The Proponent amended a number of commitments in response to submissions received. The response included a Preferred Project Report which made changes to Stage 2D including deleting the refurbishment of the Dalley Street Substation and the construction shaft beneath Dalley Street to connect to the CECT. The alignment of the tunnel has also been adjusted to accommodate this change. In addition, a further response was provided from the Proponent dated 18 March 2011 addressing a late submission from Transport NSW and issues raised by the Department including justification for the changes to the project. Ausgrid confirmed that removal of the Dalley Street substation from the project would still enable Ausgrid to meet its N-2 obligations. The Dalley Street Substation was initially proposed to be refurbished to enable the substation to remain operational until its scheduled retirement date in 2022, however further investigations from Ausgrid established that refurbishment to connect the substation to other CBD substations was no longer necessary to enable it to function until its retirement, subject to required maintenance.

5. ASSESSMENT

The Department considers the key environmental issues for the project to be:

- Noise and Vibration
- Archaeology/Heritage
- Traffic
- Groundwater/Drainage
- Spoil and Waste Management

5.1. Noise and Vibration

Issue

The Proponent conducted a noise and vibration assessment in accordance with the Interim Construction Noise Guideline (CNG) (DECC, July 2009) and Assessing Vibration: a technical guideline (DEC February 2006). Operational noise and vibration is not anticipated to have any impact and therefore the report focuses on construction issues.

The Proponent has proposed to undertake extended construction hours (not including noise intensive activities) of 1 hour Monday to Fridays (7am to 7pm rather than 7am to 6pm as per

standard construction hours) and 5 hours on Saturdays (7am to 5pm rather than 8am to 1pm as per standard construction hours). The Proponent considered that these hours are necessary to ensure Ausgrid meets its commitment to the NSW Government to expedite delivery of the project to secure the electricity supply to Sydney's CBD and inner metropolitan areas.

Construction noise levels are predicted to exceed the noise management levels nominated at surrounding receivers. Daytime excavation noise is predicted to exceed noise management goals at adjacent residential properties surrounding the Riley Street site during site establishment and shaft excavation activities. Works at the Yurong Street excavation site, and the Little Albion Street site are predicted to exceed commercial and industrial noise objectives at surrounding receivers, due to the close proximity of surrounding buildings.

The Proponent's noise report states that vibration associated with excavation activities is likely to comply with established human comfort criteria. However, regenerated noise levels associated with the tunnelling are predicted to exceed criteria at locations where the tunnels are comparatively shallow.

The proposed changes to the project detailed in the PPR would result in slightly different noise and vibration impacts to those originally described in the EA between the intersection of Loftus Street and Bent Street and the City North Zone Substation. Refined vertical and horizontal alignments have altered the distance by 1 to 2m of the CECT from buildings and underground infrastructure in the area affected by this change. The Proponent states that generally a 20 to 30m separation occurs between the CECT and nearest underground structures, which the Proponent states is likely to comply with the criteria developed in accordance with the Interim Construction Noise Guideline (DECC, July 2009) and Assessing Vibration: a technical guideline for construction noise (DEC February 2006).

The Proponent established its construction noise goals following DECCW's CNG (July 2009). For residences, the daytime construction noise goal is that the $L_{Aeq,15min}$ noise level should not exceed the background noise by more than 10dBA (Monday to Friday 7am to 6pm, and Saturday 8am to 1pm). Outside the standard hours, the criterion would be background plus 5dBA. The Proponent has established a maximum construction noise level of 75dBA which represents the level at which sensitive receivers would be highly noise affected.

Table 4 - Predicted noise levels at receivers around Riley Street construction site.

Residential Location	Predicted	Day			Evening			Night			Saturday (Extended)		
	Noise dBA	Criteria dBA	Exceedance dBA	Compliance	Criteria dBA	Exceedance dBA	Compliance	Criteria dBA	Exceedance dBA	Compliance	Criteria dBA	Exceedance dBA	Compliance
Establishment													
Anne Street	67	60	7	No	55	-	N/A	51	-	N/A	53	14	No
Riley Street	65	61	4	No	54	-	N/A	49	-	N/A	55	10	No
Albion Street	67	65	2	No - Marginal	59	-	N/A	52	-	N/A	61	7	No
Crown Street	71	60	11	No	55	-	N/A	51	-	N/A	53	18	No
Excavation													
Anne Street	71	60	11	No	55	-	N/A	51	-	N/A	53	18	No
Riley Street	67	61	8	No	54	-	N/A	49	-	N/A	55	2	No - Marginal
Albion Street	75	65	10	No	59	-	N/A	52	-	N/A	61	14	No
Crown Street	74	60	14	No	55	-	N/A	51	-	N/A	53	21	No
Tunneling													
Anne Street	64 / 55*	60	4	No	55	0	Yes	51	4	No	53	11	No
Riley Street	64 / 37*	61	3	No - Marginal	54	0	Yes	49	0	Yes	55	9	No
Albion Street	65 / 51*	65	0	Yes	59	0	Yes	52	0	Yes	61	4	No
Crown Street	59 / 39*	60	0	Yes	55	0	Yes	51	0	Yes	53	6	No

Note*: The only excavation that would occur at night would be related to tunnelling. Noise from tunnelling would be limited to operation of fans for the ventilation system and other plant and equipment, such as cranes, trucks, etc would not be used at night time.

(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

The bulk of noise generating work at the Riley Street site is anticipated to occur for a short period of approximately 3 months. The Proponent's noise monitoring was conducted at key locations surrounding the Riley Street site (Ann Street, Riley Street, and Albion Street). Construction noise at the Riley Street compound is predicted to exceed the noise goals by approximately 11dBA on weekdays and up to 18dBA on Saturdays during the establishment of the compound which is predicted to last approximately 3 months (refer to Table 4). During the excavation of the shafts at Riley Street the noise goals are expected to be exceeded by up to 14dBA on weekdays and up to 21dBA on extended Saturday hours. The Proponent states that the exceedence is predominantly linked to the use of large rock breakers which are proposed to be used for a period of 2 months, and that noise levels would be significantly lower when not in use (refer to Table 7 for typical construction sound levels). The Proponent is intending to install an acoustic enclosure over the Riley Street compound to allow tunnelling work to occur 24 hours a day over a period of 3 years. Further mitigation measures will need to be implemented at Ann Street during the night, as a result of an anticipated small exceedence of noise goals resulting from the ventilation fan which is used to ventilate the acoustic enclosure. These measures may include noise barriers and silencers on the fans.

Table 5 - Predicted noise levels at receivers around Yurong Street construction site.

Location	Predicted	Day			Evening			Night			Saturday (Extended)		
	Noise dBA	Criteria dBA	Exceedance dBA	Compliance	Criteria dBA	Exceedance dBA	Compliance	Criteria dBA	Exceedance dBA	Compliance	Criteria dBA	Exceedance dBA	Compliance
Excavation													
Yurong Street	80	70	10	No	-	-	-	-	-	-	70	10	No
Domain Park	78	70	8	No	-	-	-	-	-	-	70	8	No

(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

Table 6 - Predicted noise levels at receivers around Little Albion Street construction site.

Location	Predicted	Day			Evening			Night			Saturday (Extended)		
	Noise dBA	Criteria dBA	Exceedance dBA	Compliance	Criteria dBA	Exceedance dBA	Compliance	Criteria dBA	Exceedance dBA	Compliance	Criteria dBA	Exceedance dBA	Compliance
Excavation													
102-104 Albion Street	76	65	11	No	-	-	-	-	-	-	61	15	No
115 Albion Street	69	65	4	No	-	-	-	-	-	-	61	8	No
Sony Building	88	75	20	No	-	-	-	-	-	-	75	20	No
Park	78	65	13	No							65	13	No

(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

At the Yurong Street site noise goals are predicted to be exceeded by up to 10dBA at the nearest receivers (see Table 5), while at the Little Albion Street site noise goals are predicted to be exceeded by up to 20 dBA (see Table 6). The Proponent states that these exceedences would be predominantly from the use of the piling rig which would operate at each location for 1 or 2 weeks. The Proponent claims that due to the surrounding receivers being elevated, standard noise barriers would not achieve adequate noise mitigation, and therefore more appropriate mitigation methods would be associated with source controls. This may include but not limited to, operator training to improve techniques and knowledge, and equipment selection.

Table 7 - Typical construction sound levels

Plant	SWL, dBA	Sound pressure level at 7 m
Excavator	107	82
Dump trucks	112	87
Rock breaker	122	97
Concrete pump	112	87
Saws	116	91
Saw cutter	115	90
Small excavators	90	65
Concrete trucks	109	84
Small generators	95	71
Front-end low-loader	112	87
Compressor	100	75
Bobcat	103	78
Hand tools	90	65
Jackhammer	105	80
Piling rig	112	87
Excavator with header	112	87
Bogie (dump) truck	112	87
Crane	110	85
Power tools	115	90
Concrete trucks	109	84
Small generators	95	70
Ventilation fan* and dust collector	105	80

Note: *assumes a silencer on the fan

(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

Vibration

Vibration impacts would occur during excavation works and during tunnelling, predominantly generated from the use of plant and machinery such as rock breakers, road headers and tunnel boring machines (TBM). The Proponent conducted its assessment of vibration following the criteria for "human comfort" from the document Assessing vibration: a technical guideline for construction noise (DEC February 2006). Tables 8 & 9 below show the criteria for exposure to continuous vibration and for intermittent vibration.

Table 8 - Criteria for exposure to continuous vibration (human comfort)

Place	Time	Peak velocity (mm/s)	
		Preferred	Maximum
Critical working areas (e.g. hospital operating theatres precision laboratories)	Day or night-time	0.14	0.28
Residences	Daytime	0.28	0.56
	Night-time	0.20	0.40
Offices	Day or night-time	0.56	1.1
Workshops	Day or night-time	1.1	2.2

Table 9 - Acceptable vibration dose values for intermittent vibration ($mm/s^{1.75}$)

Location	Daytime		Night-time	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

The Proponent states within the EA that as the criteria for structural damage in commercial and residential buildings is much higher than human comfort criteria, compliance with the human comfort criteria will also achieve compliance with the structural damage criteria.

Excavation of the Riley Street shaft would involve the use of rock breakers which would create vibration impacts. The nearest sensitive receivers are residences on the western side of Riley Street, approximately 40m from the shaft location. The EA states that the Peak Particle Velocity (PPV) from heavy (1500kg) and medium sized (600kg) rock breakers would be in the order of 0.15mm and below 0.01mm respectively at a distance of 40m. The Proponent's EA indicates that at a PPV level of 0.15mm/sec, the vibration Dose Value from a rock breaker, operating for 8 hours per day would be less than $0.1mm/s^{1.75}$ which is half the preferred day time value indicated in Table 9, which the Proponent considers an acceptable impact on human comfort.

Tunnelling vibration caused from a road header or TBM is predicted to be around 0.3mm/s at residences at distances of 10m. As shown in Table 8 these levels are above the preferred PPV level of 0.2mm/s and below the maximum of 0.4mm/s. The Proponent claims that as tunnelling would proceed at a rate of about 10m/day, the impacts would be transitory and individual locations would experience vibration for a short period of time, unlikely to exceed a few days, and therefore the level of vibration is considered acceptable.

The Proponent's assessment indicates that the distance of the CECT and CSCT extension would be generally over 10m from buildings and therefore comfortably comply with the human comfort criteria. Nonetheless, a number of residences on Little Albion Street are located 5-6m from the CSCT extension. This tunnel would be excavated using a road header creating predicted vibration levels of 0.42mm/s. This level is slightly higher than the maximum night level of 0.4mm/s, however the Proponent claims that some of these residences have basements so the vibration levels would be lower at higher levels, and therefore have a lesser impact in the general living areas of these residences.

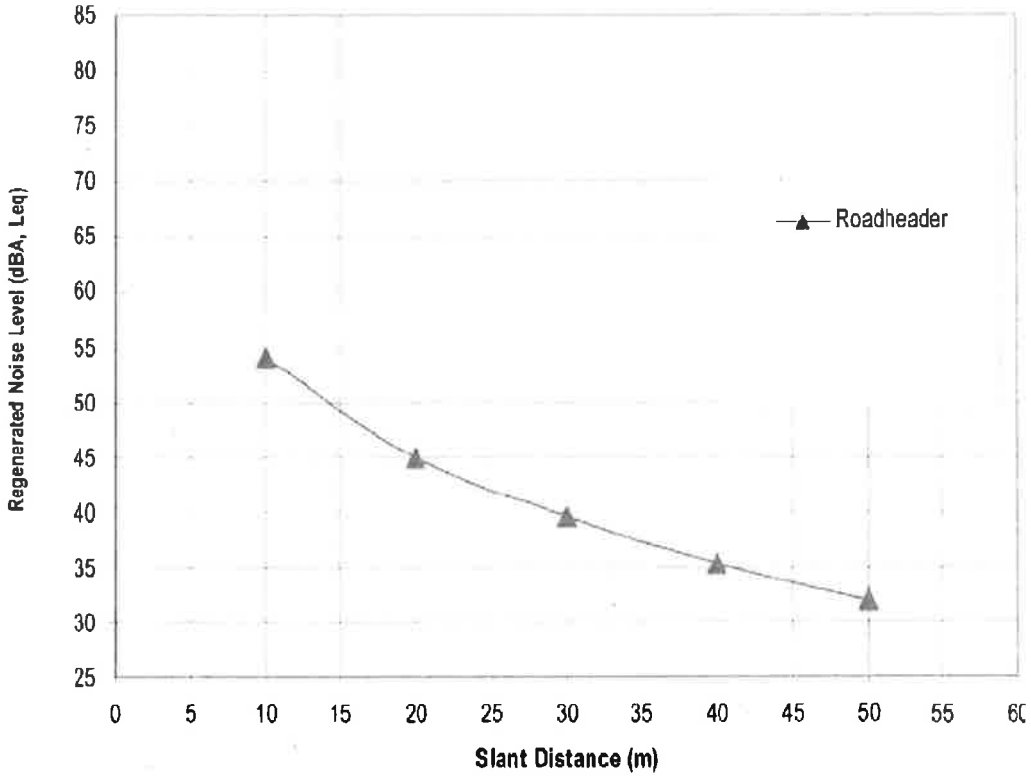
The Proponent's assessment concludes that vibration levels would satisfy the criteria for structural damage. The closest underground services and infrastructure to the proposed tunnel route are the Bondi Ocean Outfall sewer at a distance of 5.5m from the CECT and the Cross City Tunnel at a distance of 5.7m and 2.6m from associated rock bolts. Previous vibration measurements of TBMs in Sydney have found a maximum PPV level of less than 1mm/s at distances of 2.6m. As this is well below the criterion for damage to infrastructure, vibration impacts from tunnelling are considered low. Although the tunnel will be in close proximity of other infrastructure such as Busby's Bore (20m) and Rail tunnels, the tunnelling is not expected to have any impact. In particular, the Proponent states that the vibration levels generated from trains would be significantly higher than those created from tunnel boring operations.

Regenerated Noise

Road headers and the TBM may generate vibration which could be transmitted to nearby buildings generating audible (regenerated) noise within buildings. Therefore, the Proponent has conducted an assessment against DECCW criteria.

The Proponent states that a road header generates low levels of vibration and can safely perform excavation close to sensitive structures. The CSCT extension would use a road header during excavation which would generally be at a minimum distance of 10m from the basement of commercial properties and residences. As previously discussed, there are a small number of buildings which are located 5-6m from the tunnel. As indicated in Figure 4, regenerated noise at 10m would be 53dBA and at 6m would be 60dBA, which exceeds the evening and night regenerated noise criteria of 40 and 35dBA respectively. The Proponent states that the impacts would be for a maximum of 6 days and that suitable management measures would be implemented to mitigate any impacts. Management measures would include trial noise monitoring within residences when tunnelling commences to confirm predicted regeneration noise levels, which may require provision of alternative temporary accommodation for residents that may be affected.

Figure 4 – Predicted regenerated noise from road header

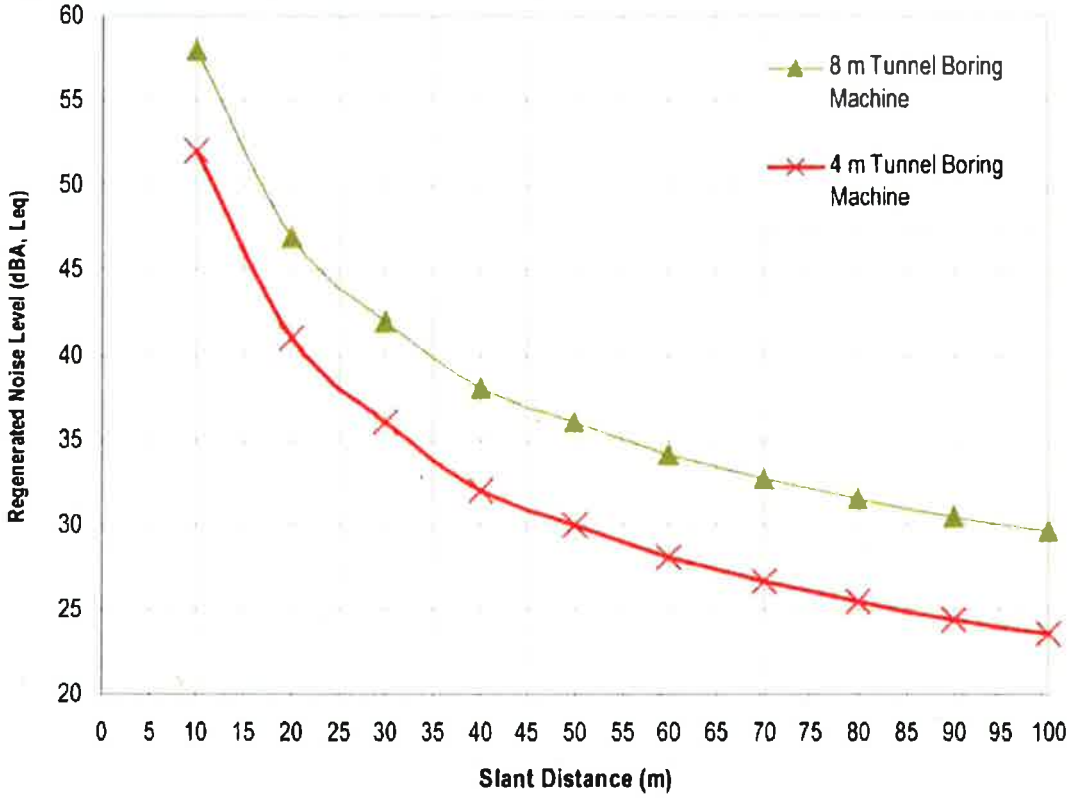


(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

A TBM will be used to construct the CECT tunnel. The Proponent's noise assessment measured ground-borne noise levels from an 8m diameter TBM, however, the proposed TBM for the construction of the CECT is expected to be a 4m TBM which the Proponent argues to be approximately 6dBA less noisy than an 8m diameter TBM. Figure 5 below shows the predicted ground-borne noise from the TBMs. The Proponent states that the minimum distance between the proposed tunnel and properties would be 6m near the intersection of Yurong Street and William Street which is predominantly commercial/retail. This section of tunnel needs to be shallower due to restrictions on passing over the Cross City Motorway. At this section of the tunnel the regenerated noise level is anticipated to reach 60dBA which again exceeds the evening and night regenerated noise criteria of 40 and 35dBA respectively. The Proponent states that along the rest of the alignment the

depths would be generally over 25m, with regenerated noise levels in the range 35-45 dBA. The Proponent concludes in the noise and vibration assessment that at a depth of 10m, the area of affection extends up to 33m either side of the tunnel, beyond which compliance with the 35dBA criterion is achieved. Therefore, as tunnelling would progress at a rate of 10m per day, it is expected that affected properties along the CECT route would be affected by noise levels above 35dBA night criterion for no longer than 6 days, however mitigation measures would need to be implemented to reduce this impact.

Figure 5 – Predicted ground-borne noise from TBM



(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

Construction Traffic Noise

Although the proposal would generate additional traffic movements, it is not expected to have significant adverse affects. Heavy vehicle traffic would be required predominantly during the removal of spoil material throughout the life of the tunnelling work which is estimated to be about 125,000 tonnes. The total daily truck movement per day is estimated to be 12 light vehicle movements per hour and 8 heavy vehicle movements per hour during peak hour at the Riley Street construction compound (an approximate total of 24 movements per day).In addition, it is anticipated that there would be 10 daily staff car movements (20 trips per day) which are expected to arrive and leave during the peak hour, which translates to 10 vehicles per hour. This increase in traffic is anticipated to equate to an increase of 2-3% on the existing peak hour traffic which is estimated to result in a 0.2dBA increase in traffic noise levels, well below the DECCW's Environmental Criteria for Traffic Noise (ECRTN) goal of a 2dBA increase above existing traffic noise, as indicated in the Proponent's Noise and Vibration Assessment.

Mitigation Measures

The Proponent is committing to a number of mitigation measures designed to help alleviate noise and vibration levels which are predicted to exceed the noise and vibration management levels at sensitive receivers.

The Proponent intends to implement a community relations program to inform the community of the progress of the project and advise potentially affected groups of any changes to noise and vibration emissions prior to critical stages of the works, which would be included in the Community Information Plan.

In addition the Proponent has included as a statement of commitment to prepare a Noise and Vibration Plan to be included in the Construction Environmental Management Plan and a range of other commitments.

Consideration

The Department considers that the proposed extended construction hours are acceptable due to the urbanised environment of the construction sites, and that the revised work hours proposed, strike an optimal balance between the efficient implementation of the works to reduce the overall duration of construction and the protection of residential amenity. The Department has consulted with the OEH regarding the revised work hours and the OEH had no issues with the proposed hours of work. Noise intensive activities have been limited to 7am to 12pm Monday to Saturday and 2pm to 5pm Monday to Friday, consistent with the OEH advice.

Notwithstanding the above, the Department has also recommended conditions of approval to provide for situations whereby works may be required outside of the approved construction hours (including isolated night works) due to unforseen circumstances. In such cases, the Department's recommended conditions require the Proponent to specifically request permission from the Director-General for these works on a case-by-case basis, accompanied by details of the need and justification for the works, alternatives considered and site-specific mitigation measures to ensure unreasonable noise impacts would not occur at nearest receptors.

The Proponent's noise assessment demonstrates that relevant noise criteria would not be met without the implementation of a range of mitigation measures. Construction noise levels are predicted to exceed the noise management levels nominated at surrounding receivers. Daytime excavation noise is predicted to exceed noise management goals at adjacent residential properties surrounding the Riley Street site during site establishment and shaft excavation activities. Construction activity at the Yurong Street excavation site, and the Little Albion Street site are predicted to exceed commercial and industrial noise objectives at surrounding receivers, due to the close proximity of surrounding buildings. The activities following this stage (tunnelling work) would be less noise intensive due to the nature of the works and proposed mitigation measures. For these reasons and from the outcomes of the Department's consultation with the OEH, the Department has recommended conditions that require the Proponent to adhere to construction noise goals. This being the case, the Department requires the Proponent to manage noise from construction activities (as measured by a Leq(15-minute) descriptor) so the noise level contributed by the construction activities does not exceed the background LA90 noise level by more than 10dB(A) for standard construction hours; and by more than 5dB(A) for works outside of standard construction hours. If the noise from a construction activity is substantially tonal or impulsive in nature, 5dB(A) must be added to the measured construction noise level when comparing the measured noise with the construction noise. In addition the Department has recommended a condition requiring an acoustic enclosure over the Riley Street compound to reduce noise emissions generated from tunnelling work and shaft construction.

The Department acknowledges that some unavoidable construction activities (i.e. rock breaking) during excavation will exceed the noise goals mentioned above. As these activities would be limited to short period of time (approximately 3 months) the Department is satisfied that impacts can be minimised to avoid discomfort to sensitive receivers if appropriate management techniques are implemented and mitigation measures put in place. As the noisiest part of the construction (and a high vibration causing activity) is related to the ground

preparation works and bulk excavation, to minimise any discomfort, the Proponent has committed to rock breaking occurring only within daylight hours, which is consistent with the OEH advice. Additionally the Department has recommended a condition specifying hours of operation for rock breaking which includes a respite period of an hour. The Department has recommended a general noise management condition, which requires the Proponent to minimise noise emissions from plant and equipment operated on the site for construction, by installing and maintaining efficient silences, low-noise mufflers (residential standard), screening of worksites and replacement of reversing alarms on vehicles with alternative silent measures.

There is potential for vibration impacts from excavation and tunnelling activities. The EA indicates that both the tunnel boring machines and road headers cause low levels of vibration and regenerated noise. Vibration annoyance and the potential for structural damage to buildings as a result of vibration from tunnel construction have been considered. The Proponent's noise report states that vibration associated with excavation activities are likely to comply with established human comfort criteria. However, a number of residential and commercial buildings may potentially be negatively affected from vibration impacts and regenerated noise as a result of the proposal, in particular regenerated noise levels associated with the tunnelling are predicted to exceed criteria at locations where the tunnels are comparatively shallow. Trial monitoring is a mitigation measure suggested by the Proponent, which will be conducted within residences when tunnelling commences to confirm regenerated noise levels. The trial monitoring would be used to assess the level of mitigation required to maintain amenity levels at residences which may include temporary accommodation for residents that may be affected. Negative impacts on sensitive receivers are only expected to last a maximum of 6 days at each receiver.

To ensure consideration and appropriate mitigation methods are installed to protect sensitive receivers the Department recommends a condition of approval that a Construction Noise and Vibration Management Plan (CNVMP) be prepared and submitted for approval. This plan is to manage noise and vibration impacts during construction, identify all feasible and reasonable noise and vibration mitigation measures, and include measures for community notification, noise monitoring and complaints management. The CNVMP is to apply to all sensitive receptor premises, including those already identified. Where the objectives are predicted to be exceeded, the CNVMP must include an analysis of feasible and reasonable mitigation measures that can be implemented to reduce construction noise impacts. Where noise and vibration objectives cannot be met, then the Proponent must develop additional measures including such as reduced hours of construction, the provision of respite from noisy and/or vibration intensive activities and alternative excavation methods or other negotiated outcomes with the affected community.

In addition, the Proponent would be required, as part of a recommended condition, both prior to the commencement of construction and after construction is complete, to prepare dilapidation reports for all affected buildings. The Department also recommends a condition relating to the monitoring of ground movements, and mitigation measures are to be included within the CNVMP.

The Department considers that with the implementation of the CNVMP, the potential for significant noise levels which cause adverse impact to human amenity would be reduced and any residual noise impacts could be managed appropriately.

With respect to traffic noise, the Department concurs with the Proponent's assessment that existing road traffic noise levels are unlikely to have a significant impact on existing traffic noise. Based on the Proponent's assessment, the Department is satisfied that the construction traffic noise impacts associated with the project are acceptable, given traffic

noise will only increase by 0.2dBA, which is negligible in an existing high traffic noise environment.

5.2. Archaeology/Heritage

Issue

Non-Indigenous Heritage

The Proponent commissioned Casey & Lowe to undertake a Non-Indigenous archaeological assessment as part of the Concept Environmental Report prepared by PlanCom Consulting (2008). Casey & Lowe reviewed the 2008 report with additional information regarding Stage 2D to prepare an updated report. The Proponent established that the bulk of the CECT and CSCT extension would be in bedrock that is generally between 10 and 55m below the existing ground surface which contain no archaeological sites or features. Therefore, potential impacts on archaeology would be limited to the above ground construction works located at the Riley Street compound and the shaft locations at Little Albion Street and Yurong Parkway.

The assessment of the Riley Street compound established that pursuant to South Sydney LEP 1998 a two storey inter-war warehouse of local environmental significance was located on site. However, the structure has previously been demolished and excavated down to basement level as part of preliminary works linked to a previous development on site which was never completed. The basement level remains exposed. As the heritage building has been demolished the Proponent believes the site has little heritage significance.

Brickfield deposits are known to occur in the Surry Hills area, however the Proponent states that the shaft location at Little Albion Street is outside the main brickmaking activity area and subsurface archaeology present at the site is considered unlikely. The site at Yurong Parkway is seen to be unlikely to contain any items of archaeological significance as the site has been used for a road and has not contained structures or buildings that are thought to have significance.

Potential impacts on built heritage would be limited to those impacts associated with vibration and therefore considered satisfactory given the mitigation methods, commitments and conditions detailed in Section 5.1.

Indigenous Heritage

The Proponent commissioned Navin Officer Heritage Consultants to conduct an Aboriginal Cultural Heritage Assessment as part of the Concept Environmental Assessment, which included a search of AHIMS, and identified 16 known Aboriginal sites in the vicinity of the Sydney CityGrid Project. The assessment established that remnants of Aboriginal archaeological material may survive in limited contexts in the now highly modified environment of the CBD. However, the Proponent states within the EA that the likelihood of undisturbed Aboriginal site remnants being located is unlikely, and that none of the known sites are located in the vicinity of areas where surface works will be carried out for Stage 2D.

Consideration

The Department is satisfied that an appropriate Heritage Assessment has been conducted by the Proponent and accepts that the proposal is unlikely to have significant heritage impacts.

However, the Department acknowledges the heritage significance of the adjacent historic heritage items and has therefore recommended specific conditions which require the Proponent to ensure the structural integrity of adjacent buildings, and to conduct dilapidation surveys as recommended by the NSW Heritage Council. These surveys are to identify any

heritage buildings in the vicinity which are structurally unsound, in which case alternative vibration criteria may need to be adopted.

Consistent with the advice from NSW Heritage Council, the Department recommends a condition that if, during the course of construction work the Proponent becomes aware of any unexpected historical relic(s), all work likely to affect the relic(s) shall cease immediately and the Heritage Branch of OEH notified in accordance with the *Heritage Act 1977*. Works shall not recommence until the Proponent receives written authorisation from the Heritage Branch of OEH.

In terms of Aboriginal heritage, the Department accepts that the project is unlikely to have significant Aboriginal heritage impacts. However, as recommended by the OEH and NSW Heritage Council, the Department recommends a condition that if during the course of construction the Proponent becomes aware of any previously unidentified Aboriginal object(s), all work likely to affect the object(s) shall cease immediately until they are collected, recorded and deposited at the Australian Museum in accordance with standard archaeological practice. In addition, registered Aboriginal stakeholders shall be informed of the finds.

The Department considers that the proposed surveys, monitoring and environmental control measures should ensure protection of any Aboriginal objects and European heritage relics.

5.3. Traffic

Issue

Traffic and transport issues as a result of the project would vary depending on the stage and phase of the construction. The most significant impacts are anticipated to be generated from the Riley Street compound as this is where the most substantial surface works would be undertaken, and from where tunnel spoil would be removed (see section 5.5). However, further short term impacts on traffic are expected from the construction of the shafts in Little Albion Street and Yurong Parkway which would involve works within the carriageway.

Traffic would be generated predominantly from equipment and material deliveries, including delivery of construction materials, spoil removal, and the removal of construction equipment machinery, and construction personnel.

The main access and egress to the compound would be off Riley Street. The Proponent states that pedestrian and traffic control devices would be implemented to ensure access and safety is maintained for all road and footpath users. In addition, a work zone for construction would be required along the Riley Street frontage, and would utilise the existing parking/traffic lane on the eastern side of the street.

Construction activities are proposed to be carried out in 5 stages, and hours would vary depending on the stage, although tunnelling is to be carried out on a 24 hour basis. Light vehicle traffic (generally staff car movements) is anticipated to be up to 20 trips per day (10 in and 10 out) and it is expected the Riley Street compound would have provision for 5 – 10 car spaces. The Proponent states that most trips would likely occur in peak hour (to and from work) and therefore equate to 10 trips during peak hour. To reduce the burden on off street parking spaces (and due to limited spaces available on site) workers will be encouraged to utilise public transport.

Heavy vehicle traffic would be most significant during the removal of spoil. The precise number of truck movements is calculated on the volume of spoil produced which is anticipated to be approximately 125,000 tonnes. Table 10 shows indicative number of truck

movements associated with spoil generation, while Table 11 shows the indicative number of vehicle movements associated with delivery of construction materials.

Table 10 - Indicative number of truck movements associated with spoil generation.

Construction activity/source	Riley Street
Stage 1 - Site establishment	4 truck movements per day
Stage 2 – excavation of the Riley Street shaft	12 -16 truck movements per day
Stage 3 and 5 – construction of the CECT and CSCT extension	20 -24 truck movements per day

Table 11 - Indicative additional number of vehicle movements (combination of light vehicles and trucks) associated with delivery of construction materials

Construction activity/source	Riley Street Construction Compound
Stage 1 - site establishment	16-24 vehicle movements per day (combination of light vehicles and trucks)
Stage 2 – excavation of the Riley Street shaft	16-24 vehicle movements per day (combination of light vehicles and trucks)
Stage 3 and 5 – construction of the CECT and CSCT extension	16-24 vehicle movements per day (combination of light vehicles and trucks) 12-16 semi trailer movements to delivering segments per day

(Source: EnergyAustralia *Sydney CityGrid Project Environmental Assessment for Stage 2D*)

As indicated in the Tables 10 and 11 the most significant traffic impact would be during Stage 3 and 5 (construction of the CECT and CSCT extension). The Proponent states that the site would require controlled and managed vehicle access. The Proponent indicates that the maximum estimated vehicle movements per day would comprise of 20 light vehicle movements, 24 heavy vehicle movements for spoil disposal, and 24 combined light and heavy vehicles for general deliveries. During Stage 5 it is anticipated an additional 16 semi-trailers would be required per day for deliveries of pre-cast segments of the tunnel. The predicted likely peak hourly generation would be a maximum of eight heavy vehicle movements and 12 light vehicle movements.

Stage 4 involves the installation of cables within the CSCT extension and it is anticipated to involve approximately 8 vehicle moments including cable drum delivery and staff vehicle movements.

The EA indicates that average daily traffic volumes on adjacent roads to the Riley Street compound range from 6000 to 11,000 vehicles per day, and peak hour volumes are estimated at 500-1100 vehicles per hour. Although the Proponent acknowledges the current road network operates close to capacity during peak hours, it is likely that the generation of traffic from Stage 2D would constitute approximately 2% – 3% of the existing traffic on Riley

Street and Albion Street. This is expected to have an insignificant impact on road sections and intersections surrounding the site.

Partial or temporary road closures along Riley Street or Albion Street are likely to be required during construction to enable heavy vehicle movements, and for some construction procedures. These closures would have an impact on the existing travel routes. The Proponent intends to prepare an activity specific traffic management plan to ensure appropriate measures are implemented including identifying as appropriate detour routes, and advance notices and warning signs to try and reduce the impact effectively as possible.

The EA indicates that temporary possession of kerbside parking will likely be required to access the construction site. In addition, restricted space within worksites may require on road parking, and waiting/unloading by construction traffic. In areas where it does not interfere with traffic lanes such as kerb side parking the Proponent may seek to create a dedicated construction zone.

It is not anticipated that the project would impact any bus routes, however the Proponent states that where necessary it will consult with the bus service provider and City of Sydney Council. In addition a pedestrian management plan is proposed to be developed as part of the CEMP to minimise impacts on pedestrian and cyclist movements.

The shafts at Little Albion Street and Yurong Parkway are anticipated to take approximately 1 or 2 months to complete and would involve partial street closure. Traffic controls are proposed for both streets to ensure road safety is maintained and to maintain vehicle movement. The Proponent anticipates these impacts to be manageable through traffic control methods and community consultation.

Consideration

The Department acknowledges that potential impacts from construction traffic are likely if not managed appropriately. The Department has considered the Proponent's studies, mitigation measures, commitments and environmental control measures to minimise adverse traffic impacts as a result of the project, and considers that potential impacts can be managed to acceptable levels, such that there are no significant or long term impacts on both immediately surrounding streets and the broader CBD traffic network.

Although the Department acknowledges unavoidable impacts such as temporary road closures and increased traffic volume and intensity, the Department agrees with the Proponent that with appropriate management techniques including a community information and awareness program, that the impacts can be reduced to a satisfactory level.

The Department has recommended a condition that requires the Proponent to prepare, in consultation with the RTA, Council and NSW Transport, a Traffic Management Plan (TMP) which must be approved by the Director-General, and which is to be included in the required CEMP. The TMP must include information on all roads nominated for use during construction, the measures to be taken to allow for heavy vehicle generation to be minimised and how the use of local roads by the heavy vehicles will be monitored to ensure safe vehicle movement. The TMP must also include information on the scheduling of works to minimise traffic disruption, development and management of parking spaces, safe pedestrian and cyclist movement, and details of how heavy vehicles will enter and exit the sites.

In order to ensure that trucks transporting spoil do not pose a hazard to other vehicles and pedestrians, the Department has recommended a condition that requires the identification and designation of heavy vehicle routes, including spoil trucks. This information is required to be included in the TMP.

The Proponent is also required, as part of a recommended condition, both prior to the commencement of construction and after construction is complete, to commission road dilapidation reports for all roads nominated in the required TMP that are likely to be used by construction traffic.

The Proponent will need to provide copies of the reports to the Council and the RTA. Any road or footpath damage, aside from that resulting from normal wear and tear, must be repaired to a standard at least equivalent to that existing prior to damage.

On the basis of the above, the Department considers that as construction traffic impacts would be temporary only and can be appropriately managed, they do not pose a constraint to the project proceeding.

5.4. Groundwater/ Drainage

Issue

Surface Water

Surface water impacts are expected at the locations where works would disturb the ground surface, and would therefore be limited to the Riley Street compound and small shafts located at Little Albion Street and Yurong Parkway. The Proponent indicates that the main potential impact would be associated with runoff transporting sediment off-site and entering the stormwater system which eventually discharges to Sydney Harbour via Cockle Bay and Bennelong Point. Potential impacts could arise from construction vehicles transferring sediment onto adjacent roadways, which ultimately would end up in the stormwater system. Additionally, chemical spills on the construction sites may be transported to the surface water and groundwater systems. However, the Proponent considers the impacts on surface water as minor, due to a small area of surface disturbance, which would make it unlikely that substantial volumes of sediment would be transported offsite. The Proponent commits to mitigating impacts by implementing management measures which focus on installing controls at the downslope site boundaries and nearby inlets to the stormwater system, which would reduce the potential for sediment or spills to be transported off-site.

Groundwater

Groundwater drawdown and seepage are potential issues which could possibly arise from construction of the tunnels, as groundwater could flow into excavations below the water table. The Proponent's EA indicates that the majority of the tunnels are to be constructed in slightly weathered to fresh Hawkesbury Sandstone and the water table in this strata is generally separate and below the water table in overlying alluvium.

The Proponent's EA states that the permeability of rock strata along the alignment is controlled by joints, faults and bedding planes. As part of the geotechnical investigations permeability measurements were undertaken and results varied from 0.02 Lugeons (approximately 2 x 10^{-9} m/s) up to 50 Lugeon[‡]. The large permeability range is due to features such as open bedding planes and a number of near vertical zones of faulting or closely spaced joints (including the Woolloomooloo Fault Zone and Martin Place Joint Swarm) which would generate groundwater inflow. These features are more prone to groundwater movement and would result in higher groundwater flow rates.

[‡] A Lugeon is a unit devised to quantify the water permeability of bedrock and the hydraulic conductivity resulting from fractures. The Lugeon test main objective is to determine the *Lugeon coefficient* which by definition is water absorption measured in litres per metre of test-stage per minute at a pressure of 10 kg/cm^2 (1 MN/m^2).

The Proponent states that it is likely that poor quality groundwater would be encountered during the construction of the CSCT between the Great Sydney Dyke and works undertaken in the Surry Hills area. The level of seepage of groundwater in the sections of the tunnel not affected by faults, joints or bedding planes would be less than 1L/s. The tunnels and shafts associated with the project would be fully lined to prevent groundwater seepage as much as possible and once completed would not affect the levels of groundwater. The tunnels are designed to limit groundwater inflows to less than 300 litres of water per 100m of tunnel per 24 hours, and any groundwater intercepted is proposed to be collected and treated to an acceptable level prior to discharge into the stormwater system. The Proponent commits to obtaining a licence from the NSW Office of Water to extract groundwater.

In regards to potential concerns highlighted in the submissions regarding groundwater drawdown, the Proponent explains within the EA that groundwater drawdown only occurs if the water table is within the soil horizon and the buildings' foundations are within this soil horizon prior to the water table being draw down. In this case, it is argued that as the tunnels would be fully lined it is unlikely that the small volumes of groundwater that may flow into the tunnel during operation of the project would result in surface settlement impacts like damage to buildings or infrastructure.

Groundwater treatment

The EA states that groundwater sampling indicates that groundwater quality is expected to be similar to inflows to the CSCT and CWCT that are currently treated at the Campbell Street Water Treatment plant (WTP). Therefore, as the groundwater from these tunnels is being treated to long term average levels that are below limits considered likely to impact on Cockle Bay (as detailed in the Operational Environmental Monitoring Plan for City West Cable Tunnel), it is unlikely to further impact water quality of Cockle Bay.

A temporary system compliant with Australian and New Zealand Water Quality Guidelines is proposed to be installed at the Riley Street compound to treat the predicted groundwater during construction and is anticipated to have a capacity of 8-15 L/s. The temporary WTP would treat then discharge to the stormwater system in accordance with the Australian and New Zealand Water Quality Guidelines for Fresh and Marine Waters. These guidelines set specific levels for contaminants when discharging to a set watercourse so as to be equivalent to or better than existing quality. In this instance, this refers to Cockle Bay. The Proponent states that as the water is proposed to be treated water quality impacts are considered to be minor.

A permanent drainage system would be installed during fit out of the tunnel under Stage 2D. The project proposes to treat water using the existing Campbell Street Substation WTP which presently operates efficiently and has substantial spare capacity. The Proponent states that the Campbell Street Substation WTP is designed to treat 3.5L/s under normal conditions, and currently treats about 2L/s. The proposed tunnels would increase groundwater to be treated by approximately 0.1L/s (the plant load will increase to 2.1 litres per second), well within the maximum capacity of the WTP.

With respect to operation, the tunnel will be lined and tanked with concrete so as to minimise water ingress. It is anticipated that 300 litres of water per 100m of tunnel per 24 hours would accumulate in the tunnel a day and will be transferred to an existing Ausgrid WTP in Campbell Street, Surry Hills.

The treatment plant focuses on the removal of iron and manganese which are in high concentrations in groundwater within the CBD. The Proponent states that the treated water is unlikely to cause any environmental impact and the performance of the water treatment plant (WTP) will continue to be monitored, and is likely to continue to comply with the requirement of Section 120 of the Protection of the Environment Operations Act 1997.

Consideration

The Department considers that the proposed construction works have the potential to cause pollution of surface water and groundwater. For this reason, the Department has recommended a condition of approval that requires the Proponent to employ measures to minimise soil erosion and the discharge of sediment and other pollutants to lands and/or waters during construction activities, in accordance with Landcom's *Managing Urban Stormwater: Soils and Conservation.* In addition, the Department has recommended a condition that requires the Proponent to prepare a contingency plan for events that have the potential to pollute or contaminate water sources. The Department requires this contingency plan to include threshold levels, remediation actions and communication strategies for the effective management of such an event. This plan is to be included in the required Construction Water Quality Management Plan, required as part of the Construction Environmental Management Plan and therefore would need to be approved by the Director-General.

The Department notes that a water licence may be required. On this basis, the Department has recommended that the NSW Office of Water (NOW) be consulted during preparation of the Water Quality Management Sub-Plan and estimated pumping volumes, flow rates, water quality data and details regarding the geotechnical investigations and analysis relating to groundwater. The Department has also recommended that Sydney Water and/or City of Sydney Council be consulted to determine capacity limits of the stormwater system and water quality requirements. Details of the groundwater treatment system must be provided with the Construction Environmental Management Plan. Water quality criteria for the groundwater entering the stormwater system should be discussed with Sydney Water.

The Department is satisfied that both construction and operation stage impacts can be managed to acceptable levels, with the implementation of the proposed mitigation measures. Recommended conditions, which will include the involvement of Council and NOW in the preparation of the Groundwater Management Plan, should ensure no adverse impacts on Cockle Bay.

5.5. Spoil and waste management

Issue

The main waste generated during construction would be spoil, with approximately 50,000m^3 or 125,000 tonnes. The majority of spoil would be generated during bulk excavation of the CECT and CSCT, with smaller quantities produced from the associated shafts and stub tunnel connections. Spoil is proposed to be removed from the Riley Street compound using a gantry crane and transported offsite using trucks. A small amount of spoil will be removed from Little Albion and Yurong streets during construction of the shafts.

The Proponent has stated that geotechnical and hydrogeological investigations have concluded that the tunnel alignment would be located predominantly within weathered and fresh Hawkesbury Sandstone (Class 1 & 2) with some intermittent portions of mudstone and laminate/shale. The sandstone is potentially reusable in engineering and remediation projects.

The Proponent states that following a preliminary waste classification assessment, there is potential for contaminated fill to be encountered during excavation of the shafts, and that existing fill materials would be classified as 'General Solid Waste (non-putrescible)' and would therefore require disposal at a landfill licensed to accept Class II material. The geotechnical investigations for the project did not indicate the presence of acid sulphate soils and it would be unlikely to be encountered during construction as the majority of the project would be excavated in bedrock.

The Proponent states that all wastes generated by the project would be managed in accordance with the DECC Waste Classification Guidelines (April 2008) and the principles of the waste management hierarchy pursuant to the NSW Waste Avoidance and Resource Recovery Strategy 2007. The Proponent states that the majority of the spoil would be classified as virgin excavated natural material (VENM) which has good opportunities to be re-used. The Proponent commits to preparing a spoil and waste management sub-plan to be prepared as part of the CEMP and would identify how spoil and other waste material would be handled, stockpiled, reused and disposed. General solid waste would either be recycled or disposed at a licensed landfill in accordance with NSW legislative requirements.

The EA indicates, that the preferred options for dealing with VENM would be for re-use in on other construction sites, to be used for land management (such as to cover contaminated land), or sent to a VENM recycling site/landfill. The Proponent states that the exact reuse/recycling method of the VENM spoil will be decided during preparation of the CEMP and will be dependent on demand during production of the spoil. The Proponent has indicated that any contaminated spoil will be disposed of at the SITA landfill at Kemps Creek or at Penrith Waste at Mulgola which are licensed to receive contaminated spoil.

Other Waste

The Proponent's EA addresses other waste to be managed during the construction of the project. This includes waste concrete from tunnel lining, which may be suitable for crushing and reuse if significant quantities are generated, or would be sent to a licensed landfill. Other potential waste which could be recycled are cable off cuts, steel off cuts, timber and plywood. All other waste is proposed to be disposed in appropriately licensed landfills. General recycling and waste bins would additionally be provided at the site office and amenities.

Consideration

The Department is satisfied that spoil and waste can be managed appropriately through the CEMP and conditions of approval. The Department has recommended in the conditions that the Proponent provides a Spoil and Fill Management Plan. This plan is to detail the locations of major (defined as a volume greater than 500 cubic metres) spoil stockpiles, and methods to re-use or dispose excess or unsuitable spoil material including estimated volumes and disposal sites. All material excavated from construction must be re-used or recycled unless otherwise approved in the Spoil and Fill Management Sub Plan. The Proponent must ensure that the re-use of material generated from construction is maximised.

6. RECOMMENDATION

The Department considers the project to be an essential component of the overall Sydney CityGrid Project. Failure to construct Stage 2D would mean failure to complete the overall Sydney CityGrid Project, which is necessary to provide a reliable and secure supply of energy in Sydney's CBD.

The Department has assessed the Environmental Assessment, Statement of Commitments, submissions received and the Submissions Report and PPR, and is satisfied that the impacts associated with the construction of the cable tunnels and associated infrastructure can be mitigated and/ or managed to ensure an acceptable level of environmental performance. To ensure significant impacts are mitigated and other impacts are managed to an acceptable standard, the Department has recommended specific conditions as part of the Project Approval.

Therefore the Department recommends that the Project Application be approved, subject to conditions.

8/7/11

A/**Executive Director**
Major Projects Assessment

17/7/11

Deputy Director-General
Development Assessment & Systems Performance

Director-General

18/7/2011

APPENDIX A ENVIRONMENTAL ASSESSMENT

See the Department's website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=4192

APPENDIX B SUBMISSIONS

See the Department's website at:
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APPENDIX C PROPONENT'S RESPONSE TO SUBMISSIONS

See the Department's website at:
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APPENDIX D RECOMMENDED CONDITIONS OF APPROVAL

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