

Zone Substation – Royal North Shore Hospital

Preferred Project Report

March 2009



Prepared for NSW Health in conjunction with Energy Australia

NSW  **HEALTH**

Table of Contents

1. Introduction.....	3
2. Response to Submissions	3
3. Preferred Project Report.....	11
4. Statement of Commitments	11
5. Conclusion.....	12

Appendix A Submissions Received

Appendix B Full Set of Drawings

Appendix C Letter from Radiation Shielding Australia

1. Introduction

The Project Application for the construction of a Zone Substation on the Royal North Shore Hospital Site was submitted in December 2008 and was on public exhibition from 17th December 2008 to 9th February 2009. During that time submissions were received from the Willoughby City Council and Ramsay Health Care (for and on behalf of North Shore Private Hospital). An issue was also raised by the Department of Planning in respect to the built form and visual impact of the facility on adjacent properties. NSW Health (the proponent) has been provided with a copy of these submissions and, in accordance with Section 75H(6) of the EP&A Act, responds to the issues raised in the submissions.

The proponent has sought advice from its consultant team in preparing the responses. As a consequence of the submissions and comments from other stakeholders in the process, the project has been amended as outlined in Section 3 and shown on plans in Appendix B.

2. Response to Submissions

Submission from Willoughby City Council

Issue:

Development Consent DA 2006/165 for stage 3 of the Royal North Shore Private Hospital extension, provides a basement car park and ground floor vehicular access way along 'Saville Street' (Right of Carriageway) to the subject sites southern boundary. The proposed scheme should incorporate this consented design into its design to ensure no conflict between use areas and access between sites.

Additionally a Section 96 application to amend this development within the vicinity of the proposed substation is currently under consideration by Council and may impact upon the proposed facility and its access.

Response:

The development consent DA 2006/165 and the approved plans were considered during the design phase of the zone substation. The issues of conflict between use area and access have been considered. In respect to the Section 96 application we do not believe that there is an impact on access from the proposed amendment.

Issue:

Hydraulic plans detailing OSD and where possible reuse of rainwater from the facility for use elsewhere on site. Any over flow connection is to be to the existing stormwater system.

Response:

Noted. This has been included in the design of the stormwater system.

Issue:

Waste management plan which aims to provide details of specific strategies to salvage and recycle a minimum of 85% of use[sic] and unused demolition and construction material.

Response:

There is no demolition proposed as part of this application as demolition has been undertaken as part of the Project Application for the Royal North Shore Hospital site. However any other waste will be disposed of in a manner which seeks to minimise landfill and maximise reuse.

Issue:

Sustainable Development commitments where possible, all efforts being made to minimise water and energy consumption of the development which includes the adoption of the following specific measures as part of the development:

- *Installation of energy efficient light fittings and fixtures*
- *Use of no or low VOC interior paints*
- *Use of recycled or plantation and/or regrowth timber*
- *Where possible no use of ozone depleting products and materials or products and materials manufactured using ozone depleting substances.*

Response:

- Energy efficient lighting will be specified for both internal and external situations in respect to the substation.
- Low VOC paint will be specified at the construction stage.
- EnergyAustralia does not use timber in the construction or fit out of its substations but will consider the use of plantation and or regrowth timber if that situation arises.
- Where possible, EnergyAustralia will minimise the use of ozone depleting products and materials or products and materials manufactured using ozone depleting substances.

All EnergyAustralia substations are designed to use natural ventilation in all areas with the possible exception of critical IT infrastructure. Major equipment installed in the substation is also designed to minimise the use of energy by utilising natural ventilation rather than mechanical ventilation for cooling – particularly in respect to transformers which rely on air movement for efficient operation.

Submission from Ramsay Health Care (for and on behalf of North Shore Private Hospital)

The following provides comments on matters raised in its letter dated 5 February 2009.

Issue:

RHC and its advisers have reviewed documentation made available as part of the Part 3A Application for the proposed Substation for the purposes of providing for the existing and increased health services, without increasing the risk or limitation as a result of EA's decision to locate a new Zone Sub Station adjacent to the Stage 3 North Shore Private Hospital (NSPH) development.

Furthermore, following a request via the Royal North Shore Hospital Redevelopment Project Office, RHC provided the following documents regarding the NSPH extension to Mr Michael Rourke of Energy Australia on 21 April 2008:

- DA drawings - plans, elevations and section through extension area;
- Photo montage. Note finishes will be in keeping with existing building;
- Structural drawings indicating proposed works to footings of existing multi-level carpark. (DA submission/plans for early works).

Response:

Structural information provided by NSPH only relates to the Multi deck car park not the NSPH. The Redevelopment Office has requested structural documentation to be provided for the NSPH basement car park. However this has only been received in the last two weeks. The obligation in respect to the provision of this information is included in a Deed of Agreement (DoA) between NSPH and NSCCAHS at clause 9.2(b)(ii). In this provision, RNSH undertakes to provide input to the NSPH design process to ensure appropriate measures are incorporated into the design to mitigate any effects of the substation.

Issue:

NSPH Stage 3 Extension project is currently under construction and will share a common boundary to the north with the proposed EA Zone Sub Station. Details of the NSPH Stage 3 project have been provided to EA consultants (on 21 April 2008) to inform them in their concept development of the proposed Sub Station. In particular, the Level 1 section of the NSPH extension which runs along the common boundary will accommodate highly sensitive patient monitoring equipment for the ICU, Operating Theatre Recovery and Day Surgery units. This section of the building incorporates extensive glazing elements for operational reasons.

Response:

It is our understanding that the ICU is not located on the common boundary. The Redevelopment Office, on behalf of NSW Health, has also requested information relating to the sensitive equipment NSPH intends to procure. However we have been advised that the equipment has not been selected at this stage and they are unable to provide any advice.

In the absence of NSPH's advice we attach a copy of a letter from an independent consultant Radiation Shielding Australia who provide advice that "*given the estimated magnetic field strengths emanating from the substation the layout of the areas within the North Shore Private Hospital, there appears to be no problems with EMF interference with equipment within the hospital due to fields from the substation as proposed.*" (Appendix C).

The Deed of Agreement between NSPH and NSW Health/NSCCAHS deals with responsibilities for EMF and what actions are to be taken by NSW Health should there be any issues regarding equipment within the Hospital. This has been considered to be mutually satisfactory by all parties and the Deed has been executed.

Consequently, during the NSPH design and construction process, NSW Health/NSCCAHS will continue to coordinate with EA to mitigate this risk.

Issue:

- 3.0 Detailed review of available EA Part 3A documentation raises the following significant concerns for NSPH:
- a) The EA Zone Sub Station documentation has been prepared without formal consultation between Energy Australia and either RHC, NSPH management or project team representatives. The only contact has been made via the RNSH Redevelopment Office.
 - b) Several of the EA Zone Sub Station drawings and perspectives may be misleading as they do not show the true relationship between both the EA and NSPH developments **on completion**. In particular, the NSPH development will be constructed to the common boundary leaving some 15m buffer zone to the Sub Station compound – not 15m plus the current 50m NSPH ground level car park as drawn.
 - c) The EA Zone Sub Station proposal is for a partially screened open enclosure for the two transformers. Given the NSPH development will be located only 34 metres from the two proposed exposed transformers, we request a copy of the risk assessment undertaken by EA and in particular the level of danger NSPH property and on going medical services could expect from a fire or explosion of the transformers or other equipment. Should that assessed risk not be zero, RHC wishes to understand what undertakings EA will provide NSPH against property or consequential loss. Should the proposed masonry screening of the transformers to the north be for aesthetic or blast protection, relocation to the south would seem appropriate. This is particularly so as the nearest neighbour to the north is a significantly greater distance away from the proposed EA Zone Sub Station than NSPH.
 - d) The EA Zone Sub Station proposal contains an Electric and Magnetic Fields (EMF) assessment. In summary it contains:
 - i) Background (ambient) EMF readings on the proposed Sub Station site before the Research and Breast Screening facilities were demolished. These results are tabulated in Table 2, page 5 of the Assessment and are ambiguously attributed to incorrect boundaries and indicate that the proposed site under those conditions has no significant inherent EMF radiation.
 - ii) Predicted EMF impact from the proposed EA Zone Sub Station rely on readings taken at the nearby Campbell Street ENCLOSED Sub Station with the conclusion that exposure levels will be well below limits described in Section 5.3 under all loading conditions. Given the proposed EA Zone Sub Station will be OPEN with no screening of transformers to the adjacent NSPH, this assessment of risk could be flawed. There is no noted Section 5.3 in the subject EMF Assessment document.
 - iii) EA in Section 9 Mitigation Measures advises Area Health "that EMF produced by substations can interfere with the operation of devices and equipment, including devices and equipment used in health facilities". Should Area Health on review request EA to take additional EMF mitigation measures Area Health would bear the cost. The Section 3A documentation neither contains nor suggests resolution on this matter by either Area Health or EA and as a result, the potential contingent risk posed to NSPH patients and life support equipment in the highly sensitive clinical areas facing the proposed EA Zone Sub Station, is of great concern to RHC and NSPH.

- iv) *EA propose to employ prudent avoidance principles of care but no responsibility. If EA cannot guarantee outcomes for want of scientific data in matters relating to EMF, fire, explosion etc we would expect that they be required to minimise the impact of such events on existing property owners.*
- e) *A heavy duty road is proposed to be constructed on the Northern Sydney TAFE site (Saville Street) along the common boundary with NSPH, to service the proposed EA Zone Sub Station. Whilst no specific details have been provided as to capacity or construction, the potential for damage to the existing NSPH light weight retaining wall along the boundary could be significant and result in loss of service access and consequential damages. Given that the NSPH retaining wall is an existing structure and has been so for many years, we would expect that EA should be required to accept full responsibility for this risk and underwrite any loss or damages incurred by NSPH as a result of failing to do so.*

Response:

- a) The proponent for this application is NSW Health not Energy Australia. NSW Health, through the RNS Redevelopment Office hold fortnightly consultation meetings between NSCAHS and NSPH in relation to program and advice on progress and status of the project. In addition, preliminary extracts of the project application documents were also provided to Bovis Lend Lease (NSPH Builder) for their information in advance of the exhibition period.
- b) The 14.3m buffer zone to the common boundary is consistent with the executed Deed of Agreement clause 9.2(a)(i). The obligation for Energy Australia and NSPH to treat a common property boundary as a fire source feature is the same regardless of NSPH DA documents. We understand NSPH's revised design, submitted in their S96 submission, has only recently come off exhibition and has yet to receive development consent.
- c) EnergyAustralia cannot relocate the transformer walls from the northern boundary to the southern boundary as they are neither for aesthetic or blast protection but are primarily to ensure security and fire segregation from and to the northern boundary. To meet design requirements within the confined space available for the substation, the transformers have had to be located on the northern boundary of the site.

The substation is designed to comply with all the relevant fire mitigation requirements prescribed in the Building Code of Australia. In addition to this, EnergyAustralia imposes more stringent guidelines designed to reduce the risk of fire or explosion with permanent passive controls incorporated in the design of the substation. Building design controls include on-site containment, enclosures, special segregation and clearance zones to adjoining boundaries. The transformers are positioned to provide these clearances while providing adequate natural ventilation. Therefore additional screening is not required. Any screening will negatively impact the rating of the substation and impede vehicular access to the transformers, and would therefore not comply with EnergyAustralia's operational design requirements.

- d) In response to the comments on the EA Zone Sub Station Electric and Magnetic Fields (EMF) assessment:

- i) The background EMF results noted on the plan are correct, however, the table has not taken into account the true north position on the plan. The following table corresponds to the plan.

Background Magnetic Field, milligauss (mG), results for the proposed Royal North Shore Zone Substation site

North Eastern Boundary	South Eastern Boundary	South Western Boundary	North Western Boundary	Property Locations
0.3	3.4	0.2	0.2	0.1
0.6	2.4	0.2	0.2	0.1
0.3	3.0	0.1	0.2	2.6
0.2	2.3	0.2	0.2	0.9
0.3	2.7	0.2	0.1	2.3

- ii) A magnetic field is a region where magnetic materials experience an invisible force produced by the flow of electricity or the current (Amps). While electric fields are blocked by many common materials, this is not the case with magnetic fields. Therefore, whether a substation is enclosed or open will not affect the resulting magnetic fields. The magnetic field strength resulting from an electrical installation varies continually with time and is affected by a number of factors including:
- The total electrical load;
 - The size and nature of the equipment;
 - The design of the equipment; and
 - The layout and electrical configuration of the equipment and its interaction with other equipment.

Connell Wagner Pty Ltd was engaged by EnergyAustralia in December 2008 to undertake a detailed assessment of Magnetic Fields at the North Shore Private Hospital (NSPH) Boundary. The assessment provides a reasonable prediction of the magnetic field levels along the boundary between the proposed substation site and the NSPH, based on the substations ultimate configuration and ultimate peak loading. The assessment looks at a series of extreme cases with a view to assessing the maximum likely contribution from each major element and, hence, the potential maximum magnetic field at each point along the substation boundary. The approach was deliberately conservative, and was not intended to imply that all of the circumstances modelled could occur simultaneously.

The assessment concluded the magnetic field contribution at the south eastern boundary of the site (abutting NSPH), due to any individual source within the substation, is expected to be less than 1 milligauss. The result of all sources within the substation is expected to be less than 3 milligauss (mG).

The assessment concluded that the magnetic fields likely to be produced by the incoming 132kV and outgoing 11kV cables, with the exception of one bank of 11kV cables routed via Saville Street, would have a negligible contribution to the magnetic fields at the boundary with NSPH. While at the time of the assessment the final location of the bank of 11kV

cables in Saville Street was yet to be determined, they would not be located less than 3 metres outside the hospital's south western boundary. For the minimum 3 metres separation between the cables and the property boundary, the field contribution 1 metre above ground level at the property boundary would be up to 2.1mG, decreasing to 1mG approximately 2 metres inside. The field at ground level will be higher, (up to 2.9mG) at the property boundary.

- iii) The executed Deed of Agreement clearly assigns responsibility and cost of any subsequent mitigation to the appropriate party. NSPH has already agreed to this and their concerns have been addressed in the Deed.
- iv) EnergyAustralia adopts a "prudent avoidance" approach to EMF risk mitigation. The Draft ARPANSA Standard¹ addresses the matter of prudent avoidance and related policy options in an Annex and the Draft makes recommendations in relation to prudent avoidance in the following terms:

"Measures for the protection of the general public who may be exposed to [Extremely Low frequency magnetic Fields] ELF and/or static fields due to their proximity to ELF and/or static sources must include the following; Minimising, as appropriate, ELF and/or static electric and magnetic field exposure, provided this can be readily achieved without undue inconvenience and at reasonable expense. Any such precautionary measures should follow good engineering and risk minimisation practice. The incorporation of arbitrary additional prescriptive safety factors beyond the exposure limits of this Standard is not supported."

Consistent with the above, and in accordance with its policy of adopting a prudent approach in designing its facilities, EnergyAustralia's design for the substation incorporates a number of design features which have the effect of reducing fields at the site boundaries. These include:

- The provision of a 14.3 metre buffer between the substation proper and the boundary of NSPH;
 - The use of compact indoor 11kV switchgear;
 - The arrangement and phasing of the 11kV transformer tails to provide mutual cancellation of their magnetic fields;
 - The use of underground cabling for incoming and outgoing feeders; and
 - The use of twisted 3-core cables for the outgoing 11kV feeders.
- e) The responsibility for the road design and any consequences rests with NSCCAHS/NSW Health. This is again addressed in the executed Deed of Agreement.

However it should be noted that as a result of the NSPH extension now containing only a single level carpark, and EnergyAustralia's requirement that no heavy duty road is proposed as part of this development, impacts are extremely unlikely.

¹ARPANSA: Exposure Limits for Electric & Magnetic Fields - 0 Hz to 3 kHz. Public Consultation Draft. 7 December 2006

Notwithstanding, as for the design and construction coordination on the NSPH extension, the Deed requires NSW Health to ensure that any imposts from the adjacent property do not cause additional costs/negative impacts to NSPH.

Issues raised by the Department of Planning

Issue:

Concerns are raised regarding the outlook of patients and staff from the NSPH, given the height and proximity of the hospital extension to the substation. Improved screening of the transformers should be considered, for example, replacement of the predominantly open metal fence with a solid, higher fence and improved plant screening, such as the use of hedge or tree planting.

Response:

The transformers are located on the northern boundary as far away from the proposed hospital development to provide adequate clearances in accordance with EnergyAustralia design guidelines.

Given the height of the hospital relative to the substation transformers, screening or fencing would not provide effective visual screening of the transformers. Furthermore the transformers require air movement and accessibility for operational purposes that would be negatively impacted by the installation of screens.

Any additional plantings of substantial trees in this area (beyond that proposed) may also lead to security risks to the substation and would provide little screening benefit due to the height difference of the hospital in relation to the substation.

EnergyAustralia has also selected transformers and switchgear for the substation that are not visually intrusive. For example, there are no external wiring and insulator arrays commonly seen in outdoor substations (refer photomontages submitted with the Project Application which indicate a similar transformer arrangement).

Other minor design changes have also been adopted that reduce the visual impact of the facility.

Issue:

You are requested to confirm that the 15m buffer zone is sufficient given the proposed uses in the hospital extension, relating to noise, potential electromagnetic impacts on hospital equipment and potential fires and other accidents.

Response:

This matter is addressed in Comments made in (d)(iv) above in response to comments from Ramsay Health.

3. Preferred Project Report

Following the exhibition of the proposal and an analysis of the comments provided by Department of Planning, Willoughby City Council and Ramsay Health Care, and to improve the design and functioning of the Zone Substation, the proposal has been amended as detailed below. For ease of understanding, a full set of drawings has been reissued, although several have not been changed. The full set of drawings attached in Appendix B should be treated as the plans for assessment purposes.

Amendments	Plans showing change
1. The building has been reduced in length (ie north/south) by 3.4m and setbacks have been increased on these elevations	DA-03RevD
2. The overall height of the building has been reduced by 0.6m	DA-0A RevC; DA-0B RevB; DA-06 RevC; DA-07 Rev C; DA-08 Rev D; DA-10 RevC.
3. North Boundary retaining wall has been moved 4m into the site and the palisade fence is now on ground	DA-0A RevC; DA-03 RevD; DA-05 RevC;
4. The door on the south elevation has been replaced by a glass block window	DA-0B RevB; DA-06 Rev C
5. Setbacks on north side of the building have increased by 0.5m and on south side by 2.4m.	DA-03 RevD; DA-05 RevC
6. Internal south wall has moved 1.0m	DA-04 RevC
7. East stair moved 3.0m to the south	DA-04 RevC
8. Two (2) basement openings deleted – replaced with face block work	DA-06 RevC
9. Awning deleted on western elevation	DA-07 RevC.
10. Materials have changed: Face Block 1 now Smooth Face rather than Split Face Face Block 2 now “Almond” rather than “Alabaster”	Finishes Board
11. On site detention added.	SY080197 Hydraulic PAn

The following plans have not been amended.

DA-00 Rev A

DA-01 Rev A

DA-02 Rev A

DA-09 Rev B

19318 Sheet 1 Shadow Diagrams

551-L01 Landscape Plan

4. Statement of Commitments

The issues raised and the changes to the project application resulting from the submissions have not warranted any changes to the Draft Statement of Commitments attached to the Project Application.

5. Conclusion

This report, together with the Environmental Assessment which accompanied the Major Project Application represents the Preferred Project for the development of the Zone Substation at Royal North Shore Hospital.

An assessment of the impacts of the proposal indicates that the project and the principles guiding the future redevelopment of the site will, on balance, result in positive social, environmental and economic outcomes.

The Minister is requested to consider the application favourably.

Leoné McEntee
Director
Urban Planning Outcomes Pty Ltd
4th March 2009

Appendix A
Submissions Received

Appendix B
Final Set of Drawings

Appendix C
Letter from Radiation Shielding Australia