NSW Police Force

Tuggerah Lakes Local Area Command

Crime Prevention Office

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January 2013

Application Coordinator
Wyong Shire Council
PO Box 20
Wyong NSW 2259

To whom it may concern,

RE: Education Establishment for Catholic High School, 48-54 Carters Road, Lake Munmorah NSW 2259

Thank you for your letter dated 16th November 2012 Tuggerah Lakes Local Area Command of the above mentioned development proposal.

In line with the Crime Prevention Guidelines of the New South Wales Environmental Planning and Assessment Act, 1979, Section 79C, Tuggerah Lakes Local Area Command has conducted a *Safer by Design Crime Risk Evaluation* as requested by Wyong Shire Council, Hely Street, Wyong on the Education Establishment for Catholic High School, 48-54 Carters Road, Lake Munmorah, NSW, 2259.

The result of this Safer by Design Crime Risk Evaluation for this development has identified an overall crime risk rating as MODERATE, on a sliding scale of low, moderate, high crime risk. The evaluation was conducted on Education Establishment for Catholic High School, 48-54 Carters Road, Lake Munmorah that was provided by Wyong Shire Council.

The proposed Catholic High School could introduce new (potential) victims, crime opportunities and offenders to the development site and its surroundings.

Traffic is always a concern for new developments and the possible impact the school may have on Carter Road. Due to the staged nature of the development, there will only be 90 students and 10 staff, until future development into Stage two. There will be sufficient off street parking and pick-up/set down facilities to ensure there is no necessity for increased parking on Carters Road.

Tuggerah Lakes Police have no objections to the development and the school will compliment the existing businesses and structure within Lake Munmorah.

Crime Prevention through Environmental Design (CPTED) treatment options should be considered for the proposed development in order to reduce opportunities for crime if the development is approved. See attached CPTED recommendations.

Yours sincerely,

Bethany Gaudin

Crime Prevention Officer

1. Disclaimer.

NSW Police Force has a vital interest in ensuring the safety of members of the community and their property. By using recommendations contained within this document, any person who does so acknowledges that:

- It is not possible to make areas evaluated by NSW Police Force absolutely safe for the community and their property.
- Recommendations are based upon information provided to, and observations made by NSW Police Force at the time the document was prepared.
- The evaluation/report is a confidential document and is for use by the person/organisation referred to on page one.
- The contents of this evaluation/report are not be copied or circulated otherwise than for the purposes of the person/organisation referred to at the start of the Assessment.

NSW Police Force hopes that by using the recommendations contained with this document, criminal activity will be reduced and the safety of members of the community and their property will be increased. However, it does guarantee that all risks have been identified, or that the area evaluated will be free from criminal activity if its recommendations are followed.

2. Executive Summary.

On 16th November 2012, Wyong Shire Council requested NSW Police Force to conduct a Safer by Design crime risk assessment of a proposed Education Establishment for Catholic High School, 48-54 Carters Road, Lake Munmorah, NSW, 2259.

Information used during the evaluation was provided by, or obtained from:

- Wyong Shire Council.
- Tuggerah Lakes Local Area Command.

Development/site specific documentation included:

- Development Application Form – Local Development (Statement of Environmental Effects)
- Development Application Form – Integrated Development.

3. Site Description

The proposed development application is described as Lots 433 and 499 Deposited Plan (DP), Nos 48 and 54 Carters Road, Lake Munmorah, and is located within the Wyong Shire Local Government Area (LGA). The site is located approximately 350 metres from the intersection of the Pacific Highway and Carters Road/Elizabeth Bay Drive and is accessible from Carters Road. The site comprises of a total area of 8.166 hectare, is square in shape and has a 258.46 metre frontage to Carters Road. Located to the North, is predominantly rural residential developments, to the South, Lake Munmorah Public School and Primary School, to the East, St Brendans Catholic School and to the West, rural residential development.

4. Introduction.

Section 79c of the Environmental Planning and Assessment Act and Crime Prevention.

In April, 2001, the NSW Minister for Planning introduced Crime Prevention Guidelines to S79C of the Environmental Planning and Assessment Act, 1979. These guidelines require consent authorities to ensure that development provides safety and security to users and the community. 'If a development presents a crime risk, the guidelines can be used to justify modification of the development to minimise crime risk, or, refusal of the development on the grounds that crime risk cannot be appropriately minimised.

The Guideline contains two parts. 'Part A details the need for a formal crime risk assessment (Safer by Design Evaluation) to be done in conjunction with trained police, and Part B outlines basic Crime Prevention through Environment Design (CPTED) principals and strategies that can by used by consent authorities to justify the modification of proposals to minimise risk'.

Site Risk Rating

The NSW Police Safer by Design Evaluation process is based upon Australia and New Zealand Risk Management Standard ANZS4360:1999. It is a contextually flexible, transparent process that identifies and quantifies crime hazards and location risk. Evaluation measures include crime likelihood (statistical probability), consequence (crime outcome), distributions of reported crime (hotspot analysis), socio-economic conditions (relative disadvantage), situational hazards and crime opportunity.

After conducting this process the rating for this development has been identified as,

Moderate crime risk.

With this in mind the following Crime Prevention Through Environmental Design (CPTED) treatments should be considered for the development in order to reduce opportunities for crime.

- *Natural*
- *Organised (low)*
- *Technical/Mechanical (low)*
- *Technical/Mechanical (high)*

5. Crime Prevention through Environmental Design.

Crime Prevention through Environmental Design (CPTED) is a crime prevention strategy that focuses on the planning, design and structure of cities and neighbourhoods. It reduces opportunities for crime by using design and place management principals that reduce the likelihood of essential crime ingredients from intersecting in time and space.

Predatory offenders often make cost-benefit assessments of potential victims and locations before committing crime. CPTED aims to create the reality (or perception) that the costs of committing the crime are greater than the likely benefits. This is achieved by creating social and environmental conditions that:

- Maximise risk to offenders (increasing the likelihood of detection, challenge and apprehension).
- Maximise the effort required to commit crime (increasing the time, energy and resources required to commit crime).
- Minimise the actual and perceived benefits of crime (removing, minimising or concealing crime attractors and rewards),
- Minimise excuse-making opportunities (removing conditions that encourage/facilitate rationalisation of inappropriate behaviour).

CPTED employs four key strategies. These are Surveillance, Access Control, Territorial Reinforcement and Space/Activity Management.

Crime Reduction Opportunity and Recommendations:

Surveillance

Natural surveillance is achieved when normal space users can see and be seen by others. This highlights the importance of building layout, orientation and location; the strategic use of design; landscaping and lighting. *Natural surveillance* is a by-product of well-planned,

well-designed and well-used space. *Technical/mechanical Surveillance* is achieved through mechanical/electronic measures such as CCTV, help points and mirrored building panels. *Technical/mechanical surveillance* is commonly used as a 'patch' to supervise isolated, higher risk locations. *Formal (or Organised) Surveillance* is achieved through the tactical positioning of guardians. An example would be the use of on-site supervisors at higher risk locations.

General Comments in Design for Surveillance:

- Surveillance equipment can enhance the physical security of the school throughout the complex including the Administration, computer rooms, canteen, library and car parks'. This can assist in the identification of people involved in anti-social or criminal behaviour. Cameras should be installed both within and around the school to maximize surveillance opportunities.

- Sightlines throughout the school need to be kept as simple as possible. Maintain clear sightlines between corridors, neighbouring properties and any buildings as to reduce any concealment opportunities. Ensure all shared paths are clearly identified and sign posted as to there use, as to avoid any confusion. Suggestions to colour sections of the paths or crossings to allow easier identification of use.

- Buildings facing 'outward' towards public and semi public areas provide natural surveillance and informal supervision (eyes on the street).

- Laminated glass walls and windows facilitate supervision of common entry areas.

- Digital technology should be used and ensure that the requirements of the Surveillance and Privacy Act are adhered to.

- For CCTV to be effective it must be vandal resistant and able to clearly identify and record faces, shapes and colours.

- TV monitors should enable staff to monitor activities on the camera.

- Recording equipment should be installed away from the counter area to avoid tampering.

- To enhance the security of the school, a monitored intruder alarm system is recommended. Consider incorporating a duress facility into the system to enable staff to activate the system manually in the event of an emergency, such as a robbery.

Lighting

There is a proven correlation between poor lighting, fear of crime, the avoidance of public places and crime opportunity (Painter, 1997). Good lighting can assist in increasing the usage of an area. There is no information with the plans, which were reviewed to indicate the lighting proposals for the development.

General Comments in Design for Lighting:

- Adequate, uniform lighting should cover the entire property. The emphasis should be on installing low glare/high uniformity lighting levels in line with Australian/ New Zealand standards 1158.

- It is the experience of the Dept. of Education and Training School Security Unit that external lighting is only effective if the illuminated area has good surveillance from others. Therefore, all external lights should be turned off in areas that are not visible to local residents. In areas that are illuminated with little or no casual surveillance, intruders are given the impression that criminal activity will go unnoticed. Timers, sensor lighting and override switches could be utilised to overcome any WH&S concerns with the cleaners or staff members working after hours.

- All luminaries (light covers) should be designed to reduce opportunities of malicious damage (vandalism). A lighting maintenance policy needs to be established for the development. Ideally, lighting that allows 15 metre facial recognition test should be installed.

- It is recommended that further information be obtained in regards to the use of lighting, both internally and externally to ensure lighting meets required standards to enhance surveillance opportunities during hours of darkness and the safety of staff and residents both inside the school and on the footpaths.

Territorial Re-enforcement

Criminals rarely commit crime in areas where the risk of detection and challenge are high. People who have guardianship or ownership of areas are more likely to provide effective supervision and to intervene in crime than passing strangers. Effective guardians are often ordinary people who are spatially 'connected' to a place and feel an association with, or responsibility for it.

Territorial Re-enforcement uses actual and symbolic boundary markers, spatial legibility and environmental cues to 'connect' people with space, to encourage communal responsibility for public areas and facilities, and to communicate to people where they should/shouldn't be and what activities are appropriate.

General Comments in Design for Territorial Re-enforcement:

- There is no information to indicate signage, which might be used in and around the development. Confusion resulting from vague entry design can legitimise exploration, trespassing and excuse making by opportunistic criminals. Entries should be legible and inviting.

- The schools name should be predominantly displayed at the front of the school to comply with the Local Government Act 1993 Section 124 (8). It is important that signs do not provide places for persons to hide behind. Signs need to be well lit in front with care taken to eliminate unnecessary side shadows. The ground behind can be bermed up to prevent people from standing behind it. An alternative is to raise the sign high enough off the ground, that a person's feet would be visible if they were behind it.

- Warning signs should be strategically posted around the school to warn intruders of what security treatments have been implemented to reduce opportunities for crime. 'Warning: Trespassers will be prosecuted', 'Warning: No large amounts of money kept of premises', 'Warning: these premises are under electronic surveillance'.

- Effective signage and/or directional signs should be considered to provide directional guidance to visitors to reception & classroom areas. Signs can also assist in controlling activities and movements throughout the school grounds.

- Directional signage should be posted a decision making points (eg. Entry/Egress, reception/main office) to provide guidance to visitors, including to areas of medical assistance. This can also assist in access control and reduce excuse making opportunities by intruders.

- A current fire safety statement must be predominately displayed within the school to comply with Environmental Planning & Assessment Regulations (1994) Clause 80GB.

- Park Smarter signage should be considered in all car parks to assist in educating all vehicle owners to lock their cars and secure their valuables. Parking lots should be located close to classrooms and administration areas. Classrooms should be provided with sufficient windows to allow view of the parking lot, since each classroom represents 20 or 30 sets of eyes. Anyone intent on stealing or vandalising a car in the car park, must worry that he or she may be being watched.

Environmental Maintenance

All space, even well planned and well-designed areas need to be effectively used and maintained to maximize community safety. Places that are infrequently used are commonly abused. There is a high correlation between urban decay, fear of crime and avoidance behaviour.

General Comments in Design for Environmental Maintenance:

- There is no information within the plans which indicate what maintenance policies will be included within this development. A maintenance policy needs to be established.

  Vandalism and graffiti is a major problem within this local area command and it is very important that porous building surfaces are not used. Easily damaged building materials may be less expensive to purchase, but their susceptibility to vandalism can make them a costly resource in the long term, particularly in at-risk areas.

  Many graffiti artists favour porous building surfaces, as their "tags" are difficult to remove and often a ghost image will remain even after cleaning. Therefore it is important to consider the type of external building materials for all blank walls including retaining walls such as stainless steel, gloss ceramic tiles or the use of anti-graffiti coatings and silicone based paints. As these surfaces are comparably easy to clean and help reduce the expense of cleaning.

As malicious damage (graffiti) is often an offence caused to such developments strong consideration must be given to the use of graffiti resistant materials, particularly on the ground floor and areas which are accessible by other structures to reduce such attacks or assist in the quick removal of such attacks.

A graffiti management plan needs to be incorporated into the maintenance plan for the development. Research has shown that the most effective strategy for reducing graffiti attacks is the quick removal of such material generally with a forty-eight hour period.

- Ensure all amenities, ramps etc have deterrent bars on them to restrict the use of skateboarders using the area inappropriately.

Space/Activity Management

Space/Activity management strategies are an important way to develop and maintain *natural* community control. Space management involves the formal supervision, control and care of the development. All space, even well planned and well-designed areas need to be effectively used and maintained to maximize community safety. Places that are infrequently used are commonly abused. There is a high correlation between urban decay, fear of crime and avoidance behaviour.

General Comments in Space/ Activity Management:

- The placement of public telephones can increase crime opportunity at those sites. Problem facilities are often poorly supported by internal/external lighting; positioned in isolated areas, or placed close to structures that facilitate loitering, concealment and possible entrapment.

- Dumpsters should be secured and enclosed to prevent children from climbing into them. They should be surrounded on three sides by an eight foot screen wall. The base of the wall should be surrounded by a hedge to discourage climbing.

- Bicycle racks should be located in a highly visible area near the main entry or parking: maintaining a separation between bicycle and vehicular traffic with landscaping and bike paths. A low hedge or wall around the racks would visibly screen bicycles, but not persons attempting to steal or vandalism.

- To reduce hiding places and possible injury, water coolers, vending machines, trash containers, and lockers should be either low profile or flush with the wall. Avoid creating alcoves, nooks and other small spaces along corridors that create criminal activity. Any freestanding objects such as stand alone lockers or vending machines should be mounted to the wall to avoid injury if they should fall over.

- Blind bends and corners should be avoided in building corridors and walkways whenever possible. Where they are present or cannot be avoided in proposed developments, surveillance can be enhanced through the use of vandal resistant mirrors, windows (where applicable), and bright, evenly distributed lighting.

Much of the design of school corridors is dictated by the safety requirement which ensure that hallways are wide enough to allow students to evacuate the building quickly. Regardless, as a general rule, hallways should be avoided. The corners allow people to hide and cause others to run into each other.

Access Control

Access control treatments restrict, channel and encourage people and vehicles into, out of and around the development. Way-finding, desire-lines and formal/informal routes are important crime prevention considerations. Access control is used to increase the time and effort required to commit crime and to increase the risk to criminals.

Natural access control includes the tactical use of landforms and waterways features, design measures including building configuration; formal and informal pathways, landscaping, fencing and gardens.

Technical/Mechanical access control includes the employment of security hardware and *Formal (or Organised) access control* includes on-site guardians such as employed security officers.

General Comments in Access Control:

- Research shows that vegetation is commonly used to aid concealment of criminals, therefore it is important that landscaping/vegetation be applied effectively. Vegetation closest to pedestrian pathways and cycle ways require close consideration. Species must be selected for different locations on the basis of their height/bulk and shape. Low garden shrubs (<600mm), with vegetation stepped back in height to maximise sightlines.

  Additionally, ensure that high branching trees are not planted next to street lights, as in the future, trees will grow and develop and if the wrong species is planted, visibility is decreased, fear increases and pedestrians street usage is decreased. Ensure there are no natural ladders, wether that be, natural or man made to enable access to the roof tops of buildings.

- Green-screens are wall-hugging plants that cannot be hidden behind. Comprised of shrubs, creepers or vines, green-screens protect walls and other susceptible structures from graffiti and vandalism. Green-screens should not cover windows or other vantage points. While the *sensible* maintenance of vegetation is encouraged, the objectives of safety, aesthetics and horticulture need to be balanced. Conflict can arise when high-branching trees pass through dense, bushy stages of growth. Care should be taken with young plants as inappropriate trimming can cause plant disease and long-term damage.

- Landscaping can also be used as a method of access control. Like wall and fencing, a tightly spaced row of tress incorporated with love level plants, can define a edge that leads to an opening or entrance. Large trees, such as oaks and sable palms, lining side walks and driveways will deter potential motorists from driving onto the school and damaging lawns and recreational fields.

- Trees and shrubs should be trimmed to reduce concealment opportunities and increase visibility to and from the school.

- Remove obstacles & rubbish from school boundaries, footpaths, driveways, car parks and buildings to restrict concealment & preventing offenders scaling your school.

- Maintain clear sightlines between street, neighbouring properties and the buildings.

- Fencing – Install quality security fences around the perimeter of your school to clearly define the property boundaries and restrict access, preferably open-style fencing and gates of similar construction to prevent an offender from using the fence for concealment.

- Entry points for burglary are most often located at the side and rear of buildings. Studies among active burglars also show that access to the side or rear of buildings is an important consideration in target choice. Side gates and fences increase the effort required by criminals to access *favoured* areas. All classrooms should have proper security screens and windows, especially those facing the bushland or entry/exit areas.

- A safe designed and installed to the Australian Standards can provide additional security to money and other valuables.

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If you require any further information, please don't hesitate to contact the Crime Prevention Office on 43566236.

Regards,

Bethany GAUDIN
Senior Constable
Crime Prevention Officer
Tuggerah Lakes LAC

Transport
Roads & Maritime
Services

19 February 2013

SF 2012/049224
CR 2012/011220
MJ

General Manager
Wyong Shire Council
DX 7306
WYONG

Attention: Heidi Cox

PACIFIC HIGHWAY (HW10): LOTS 433 AND 499 DP 755266, NO.48-54 CARTERS ROAD, LAKE MUNMORAH EDUCATIONAL ESTABLISHMENT FOR CATHOLIC HIGH SCHOOL (DA 942/2012)

Dear Ms Cox,

I refer to your letter dated 15 November 2012 regarding the subject development application forwarded to Roads and Maritime Services (RMS) for consideration. I apologise for the delay in responding.

RMS Responsibilities and Obligations

Transport for NSW and RMS primary interests are in the road network, traffic and broader transport issues. In particular, the efficiency and safety of the classified road network, the security of property assets and the integration of land use and transport.

In accordance with the *Roads Act 1993*, RMS has powers in relation to road works, traffic control facilities, connections to roads and other works on the classified road network. The Pacific Highway is a classified (State) road and Carters Road is an unclassified local road. RMS concurrence is required for works, structures, and disturbances to, in, on, under or over classified roads, under section 138 of the Act, with Council consent. RMS consent is required for traffic control signals under section 87 of the Act. Council is the roads authority for these roads and all other public roads in the area. Should works be required on a classified (State) road, RMS would exercise the function of roads authority under section 64 & 71 of the Act.

Additionally, RMS has powers under Section 104 of the Roads Act 1993 to direct the removal of any works deemed by to be a traffic hazard.

RMS Response and Requirements

RMS has reviewed the information provided and has no objections to the proposed development provided the following matters are addressed and included in Council's conditions of development consent:

Vehicular Access and Parking

- The lane configuration in Carters Road on the approach to the Pacific Highway / Carters Road intersection shall be altered to provide a left only lane and a combined right / through lane to RMS requirements.

  Comment: This will require a minor modification to the traffic control signal operation and pavement marking.

- All on-street parking shall be removed on the northern side of Carters Road on the approach to the Pacific Highway / Carters Road intersection from the intersection to the western driveway access of the recently constructed off-street car park provided by Ausgrid. That is, all on-street parking is to be removed between the eastern pedestrian crossing and the highway. This shall be marked as a left only lane and 'no stopping' signs erected to Council / RMS requirements.

  Comment: The provision of a 120 metre long left lane will improve road safety / traffic flow in Carters Road and overall performance (reduced delays) at the Pacific Highway / Carters Road traffic control signals during peak school periods. It is considered that the loss of on-street car parking is offset by the gains in the Ausgrid car park facility and the road safety / traffic flow benefits on Carters Road. Council should consult with the schools to enable this change to be implemented.

- The swept path of the largest vehicles entering and exiting the proposed development, internal accesses and all parking facilities on site are to be designed and constructed in accordance with Wyong Shire Council DCP No. 61 "Car parking" and AS/NZS 2890.1:2004 Part 1: "Off-Street Car Parking", to Council requirements.

- On site vehicular turning facilities shall be provided to enable all vehicles to enter and exit the site in a forward direction.

- The existing school zone and flashing lights shall be extended past the subject site, to RMS requirements.

- Appropriate site works shall comply with the minimum sight distance requirements and minimum sight lines for pedestrian safety set out in the RMS publication "Guide to Traffic Generating Developments" (1993) and AS/NZS 2890.1:2004 Part 1: "Off-street car parking".

- A Construction Traffic Management Plan (CTMP) shall be prepared and include a Vehicle Movement Plan and Traffic Control Plan. It shall be prepared with the intention of causing minimal impact to the operation of the Pacific Highway and Carters Road during construction, especially during peak school periods. Restrictions on construction vehicle movements may be required during these peak periods. The CTMP shall be submitted to the RMS and Council for review and approval prior to any construction activities occurring onsite.

- As road works are required on a State road, and traffic control signals, RMS will require the developer to enter into a Works Authorisation Deed (WAD) with RMS. RMS will exercise its powers under Section 87 of the *Roads Act 1993* (the Act) and the functions of the roads authority, to undertake road works in accordance with Sections 64, 71, 72 and 73 of the Act, as applicable, for all works under the WAD.

  Comment: Further advice regarding the WAD process is provided in Attachment A

- Prior to issuing a construction certificate for the proposed development, the developer shall enter into a WAD with RMS for any adjustments to the Pacific Highway / Carters Road intersection traffic control signals.

- Prior to issuing an occupation certificate (interim or final) certificate for the proposed development the developer shall complete the traffic control signal works under the WAD to practical completion, as determined by RMS.

- All works shall be carried out at full cost to the developer and at no cost to RMS or Council.

Advice to Council

- RMS has no proposal that requires any part of the subject property.

- Council should undertake monitoring / enforcement of the traffic conditions in Carters Road during the peak school periods to ensure that vehicular traffic is operating in a safe, efficient and legal manner. Further removal of parking on the southern side of Carters Road between the Pacific Highway and the car park entry to the Lake Munmorah Primary School may be required to prevent vehicles queuing back onto the Pacific Highway during the peak periods.

- Carters Road should be upgraded across the frontage of the proposed development site to a similar standard as provided east of the site to the Pacific Highway to Council requirements.

- Council should ensure that the proponent provides appropriate pedestrian facilities (footpaths, crossings, etc.) between the proposed development (Catholic High School) and the existing Catholic Primary School.

- Council should formalise the angle parking on the grassed area adjoining the Lake Munmorah High School bus pick up / set down lane.

- Council should ensure that the proponent makes provision for a new u-turn facility on Carters Road immediately west of the proposed development site, to enable u-turn manoeuvres in a location which will not impact on the designated pick up / set down areas and clear of pedestrian movements.

- It is noted that the provision of one bus standing area per 200 students satisfies the requirements of Wyong Council DCP No. 61 "Car parking". Council should ensure the available area for the bus standing area will satisfy the requirements for the full development of the site. That is, including years 7 to 12.

- Reversing vehicles in the car park adjacent to the bus pick up / set down area may impact on pedestrians using the adjacent pedestrian crossing. This matter should be addressed to Council's satisfaction.

- The plans provided indicate that there is a gap in the pedestrian fencing separating the car park and the bus pick up / set down area. This gap should be removed to prevent pedestrian movements at this location. All pedestrian movements should be via the crossings provided.

- Council should ensure that adequate provisions for cyclists are identified and implemented as part of this development.

  Comment: RMS has noted that no designated on or off street cycle lane / paths have been provided in the Carter Road precinct.

Notwithstanding the above, all matters relating to the local road network, car parking and traffic / cyclist / pedestrian management in the immediate vicinity of the subject development are matters for Council's determination.

Noise Considerations

- Council should ensure that the applicant is aware of the potential for road traffic noise to impact on development on the site. In this regard, the developer, not RMS is responsible for providing noise attenuation measures in accordance with the Office of Environment and Heritage *NSW Road Noise Policy 2011*, should the applicant seek assistance at a later date.

  Where the Office of Environment and Heritage external noise criteria would not feasibly or reasonably be met RMS recommends that Council apply internal noise objectives for all habitable rooms under ventilated conditions that comply with the Building Code of Australia.

On Council's determination of this matter, it would be appreciated if a copy of the Notice of Determination is forwarded to the RMS for record and / or action purposes.

Please contact me on 4924 0688 if you require further advice.

Yours sincerely

Dave Young
Manager Land Use
Hunter Region

Attachment A: Preliminary WAD Advice to Consent Authority and Developer

Advice to the Consent Authority

- On Council's determination a copy of the Notice of Determination should be forwarded to RMS within the appellant period for advice / consideration and action where required.

- Conditions of development consent do not guarantee RMS' consent to the specific road works, traffic control signals and / or other structures or works for which it is responsible. The developer must obtain RMS' authorisation in writing prior to the commencement of any road works and traffic control signals, including traffic management, temporary or permanent road works associated with the proposed development.

Advice to the Developer

- Following development consent, early discussion with RMS' Project Manager is recommended. RMS will initiate the WAD process by sending out a letter and information pack on receipt of the Notice of Determination, including the name and contact details of the Project Manager.

- As the WAD process, including acceptance of design documentation and construction can take considerable time, you should allow sufficient lead time within the project development program to ensure that all documentation and works are completed in advance of occupation. RMS will not consider granting concurrence to occupation until it is satisfied all documentation and works under the WAD have been completed.

- Authorisation to commence construction will only be granted when RMS is satisfied that all requirements under the WAD have been met by the developer, including RMS' fees and charges, an unconditional bank guarantee for the full value of the works, detailed design documentation, environmental assessment, road occupancy license, among other matters. RMS will issue a letter to the developer advising of this authorisation.

- Any property acquisition / dedication required to accommodate the State road works / traffic control signals associated with the proposed development shall be at full cost to the developer, including all legal and survey costs. This land shall be dedicated by the developer as public road reserve in favour of the Council, as the owner.

- Part of the developers' timeline should make provision for RMS to satisfy its obligations under the *Environmental Planning and Assessment Act 1979* (EP&A Act) to assess the environmental impacts of the works within the road reserve. Further investigation and assessment to that undertaken for the development consent may be required to the satisfaction of RMS, under Part 5 of the EP&A Act.

- It is recommended that the developer use design consultants with the experience and knowledge of RMS' design requirements, in particular the Austroads *Guide to Road Design 2009* (with RMS supplements) and relevant Australian Standards.

- A factsheet providing further information on the WAD process can be obtained from the RMS Private Developments Website at:

  http://www.rta.nsw.gov.au/roadprojects/community_environment/private_developments.html

- Construction on a State road and / or traffic control signals requires the engagement of an RMS pre-qualified contractor. A list of pre-qualified contractors can be found on the RMS website below.

  http://www.rta.nsw.gov.au/doingbusinesswithus/tenderscontracts/prequalifiedcontractors.html

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T +61 2 131 525
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www.ausgrid.com.au

WYONG SHIRE COUNCIL

13th May 2013

To whom it may concern,

Proposed Development at Carters Road, Lake Munmorah - Development Application No. DA 942/2012

I refer to site master plan Project No. DBB 2301 Drawing No. A001 Issue G which has been provided to Ausgrid for comment on the development and consent to development within Ausgrid's transmission easement.

Purpose of easement

The purpose of the easement is to enable construction and then protect electricity assets and to provide adequate working space along the route of the assets for future construction and maintenance work. The easement is also to ensure that no work or activity is undertaken near to the electricity assets which could either by accident or otherwise create an unsafe situation for persons or reduce the security of the electricity network.

Encroachment over easement site

No building or any other structure may be constructed on the easement site without Ausgrid's consent.

Ausgrid has carried out a study of the proposed development in relation to potential hazards as a result of induced and transferred voltages from the adjacent Ausgrid infrastructure under normal operating and fault conditions. Analysis indicates mitigation will be required.

Ausgrid consents to the proposed development within and nearby Ausgrid's Transmission easement subject to application of hazard mitigation specified in the attached report (NET13-022-001). In addition to the requirements of the attached report Ausgrid wishes to comment on the proposed easement encroachment as follows:

1. Ausgrid is to be indemnified from and against all actions, suits, claims and demands of whatsoever nature, which Ausgrid may incur as a result of the encroachment.
2. The acceptance by Ausgrid of the encroachment within the easement does not in any way limit Ausgrid's legal rights to utilise the easement within the current terms of the easement for lot 499 DP755266.
3. The proposed car park must be capable of supporting the size and weight of Ausgrid plant and machinery expected to infrequently traffic this route (approx. 25 tons).
4. Ausgrid structures are to be adequately protected from accidental damage from any private vehicles, plant or equipment that may be operated within the easement.
5. No obstructions are to be placed within 5m of any power poles, equipment or support wire.
6. The existing ground levels should be maintained. The overhead powerline has been designed to achieve a statutory clearance for the conductors over the ground and this clearance shall not be reduced without further consultation with Ausgrid.

7. The planting of trees and shrubs is allowed within the easement area providing they are of a species which will not grow to a height exceeding 4 metres and do not restrict access along the easement.
8. Clearances detailed in Work Cover Code of Practice 'Working near Overhead Powerlines' should be maintained during any construction work and future maintenance.

For further clarification on any of the above mentioned points please contact Jordan Holliday on (02) 4399 8104.

Regards,

Jordan Holliday

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Proposed Secondary High School 48-54 Carter Road, Munmorah Adjacent to Ausgrid Powerlines

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1. Executive Summary

Ausgrid has been notified of the proposed development of an Educational Establishment for Catholic Secondary High School at 48-54 Carters Road, Lake Munmorah. The Network Earthing section of Ausgrid has been asked to assess the electrical earthing safety compliance of proposed school with regards to induced and transferred voltages from Ausgrid assets under normal operating and fault conditions. Analysis indicates that mitigation will be required if conductive infrastructure, such as fences, are built within the separation distances specified in this report or are continuous for more than 100m.

2. Site Location

The proposed location of the Catholic Secondary High School is 48-54 Carters Road, Lake Munmorah which is shown below in Figure 1. Along the proposed north western boundary is an Ausgrid easement with a 132kV and 11kV overhead power lines. There are several concrete poles which the proposed fence will be built near to. Overhead low voltage and 11kV services exist along Carters Road.

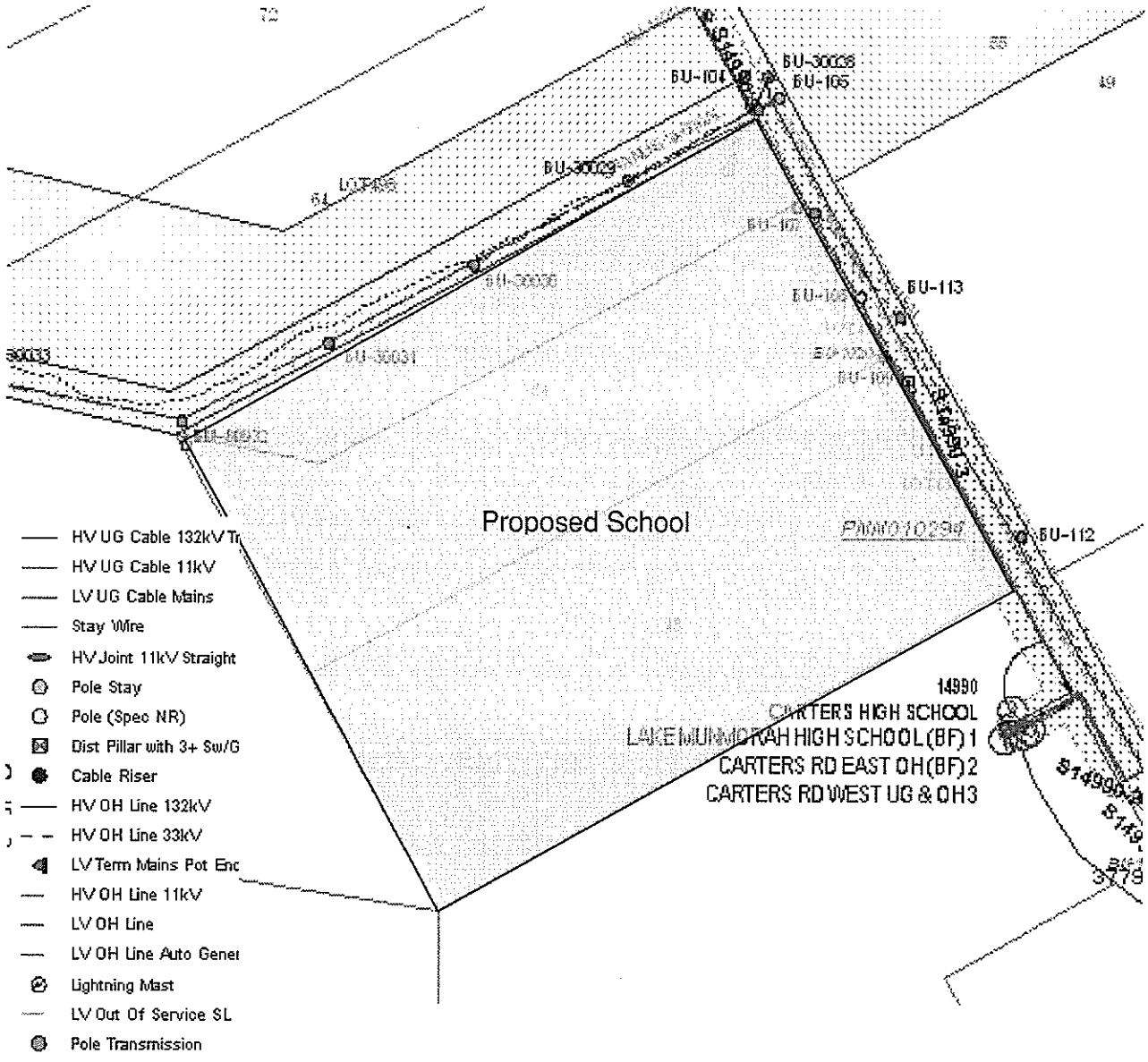

Figure 1: Site Location

3. Electrical Shock Hazards

Electric shocks may occur when people are exposed to a voltage across any part of their body. Faults can occur on electrical power lines for a number of reasons such as when lightning strikes the line, if an insulator should break down, or in rare cases, where a conductor drops to the ground. When a fault occurs, part of the electrical current flows through the ground along the easement, and this can in certain situations cause voltages to occur in the ground for a short period of time until the fault is cleared by protection devices (e.g. circuit breakers) at the substations. This phenomenon is known as an earth potential rise or EPR.

A fault can occur at any time, but are more likely during severe weather such as during strong winds, thunderstorms, or bushfires. The closer a metallic object such as a fence, water pipe, or low voltage equipment is to a tower or pole, the greater the risk, since the electrical current normally enters the ground at these locations.

The flow of electrical current in a conductor and the associated electromagnetic waveform that radiates out from the conductor will induce a voltage in the surrounding conductive structures. This phenomenon is known as Low Frequency Induction or LFI. The following description of LFI is taken from AS/NZS 4853:2012 Electrical Hazards on Metallic Pipelines, and may be more generally applied to any long metallic structure located nearby electrical powerlines.

Alternating current on a high voltage power line can induce a voltage on an adjacent pipeline. This induction results in a voltage over the exposure length due to the electromagnetic field from the current. The induction is caused by the alternating magnetic field intersecting the pipeline, causing the pipeline to act as the secondary of an air core transformer. The voltage is proportional to the length exposed to the magnetic field. The effect applies to both buried and above ground pipelines.

3.1. Safety Criteria

For a given current path through the human body, the hazard to persons depends mainly on the magnitude, duration and path of the current flow, as well as presence of any series resistance (e.g. footwear). AS/NZS 60479:2002 Effects of Current on Human Beings and Livestock establishes the electrical safety requirements for Australia and is a reproduction of an International Standard IEC 60479.

The performance of the earthing system of the electrical power line will be assessed to comply with guidelines and standards AS/NZ 7000 (ENA EG-0), AS/NZ 3835, AS/NZ 4853, ENA EG-1 and AS/NZ 1768 as applicable for the primary clearing time.

3.1.1. Soil Resistance

The soil resistivity in the area surrounding the proposed school has been characterised by number of soil resistance tests performed by Network Earthing, Ausgrid, over the previous six years. The results of some of these tests are shown in Figure 2.

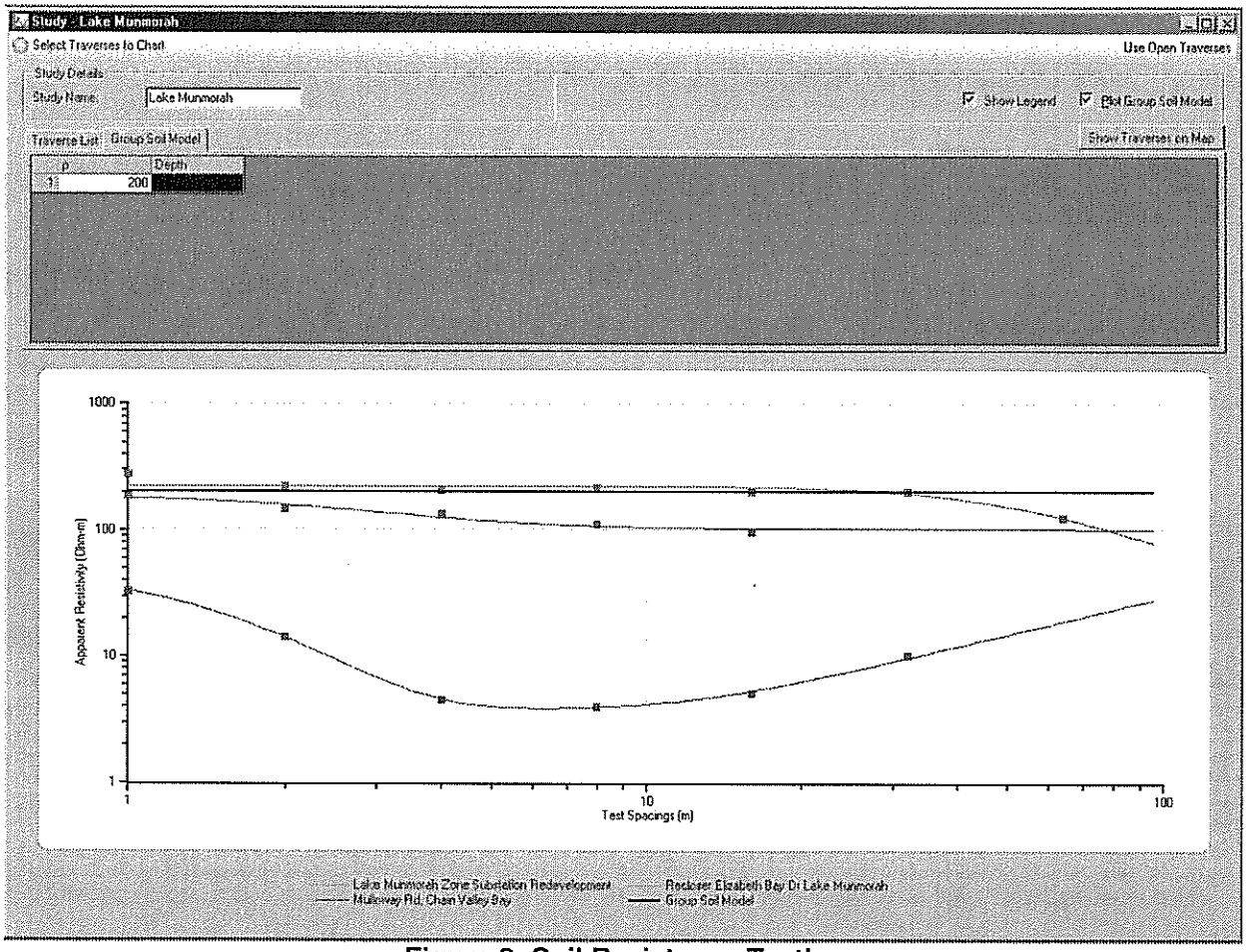

Figure 2: Soil Resistance Testing

From this data a conservative average soil model of 200Ω.m has been chosen. For wet soil the surface layer resistivity is expected to drop to half this value. Therefore safety criteria have been chosen assuming a surface impedance of 100Ω.m.

3.1.2. Normal operating conditions

At normal operating currents, LFI will cause an induced voltage in parallel conductive infrastructure adjacent to power lines.

The magnitude of the inducted voltage is dependent on both the magnitude of the load current as well as the relative distances between each of the phases and the exposed infrastructure. Since the high voltage power line load current can be considered predominantly as a balanced set of currents in the three-phases, in which case their vector sum is zero, the LFI at design load conditions is always much less than the LFI during fault conditions.

The allowable touch voltage limit for continuous voltage is 50Vac.

3.1.3. Fault conditions

AS/NZ 7000:2010 Overhead Line Design Section 10.5 (in conjunction with the ENA EG-0:2010 Power System Earthing Guide – Part 1) recommends using a probabilistic risk based approach to calculate the tolerable voltage criteria during earth faults.

The Argon safety assessment tool is the companion software to ENA EG-0 and is available from the SAI Global website. It is used for the calculation of the tolerable voltage for a given fault duration and frequency and contact duration and frequency. Figure 3 has the relevant information for Ausgrid's electrical assets near proposed school.

Voltage	Fault Current (Amps)	Fault Frequency (per year)	Fault Duration (seconds)	Soil Resistance (ohm.m)
132kV	10,000	0.1	0.2	100
11kV	3,000	2	0.7	100

Figure 3: Feeder Information

Figure 4 and Figure 5 show the Argon assessment for the 132kV and 11kV fault scenarios for Lake Munmorah ZS for TDMEN contact scenario. Typically metal infrastructure under the influence of power system assets is assessed against the TDB assessment criterion that assumes fewer and shorter contacts. However it is assumed that school children will have a contact profile to metal fences more in line with that specified by the TDMEN criteria, hence the tolerable voltages have been calculated using this. As discussed above a conservative lower soil resistivity than the group model was chosen for the calculation of the tolerable voltage criteria to account for wet conditions. This has the effect of reducing the serial impedance in the shock circuit and hence reduces the tolerable voltage.

The tolerable voltage limits chosen for the different contact scenarios is given in Figure 6.

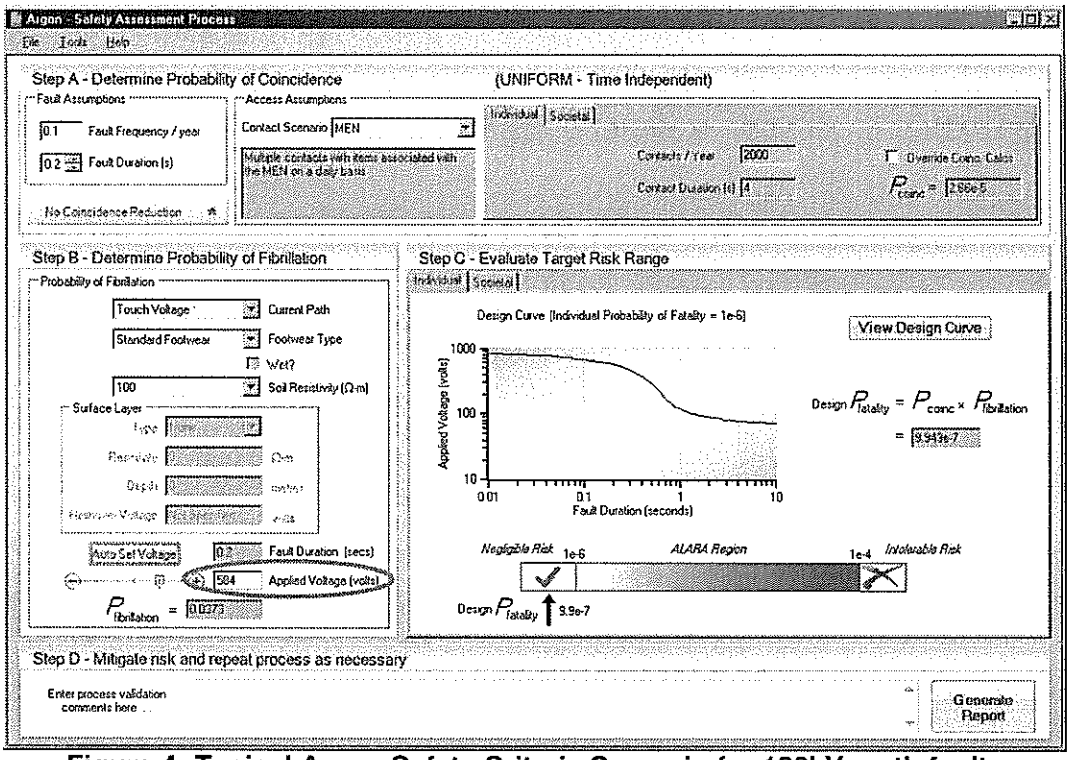

Figure 4: Typical Argon Safety Criteria Scenario for 132kV earth faults

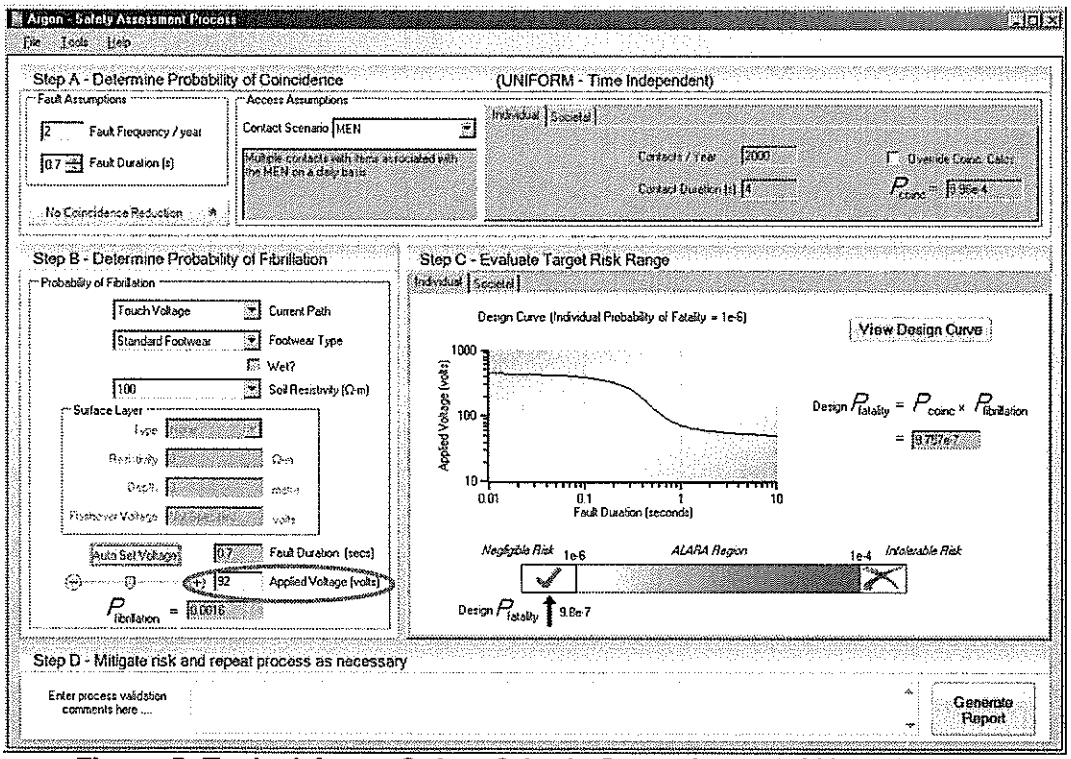

Figure 5: Typical Argon Safety Criteria Scenario for 11kV earth faults

Items	Relevant Guideline or Standard	Category		Clearing Time / type of hazards	Allowable Voltage (V)
Conductive objects under the influence of power system assets	AS7000 (ENA EG-0)	Contact with MEN connected metal work (around house) where MEN or soil is affected by transmission assets.		TDMEN - 100Ω.m 0.2 sec	584
		Contact with MEN connected metal work (around house) where MEN or soil is affected by distribution assets.		TDMEN - 100Ω.m 0.7 sec	92
Pipelines and ancillaries	AS4853	Public	Regulator metallic pit lids	Step	≤1700
			Scour or air valve	Touch	≤120
			Air valve in playgrounds, sporting fields etc	Touch	≤50
		Pipeline operators	Gas valve operation	Touch	≤70
			Water valve operation	Touch	≤58
			CP test point inspection	Touch	≤75
		Construction workers	New gas pipeline	Touch	≤110
			Tee-off from long exposed pipe	Touch	≤110
		Maintenance workers	Leak repair on water pipe	Touch	≤95
			Leak repair on gas pipe	Touch	No voltage limit
Telecommunications assets (conductive & inductive hazards)	AS3835	Category A: 132kV feeder HV line structure > 100kV, ≤ 200kV with continuous earthwire		Any	1000
		Category C: 11kV feeder HV line structure ≤ 100kV		Any	430

Figure 6: Safety Criteria

3.2. Determination of Hazardous Voltages

3.2.1. Normal operation LFI

Following the LFI example from Appendix B of the Pipeline Standard AS/NZ 4853:2012, the induced voltage during peak loading conditions has been calculated to be 5V for an insulated wire for the entire 300m boundary length. This is well below the continuous tolerable voltage limit of 50V.

3.2.2. 132kV Fault Scenario LFI

Inducted voltages on the proposed boundary fence will occur during an earth fault on the 132kV network supplying Lake Munmorah ZS. The Pipeline Standard AS/NZ 4853:2012 provides a conservative method to calculate the inducted voltage. This method is for a parallel conductor insulated from ground. This is shown below in Figure 7.

The induced voltage for the exposure will be derived from—

$$E = C \times I \times L \times k \quad \ldots C9$$

where

E = the pipeline induced voltage (V)

C = the coupling factor (from the chart in Figure C3)

I = the fault current (from the current profile in Figure 4.2)

L = the length, in km, of the exposure.

k = shielding factor.

Figure 7: Induced Voltage Formula from the Pipeline Standard

The average separation distance between the feeder and the infrastructure has been chosen to be 15m for this scenario. Fault currents have been taken from Figure 3.

The group soil resistance from Figure 2 will be used for the calculation of the LFI.

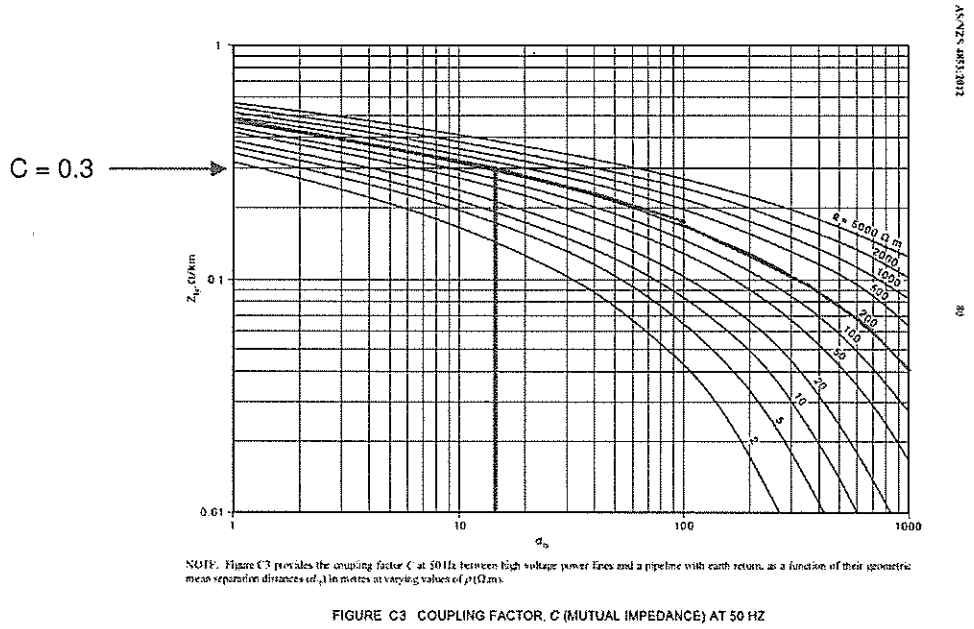

FIGURE C3 COUPLING FACTOR, C (MUTUAL IMPEDANCE) AT 50 HZ

Figure 8: Coupling Factor, C at 50 HZ from the Pipeline Standard

The coupling factor between the OHEW/ECC and the phase conductors for 95T was measured to be over 40%. The shielding factor is equal to 1 – coupling factor.

The induced voltage in the fence can be calculated using equation C9 from the Pipeline Standard:

C = 0.3 Ω/km (from figure 8)
I = 10,000A
L = 0.3km (length of fence)
k = 1 – 0.4

E = 0.3 x 10,000 x 0.3 x (1 - 0.4)
= 540V

This conservative estimate is below the tolerable voltage criteria calculated in Section 2 for conductive objects under the influence of power system assets (i.e. metal fences), but exceeds those set for Pipelines and ancillaries. Refer to Section 4 for mitigation options. Infrastructure such as metal fences typically have earthed footings approximately every 3-5metres which will have the effect of reducing the calculated induced voltage from that of the case of an insulated conductor as given above.

3.2.3. 11kV Fault Scenario LFI

The 11kV fault scenario case can be analysed in the same manner as Section 3.2.2. The 11kV feeder along the easement will have some shielding from the 132kV OHEW and the feeder along Carters Rd will receive some shielding from the LV neutral. A conservation

coupling factor of 10% will be used. The induced voltage in the fence can be calculated from Equation C9 from the Pipeline Standard:

E = 0.3 x 3,000 x 0.3 x (1 - 0.1)
= 243V

This conservative estimate is above the tolerable voltage criteria calculated in Section 2. The options to limit the voltage rise of the conductive infrastructure include increasing the separation distance between infrastructure and the powerline and/or reducing the exposure length. More detailed modelling of the assets would provide more accurate induced voltages.

As the calculated induced voltage is approximately three times the tolerable voltage, the coupling factor from Figure 7 would have to be reduced by three, resulting in a separation distance of 300m.

A more feasible option would be to reduce the exposure length by three. This mitigation method would require a fence isolation section to be installed every 100m. Refer to Section 4 for more details on fence isolation sections.

3.2.4. 132kV Fault Scenario EPR

Transmission earthing modelling software TDS was used to simulate the worst case 132kV fault scenarios along the transmission feeders. The model was fine tuned using test results from the recent injection tests on both 95T and 97E as part of the commissioning test for the new Lake Munmorah Zone Substation. The highest measured EPRs of the concrete poles were measured to be between 1,000-1,300V.

The simulation results indicated that the worst case was for an earth fault to a concrete pole, resulting in an EPR at the poles close to the proposed school of approximately 2,800V. This however, this is a very unlikely event.

In order to ensure that the transferred voltage from an EPR at a concrete pole to any surrounding metallic infrastructure via the soil does not exceed the tolerable voltages from Section 3.1 it is recommended that a minimum separation distance of 12m between the assets be maintained. If this can not be achieved, additional mitigation requirements must be implemented, as discussed in Section 4

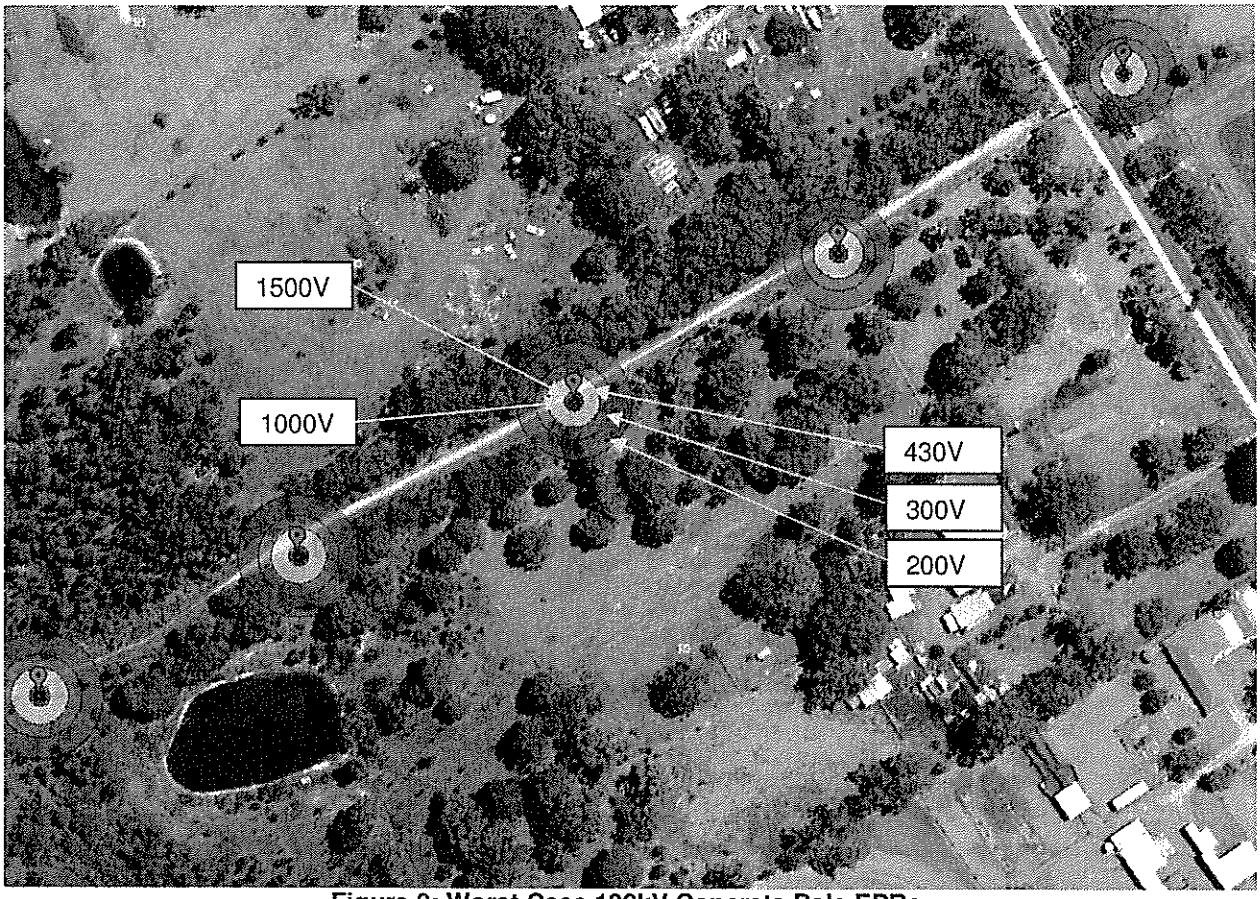

Figure 9: Worst Case 132kV Concrete Pole EPRs

3.2.5. 11kV Fault Scenario EPR

Distribution earthing modelling software NEOn was used to simulate a number of 11kV fault scenarios which could create a hazard to the proposed school infrastructure. Analysis indicated that the fault current returning from a fault at the 11kV UGOH in the easement or at 11kV equipment downstream of the proposed school was very unlikely to create a hazard due to the solid bonded 11kV cable sheaths and the interconnection to the 132kV OHEW.

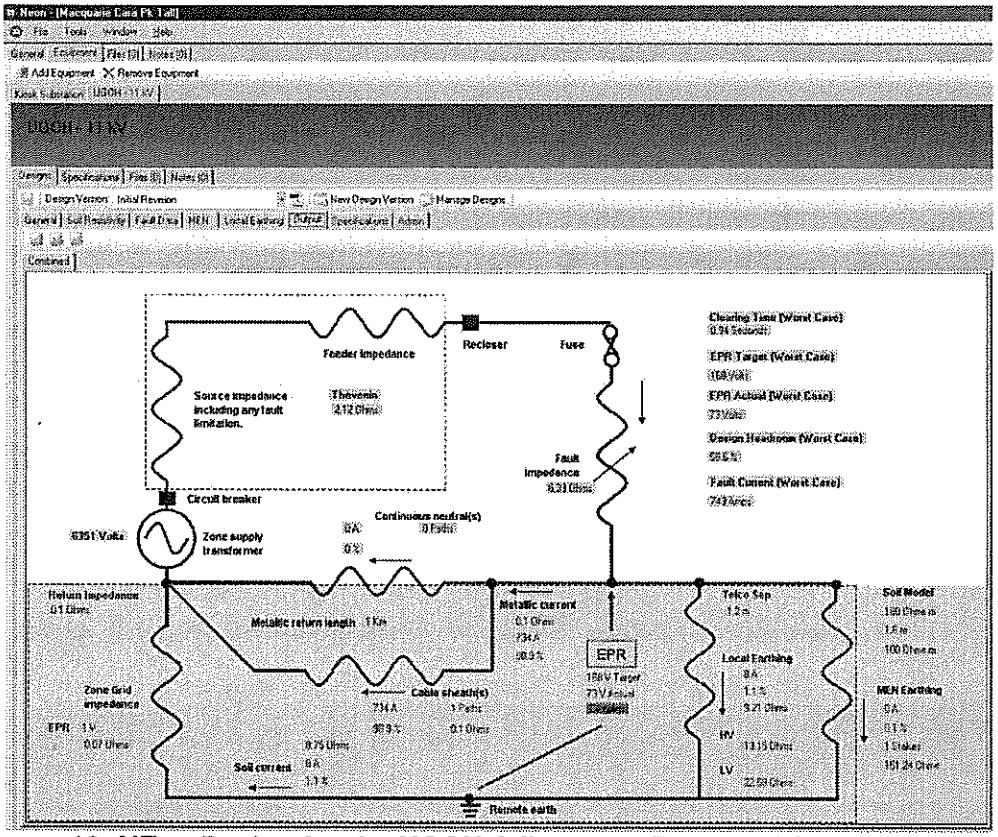

Figure 10: NEon Design for the UGOH Adjacent to Proposed School Boundary

4. Mitigation Options

To ensure that the induced voltages in conductive infrastructures do not exceed the tolerable voltages, the maximum continuous length of exposure must be not exceed 100m. Additionally to prevent the transferred voltage from a concrete 132kV pole to any surrounding metallic infrastructure via the soil exceeding the tolerable voltage criteria, it is recommended that a minimum separation distance of 12m be maintained between the existing concrete poles and any proposed metallic structures such as fences, gates, water pipes, telecommunication hardware & taps and any LV services.

It is recommended that conductive infrastructure with a high contact rate, such as gates, be isolated from long sections of conductive fencing with timber separators such as that shown in detail EB7 in Figure 13.

In summary, the following separation distances shall be maintained between the concrete poles and other third party assets:

Third Party Assets	Required Separation Distance (m)
MEN-connected metalwork / metallic school fencing	12
Telecommunications	8

Figure 11: Required Separation Distances

If the required separation distance cannot be maintained between the poles and any metallic structures, then it is necessary to implement the following mitigation measures.

- The metallic fences within 12m of the concrete poles shall have timber isolation sections installed every three (3) metres. Refer to attachment drawing number 127869 in Figure 13.
- The fence shall not be bonded to the MEN or connected to any other metalwork which is in contact with the MEN such as lighting circuits.
- Any taps or other metallic objects within 2m of the fence along the easement must have an isolating (PVC) section of at least 3m installed.
- No LV electrical wiring or appliances within 2m of the easement fence.
- No telecommunications pits or pillars within 8m of the concrete poles.
- Timber isolating sections separating gates from long metallic lengths of fence

Possible locations of the isolation sections are shown in Figure 12.

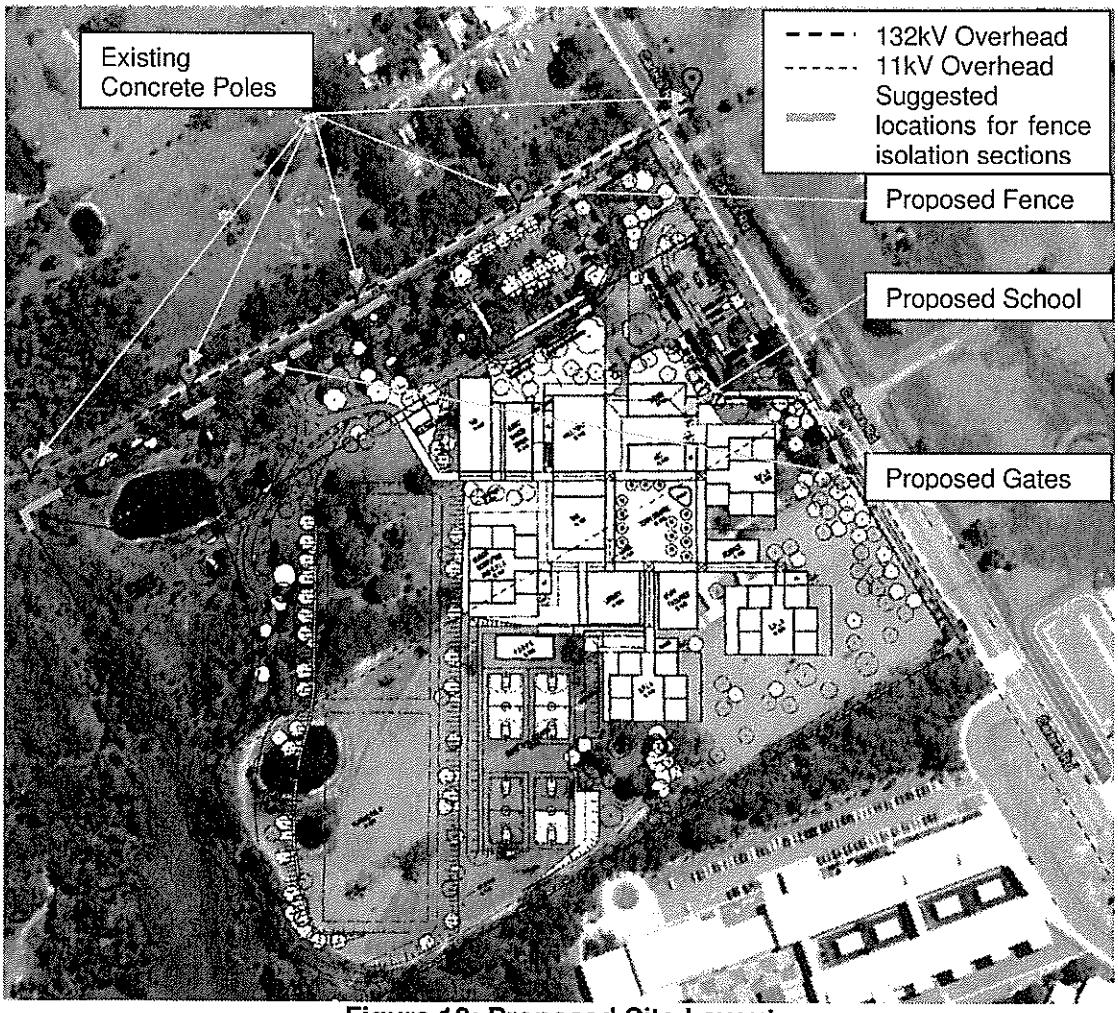

Figure 12: Proposed Site Layout

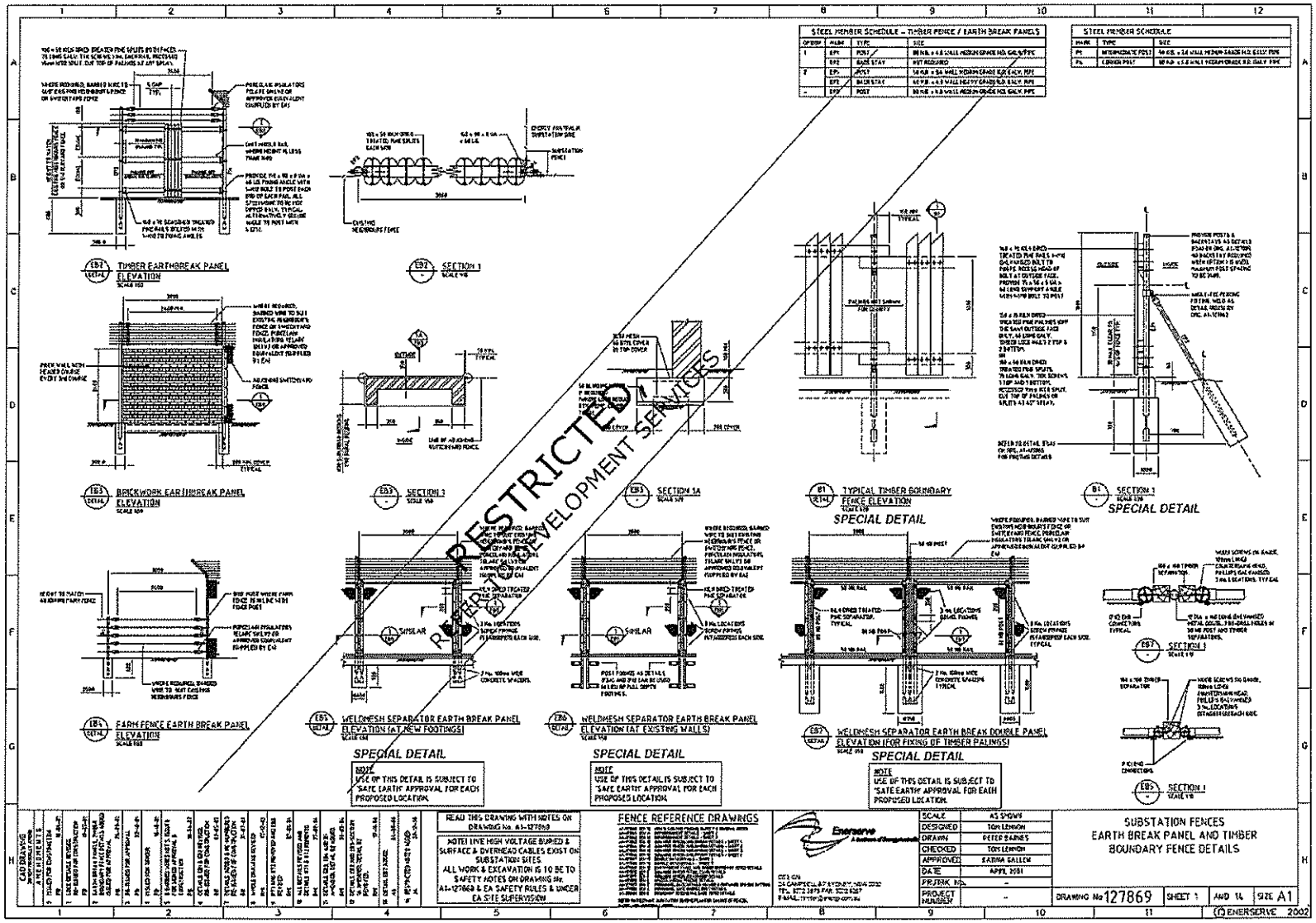

Figure 13: Example Earth Break Panel Fence Drawing

5. Conclusion

The analysis presented in this report identifies that there is a risk of electric shock if conductive infrastructure is installed nearby the Ausgrid concrete poles. Mitigation will be required if conductive infrastructure is to be installed within the separation distances specified in Figure 11. Mitigation will also be required if a continuous section of conductive infrastructure such as a fence is to be longer than 100m.