

VINEYARD TO ROUSE HILL ELECTRICITY UPGRADE

SUBMISSIONS REPORT



Environmental Assessment for the Vineyard to Rouse Hill Electricity Upgrade

Submissions Report

March 2006

Integral Energy



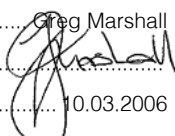
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1. Introduction

1.1 Background

Integral Energy is a statutory State owned corporation responsible for the distribution and retail of electricity in western Sydney, the Blue Mountains, the Southern Highlands and the Illawarra region.

Continued development throughout Integral Energy's franchise area has seen its electricity network upgraded gradually as demand has grown. Feeder 9JA is the major transmission asset conveying electricity between Vineyard bulk supply point and Carlingford transmission substation. It was designed and installed in the early 1950's utilising a 30 metre wide easement and has a carrying capacity of 84 megavolt amperes (MVA). Demand on the line has increased substantially over the last 50 years and is forecast to double over the next 10 years. By 2014/15 demand on the line is predicted to exceed 200 MVA.

As a reflection of its age and historical role in the network, there is no back-up electricity supply for customers served by Feeder 9JA. In the event of a network fault, many thousands of existing customers would experience a blackout.

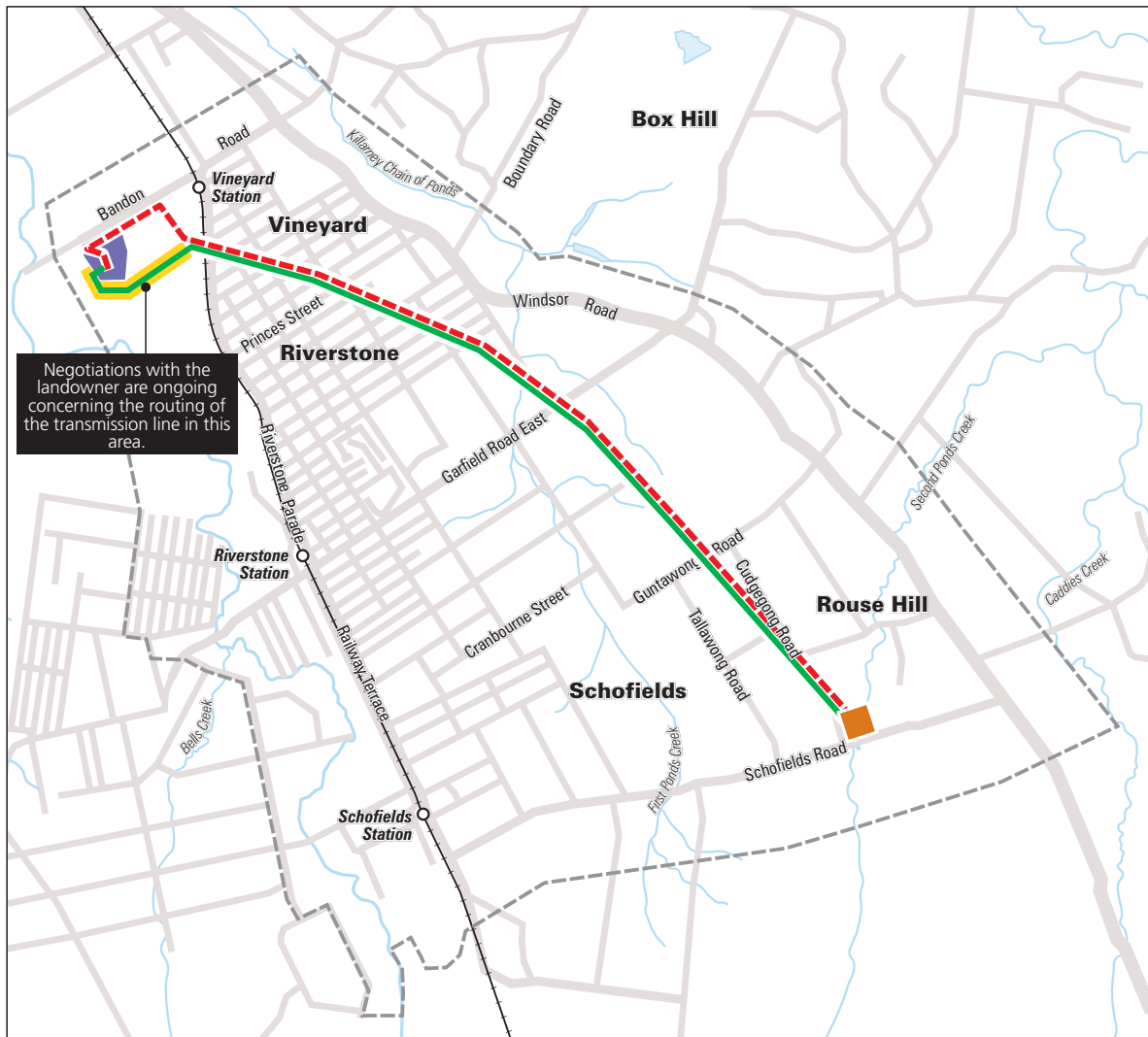
In December 2004, the NSW Government announced new releases of land in Sydney's North West Sector for residential development (NSW Government 2004). This included an estimated 60,000 new dwellings over the next 25-30 years and areas for industrial and commercial premises.

An upgrade of Feeder 9JA is needed to ensure that reliable electricity supplies are available to existing customers during peak periods and adequate supplies are available to accommodate the anticipated scale of development and population growth in the area. If an upgrade is not undertaken before 2008-09, Integral Energy will be unable to supply electricity to both existing and future customers.

Integral Energy has commissioned Parsons Brinckerhoff to prepare a Submissions Report for the proposed Vineyard to Rouse Hill Electricity Upgrade following exhibition of the Environmental Assessment. Integral Energy is the proponent for the proposal. The approval of the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (Planning Act) is required before the proposal can proceed. This report has been written in accordance with the requirements of the Planning Act and its Regulation.






1.2 Overview of the proposal

The proposal would involve the reconstruction of an 8.5 kilometre section of transmission line between Vineyard bulk supply point and a future switching station near Schofields Road at Rouse Hill (refer *Figure 1.1*). The capacity of the transmission line would be substantially upgraded to a two single circuit overhead transmission line to replace the



 Scale and alignments are indicative

Figure 1.1 The Proposal

-  Study area
-  Existing alignment of Feeder 9JA
-  Proposed alignment of upgraded Feeder 9JA
-  Vineyard bulk supply point
-  Future site of Rouse Hill switching station

existing single circuit arrangement. The infrastructure would be constructed entirely within the existing 30 metre wide easement.

Forty-three twin sets of steel support poles, each an average of 22 metres in height would be installed. The poles would be largely located in the positions of the existing supports. Each pole would support six conductors (wires) and one earth wire. In constructing the new line, the existing support structures would be progressively removed.

The poles would be constructed of steel and finished in a mid-grey colour, which would appear neutral in the existing and expected future setting. The conductors would be finished using a technique known as 'shadow-lining' to produce an aged finish with a very dull sheen.

Existing access tracks would be upgraded or approximately 3.4 kilometres of new access tracks constructed.

1.3 Proposed modifications to the proposal

As a result of the submissions received (see *Section 4*) and following additional investigations (see *Section 5*); Integral Energy proposes two modifications to the proposal which was described in the Environmental Assessment. These are detailed in *Section 6*.

The two modifications to the proposal are:

- The relocation of six poles and modifications to the height of eight poles. The relocation of poles is proposed in order to reduce impacts to properties. Changes to the height of eight poles have been made as a result of design information received following exhibition of the Environmental Assessment. Changes to the height of these poles and revisions to the modelling of EMF would result in a reduction of EMF levels.
- Use of 'Invar' conductors, which reduces the number of overhead wires from 14 to eight, reducing visual impacts. There are no changes to any other environmental aspect.

A preferred project report may be produced in cases where proposals are modified after exhibition of an Environmental Assessment and modifications are made to minimise environmental impact. Accordingly, *Sections 5, 6* and *7* of this report constitute the preferred project report under Section 75H(6) of the Planning Act and provide the environmental impact assessment of the proposed modifications (*Section 6*). The purpose of a preferred project report is to clearly describe the scope of the revised project, the modifications made and the justifications for them. The Director-General may make this report public.

1.4 The determination process

An overview of the planning, assessment and decision process is provided in *Figure 1.2*.

Following the exhibition of the Environmental Assessment, Integral Energy considered and responded to the issues identified within all submissions received. These issues and responses are detailed in *Section 4* of this Report.

Under section 75G of the *Environmental Planning and Assessment Act 1979*, the Minister for Planning has directed that an Independent Hearing and Assessment Panel (the Panel) be constituted to consider, evaluate and provide advice on issues raised in public submissions to the Environmental Assessment. All submissions made to the Environmental Assessment have been forwarded to the Department of Planning and the Panel for consideration.

The Director-General of the Department of Planning will prepare an environmental assessment report which will include a copy of the Environmental Assessment, any preferred project report, any advice provided by public authorities on the project and a copy of the report of the Panel. The Director-General would then submit the report to the Minister for Planning for determination. The Minister would consider the Director-General's assessment report and decide whether or not to approve the proposal.

The Minister's determination and the Director-General's Report would be published on the website of the Department of Planning of following the Minister's decision.

If the proposal is approved by the Minister for Planning, Integral Energy would consider the terms of the approval and decide whether to proceed with the proposal.

1.5 The consultation program

Consultation for the Environmental Assessment has been ongoing since June 2004.

Face-to-face meetings with land owners residing in the study area were initially undertaken in June and July 2004, coinciding with the community information evenings. These meetings were used to discuss details of the proposal and obtain community feedback.

A second round of face-to-face consultations with land owners was undertaken in August/September 2005 to discuss details of the design following announcement of the preferred development concept.

A Community Advisory Group was established and had its inaugural meeting in November 2004 and has held eight meetings to date, three of which have been focused on the consideration of alternatives.

A community newsletter was issued in June 2004 to approximately 4,000 households. Since that time, and coinciding with the consideration of a wider range of project

KEY STAGES OF THE PLANNING PROCESS

OPPORTUNITIES FOR COMMUNITY AND STAKEHOLDER INVOLVEMENT

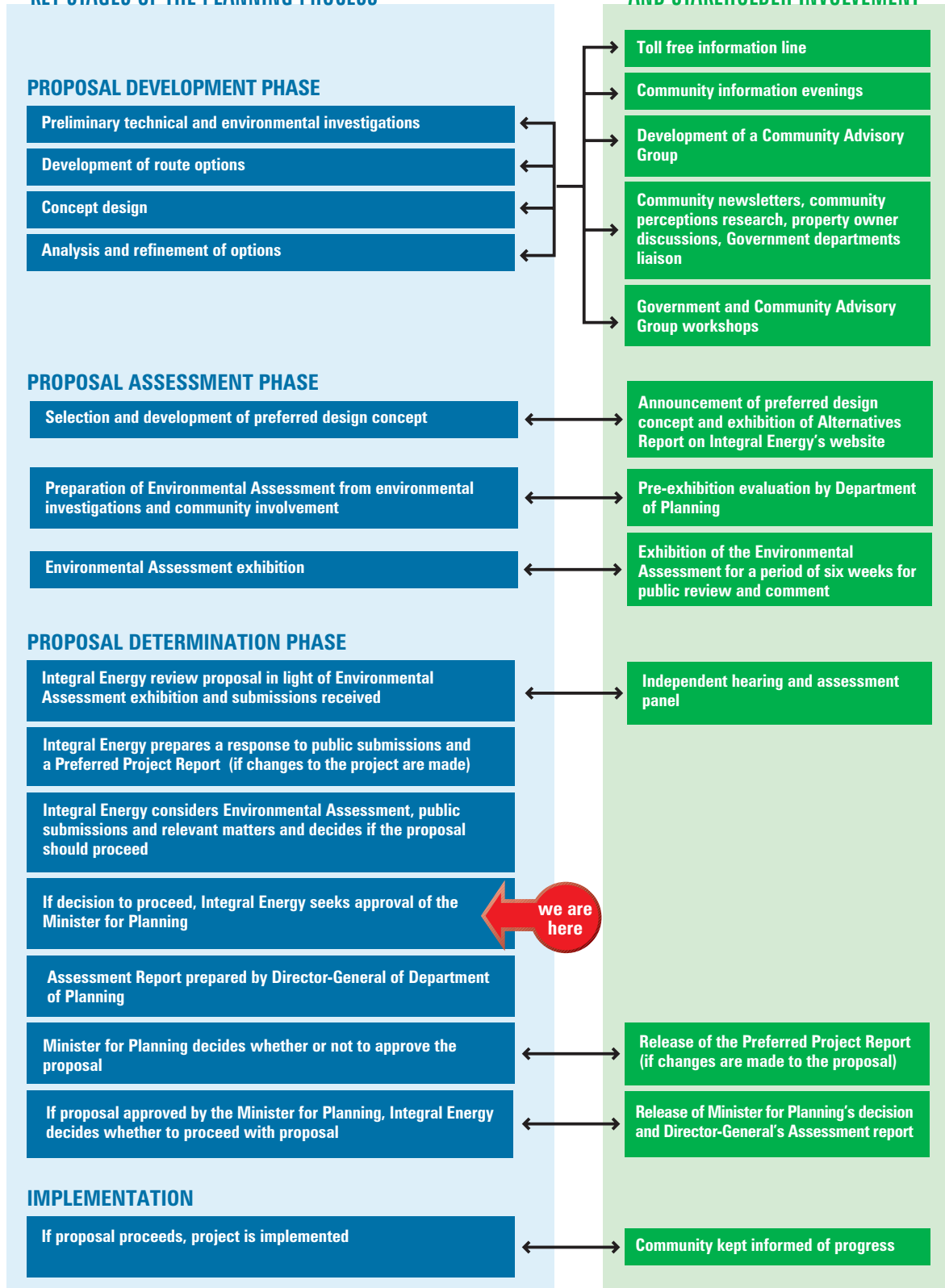


Figure 1.2 Overview of the Planning, Assessment and Decision Process

options, newsletters have been published at regular intervals and sent to approximately 6,000 households. Eleven newsletters in total have been issued.

The newsletter was introduced to ensure the community had access to up-to-date information regarding the proposal.

The Environmental Assessment was exhibited for a period of six weeks between 7 November and 16 December 2005. A copy of the summary of the Environmental Assessment and a compact disk containing an electronic copy of the Environmental Assessment was sent to the 82 landholders identified as being directly affected by the proposal.

An advertisement outlining details of the proposal and exhibition was placed in the Blacktown Sun, Blacktown Advocate and Sydney Morning Herald on 8, 9 and 7 November 2005 and again on 1, 6 and 7 December respectively. Full copies of the Environmental Assessment and its summary were available for viewing at Integral Energy's head office, Riverstone Library, Blacktown City Council's main office, Department of Planning Sydney, Department of Planning Parramatta, NSW Government Information Centre and Nature Conservation Council during the exhibition period. The Environmental Assessment was also made available on Integral Energy's website at www.integral.com.au/upgrade/9ja. Free copies of the Environmental Assessment were also posted to interested parties on request.

During the exhibition period the Riverstone Library was staffed by a representative from Integral Energy and/or Parsons Brinckerhoff on Thursdays from 5:30pm – 7:45pm and Saturdays from 9:30am – 11:45am. These staff members were available to answer questions from the community concerning the Environmental Assessment. A 1800 number was also established to answer queries on the Environmental Assessment.

The issues raised in written submissions variously included concerns about visual impacts, planning and land use considerations, effects on property values, health effects, the process for evaluation of project options, the accuracy of capital cost estimates, public amenity and safety issues.

1.6 Purpose and structure of the Submissions Report

The Submissions Report provides a review of the Environmental Assessment, consideration of the submissions received, Integral Energy's responses to these submissions and details of any additional investigations or modifications that have occurred after the exhibition period. The Submissions Report also provides a conclusion whether to proceed with the proposal, and a Statement of Commitments that Integral Energy would undertake if the project was approved and Integral Energy decided to proceed with the proposal.

The report provides the following:

- **Section 1 – Introduction:** An introduction to the proposal as well as responses to key issues raised.

- **Section 2 – Consideration of the Environmental Assessment:** A consideration of the Environmental Assessment, and the proposal as described in the Environmental Assessment, including compliance with statutory requirements, the justification for the proposal, and the assessment of the environmental impacts of the proposal.
- **Section 3 – Community consultation:** An overview of the consultation process.
- **Section 4 – Consideration of submissions:** A review of the submissions received in response to the exhibition of the Environmental Assessment and Integral Energy’s response to issues raised in the submissions.
- **Section 5 – Additional investigations undertaken after exhibition of the Environmental Assessment:** A summary of additional investigations undertaken after exhibition of the Environmental Assessment.
- **Section 6 – Modifications to the project:** A description and justification of modifications to the proposal that are proposed following exhibition of the Environmental Assessment.
- **Section 7 – Preferred project report:** Documentation as to the revised form of the proposal including the commitments made by Integral Energy to be implemented during the construction and operation of the proposal.
- **Section 8 – Conclusion**
- **Section 9 – References**

1.7 Frequently raised issues from the exhibition

The following is a summary of the issues raised in submissions received following the exhibition of the Environmental Assessment. Integral Energy’s responses are provided in Chapter 4 of this report.

Proposal description

- The number of poles will increase from 51 to 88.
- The capacity of the line will increase from 87 to 1,000 MVA.

Legal status of the proposal

- The project is not permissible under Part 3A of the Planning Act.
- The existing transmission line is unlawful in that it originally would have required development consent which may not have been obtained.

Options development and assessment

- Why can’t Integral Energy sell the easement and offset the cost of implementing a more expensive option with the money from the land sale?

- Why can't Integral Energy increase electricity tariffs to pay for undergrounding?
- Why does Integral Energy claim that undergrounding is cost prohibitive when other lines in the area have been undergrounded?
- Why wasn't an underground option selected as the preferred option?
- The preferred option should be co-located with other utilities or easements.
- The preferred option doesn't respond to the expressed wishes and expectations of stakeholders.

Planning and land use

- Why can't the upgrade wait?
- Why is there an apparent conflict between the proposed future development of the North West Sector by the Department of Planning and Integral Energy's proposal?
- Why hasn't Integral Energy co-ordinated the proposal with the Department of Planning?
- Implementation of the proposal would result in impacts on land use and cause sterilisation of areas adjacent to the easement.
- Why would Integral Energy want to relocate the line in the future? Wouldn't it be cheaper to underground it now?
- Why do we have easements and how is easement width determined?
- Why doesn't Integral Energy prohibit people from living adjacent to electricity easements on account of potential health (and other) issues?

Property values

- The reduction in property values seems too low given the nature of the proposal.
- Why did Integral Energy not consider relinquishing the easement and why was it not included in the economic modelling?

EMF and public health effects

- Why hasn't Integral Energy adopted prudent avoidance measures?
- What is the status of the National Health and Medical Research Council EMF Guidelines? Aren't they too old to be applicable?
- Why can't Integral Energy prescribe a safe offset from the easement to reduce the risk of EMF related health issues?
- The NHMRC guidelines do not address the issue of chronic or long term exposure to magnetic fields.
- World opinion indicates that long term effects are sustained at around 3-4 milligauss.

2. Consideration of the Environmental Assessment

This chapter presents the consideration of the Environmental Assessment, both in terms of its compliance with statutory requirements and in terms of its environmental assessment and mitigation measures.

2.1 Statutory compliance of the Environmental Assessment

2.1.1 NSW statutory framework

Integral Energy determined in 2003 that the proposal requires an environmental assessment to be prepared under Division 4, Part 5 of the Planning Act. However, on 1 August 2005, the *Environmental Planning and Assessment Amendment (Infrastructure and Other Planning Reform) Act 2005* was proclaimed and Division 4 of Part 5 was repealed. The Act contained the key elements of the NSW Government's planning system reforms and changed the assessment process for major developments.

Section 75B of Part 3A of the Planning Act applies to the carrying out of development that is declared to be a project to which Part 3A applies by operation of a State Environmental Planning Policy (see State Environmental Planning Policy (Major Projects) 2005), or by Order of the Minister for Planning published in the Gazette. The Minister for Planning published an order on 29 July 2005 declaring development that is an activity for which the proponent is also a determining authority and that, in the opinion of the proponent, requires an environmental impact statement under Part 5, as development to which Part 3A applies. Prior to 1 August 2005, Integral Energy determined that this project required an Environmental Impact Statement under Part 5 and consequently, by reason of the Minister's Order, this project will be required to be assessed under Part 3A of the Planning Act. The contents of the Environmental Assessment were prepared in accordance with Schedule 2 – Environmental Assessments and Clause 230 of the Regulation and take into account the factors set out in Clause 228 and the requirements issued by the Director-General on 14 January 2004. The Director-General adopted these requirements for the purposes of the Environmental Assessment under Part 3A.

The Environmental Assessment requirements of the Director-General of the Department of Planning are set out in *Appendix A* of Volume 1 of the Environmental Assessment.

The Director-General of the Department of Planning also required that the preparation of the Environmental Assessment includes consultation with relevant government agencies and the community. *Section 3* summarises these consultations.

The Department of Environment and Conservation also provided a list of requirements. Copies of these requirements and those of the Director-General of the Department of Planning are provided in *Appendix A* of Volume 1 of the Environmental Assessment. A checklist of matters to be addressed in the Environmental Assessment derived from

these requirements and indicating sections in the documents where each issue is addressed is provided in *Appendix B* of Volume 1 of the Environmental Assessment.

Eight-part tests of significance were carried out for four plant species, one animal species and three endangered ecological communities (see *Appendix I* of Technical Paper 2 of the Environmental Assessment). These tests indicated that the proposal would not significantly affect these species.

The Environmental Assessment was lodged on 21 September 2005 with the Department of Planning for an adequacy review prior to exhibition in accordance with Section 75H of the Planning Act. An application for the approval of the Minister for Planning to carry out the above project in accordance with Section 75E of the Planning Act was made on 20 October 2005.

2.1.2 Commonwealth framework

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* applies to a proposal if it is determined to be a controlled action as defined in the Act.

Appendix C of Volume 1 of the Environmental Assessment contains a checklist of matters of national environmental significance that could be affected by the proposal.

Three plant species and one endangered ecological community listed as threatened under the Act are present within and adjacent to the proposal. Assessments of significance were undertaken for these species and communities and concluded that the proposal is unlikely to have a significant impact on threatened species and communities. Therefore a referral to the Commonwealth Minister for the Environment and Heritage is not required.

2.2 Development of the proposal

In accordance with statutory requirements, the Environmental Assessment justified the need for the proposal and outlined the concept design development process (see *Sections 3* and *4* of Volume 1 of the Environmental Assessment). A summary of these aspects is presented as follows.

2.2.1 Need and objectives

Need

Feeder 9JA was designed and installed in the early 1950's and has a carrying capacity of 84 megavolt amperes (MVA). Electricity demand has increased substantially over the last 50 years and is forecast to increase by approximately 20 per cent per year. If an upgrade is not undertaken before 2008-09, Integral Energy will be unable to supply electricity to approximately 22,000 existing customers during peak periods, resulting in widespread blackouts in the event of a network fault. The proposed upgrade would involve construction of a two single circuit system which would provide the primary and back-up supply for the North West Sector of Sydney.

The measured peak demand on the Parklea and West Castle Hill zone substations in the summer of 2003-04 was 117 MVA. This level of demand is 33 MVA above the existing capacity of Feeder 9JA at 84 MVA. Should a network fault occur during a period of peak demand, it would be necessary to remove load from the network which would result in blackouts over a large area. The number of customers potentially at risk in this scenario is shown in *Figure 2.2a*.

In addition to this existing capacity shortfall, additional capacity required by committed commercial and industrial development (i.e. development which has been approved to be built which is not yet operational) between 2005 and 2008 is estimated to amount to a further 70 MVA. Therefore in order to provide adequate supplies of electricity to existing and future customers, but only up until 2008, would require implementation of an additional 103 MVA (33 MVA plus 70 MVA) circuit. This would however not address the inadequate security of these supplies which is an additional aspect of the proposal.

Figures 2.1a and *2.2a* show the electricity demand/supply imbalance, the load at risk and the number of customers who would be without electricity if a fault occurred. A more detailed explanation of the need is provided in *Section 3.2.2* of Volume 1 of the Environmental Assessment. *Figures 2.1b* and *2.2b* provide similar information following implementation of the proposal.

The proposed new releases of land in the North West Sector for residential development include an estimated 60,000 new dwellings over the next 25–30 years. These new dwellings are proposed to be built within areas served by Feeder 9JA. Additionally, parts of the North West Sector will include commercial and industrial premises. An upgrade is required to ensure that an adequate supply of electricity is available to existing customers and to accommodate the anticipated scale of development and population growth.

Objectives

Primary and secondary objectives for satisfying the identified network deficiencies have been developed. The primary objectives state 'what needs to be done' and the secondary objectives outline 'how it should be done'.

The primary objectives of the proposal are to:

- Provide sufficient capacity to meet current and predicted future demand for electricity.
- Provide a safe, secure and reliable supply of electricity.
- Provide for the orderly and economic development of land.

The secondary objectives of the proposal are to:

- Balance efficient and effective security of electricity supply with community needs and desires.
- Deliver a solution in accordance with the principles of ecologically sustainable development.
- Support the sustainable development of the North West Sector.

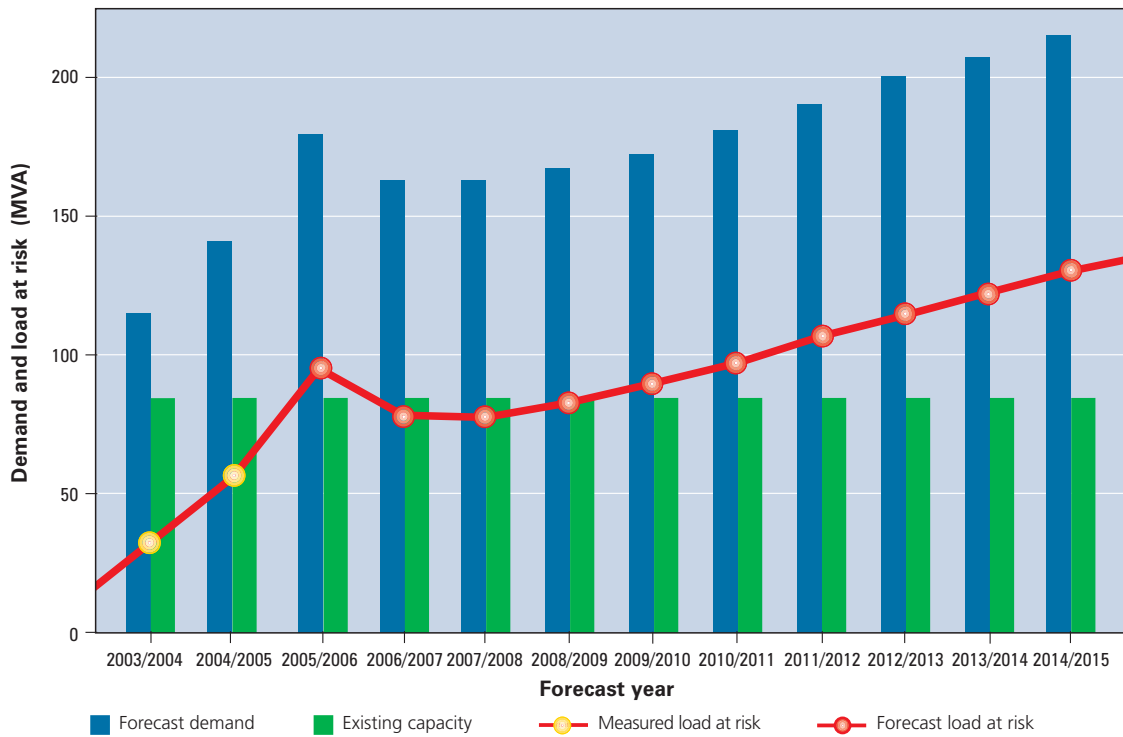


Figure 2.1a Feeder 9JA Forecast Demand and Load at Risk Existing

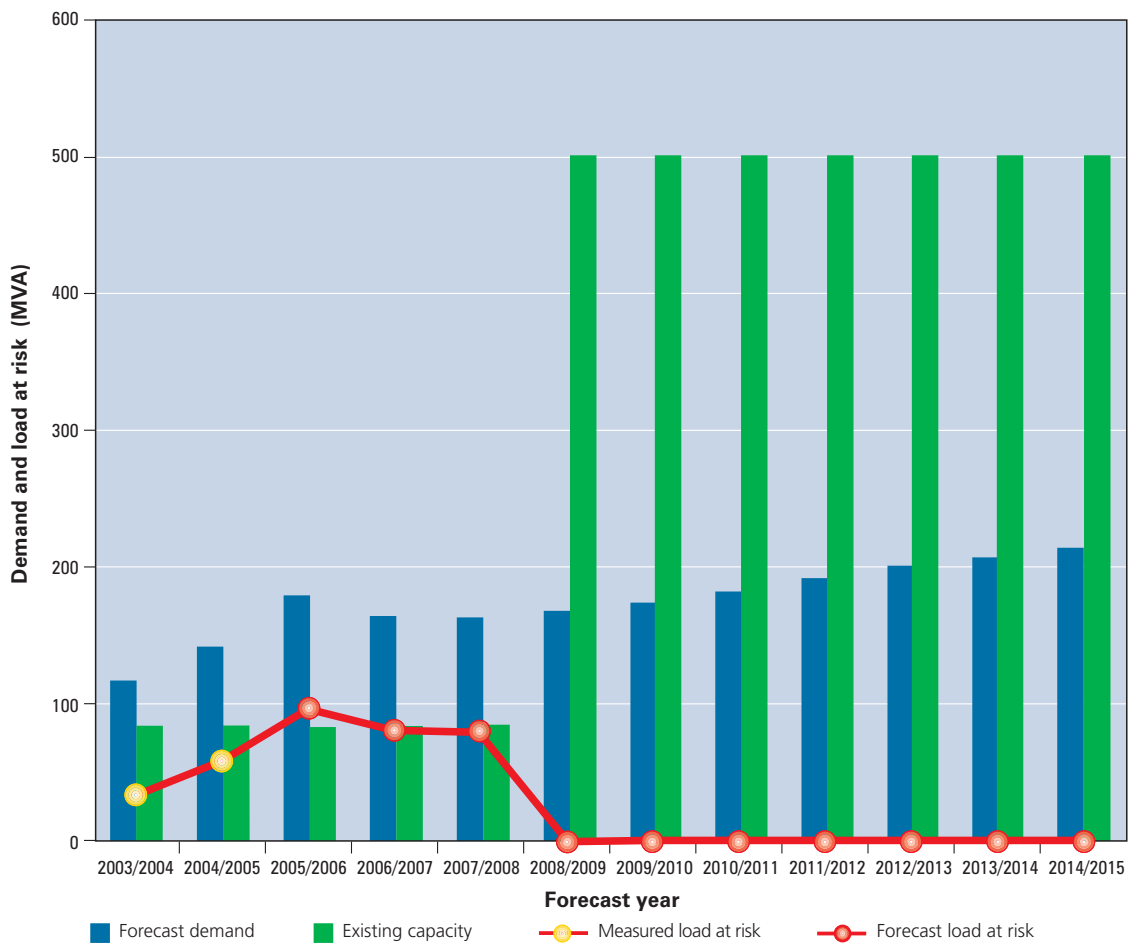


Figure 2.1b Feeder 9JA Forecast Demand and Load at Risk Post-implementation

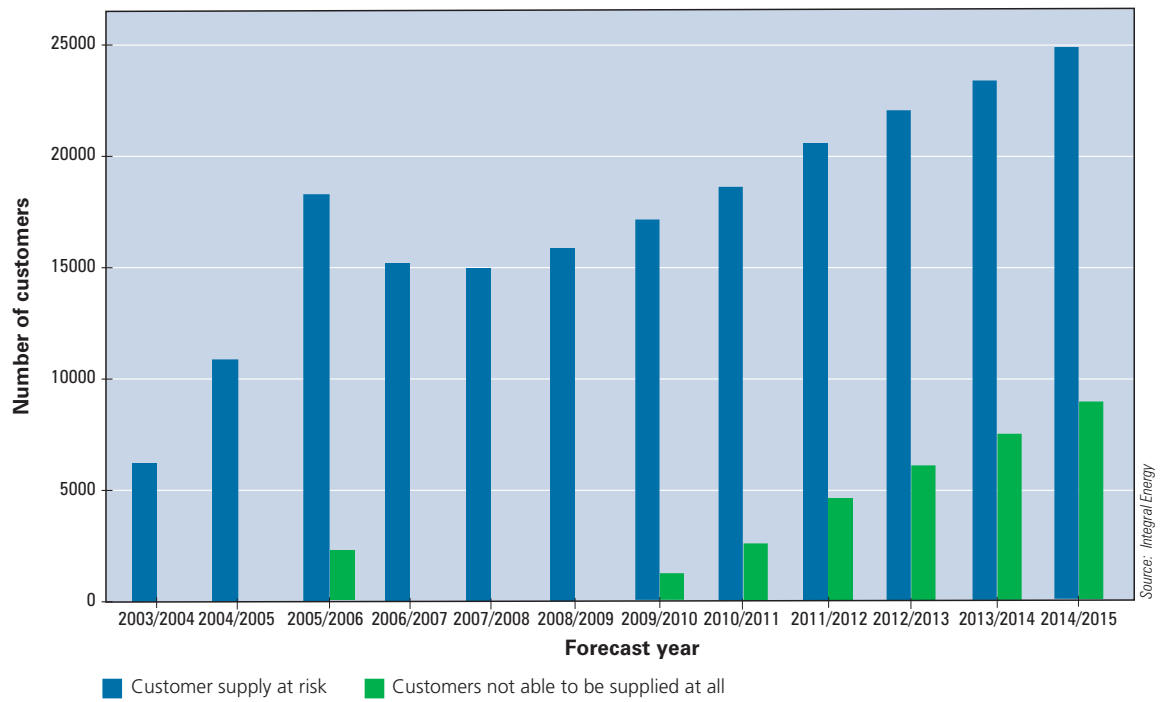


Figure 2.2a Feeder 9JA Forecast Supply at Risk Existing

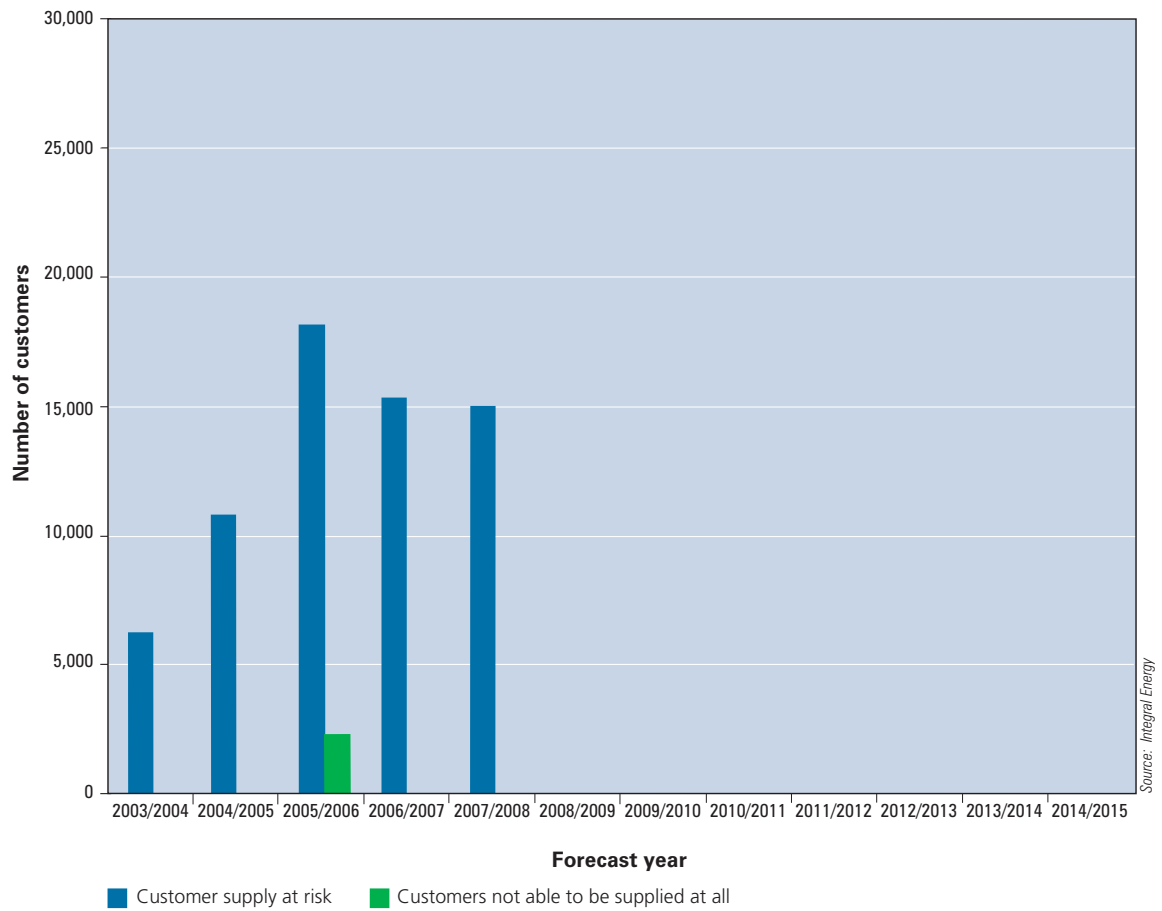


Figure 2.2b Feeder 9JA Forecast Supply at Risk Post-implementation

- Ensure the prudent expenditure of public funds.
- Achieve a value-for-money investment.

2.2.2 Northwest Sector Conceptual Network Plan

Integral Energy has determined that the first stages of network development in the area should comprise the following three elements:

- Upgrade of Feeder 9JA between the Vineyard bulk supply point and the site of the future switching station at Rouse Hill.
- Upgrade of Feeder 9JA between the future Rouse Hill Switching Station and Parklea zone substation.
- Establishment of a high-capacity switching station at Rouse Hill.

The implementation of each one of the above three elements is equally important to achieve the overall strategy, as well as relief from existing network limitations and supply risks.

2.2.3 Benefits of the proposal

The proposal will:

- Provide an electrically safe, secure and reliable supply of electricity to existing and future customers.
- Resolve the deficiencies of this part of the network and provide the capacity and security of electricity supplies expected by existing and future customers.
- Facilitate the cost-effective development of all future components of the North West Sector network.
- Avoid the need to augment Feeders 229 and 230, which would otherwise be required if Feeder 9JA is unable to be augmented.

2.3 General description of the proposal

2.3.1 Design and operation

The proposal would involve reconstruction of an 8.5 kilometre section of transmission line between Vineyard bulk supply point and a proposed switching station near Schofields Road at Rouse Hill. The capacity of the transmission line would be substantially upgraded and a twin single circuit design would be installed. The infrastructure would be constructed entirely within the existing 30 metre wide easement.

Forty-three twin sets of support poles, each of 22 metres in height (on average) would be installed. The poles would be located in the approximate positions of the existing supports. Each pole would support six conductors (wires) and one earth wire.

The poles would be constructed of steel and finished in a mid-grey colour, which would appear neutral in the existing and expected future setting. The conductors would be finished using a technique known as 'shadow-lining' to produce an aged finish with a very dull sheen.

Other key aspects of the proposal include the:

- Removal of the existing support structures between the Riverstone Sewage Treatment Plant and Schofields Road.
- Upgrading of existing access tracks and/or construction of approximately 3.4 kilometres of new access tracks.
- Use of three site compounds during construction.

It is proposed that the two circuits would share the electrical load equally, with either circuit being able to provide the total load should one of the circuits suffer an unplanned event.

2.3.2 Construction

The Vineyard to Rouse Hill Electricity Upgrade would cost approximately \$16.8 million (2005 dollars) and be fully funded by Integral Energy. It is anticipated that construction would take between 12 and 18 months and be completed by mid-2008 (subject to environmental approvals).

Construction would be jointly undertaken by Integral Energy and a construction contractor selected through a competitive tendering process. The construction contractor would be primarily responsible for the installation of the new pole supports and their foundations.

The general construction activities proposed include:

- clearing and upgrading accesses to the easement
- modification of the existing infrastructure
- construction and commissioning of the first circuit
- dismantling and removal of the existing infrastructure
- construction and commissioning of the second circuit
- restoration of disturbed areas.

The general hours of construction would be from 7am to 6pm Monday to Friday and 8am to 4pm Saturdays. The need to extend working hours beyond those normally permissible is justified by the need to augment Feeder 9JA by December 2008. No work would be conducted at night or on Sundays or public holidays, with the exception of conductor stringing where closure of the Western Railway and major public roads is required. In these cases, the nearest residences would be notified in advance of the upcoming construction work and measures implemented to avoid disturbance as far as practicable. Other work outside of these standard construction hours may be permitted subject to the approval of the Department of Environment and Conservation.

2.4 Environmental issues overview

2.4.1 Key issues

Soil and water management

The proposal has the potential to affect the local biophysical environment through transport of soil on the tyres of construction vehicles. Other possible impacts include interaction of pole foundations with potentially saline groundwaters, disposal of potentially saline or contaminated groundwater from excavations, accidental spills of pollutants into nearby watercourses, water quality impacts from concrete wastes and washing out concrete mixers. The construction of the proposed structures to the south of the Vineyard bulk supply point also have the potential to affect the Hawkesbury-Nepean River system and floodplain.

A number of measures to mitigate potential local soil and water impacts are outlined in *Section 6.1.1* of Volume 1 of the Environmental Assessment, including the preparation of a soil and water management sub-plan and use of sediment control devices.

Utilities and crossings

Various infrastructure assets of other NSW Government and statutory authorities exist within the study area and may be affected directly or indirectly by the proposal. Those currently known are:

- The Vineyard bulk supply point, which is owned by TransGrid, is located at the northern end of the alignment on Bandon Road.
- Three TransGrid 330 kV transmission lines would cross over the proposal at Bandon Road, Perth Street and near Guntawong Road.
- The Riverstone Sewage Treatment Plant is located immediately to the east of the Vineyard bulk supply point and is connected to sewer pumping station No 564 immediately to the south.
- A Sydney Water trunk water main exists near Loftus Road and two sewer rising mains (250 and 300 millimetre diameter respectively) connect the sewage treatment plant and the pumping station.
- The Western Railway crosses the alignment near Riverstone Parade.
- Various local roads, including Garfield Road East and Riverstone Parade, cross the proposal.

Ongoing liaison and dialogue with other utilities will ensure impacts to other utilities and services are avoided. A comprehensive list of measures to mitigate potential impacts to utilities and services is outlined in *Section 6.1.2* of Volume 1 of the Environmental Assessment.

Energy, materials use and greenhouse gases

The manufacture of the upgrade structures and construction of the proposal is anticipated to consume the following resources:

- electricity: 200 gigajoules

- water: 2,500 kilolitres
- fuel: 400 kilolitres
- concrete: 3,700 tonnes
- steel: 250 tonnes
- aluminium: 450 tonnes.

Overall, the manufacture and construction of the proposal is estimated to consume about 120,000 gigajoules of energy. The proposal would not result in these resources becoming scarce.

Although the proposal would facilitate the consumption of electricity required to meet the growing energy demand in the North West Sector, it would not in itself cause increased personal consumption of electricity and therefore would not create additional greenhouse gas emissions.

Land use

The existing transmission line is a long-standing feature of the area and is generally compatible with the planning objectives of the land zonings through which it currently passes.

The NSW Government's revised *Draft North West Growth Sector Structure Plan*, which is currently on exhibition for public comment, is expected to guide the rezoning of land in the North West Sector, to facilitate development of residential, commercial, industrial and open space land uses. The proposal would not preclude future development of the area and is necessary to facilitate the development proposed by the NSW Government. The proposal would provide the opportunity for potential relocation of the infrastructure in the future if required.

Visual

The existing support structures would be removed and replaced by taller (5 metres on average), slender steel poles. The colour of the poles would be mid-grey, which would appear neutral in the existing and anticipated future environment, with specific treatment to reduce reflectivity. The existing pole locations would be largely maintained for the proposed new pole structures, although land owners would be consulted regarding the final positioning of the structures to further reduce impacts prior to construction commencement. There may also be an opportunity for selective planting of appropriate vegetation near the roadside to minimise views along the easement.

Measures to mitigate visual impacts from the proposal have been largely incorporated as part of the design development process and are outlined in *Section 7.1.2* of Volume 1 of the Environmental Assessment. These include the preparation of specialist advice on an appropriate colour and finish for the structures, which have led to the adoption of a mid-grey colour and 'shadow blasting' of the conductors to produce a dull, less shiny finish.

Property values

The study estimated that the proposal would reduce property values by between 0 and 2 percent for properties located within 50 metres of the transmission line alignment. This option results in the lowest impact on property prices of the options that do not involve undergrounding.

Effective approaches to mitigate the visual impact of the proposal would, therefore, assist in minimising property value impacts. *Section 7.1.2* of Volume 1 of the Environmental Assessment outlines proposed visual mitigation measures for the proposal.

Electric and magnetic fields and potential health effects

Electric and magnetic fields are produced by virtually all electrical equipment and occur wherever electricity is used, including high voltage transmission lines, low voltage distribution lines, electrical wiring in the home and any appliance that uses electrical power.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005-06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

Part of the reason for this is that the proposal design adopts a number of design measures consistent with the principles of prudent avoidance that maximise field cancellation and thereby result in reduced magnetic fields.

Over the past 30 years, questions have been raised as to whether the electric and magnetic fields associated with electrical equipment may be harmful to human health. There is scientific consensus that while health effects cannot be confirmed, they also cannot be ruled out. There is unanimity that in these circumstances, prudent avoidance is the most appropriate approach to adopt. Integral Energy has strictly followed the principles of prudent avoidance in the formulation of this project.

Measures to mitigate potential health effects associated with electric and magnetic fields are outlined in *Section 7.1.4* of Volume 1 of the Environmental Assessment.

2.4.2 Other issues

Flora and fauna

The proposal would require clearing of up to seven hectares of native vegetation within the existing 30 metre easement.

Desktop and field surveys have been completed to identify important flora and fauna species, populations and ecological communities. A number of endangered species were found to be present in the area however eight-part tests conducted in accordance with the relevant legislation concluded that significant impacts are unlikely.

Measures to mitigate potential impacts to flora and fauna are outlined in *Section 6.2.3* of Volume 1 of the Environmental Assessment. These include the preparation of a flora and fauna sub plan, detailed surveys along the proposed route and access tracks and revision of pole locations to reduce impacts on identified threatened species.

Noise

Construction noise emissions would generally comply with the relevant criteria set by the Department of Environment and Conservation, except for potential exceedances of the criteria of 1-6 dBA at 10 dwellings.

Operational noise phenomenon known as ‘corona’ (the faint ‘buzzing’ or ‘crackling’ noise heard under certain meteorological conditions) and ‘aeolian noise’ (the sound heard when wind blows over a structure) were investigated. These phenomena do not occur all the time and are usually inaudible except under certain meteorological conditions.

Detailed assessments of construction and operational noise impacts are provided in Technical Papers 4 and 5 of Volume 3, respectively, of the Environmental Assessment. Mitigation measures for potential construction noise impacts are provided in *Section 7.2.2* of Volume 1 of the Environmental Assessment. Operational noise impacts are not expected to be a source of concern for the proposal and therefore measures to mitigate operational noise were not considered in the Environmental Assessment.

Heritage

A number of sites of Indigenous heritage significance have been recorded within the existing easement. The proposal would involve limited surface and subsurface excavation and would generally occur in areas which are likely to have been disturbed during construction of the existing pole supports.

Measures to mitigate potential impacts to Aboriginal or historic heritage sites are outlined in *Section 7.2.1* of Volume 1 of the Environmental Assessment. These include preparation of an Aboriginal heritage management sub plan, exclusion zones to be established around the identified aboriginal site adjacent to poles 23 and 24 and a program of detailed archaeological survey and recording of aboriginal artefacts to be undertaken in all areas where movement of heavy vehicles would occur.

Cumulative impacts

A number of other projects or activities are likely to be constructed concurrently and within the general vicinity of the proposal. Examples include ongoing Windsor Road upgrading works (NSW Roads and Traffic Authority), the proposed development of new residential, commercial and industrial premises in the North West Sector (NSW Government), upgrades to other parts of the transmission network (Integral Energy) and works by other utilities. Any concurrent developments have the potential to cause cumulative impacts during their construction and operational phases, including traffic, access, visual, dust and noise impacts.

Relative to these other projects, the scope and intensity of effort involved with the proposal is minor, and it is considered that it would have only a minor contribution to any cumulative impacts.

Other potential impacts

A number of other issues were assessed as part of the proposal development and environmental assessment, including soil and water management, television and radio interference, bushfire, air quality, energy and materials use, generation and management of waste and impacts on utilities and crossings. None of the identified impacts are expected to be significant.

2.4.3 Mitigation measures and Statement of Commitments

The Director-General's requirements for the Environmental Assessment require the document to contain a compilation of mitigation measures in a single section of the document. The requirements of Part 3A of the *Environmental Planning and Assessment Act 1979* also require the proponent to provide a draft Statement of Commitments which demonstrates their commitment to the implementation of the proposed mitigation and management measures. Drafts of these documents are provided in *Appendix E* of Volume 1 of the Environmental Assessment.

These two documents have been compiled into a stand alone Statement of Commitments (*Chapter 7*). The Statement of Commitments provides a detailed set of mitigation and management requirements specific to each issue identified and described in the Environmental Assessment.

3. Community consultation

3.1 Consultation during preparation of the environmental assessment

3.1.1 Overview of process

Effective consultation and communication with the community and key stakeholders enabled the early identification of issues for consideration and maximised the extent to which local issues and concerns could be addressed by the proposal.

At the start of the environmental assessment process, a community and stakeholder involvement plan was prepared with the objectives of:

- Consulting with members of the community to identify and address any concerns and issues.
- Providing a two-way information exchange with the community.
- Obtaining public feedback on options and decisions.
- Ensuring that the public and their concerns were consistently understood and considered.
- Achieving community and stakeholder acceptance of the need for the proposal.

To achieve these objectives, the plan included strategies to:

- Convey the objectives of the proposal to affected communities.
- Recognise the role of Feeder 9JA in servicing the local and regional community and future residential development.
- Identify local stakeholders and understand their interest in the project.
- Help the immediate community understand the proposal, its scope and the timetable of the investigations.
- Help the community understand the proposal by providing objective, up-to-date, transparent information.
- Provide opportunities for community input through the provision of appropriate public material and community feedback forums.
- Obtain, consider, manage and document community and stakeholder comments and issues of concern.

Stakeholder groups identified for the proposal included:

- State and Local Government.
- Landowners directly affected and adjacent to the proposed route options in the Vineyard, Riverstone, Rouse Hill and Schofields areas.
- Residents of areas near the proposed upgrade.
- Interested individuals and key community representatives.
- Regional stakeholders in the Blacktown Local Government area.
- Local, regional and metropolitan media.
- Integral Energy's corporate stakeholders and customers.

3.1.2 Consultation tools and activities

Since June 2004, a range of consultation activities have been undertaken to identify key community and stakeholder issues. These activities included:

- *Two community information evenings* — held in June 2004 at the Riverstone Bowling Club, each attended by approximately 120 people. They created awareness of the proposal and provided the community with a forum to raise issues, which were subsequently analysed and considered as part of the assessment process. Questions from the community recorded at these meetings have been progressively answered in community newsletters and on Integral Energy's website.
- *Individual meetings with landholders along the existing Feeder 9JA easement* — held before and after the public meetings, to establish key issues and perceptions concerning the original preferred design consisting of 36 metre high steel lattice towers along the alignment.
- *Eleven community newsletters* — each distributed to approximately 6,000 recipients over the last 12-18 months. The February 2005 newsletter contained an outline description of each project option under consideration and the May 2005 newsletter announced the revised preferred design concept.
- *Community Advisory Group* — which had its inaugural meeting in November 2004 and has held eight meetings to date, three of which have focused on the consideration of alternatives.
- *Community attitudes survey* — which asked seven groups of land owners to provide feedback on their understanding of the project and their attitudes and thoughts about various project options and issues.
- *Industry consultation paper (Integral Energy 2005)* — issued under the auspices of the National Electricity Rules (a national code outlining the market rules for the Australian electricity industry) and publicly exhibited in February 2005. This paper outlined the project options being considered by Integral Energy and the indicative capital and operating costs. It also identified options that satisfied the regulatory test specified under the National Electricity Rules.

- *Consultation with professional valuers and local real estate agents* — conducted via a survey in December 2004, and associated with a study to quantify the magnitude of social and environmental externalities of the proposal.
- *Three options evaluation workshops* — one workshop held with Integral Energy, one with the Community Advisory Group, and one with some government departmental representatives. These workshops were held between November 2004 and February 2005.
- *Consultation and correspondence with various government departments in regard to key project issues* — generally between June 2004 and April 2005. They included meetings with the Department of Planning (formerly the Department of Infrastructure, Planning and Natural Resources) (Offices of Sustainable Development and the Metropolitan Region), NSW Health, NSW Treasury, the Independent Pricing and Regulatory Tribunal and the Department of Energy, Utilities and Sustainability. Correspondence with others included Blacktown City Council, the Department of Environment and Conservation, Sydney Water and the NSW Roads and Traffic Authority.
- *Briefings with Ministerial and local political stakeholders* — which were ongoing throughout the environmental impact assessment process.
- *Public release of the Alternatives Assessment Report (Parsons Brinckerhoff 2005)* — which was made public on Integral Energy's website in May 2005.
- *Design refinement meetings* — held with Integral Energy and the Community Advisory Group in May and July 2005 respectively.

3.1.3 How the input was used

Community and stakeholder input was used to inform the options development and evaluation process in two main ways.

Representations received from community members and the outcomes of discussions with project stakeholders allowed Integral Energy to identify key issues. Details of the correspondence received and the key issues identified are outlined in *Section 4* of Volume 1 of the Environmental Assessment. These key issues were subsequently investigated through specialist technical assessments, as appropriate.

More specifically, input from the community and stakeholders resulted in the following project outcomes:

- An independent review of Integral Energy's capital cost estimates.
- Route options being investigated along the Eastern Creek floodplain and co-located with other utilities easements through the study area.
- A detailed comparative assessment of nine project options.
- Consideration and quantification of various environmental and social effects of the project options.
- Detailed financial and economic analyses of the project options.

- Abandonment of Integral Energy's original development proposal in favour of a concept that provides a more appropriate balance between environmental, economic social, and design considerations.

3.2 Exhibition of the Environmental Assessment

This Environmental Assessment was placed on public exhibition from 7 November 2005 to 16 December 2005 in accordance with Section 75H(3) of the Planning Act. The Act requires a minimum period of 30 days for exhibition, however, Integral Energy chose to extend the exhibition period to 40 days. Integral Energy also accepted late submissions regarding the Environmental Assessment until 20 January 2006.

A copy of the summary and a compact disk containing a complete electronic copy of the Environmental Assessment were sent to the 82 landholders identified as being directly affected by the proposal and other stakeholders along with a letter outlining details of the Environmental Assessment and the exhibition process.

An advertisement outlining the proposal and exhibition details was placed in the Sydney Morning Herald, Blacktown Sun, Blacktown Advocate on 7, 8 and 9 November 2005 and 7, 1 and 6 December 2005 respectively. Full copies of the Environmental Assessment, Summary and Compact Disk were available for viewing at the: Integral Energy's head office, Riverstone Library, Blacktown City Council main office, Department of Planning, NSW Government Information Centre and Nature Conservation Council. The Environmental Assessment was also made available online at Integral Energy's website at www.integral.com.au/upgrade/9ja. Free copies of the Environmental Assessment were made available on request.

3.2.1 1800 line calls

A 1800 information line was staffed throughout the exhibition period and received 36 calls between 7 November 2005 and 20 January 2006.

3.2.2 Riverstone library staffing

During the exhibition period the Riverstone Library was staffed by a representative from Integral Energy and/or Parsons Brinckerhoff on Thursday's from 5:30pm – 7:45pm and Saturday's from 9:30am – 11:45am. These staff members were available to answer questions from the community concerning the Environmental Assessment.

3.2.3 Agency meetings

To clarify a number of issues raised in submissions a number of meetings were held with the NSW Health Department on 31 January 2006 and 8 February 2006. The Department of Planning were present at the latter meeting.

3.2.4 Independent Hearing and Assessment Panel

Owing to the sensitivity of the issues identified in the Environmental Assessment and the relationship of the proposal with the development of the North West Sector, the Minister for Planning established the Independent Hearing and Assessment Panel (the Panel) to review the Environmental Assessment. The Panel was advertised in the Sydney Morning Herald and the Blacktown Advocate on 18 January 2006 and the Blacktown Sun on the 17 January 2006.

The Panel was set up to evaluate and advise the Minister of Planning on issues raised in public submissions and Integral Energy's Environmental Assessment, taking into account:

- the essential need to augment the electricity supply by December 2007
- economic, social and environmental justification for the proponent's preferred option.

Newspaper advertisements were lodged which called for (separate) submissions on the proposal. Integral Energy also provided copies of all submissions which had been received to the exhibition of the Environmental Assessment.

The Panel comprising Barrie Unsworth (Chair), Colin Roy (ARPANSA) and Charles Hill (Planning Workshop Australia) was briefed by Integral Energy on 1 February 2006 before undertaking a site visit. Subsequently, following their review of submissions received, a two day roundtable was held on 9-10 February 2006 to consider submissions from the community concerning the proposal. Part of the second day was also spent visiting the site of the proposal and various residences of persons who had made submissions to the panel on day 1.

It is understood the panel is due to present its report to the Minister for Planning on 6 March 2006.

4. Consideration of submissions

4.1 Summary of submissions and analysis process

4.1.1 Overview

Parsons Brinkerhoff received 101 unique submissions from the exhibition of the Environmental Assessment. These consisted of 70 letters from individuals, 16 types of form letters (a total of 1,027 form letters were received), 6 submissions from community groups, 3 submissions from government agencies, 3 letters from private companies and 3 petitions (with a total of 1,711 signatures).

Integral Energy has provided a copy of all submissions received to the Department of Planning and the Panel.

4.1.2 Analysis process

Upon receipt, each submission was assigned a unique number and analysed to determine the key issues it raised (these are listed in *Section 4.1.2*). Details of the submission, including the date received, key issues raised and respondent's details were entered to a database.

A number of submissions were identified as form letters. These were identical copies of the same letter with a space on the page for individuals to write their name and postal address. A total of 16 different types of form letters were identified during the analysis of the submissions. Approximately 41 form letters were identified as photocopies or duplicates of other submissions and several form letters of the same type were submitted by the same respondent. These letters were still considered as individual submissions.

Letters were sent out to each respondent acknowledging receipt of their submission. The submissions were then further analysed in order to create a detailed list of original issues. These issues were then analysed and a response prepared. The list of specific issues raised and Integral Energy's response are provided in *Section 4.2*.

4.1.3 List of issues

A breakdown of the key issues raised by the 101 unique submissions is displayed in *Table 4.1*. Each number represents the number of submissions that raised the key issue at least once.

Table 4.1 Key issue count

Key Issue	Number of submissions¹
Options development and assessment	87
Environmental Impact Assessment process	24
Planning	60
Network deficiencies	0

Key Issue	Number of submissions¹
Future development	0
Consultation	44
Construction/general amenity	0
Soils and water	0
Utilities and crossings	0
Energy, materials use and greenhouse gas emissions	0
Waste	0
Air quality	0
Flora and fauna	1
Land use and property issues	0
Visual	54
Property issues	51
EMF and health effects	68
Heritage	0
Noise and vibration	0
TV and radio interference	0
Safety (but not health related)	0
Bushfire hazard	0
Cumulative impacts	0
Ecologically Sustainable Development	0
Social impacts	38
Benefits	0
Documentation	0
Support proposal	9
Exhibition period	0
North West Sector related	28
Other	24

Note: 1. This number represent the number of submissions that raised a particular key issues out of a total of 101 unique submissions.

A list of the specific issues is provided in *Section 4.2*, along with Integral Energy's responses.

4.2 Responses to community submissions

4.2.1 Options development and assessment

1. Why was the preferred option not chosen in the first place?

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17

Integral Energy initially selected an option which was the most cost-effective, minimised the electric and magnetic field emissions in light of costs involved and was similar to

other transmission lines in the area. Based on community reaction to this option, Integral Energy undertook a more thorough investigation of all the issues involved including the key issues raised by the community and selected a different option as its preferred proposal on the basis that it represented a better balance between social, environmental, economic and design factors. The change in option was a result of Integral Energy's detailed consideration of social, economic and environmental considerations and its assessment and consideration of the community response to the proposal. This result demonstrates the effectiveness of the community consultation process.

2. The current proposal would not have been considered if the project was planned to be a new line

Submission numbers: 128

The preferred option represents a logical progression of the design process given the identified project end points, the use of the existing easement as a route corridor and an overhead line configuration which is commonly in use. Integral Energy has adopted all relevant industry design standards at arriving at the current proposal. These standards do not distinguish between new lines and upgrades.

3. Integral Energy did not look hard enough for a better solution

Submission numbers: 128

Initially at two community information evenings held in June 2004, Integral recommended as its preferred development option, the construction of 36 metre high steel lattice towers along the alignment of the existing Feeder 9JA easement. Lattice towers are the most cost-effective and widely used means to support high voltage overhead power lines throughout Australia. In consideration of community opinion, Integral Energy spent an additional 12 months conducting a comprehensive review of alternatives to this proposal. A long list of 16 options was initially developed. Preliminary technical assessments were conducted, including engineering and cost considerations. Of the long listed options, 12 were selected for detailed assessment. These were subject to more detailed technical assessment and the results used in three options workshops. Community input was also sought on the performance of the options.

The preferred option is a result of comprehensive technical investigations and consultation with the community advisory group and other project stakeholders. The preferred option was chosen because it is considered to provide a balance between social, environmental, economic and design factors. Other network solutions and upgrades would have greater impacts.

4. Integral Energy changed the initial proposal due to community complaints, but have not selected a better option

Submission numbers: 353-408, 548-604, 937-945, 946-948

Integral Energy considers that the option development and assessment process was thorough and comprehensive. The change in the originally preferred option was a result of Integral Energy's detailed consideration of social, economic and environmental considerations and its assessment and consideration of community response to the

proposal. This result demonstrates the effectiveness of the community consultation process. The preferred option represents a 44 per cent cost increase compared to the initial proposal, however Integral Energy believe this is justified to respond to the key community issues.

5. The location of Rouse Hill Switching Station limits the upgrading options available and does not account for future development and should be reviewed

Submission number: 1103

It is preferable for transmission lines to adopt straight routes as changes in direction significantly add to the capital cost. Achieving a direct link between project end points is consistent with the objectives of achieving a prudent investment which represents value for money.

The significance of the switching station location is that it represents the future “centre of load” of the North West Sector. On this basis, the siting of the switching station is entirely consistent with the Sydney Metropolitan Strategy and fully takes into account the future development of the area. If the switching station were to be relocated, it would not necessarily mean that an alternate route would be adopted. It would however mean that the length of all future connections to the switching station would be longer and that the capital costs of these future projects would increase proportionately.

6. There is a vast difference between the line in 1952, and what Integral Energy plan to do now

Submission number: 1110

In 1952 the line functioned as a transmission asset transferring bulk power between the Wallerawang bulk supply point near Lithgow and Carlingford transmission station. In the future, the line will still serve a transmission function but instead transfer bulk power between Vineyard bulk supply point and a new switching station proposed at Schofields Road. In a network sense, the line still functions in a similar manner as it did in the past. Changes to the line capacity and security are a direct result of changes in population density and power consumption trends which have occurred since 1952. The line has been augmented in part since 1952 in response to population changes. However, the upgrade section is in the original configuration since it was first built in 1952. The current proposal represents an upgrade of the line, albeit a more substantial one, which is appropriate to the expected scale of changes which will result from the future development of the North West Sector.

7. The community believes that the options assessment process was biased through undervaluing the negative externalities of the preferred solution

Submission number: 1108

The options assessment process was detailed and comprehensive and took account of a range of technical information including the views of various Government groups and community stakeholders including the community advisory group. The extensive

community consultation conducted is summarised on p2-10 of Volume 1 of the Environmental Assessment.

The options costs were independently verified by a specialist engineering firm. The valuation of the perception of social and environmental externalities was also conducted by a firm specialising in land and property valuation matters.

8. The upgrade should be restricted to the existing easement, co-located with existing infrastructure corridors or located with the floodplain, so that it is away from residential areas and reduce maintenance costs, property and health impacts.

Submission numbers: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 19, 29, 38, 39, 47, 48, 49-77, 79, 111, 112, 116, 129, 130, 767-825, 1103, 1108, 1114

Options F, G, H, J, K and L variously contain sections of alignment which are co-located with existing roadways and other utility infrastructure.

It is not correct that such options would result in less maintenance since the route adopted has no bearing on the level of maintenance required. The level of property impact would depend on the pattern of development. In light of scientific uncertainty surrounding EMF and health impacts, it can also not be agreed that such a proposal would result in fewer health impacts.

9. The proposal was not co-ordinated with the Windsor Road upgrade

Submission numbers: 110, 1108

Section 4.3.4 of Volume 2 of the Environmental Assessment provides a detailed (2 page) account of the investigations conducted and the reasons this option was not considered feasible. Consideration included both underground and overhead options located either at the roadside or in the central median. In summary, the difficulties of overhead options included: limitations on physical space, the need to provide traffic protection measures (which would conflict with the urban design objectives for the road), the necessity to acquire new easements (or in some case whole properties) and supply security issues. For underground options, the difficulties included: limitations on physical space, impact on European heritage items, supply security issues, impacts on existing vegetation, construction safety and safety for maintenance workers, traffic congestion during construction and maintenance, increased construction cost and differences in the timing of the two projects (the design and construction of the Windsor Road Upgrade was well advanced at the time of contact).

10. The proposal will have poles lower than the original steel poles proposed and will result in higher EMF impacts on residents

Submission number: 18

It is agreed the currently proposed poles are lower than the steel lattice towers originally proposed. The lower pole height was decided upon as a result of the community consultation during a design refinement process. In this context, Integral Energy has used all of the mitigation measures outlined in the response to achieve an outcome which meets all the goals of the project as well as considering community concerns.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005/06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

11. The proposal is aligned along the existing easement because Integral Energy paid nothing for it, and Integral Energy should release the land to realise its high value

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 79, 119, 128, 826-893, 1103, 1104

Integral Energy does not own the land burdened by the easement – it is owned by some 82 landholders along its length. The conditions upon which the easement could be extinguished are documented on p4-14 of Volume 1 of the Environmental Assessment and in part include compensation to Integral Energy from the landholders for the current market value of the rights that Integral Energy currently hold. It is noted that Integral Energy cannot insist on these landholders to compensate Integral Energy in order for the easement to be extinguished.

It is understood that at the time of acquiring the original easement, all existing landholders were compensated to the extent required by law. Further, all existing landholders purchased their properties in the knowledge that these properties were burdened by an easement.

Integral Energy acquired the rights to construct, maintain and operate a transmission line within the existing easement from its predecessor Prospect Electricity. The use of the existing easement provides a number of strategic advantages which are fundamental to achieving the project objectives including: the certainty of completing the project before December 2008, providing a cost-effective solution and more generally, reducing the impacts of network augmentation on the community.

12. The location of Options G and K are cause for concern

Submission number: 116

The basis of the concern is not clear however the preferred option is Option C.

Table 4.4 in Volume 1 of the Environmental Assessment outlines the performance of each option against the assessment criteria. Options G and K would require the acquisition of new easements along both sides of Garfield Road West, Railway Terrace and Schofields Roads (as appropriate) over between 146 and 200 properties.

13. The preferred route is not the best route for the health, prosperity and growth of the North West Sector

Submission numbers: 5, 6, 8, 9, 10, 11

The preferred option was chosen after a comprehensive option assessment process which took into account the social, environmental, economic and design factors including health issues. The preferred option was chosen because it is considered to provide the best balance between these issues. Other network solutions and upgrades would have greater impacts. It is not expected that the prosperity and the growth of the North West Sector would be adversely affected by the proposal.

14. High Voltage Direct Current (HVDC) technology should be used to reticulate large amounts of high voltage power through urban areas and does not generate EMF fields.

15. The proposal will have poles lower than the original steel poles proposed and will result in higher EMF impacts on residents.

16. Other authorities in Australia have shown underground cabling to be economical over longer distances eg the HVDC technology used in the MurrayLink cable. Integral Energy has not considered this.

Submission numbers: 128, 1108

The key advantages of using an underground High Voltage Direct Current (HVDC) construction configuration instead of Alternating Current (AC) are:

- Overcomes the high charging current requirement (and the resultant MVAR load) of underground high voltage cables when long distances are involved.
- More suited to situations where two different transmission power grids are being joined together as it achieves a zero impact on system stability on one network under fault conditions occurring in the other network.
- Provides an opportunity to reduce fault levels.

In comparison the Vineyard to Rouse Hill upgrade :

- Is proposed over a short distance of 8.5km, although it will form the primary and back up electricity supply to the North West Sector of Sydney.
- The voltage is transformed at the Vineyard bulk supply point from 330kV to 132kV and does not interconnect with other transmission grids (it is internal to the NSW grid).
- The fault levels are manageable and the required interconnection with the surrounding network is such that no benefit would accrue from lower fault levels being associated with HVDC.

There have been many such projects throughout the world including four major projects in Australia and New Zealand that have used HVDC technology, namely:

- The connection between the North and South Islands of New Zealand.

- The Direct Link project connecting NSW with Queensland, consisting of 3 x 60kV, 60MW circuits over 60 km.
- The Murray Link between Victoria and South Australia consisting of a 1 x 150kV, single pair cable set with a circuit rating of 200MW over 180km.
- The Bass Link Project, currently being undertaken between Victoria and Tasmania.

While it is understood that DC cable costs are substantially less costly than AC cables of a similar rating, the costs associated with the station required to convert the DC to AC (i.e. at each end of the line) have been confirmed with both the Direct Link and Murraylink projects are approximately \$1 million for each Megawatt converted. The Vineyard to Rouse Hill project proposes a secure 500MVA capacity and to convert AC to DC and DC to AC would be in the order of \$500million for each station.

17. The original 36 metre high lattice towers were not favoured by residents. Integral Energy only considered the bottom line when selecting options

Submission numbers: 353-408, 548-604, 937-945, 946-948

Integral Energy initially selected an option which was the most cost-effective, minimised the electric and magnetic field emissions in light of costs involved and was similar to other transmission lines in the area. Based on community reaction to this option, Integral Energy undertook a more thorough investigation of all the issues involved including the key issues raised by the community and selected a different option as its preferred proposal on the basis that it represented a balance between social, environmental, economic and design factors. The change in option was a result of Integral Energy's detailed consideration of social, economic and environmental considerations and its assessment and consideration of the community response to the proposal. This result demonstrates the effectiveness of the community consultation process.

18. The location and configuration of the Rouse Hill Switching Station and the Schofields Substation should be flexible and coordinated with the Sydney Metropolitan Strategy.

Submission numbers: 128, 1103

The location of the Rouse Hill Switching Station has been determined based on analysis of future load growth in the North West Sector area. The siting of the Schofields Zone Substation is such that it is located in the approximate centre of load for its distribution area (which is in a different location to the load centre of the entire North West Sector). It is therefore not possible to combine the Schofields Zone Substation and the Rouse Hill Switching Station. The switching station is strategically located at the approximate 'centre of load' of the North West Sector. Being located at the centre of load will minimise the length of all future electrical connections and therefore help to reduce the cost of future augmentations.

19. The underground option should be the preferred option because it has many positive outcomes over the proposed overhead solution

Submission numbers: 2, 3, 4, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, 28, 32, 36, 38, 39, 47, 48, 49-77, 78, 79, 81, 106, 108, 112, 114, 119, 120, 121, 122, 124, 125, 126, 130, 767-825, 1026-1080, 1082, 1083, 1084, 1085, 1108

The comparative performance of all options considered is summarised in *Table 4.4* of Volume 1 of the Environmental Assessment. Both overhead and underground options have advantages and disadvantages. The preferred option is a result of comprehensive technical investigations and consultation with the community advisory group and other project stakeholders. The rationale for selection of the preferred option is outlined on p4-66 of Volume 1 of the Environmental Assessment and the overall justification for the proposal on p8-1. Integral Energy believe that the proposal appropriately balances the social, environmental and economic issues.

20. The underground option is the only option that would legitimately avoid houses, schools and populated areas

Submission numbers: 110, 118

It is extremely difficult to avoid the co-existence of people and electricity infrastructure. Examples such as Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicates that despite the existence of electricity infrastructure, developers choose to develop land around them and people choose to purchase properties in close proximity even when the infrastructure has been in existence for a long time (eg Feeder 9JA has been in place since 1952). If future residential areas are to be quarantined from some level of electricity infrastructure (it is not possible to avoid all forms of electricity infrastructure) then strategic planners need to identify and provide utility corridors as part of the structure planning process for new release areas and funding and administrative mechanisms put in place to ensure that electricity providers are not disadvantaged by their regulators for incurring costs resulting from such strategic planning processes. These are matters for the relevant planning authority.

In light of the scientific uncertainty surrounding EMF and potential health effects, there seems to be agreement that a cautionary policy should be followed. In an Australian context, this is known as prudent avoidance.

Prudent avoidance is defined by Sir Harry Gibbs as “taking actions and doing whatever can be done, at modest cost and without undue inconvenience to avoid a possible risk to health...” In selecting the preferred option, Integral has considered the principles of prudent avoidance and has adopted specific line circuit geometry and phasing arrangements of the conductors to reduce magnetic fields at the edge of the easement. These have resulted in a substantial reduction in magnetic fields at the edge of the easement.

21. The upgrading provides the opportunity to place the line underground

Submission numbers: 353-408, 548-604, 937-945, 946-948

Table 4.4 of Volume 1 of the Environmental Assessment indicates the relative performance of all the options against the assessment criteria including underground and overhead options. Several options that placed the line underground were considered during the options development and assessment process. The economic assessment of the options, one factor in the selection of the preferred option, indicated that underground options did not minimise the net present value of the costs of the upgrade or represent prudent costs which is a regulatory requirement placed on Integral Energy by National Electricity Rules and the Independent Pricing and Regulatory Tribunal.

Selection of the preferred option took into consideration the technical requirements of the project and minimisation of the impact on the social, environmental, economic and design factors. Integral Energy believe that the preferred option provides the best balance between the environmental, social and economic issues. Other network solutions and upgrades would have greater impacts.

22. Power lines are placed underground in populated areas overseas

Submission numbers: 605-627

Integral Energy is a member of the International Council for Large Electrical Power Systems (CIGRE) and provides the Australian representative for the CIGRE international study committee on overhead line development.

It is incorrect to state that “no other country is putting these lines on poles in populated areas”. CIGRE members in other countries indicate new transmission and distribution electricity assets are being developed throughout the world in both overhead and underground arrangements.

Similarly Integral Energy places transmission and distribution electricity assets in both overhead and underground arrangements. It is a matter of public record Integral Energy has placed substantial distribution electricity assets underground in residential, commercial and industrial areas since the 1970's.

23. To reduce the EMF's to values considered safe overseas would require widening the easement to about 70 metres, which would mean that the underground option would be more cost effective

Submission numbers: 119, 113

The magnetic field strengths at the edge of the existing 30 metre easement are described in Technical Paper 8 of the Environmental Assessment. These strengths are substantially below the recommended International guideline of 1000 milligauss for general public exposure for up to 24 hours per day.

Notwithstanding this the economic assessment conducted indicated that the underground options (Option F in particular) were the worst performers.

24. Why is the upgrade selective in the area it will underground

Submission number: 110

The preferred option described in the Environmental Assessment does not propose that the alignment is placed underground.

25. An independent review by ATTAG found the underground option costings in the EA to be inflated.

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 79, 128

The project options were costed initially by Integral Energy and subsequently independently reviewed by an independent specialist engineering firm, Maunsell Australia. The two sets of costs were not dissimilar. The costs presented in *Table 5.4* on p5-22 of Volume 1 of the Environmental Assessment are those which were derived from the independent review process. The expected accuracy of the costs is within about 10 per cent.

26. The EA admits that underground cables have fewer faults, less dangerous emissions, the least visual impact and are more secure

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 25, 24, 39, 79, 113, 118, 123, 137-352, 628-710, 711- 712, 713-766, 826-936, 949-1025, 1026-1080, 1104

Table 4.4 of Volume 1 of the Environmental Assessment indicates that the relative performance of all the options against the assessment criteria including underground and overhead options. While there are some differences, the differences are not always substantial and not always in favour of underground options. For example, the cost and maintenance aspects of underground options are many times greater than overhead options. Some underground options would also not provide the flexibility for future relocation if desired to improve the efficiency of land use. While EMF levels can be substantially reduced, the land use constraints of underground cables are much more restrictive than overhead wires. If a fault occurs, the rectification of that fault may take days or weeks for underground cables whereas only a few hours or a day for overhead wires. The choice between an overhead and underground options therefore is not always clear and remains a balance between a number of often competing issues and should be relevant to the individual circumstances being considered.

27. The reason the preferred option is not underground is because of cost

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 25, 24, 39, 79, 113, 118, 123, 137-352, 628-710, 711- 712, 713-766, 826-936, 949-1025, 1026-1080, 1104

Cost was only one consideration in the selection of the preferred option. As documented on p3-10 of Volume 1 of the Environmental Assessment, there were social, environmental and economic justifications provided for the preferred option.

Integral Energy has complied with the requirements of both the National Electricity Rules and the Independent Pricing and Regulatory Tribunal's Network Determination in selecting the preferred option. Under the National Electricity Rules, Integral Energy is required to 'carry out an economic effectiveness analysis of possible options to identify

options that satisfy the regulatory test...'. In satisfying the regulatory test the Rules state that an augmentation must 'minimise the net present value of the cost of meeting those standards'.

28. Integral Energy has not considered the social and health benefits of the underground options

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 25, 24, 39, 79, 113, 118, 123, 137-352, 628-710, 711- 712, 713-766, 826-936, 949-1025, 1026-1080, 1104

The economic assessment conducted in *Appendix F* of Volume 2 of the Environmental Assessment includes wider costs than purely financial costs to Integral Energy.

The direct costs to Integral Energy were therefore only one consideration in the selection of the preferred option. As documented on p3-10 of Volume 1 of the Environmental Assessment, the preferred option is justified on a wider assessment of costs which includes social, environmental and economic issues.

Integral Energy considers that in circumstances where the risk of future health problems is unable to be quantified, the costs associated with any such problems are similarly unable to be quantified. Any cost attributed would be arbitrary and without foundation.

29. Integral Energy should use its profits to finance major new projects

Submission number: 110

Integral Energy is obliged under the National Electricity Rules and the Independent Pricing and Regulatory Tribunal's Network Determination to invest in assets in a prudent and efficient manner so as to minimise costs to all consumers.

Under the National Electricity Rules, Integral Energy is required to "carry out an economic effectiveness analysis of possible options to identify options that satisfy the regulatory test...". In satisfying the regulatory test, the Rules state that an augmentation must "minimise the net present value of the cost of meeting those standards".

Integral Energy has complied with the requirements of both the National Electricity Rules and the Independent Pricing and Regulatory Tribunal's Network Determination in selecting the preferred option.

The Independent Pricing and Regulatory Tribunal regulates the prices Integral Energy can charge. The Independent Pricing and Regulatory Tribunal may adjust down the prices that Integral Energy can charge if it is making excessive profits. If Integral Energy uses its profits from other parts of the business to finance a project that is thought to be not prudent, then the Independent Pricing and Regulatory Tribunal will not allow these costs to be recovered.

30. The estimated cost for the Picnic Point to Haymarket project by TransGrid is considerably lower per kilometre than the proposal

31. 132 kV cables were also able to be undergrounded at the Sydney Olympic Site at Homebush

32. A cost-reduction for Olex type underground cabling has not been factored into the costing of the proposal, despite a fall in market price

Submission number: 130, 1108

Maunsell Australia, a specialist-engineering firm, has independently verified the costs associated with all options considered in the Environmental Assessment. While we do not have detailed knowledge of the projects mentioned, it is understood the difference in costs is related to the different voltages, capacity of the cables used and the number of circuits implemented.

Integral Energy is a State owned corporation and as such is required to undertake prudent investments in accordance with the Independent Pricing and Regulatory Tribunal's 2004 Network Determination and the National Electricity Rules. The undergrounding of Feeder 9JA would not represent a prudent investment and would therefore not satisfy the objectives of the Environmental Assessment.

It is noted that in April 2005, the ACCC made a decision to disallow \$36 million (1999 dollars) of capital expenditure, principally relating to the two projects cited above undertaken by TransGrid and Energy Australia. The ACCC was not satisfied that these underground transmission projects were prudent investments, on the grounds of the substantial cost overruns and concerns over whether replacement of the overhead lines with undergrounding was necessary and lead to a consumer benefit.

In Integral Energy's 2004 Network Determination the Independent Pricing and Regulatory Tribunal did not consider or make allowance for specific undergrounding, rather it undertook a total cost review and engaged Meritec to assess Integral's capital expenditure. Meritec accepted Integral's capital proposal as prudent.

Integral has previously stated on record that they will make a contribution equal to the cost of an equivalent overhead asset plus any savings identified in operations and maintenance costs arising from an underground solution. Other beneficiaries who receive the direct aesthetic and amenity benefits provided by undergrounding would be required to meet the remaining costs of undergrounding network assets.

33. If the line was placed underground, the easement could be reduced in width and sold, re-couping the extra cost of placing the line underground

Submission number: 118

The economics of all options was considered and for underground options, the assessment indicated that the net present value was substantially negative and more so than for the overhead options. Integral Energy is obliged under the National Electricity Rules and the Independent Pricing and Regulatory Tribunal's Network Determination to

identify upgrade options which “minimise the net present value of the cost of meeting those standards”.

It is not necessarily the case that the easement could be reduced in width if the line was undergrounded, however there are circumstances where developers have paid to achieve this. The difference in this instance is that Integral Energy does not own the land on which the easement is located. Integral Energy is entitled to the benefit granted by the easement. To offset the cost of an underground option through the sale of a portion of the easement would require (1) compensation to be paid to Integral Energy by each private landholder for the value of Integral Energy’s current easement rights which would need to be extinguished. Importantly, Integral Energy could not compel the owner of the freehold land to pay consideration for the extinguishment of the easement (2) purchase of the land by a third party such as Blacktown City Council or the NSW Government. Even if this could be achieved, it is unlikely it could be achieved in the timeframe required to meet the need for the upgrade to be completed by December 2008.

Integral Energy would not extinguish the easement for any underground option. It would still need to access the underground cable from the surface and retaining the easement would ensure that development could not interfere with the underground cable. Integral Energy would only consider extinguishing the easement if the existing line was dismantled and there was no proposal to replace it in that location.

34. A development levy could be implemented in growth areas to pay for a more suitable option.

Submission number: 1103

Integral Energy would not be permitted by its regulator, the Independent Pricing and Regulatory Tribunal to introduce a levy on its customers to pay for an option which did not minimise the net present value of the costs of the project. While the North West Sector Growth Centres Commission has responsibility for the planning, co-ordination and implementation of some types of infrastructure and the recouping of costs via development levies on new land purchasers, electricity infrastructure is not included. The other party who could possibly implement the type of levy suggested would be Blacktown City Council.

It should be noted that there is no agreed framework for this type of approach and no agreed method of identifying who should contribute and in what proportion. Another important factor in considering the introduction of a new levy is the affordability of housing in the area. As more levies are imposed, the affordability of new housing would decrease. While Integral Energy fully support a beneficiary pays approach to infrastructure provision, it is recognised that there are significant obstacles in achieving the desired outcomes.

35. The EA has undervalued the negative impacts that the upgrade will have on the community by \$76 million which invalidates its overall conclusions.

36. Integral Energy has not included the opportunity cost of the easement in its calculations of environmental and social impacts.

Submission numbers: 5, 6, 8, 9, 10, 11, 128, 1108

The opportunity cost of easement relinquishment was investigated by Integral Energy but as stated on p4-14 of Volume 1 of the Environmental Assessment, could not be considered a factor in the Environmental Assessment because it could not be achieved in the timeframe required for the upgrade and therefore would not meet the objectives of the project.

The opportunity cost of the easement was not included in the economic analysis given the easement currently exists, and is expected to continue to exist under each of the options considered. Therefore, when calculating the net benefits or costs of an option compared with the status quo, the opportunity cost of the easement will net out (i.e. it is not an incremental cost). For the reasons stated above, the cost of relinquishing the easement has not been included in any of the options considered.

It should also be noted that the value of the easement to Integral Energy relies on it being linear and continuous.

37. Would other configurations of cables be cheaper than the 2 x 500 MVA configuration adopted?

Submission number: 1109

The adoption of multiple circuits of smaller capacity cables would likely be cheaper since the material capital costs of the cables is driven primarily by the amount of conductor material involved, e.g. the copper core of underground cables. While the capital costs of smaller capacity cables is likely to be cheaper, there would be an increase in the operating and maintenance costs associated with a larger number of smaller capacity cables.

In addition, the adoption of a larger number of circuits, whether overhead or underground, would be limited by the width of the existing easement. The configurations of 3 x 250 MVA and 4 x 166 MVA described in *Section 4.2.4* of Volume 1 of the Environmental Assessment could not be recommended in the existing easement and would be routed elsewhere involving impacts on property, visual amenity, health and the biophysical environment, potentially putting at risk the delivery of the project in the proposed timeframe.

38. Moving or acquiring existing dwellings which are close to the cables may remove health impacts

Submission number: 1108

Integral Energy has considered the option of widening the existing 30 metre easement. It has ultimately determined not to do so for a number of reasons. First, the width of

easement required for a project is determined by the various requirements for minimum clearance, access and maintenance purposes. It is not determined having regard to EMF levels at a particular location.

Second, to alter the easement width to reduce EMF encounters, the same problems are associated with imposing an arbitrary standard of EMF exposure.

Third, widening the easement may expose Integral Energy to costs in compensating adjoining landowners for any increased burden on their land.

Fourth, widening the easement may result in undue inconvenience, especially in respect of those landowners who have developed their properties within the boundaries of any proposed widening.

In Integral Energy's view, widening the easement may not satisfy the 'modest cost' and 'without undue inconvenience' limbs of prudent avoidance, particularly in circumstances where it is unclear whether widening the easement would ameliorate any potential health risk.

39. Option F would be the cheapest option if community costs and values were considered.

Submission numbers: 6, 8, 9, 10, 13, 14, 15, 16, 17

Community issues and values were identified from a number of sources including: public meetings, written submissions and other communications, stakeholder liaison, the community advisory group meetings and workshops and community surveys. Additionally, a study of social and environmental externalities was undertaken which took into account perception of visual, noise, reduced property marketability, safety and health issues associated with transmission lines for all of the alternative options. The results of the economic assessment are outlined in *Appendix F* of Volume 2 of the Environmental Assessment and summarised on p4-49 of Volume 1 of the Environmental Assessment. The economic assessment has been revised to reflect the major driver for the upgrade being reliability issues. The revised analysis is contained in *Appendix E* of this submissions report, however, it has no effect on the modelling or conclusions of the original report.

Option F was the second worst performer in the net present value analysis even when the high estimate of social and environmental externalities was considered. Integral Energy therefore believe that community costs and values were considered to the fullest extent possible in the Environmental Assessment.

40. The stated maintenance activities and costs associated with underground options were inaccurate.

Submission number: 1109

Integral Energy crews are required to patrol underground cables on a weekly basis to ensure there are no unauthorised activities occurring along the line that could impact on the security of the underground cables (eg. earthwork activities, access constraints etc). The reason for this is that if a fault was to occur to an underground cable, the time taken to locate and repair such a fault will be significantly greater than the time required to repair a fault on an overhead line. A fault on an underground cable is therefore more likely to result in a disruption to power supply to many customers over an extended

period of time. The weekly inspection regime is designed to minimise the risk of this occurring.

The durations of fault repairs quoted in the Environmental Assessment represent an average case which is comparable across all the options considered; underground or overhead. The timeframes used were determined through a review of historical fault duration data for existing overhead and underground transmission lines. Faults of different severity may take shorter or longer than the average durations quoted.

Faults in underground transmission lines can be much harder to locate and rectify than faults on overhead lines simply because the lines not visible and also may require excavation for inspections and repair work. Repairs on underground cables also require much more sophisticated and specialised techniques whereas this is not the case for overhead wires.

41. After an initial capital outlay, Integral Energy will enjoy a high return on their investment

Submission number: 1103

The Independent Pricing and Regulatory Tribunal choses a return by balancing the interests of consumers and Integral Energy, guided by the Capital Asset Pricing Model. This is transferred into the prices that Integral Energy is allowed to charge its customers. The Independent Pricing and Regulatory Tribunal only allows returns on investments it deems to be prudent.

42. The capital contributions of the method of financing the proposed Feeder 9JA upgrade have not been specifically considered.

Submission number: 1112

Integral is able to require new customers to contribute to the costs incurred or to be incurred in extending or increasing the capacity of the distribution system. However, under Integral Energy's Electricity Distribution Network Service Providers Licence, Integral Energy must comply with any determination of the NSW Independent Pricing and Regulatory Tribunal relating to the proportion of contributions that may be required from customers.

The Independent Pricing and Regulatory Tribunal has made Determination No 1 2002 "Capital Contributions and Repayments for Connections to Electricity Distribution Networks in New South Wales". This determination establishes clear guidelines for establishing which assets the customer will pay for and which assets Integral Energy will pay for. The key element of the approach determined by the Independent Pricing and Regulatory Tribunal is that customers will pay for the costs of providing and installing lines and equipment up to a defined point of connection to the network (i.e. connection costs). Integral Energy is required to pay for all other costs - that is those incurred beyond the point of connection (i.e. augmentation costs).

In relation to the proposal and in accordance with the 2004 the Independent Pricing and Regulatory Tribunal Determination, any augmentation of the feeder would need to be funded by Integral Energy.

43. The number of poles will increase from 51 to 88

Submission numbers: 21, 22, 40, 46, 82, 83, 86, 87, 88, 89, 90, 93, 96, 98, 101, 103, 109, 118, 137-352, 353-408, 711, 712, 713-766, 826-936, 949-1025, 1026-1080, 1104, 1106, 1107, 1109, 1110

This is incorrect. There are fifty sets of existing wooden poles along Feeder 9JA between the Vineyard Bulk Supply Point and Schofields Road. These would be removed and replaced with forty-three sets of steel poles along the easement.

44. The capacity of the line will increase from 87 to 1,000 MVA

Submission numbers: 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 40, 46, 78, 82, 87, 88, 89, 93, 96, 98, 101, 103, 109, 118, 137-352, 711, 712, 713-766, 826-936, 949-1025, 1026-1080, 1103, 1106, 1107, 1109, 1110

This is incorrect. The existing Feeder 9JA is a single circuit structure of 84 MVA capacity. The proposal would replace this with a two single circuit overhead transmission line with each circuit having a capacity of 500 MVA. One circuit would provide the primary electricity supply and the other one the back-up supply in the event of a fault or maintenance event. The electrical load up to and including 2043 is not expected to exceed 500 MVA.

4.2.2 Environmental assessment process

45. The project timeline has affected the design outcome

Submission number: 1103

Planning for the upgrade began in 1988, with Integral Energy commencing preparation of the Environmental Assessment in November 2003. *Section 3* of Volume 1 of the Environmental Assessment states that the Upgrade is required to be completed by mid 2008 as Integral Energy would, in that absence of the project, be unable to supply any new customers by 2008-09. Furthermore, the transmission line's current capacity cannot reliably supply customers during peak periods as there is no backup facility, meaning a fault could cause blackouts for thousands of customers. The project timeline is described in *Section 3.2.2* of Volume 1 of the Environmental Assessment. The timeline is justified in the context of maintaining the safe, secure and reliable supply of electricity to both existing and future customers. The design concept was undertaken within the timeline constraints.

46. The time provided to provide submissions is too short

Submission number: 128

The minimum time required for public exhibition of an Environmental Assessment, as prescribed in *Section 75H* of the Planning Act, is 30 days. Integral Energy elected to exhibit the Vineyard to Rouse Hill Electricity Upgrade Environmental Assessment for a period of 40 days and also accepted late submissions for another 35 days beyond the original exhibition period for parties who specifically requested more time to prepare their submissions.

47. The assessment process demonstrates the faults of the planning system in dealing with infrastructure upgrades

Submission number: 1

The statutory framework under which the proposal was assessed is detailed in *Section 2.1* of the Environmental Assessment. At the commencement of the planning and approvals process, Integral Energy determined to prepare an Environmental Impact Statement under Division 4, Part 5 of the Planning Act. Subsequent changes to the planning and assessment of major projects resulted in the proposal being considered under Part 3A of the Planning Act. The assessment process undertaken for the proposal adheres to the requirements of Part 3A of the Act.

48. Integral Energy is not required to meet the same standards of other public utilities

Submission number: 1104

The environmental impact assessment process under the Planning Act is consultative and comprehensive and Integral Energy has complied with its statutory requirements under that Act.

The Act applies equally to infrastructure projects carried out by all public authorities. Integral Energy also believes it has met its statutory obligations under all other Acts relevant to the proposal.

49. Electricity upgrades in the north west and south west growth centres should be declared critical infrastructure under Part 3A of the Planning Act

Submission number: 1

The Minister for Planning is the authority for declaration of critical infrastructure. *Section 2.1.2* of Volume 1 of the Environmental Assessment outlines the recent changes to the assessment of major projects and how this applies to the proposal. The approval being considered is a project approval under Part 3A of the Environmental Planning and Assessment Act 1979. Integral Energy has no role in the process of determining a project to be critical infrastructure.

50. Integral Energy should provide what the community demands

Submission number: 1104

Integral Energy is a statutory State-owned corporation with responsibilities (including those to the community) to undertake its business in a manner which exhibits a sense of social responsibility and to conduct its operations in compliance with the principles of ecologically sustainable development. Integral Energy believes it has discharged these responsibilities satisfactorily in this project.

51. The current EA has not considered all the strategic alternatives

Submission number: 1108

Integral Energy believes it considered all the feasible strategic alternatives for the proposal. Integral Energy announced its preferred option at a community information evening in June 2004 and in consideration of the community responses, conducted a comprehensive review of alternatives.

Two categories of strategic alternatives were considered for the proposal comprising network and non-network options. *Section 4.1* of Volume 1 of the Environmental Assessment describes the alternatives.

The development of assessment criteria and evaluation of the strategic alternatives are fully described in *Sections 4.2, 4.3* and *4.4* of Volume 1 and *Sections 4, 5* and *6* of Volume 2 of the Environmental Assessment.

52. There is no evidence of whole-of-government approach, or land use planning and coordination by the Department of Planning

Submission number: 1108

Integral Energy has been in correspondence with the Department of Planning since 1992 regarding the electricity infrastructure of the North West Sector. It is therefore inaccurate to say that no co-ordination with the Department of Planning has been undertaken. Integral Energy has participated in planning workshops with Blacktown City Council and the Department of Planning and provided detailed comments on proposed planning instruments. The liaison with government stakeholders are described in *Section 4.4.4* of Volume 1 of the Environmental Assessment.

53. The EA is biased and gives the impression there are no other reasonable alternatives to the proposal and that it is safe, sensible and acceptable and there are no negative effects

Submission numbers: 128, 118, 767-825, 1108

The Environmental Assessment presents the facts of the proposal factually, simply and concisely. This includes the environmental impacts outlined in *Sections 6* and *7* of Volume 1 of the Environmental Assessment of which some are beneficial and adverse. Volume 2 of the Environmental Assessment reviews both strategic alternatives and twelve specific project options. Strategic alternatives comprise major network and non-network development initiatives. Project options comprise different routes and configurations of support structures for the proposed infrastructure. The preferred option was chosen after a comprehensive option assessment process which took in to account impacts to the biophysical, social and economic environment. The preferred option was chosen as it provided the best balance between these impacts. Other network solutions and upgrades would have greater impacts.

54. Companies paid by Integral Energy would not be impartial when preparing the EA

Submission number: 1103

Parsons Brinckerhoff are obliged to provide impartial advice to their client and in the preparation of the Environmental Assessment. *Appendix F* of Volume 1 of the Environmental Assessment contains a declaration required under Section 112 of the *Environmental Planning and Assessment Act 1979* that the information presented is neither false or misleading.

55. All negative side effects were not identified in the Summary

Submission number: 1103

Section 4 of the Summary document is prefaced by the statement that “There would however be a number of temporary and long-term adverse effects associated with the implementation of the proposal which would be avoided if the proposal did not proceed.” The subsequent sections in the summary discuss both the positive and negative effects of the proposal.

56. Integral Energy appear to have two main objectives on their agenda; minimum cost and maximum convenience

Submission number: 1103

Integral Energy is obliged under the National Electricity Rules and the Independent Pricing and Regulatory Tribunal’s Network Determination to identify upgrade options which “minimise the net present value of the cost of meeting those standards”. Notwithstanding, the capital cost of the preferred option represents an increase of approximately 40 per cent on the initially proposed option. Integral Energy as a statutory, State owned corporation has a number of statutory obligations in the environmental impact assessment process under the *Planning Act* and under the *State Owned Corporations Act 1989*, and under the *Energy Services Corporations Act 1995*, which include, amongst other things, a need to exhibit a sense of social responsibility by having regard to the interests of the community in which it operates.

57. Little effort has been expended trying to develop creative technical and financial solutions to identified constraints

Submission number: 128

This is incorrect. Integral Energy has understood and considered the need for electrical infrastructure in the North West Sector of Sydney and developed strategic alternatives to satisfy the need. These alternatives are described in *Section 4* of Volume 1 of the Environmental Assessment.

Integral Energy informs itself of innovations through its membership of the International Council for Large Electrical Power Systems (CIGRE) and provides the Australian representative for the CIGRE international study committee on overhead line development. It also informs itself of technology innovation by its contact with product suppliers.

Integral Energy is obliged under the National Electricity Rules and the 2004 Independent Pricing and Regulatory Tribunal Network Determination to invest in assets in a prudent and efficient manner so as to minimise costs to all consumers. With this funding mechanism in place, Integral Energy has no discretion whether or not to fulfil its obligations as these are legislative requirements.

58. The EA is a waste of taxpayers money and is not reliable

Submission numbers: 767-825

Integral Energy was required to prepare the Environmental Assessment under Part 3A of the Planning Act. The Department of Planning will determine the adequacy of the Environmental Assessment, including the factual basis of the information provided.

59. The EA focuses excessively on detail, loses the big picture, is bureaucratic, legalistic and not common sense

Submission number: 128

Integral Energy has a statutory obligation under the Planning Act to prepare an Environmental Assessment in accordance with the form prescribed by the Director-General. This includes the requirements received on 20 January 2005 and all relevant matters. The proposed upgrade is needed to address an existing network deficiency that will increasingly affect the existing and future population of the North West Sector. Local and regional issues and impacts to the biophysical, social and economic environment were considered in the options assessment process and in the environmental assessment of the preferred option.

60. The size of the EA stops the public from reading through it. It is repetitive and misleading and does not treat positive and negative aspects equally

Submission numbers: 1106, 1109

A number of elements of the document were included to reduce the bulk of the Environmental Assessment and the reliance on the written word. These included the liberal use of information in graphical and tabular form. Volume 1 of the Environmental Assessment also summarises the information presented in Volumes 2 and 3. An additional standalone summary document was also prepared to aid the review by the public and Government. The Department of Planning will determine the adequacy of the Environmental Assessment including the factual basis of the information provided.

61. The exhibition of the EA over the Christmas period comes across as an attempt to hide the document from those affected

Submission number: 1106

Integral Energy volunteered to exhibit the Environmental Assessment for a period longer than required by the Planning Act between 7 November and 16 December 2005. This was undertaken specifically in view of the upcoming Christmas period to increase public accessibility to the documentation. This period of exhibition was further extended to 20 January 2006. Integral Energy also individually notified existing landholders along the

easement and distributed to them CD copies of the Environmental Assessment. The Environmental Assessment was also available on Integral Energy’s website.

62. The ability of affected community members to access the EA was limited by access to computers and is not mitigated by having copies available at local libraries. The study should have been presented at a community presentation along with presentation of a hard copy.

Submission number: 1106

The Environmental Assessment documentation was available for viewing in hard copy at the following locations:

- Integral Energy, 51 Huntingwood Drive, Huntingwood
- Riverstone Library, Upstairs Marketown, Riverstone
- Blacktown City Council, 62 Flushcombe Road, Blacktown
- Department of Planning, 23-33 Bridge Street, Sydney
- Department of Planning, 10 Valentine Avenue, Parramatta
- NSW Government Information Centre, Goodsell Building, corner Phillip and Hunter Streets, Sydney
- Nature Conservation Council, NSW Environment Centre, Level 5, 362 Kent Street, Sydney.

In addition, staff from Integral Energy and Parsons Brinckerhoff were available on Thursday evening and Saturday morning at the Riverstone library to answer questions from the public. Free copies of the EA were also made available to members of the community who called the 1800 Project Information Line and requested a copy.

Integral Energy also individually notified existing landholders along the easement and distributed to them CD copies of the Environmental Assessment. Additionally, the Environmental Assessment was made available on Integral Energy’s website for those people with access to computers.

63. Integral Energy’s ownership of the easement has limited the consideration of other options and led to a poor result for the community

Submission number: 1108

Integral Energy does not own the easement. It has a proprietary interest in the easement. Detailed strategic route corridors and twelve design configurations were considered and described in *Section 4.2* of Volume 1 of the Environmental Assessment. The existing easement was one of the strategic corridors considered.

The existence of the existing easement offers a strategic advantage over other alternative routes because it provides certainty that the upgrade can be completed in the required timeframe which achieves one of the primary objectives of the upgrade.

The proposed upgrade is needed to address an existing network deficiency that will increasingly affect the existing and future population of the North West Sector. Local and regional issues and impacts to the biophysical, social and economic environment were considered in the options assessment process and in the environmental assessment of the preferred option.

The preferred option was the better balance between social, environmental, economic and design factors.

64. A designer should consider all possible system configurations and commence design of a component only after consideration of the form and structure of the overall system

Submission number: 1108

Integral Energy has been planning for the upgrade of the North West Sector network since 1988 and has updated the plan at key intervals. The Environmental Assessment sets out a logical progression of the concept design process commencing with the need for the proposal in a total network sense and determining the objectives that the proposal should meet. *Figures 1.2 and 3.1* of Volume 1 of the Environmental Assessment demonstrate this. It then considers strategic alternatives and identifies a preferred approach to the upgrade. It subsequently reviews the features and characteristics of the study area before identifying strategic route corridors and then options involving different routes and configurations of transmission line. A wide range of information is then provided to inform decision makers on the views and key issues before a preferred option is selected.

65. Current world's best practice in Environmental Assessments provides a final table of the options, the decision criteria and weightings, and the final scores. The final decision on the form of the upgrade has been made in secret.

Submission number: 128

Integral Energy has prepared an Environmental Assessment in accordance with its obligations under the Planning Act and comprising the form and content prescribed by the Director-General. Selection of the preferred option has been undertaken based on all the information presented in *Table 4.4* of Volume 1 of the Environmental Assessment and a justification provided in *Section 4.5.2*.

66. There was no initial recognition and management of public concerns, creating delays and expense while investigating non-viable options

Submission number: 1

In recognition of the strength of public opinion when Integral Energy's original proposal was announced, Integral Energy took the time to conduct comprehensive technical studies and consultation on a wide range of options.

A comprehensive and extensive community consultation and involvement process was subsequently implemented to ensure that community issues, concerns, values and expectations were considered during evaluation of options. This is outlined in *Section*

2.3 of Volume 1 of the Environmental Assessment. The alternatives considered for the proposal were developed while taking into consideration the technical requirements of the project, available routes and impacts to the biophysical, social and economic environment.

67. The project should not proceed if it is intended to relocate the transmission line in the near future

Submission numbers: 118, 130

Integral Energy has no plans to relocate the transmission line in the future. The statement made on p7-2 of Volume 1 of the Environmental Assessment is that “the proposal would provide the opportunity for potential relocation of the infrastructure in the future if required”. This could only be undertaken if a number of existing issues outside Integral Energy’s control could be overcome. Based on past experience, the most feasible scenario for a future relocation of the proposal would be when the area is being extensively redeveloped for release. At this time, developers would make a commercial decision whether the cost of relocation or undergrounding of the line would likely be offset by the sale of future lots. The transaction also becomes much simpler because of the negotiations are only with one party.

68. The EA lacks a full discussion of funding mechanisms or alternative arrangements that could help meet the cost of undergrounding the project

Submission numbers: 128, 130

It is not the place for the Environmental Assessment to contain a discussion of alternative funding mechanisms when there is already a funding mechanism in place for the industry. Integral Energy has no discretion whether or not to fulfil its obligations under the National Electricity Rules and the Independent Pricing and Regulatory Tribunal’s Network Determination as these are legislative requirements.

69. The number of affected properties post 2007 should be taken into account when choosing the preferred option as there will be significantly more properties affected by the transmission line at this time.

Submission number: 130

The number of lots affected in 2004 and 2007 was one criteria among a number of others used to form a view of the likely differences in options performance. There is difficulty in predicting the number of lots post 2007 unless information is made available from the Department of Planning on the average lot yield expected in each area and the timing of each development. To draw valid comparisons between the options, information on expected lot yields would have to address a number of different release areas which represent conditions along all of the alternative routes. Despite liaison with the Department of Planning on a number of occasions during the conduct of the Environmental Assessment, such detailed information is not currently available.

Decisions on planning matters are the responsibility of the relevant planning authority.

70. The EA fails to adequately measure the economic impacts of the proposal in relation to the loss of development and property market values

Submission number: 130

The study of social and environmental externalities (refer to *Appendix E* of Volume 1 of the Environmental Assessment) was conducted by a firm who provide specialist independent property advice. The valuation of externalities is a complex issue however we believe the approach adopted is valid and the results accurate. A key factor in the results of the study is that there is already an existing transmission line in place. Therefore, the perceived impact on property prices identified to result from the proposal reflects the marginal impact i.e. on top of that which exists already.

Examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicate that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity to them. These examples do not support the contention that development of electricity infrastructure necessarily results in a loss of development outside of the easement. This would be particularly the case where there is an existing transmission line in place and therefore an existing impact.

71. There is no evidence in the EA that Integral Energy considered the wishes of the community

Submission number: 128

Integral Energy has listened and responded to the key issues raised by the community. Details of community consultation are outlined in *Section 2.9* of Volume 1 of the Environmental Assessment. Additionally, the results of community influence over the project are listed on p1-8 of Volume 2 of the Environmental Assessment which demonstrates the direct responses made by Integral Energy in relation to these key issues. As a direct result of engaging with the community on issues of concern, Integral Energy decided to depart from the initially preferred option in favour of one which better balances social, environmental, economic and design factors.

Wherever possible Integral Energy believe it has responded to the community's key issues whilst acknowledging the sometimes competing nature of environmental impacts and recognising that overall, a balance needs to be made across a range of issues in order to progress the development. Integral Energy has used a variety of means and enlisted the support of a range of stakeholders to assist it in this process.

72. The financial and economic assessment does not consider the “serious problems which could arise which could only be remedied at great cost” quoted by Sir Harry Gibbs if future EMF research establishes a real risk to human health.

Submission number: 1101

The Energy Supply Association of Australia and Integral Energy for many years has adopted the application of “prudent avoidance” as proposed by Sir Harry Gibbs as a policy. However, it should be noted that there has been a large volume of research and many other inquiries in the 15 years since the Gibbs inquiry. Yet, despite this, a “real risk to health” has not been established.

Integral Energy considers that in circumstances where the risk of future health problems is unable to be quantified, the costs associated with any such problems are similarly unable to be quantified. Any costs attributed would be arbitrary and without foundation.

Integral Energy has successfully applied prudent avoidance to the proposal resulting in a substantial reduction in EMF fields relative to the existing situation, as described in *Section 6* of this report.

73. There is a lack of analysis of the loss in property values as a result of the proposal and discussion of compensation and the application of the Just Terms Compensation Act.

Submission number: 128

Impacts on property values were investigated and reported on p7-6 of Volume 1 of the Environmental Assessment. A separate study is attached in *Appendix E* of Volume 2 of the Environmental Assessment. The Just Terms Compensation Act is mentioned on p5-1 of Volume 1 of the Environmental Assessment and applies where an interest in land is acquired by the proponent. Since no interests in land are proposed to be acquired, there are no rights to compensation arising from the proposal.

74. There is a lack of discussion on social equity principles in relation to funding of capital works for community infrastructure.

Submission number: 128

The Independent Pricing and Regulatory Tribunal determines the funding of capital works for monopoly businesses such as Integral Energy. The Independent Pricing and Regulatory Tribunal chooses a return by balancing the interests of consumers and Integral Energy, guided by the Capital Asset Pricing Model. The Independent Pricing and Regulatory Tribunal only allows returns on investments it deems to be prudent.

75. The proposal should be considered a new line and not an upgrade

Submission number: 1104

The proposal involves the replacement of an existing single circuit 132 kV transmission line of 84 MVA capacity with a two single circuit 132 kV transmission line of 500 MVA capacity. In the planning context, it is a new line because a fresh approval is being

sought. However, as the proposal involves the replacement of an existing transmission line in an existing easement with one of a higher capacity, it is also considered in a practical sense to be an upgrade.

76. The size of the Summary document demonstrates that there is little substance to the EA

Submission number: 1104

The Summary was created to provide a brief overview of the Environmental Assessment, to inform people who would not consider reading the complete report.

77. The cover of the EA is not representative of the proposal

Submission number: 1104

The cover photo of the Environmental Assessment was taken from above the existing easement near the intersection of Riverstone Road and Clarke Street looking south. It is considered to be representative of the study area.

78. The EA seems to have been designed to attract as few submissions as possible

79. Integral Energy's publicity and the Summary both fail to mention the dangers identified in the body of the document

80. Integral should have produced a short, readable summary which gave the positives and negatives of the new line, including copies of the before and after pictures. A model of the landscape showing the area and the difference between the existing line and the upgrade should have been placed on display throughout the North West

Submission number: 1110

The purpose of the Summary document is to provide an overview of the project. The foreword of the summary states 'For a more complete understanding of the proposal, its benefits and potential environmental impacts, reference should be made to Volume 1 of the Environmental Assessment and the Technical Papers contained in Volumes 2 and 3 of the same document'.

Figure 5.2 on pS-13 of the Summary shows the existing and proposed (i.e. before and after) view from Pole location 42.

Section 4 of the summary discusses environmental effects including "temporary and long-term adverse effects...which would be avoided if the proposal was not implemented". Effects on the biophysical environment and effects on the community are discussed in detail in *Sections 6* and *7* of Volume 1 of the Environmental Assessment. Due to the nature of the upgrading of existing infrastructure, in some cases there is little change anticipated for a number of issues.

Figures 7.2a-c on p7-5 of Volume 1 of the Environmental Assessment provides computer enhanced images of the existing infrastructure and that proposed by the upgrade. It

was not considered necessary to additionally construct a physical model which could not show the same level of details contained in the figures.

81. The EA does not state that the additional height of 5 metres equates to a 30 per cent increase

Submission number: 1109

The Environmental Assessment stated that the poles would be on average 5 metres taller than the existing 17 metre poles. Additionally, *Figure 4.7* in Volume 1 of the Environmental Assessment shows the relative heights of the structures proposed. This is considered to be a simple statement and does not require expression in another form.

82. Several figures in the EA that were printed in black and white were difficult to read and interpret

Submission number: 1109

The appendices of the printed copies of the Environmental Assessment were printed in black and white. However, electronic copies of the report were available in colour. Several of the figures used in the Technical Paper 8 were reproduced in colour in the main report, such as *Figure 4.16* in Volume 1 and *Figure 5.7* in Volume 2 of the Environmental Assessment.

83. Alternative locations for the display of the EA were suggested to improve public access to the documents

Submissions number: 1107

The Environmental Assessment was displayed in a number of public locations which included Blacktown City Council main offices, the NSW Government Information Centre, the Nature Conservation Council's offices and two locations of the Department of Planning. Additionally, the Environmental Assessment was available on the websites of Integral Energy and the Department of Planning and free copies of the full report were posted to interested parties on request.

Integral Energy chose to exhibit the Environmental Assessment at the local library so that members from the public could review the documents in a private and quiet environment. Additionally, if the public wished to take photocopies of particular pages facilities were available at library.

84. There is insufficient discussion within the EA on safety, which is a key aspect.

Submission number: 1106

Both construction safety and safety during operation were considered as part of the options assessment and are discussed in relevant sections. Operational safety was considered to include bushfires, vehicular collisions and accidental electrocution. Safety was also investigated as an issue in *Appendix E* of Volume 2 of the Environmental Assessment. Potential health effects could also be considered to relate to human safety and is discussed in all volumes of the Environmental Assessment.

85. There may have been inadequate knowledge and understanding of the impact of EMF on property values when impacts of the proposal were assessed

86. An EMF risk would be created in an area which will soon house thousands of new residents

Submission number: 1108

Table 5.2 on p36 of *Appendix E* of Volume 2 of the Environmental Assessment indicates that 100 per cent of property professionals identified possible health concerns as an adverse effect of transmission line infrastructure on property values. The same report also makes the point that regardless of any rationale or factual basis, it is the public's perceptions that drive changes in property prices. Therefore we do not agree that property price reductions would necessarily be greater if the survey group had greater specific knowledge of the issue.

The same report indicates that developers use mitigating tactics in order to sell blocks in close proximity to transmission lines. This may include a combination of lower prices and larger land areas for example.

87. Figure 1.1 of the EA is misleading. It suggests that the new line is an upgrade of one section of a continuous linear system that continues into the city

Submission number: 1108

Figure 1.1 on p1-2 of Volume 1 of the Environmental Assessment shows only the 132kV transmission network for clarity and identifies the scope of the proposal. The proposal involves an increase in capacity and an additional circuit necessary to provide additional reliability of supply. The increase in capacity is delivered by removing the existing line and constructing a new line. The purpose of the upgrade is to provide a high capacity, high security link to the new Rouse Hill Switching Station. A future project would also provide an increased capacity and reliability between the switching station and Parklea zone substation.

88. The proposed upgrade is not necessary as power demand transfer in an east-west direction from the Schofields Road site could be achieved by the Marsden Park zone substation to be built in the future

Submission number: 1108

There is an immediate need to provide security of supply to existing customers fed with power from the Parklea and West Castle Hill zone substations which in turn are supplied via Feeder 9JA from Vineyard bulk supply point. This is the reason that higher capacity circuits need to be built between Vineyard bulk supply point and Parklea zone substation. The future development in the north-west sector will also require power to be provided in an east-west direction from the future Rouse Hill Switching station site however this is in addition to the above requirement.

89. The EA only considers the cost of one component, while the EA shows there is a need to upgrade the total system

Submission number: 1108

The upgrade of Feeder 9JA between Vineyard bulk supply point and Schofield Road is the only section of the network proposed to be upgraded in this project and for which planning approval is being sought. Other network upgrades are being planned by Integral Energy in consultation with the Department of Planning. Integral Energy's Annual Planning Reports and five yearly Independent Pricing and Regulatory Tribunal submissions identify the additional network components proposed to be upgraded and the likely costs involved.

4.2.3 Planning

90. Overhead transmission lines should not be located in residential areas, particularly ones where there is projected high density development.

Submission numbers: 2, 5, 6, 8, 9, 10, 11, 18, 110, 118, 353-408, 548-604, 605-627, 711-712, 937-945, 946-948

Experience shows that it is extremely difficult to avoid the co-existence of people and electricity infrastructure. Examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicates that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity.

The preferred option will utilise an existing easement and will replace an electricity line that has been in existence since 1952. The planning of the North West Sector area is the responsibility of the State and Local Governments. Since 1998, Integral Energy has consistently advised the planning authorities of the electrical asset needs of the area. The urban planning of the area has thus been conducted with the clear acceptance that the existing easement would remain in place. Liaison between Integral Energy and the Department of Planning has been ongoing and has ensured that Integral Energy's estimates of population and timing of development are consistent with those of the Department of Planning.

91. Why should the factory areas get cables put underground when people spend more time in their homes?

Submission number: 126

The proposal outlined in the Environmental Assessment is for an overhead transmission line and no sections of alignment are proposed to be underground.

Integral Energy's policy is to place all low voltage and 11kV electricity lines underground in new commercial and residential subdivisions. Higher voltages, such as 132kV lines, may also be placed underground depending on the individual circumstances of the development. Normally, this is conducted at the discretion and cost of a developer. Integral Energy has a policy on the undergrounding of transmission lines. The particular

conditions associated with this proposal are contained on p4-14 of Volume 1 of the Environmental Assessment which are consistent with this policy.

92.Future development of overhead powerlines in the North West sector, as shown in Figure 1.2 may degrade the whole sector

Submission number: 1110

The section of Feeder 9JA to be upgraded as part of this proposal is shown in *Figure 1.1* of Volume 1 of the Environmental Assessment. The proposed upgrade would replace an overhead transmission line between Vineyard bulk supply point and the site of the future switching station at Rouse Hill. The preferred option being an overhead transmission line represents a balance between the environmental, economic, social and design factors of the proposal.

The conceptual network strategy, shown in *Figure 1.2* of Volume 1 of the Environmental Assessment, is a concept only and does not represent a commitment by Integral Energy to particular lines, routes or construction types. These types of decisions will be taken at a future point in time as a result of the actual timing and pattern of development and in accordance with the specifics of each situation.

93.The proposal is located in an area that is subject to future population growth and urban development

94.Integral Energy should coordinate the electricity transmission reticulation scheme with the Growth Centres structure plan

Submission numbers: 1108, 1110

It is normally the case that urban development would follow the implementation of electricity infrastructure. The preferred option will utilise an existing easement and will replace an electricity transmission line that has been in existence since 1952. The planning of the North West Sector is the responsibility of State and Local Governments planning authorities. Since 1998, Integral Energy has consistently advised the planning authorities of the electrical asset needs of the area. The future urban planning of the area has thus been conducted with the clear acceptance that the existing easement would remain in place.

It is extremely difficult to avoid the co-existence of people and electricity infrastructure. Examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicates that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity.

Liaison between Integral Energy and the Department of Planning has been ongoing and has ensured that Integral Energy's estimates of population and timing of development are consistent with those of the Department of Planning.

95. Integral Energy is not adopting the planning principle of co-locating utilities in pre-defined corridors

96. There is no necessity for a switching station to be located at the corner of Schofields Road and Cudgegong Road

97. There is one major floodable area (surrounding Eastern Creek) that bisects the overall development area, this could, quite readily, be used as a north-south power transmission corridor.

98. The minor flood prone area that surrounds First Ponds Creek could, in principle, be used as a north-south power transmission corridor.

99. There is no necessity for feeder 9JA to be kept on the same alignment as the existing powerlines since the reticulation lines will in all probability be put underground when they hit Second Ponds Creek Development Area.

100. The North West rail link could provide a co-location possibility for the North-South electricity power link

Submission number: 1108, 1109, 1110

It is not correct to state that Integral Energy did not adopt the principle of co-locating utilities in a defined corridor.

The potential location of the transmission line along Eastern Creek was considered in Options G and K.

An alignment along First Ponds Creek was not specifically considered in the Environmental Assessment. *Figure 4.5* of Volume 1 of the Environmental Assessment indicates the strategic route corridors investigated which link the two project end points. A potential alignment along First Ponds Creek would potentially cross three of these corridors and would be less direct. A potential alignment along First Ponds Creek would also result in new impacts on properties on which there are currently no easements, the poles would need to be 30 metres high to account for flooding issues and would need to be located along both Windsor and Schofields Roads in order to route back to the future site of the Rouse Hill Switching Station. Discussions with the Roads and Traffic Authority have confirmed that the project is not able to be co-located along Windsor Road for the reasons set out in p4-14 of Volume 1 of the Environmental Assessment.

The existence of the existing easement offers a strategic advantage over other alternative routes because it provides certainty that the upgrade can be completed in the required timeframe which achieves one of the primary objectives of the upgrade.

Studies are currently ongoing to determine a preferred route for the North West Rail Link but it is understood that the section of alignment north of Rouse Hill which would pass through the study area has been deferred for future consideration.

The significance of the switching station location is that it represents the future “centre of load” of the North West Sector. If the switching station were relocated, it would mean that the length of all future connections to the switching station would be longer and that the capital costs of these future projects would increase as a result.

101. The proposal will limit the potential for co-location of services, which would result in less fragmentation and a more efficient and economic use of land

102. The proposal is contrary to the objects of the Planning Act relating to the 'promotion and co-ordination of the orderly and economic use and development of land' and the State Governments objectives in relation to 'Investigation Zones' which is 'to protect, and prevent the fragmentation and inappropriate development of land that may have potential for future development'

Submission number: 130

The reasons why the proposal would result in fewer opportunities for future co-location of utilities is unclear. The existing transmission line easement has been in existence since 1952 and Integral Energy has continued to advise the Department of Planning of the presence of the electrical infrastructure. The current structure planning exercise undertaken by the Department of Planning is strategic in nature and does not involve investigation of the detail of particular easements in the future areas of which there are several in the study area. Integral Energy understands that the majority of future services and utilities are currently undergoing planning and have yet to be completed. The next detailed step in the planning of the North West Sector is the point at which the detail of all existing land use constraints will be considered by developers and it is possible that developers may approach Integral Energy at that time to discuss better land use efficiency which might involve a relocation of the existing transmission line or undergrounding. This process may also realise opportunities for utility co-location that currently have not been identified.

The principle of co-location of services and utilities may potentially result in more efficient land use and development outcomes however there are practical reasons why a high degree of utility co-location may be difficult to achieve in practice. Utilities often have very different siting and operational requirements which do not easily facilitate co-location eg gravity sewerage needs to flow downhill, transmission lines seek direct routes, railways have limitations on horizontal curvature and vertical grades, roads should ideally be separated from power poles for safety reasons, etc. As the proposal would use an existing transmission line corridor for the upgrade, we do not believe there would be any change to the opportunities for co-location relative to the present situation.

The implementation of the proposal is fundamental to achieving the future development announced by the NSW Government. Integral Energy therefore believe that the upgrade achieves the primary project objective in relation to providing for the orderly and economic development of land in accordance with the Planning Act. The proposal also fulfils another object of the Planning Act which is to 'encourage the protection, provision and co-ordination of communication and utility services'.

103. Why would it be necessary to relocate the infrastructure in future if, as the EA states, the proposal is the most sensible option for the North West sector.

104. Isn't relocation in future just a wasted cost, especially when the preferred option was chosen based on cost.

Submission number: 110

Integral Energy has no plans to relocate the transmission line in the future. Integral Energy however acknowledges that the question of future land use efficiency is an important one for a number of stakeholders and suggests that the proposal would provide the flexibility for a future relocation of the line in the future if required. This could only be undertaken if a number of existing issues could be overcome. Based on past experience, the most feasible scenario for a future relocation would be when the area is being extensively redeveloped for release. At this time, developers would make a commercial decision whether the cost of relocation or undergrounding of the line would likely be offset by the sale of future lots.

105. There is no mention of widening of the easement or compensation for radiation which would make the proposal less favourable than other options

Submission numbers: 119, 1108

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

The Environmental Assessment makes several statements concerning the inconclusive nature of the body of health studies conducted relating to EMF and health effects.

Easements are established to control development so as to maintain electrical safety clearances and to allow access for routine and emergency works. Therefore it is not Integral Energy's or current industry practice to adopt an easement width based on EMF field levels at the edge of the easement. There is also therefore no agreed safe exposure level.

Integral Energy has taken steps to ensure that the EMF levels emitted by the proposal are as low as reasonably possible. Estimated costs for easement acquisitions and compensation payable to landowners was included as a cost category in the project capital cost as outlined on p4-48 of Volume 1 of the Environmental Assessment. The compensation for an acquisition of an easement right over property is not necessarily related to keeping EMF as low as possible. Widening of the easement is not to suggest that a particular width of easement (including the existing easement) authorises a certain level of EMF and that a different type of easement would need to be acquired if there is any increase in EMF.

106. Integral Energy failed to budget for the development of the proposal

Submission numbers: 1, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 39, 113, 118

Sufficient prudent funding for this project was included in the most recent Independent Pricing and Regulatory Tribunal determination in 2004.

107. The proposal is based on superseded land use planning and therefore will freeze more land and affect more future residents

108. If the easement was released then Integral Energy could recoup much of the cost of the upgrade by selling the land to developers.

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 78, 110, 118, 119

The Environmental Assessment presented information on the structure planning process for the North West Sector which was current at the time of the document preparation. The development of the Sydney Metropolitan Strategy was prepared with knowledge of the existing constraints of the area. The type and density of future development on land surrounding the existing easement is the responsibility of the relevant planning authority and consideration should be given to the appropriate use of land at these locations during the planning stage of the development. The structure planning exercise is strategic in nature and presents the aims and framework of future development rather than a blueprint which will be implemented on the ground. More detailed planning work will be undertaken during a subsequent planning exercise conducted by developers which will articulate how these aims will be achieved.

While Integral Energy has a right to use the land on which the easement traverses, they do not own the land and as such, could not compel landowners to pay consideration for the extinguishment of the easement. The conditions under which Integral Energy would extinguish the easement are discussed on p4-14 of Volume 1 of the Environmental Assessment.

109. The land around the easement won't be able to be developed due to 'Prudent avoidance' thus wasting more valuable land, including areas near existing public transport.

Submission numbers: 13, 14, 15, 16, 17, 24, 29, 1104

Integral Energy does not agree that land along the existing easement will be unable to be developed. Examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicates that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity.

Integral Energy has complied with the principles of prudent avoidance (refer to *Section 7.1.4* of Volume 1 of the Environmental Assessment) and has selected a preferred option that balances the social, environmental, economic and design factors.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the

edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005/06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

Matters regarding planning issues are for planning authorities to resolve. The impact of the project on development is a matter for the Department of Planning.

110. The land in the vicinity of the proposal is zoned ‘urban capable’, rather than ‘landscape and rural lifestyle’ as it was when the proposal was written. This will make the land more valuable which will lead to compensation claims against Integral Energy.

Submission numbers: 24, 39

Figure 5.5 of Volume 2 of the Environmental Assessment shows the landscape and rural lifestyle zone that was current at the time of the document preparation. Revised maps were released in January 2006 following exhibition of the Environmental Assessment.

The estimate of social and environmental externalities in *Appendix E* of Volume 2 of the Environmental Assessment was strategic in nature and assumed all development within various offsets from the proposal was available for development. The removal of the landscape and rural lifestyle zone has no effect on the estimates conducted.

The right to compensation for land resumption only occurs when an interest in land is acquired. As no interest in land is being proposed to be acquired, no compensation is payable.

The Environmental Assessment indicates that the estimated reduction in property values will be temporary and diminish with time. This is because of the broader appreciation in property values which would result from development of the North West Sector made possible in part by the provision of secure and reliable supplies of electricity.

111. The proposal will exclude land from residential development

Submission numbers: 409-547

Matters regarding planning issues are for planning authorities to resolve. However, examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicates that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity to the infrastructure.

112. Floodplains should be used for the upgrade and any future additions to the power grid

Submission numbers: 111, 1108

The option of utilising the Eastern Creek floodplain was considered in the Environmental Assessment as represented by Options G and K. The flood prone lands along Eastern Creek are also owned by a private landholder. Integral Energy's preferred option is based on a balance between environmental, economic, social and design factors.

113. Legal opinion says that the upgrade is illegal.

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 1111, 1112, 1113

Integral Energy has satisfied itself of the legality of the use of the easement for the proposal.

114. There are concerns about the legality of converting an easement created for State Rail in 1952 into an easement for high voltage power transmission lines.

Submission numbers: 113, 118, 119, 128, 1111, 1112, 1113

Integral Energy has satisfied itself that the proposal is consistent with the terms of the proprietary rights which Integral Energy holds over the easement.

115. Compensation should be available for landholders who bought land subject to an easement for rail development, which is now an electricity easement

Submission number: 24

Integral Energy has satisfied itself of the legality of the use of the easement for the proposal. As compensation was payable to the original landowners upon acquisition of the easement and all current landowners have purchased their properties in the knowledge that the easement was in place, it is not considered there is a requirement to pay further compensation because there is no further acquisition contemplated by reason of the proposal.

116. Planning figures would provide sufficient time for a temporary solution, allowing for better options to be developed

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17

Part of the justification for the urgent nature of the proposal is based upon existing electrical supply risks associated with thousands of existing customers. Integral Energy demand forecasts shown in *Figure 3.3* of Volume 1 of the Environmental Assessment indicate that the upgrade is needed prior to December 2008 at which time no further connections will be able to be made to meet ongoing urban consolidation and development in other areas.

The form of the proposal provides for future flexibility should relocation wish to be pursued by a third party, however Integral Energy does not wish to speculate on issues which may or may not be able to be resolved in the future.

117. The proposal is not compatible with innovative urban planning

Submission number: 111

A safe, secure and reliable supply of electricity is required for the short-term and long term development of the North West Sector. The planning of the North West Sector is being undertaken by the Department of Planning in conjunction with the Growth Centres Commission and developers. Unfortunately the level of detail of the current structure plans does not consider details such as the co-location of utilities or the relocation of existing easements to maximise future development, however when these issues are investigated in detail in future planning stages, future opportunities to achieve this outcomes may be identified.

118. The proposed development in the future makes living adjacent to the powerlines undesirable

Submission numbers: 767-825

The decision on whether to live near electricity infrastructure is a personal choice and is a matter for consideration between the buyer and seller during the property transaction process. Often developers provide offsets against the perceived social and environmental impacts of electricity infrastructure for example by making larger lots or dwellings. For some, the opportunity of not having neighbours along their back fence may also be attractive. There are a range of reasons different people may or may not choose to live near electricity infrastructure. The decision of whether or not to release land adjacent to the easement will be made by the relevant planning authorities.

119. Rates should not be payable on land that has no use due to overhead power lines

120. Large slices of land will be unsaleable and will affect future development in the area

Submission number: 1084

Easement land is not owned by Integral Energy. Private landholders were compensated at the time of easement acquisition for restrictions on land use that would result from the establishment of the easement. The current restrictions on land use within the easement would not change as a result of the proposal.

There is no evidence that land will be unsaleable due to the development of the proposal. In fact, examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicate that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity to the infrastructure. The Environmental Assessment acknowledges that the duration of sales may be longer for properties adjacent to transmission lines.

The development of the Sydney Metropolitan Strategy was prepared with knowledge of the existing constraints of the area. The type and density of future development on land surrounding the easement is the responsibility of the relevant planning authority and future developers.

121. The proposal will adversely affect the future urban development of 220 properties in the Riverstone Release Area. In particular, the scheduled lands where redevelopment proposals have stalled for over half a century.

Submission number: 130

Integral Energy is not responsible for the urban planning nor the legislative difficulties that have prevented the development in the scheduled lands. These responsibilities lie with Blacktown City Council and the Department of Planning.

Integral Energy's understanding is that the difficulties associated with the redevelopment of the Vineyard and Riverstone scheduled lands are not solely related to the existing electricity easement and include: the legislative processes previously adopted, the large number of disparate landowners, the size of some blocks (some as small as 100 square metres) and other land use constraints including a 65 metre easement in favour of TransGrid.

Integral Energy's proposal would utilise an existing electricity easement which has been in place since 1952. Conversely, the planning of the Riverstone and Riverstone East precincts has been undertaken only relatively recently. The future planning of these precincts was therefore undertaken in the clear knowledge that the easement would remain in place.

122. Planning of Riverstone and Riverstone East precincts will be adversely affected by the proposal

Submission numbers: 5, 6, 8, 9, 10, 11, 18

Conversely, Integral Energy's proposal would utilise an existing electricity easement which has been in place since 1952. The planning of the Riverstone and Riverstone East precincts has been undertaken only relatively recently. The future planning of these precincts was therefore undertaken in the clear knowledge that the easement would remain in place. Since the proposal would utilise the existing easement in its entirety, it is not correct to claim that the proposal will result in an adverse effect on the planning of these precincts.

As indicated on p7-2 of Volume 1 of the Environmental Assessment, the proposal provides the flexibility for future relocation if desired and therefore there remain opportunities for a better outcomes to be achieved in the future subject to existing insurmountable issues being overcome.

123. Planning for development in the Sydney Basin should be done so that it does not impact negatively on people

Submission numbers: 124, 1084

The preferred option was chosen after a number of strategic alternatives and project options were considered. The fact that the line already exists is a powerful consideration in determining the location of the project. The project objectives identified were used to derive a comprehensive range of environmental, social, economic and design criteria against which performance of the different options were measured. A comprehensive and extensive community consultation and involvement process was implemented to ensure that community issues, concerns, values and expectations were considered during the evaluation of options. The preferred option represents a balance between the often competing interests between social, environmental and economic and design factors.

124. A final decision on the proposal should be deferred until the Metro Planning Strategy is released

Submission number: 118

The need for electrical infrastructure in the North West Sector is not influenced by the release of the strategic Sydney Metropolitan Strategy. The Sydney Metropolitan Strategy was released on 5 December 2005. *Section 3* of Volume 1 of the Environmental Assessment describes in detail the need for the proposal in the North West Sector. To wait for any further decision on the draft structure plan of the North West Sector will put at risk secure and reliable electricity supplies for thousands of existing customers.

125. Lack of planning has resulted in the proposal having to be rushed

Submission numbers: 1, 5, 6, 8, 9, 10, 13, 14, 15, 16, 17, 39, 113, 118

Planning for the upgrade began in 1988, with Integral Energy commencing preparation of the Environmental Assessment in November 2003. *Section 3* of Volume 1 of the Environmental Assessment states that the upgrade is required to be completed by mid 2008 as Integral Energy would, in that absence of the project, be unable to supply any new customers beyond this time. Also, the transmission line's current capacity cannot reliably supply customers during peak periods and there is no backup facility, meaning a fault would cause blackouts for thousands of customers. The project timeline is described in *Section 3.2.2* of Volume 1 of the Environmental Assessment. The timeline is justified in the context of maintaining the safe, secure and reliable supply of electricity to both existing and future customers. The design concept was undertaken within the timeline constraints.

126. Zone plans are not correct

Submission number: 1109

Figure 2.2 in Volume 1 of the Environmental Assessment displays the current zoning of land in the study area under the Blacktown Local Environmental Plan 1988. Other plans which are either in draft or in force are discussed on p2-4 of Volume 1 of the

Environmental Assessment but none supersede the Blacktown 1988 Local Environmental Plan 1988 at the present time.

127. Integral Energy should plan in the long term and use the Metro strategy

Submission number: 1103

The structure plan released for the North West Sector is of a strategic nature and identifies the aims of future development. It considers none of the details or the constraints upon the existing land which will be the subject of detailed investigations in a subsequent planning process. It does not identify service corridors.

Integral Energy has been in discussion with the Department of Planning since 1992 on the planning for the North West Sector. The proposal is entirely consistent with the Sydney Metropolitan Strategy in that it would facilitate the future urban development proposals and being located entirely within an existing transmission line easement would not result in adverse effects on existing planning or land uses.

128. Integral Energy should consult with the Department of Planning to identify service corridors consistent with the proposed North West Growth Centre Structure Plan

Submission number: 130

Integral Energy has been in discussion with the Department of Planning since 1992 on the future planning of the North West Sector. The proposal is entirely consistent with the strategy in that it would facilitate the future urban development proposals. The proposal is located entirely within an existing easement corridor and would not result in adverse effects on existing planning or land uses.

The Sydney Metropolitan Strategy is a strategic plan of the NSW State Government to facilitate the orderly growth of Sydney. Specific to the proposal is the North West Sector of Sydney and the Sydney Metropolitan Strategy provides infrastructure to enable development.

129. Unrealised urban development projections and other power infrastructure developments result in the proposed upgrade not being required immediately, allowing more time to develop a better option

Submission number: 1110

Integral Energy has determined that the need to upgrade the existing transmission infrastructure is imminent. Secure and reliable electricity supplies to thousands of existing customers are currently at risk and beyond December 2008, no new connections will be possible without the upgrade. The proposed new substation at Bella Vista will provide an element of temporary relief until December 2008, although it will not resolve a substantial proportion of the load at risk and therefore it is not prudent to delay the upgrade.

130. The clearance of vegetation as a result of the proposal is contrary to the Metro strategy.

131. The proximity of bushland, housing and the powerline creates a dangerous bushfire hazard

Submission numbers: 1109, 1110

The existing easement has been cleared only to a width of about 20-25 metres because this is all that is required to meet safety clearances under the Electricity Supply Regulation. The changes resulting from the upgrade will require the full 30 metre easement width to be cleared to ensure reliable and secure supplies of electricity to be delivered in accordance with the same regulation. The proposed clearance of this vegetation is not inconsistent with the Sydney Metropolitan Strategy and the proposed impacts of future development in the area.

Figure 4.17 in Volume 1 of the Environmental Assessment shows the location and extent of Category 1 vegetation considered prone to bushfire. Integral Energy has also developed a Bushfire Management Plan (refer p7-16 of Volume 1 of the Environmental Assessment) which is administered for all network assets to minimise the risk of bushfires and to ensure infrastructure and the supply of electricity are safeguarded during bushfire events.

132. The proposal cannot be considered as taking a new approach to planning

Submission number: 111

The planning of the North West Sector is the responsibility of the State and Local Governments. The proposal is a necessary infrastructure upgrade, required to enable development of the North West Sector. The long and short term planning strategies for the area are detailed in the NSW Government's 2004 Sydney Metropolitan Strategy. Consideration to this planning strategy is given in *Section 7.1.1* of Volume 1 of the Environmental Assessment. The proposal has been assessed in accordance with the statutory requirements set out in the Planning Act.

133. The proposal has been developed without world's best practice, in relation to urban planning and standards for EMF

Submission number: 1110

The standards for, and planning of the North West Sector is the responsibility of the relevant planning authority. Integral Energy has a responsibility under the Planning Act to assess the matters prescribed in the legislation and identified by the Director-General in their Environmental Assessment which they have done. Integral Energy has also met other relevant industry standards and guidelines and statutory obligations in developing the proposal.

In relation to EMF, there is no substantial evidence of a casual link between EMF and health effects on humans. Given the scientific uncertainty, it appears there is consensus that a cautionary policy be adopted. In an Australian context this is referred to as prudent avoidance. The two main principles of prudent avoidance are that measures

should be taken to avoid possible risks, which are of 'modest cost' and 'without undue inconvenience'.

The Environmental Assessment has drawn on the relevant EMF health guideline being that promulgated by the Australian National Health and Medical Research Council. While the guidelines are dated and have been rescinded, the limits they adopted are the same limits adopted by the International Commission on Non-Ionising Radiation Protection Agency (ICNIRP). These standards have been reviewed several times since original publication and have not changed. They are also consistent with the UK and European countries. The standards in the US are even less stringent.

Following consideration of the submissions for the Environmental Assessment, Integral Energy has reviewed its design for the proposal and this process has allowed Integral Energy to achieve a magnetic field strength at the edge of the easement, for the life of the proposal, matching the existing magnetic field conditions. There are three exceptions, which are described below.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005/06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

134. The project should not be assessed under Part 3A of the Planning Act.

Submission numbers: 1111, 1112, 1113

The project is properly characterised as being development permissible without consent by reason of State Environmental Planning Policy No 4 – Development Without Consent and Miscellaneous Exempt and Complying Development. The effect of this environmental planning instrument is that certain projects such as the current project, which would otherwise require development consent (in this case, the project is permissible with consent under *Blacktown Local Environment Plan 1988*), are permissible without consent. This has the effect of ensuring that Part 5 of the Planning Act applies. Given that Integral determined that the project is likely to significantly affect the environment, it is a project which would require the preparation of the environment impact statement under Part 5. However, by reason of a Ministerial order dated 29 July 2005, projects which would (but for the commencement of Part 3A) require the preparation of an environmental impact statement to be assessed under Part 5, would be assessed under Part 3A. Accordingly, the project is properly assessed under Part 3A of the Planning Act. Further, since the proposal involves the demolition of the existing line and the construction and operation of a new line, Integral is seeking a fresh approval. The project is permissible, it is not prohibited. In these circumstances, the planning concept of 'existing use' does not apply.

135. The existing transmission line is unlawful in that it required development consent which may not have been obtained

Submission numbers: 1111, 1112, 1113

Integral Energy has satisfied itself that the existing transmission line has been lawfully erected and used.

136. Permissibility of the proposal to be considered under Part 3A of the EP&A Act is questioned.

Submission numbers: 1111 and 1113

The proposal is properly characterised as being development permissible without consent by reason of the action of State Environmental Planning Policy No 4-Development Without Consent and Miscellaneous Exempt and Complying Development. The effect of this environmental planning instrument is that projects such as the current proposal, which would otherwise require development consent, are permissible without consent. This has the effect of ensuring that Part 5 of the Environmental Planning and Assessment Act 1979 (the Planning Act) applies. Given that Integral Energy determined that the proposal is likely to significantly affect the environment, it is a project, which would require the preparation of the environmental Impact statement under Part 5. However, by reason of Ministerial order dated 29 July 2005, a project which would (but for the commencement of Part 3A) require the preparation of an environmental impact statement to be assessed under Part 5, would be assessed under Part 3A. Accordingly the proposal is properly assessed under Part 3A of the Planning Act. Further, since the proposal involves the demolition of the existing line and the construction and operation of a new line, Integral Energy is seeking a fresh approval. The proposal is permissible, it is not prohibited. In these circumstances, the planning concept of 'existing use' does not apply.

Integral Energy considers that the existing transmission line has been lawfully erected and used. Notwithstanding this, the position of the existing transmission line from a planning perspective is not relevant to the assessment of the proposal. In addition, the position of the existing line from a planning perspective can have no bearing on the proper construction of the scope and terms of Integral's proprietary rights in the easement upon which the proposal is based.

4.2.4 Consultation

137. Integral Energy did not involve or get the support of relevant stakeholders

Submission number: 1

A comprehensive and extensive community consultation and involvement process was implemented in June 2004 to identify community issues and concerns. Consultation activities included two community information evenings, individual meetings with easement landholders, eleven community newsletters and Community Advisory Group meetings, a community attitudes survey, an electricity industry consultation paper, a survey of professional valuers and local real estate agents, three options evaluation

workshops, consultation and correspondence with various government departments in regard to key project issues, briefings with Ministerial and local political stakeholders and public release of the alternatives assessment report following the selection of the preferred option. Further information is provided in *Section 2.3* of Volume 1 of the Environmental Assessment.

Blacktown City Council were invited and attended the community advisory group meetings, were involved with Integral Energy during meetings with local and state level politicians, attended the Government Department Representatives workshop and were met with on a separate occasion in regard to participation in proposed demand management activities.

138. Initial letters to the community were not received by the majority of affected people

Submission numbers: 1107

Figure 4.18 of Volume 1 of the Environmental Assessment shows the distribution area for community newsletters. The first community newsletter was issued in June 2004 to a population of approximately 4,000 households. Subsequent newsletters were distributed to around 6,000 households. The database of property owners in the study area was provided by the Department of Lands. Approximately 1 per cent of letters were returned mostly in cases where the address information contained only a lot number and not an actual street address. In some other cases, postcodes were given incorrectly. Parsons Brinckerhoff used its best endeavours to correct the missing or incorrect information by resorting to the telephone book and correcting street addresses also by reference to the street directory. The database was also updated by people who left their contact details with us on the night of the community information evenings and who also called on the project information line and provided their updated address details.

139. Integral Energy did not genuinely consult with the residents, ATTAG, the CAG, and Blacktown City Council

Submission numbers: 18, 113

Integral Energy engaged in a comprehensive program of community consultation. The consultation resulted in the following project outcomes as documented on p2-11 of Volume 1 of the Environmental Assessment: an independent review of capital cost estimates, route options being investigated along the Eastern Creek Floodplain and co-located with other utilities easements through the study area, a detailed comparative assessment of nine project options, consideration and quantification of various environmental and social externalities of the project options and the abandonment of Integral Energy's original development proposal.

140. Direct contact with the CEO of Integral Energy was denied to a member of the public, creating a sense of mistrust

Submission number: 1104

The CEO of Integral Energy telephoned the recipient and this particular issue has now been resolved.

141. Who took part in the ‘community attitudes survey’?**142. The methods used and adequacy of the community attitudes survey is in question**

Submission numbers: 1106, 1109

The community attitudes survey was conducted by UMR, an independent research company. The survey was conducted with seven focus groups that contained people selected randomly from the local area who are interested in local issues but who had not been actively involved in the 9JA project previously. There were typically eight or nine people in each group. Each group contained people representing a range of age groups. Two groups were formed by residents within about 2 kilometres of the existing transmission line or other proposed routes, three groups were formed from residents within about 2–5 kilometres from the existing transmission line and two groups were from between 5–10 kilometres from existing transmission line. The results of the survey are provided on p4-62 of Volume 1 of the Environmental Assessment.

143. The project has failed to properly consult with government departments involved in the planning and release of land in the North West Sector

Submission numbers: 5, 6, 8, 9, 10, 11, 18, 24, 39, 78, 79, 113, 128

The Government and stakeholder consultation conducted is outlined in *Section 4.4.4* of Volume 1 of the Environmental Assessment. It includes liaison with the Department of Planning, Blacktown City Council, Landcom and various local members and ministers. Since 1998, Integral Energy has consistently advised the planning authorities of the electrical assets in the area and ongoing liaison has ensured that Integral Energy's estimates of population and timing of development are consistent with those of the Department of Planning.

An approach which suggests that Integral Energy should not conduct the upgrade until further planning of the area has been completed would jeopardise the security and reliability of electricity supplies to many thousands of existing customers.

144. Dissenting comments from other agencies has not been included.

Submission numbers: 119, 1104

All comments received from the community and other stakeholders during the exhibition period are included in this report.

145. The EA lists all the key issues and recommendations raised in the consultation process and then proceeds to ignore them. The consultation process and formation of a Community Advisory Group did not influence the selection of the preferred option.

Submission numbers: 13, 14, 15, 16, 17, 18, 27, 28, 30, 31, 33, 34, 110, 117, 118, 937-945, 1026-1080, 1104

The aim of the consultation was to identify the key issues and expectations of the community for consideration by Integral Energy. The consultation with project stakeholders was genuine albeit that the consultation raised several issues which are not in the control of Integral Energy. Input from the community and stakeholders also resulted in a range of project outcomes as outlined on p2-11 of Volume 1 of the Environmental Assessment. Including: an independent review of capital costs, route options along Eastern Creek, a detailed comparison of nine project options, estimation of social and environmental externalities, detailed financial and economic analysis and abandonment of Integral Energy's original proposal. A design refinement process conducted on the preferred option was also driven primarily by the Community Advisory Group. The result was a significant lowering of the proposed structures.

146. Integral Energy refused to consider a community meeting involving people who live along alternative routes

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17

The two public meetings held by Integral in June 2004 were advertised in local newspapers and were an open invitation to people from the local area. Integral Energy did not refuse any residents from these meetings.

147. The input of many concerned residents, other than the seven groups of landowners surveyed, during the community consultation process should be recognised in the Environmental Assessment

Submission number: 110

The extensive process of community consultation was explained and acknowledged fully in the Environmental Assessment. The survey of community attitudes was one part of a comprehensive consultation program. It consisted of seven groups of landowners living within a distance of up to 10 kilometres from the existing transmission line. Other consultation activities involved landholder meetings, correspondence with the community and government agencies, the options assessment workshops and the distribution of information via newsletters and Integral Energy's website. The newsletters were distributed to over 6,000 residents in the study area.

148. Residents feel their objections to the above ground upgrade were ignored

Submission numbers: 30, 31, 33, 34

The community preference for underground options was clearly conveyed through a number of means and documented as a key project issue (refer p4-65 *Section 4.5.1* of

Volume 1 of the Environmental Assessment). However, Integral Energy made a decision on the preferred option based on a balance of social, environmental, economic and design factors that a lower overhead option provided the best balance of these sometimes competing issues.

149. The opinions and preferences of the Community Advisory Group were ignored, and was not involved in the final decision making process

Submission number: 119

The aim of the consultation was to identify the key issues and expectation of the community for consideration by Integral Energy. The consultation with project stakeholders was genuine albeit that the consultation raised several issues which are not within the control of Integral Energy. Selection of the preferred option specifically responded to key community issues as stated on p4-66 of Volume 1 of the Environmental Assessment. Input from the community and stakeholders also resulted in a range of project outcomes as outlined on p2-11 of Volume 1 of the Environmental Assessment.

4.2.5 Energy, materials use and greenhouse gas emissions

150. The predictions of rising energy consumption are concerning

151. New technologies for renewable sources of energy as well as the implementation of strategies to reduce energy use are supported.

Submission number: 80

The catchment area for the upgraded Feeder 9JA is currently characterised by large landholdings and low density development. The NSW Government has announced the expected type and density of future land releases which will comprise land for residential, commercial and employment development and estimated that some 60,000 new dwellings will be developed over the next 25-30 years. It is incontrovertible given this intensity of development that energy consumption in these areas will rise substantially relative to current usage trends.

Integral Energy is also concerned about the potential rise in electricity consumption and has taken the extraordinary step of establishing a \$500,000 demand management fund to be spent on projects in the Blacktown and Baulkham Hills Local Government areas among other initiatives. The dispersion of funds would be agreed by a governance committee represented by Integral, Blacktown and Baulkham Hills Councils and the Department of Energy, Utilities and Sustainability.

4.2.6 Flora and fauna

152. The proposal will require extensive clearing of the endangered Cumberland Plain woodland

Submission number: 113

Clearance of up to seven hectares of land will be required for construction and operation of the proposal. Clearing of native vegetation has been minimised by the selection of the existing transmission line route as the preferred route for the proposal. These areas have also been largely cleared and are not mapped as containing remnant native vegetation. The existing easement has been subject to ongoing maintenance in the form of tree removal and slashing of the understorey.

Impact assessments were completed for endangered ecological communities along the proposed route (Cumberland Plain Woodland, Shale–Gravel Transition Forest and River-flat Eucalypt Forest on Coastal Floodplains). These impact assessments concluded that the proposal was unlikely to have a significant impact on these communities because vegetation within the route has been significantly cleared or modified through slashing, mowing and canopy removal.

4.2.7 Visual

153. The proposal will detract from the future residential character, beauty and amenity of the Riverstone Release Area and contribute to devaluation

Submission numbers: 106, 108, 130

The future residential character, beauty and amenity of the Riverstone Release Area will depend on a number of factors including the final design of the subdivision, the density of housing and the quality of development within it.

Property devaluation effects were reported in *Section 7.1.3* of Volume 1 of the Environmental Assessment. It was concluded that properties within 50 metres of the proposal would reduce in value by between 0 and 2 percent. This reduction has been calculated as a marginal effect and has had regard to the existence of the transmission line currently. Property devaluations would be temporary given the local and regional benefits which would result from the provision of a safe, secure and reliable supply of electricity and the broader appreciation of property values which would result.

154. The proposal would reduce the visual amenity of the area from Vineyard to Rouse Hill

Submission number: 27

Visual issues were identified as a potential cumulative impact on p8-3 of Volume 1 of the Environmental Assessment as a result of proposed long term development. Mitigation measures incorporated into the proposal design are outlined on p7-6 of Volume 1. It was also noted that the retention of mature trees would reduce the visibility of the proposal as well as provide a broad range of other social and environmental benefits and reduce property devaluation effects.

155. The number of transmission lines associated with the proposed Bulk Supply Point to the south of Vineyard, the upgrade of Windsor Road and the proposal would have a cumulative visual impact at Vineyard.

Submission number: 111

The existing Vineyard Bulk Supply Point is owned and operated by TransGrid and is not subject to any construction as part of the proposal. The proposal is adopting an existing transmission line easement and reduces the clearing required relative to alternative routes. Mitigation measures have been included as part of the concept design to reduce the visual impacts of the pole structures. A reduction in the number of pole sets from 50 (currently) to 43 would also help reduce visual impacts. Cumulative visual impacts as a result of other proposed developments were identified in *Section 8.2.2* of Volume 1 of the Environmental Assessment. The cumulative visual impacts of the proposal are discussed on p8-3 of Volume 1 of the Environmental Assessment.

156. The proposal will impact visitors' views from to Rouse Hill Regional Park

Submission number: 78

It is not agreed that the proposal would be visible from the Rouse Hill Regional Park. As part of the visual assessment conducted (refer Technical Paper 6, Volume 3 of the Environmental Assessment) visual specialists visited Rouse Hill Regional Park driving along the internal roadway to the parking area and periodically getting out of the car at pavilions and picnic areas to check for views of the existing transmission line easement to the west. No structures or overhead wires were visible. Access to the future portion of the Regional Park closest to the transmission line is not yet formalised.

The assumption was made that even with some clearing along the edge of the easement and additional height of the structures, the proposal would not be visible from within the park based on the distance from the existing easement (approximately 600 metres), the extent and height of existing vegetation between the park and the easement and within the park itself and the undulating nature of the terrain.

157. The poles will be unattractive and more visible than the existing transmission line

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 24, 78, 118, 548-604, 937-945, 946-948

It is acknowledged that in some areas the proposed poles will potentially be more visible as a result of the increase in pole heights from an average of 17 to 22 metres which would extend in places above the existing tree canopy, clearing associated with the proposal and future development and an increase in the number of conductors. The pole structures would also be thicker than the existing structures to accommodate the increase in height.

The Community Advisory Group assisted in the identification and selection of visual mitigation measures such as the colour and pole material. Other measures that have been adopted include adopting a "like-for-like" replacement of existing poles wherever

possible and in some instances, relocating poles to minimise impacts on affected properties after discussions with individual landowners. The retention of vegetation, particularly along the easement edge but also individual and clusters of mature trees would all reduce the future potential visibility of the proposal.

158. The insulator configuration on the new line is bulky and prominent and will detract from the present rural environment and from future urban development

Submission number: 78

The insulator and conductor configuration on the new transmission line is based on standard industry practice and has been optimised to reduce the electric and magnetic fields. Mitigation measures have been incorporated into the proposal design to reduce the visual impact on both existing and future residents. The proposed modification from twin mango to Invar conductor will reduce the number of overhead wires from 14 to 8, which will also reduce visual impact.

159. A 5 metre increase in height can not be regarded as an insignificant change

Submission number: 110

P7-3 of Volume 1 of the Environmental Assessment outlines that the visual impact of the proposal at the time of commissioning is considered to be moderate. The assessment considered the marginal i.e. additional impact of the proposal taking into account the visual impact of the existing structures.

160. The new lines will be unattractive and more visible than the existing lines, and become more visible as the area is developed

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 21, 24, 36, 40, 46, 79, 78, 98, 103, 105, 118, 137-352, 353-408, 409-547, 605-627, 628-710, 711, 712, 826-936, 1026-1080, 1104

It is acknowledged that in some areas the proposed poles will potentially be more visible as a result of the increase in pole heights from an average of 17 to 22 metres which would extend in places above the existing tree canopy. The base of the pole structures would also be thicker than the existing structure bases to accommodate the increase in height.

The Community Advisory Group assisted in the identification and selection of visual mitigation measures such as the colour and pole material. Other measures that have been adopted include adopting a "like-for-like" replacement of existing poles wherever possible and in some instances, relocating poles to minimise impacts on affected properties after discussions with individual landowners. The retention of vegetation, particularly along the easement edge but also individual and clusters of mature trees would all reduce the future potential visibility of the proposal.

The proposed modification from twin mango to Invar conductors will reduce the number of overhead wires from 14 to 8, thereby reducing the visual impact. As outlined in

Section 6.3 of this report, Integral Energy proposed to modify the proposal to minimise visual impact.

161. The photomontage does not accurately show the changes to the configuration and size of the proposal

Submission numbers: 20, 110

Three photomontages are depicted in *Figures 7.2a-c* on p7-5 of Volume 1 of the Environmental Assessment taken at different distances and angles so that a range of views is addressed. The computer enhanced images presented in the Environmental Assessment were made as accurately as possible to present the expected nature of future views of the proposal.

4.2.8 Property values

162. The EA states that the upgrade can devalue land up to 500 metres away, by up to 30 per cent

Submission numbers: 21, 40, 46, 98, 103, 105, 118, 137-352, 409-547, 628-710, 826-936, 1026-1080, 1103

Figure 5.3 on p36 of *Appendix E* of Volume 2 of the Environmental Assessment indicates that none (0 per cent) of the interviewees surveyed for this project considered there would be effects on property values above 15 per cent at 500 metres from the easement. Furthermore, *Section 7.1.3* of Volume 1 of the Environmental Assessment states that there will be no impact on properties greater than 50 metres from the alignment.

163. Residing near the proposal will be undesirable, leading to a reduction in property values

Submission numbers: 24, 25, 39, 111, 118, 130, 353-408, 548-604, 605-627, 628-710, 937-945, 946-948, 1026-1080

The presence of development around the existing line does not support the claims made in the submission. There is no evidence that land near the proposal will be unsaleable due to the development of the proposal. In fact, examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicate that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity to the infrastructure. The Environmental Assessment acknowledges that the duration of sales may be longer for properties adjacent to transmission lines.

The analysis conducted in the Environmental Assessment of the effect on property values (refer *Appendix E* of Volume 2 of the Environmental Assessment) indicated that a reduction of value of between 0-2 per cent for dwellings within 50 metres of the transmission line could be expected. This impact is assessed having regard to the presence of the existing line, and is therefore a marginal impact. This reduction will be

temporary however and offset in the medium to longer term by the broader appreciation in property prices as a result of development.

164. The proposal will lower property values more than that stated in the EA

Submission numbers: 5, 6, 8, 9, 10, 11, 23, 110, 713-766, 949-1025

The assessment outlined in *Appendix E* of Volume 2 of the Environmental Assessment analysed the marginal impact i.e. the additional impact relative to the existing infrastructure. A survey of local property agents was conducted to ensure that information relied upon was relevant to the local area. The assessment in *Appendix E* also identified the importance of visual concerns as a key driver for property price changes and that it is the community 'perception' of the environmental issue which results in an impact on property prices rather than necessarily the magnitude of the impact. This is suggested as a possible reason why the property price reductions may be lower than the expectations of this respondent.

165. I don't want to move because Integral Energy has chosen the cheapest option. Even if I move, no-one will buy my place.

Submission number: 25

There is no evidence that land will be unsaleable due to development of the proposal. In fact, examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer to Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicate that despite the evidence of electricity infrastructure, people chose to purchase properties in close proximity to the infrastructure. The Environmental Assessment acknowledges that the duration of sales may be longer for properties adjacent to transmission lines. The preferred option is not the cheapest.

166. We have been involved in negotiations for the sale of another property affected by a transmission line easement and its value has been reduced by approximately 40 per cent by the transmission line, not 2 per cent as stated in the EA summary.

Submission number: 23

We are not aware of the specifics of either the property or the other transmission line easement referred to or the basis on which a 40 per cent price reduction was determined. The analysis conducted in *Appendix E* of Volume 2 of the Environmental Assessment specifically for this project indicated that the price reduction could be between 0-2 per cent for properties within 50 metres. This is a marginal impact and reflects the existence of the existing transmission line. The report also indicates that the Sydney property market generally has been in decline in recent years.

167. The easement and its vicinity will be unattractive to developers for many years

Submission number: 1103

This claim is not supported by development around the existing line or Integral Energy's experience in other new release areas. Refer to Attachment 2 of *Appendix E* of Volume 2 of the Environmental Assessment.

Integral Energy prefers not to speculate on the strategies which may be adopted by developers but we would note that they are usually extremely commercially focussed. Providing the sale price is reasonable, there is no reason to suggest that developers would not be interested in acquiring a property.

168. Studies found that HVOTLs, lower property values by up to 20 per cent, especially for smaller properties

Submission number: 130

Table 4.5 on p33 in *Appendix E* of Volume 2 of the Environmental Assessment summarises the conclusions of an international literature review of similar studies and quotes a range of price impacts at different offsets from different types of electricity infrastructure. This material is provided for background information only since the situations in other countries may be completely different to NSW, Australia.

The conclusion drawn from the table is that there is a range in impact depending on the specific circumstances, although the 'typical' range appears to be between 2 and 10 per cent. The table also contains results of some studies indicating impacts of greater than 15 per cent.

The analysis conducted in *Appendix E* of Volume 2 of the Environmental Assessment is strategic and does not purport to be specifically applicable to any particular property since there are many individual factors which may result in a higher or lower price effect than stated. It was also based on the average englobo land price but is nonetheless considered to be a fair and accurate assessment of the level of impact expected. We acknowledge that the paper cited by this respondent does indicate that the adverse effect on sales price for smaller properties may be greater than for larger properties.

169. The proposal will affect new properties

Submission number: 23

The proposal will adopt the line of an existing electricity easement and will be wholly contained within it. As such, it will not result in any direct affect on properties which are not currently encumbered by the existing easement in favour of Integral Energy.

170. Adjacent property owners bought property with the transmission line in its current state, however the change to the transmission line makes it unacceptable

Submission number: 78

A property affected by an easement is liable to be developed to the full extent of the terms of that easement. Purchasers of land encumbered with an easement are normally made aware of this by their solicitor during the title search conducted during the property transaction process. Purchasers of land properties adjacent to the easement ought therefore to have been aware of the potential affectation to that land.

171. Affected landholders should not be impacted financially when another alternative exists

Submission number: 128

The landholders affected by the proposal are the same landholders who currently own land along the existing easement. The proposal requires no new easements to be established and therefore compensation is not considered. A study was conducted to determine the value of social and environmental externalities and concluded that the marginal effect was between 0-2 percent. This impact would be temporary however and would reduce over time. Selection of the preferred option is based upon a balance of social, environmental, economic and design factors.

172. The EA underestimates the impact of the proposal on the community

Submission number: 128

Integral Energy undertook an extensive community consultation program to manage the impact of the proposal on the community. Through the conduct of various technical studies, it also sought to respond to various key issues raised.

Integral Energy has employed HillPDA, an independent property consulting firm, to estimate the value of social and environmental externalities inherent with the proposal. The results of those estimates are contained in *Table 4.3* of Volume 1 of the Environmental Assessment.

173. The proposal adversely affects land suitable for development for employment purposes

Submission number: 129, 1114

Discussions have been held and are ongoing with the landowner of this property adjacent to the Vineyard bulk supply point and Riverstone STP. The principle being pursued by Integral Energy is a relinquishment of the existing easement in favour of the new proposal. Integral Energy has attempted to minimise the implications to this property by skirting the perimeter of neighbouring properties with the line. If this is not achievable, Integral Energy will continue to use the existing easement alignment.

174. The assessment of the effect of the proposal on land prices has not accounted for land within the easement which would be precluded from development

Submission number: 128

The proposal would utilise the alignment of an existing transmission line easement and be wholly contained within it. The existing constraints on land within the easement would not change as a result of the proposal. Structures are not permitted within the existing easement and therefore no consideration should be given to the effects on future structures within the easement.

175. The net negative effect on property values from the proposal is greater than that quoted in the EA

Submission number: 1108

It is not clear the basis on which this assertion is being made. Integral Energy commissioned an independent consultant specialising in land and property matters to undertake an assessment of social and environmental externalities resulting from the proposal. Given the existence of the existing transmission line, the estimated costs are only the marginal costs i.e. above the existing situation. Integral Energy believe the results are conservative for the reasons stated on p51 of *Appendix E* of Volume 2 of the Environmental Assessment.

176. Is Integral Energy prepared to buy property or relocate homes?

177. Better technology should be used instead of overhead transmission lines so that land is not wasted

Submission number: 1105

There is no consideration being given to purchase property or relocate homes based on the information presented in the Environmental Assessment. Integral Energy investigated alternative conductor technology as part of the options development and assessment process. The proposed modification from twin mango to invar conductors adopts new technology. This modification is described in *Section 6* of this report.

178. The survey of property valuers did not compare the preferred option with existing poles

Submission number: 1109

Photo 2 on p38 of *Appendix E* of Volume 2 of the Environmental Assessment indicates that the existing pole structures were part of the valuers survey. The analysis conducted identified the marginal impact of the options relative to the existing structures.

179. The safe distance from the proposed alignment estimated in the EA is not consistent with other published data on EMF exposure, resulting in the drop in land value being incorrect

Submission number: 128

As noted in *Appendix E* of Volume 2 of the Environmental Assessment, the social and environmental externalities study considered potential health effects to be one of the reasons why property prices were reduced. The study also identified that it was the perception of the issue, rather than any factual basis which results in a change to property prices. Integral Energy therefore believe the estimates provided address the health issue.

180. Landholders' decisions to purchase land would have been different if it was known that transmission lines in the area were not going underground

Submission numbers: 5, 11, 13, 14, 15, 16, 17

Integral Energy cannot comment on the reasons people choose to purchase their property. Integral Energy has an existing easement and has a right to utilise the easement for the purposes of transmitting electricity. Records indicate that all current landowners affected by the easement purchased their properties after the time the easement was acquired. These landowners bought their land with the full knowledge of the existence of the easement and terms and conditions of the easement. Integral Energy is not aware of any reason why landowners would have assumed that the cabling would be underground.

4.2.9 EMF and health issues

181. The boundary of the EMF affected zone is 30 metres from the centre of the easement, which creates an area of affected land outside 15 metre easement area

182. A policy of prudent avoidance should be implemented and no land within 30 metres of the centre of the easement should be developed for residential purposes.

Submission number: 1108

Easements are established to control development so as to maintain electrical safety clearances and to allow access for routine and emergency works. It is not industry practice to acquire an easement for the purpose of mitigation of EMF and thus it is not appropriate to consider doing so under the current circumstances.

There is no evidence that land bordering the easement will be unsaleable due to the development of the proposal. In fact, examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicate that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity to the infrastructure.

Integral Energy has documented the steps taken to achieve levels of EMF as low as reasonably possible (prudent avoidance) consistent with the notation of 'modest cost' on p7-11 of Volume 1 of the Environmental Assessment.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005/06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the

magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

183. Overseas expert opinion (US Draft NCRP Recommendations, 1995) indicates that a safe distance of 35 metres from the alignment is required, not 15 metres as stated in the EA

Submission number: 128

The draft document referred to was prepared by one of NCRP's scientific committees and was leaked to the media before undergoing NCRP's rigorous process of internal review – it therefore had no official status. As a result of misrepresentation of the draft content of the report, on 11th October 1995, NCRP issued a news release headed “NCRP has no ELF EMF recommendations”. The press release stated “*Contrary to many erroneous sources of information, the National Council on Radiation, Protection and Measurements (NCRP) has not made recommendations on Extremely Low Frequency electromagnetic fields (ELF EMF). Draft material formulated by NCRP Scientific Committee 89-3 on ELF EMF has been improperly disseminated and does not reflect NCRP recommendation*”. The release went on to explain the NCRP's rigorous process of internal and external review of draft documents and notes that this particular draft report “*has absolutely no standing at this time. Thus it should not be copied, quoted, cited or referenced outside of the NCRP*”.

The current status of the draft report is not known but to date, despite the passage of 10 years, it has not yet passed through the full review process and has not been issued. In an e-mail dated 9th February 2006, the Executive Director of NCRP, Dr David Schauer, advised that, following the inappropriate leaking of the draft by a member of the drafting committee, “*NCRP immediately convened a panel of 25 expert reviewers, nearly all of whom stated that the recommended public exposure limit was not supported by the analysis of biological and health effects described in the remainder of the 1,000 page draft report*”.

184. Integral Energy has stated that safety is not a concern when deciding upon an easement

Submission numbers: 1106, 1107

Integral Energy takes safety concerns seriously and they have underpinned considerations during the development of the proposal. Integral Energy has fully complied with the principles of prudent avoidance.

The industry's position is to adopt an easement width which matches the configuration of the infrastructure. That is, various industry standards and guidelines specify the easement width in order to maintain electrical safety clearances and reduce potential impacts eg from contact with vegetation which may result in faults, etc.

185. The EMF limits the EA refers to are for a limited dose, not for chronic exposure

Submission numbers: 81, 113, 118, 119

This assertion is incorrect. The EMF limits referred to in the EA, (1,000 milligauss and 5 kV per metre) apply to the general public for 24 hours per day.

186. The EMF standards outlined in the EA are outdated (1987) by world standards, with European countries and the U.S.A using more stringent guidelines

Submission numbers: 78, 117, 118

As noted in Technical Paper No 8 of Volume 3 of the Environmental Assessment, the NHMRC EMF guidelines were issued in 1989 and were based on earlier guidelines produced by the International Radiation Protection Association (now known as ICNIRP). Also, as noted in the Technical Paper, the ICNIRP guidelines, which are widely accepted in Europe, have been updated several times since their original issue and the limits for 24 hour general public exposure remain unchanged. In recent times, the UK National Radiological Protection Board has adopted similar limits and the IEEE in the United States has adopted limits even less stringent.

187. The proposal has different requirements in relation to health hazards when compared to other infrastructure developments

Submission number: 28

Integral Energy has undertaken prudent design measures to ensure that the EMF emissions from the future transmission line are as low as reasonably possible. The measures are outlined on p7-11 of Volume 1 of the Environmental Assessment. These are consistent with the principle of prudent avoidance. The difficulty with the issue of EMF is that there is ongoing debate about the role of magnetic fields in potential health effects on humans and it is therefore not possible to be definitive about the risk to health, if one exists. Similarly, it is not possible to prescribe a threshold of exposure below which the population may be considered safe or a threshold above which exposure to EMF is dangerous.

188. There is insufficient evidence to establish that low-frequency magnetic fields are carcinogenic to humans

Submission number: 1101

The comments of the NSW Health Department concerning the uncertainty associated with the potential role of magnetic fields in the incidence of cancer are noted and are in line with the information presented in the Environmental Assessment. It is also noted that the current scientific evidence is not sufficient to establish definite causation.

189. Although risks have not been conclusively established, the World Health Organisation has released a document outlining a number of cautionary policy approaches to EMF

Submission number: 80

As noted in Technical Paper 8 of Volume 3 of the Environmental Assessment, given the current uncertainty associated with this issue, there seems to be consensus that a prudent or cautionary approach is appropriate. The actions already undertaken by Integral Energy as noted on p7-11 of Volume 1 of the Environmental Assessment are consistent with this approach.

190. The benchmark for comparison of EMF levels should be those currently generated by the transmission line

Submission numbers: 80, 1101

Integral Energy does not agree with the adoption of the current EMF levels as the baseline for assessment of EMF effects. The EMF standards are arbitrary not because demand can grow over the life of an asset. The electricity network is not operated on the basis of reducing EMF levels. For instance, Feeder 9JA has been operating in “abnormal mode” for several years because of the inability to supply secure supplies of electricity to Parklea and West Castle Hill zone substations. Prior to that, Feeder 9JA was operating in “normal mode” where the electrical load was approximately double relative to the current arrangement.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005/06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

191. The guidelines for EMF exposure are out of date, with most countries using standards based on levels known to result in statistical increases in cancer

Submission number: 113

As noted in Technical Paper No 8 of Volume 3 of the Environmental Assessment, the NHMRC EMF guidelines were issued in 1989 and were based on earlier guidelines produced by the International Radiation Protection Association (now known as ICNIRP). Also, as noted in the Technical Paper, the ICNIRP guidelines, which are widely accepted in Europe, have been updated several times since their original issue and the limits for 24 hour general public exposure remain unchanged. In recent times, the UK National Radiological Protection Board has adopted similar limits and the IEEE in the United States has adopted limits which are even higher.

The assertion that *“most countries.... have moved to rectify and tighten standards to levels known not to yield a statistical increase in cancers”* is not supported by any particular reference and can only be addressed as a general statement. The claim also is contradictory to the findings of authoritative bodies such as the NIEHS in the USA, the NRPB in the UK, the World Health Organisation and the Australian regulatory authority, ARPANSA. The current international consensus is that there is insufficient evidence to support the setting of standards at levels below those which exist at present. There is also general consensus that it may be prudent to adopt additional measures which can be undertaken at reasonable cost and without undue inconvenience to reduce EMF exposure. Integral Energy has adopted several such measures in connection with the proposed Vineyard to Rouse Hill electricity transmission line as outlined on p7-11 in Volume 1 of the Environmental Assessment. At present, there are no ‘levels known to yield a statistical increase in cancers’.

192. The ICNRP guidelines referred to in the EA were developed in 1989 and were not intended to cover adults and children living permanently in the radiation field.

Submission number: 128

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

The assertion that the ICNIRP guidelines are not applicable due to their age is invalid as the guidelines have been updated several times since the original publication. It is also not correct to say that the levels therein are invalid for chronic exposure cases or are only valid for short duration exposure since the levels apply to the general public for 24 hours per day. The comments are also not consistent with the positions adopted by other health standard setting bodies throughout the world including World Health Organisation, NRPB (UK) and NIEHS (USA).

193. An external party should be asked to set safe distances for EMF exposure which will determine the safe corridor width for HVOTLs.

Submission number: 128

The scientific uncertainty surrounding the link between EMF and potential health effects does not allow a “safe” exposure to EMF to be determined. It is therefore not possible to translate the (non-determinable) safe threshold into an (definitive) easement width. Even if it were possible, easement widths for electricity transmission lines are not based upon the mitigation of environmental issues. They are intended to control development and to ensure minimum electrical safety clearances between the conductors and external influences eg vegetation clearances are maintained to ensure reliable supplies of electricity.

194. There are different EMF limits for playgrounds, residential buildings and schools to those in Italy and Switzerland

Submission number: 1109

Given the health studies are unable to conclusively establish an association between EMF and human health effects, any such numbers relied upon are arbitrary. They also not consistent with the positions adopted by other health standard setting bodies throughout the world including World Health Organisation, NRPB (UK) and NIEHS (USA). Notwithstanding that different countries have adopted different limits for EMF, the agreed position by all international authorities is that it is appropriate to adopt a policy of prudent avoidance to minimise any risks which may occur. Integral Energy has achieved this through the measures documented on p7-11 of Volume 1 of the Environmental Assessment.

195. The Australian National Health and Medical Research Council have recently rescinded their guidelines on EMF exposure with the expectation that the exposure levels will be lowered. They are therefore invalid, not best practice and should not be used for the proposal

196. The proposal should not commence until either the new Australian Standard for EMF is finalised, or interim standards are available

Submission numbers: 1106, 1107, 1108

Given the uncertainty surrounding EMF and health effects on humans, the policy of prudent avoidance is the appropriate response to adopt which Integral Energy has done. There is currently no timetable for the release of the new ARPANSA guidelines although they were expected to be released for public comment in late 2005. It is speculative to assume that the exposure guidelines in the new document will necessarily be lower than the old NHMRC guidelines. The upgrade is needed urgently to provide safe, secure and reliable supplies of electricity to existing customers. Integral Energy does not believe it would be prudent to delay construction of the proposal.

197. Where future higher density development is likely, levels of EMF exposure should not be increased, and options to reduce exposure should be explored

Submission number: 1101

Integral Energy broadly agrees with the principles expressed by NSW Health however there are some practical difficulties associated with this approach if it is interpreted and applied literally. Integral Energy adopts the prudent avoidance principle. There are also other ways in which the same objectives can be met and while these may be outside of the influence of Integral Energy, they should also not be ruled out in the current circumstances. For example, reducing the density of residential populations alongside the easement is a factor that is beyond the control of Integral Energy, however in this instance given the long term existence of the transmission line and the recent structure planning process completed by the Department of Planning, it is not an unreasonable assumption that this may have already been factored into future development plans.

198. The best option from a health risk minimisation perspective is Option E, in which all cables are placed underground. The next best option would be Option I.

199. Integral Energy should implement low to moderate cost measures to reduce EMF.

200. Although the capital cost of Option I is 2.3 times greater than the preferred option, there are potential costs associated with future health impacts not currently able to be factored into the environmental assessment that could be averted

201. The preferred option could result in a progressively larger population being exposed to higher levels of EMF than is currently the case.

Submission number: 80

Integral Energy is aware that potential health effects is a key issue associated with the proposal. Integral Energy has undertaken a comprehensive assessment of available options including those options which would reduce magnetic fields in the future. However Integral Energy has a responsibility to achieve a balance between the often competing social, environmental, economic and design factors.

P7-11 of Volume 1 of the Environmental Assessment indicates the measures adopted by Integral Energy to reduce electric and magnetic fields to levels as low as reasonably possible given the prudent avoidance concept of 'modest cost' and 'undue inconvenience'.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005-06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

202. The EA states that the electromagnetic field can be stopped by lead barriers, which are not proposed

Submission numbers: 767-825, 1108

It would not be feasible to use lead barriers as a mitigation response to EMF.

203. The proposal will contribute to negative perceptions and anxieties about the health impacts of high voltage transmission lines for future residents of adjoining urban areas

Submission number: 130

There are a number of factors that contribute to community and individual perceptions and anxieties. What is perceived as a threat to one community or individual; may not be classed as such by another. There is no evidence that substantiates that the proposal will present a health threat to future communities in adjoining urban developments.

204. The stated increases in electric field and magnetic field levels at the edge of the easement create an unacceptable risk to families living adjacent to the proposal

Submission numbers: 19, 118, 137-352, 409-547, 628-710, 711, 712, 713-766, 826-936, 949-1025

Technical Paper 8 of Volume 3 of the Environmental Assessment provides details of the modelling and prediction of electric and magnetic fields. It is predicted that the electric field from the proposal would be up to 60 percent higher at the edge of the easement than exists currently.

While EMF involves both electric and magnetic fields, electric fields are driven by the line voltage and are constant over time. Electric fields are readily shielded and in the health context are generally, not associated with the same interest as magnetic fields. The electric field for the proposal is less than 20 percent of the relevant health guideline.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005-06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

205. The EA admits that potential health effects cannot be ruled out

Submission numbers: 5, 6, 8, 9, 10, 11, 12, 25, 106, 108, 113, 118, 137-352, 409-547, 713-766, 826-936, 937-945, 946-948, 949-1025, 1026-1080

While the potential health effects of electric and magnetic fields cannot be confirmed, they also cannot be ruled out. In recognition of this uncertainty, it is accepted practice to exercise precaution. In an Australian context, this was defined as the adoption of a policy of prudent avoidance. The measures undertaken by Integral Energy in accordance with this policy are described on p7-11 of Volume 1 of the Environmental Assessment.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the

edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005-06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

206. The EA admits that electromagnetic radiation could go wider than the easement and into adjoining buildings

Submission numbers: 118, 137-352, 713-766, 826-936, 949-1025, 1104

This is correct and is shown diagrammatically in *Figure 7.3* on p7-11 of Volume 1 of the Environmental Assessment. However, people are exposed to EMF everywhere through contact with electrical apparatus and its not possible to have a non-EMF environment.

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

207. There is no proof that the increases in EMF levels given out by the proposal are safe, and Integral Energy won't guarantee the community is safe

While the potential health effects of electric and magnetic fields cannot be confirmed, they also cannot be ruled out. In recognition of this uncertainty, it is accepted practice to exercise precaution. In an Australian context, this was defined as the adoption of a policy of prudent avoidance. The measures undertaken by Integral Energy in accordance with this policy are described on p7-11 of Volume 1 of the Environmental Assessment.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005-06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

208. Integral Energy should not risk the health of the residents of future urban development adjacent to the proposal

Submission numbers: 353-408

It is not practical or realistic to separate people and powerlines. Integral Energy's experience such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicates that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity to the infrastructure.

209. There is increasing community concern about the detrimental health effects and risks of living under transmission lines

Submission numbers: 767-825

In recognition of the ongoing scientific uncertainty over magnetic fields, it is accepted practice to exercise precaution. In an Australian context, this was defined as the adoption of a policy of prudent avoidance. The measures undertaken by Integral Energy in accordance with this policy are described on p7-11 of Volume 1 of the Environmental Assessment.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005-06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

210. The proposal will result in transmission lines being closer to homes, increasing health risks. Why should residential homes be treated any differently than the schools along the dismissed Hamilton Road route option

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 113, 118

The increased separation of the poles in the proposal would result in the conductors being situated closer to the easement boundary compared to the existing situation. Integral Energy does not agree that this would increase health risks because a casual link between EMF and health risks has not been proven. In recognition of this uncertainty, it is generally accepted to exercise caution. In an Australian context, this was defined as the adoption of a policy of prudent avoidance. The measures undertaken by Integral Energy in accordance with this policy are described on p7-11 of Volume 1 of the Environmental Assessment.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005-06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the

magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

211. There is too little account for the 60 percent increase in the electric field at the edge of the easement

Submission number: 114

While EMF involves both electric and magnetic fields, electric fields are driven by the line voltage and are constant over time. Electric fields are readily shielded and in the health context are generally, not associated with the same interest as magnetic fields. The electric field for the proposal is less than 20 percent of the relevant health guideline.

Technical Paper 8, Volume 3 of the Environmental Assessment gives a detailed outline of electric fields. It states that electric fields are readily shielded by conducting and semi-conducting objects including buildings, trees and the human body. While the electric field is predicted to increase at the edge of the easement, this would still be less than 20 percent of the relevant health guideline. To date, research has consistently shown that there is no evidence that prolonged exposure to weak electric fields, like those found in the home or workplace, result in adverse health effects in humans.

212. The proposal will be a health hazard to people, children, pets and livestock

Submission number: 32

While the potential health effects of electric and magnetic fields cannot be confirmed, they also cannot be ruled out. In recognition of this uncertainty, it is accepted practice to exercise precaution. In an Australian context, this was defined as the adoption of a policy of prudent avoidance. The measures undertaken by Integral Energy in accordance with this policy are described on p7-11 of Volume 1 of the Environmental Assessment. The effectiveness of these measures is demonstrated by the proposal resulting in a reduction in magnetic field levels over its life compared with the existing situation. This is a substantial achievement given that the forecast load growth of the same period is a multiple of approximately three times the existing load.

213. The World Health Organisation has classified magnetic fields as a possible carcinogen

Submission number: 1109

This is correct. The respondent might find the detail of this classification of further interest as documented on p7-11 of Volume 1 and in Technical Papers 8 and 9 of Volume 3 of the Environmental Assessment. Various statements by other health authorities who have reviewed these conclusions have stated that the evidence relied upon is considered "weak". EMF is classified as a Class 2B carcinogen along with 236 other compounds including coffee, vehicle exhaust gases and gasoline.

214. The line that passes next to my house has a 100 foot easement, which is less than the recommended width easement for this size line according to the TransGrid guidelines. Yet the distance from the outside wire of the proposed transmission line to my house will be 30 metres

Submission number: 1106

Easement widths are determined by a number of technical factors including conductor “blow-out” which depends upon the conductor ground clearance and pole spacing adopted. Easements are established to control development so as to maintain electrical safety clearances and to allow access for routine and emergency works. Integral Energy does not have detailed knowledge of the policies adopted by TransGrid with respect to easement widths but assume that the guidelines are generic and not specific to this proposal.

215. The EA states that the new line will be safe because the EMF that it will generate will be less than that generated by the existing line, however it has not been determined that the current line is safe

Submission number: 1108

The Environmental Assessment is unable to explicitly state that either the new or existing line is “safe” from an EMF perspective due the ongoing scientific uncertainty over the issue. The statements made in the Environmental Assessment indicate that a reduction in magnetic fields represents an environmental improvement. The uncertainty of the science results in their being no way to determine the minimum or safe threshold of exposure to EMF.

216. The EA is deliberately misleading as it focuses on the effects of short-term rather than chronic EMF exposure and that the short term safe exposure criteria can be 250 times higher than long term safe exposure criteria.

Submission number: 1108

This assertion is incorrect. The EMF limits referred to in the EA, (1,000 milligauss and 5 kV per metre) apply to the general public for 24 hours per day.

Technical Paper 10 of Volume 3 of the Environmental Assessment does not conclude that there is any agreement on a long term safe exposure criteria and also does not conclude that the existing exposure criteria of ICNIRP and NHMRC are for short term exposure only.

217. A field study found magnetic fields throughout a house located 60 metres from a 500 kV transmission line were at a level of 6 mG 24 hours a day. Some of the houses along the easement will be in the same situation if the proposal is built.

Submission number: 1108

While we are not aware of the detail of the referenced field study by ARPANSA, the discussion on p7-8 of Volume 1 of the Environmental Assessment indicates that there are many man-made devices and household electrical equipment which contribute to the magnetic fields found inside the home.

218. The preferred option is predicted to increase magnetic fields by 8 mG or 80 percent above the existing level at the edge of the easement by 2043.

Submission number: 1101

Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment allows for a more accurate calculation of the increase in magnetic fields at the edge of the easement. The increase at the edge of the easement relative to the current “abnormal” operation of Feeder 9JA is approximately 55 percent not 80 percent as cited.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005/06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

219. Health effects of EMF radiation may be considered comparable to health effects of asbestos in the future

Submission numbers: 78, 81

It is not considered appropriate to speculate about future events which cannot be predicted with any certainty based on the information currently available.

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

220. If a study finds direct evidence linking EMF to cancer there could be large compensation claims made against Integral Energy in the future if the proposal was to proceed

Submission numbers: 24, 78

At the current point in time, no causal relationship between EMF and health effects has been proven. Notwithstanding, because of the uncertainty surrounding potential health effects, Integral Energy has adopted the policy of prudent avoidance and implemented measures into the concept design of the proposal to reduce EMF levels to as low as reasonably possible given 'modest cost' and avoidance of 'undue inconvenience' as documented on p7-11 of Volume 1 of the Environmental Assessment.

221. Which studies of the health impacts on human development has Integral Energy based their decision that the upgrade can safely proceed

Submission number: 39

There is agreement by world health authorities that the appropriate principle to adopt in respect of the uncertainty surrounding EMF and potential health effects is the policy of caution or in the Australian context, prudent avoidance. Integral Energy has taken steps as outlined on p7-11 of Volume 1 of the Environmental Assessment to reduce magnetic fields to as low as reasonably possible having regard to the 'prudent avoidance' concept of modest cost.

222. The health of property owners adjacent the easement will be adversely affected due to the stress of the unknown effects of EMF radiation

Submission number: 78

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

There are a number of factors that contribute to community and individual perceptions and anxieties. There is no evidence that substantiates that the proposal will present a health threat to future communities in adjoining urban developments. Integral Energy is unable to resolve the uncertainty associated with the EMF and potential health effects on humans.

223. The EA adds disclaimers which indicate that safe levels of EMF radiation are uncertain.

224. Integral Energy should use ‘Prudent Avoidance’ for this proposal.

Submission number: 78

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

The scientific uncertainty surrounding the link between EMF and potential health effects does not allow a “safe” exposure to EMF to be determined. It is therefore not possible to translate any particular potential exposure to EMF the ‘safe’ threshold into an easement width. Easement widths for electricity transmission lines are not based upon the mitigation of environmental issues. They are intended to control development and to ensure minimum electrical safety clearances between the conductors and external influences e.g. vegetation clearances being maintained to ensure reliable supplies of electricity.

Integral Energy has taken steps outlined on p7-11 of Volume 1 of the Environmental Assessment to reduce magnetic fields to as low as reasonably possible having regard to cost, which in accordance with the principle of prudent avoidance.

225. The 60 percent increase in EMF’s and radiation is a safety concern for children who play beneath the transmission lines

Submission number: 114

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

While EMF involves both electric and magnetic fields, electric fields are driven by the line voltage and are constant over time. Electric fields are readily shielded and in the health context are generally, not associated with the same interest as magnetic fields. The electric field for the proposal is less than 20 percent of the relevant health guideline.

Technical Paper 8, Volume 3 of the Environmental Assessment gives a detailed outline of EMF, including electric fields. It states that electric fields are readily shielded by conducting and semi-conducting objects including buildings, trees and the human body. While the electric field is predicted to increase by about 60 percent at the edge of the easement, this would still be less than 20 percent of the relevant health guideline. To date, research has consistently shown that there is no evidence that prolonged

exposure to weak electric fields, like those found in the home or workplace, result in adverse health effects in humans.

226. It would be better to pay now to avoid future health risks

Submission number: 125

Integral Energy is not able to increase electricity tariffs to pay for a more expensive option beyond any increase allowed by their Regulator the Independent Pricing and Regulatory Tribunal. There are a range of views in the community about what level of additional tariff might be acceptable, if it were possible, depending upon where each person lives. The affordability of individual projects may seem inexpensive when measured in this way, however if applied to all Integral Energy projects, electricity tariffs would likely be very expensive. The health risk is uncertain and therefore a cost cannot be calculated and may, in fact, not even exist.

227. The EA states that the proposal will meet the guidelines for exposure to EMF, but admits that these guidelines don't consider the possible long-term health effects

Submission numbers: 113, 137-352, 826-936

This assertion is incorrect. The EMF limits referred to in the EA, (1,000 milligauss and 5 kV per metre) apply to the general public for 24 hours per day. The proposal falls well below these guidelines.

228. The proposed transmission lines are dangerous - no-one can prove that the EMF's given out by these lines are safe, and the electric and magnetic field of the upgrade will be much greater.

Submission numbers: 605-627

While the potential health effects of electric and magnetic fields cannot be confirmed, they also cannot be ruled out. In recognition of this uncertainty, it is accepted practice to exercise caution. In an Australian context, this was defined as the adoption of a policy of prudent avoidance. The measures undertaken by Integral Energy in accordance with this policy are described on p7-11 of Volume 1 of the Environmental Assessment.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005/06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

229. Integral Energy puts too much faith into current technology and should remember that DDT and asbestos were once declared safe scientifically

Submission number: 1103

There is no evidence that substantiates that the proposal will present a health threat to existing and future communities. Further, the appropriate response in situations of uncertainty is to exercise caution and regarding EMF, this is referred to as prudent avoidance.

Integral Energy has taken steps outlined on p7-11 of Volume 1 of the Environmental Assessment to reduce magnetic fields to as low as reasonably possible having regard to cost, which in accordance with the principle of prudent avoidance.

230. Integral Energy cannot guarantee that the lines are safe

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 24, 25, 33, 34, 79, 118

There is a consensus that an approach founded on prudent avoidance is appropriate in these circumstances. The measures adopted by Integral Energy, in accordance with this policy, are provided on p7-11 of Volume 1 of the Environmental Assessment. The scientific uncertainty surrounding the link between EMF and potential health effects does not allow a "safe" exposure to EMF to be determined.

231. Studies have shown that exposure to power cables can cause childhood leukaemia and other illnesses

Submission number: 114

These particular types of studies are known as epidemiological studies which is the study of the incidence and distribution of disease in humans through statistical analysis. Concerning EMF and potential health risks, some epidemiological studies have concluded an increased risk of incidences of cancer, however, despite some 20 years of laboratory research no mechanism for measuring an effect has been identified. Therefore there remains some doubt about the accuracy of the epidemiological studies which conclude that there is a link between EMF and various illnesses including cancer.

232. The EA assumes that if you are outside the easement or below the guidelines you are safe. Research from the National Grid Company, the sole transmission company in England and Wales, have written that is not true that it is safe to build up to the edge of easements

Submission number: 1108

The Environmental Assessment makes several statements concerning the inconclusive nature of the body of health studies conducted relating to EMF and health effects. and that, partly for this reason; there is no agreed safe limit for exposure to magnetic fields. Prudent avoidance is an appropriate response to adopt in situations of uncertainty. P7-11 of Volume 1 of the Environmental Assessment identifies the specific measures adopted by Integral Energy.

Integral Energy's experience indicates that it is difficult to avoid houses being built alongside electricity easements. Examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicates that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity even when the infrastructure has been in existence for a long time (eg Feeder 9JA has been in place since 1952).

233. A study by Professor Beale of Auckland University, involving clinical studies of 570 people over a period of 3 years, found a higher incidence of asthma, diabetes, depression and allergies in people who were exposed daily to radiation levels of 3-5mG.

Submission number: 1108

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

Technical Paper 11 of the Environmental Assessment examines key scientific reports reviewed by international health agencies relating to potential health effects associated with electric and magnetic fields over the past 15 years. The studies generally indicate that the strongest evidence for health effects is from associations with childhood leukaemia and chronic lymphocytic leukaemia in occupationally exposed adults. The evidence associated with childhood leukaemia is considered to be stronger although overall the risk is small. None of the evidence is sufficient to establish that there is any casual link between exposure to EMF and risk to human health. The scientists of the California Department of Health Services completed a major review of the effect of EMF on a number of health conditions in 2002. The scientists were inclined to believe that EMFs do not cause an increased risk of depression and are borderline between believing and not believing on the association with suicide. Integral Energy believes that the omission of this one study does not materially affect the assessment of EMF or its potential health effects documented in the Environmental Assessment. The weight of scientific opinion is unable to conclude that a link between these illnesses and EMFs exist. Indeed, there remains some doubt as to the accuracy of the epidemiological studies which conclude that there is a link between exposure to EMF and illness including cancer.

234. As electrical fields are so easily shielded against, little research has been undertaken into its effects. The EA should consider the effects of both the electric and magnetic fields created by the proposal

235. No shielding against electric fields has been contemplated for the proposal

Submission number: 1108

The predicted electric field generated by operation of the proposal is shown in Technical Paper 8 of Volume 3 of the Environmental Assessment. Modelling indicates that the future level of electric fields resulting from the upgrade would be less than 1kV/metre at the edge of the easement. Technical Paper 9 of Volume 3 of the Environmental Assessment reviews the key scientific reports relating to potential health effects associated with electric and magnetic fields. The World Health Organisation states in their 1998 fact sheet that “available evidence suggests that exposure to electric fields of up to 20 kilovolts per metre has few and innocuous effects”.

The bulk of the research over the past 15 years has been directed toward magnetic rather than electric fields. While EMFs involve both electric and magnetic components, electric fields are driven by the line voltage, are relatively constant over time, are readily shielded and in the health context, are generally not associated with the same level of interest as magnetic fields.

Shielding of electric fields is readily achieved by conducting and semi-conducting objects including buildings, trees and the human body, no shielding for electric fields is proposed.

236. The community wants an assurance from Integral Energy that radiation levels in a particular home just 16 metres from the centreline of the easement will not generate ill-health effects to the family, or consider relocating the family, or localised shielding, such as undergrounding

Submission number: 1108

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

The scientific uncertainty surrounding the link between EMF and potential health effects does not allow a “safe” exposure to EMF to be determined. It is therefore not possible to translate the safe threshold into an easement width. Easement widths for electricity transmission lines are not based upon the mitigation of environmental issues. They are intended to control development and to ensure minimum electrical safety clearances between the conductors and external influences e.g. vegetation clearances being maintained to ensure reliable supplies of electricity.

237. How far away from this particular 132 kV power line does a child have to be before he or she can sleep in safety?

Submission number: 1108

The scientific uncertainty surrounding the link between EMF and potential health effects does not allow a “safe” exposure to EMF to be determined. It is therefore not possible to translate the safe threshold into an easement width. Easement widths for electricity transmission lines are not based upon the mitigation of environmental issues. They are intended to control development and to ensure minimum electrical safety clearances between the conductors and external influences e.g. vegetation clearances being maintained to ensure reliable supplies of electricity. Other responses in this section provide more detailed information to this issue.

238. If a public authority knowingly exposes people to radiation danger, is that authority liable to charges of criminal negligence?

Submission number: 1108

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

Since no health risk has been identified, there is no warrant to suggest that anybody has been placed in danger. Since no risk has been identified, an authority could not knowingly have placed anybody in such a danger. The proposal has been fully investigated and it is inappropriate to speculate on hypotheticals beyond the scope of the submissions report. Integral Energy has undertaken cautionary measures in accordance with the principle of prudent avoidance to ensure that EMF levels from the proposal will be as low as reasonably possible. These measures are indicated on p7-11 of Volume 1 of the Environmental Assessment.

239. Integral should be forced to develop a general public safety policy before the upgrade is permitted to proceed

Submission number: 1108

Integral Energy is a member of the Energy Supply Association of Australia and adopts the Policy Statement on Electric and Magnetic Fields. This includes a commitment to the ongoing monitoring of engineering and scientific research, including overseas policy developments and a commitment to the policy of prudent avoidance as endorsed by the ESAA with regard to the location of assets and electric and magnetic fields.

Integral Energy is committed to ensuring that all our activities and assets conform to all relevant International and Australian Standards, National Health and Medical Research Council Standards, Energy Supply Association of Australia (ESAA) Standards and NSW legislation.

240. Epidemiological studies show that high voltage power line safety issues emerge at low levels of radiation. As a result, all residences should be moved sufficiently away from the power line radiation source such that the magnetic field falls below 2-4 mG

Submission number: 1108

It is incorrect to refer to power frequency EMF as radiation. EMFs result from the forces that electric charges exert on one another and from the movement of electric current. EMFs occur whenever electric current flows in wires or cables of all electrical apparatus, including transmission and distribution electricity lines. The EMF surrounds the wire or cable. Without EMF, there would be no energy flow. When the electrical apparatus is turned off or disconnected however, the EMF ceases. It is this fact that distinguishes EMF from radiation.

Technical Paper 10 of Volume 3 of the Environmental Assessment specifically includes a discussion on the origins and relevance of the 4 mG level in relation to the establishment of a safe threshold of EMF exposure. Integral Energy, NSW Health and ARPANSA agree that the 4mG level is an arbitrary figure and bears no relationship to a safe threshold of EMF exposure for individuals.

Integral Energy has undertaken cautionary measures in accordance with the principle of prudent avoidance to ensure that EMF levels from the proposal will be as low as reasonably possible. These measures are indicated on p7-11 of Volume 1 of the Environmental Assessment.

241. If the draft recommendations of the US NCRP were applied to the proposal the correct width of the proposed corridor, from a public safety point of view, would be around 60 metres

Submission number: 1108

The status of this of this draft document is described earlier. It remains a draft after approximately 10 years and the NCRP has stated that the draft recommendations have no standing at this time. There is no policy basis for applying the EMF limits derived in another country to this project.

242. Insurance for electricity providers is refused against claims by workers and the public for health problems associated with EMF exposure

Submission number: 1109

Integral Energy considers that in circumstances where the risk of future health problems is unable to be quantified, the costs associated with any such problems are similarly unable to be quantified. Any cost attributed would be arbitrary and without foundation.

It is unclear how the policy of an insurance company is relevant to the assessment of the proposal.

4.2.10 Social impacts

243. Integral Energy did not consider costs to the community when choosing the preferred option

Submission numbers: 13, 14, 15, 16, 17, 18, 79

Community issues and values were identified from a number of sources including: public meetings, written submissions and other communications, stakeholder liaison, the Community Advisory Group meetings and workshops and community surveys. Additionally, a study of social and environmental externalities was undertaken which took into account issues associated with the perception of impacts regarding visual, noise, reduced property marketability, safety and health associated with transmission lines for all of the alternative options. The results of an economic assessment conducted by Integral Energy which included these social and environmental externalities are outlined in *Appendix F* of Volume 2 of the Environmental Assessment and summarised on p4-49 of Volume 1. Integral Energy therefore believe that community costs and values were considered to the fullest extent possible in the Environmental Assessment.

244. The losses associated with land devaluation, long-term negative health effects and visual amenity have not been included

Submission numbers: 1101, 1103

Community issues and values were identified from a number of sources including: public meetings, written submissions and other communications, stakeholder liaison, the community advisory group meetings and workshops and community surveys. Additionally, a study of social and environmental externalities was undertaken which took into account issues associated with the perception of impacts regarding visual, noise, reduced property marketability, safety and health associated with transmission lines for all of the alternative options. The results of the economic assessment are outlined in *Appendix F* of Volume 2 of the Environmental Assessment and summarised on p4-49 of Volume 1 of the Environmental Assessment. Integral Energy therefore believe that community costs and values were considered to the fullest extent possible in the Environmental Assessment.

245. Determining the safety of the proposal to the public cannot be left to Integral Energy because Integral has a serious conflict of interest

Submission number: 1108

Public safety is not decided by Integral Energy. Integral Energy is bound by legislation to various standards and guidelines that determine the safety of a proposed structure or activity. Integral Energy is committed to conforming with all industry standards, practices and guidelines.

246. A small group of people along the easement should not suffer large losses to provide advantage to Integral Energy's ratepayers and the community at large

Submission numbers: 78, 110, 118, 128

The development of the concept design takes into consideration the technical requirements of the project and minimising the impact on the environmental, social, economic and design factors. The analysis of alternatives shows that the proposal provides the best solution to address the short and long term needs of the local and regional area and is the best solution from an environmental, social, economic and design perspective. Other network solutions and upgrades would have greater overall impacts. Volume 2 of the Environmental Assessment outlines the option selection process in detail and the justification for the preferred option. The option selected minimises the costs to the community of the overhead options considered. Any losses which are claimed to be sustained must take into account the existing transmission line.

247. It can not be argued that the people who live along the easement are going to benefit from the proposal

Submission number: 128

The proposal will utilise an electricity easement that has been in existence since 1952. There is already an impost on the land via the easement notice on the land title and landowners whose land was originally burdened by the easement were compensated for this. Easement landowners will also benefit from the provision of a safe, secure and reliable supply of electricity.

248. The proposal is not palatable to local residents and its impacts on the visual, social and economic environment can not be mitigated.

Submission number: 110

The proposed upgrade is needed to resolve existing network deficiencies. As a result of the upgrade, existing customers would be provided with a safe, secure and reliable supply of electricity. The preferred option provides the best solution to address the short and long term needs of the area and is the best solution from an environmental, social, economic and design perspective. Other network solutions and upgrades would have greater impacts.

249. Existing residents neighbouring the easement should not have these unsightly, unsafe structures forced onto them for the benefit of the wider community.

Submission number: 78

The history of the easement is explained in *Section 1.2.1* of Volume 2 of the Environmental Assessment. The current easement provisions relate to the construction, maintenance and operation of electrical infrastructure and are assigned to Integral Energy. The proposal is consistent with these provisions. That is, structures are already there. Notwithstanding this, Integral Energy has involved the community in the evaluation of options in order to achieve a balance between the environmental, social, economic and design factors of the proposal. The proposal provides the best solution to address the short and long term needs of the area and is the best solution from an

environmental, social, economic and design perspective. Other network solutions and upgrades would have greater impacts.

250. The cost to minimise the risk to human health should be levied on all energy users

Submission number: 113

Integral Energy is a NSW Government state-owned corporation and as such, is bound by the NSW Government's policies and guidelines for economic, social and environmental equity. The proposal addresses an existing electrical network deficiency and provides for long term demand in the North West Sector. The analysis of alternatives shows that the proposal provides the best solution to address the short and long term needs of the area and is the best solution from an environmental, social, economic and design perspective.

251. Why should the people affected by the upgrade suffer for the good of the whole North West Sector?

Submission numbers: 5, 6, 8, 9, 10, 11, 24, 79, 114, 353-408, 548-604, 767-825, 937-945, 946-948

The Environmental Assessment considered and analysed a number of options. The community was involved in the evaluation of the options and community values, needs and concerns were considered when selecting the preferred option as outlined in *Section 4.3.5* of Volume 1 of the Environmental Assessment. Potential environmental and social and economic impacts were identified during the technical and environmental investigations and mitigation measures have been recommended as outlined in *Sections 6 and 7* of Volume 1 of the Environmental Assessment.

The proposal addresses the identified network deficiencies and provides for the long term demand in the North West Sector. The analysis of alternatives shows that the proposal provides the best solution to address the short and long term needs of the area and is the best solution from an environmental, social, economic and design perspective. Other network solutions and upgrades would have greater impacts. Integral Energy also note that there is an existing easement and transmission line in place.

252. Don't treat the west as second best

Submission numbers: 81, 114, 122, 548-604, 767-825, 937-945, 946-948, 1082, 1084

Integral Energy is a NSW Government state-owned corporation and as such, is bound by the NSW Government's policies and guidelines for economic, social and environmental equity. The proposal addresses an identified electrical network deficiency affecting and provides for the long term demand in the North West Sector. The analysis of alternatives shows that the proposal provides the best solution to address the short and long term needs of the area and is the best solution from an environmental, social and economic perspective.

253. It is unfair that residents adjacent to the proposal be affected by the visual and safety impacts, while users at the end of the transmission line are provided with an aesthetic and safe environment

Submission number: 78

A comprehensive and extensive community consultation and involvement process was implemented during preparation of the Environmental Assessment to ensure that community issues, concerns, values and expectations were considered during evaluation of options.

The development of the concept design takes into consideration the technical requirements of the project and minimising the impact on environmental, social, economic and design factors.

Where impacts have been identified, the recommended mitigation measures will be implemented. The analysis of alternatives shows that the proposal provides the best solution to address the short and long term needs of the area and is the best solution from an environmental, social, economic and design perspective. Other network solutions and upgrades would have greater impacts.

254. Why are above ground power lines only deemed suitable for this section of the proposed upgrade?

Submission numbers: 13, 14, 15, 16, 17, 30, 31, 32, 110

The section of Feeder 9JA south of Schofields Road is not the focus of this Environmental Assessment. However, south of the proposed Rouse Hill Switching Station, the capacity of the lines will decrease from 500MVA (per circuit) to 180MVA. An 180MVA line is significantly cheaper to underground at approximately \$1 million per kilometre. This compares to the \$8-9 million per kilometre that would be required for undergrounding of two 500MVA circuits.

The other important aspect to note is that the developers are financing the undergrounding of this line with the support of Integral Energy.

255. Why should the Vineyard, Rouse Hill and Riverstone areas be the victims of an outdated system of power

Submission number: 119

A comprehensive and extensive community consultation and involvement process was implemented during preparation of the Environmental Assessment to ensure that community issues, concerns, values and expectations were considered during evaluation of options. The development of the concept design takes into consideration the technical requirements of the project and minimising impacts to environmental, social, economic and design factors.

Should the proposal not proceed existing customers would be affected by the declining reliability of the system and would result in the increased likelihood of blackouts. In addition, the provision of electricity to the North West Sector would be limited resulting

in network outages during times of peak demand. As such populations on a local and regional level would be affected should the proposal not proceed.

256. Intergenerational equity would be best maintained by the underground option. Intergenerational equity appears to be only applied to some residents

Submission number: 110

Integral Energy believes that the proposal satisfies the principles of fairness and equity to future generations. These principles are clearly described in *Table 8.1* of Volume 1 of the Environmental Assessment. The extensive cost of underground options would impose an inequitable cost on customers who may derive little or no benefit.

257. Why are a small group of current residents being forced to bear the costs instead of the whole community

Submission number: 118

A comprehensive and extensive community consultation and involvement process was implemented during preparation of the Environmental Assessment to ensure that community issues were considered during the evaluation of options. The development of the concept design takes into consideration the technical requirements of the project and the impacts to environmental, social, economic and design factors.

Should the proposal not proceed existing customers would be affected by the declining reliability of the system and would result in the increased likelihood of blackouts. In addition, the provision of electricity to the North West Sector would be limited resulting in network outages during times of peak demand. As such populations on a local and regional level would be affected should the proposal not proceed. There is also an existing easement and transmission line which reduces the costs to the whole community with the original landowners being compensated for the easement at the time of its acquisition.

258. The burden of electricity demand created by the North West Growth Centre should be spread fairly across the whole area

Submission number: 1103

The development of the concept design takes into consideration the technical requirements of the project and minimising the impact to environmental, social, economic and design factors.

Should the proposal not proceed existing customers would be affected by the declining reliability of the system and would result in the increased likelihood of blackouts. In addition, the provision of electricity to the North West Sector would be limited resulting in network outages during times of peak demand. As such populations on a local and regional level would be affected should the proposal not proceed.

259. Profits are being put ahead of public health and safety

Submission number: 1105

The pricing of electricity associated with the project is a matter that is independent of the issues of safety and public health.

Integral Energy is a NSW Government state-owned corporation and is committed to ensuring that all our activities and assets conform to all relevant International and Australian Standards which, amongst other things, are directed towards safety and public health. The Independent Pricing and Regulatory Tribunal is required to assess the costs it allows Integral Energy to recover against the prudence of the investment that caused those costs to be incurred.

260. The impression given by the EA that the community has accepted the risks associated with the existing transmission line is untrue. The lines have increased since the 1950's, which was not envisaged.

Submission number: 1108

Integral Energy began consultation with the community in June 2004 concerning the project. The consultation activities undertaken by Integral Energy were of various forms and are described in *Section 4.4* of Volume 1. Integral Energy committed to assessing options and consistently providing open and factual information of the proposal to the community.

Growth in power demand as a result of new development is unavoidable. In order to meet this growing demand, it is logical that the electricity network will need to be upgraded as for other types of utility infrastructure eg roads, sewer, drainage, etc. The easement provisions provide Integral Energy the rights to upgrade the network on this easement.

261. Riverstone is unfairly treated in comparison with Rouse Hill, and should be considered more

Submission number: 37

Strategic alternatives that would not require Feeder 9JA to be upgraded are discussed in *Section 4.1* of Volume 1 of the Environmental Assessment. These alternatives were found to either create more impacts to the local and regional environment or to be technically unfeasible. As such, four route alternatives were developed, all of which pass through Riverstone due to its location between the Vineyard Bulk Supply Point and the proposed future Rouse Hill Switching Station.

The upgrade is needed to address an existing network deficiencies that affect Riverstone, Rouse Hill and a number of other suburbs in the region. The upgrade will also provide the infrastructure necessary to provide safe, secure and reliable supplies of electricity to future Riverstone and Rouse Hill residents.

262. Plans by landholders at Riverstone to sub-divide land has been adversely impacted by the proposal

Submission number: 37

The land through which the proposal traverses is already affected by an existing easement. The proposal will not change the subdivision potential of the area from that which existed prior to the proposal.

263. People who have to buy cheap housing should not be expected to sacrifice their health by buying homes near transmission lines

Submission number: 1108

Where people choose to live is an individual choice based a number of factors such as price, lifestyle aspirations, proximity to work and transport, etc. Dwellings located near transmission line easements may often be purchased at lower prices than surrounding blocks due to the perceived environmental impacts of the infrastructure. In this specific circumstance, however, an existing transmission line and easement exist and have existed for many years, such that the marginal impact of the proposal on these properties is estimated at 0-2 percent. Further, the existence of transmission line easements may also provide larger blocks and views to bushland and open space such as an easement may provide which may be valued by some people more so than perceived amenity impacts. Overall, the purchase of property remains the choice of individuals. It is also important to note that there is no scientific evidence of health impacts associated with exposure to EMF.

264. The proposal only favours developers

Submission number: 110

The proposed upgrade is required to address existing network deficiencies that will increasingly affect the population at a local and regional level. Without the proposed upgrade proceeding, it would not be possible to develop any land in accordance with the NSW Government's plans simply because there would be no electricity available to service these areas.

The preferred option was chosen after a comprehensive option selection process which took in to account environmental, social, economic and design factors. Volume 2 of the Environmental Assessment outlines the option selection process in detail. The preferred option was chosen as it provided the best balance between these impacts.

265. The proposal will lead to a win/lose outcome, when it should be a win/win outcome for the community

Submission numbers: 128, 1103

The proposed upgrade is needed to address existing network deficiencies and provide power supplies to enable the development of the North West Sector. As such, populations on a local and regional level would be adversely affected should the proposal not proceed.

The upgrade would create benefits for the community on a local and regional level as it would secure an adequate power supply for existing residents and enable a sufficient supply for future development of the area. Economic impacts to existing and future customers were considered as a key factor in selecting the preferred option.

The analysis of alternatives to the proposal shows that the preferred option provides the best solution to address the short and long term needs of the area and is the best solution from an environmental, social, economic and design perspective. Other network solutions and upgrades would have greater impacts.

4.2.11 Support

266. There is a general understanding of the increasing demand for energy and future growth

Submission number: 110

Noted. The need for the proposal is generally accepted.

267. The upgrade is necessary to sustain the growth of the area

Submission numbers: 20, 28, 29, 80, 1101

Noted. The need for the proposal is generally accepted.

268. Strong support is expressed for the need to provide additional power supply to cater for existing and future customers within the North West Sector.

Submission number: 1081

Noted. The need for the proposal is generally accepted.

269. Integral Energy needs to be given adequate resources to enable the urgent implementation of their upgrade program

Submission number: 1

Noted.

4.2.12 Other

270. The fees paid to the environmental consultant were not disclosed

Submission number: 1104

Financial arrangements between Integral Energy and its consultants have no bearing on the need to prepare an Environmental Assessment for the proposal.

271. The lines are a potential bushfire risk

Submission number: 1109

Section 7.2.4 of Volume 1 of the Environmental Assessment outlines the potential bushfire risk and the mitigation measures which would be put in place to reduce the risk. Principally, this relates to a Bushfire Management Plan which would required annual inspections and rectify problems prior to the onset of the bushfire season. This requirement is common for all electrical infrastructure operated by Integral Energy.

272. The Liberal party promised to put the lines underground if they win the next election, even if the Labour party approves it

Submission numbers: 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18

No comment.

273. The NSW Labour government should be made aware that Integral Energy's approach to the project will cost them at least one seat in the next state election.

Submission number: 18

No comment.

274. Support is expressed for Blacktown City Council's arguments against the proposal

Submission numbers: 26, 27, 32, 33, 34

Noted.

275. Blacktown City Council has stated that it does not support the proposal and that it will pose a health risk for the residents

Submission numbers: 30, 31

Noted.

276. Television and radio interference can occur near overhead transmission lines

Submission number: 1109

Section 7.2.3 of Volume 1 of the Environmental Assessment outlines television and radio interference issues. Approaches that are available to members of the community to mitigate the potential for television and radio interference include:

- watching local television services, as these have higher signal strength and low signal strength worsens interference
- ensuring that outdoor antennas and cabling are in good condition
- reporting persistent interference to Integral Energy.

4.3 Response to Government correspondence

Three submissions were received from government organisations following exhibition of the Environmental Assessment. They are presented in *Appendix B* and were:

- Blacktown City Council (Submission number 130)
- Sydney West Area Health Service (Submission number 80)
- NSW Health Department (Submission number 1101).

These submissions were allocated submission numbers and considered in the previous section. A consolidated response to the issues raised in each submission is presented here. The Department of Planning also provided comments on the proposal and material presented in the Environmental Assessment. These issues are similar to those from the community and other Government agencies. Integral Energy will be responding to these issues separately.

4.3.1 Blacktown City Council

1. The proposal will adversely affect the future urban development of 220 properties in the Riverstone Release Area. In particular, the Scheduled Lands where redevelopment proposals have stalled for over half a century.

Integral Energy is not responsible for the urban planning nor the legislative difficulties that have prevented the development in the scheduled lands. These responsibilities lie with Blacktown City Council and the Department of Planning.

Integral Energy's understanding is that the difficulties associated with the redevelopment of the Vineyard and Riverstone scheduled lands are not solely related to the existing electricity easement and include: the legislative processes previously adopted, the large number of disparate landowners, the size of some blocks (some as small as 100 square metres) and other land use constraints including a 65 metre easement in favour of TransGrid.

Integral Energy's proposal would utilise an existing electricity easement which has been in place since 1952. Conversely, the planning of the Riverstone and Riverstone East precincts has been undertaken only relatively recently and prior to the upgrade commencing. The future planning of these precincts was therefore undertaken in the clear knowledge that the easement would remain in place.

2. The proposal will further restrict the urban potential and marketability of the lands adjoining the existing easement by contributing to visual blight, detracting from the future residential character and amenity of the Release Area lands, contributing to perceptions and anxieties about the health impacts of high voltage transmission lines for future residents of adjoining urban areas and detracting from the economic value of properties affected by and adjoining the easement

The proposal would utilise the existing easement in its entirety and the Environmental Assessment indicates on p7-2 of Volume 1 that the proposal would be generally compatible with the current and likely future land uses and not result in a change in land uses.

Visual issues were identified as a potential cumulative impact on p8-3 of Volume 1 of the Environmental Assessment as a result of proposed long term development. Mitigation measures incorporated into the proposal design are outlined on p7-6 of Volume 1 of the Environmental Assessment. It was also noted that the retention of mature trees would reduce the visibility of the proposal as well as provide a broad range of other social and environmental benefits and reduce property devaluation effects.

Property devaluation was estimated to be between 0 and 2 percent for properties located within 50 metres of the alignment. These devaluation effects were identified as being temporary given the local and regional benefits which would result from the provision of a safe, secure and reliable supply of electricity and the broader appreciation of property values which would result from future urban development.

The future residential character and amenity of the Riverstone Release Area will depend on a number of factors including the final design of the subdivision, the density of housing and the quality of development within it.

There are a number of factors that contribute to community and individual perceptions and anxieties. What is perceived as a threat to one community or individual may not be classed as such by another. There is no evidence that substantiates that the proposal will present a health threat to future communities in adjoining urban developments. Notwithstanding, the property devaluation estimates have relied on perceptions rather than facts and these have been incorporated into the analysis conducted. Integral Energy has also adopted a number of design measures consistent with the principle of prudent avoidance, as indicated on p7-11 of Volume 1 of the Environmental Assessment, to minimise EMF levels to as low as reasonably possible.

The study on social and environmental externalities (refer *Appendix E* of Volume 2 of the Environmental Assessment) indicates that reduced marketability of properties is a factor associated with properties located adjacent to overhead transmission lines but notes that developers often use mitigating tactics such as increasing the size of these blocks or artificially creating demand in order to sell the properties.

There is no evidence that land alongside the easement will be unsaleable due to the development of the proposal. In fact, examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicate that despite the

existence of electricity infrastructure, people choose to purchase properties in close proximity to the infrastructure.

3. The proposal will limit the potential for co-location of services, which would result in less fragmentation and a more efficient and economic use of land. The proposal is contrary to the objects of the Planning Act relating to the 'promotion and co-ordination of the orderly and economic use and development of land' and the State Governments objectives in relation to 'Investigation Zones' which is 'to protect, and prevent the fragmentation and inappropriate development of land that may have potential for future development'

The reasons why the proposal might result in fewer opportunities for future co-location of utilities is unclear in the submission.

The principle of co-location of services and utilities may potentially result in more efficient land use and development outcomes, however, there are practical reasons why a high degree of utility co-location may be difficult to achieve in practice. Utilities often have very different siting and operational requirements which do not easily facilitate co-location, eg. gravity sewerage needs to flow downhill, transmission lines seek direct routes, railways have limitations on horizontal curvature and vertical grades, roads should ideally be separated from power poles for safety reasons, etc.

The route adopted by the proposal is along one of the strategic corridors investigated by Integral Energy in the development of potential options. Some of the options investigated specifically considered co-location with other existing infrastructure such as with Windsor Road and an existing TransGrid easement. These options were not adopted as the preferred option on the basis of the balance of social, environmental and economic aspects inherent in them.

The existing transmission line easement has been in existence since 1952 and Integral Energy has continued to advise the Department of Planning of the presence of the electrical infrastructure. The current structure planning exercise undertaken by the Department of Planning does not involve investigation of the detail of particular easements in future development areas. Integral Energy understands that the majority of future services and utilities are currently undergoing planning and have yet to be completed. This includes the North West Rail link which from our knowledge is only currently being planned up until Rouse Hill. The next step in the planning of the North West Sector is likely to be the point at which the detail of all existing land use constraints will be considered by developers and it is possible that developers may approach Integral Energy at that time to discuss better land use efficiency which might involve a relocation of the existing transmission line or undergrounding. This process may also realise opportunities for utility co-location that currently have not been identified.

The implementation of the proposal is fundamental to achieving the future development announced by the NSW Government. Integral Energy therefore believe that the upgrade achieves the primary project objective in relation to providing for the orderly and economic development of land in accordance with the Planning Act.

The 'Investigation Zones' of the North West Sector Structure Plan were announced by the NSW Government on 27 January 2006 following exhibition of the Environmental Assessment. While the objectives of the Investigation Zones are as stated, there is no

basis in the structure plan for the assertion that this would invalidate existing land uses, particularly given the long standing nature of the existing transmission line easement.

The object referred to is not the only object referred to in the Planning Act and Section 5(a)(ii) of the same Act states 'encourage the protection, provision and co-ordination of communication and utility services'. The proposal satisfies this object.

4. The EA fails to adequately measure the economic impacts of the proposal in relation to the loss of development and property market values. One paper from the UK cited a 6-17 percent reduction for properties within 100 metres and another from Wisconsin up to 14 percent. This latter paper also indicates that the value reductions could be greater for smaller properties.

The study of social and environmental externalities (refer *Appendix E* of Volume 2 of the Environmental Assessment) included an international literature review and summarises the results in *Table 4.5* on p33 of the report. The table identifies a range of impacts from 0 to 50 percent depending upon the specifics of each country and circumstance. In so far as the results of the studies cited in the submission fall within this range, we do not believe this additional information materially alters the conclusion of the study. We do however acknowledge that the Wisconsin study found that the value reduction of smaller properties could be greater which is additional information not identified in the other papers reviewed.

The study of social and environmental externalities was conducted by a firm who provide specialist independent property advice. The valuation of externalities is a complex issue however Integral Energy believe the approach adopted is valid and the results accurate. A key factor in the results of the study is that there is already an existing transmission line in place. Therefore the impact on property prices identified to result from the proposal reflects only the marginal impact i.e. on top of that which already exists. Therefore, comparisons with properties which were unaffected prior to the construction of a transmission line, are misleading. The paper also identifies that it is peoples perceptions of issues which drive property price reductions, rather than the facts in each case.

Given that the literature and case studies reviewed from outside of Australia may not be relevant to the specifics of the circumstances at Riverstone, the study included a survey of local property agents and valuers who provided their expert opinions on the reduction in property values which would result from the various options.

Examples such as at Carlingford and more recent land releases at Werrington Downs, Rouse Hill and Cambridge Park (refer Attachment 2, *Appendix E* of Volume 2 of the Environmental Assessment) indicate that despite the existence of electricity infrastructure, people choose to purchase properties in close proximity to them. These examples do not support the contention that development of electricity infrastructure necessarily results in a loss of development outside of the easement. This would be particularly the case where there is an existing transmission line in place and therefore an existing impact.

5. Underground options would provide the following advantages:

- **Vegetation management costs are lower**
- **Less susceptible to extreme storm conditions (except flooding) leading to long term saving on repair costs**

The comparative performance of all options considered is summarised in *Table 4.4* of Volume 1 of the Environmental Assessment. Both overhead and underground options have advantages and disadvantages. An economic analysis of the project options included in *Appendix F* of Volume 2 of the Environmental Assessment considered both the direct costs to Integral Energy and the perceived costs to the community (in terms of social and environmental externalities) in arriving at its conclusion. This conclusion was that Integral Energy's proposal results in the lowest impact on social and environmental externalities of the options that do not involve undergrounding.

The preferred option is a result of comprehensive technical investigations and consultation with the community advisory group and other project stakeholders. The rationale for selection of the preferred option is outlined on p4-66 of Volume 1 of the Environmental Assessment and the overall justification for the proposal on p8-1. Integral Energy believe that the proposal appropriately balances the social, environmental and economic issues.

6. The estimated cost of two other projects eg the Picnic Point to Haymarket project by TransGrid and the undergrounding the two, twin circuit 132 kV cables at Homebush through the Sydney Olympic site seems lower than the prices quoted by Integral Energy for its underground options.

7. Since these lines were able to be placed underground, it must be possible to underground Feeder 9JA

The costs associated with all options considered in the Environmental Assessment have been independently verified by a specialist engineering firm. A comparison of the costs between the cheapest fully overhead option (Option A) and fully underground option (Option F) indicates that the underground option is approximately six times more expensive. A partly underground option (Option I) is still more than three times more expensive than Option A.

Integral Energy is a state owned corporation and as such is required to undertake prudent investments in accordance with the Independent Pricing and Regulatory Tribunal's 2004 Network Determination and the National Electricity Rules. While we do not have detailed knowledge of the projects cited, the difference in costs may be related to the different voltages and capacity of cables used as well as the number of circuits implemented.

It is noted that in April 2005, the Australian Competition and Consumer Commission (ACCC) made a decision to disallow \$36 million (1999 dollars) of capital expenditure, principally relating to the two projects cited above undertaken by TransGrid and Energy Australia. The ACCC was not satisfied that these underground transmission projects were prudent investments, on the grounds of the substantial cost overruns and concerns

over whether replacement of the overhead lines with undergrounding was necessary and led to a consumer benefit.

In Integral Energy's 2004 Network Determination, the Independent Pricing and Regulatory Tribunal did not consider or make allowance for specific undergrounding, rather it undertook a total cost review and engaged Meritec to assess Integral's capital expenditure. Meritec accepted Integral's capital proposal as prudent.

The undergrounding of Feeder 9JA would not represent a prudent investment and would therefore not satisfy the objectives of the Environmental Assessment. Integral has previously stated on record that they will make a contribution equal to the cost of an equivalent overhead asset plus any savings identified in operations and maintenance costs arising from an underground solution. Other beneficiaries who receive the direct aesthetic and amenity benefits provided by undergrounding would be required to meet the remaining costs of undergrounding network assets.

8. The EA lacks a full discussion of alternative funding mechanisms or arrangements that could help meet the cost of undergrounding the project

The Environmental Assessment is not the place for a discussion of alternative funding mechanisms when there is already a funding mechanism in place for the industry. Integral Energy has no discretion whether or not to fulfil its obligations under the National Electricity Rules and the Independent Pricing and Regulatory Tribunal's Network Determination as these are legislative requirements. If Integral Energy were to proceed on an investment which was not considered financially prudent by the Independent Pricing and Regulatory Tribunal, then this would result in losses being incurred by Integral Energy.

9. It is noted that Integral Energy may reconfigure or relocate the transmission line in future. This would be wasteful. The project should not proceed if it is intended to relocate the transmission line in the near future

Integral Energy has no plans to relocate the transmission line in the future. The statement made on p7-2 of Volume 1 of the Environmental Assessment is that "the proposal would provide the opportunity for potential relocation of the infrastructure in the future if required". This could only be undertaken if a number of existing issues, not in Integral Energy's control, could be overcome.

Based on past experience, the most feasible scenario for a future relocation of the proposal would be when the area is being redeveloped for release. At this time, developers would make a commercial decision whether their costs for relocation or undergrounding of the line would likely be offset by the sale of future lots. The transaction also becomes much simpler because the negotiations are only with one party.

10. The upgrade should be undertaken along First Ponds Creek or another floodplain or co-located with existing infrastructure corridors.

An alignment along First Ponds Creek was not specifically considered in the Environmental Assessment. *Figure 4.5* in Volume 1 of the Environmental Assessment

indicates the strategic route corridors investigated which link the two identified project end points. A potential alignment along First Ponds Creek would potentially cross three of these corridors and would be less direct. A potential alignment along First Ponds Creek would also incur new impacts on properties on which there are currently no easements, the poles would need to be 30 metres to account for flooding issues and would need to be located along both Windsor Road and Schofields Roads in order to route back to the future site of the Rouse Hill Switching Station. Discussions with the Roads and Traffic Authority have confirmed that the project is not able to be co-located along Windsor Road for reasons stated on p 4-14 of Volume 1 of the Environmental Assessment.

Other options considered eg Options F, G, H, J, K and L variously contain sections of alignment which are co-located with existing roadways or other infrastructure. Options G and K propose to utilise the Eastern Creek floodplain which was the specific subject of discussion at the meeting on 24 June 2004 cited by Council.

11. Integral Energy should consult with the Department of Planning to identify service corridors consistent with the proposed North West Growth Centre draft Structure Plan

Integral Energy has been in discussion with the Department of Planning since 1992 on the future planning of the North West Sector. The proposal is entirely consistent with the Sydney Metropolitan Strategy.

The revised structure plan released for the North West Sector on 27 January 2006 is of a strategic nature and does not identify service corridors which could be utilised for this proposal.

12. The number of affected properties post 2007 should be taken into account when choosing the preferred option as there will be significantly more properties affected by the transmission line at this time.

The number of lots affected in 2004 and 2007 was one criteria among a number of others used to form a view of the likely differences in options performance. There is difficulty in predicting the number of lots post 2007 unless information is made available from the Department of Planning on the average lot yield expected in each area and the timing of each development. To draw valid comparisons between the options, information on expected lot yields would have to address a number of different release areas which represent conditions along all of the alternative routes. Despite liaison with the Department of Planning on a number of occasions during the conduct of the Environmental Assessment, such detailed information is not currently available.

Decisions on planning matters are the responsibility of the relevant planning authority.

4.3.2 NSW Department of Health and Sydney West Area Health Service

Submission number: 80, 1101

- 1. Section 3 of the EA clearly establishes the need for an upgrade of the existing infrastructure. The potential demand resulting from likely future urban development is acknowledged and further establishes the need to upgrade the existing infrastructure.**

The comments are noted. The need for the proposal is generally accepted.

- 2. There continues to be uncertainty about the role of magnetic fields in the incidence of cancer. In response to the scientific evidence available up to 2002, the International Agency for Research on Cancer (IARC) classified extremely low-frequency magnetic fields as possibly carcinogenic to humans (Group 2B). The 2002 IARC evaluation of the evidence relating to carcinogenic effects of ELF EMF on humans determined that there is limited evidence in humans for the carcinogenicity of extremely low frequency magnetic fields in relation to childhood leukaemia.**

The finding that ELF magnetic fields are “possibly carcinogenic to humans” was driven by limited evidence in humans in combination with inadequate evidence in experimental animals. This finding was consistent with the findings of the UK National Radiological Protection Board (NRPB) in 2001 who found:

“laboratory experiments have provided no good evidence that extremely low frequency electro magnetic fields are capable of producing cancer, nor do human epidemiological studies suggest they cause cancer in general. There is, however, some epidemiological evidence that prolonged exposure to higher levels of power frequency magnetic fields is associated with a small risk of leukaemia in children.

In practice, such levels of exposure are seldom encountered by the general public in the UK. In the absence of clear evidence of a carcinogenic effect in adults, or of a plausible explanation from experiments on animals or isolated cells, the epidemiological evidence is currently not strong enough to justify a firm conclusion that such fields cause leukaemia in children. Unless, further research indicates that the finding is due to chance or some currently unrecognised artefact, the possibility remains that intense and prolonged exposures to magnetic fields can increase the risk in leukaemia in children”.

The classification: Group 2B – possibly carcinogenic has been applied to more than 200 substances including naphthalene, styrene, coffee, diesel, petrol and petrol fumes. It is noted that society does not always seek to impose limitations on the availability or exposure to these substances.

3. It is the NSW Health Department's view that current evidence is not sufficient to establish definite causation. Furthermore even if causation could be assumed, based upon current scientific knowledge it is not possible to quantify the level of risk for a certain level of magnetic field and it is unclear whether there is a threshold level below which magnetic fields do not pose a risk. Consequently, the Department's policy is one of employing prudent avoidance when assessing risks from developments such as the upgrading of a power line within an existing easement.

Integral Energy agrees with the Department's position that current evidence is not sufficient to establish definite causation between EMF and adverse health affects. Notwithstanding the current state of scientific knowledge, Integral Energy continues to monitor the latest research and expert opinion on this matter through its membership of the Energy Supply Association of Australia (ESAA) and its own independent monitoring.

However, various inquiries and review bodies have indicated that, if it does exist, the level of risk is not large eg Gibbs *"the fact that evidence on the question whether exposure creates a risk to health is so inconclusive suggests that, if a risk exists it is a comparatively small one"*. NRPB (2001) *"there is, however, some epidemiological evidence that prolonged exposure to higher levels of power frequency magnetic fields is associated with a small risk of leukaemia in children"*. ARPANSA *"on balance, the scientific evidence does not indicate that exposure to 50 Hz EMFs found around the home, the office or near power lines is a hazard to human health"* (fact sheet 8) and *"the scientific research done so far shows that if any risk exists, it is small"* (fact sheet 19).

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic field at the edge of the easement for the proposal based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA transmission line (2005-06) when operating at 45 MVA is 11.7 milligauss. In the year 2028, the magnetic field of the proposal will match the existing magnetic field of Feeder 9JA, as shown in *Figure 7.3* of Volume 1 of the Environmental Assessment.

4. In 1991 the NSW Government commissioned Sir Harry Gibbs to conduct an inquiry into community needs and high voltage transmission line development. In this report he advocated the policy of prudent avoidance by stating: "when new lines are being constructed, it may be prudent to do whatever can be done without undue inconvenience and at modest expense to avert the possible risk, remembering that if that is not done and future research establishes the existence of a real risk to health, serious problems may arise which can be remedied only at great cost".

The Energy Supply Association of Australia and Integral Energy for many years has adopted the application of "prudent avoidance" as proposed by Sir Harry Gibbs as a policy. The question of its interpretation is addressed further below. However, it should be noted that there has been a large volume of research and many other inquiries in the

15 years since the Gibbs inquiry. Yet, despite this, a “real risk to health” has not been established.

As noted previously, Integral Energy has successfully applied prudent avoidance to the proposal resulting in substantial improvements to the EMF fields relative to the existing situation.

5. When interpreting prudent avoidance it is important to emphasise that “prudence” should be interpreted in terms of reasonable cost and that it does not relate to health risk. It is difficult to define what a reasonable cost would be when addressing development proposals and consequently this should be done on a case-by-case basis.

Consistent with Sir Harry Gibbs’ definition, prudence implies modest cost and without undue inconvenience.

6. When considering what level of expenditure to minimise magnetic fields is prudent when upgrading a power line in an existing easement one factor that could be considered is the likelihood of future development. It is the Department’s understanding that the land surrounding 9JA will almost certainly be used for higher density development in the future. It is the Department’s view that when upgrading a power line in an area where future higher density development is likely, it is highly desirable to avoid creating levels of magnetic field exposure higher than those that existed prior to the upgrade. Furthermore, in this situation it is also desirable to explore options that decrease magnetic field exposure to levels below those that existed prior to the upgrade.

Having regard to the current state of the science, namely that adverse health effects have not been established and it is not possible to quantify the level of risk, if any, for any particular magnetic field level, there appears to be no logical basis for selecting the field level associated with the existing line as an arbitrary standard. It would be a more rational approach in the context of prudent avoidance, to adopt whatever measures could be adopted at modest cost and without undue inconvenience to reduce the fields likely to be associated with the proposed line. The suggestion that “it is also desirable to explore options that decrease magnetic fields exposure levels below those that existed prior to the upgrade” is inconsistent with the notion of prudent avoidance.

The World Health Organisation has produced a discussion document on cautionary policies, which may be applied in relation to electromagnetic fields. In discussing the uncertainties surrounding the EMF / health issue it says “in particular, a number of epidemiological studies suggest the existence of weak links between exposure to EMF and human disease. The studies involve a variety of diseases and exposure conditions. However, the largest body of evidence involves a possible increase in risk of leukaemia in children associated with exposure to electric and magnetic fields at power frequencies (50 / 60 Hz) in the home. Other scientific evidence, including a large number of animal studies does not support this conclusion, and many of the epidemiological studies themselves suffer from problems including inadequate exposure assessment”.

The document also quotes that “no major committee has concluded that a hazard actually exists from low level fields”. In relation to prudent avoidance the document says “since 1989 prudent avoidance has evolved to mean taking simple, easily achievable, low cost measures to reduce EMF exposure, even in the absence of a demonstrable risk”. ... “prudent avoidance prescribes taking low cost measures to reduce exposure in the absence of any scientifically justifiable expectation that the measures would reduce risk. Such measures are generally framed in terms of voluntary recommendations rather than in terms of fixed limits or rules”. Integral Energy has applied prudent avoidance to the proposal as outlined above.

The document also notes “in prudent avoidance, as implemented by various countries, prudent refers to expenditures, not an attitude to risk. It does not imply setting exposure limits at an arbitrary low level, and requiring that they be achieved regardless of cost, but rather adopting measures to reduce public exposure to EMF at modest cost”.

7. The EA has identified the proponent’s preferred option (option C) and briefly outlined alternate options along with broad costings (section 4.2.4). Estimates of magnetic field strengths generated by these options are described in the Environmental Assessment, volume 1, figure 7.3 and in Appendix D “Environmental Assessment for the Vineyard to Rouse Hill Electricity Upgrade Electric and Magnetic Fields Study of Project Options, 26 October 2005”. There is also an assessment of the level of magnetic field strength that 9JA produces (labelled “abnormal operating conditions in figure 7.3 & 9JA:2005/6 in figure 1 of appendix D) and a hypothetical estimate of magnetic field level that could be produced assuming the 9JA feeder was to operate closer to maximal capacity (82 MVA). It is the Department’s view that the current level of magnetic field generated by 9JA ie the level identified as “abnormal operating conditions” and 9JA:2005/6” should be used as a benchmark against which to compare the magnetic fields produced by the options considered.

We do not agree that alternative options are outlined only briefly. Volume 2 of the Environmental Assessment provides a detailed comparison of the nine project options considered. The level of detail of this consideration is equal in all cases. The accuracy of the costings is expected to be within 10 percent.

It is not unreasonable to regard the field strengths currently associated with the 9JA line as a reference point. However, in the context of prudent avoidance, there appears little logic in seeking to impose it as a standard (albeit an arbitrary one) to be met by the proposed line. Prudent avoidance involves looking at the job to be done, in this case, providing a two single circuit 500MVA transmission line from Vineyard to Rouse Hill in order to meet electricity demand many years into the future, identifying the options available to reduce magnetic fields and implementing all of those which can be implemented at modest cost and without undue inconvenience. These attributes are described in the Environmental Assessment. Given that load growth resulting from future urban development will occur, the adoption of any benchmark appears arbitrary. This is even more so when it is considered that the electricity network is not operated in order to minimise EMF exposure but to supply a reliable source of power. As demonstrated in

the case of Feeder 9JA, this can result in substantial changes to the loading of a particular line on a frequent basis and unrelated to EMF exposure.

8. The upgrading of power lines in existing easements has the potential to increase levels of magnetic fields above those that already exist. In the case of upgrading the existing 9JA feeder it can be seen that the preferred option C is predicted to result in an increase of approximately 8 milliGauss (or 80%) above the existing level of magnetic field at the edge of the existing easement by 2043 (figure 7.3). Prior to 2043 the level of magnetic field will be less with lower levels than those that currently exist being present prior to 2019.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005/06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

Integral Energy has conducted a further design refinement subsequent to the exhibition of the Environmental Assessment. This refinement has been based on a detailed span by span analysis with a conductor height ranging between 10.5 and 17.4 metres. This process has allowed Integral Energy to achieve a magnetic field at the edge of the easement in 2043 of less than 11.7 milligauss for all spans, with the exception of two 330 kV under-crossings and one structure adjacent to the Vineyard bulk supply point. In these three situations, the maximum magnetic fields at the edge of the easement would be 13.8 milligauss.

The magnetic field levels are substantially less than the relevant health guideline of 1000 milligauss for 24 hour general public exposure.

9. It should be noted that option E involving total underground cabling is estimated to produce magnetic fields much lower than existing levels up to and including 2043. Option I involves a combination of underground and overhead cabling and is predicted to initially produce magnetic field levels lower than those that currently exist. With increasing electricity demand the level of magnetic field produced by this option is predicted to be similar to those that currently exist by 2043. All options exclusively using overhead cabling only, whilst also initially producing lower magnetic field levels are predicted to produce magnetic field levels similar to existing levels by 2019 and higher levels thereafter with options A & B producing marginally lower levels than the preferred option C.

The table presented in Attachment 2 of Technical Paper 8 of Volume 3 of the Environmental Assessment clearly sets out the magnetic fields for the proposal at the

edge of the easement based on a preliminary line design with an average conductor height of 8.5 metres. According to this table, the magnetic field at the edge of the easement in 2043 (with each circuit operating at 243 MVA) is 18.1 milligauss. The magnetic field of the existing Feeder 9JA line (2005/06) when operating at 45 MVA is 11.7 milligauss. In the year 2028 the magnetic field of the proposal will match the magnetic field of the existing line as described in *Figure 7.3* of Volume 1 of the Environmental Assessment.

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10. As demonstrated in the EIS there are considerable marginal construction costs generated when comparing underground options to the preferred option proposed. The cost above that for the preferred option have been estimated as: option E \$56M (72.8M-16.8M) and option I \$22 M (38.8M-16.8M). The overhead cabling option A has a lower capital cost of \$11.8M compared to \$16.8M for the preferred option.

The high cost of underground cables compared to an equivalent overhead line counts significantly against un precludes their consideration under the category of prudent avoidance. This was noted by Sir Harry Gibbs in his 1991 report “having regard to the cost, it cannot be stated as a general rule that new lines should be placed underground for the purpose only of avoiding a possible risk to health”.

11. The NSW Health Department notes the economic assessment of “social & environmental externalities” presented in section 4.3.6. This assessment has been based upon a survey of real estate and property professionals and is limited to “property values”. As such this cost only takes into account impacts upon existing land holders and does not address costs that future residents may have. It is important to note that this sort of assessment does not include any cost associated with potential health issues. As referred to earlier Gibbs stated in relation to taking prudent measures to minimise exposure to magnetic fields “...if that is not done and future research establishes the existence of a real risk to health, serious problems may arise which can be remedied only at great cost”. The financial and economic analysis economic analysis included in table 4.4 does not consider this component.

A closer examination of the Social and Environmental Externalities Study contained in *Appendix E* of Volume 2 of the Environmental Assessment would reveal that the property value was used a surrogate for a range of social and environmental issues including perceptions of visual impact, health effects, safety, aural issues and reduced

marketability of properties. It may in fact include other aspects but these were the ones most commonly cited in the literature reviewed. To the extent that these issues accurately reflect the communities concerns about electricity infrastructure would mean that the estimated costs are not limited only to the existing landholders and would also apply to future landholders.

Integral Energy considers that in circumstances where the risk of future health problems is unable to be quantified, the costs associated with any such problems are similarly unable to be quantified. Any cost attributed would be arbitrary and without foundation.

Furthermore, it is arguable that, even if the possible risk implied by some of the epidemiological studies was assumed to be a real one, it would have only a minor influence due to the relatively small number of people involved, the rarity of childhood leukaemia as a disease and the low risk ratios reported in the epidemiological studies.

As identified in *Appendix E* of Volume 2 of the Environmental Assessment, it is the communities perception of an issue which drives changes in the value of social and environmental externalities rather than necessarily any factual basis. In this regard therefore, the approach adopted for the social and environmental externalities study has appropriately addressed the issue of potential health effects to the extent possible in this type of study.

12. There is a clear need to upgrade the existing infrastructure and in choosing an option one of the factors that needs to be considered is the level of magnetic field that the new infrastructure generates. The likely outcome of the preferred option will be that an increased number of people (in newly developed homes) will be exposed to higher magnetic field levels than those that currently exist. It is the view of the NSW Health Department that further consideration should be given to options for the density of adjacent residential development, the width of the easement and at least an element of underground cabling.

The statement “the likely outcome of the preferred option will be that increased number of people (in newly developed homes) will be exposed to higher magnetic fields than currently exist”, is correct in so far as the North West Sector will develop in accordance with the stated objectives of the Sydney Metropolitan Strategy.

Integral Energy has considered the option of widening the existing 30 metre easement. It has ultimately determined not to do so for a number of reasons. First, the width of the easement required for a project is determined by the various requirements for minimum clearance, access and maintenance purposes. It is not determined having regard to EMF strength at a particular location.

Second, to alter the easement width to reduce EMF encounters the same problems as are associated with imposing an arbitrary standard of EMF exposure.

Third, widening the easement may expose Integral Energy to costs in compensating adjoining landowners for any increased burden on their land.

Fourth, widening the easement may result in undue inconvenience, especially in respect of those landowners who have developed their properties within the boundaries of any proposed widening.

In Integral Energy's view, widening the easement may not satisfy the 'modest cost' and 'without undue inconvenience' limbs of prudent avoidance, particularly in circumstances where it is unclear whether widening the easement would ameliorate any potential health risk.

The existing transmission line and easement have been in existence since 1952. Integral Energy has been in consultation with the Department of Planning regarding the development of the North West Sector since 1992 to ensure that the infrastructure is able to support the proposed development. Integral Energy representatives have continually identified the location of existing electricity infrastructure to the Department. Since the Sydney Metropolitan Strategy is a relatively recent document, it is not unreasonable to assume that full account of the existing infrastructure and its potential impacts have been assumed which may, upon the release of more detailed planning information from the Department, indicate that residential densities have been reduced.

13. The prediction that energy consumption will rise at the rate of 14 percent per annum is concerning. New technologies for renewable sources of energy as well as the implementation of strategies to reduce energy use are supported.

The catchment area for the upgraded Feeder 9JA is currently characterised by large, rural landholdings and low density development. The NSW Government has announced the expected type and density of future land releases which will comprise land for residential, commercial and employment development and estimated that some 60,000 new dwellings will be developed over the next 25-30 years. It is incontrovertible given this intensity of development and transformation of land use that energy consumption in these areas will rise substantially relative to current usage trends.

Integral Energy is also concerned about the potential rise in electricity consumption and has taken the extraordinary step of establishing a \$500,000 demand management fund to be spent on projects in the Blacktown and Baulkham Hills Local Government areas among other initiatives to help reduce the unnecessary consumption of electricity.

Integral Energy also supports new technologies for renewable sources of energy.

5. Additional investigations undertaken after exhibition of the Environmental Assessment

5.1 Financial and economic assessment

The financial and economic analysis has been revised to address the reliability limb of the National Electricity Rules. This revision has no effect on the modelling or the conclusions of the report compared with that exhibited in the Environmental Assessment.

A financial and economic analysis report was prepared by Integral Energy and exhibited in the Environmental Assessment for the Vineyard to Rouse Hill Electricity Upgrade to fulfil its obligations under the National Electricity Rules. Integral Energy is subject to s5.6.2 (g) of the National Electricity Rules which requires it to carry out an economic cost effectiveness analysis of possible actions to identify alternative actions that satisfy the regulatory test. The regulatory test is used by the Regulator to identify a preferred action as required by s5.2.3 (d) (12) and s5.6.2 (g) and (h) of the National Electricity Rules.

The regulatory test is commonly considered as having two limbs - reliability and market benefits. Integral Energy must identify the appropriate limb it is seeking to satisfy. The selection of the appropriate limb for the Vineyard to Rouse Hill Electricity Upgrade is a difficult exercise due to the multi-faceted project need, the non-exhaustive definitions provided in the National Electricity Rules and that Integral Energy has elected to include costs associated with social and environmental externalities in the analysis. It is not possible to state conclusively whether these costs are eligible for consideration in the regulatory test (refer p6 *Appendix E* of this report).

The version of the report included in the Environmental Assessment considered that, as the project was not necessitated by the inability of the network to meet minimum network performance standards defined in the National Electricity Rules, it was appropriate to consider the project under the market benefits limb of the regulatory test.

As a result of further consideration of the project need and the determination that the principal driver for the upgrade is reliability issues, Integral Energy has resolved that the project is more correctly considered under the reliability limb of the regulatory test under the National Electricity Rules.

A revised financial and economic analysis report is contained in *Appendix C*.

5.2 Flora and fauna habitat issues

Technical Paper 2 of Volume 3 of the Environmental Assessment contains a flora and fauna assessment of the proposal. *Section 3.1.7* on p3-10 makes reference to *Table 3.3* which summarises the characteristics of vegetation and fauna habitat at each of the proposed pole sites. It has been identified that the table presented was not complete and was truncated at pole location 11.

While this does not constitute an additional investigation, the opportunity is being taken to correct this mistake. *Appendix D* contains the complete table which was omitted from the exhibited Environmental Assessment.

6. Modifications to the proposal

6.1 Introduction

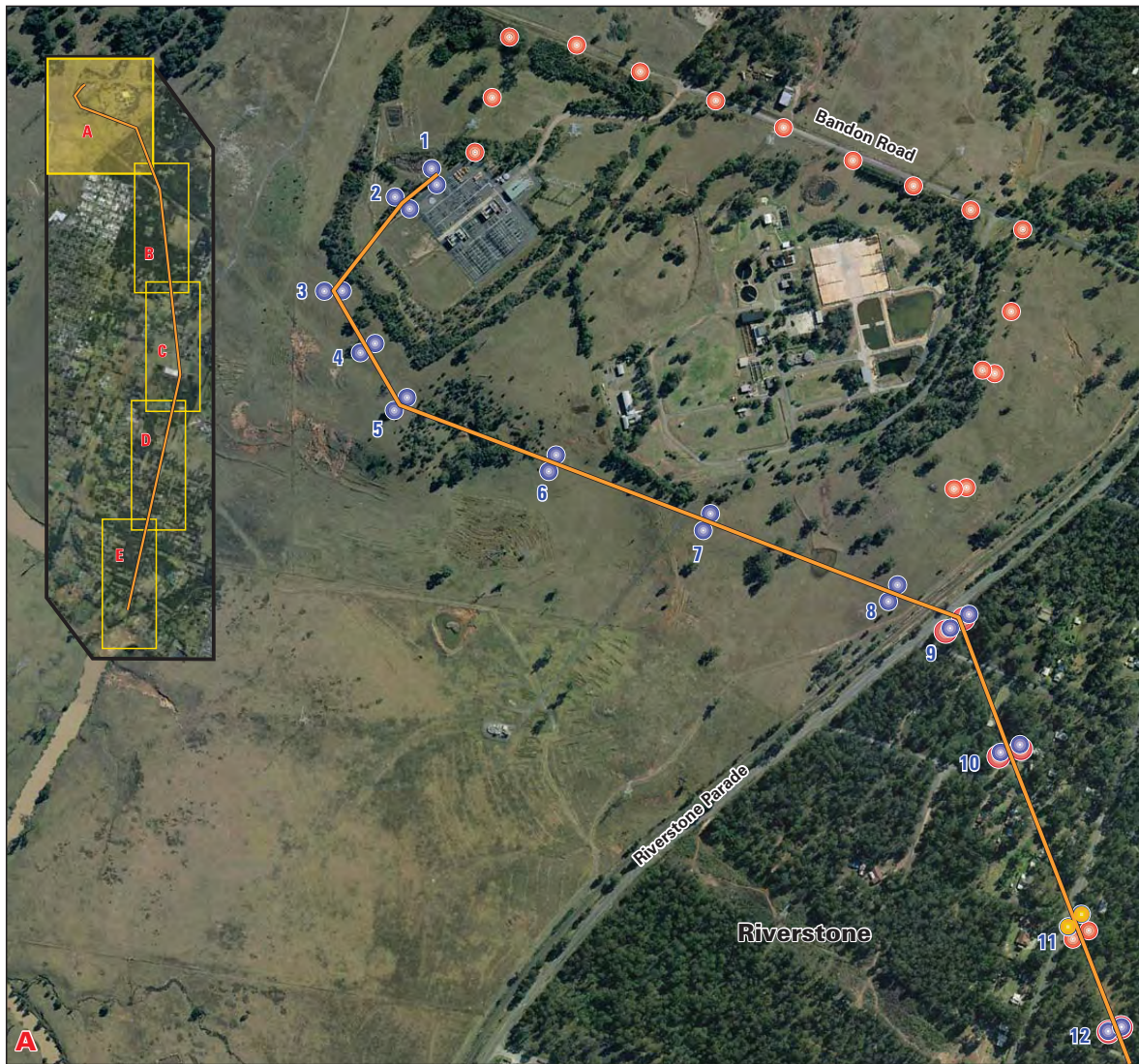
Subsequent to the exhibition of the Environmental Assessment, modifications have been made as a result of consideration of public submissions and further development of the concept design. The following sections summarise the proposed modifications.

Under Section 75H(6) of the Planning Act there are no specific assessment requirements for a proposed modification. However under Part 5 of the EP&A Act, Section 111 outlines the duty of the determining authority to consider the environmental impacts of an activity. Consequently, Integral Energy has considered it appropriate to assess the environmental impact of the proposed modifications under Section 111 of the Planning Act and has adopted the factors set out in Clause 228 of the Environmental Planning and Assessment Regulation 2000 as the appropriate aspects to consider in relation to determining the environmental impacts of the modifications.

6.2 Pole structures

6.2.1 Pole locations

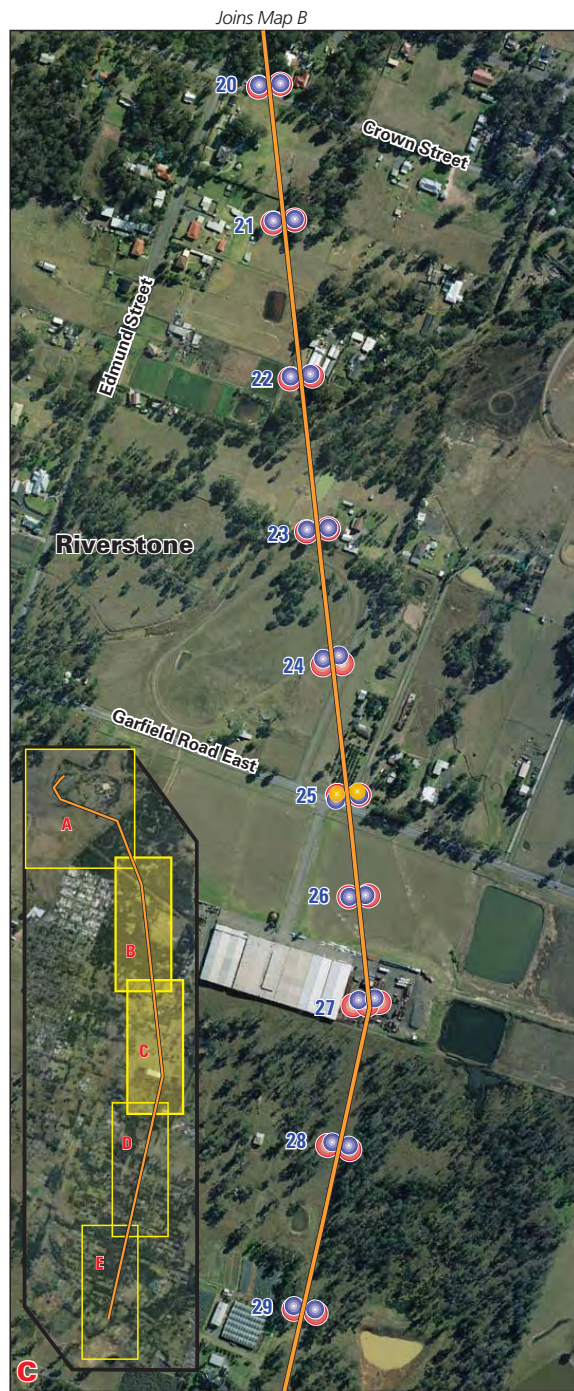
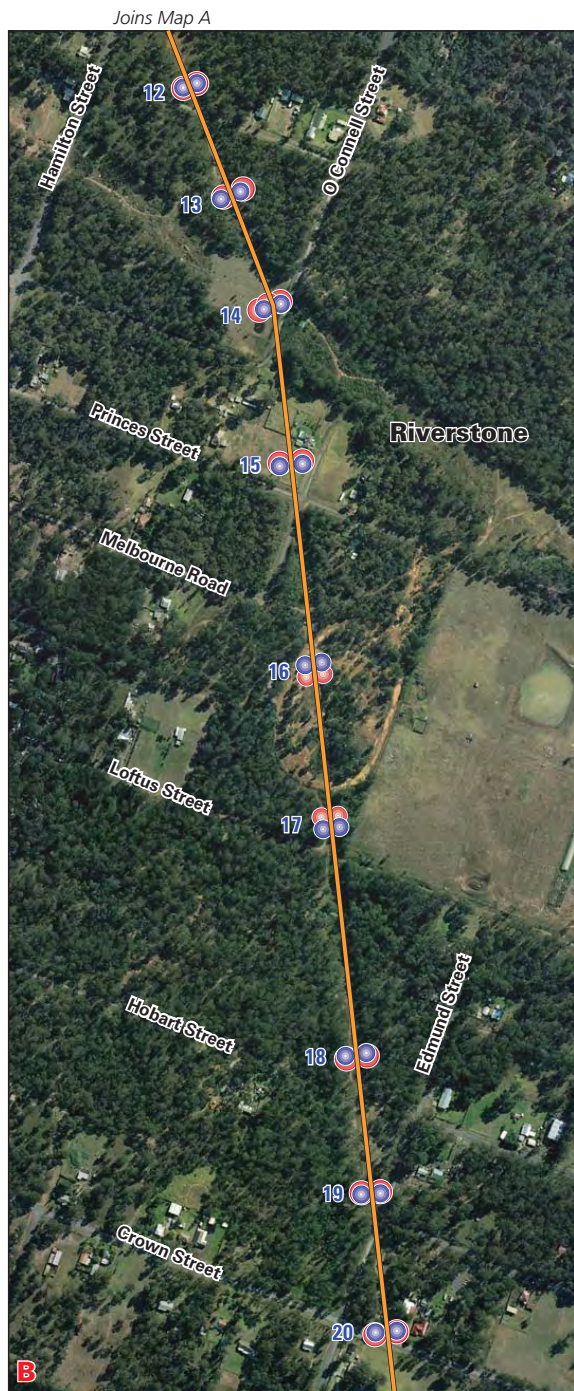
The locations of six individual poles are proposed to be modified to reduce impacts on properties. Some of these changes are at the request of the landowner who have cited amenity benefits in support of their requests for movement of the poles. The modification of pole locations would not result in poles being moved onto adjacent properties. The revised pole locations are indicated in *Table 6.1* and shown in *Figure 6.1*.



Joins Map B

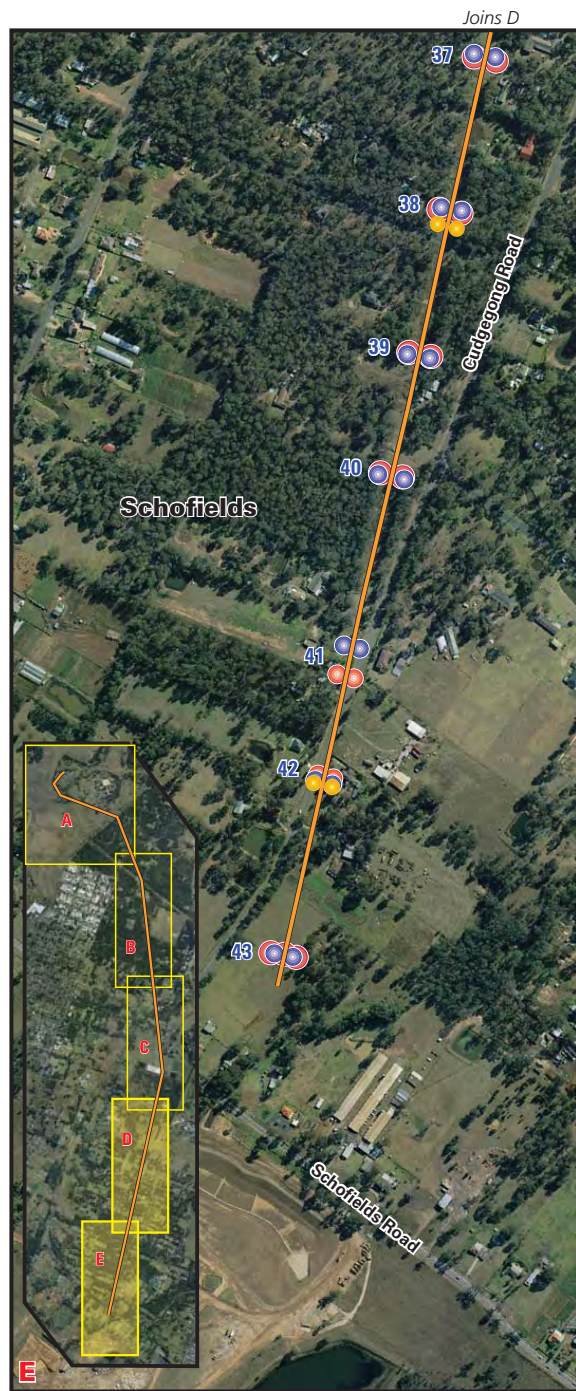
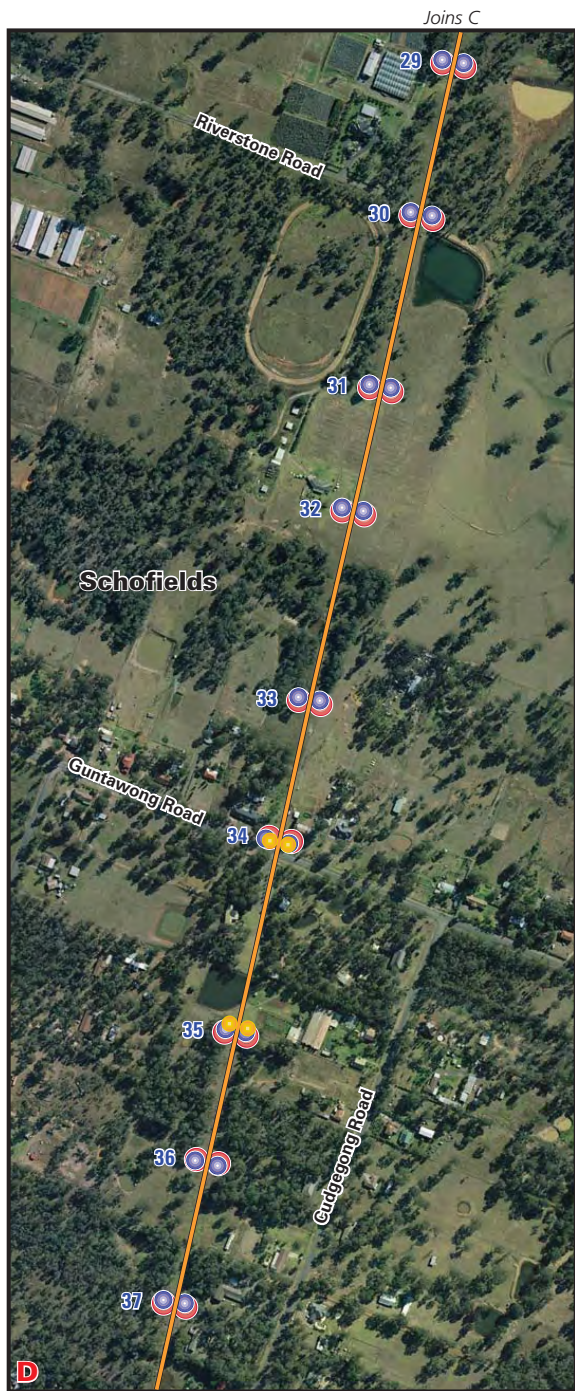
- Proposed pole location in the EA
- Existing H-pole location
- Modified pole location
- Centerline

Figure 6.1a Modified Pole Locations



- Proposed pole location in the EA
- Existing H-pole location
- Modified pole location
- Centerline

Figure 6.1b Modified Pole Locations



- Proposed pole location in the EA
- Existing H-pole location
- Modified pole location
- Centerline

Figure 6.1c Modified Pole Locations

Table 6.1 Proposed modification to pole locations

Pole Number	Property Lot/Section/ DP Number	Street Address/ Reason for modification
11	70/1480/44	Lot 70 Clyde Street Vineyard. Further slight adjustment to protect threatened species at this location.
25	Roadway	Garfield Road East, Riverstone. Moved west toward property boundary to account for future proposed road widening.
34	97//208203	Lot 97 Guntawong Road, Rouse Hill. Moved approximately 2 metres east to property boundary to reduce impact on property.
35	89//208203	Lot 89 Cudgegong Road, Rouse Hill. Moved approximately 12 metres west to property boundary as requested by landowner.
38	82//208203	Lot 82 Cudgegong Road, Rouse Hill. Moved approximately 29 metres east to property boundary as requested by landowner.
42	118//208203	Lot 118 Cudgegong Road, Rouse Hill. Moved approximately 8 metres to property boundary as requested by landowner.

A risk assessment of potential impacts of this modification on biodiversity and heritage items has been conducted. The initial biodiversity assessment of pole locations is summarised in *Table 3.3* of Technical Paper 2 in Volume 3 of the Environmental Assessment. The proposed modifications to pole locations are near to those assessed originally in this table and there would be no appreciable difference to the impacts identified. Three of the proposed pole locations occur within cleared land which is predominantly covered with introduced grasses. The remaining three poles occur in areas of regrowth vegetation and their proposed locations have been moved closer to disturbed and cleared property boundaries and roadside margins. As such, the new pole locations are likely to have a decreased risk of impacts to threatened biodiversity.

The proposed modifications to pole locations have also been assessed for changes to impacts on Aboriginal or historical cultural heritage values. The proposed modifications were compared to the assessment found in Technical Paper 7 of Volume 3 of the Environmental Assessment. Due to the small changes to the locations of poles, the impacts on cultural and historic heritage values remain unchanged compared to those identified in the Environmental Assessment.

6.2.2 Pole heights and EMF emissions

Integral Energy has successfully applied a range of measures in accordance with the policy of prudent avoidance to reduce the emissions of magnetic fields to a level as low as reasonably possible having regard to the notion of “modest cost”. Notwithstanding, as a result of information being received and the further development of the concept design following the exhibition period, Integral Energy proposes to modify the heights of poles in specific locations. The modelling and prediction of magnetic fields presented in the Environmental Assessment also relied upon certain conservative assumptions which

are not consistent with the actual conditions. The resulting effect is a substantial reduction in magnetic fields of between 24 to 67 percent.

The calculation of electric and magnetic fields included in Technical Paper 8 of Volume 3 of the Environmental Assessment relied on certain conservative assumptions when predicting the future levels of magnetic fields. These assumptions resulted in an assumed ground clearance of 8.5 metres being adopted for each span along the length of the proposal. Conductor ground clearance is influenced primarily by the height of the poles, the length of the spans and the temperature of the conductors. The greater the current flowing in the conductors, the hotter they get and, due to thermal expansion, the more they sag, thereby reducing the distance to the ground. The adopted 8.5 metres was a conservative assumption based on the average ground clearance of the shortest span, using the shortest proposed poles.

Design information received by Integral Energy following exhibition of the Environmental Assessment has resulted in modification to the height of eight poles. These are shown in bold in *Table 6.2* below. The changes to these poles heights does not effect the overall average height of poles as indicated in the Environmental Assessment and therefore there would be no changes in the visual impact of the proposal resulting from these modifications.

A span-by-span review of the concept design has been undertaken using these revised pole heights and the consequential expected minimum conductor ground clearance. While the revised design of the proposal still allows for a maximum conductor temperature (to ensure that the minimum ground clearance is maintained under the worst case condition), the actual load in the line will be less than 25 percent of the maximum design load for more than 85 percent of the time. This means that, for a majority of the time, the expected conductor ground clearance will be substantially greater than the design minimum ground clearance. The consequent effect has been a substantial reduction of magnetic fields compared to the levels indicated in the exhibited Environmental Assessment.

Table 6.2 Modifications to pole heights and span-by-span review of predicted magnetic fields

Pole Number	Pole height as described in the Environmental Assessment (m)	Proposed modified pole height (m)	Conductor clearance assumed in preceding span in the Environmental Assessment (m)	Predicted magnetic field 2043 outlined in the Environmental Assessment¹ (mG)	Expected minimum conductor clearance in preceding span (m)	Revised predicted magnetic field 2043^{2&3}(mG)	Percentage of relevant health guideline of revised predictions⁴ (%)	Magnetic field reduction compared with the Environmental Assessment (%)
1	21	21	na	Na	na	na	na	na
2	21	21	8.5	18.1	13.2	9.5	1.0	48
3	21	24	8.5	18.1	11.3	12.5	1.3	31
4	21	21	8.5	18.1	15.2	7.2	0.7	60
5	21	21	8.5	18.1	12.8	10.1	1.0	44
6	21	24	8.5	18.1	13.3	9.4	0.9	48
7	21	21	8.5	18.1	13.8	8.7	0.9	52
8	24	24	8.5	18.1	17.4	5.4	0.5	70
9	24	24	8.5	18.1	16.0	6.5	0.7	64
10	21	21	8.5	18.1	12.2	10.9	1.1	40
11	21	21	8.5	18.1	13.8	8.7	0.9	52
12	21	21	8.5	18.1	13.9	8.6	0.9	52
13	21	18	8.5	18.1	13.1	9.6	1.0	47
14	18	14.5	8.5	18.1	10.6	13.7	1.4	24
15	24	24	8.5	18.1	10.5	13.8	1.4	24
16	21	24	8.5	18.1	15.3	7.1	0.7	61
17	24	24	8.5	18.1	12.3	10.8	1.1	40
18	24	24	8.5	18.1	16.7	5.9	0.6	67
19	21	21	8.5	18.1	15.5	6.9	0.7	62

Pole Number	Pole height as described in the Environmental Assessment (m)	Proposed modified pole height (m)	Conductor clearance assumed in preceding span in the Environmental Assessment (m)	Predicted magnetic field 2043 outlined in the Environmental Assessment¹ (mG)	Expected minimum conductor clearance in preceding span (m)	Revised predicted magnetic field 2043^{2&3}(mG)	Percentage of relevant health guideline of revised predictions⁴ (%)	Magnetic field reduction compared with the Environmental Assessment (%)
20	21	21	8.5	18.1	12.6	10.3	1.0	43
21	21	21	8.5	18.1	13.2	9.5	1.0	48
22	21	21	8.5	18.1	13.2	9.5	1.0	48
23	21	21	8.5	18.1	14.6	7.8	0.8	57
24	21	21	8.5	18.1	14.3	8.1	0.8	55
25	21	21	8.5	18.1	13.9	8.6	0.9	52
26	21	21	8.5	18.1	14.3	8.1	0.8	55
27	21	24	8.5	18.1	13.2	9.5	1.0	48
28	21	21	8.5	18.1	13.4	9.2	0.9	49
29	21	21	8.5	18.1	13.3	9.4	0.9	48
30	21	21	8.5	18.1	12.8	10.1	1.0	44
31	21	21	8.5	18.1	14.0	8.5	0.9	53
32	24	21	8.5	18.1	13.5	9.1	0.9	50
33	18	18	8.5	18.1	13.0	9.8	1.0	46
34	18	18	8.5	18.1	10.5	13.8	1.4	24
35	24	18	8.5	18.1	12.0	11.2	1.1	38
36	21	24	8.5	18.1	14.4	8.0	0.8	56
37	21	21	8.5	18.1	13.9	8.6	0.9	52
38	21	21	8.5	18.1	12.3	10.8	1.1	40
39	21	21	8.5	18.1	13.7	8.8	0.9	51
40	21	21	8.5	18.1	14.0	8.5	0.9	53

Pole Number	Pole height as described in the Environmental Assessment (m)	Proposed modified pole height (m)	Conductor clearance assumed in preceding span in the Environmental Assessment (m)	Predicted magnetic field 2043 outlined in the Environmental Assessment¹ (mG)	Expected minimum conductor clearance in preceding span (m)	Revised predicted magnetic field 2043^{2&3} (mG)	Percentage of relevant health guideline of revised predictions⁴ (%)	Magnetic field reduction compared with the Environmental Assessment (%)
41	21	21	8.5	18.1	13.3	9.4	0.9	48
42	21	21	8.5	18.1	13.0	9.8	1.0	46
43	21	21	8.5	18.1	12.6	10.3	1.0	43

Notes:

- n/a The EMF levels are calculated on a span basis not on a pole basis. Therefore there are no EMF predictions for pole location 1
- 1 Assumes an average ground clearance of 8.5 metres
- 2 Based on predicted ground clearances derived from actual pole heights as indicated in *Table 5.1* of Volume 1 of the exhibited Environmental Assessment. These clearances are greater than the minimum design clearance
- 3 Conservatively based on minimum clearance for all spans, except for undercrossing spans (14, 15 & 34), where average clearance has been used in accordance with ESAA guidelines.
- 4 The relevant health guideline is the National Health and Medical Research Council 1989 Interim guidelines on limits of exposure to 50/60 Hertz electric and magnetic fields. While this publication has since been rescinded due to age, the guidelines of the International Commission on Non-Ionising Radiation Protection (ICNIRP) on which the National Health and Medical Research Council guidelines were modelled have not. The ICNIRP guidelines have been reviewed several times since their original publication and no changes to the limits have been made. The limit for the general public for 24 hours per day is 1,000 milligauss.

Bold text This indicates pole heights that have changed relative to the heights indicated in the Environmental Assessment.

Clause 228 of the Environmental Planning and Assessment Regulation 2000 specifies the matters that must be taken into consideration when undertaking an environmental assessment of an activity. The modifications of pole locations and heights have been assessed against the factors set out in Clause 228 as shown in *Table 6.3*. This indicates that there would be a reduction in environmental and cumulative impacts (reduced EMF levels) and an improvement in environmental quality.

Table 6.3 Assessment of Clause 228 factors for the proposed modifications to pole locations and heights

Clause 228 Factors	Impact	
a) Any environmental impact on a community	-ve	<input type="checkbox"/>
The movement of some poles toward the boundaries of individual properties would result in amenity benefits for those properties. EMF levels would be reduced by between 24 and 67 percent. This would also lead to a perception of reduced potential health effects.	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
b) Any transformation of a locality	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
c) Any environmental impact on the ecosystems of the locality	-ve	<input type="checkbox"/>
A review of the proposed changes to pole locations concluded that a reduced risk of impacts on biodiversity would result. In one instance, the pole location modification would further reduce the potential impact on a threatened species.	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality	-ve	<input type="checkbox"/>
Reduction in EMF levels would result in reduced perception of potential adverse effects on the environmental quality of the areas through which the transmission line passes. Modification to some pole locations is being undertaken at the request of some landowners on the assumption that impacts from poles would be reduced relative to their current positions.	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations	-ve	<input type="checkbox"/>
A review of the proposed modifications to pole locations concluded that there would be no adverse impacts resulting from the modifications.	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
f) Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
g) Any endangering of any species of animal, plant or other form of life whether living on land, in water or in the air	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>

Clause 228 Factors	Impact	
h) Any long-term effects on the environment	-ve	<input type="checkbox"/>
Reduction in EMF levels would result in reduced perception of potential adverse health concerns.	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
i) Any degradation of the quality of the environment	-ve	<input type="checkbox"/>
Reduction in EMF levels would result in a reduced perception of adverse effects on the environmental quality of the areas through which the transmission line passes. Modification to some pole locations is being undertaken at the request of some landowners on the assumption that impacts from poles would be reduced relative to their current positions.	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
j) Any risk to the safety of the environment	-ve	<input type="checkbox"/>
Reduction of EMF levels would result in a reduced perception of potential safety effects on humans	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
k) Any reduction in the range of beneficial uses of the environment	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
l) Any pollution of the environment	-ve	<input type="checkbox"/>
Reduction in EMF levels would result in reduced perception of potential adverse health concerns.	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
m) Any environmental problems associated with the disposal of waste	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
n) Any increased demands on resources (natural or otherwise) that are or are likely to become in short supply	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
o) Any cumulative environmental effect with other existing or likely future activities	-ve	<input type="checkbox"/>
Electric and magnetic fields from the proposal were identified to be cumulative with future infrastructure provision in the North West Sector. The reduction in electric and magnetic fields from the proposal would reduce the extent of cumulative impact.	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>

6.3 Conductor type

A modification of the conductor type is proposed as a result of the submissions received concerning the adverse visual impact of the proposal relative to other options investigated. This modification would also result in the proposal design being more consistent with the expressed views of various workshop forums during the assessment of the alternative options. The adoption of the invar type conductor would result in a reduction in the number of overhead conductors from 12 to 6. This would reduce the visual impact of the proposal.

The Environmental Assessment proposed twin mango conductors, resulting in 12 overhead conductors of 30 millimetre diameter with spacers and two earth wires. The modification would involve the use of single invar conductors in place of twin mango. The modified proposal would result in six overhead conductors of 40 millimetre diameter (without the need for spacers) and two overhead earth wires. The new configuration would be similar to Option D as shown in the Environmental Assessment.

A discussion of the assessment of options in evaluation workshops conducted during the development of the project is provided in *Section 4.4.6 in Volume 1* of the Environmental Assessment. These workshops generally concluded that, of the overhead options, and assuming that an underground option was not feasible, Option D would be preferred specifically because it comprised less overhead wires and was considered to reduce the visual impact of overhead structures.

Figures 6.2, 6.3 and 6.4 provide comparative examples of the twin mango and invar conductors in selected locations along the proposed corridor.

The capital cost of the proposal would increase by approximately \$600,000 to \$17.4 million. There would be no change to any other environmental aspects described in the Environmental Assessment as a result of this modification, including EMF.

Clause 228 of the *Environmental Planning and Assessment Regulation 2000* specifies matters that must be taken into consideration when undertaking an environmental assessment of an activity. The modification to the conductor type has been assessed against the factors set out in Clause 228 as shown in *Table 6.4*. This indicates that there would be a reduction in environmental and cumulative impacts (visual) from the proposal which would result in the improvement of environmental quality.

Table 6.4 Assessment of Clause 228 factors for the proposed modification to invar conductors

Clause 228 Factors	Impact	
a) Any environmental impact on a community	-ve	<input type="checkbox"/>
There would be an improvement in the visual impact of the proposal.	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
b) Any transformation of a locality	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
c) Any environmental impact on the ecosystems of the locality	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality	-ve	<input type="checkbox"/>
There would be an improvement in the visual impact of the proposal.	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>



Existing



As proposed in EA



Modified

Figure 6.2 View South-east from Pole Location 10



Existing



As proposed in EA



Modified

Figure 6.3 View South-east from Pole Location 42



Existing



As proposed in EA



Modified

Figure 6.4 View South from Pole Location 43

Clause 228 Factors	Impact	
e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
f) Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
g) Any endangering of any species of animal, plant or other form of life whether living on land, in water or in the air	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
h) Any long-term effects on the environment	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
i) Any degradation of the quality of the environment The quality of the environment would be improved as a result of the reduction in visual impact.	-ve	<input type="checkbox"/>
	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
j) Any risk to the safety of the environment	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
k) Any reduction in the range of beneficial uses of the environment	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
l) Any pollution of the environment There would be an improvement in the visual impact of the proposal.	-ve	<input type="checkbox"/>
	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>
m) Any environmental problems associated with the disposal of waste	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
n) Any increased demands on resources (natural or otherwise) that are or are likely to become in short supply	-ve	<input type="checkbox"/>
	Nil	<input checked="" type="checkbox"/>
	+ve	<input type="checkbox"/>
o) Any cumulative environmental effect with other existing or likely future activities The visual impact of the proposal was identified to be cumulative with future infrastructure provision and urban development of the North West Sector. The reduction in visual impact from the proposal would reduce the extent of cumulative impact.	-ve	<input type="checkbox"/>
	Nil	<input type="checkbox"/>
	+ve	<input checked="" type="checkbox"/>

7. Preferred project report

In accordance with section 75H(6) of the Planning Act, the Director-General may require the proponent to submit a preferred project report that outlines any proposed changes to the project to minimise its environmental impact.

Subsequent to the exhibition of the Environmental Assessment, modifications have been made as a result of consideration of public submissions and further design information becoming available. *Sections 5, 6 and 7* provide a description of the proposed modifications, an environmental assessment of the modifications and a justification for each and constitute the preferred project report.

The Environmental Assessment concludes that each modification would reduce the environmental impact relative to that outlined in the Environmental Assessment. Also taken together, the proposed modifications would not result in any adverse environmental impacts not already anticipated in the Environmental Assessment.

The requirements of Part 3A of the Planning Act require the proponent to provide a Statement of Commitments which demonstrates their commitment to the implementation of the proposed mitigation and management measures. A draft Statement of Commitments was provided in *Appendix E* of Volume 1 of the Environmental Assessment. A final Statement of Commitments is provided in *Appendix E* of this report.

8. Conclusion

This Submissions Report has addressed the outcomes of the consultative process conducted during and subsequent to the exhibition of the Environmental Assessment for the Vineyard to Rouse Hill Electricity Upgrade.

In addressing both compliance with legislative requirements and the requirements of the consultative process, this Submissions Report demonstrates that:

- Statutory obligations have been met (*Section 2.1*).
- Integral Energy has considered all issues arising from submissions and provided written responses to the issues (*Section 4*).
- In responding to the issues and upon further consideration of design detail, additional studies have been undertaken (*Section 5*).
- Design modifications have been undertaken which reduce identified impacts (*Section 6*).
- The environmental impacts of the modifications have been assessed and it has been determined that there are no significant impacts as a consequence of these modifications (*Sections 5 and 6*).

In consideration of the above, it is concluded that the Vineyard to Rouse Hill Electricity Upgrade as described in the Environmental Assessment should proceed for the approval of the Minister for Planning subject to the adoption of the preferred project report.

9. References

Integral Energy, 2005, *Vineyard to Rouse Hill Electricity Upgrade, Augmentation of 132 kV Feeder 9JA – Network Consultation Paper*

NSW Government, 2005, *Sydney Metropolitan Strategy*

Parsons Brinckerhoff, 2005a, *Vineyard to Rouse Hill Electricity Upgrade – Alternatives Assessment Report, May 2005*

Parsons Brinckerhoff, 2005b, *Vineyard to Rouse Hill Electricity Upgrade – Environmental Assessment, November 2005*

Appendix A

Detailed breakdown of
representations

CONFIDENTIAL

Appendix B

Correspondence from Government agencies

15 December 2005

The Project Manager
Vineyard to Rouse Hill Electricity Upgrade
Parsons Brinckerhoff
GPO Box 5394
Sydney NSW 2000

Dear Sir/Madam,

Environmental Assessment of the Vineyard to Rouse Hill Electricity Upgrade

Reference is made to the Environmental Assessment for the proposed upgrade of the 132 kV electricity transmission line between Vineyard and Rouse Hill, known as Feeder 9JA. It is noted that the capacity of the line will be increased from 84 MVA (mega volt amperes) to 1,000 MVA by replacing the single circuit arrangement with two single circuit overhead transmission lines.

Council wishes to convey its **strongest possible objection** to the above proposal for the reasons outlined below.

1. Impact on the future urban development of the Riverstone Release Area (especially the "Scheduled Lands")

The existing 8.5 kilometre Vineyard to Rouse Hill transmission line cuts across **more than 220 properties** in the Riverstone Release Area, which is earmarked for future urban development. Reconstruction of this line along the existing route will adversely affect the future urban development of these properties, most of which form part of the "Scheduled Lands".

The "Scheduled Lands" are characterised by small lots (approximately 500 m² in area) arranged in a grid street pattern, the result of a subdivision dating from the early 1890s. Since the introduction of planning controls in 1951 these lands have been zoned "Rural" and subject to minimum area requirements for the construction of a dwelling ranging from 2 hectares to 10 hectares. This has effectively sterilised the development of these lands for over half a century.

However, since 1989 and the gazettal of *Sydney Regional Environmental Plan (SREP) No. 19 – Rouse Hill Development Area*, landowners have been given some hope that their land will be rezoned to enable houses to be built on their lots. SREP 19 included a Structure Plan which identified all of the "Scheduled Lands" (east of

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the Richmond rail line) as being suitable for urban development at some point in the future.

In 1998 the then Minister for Urban Affairs and Planning declared the "Scheduled Lands" part of an urban release area (referred to as the Riverstone Release Area). This declaration opened the way for Council to commence the process of rezoning the land from rural to various urban purposes, but predominantly residential. Council commenced this process by exhibiting a draft Local Environmental Plan (LEP) in 2002, bringing landowners' hopes one step closer to being realised.

The rezoning process was stalled, however, as a result of a series of conflicting requirements from various Public Authorities. These requirements remained unresolved until the recent release by the State Government of a revised Structure Plan for the North West Sector. The latest draft Structure Plan identifies 2 large areas for conservation in the "Scheduled Lands", thereby ensuring that they can never be developed for housing (refer to a copy at **Attachment 1**).

The proposed upgrade of the Feeder 9JA transmission line, involving the replacement of the existing 20 metre support poles with 43 twin sets of 22 metre (average) support poles will **further restrict the urban potential and marketability of the lands adjoining the existing easement** by:

- contributing to visual blight;
- detracting from the future residential character and amenity of the Release Area lands;
- contributing to the community's perception and anxieties that high voltage transmission lines are a health threat to the residents of future adjoining urban development; and
- detracting from the economic value of properties affected by and adjoining the electricity line easement.

Furthermore, the proposed upgrade of Feeder 9JA will limit the potential for other services, such as existing or future rail lines, roads and drainage reserves, to be co-located in a common corridor with the transmission line. Such co-location of services would result in less fragmentation and therefore a more efficient and economic use of land. The current proposal is, therefore, contrary to:

- the objects of the *Environmental Planning and Assessment Act 1979* relating to "the promotion and co-ordination of the orderly and economic use and development of land"; and

- one of the State Government's objectives in relation to "Investigation Zones", which is *"to protect, and prevent the fragmentation and inappropriate development of land that may have potential for future development"*.¹

2. Economic Impacts

Even though the reconstruction of the existing high voltage overhead transmission line (HVOTL) presents the most cost-effective solution for Integral Energy, this assessments fails to adequately measure the economic impacts the proposal will have on the area in relation to the loss of development and property market values, particularly as the proposal bisects over 230 properties.

The Environmental Assessment estimates that *"the proposal would reduce property values by between 0 and 2 percent for properties located within 50 metres of the transmission line alignment"*. Having reviewed some international research on the impact of HVOTLs on property values, Council considers that the Environmental Assessment has considerably underestimated the expected impact on property values.

One study, based on research conducted in the UK, found that:

"...the value of properties within 100 metres of a HVOTL is reduced by 6 - 17 per cent (an average of 11.5 per cent). The presence of a pylon was found to have a more significant impact on value than the HVOTL and could reduce value by up to 20.7 per cent compared with similar property sited 250 metres away..."

All negative impacts appeared to diminish with distance and were negligible at around 250 metres...

*In addition, the results suggest that marketing time is increased, possibly due to a reduction in the numbers of willing buyers."*²

Another study, from Wisconsin in the US, found that the potential reduction in sale price for single family homes may range up to 14 per cent. Furthermore, it was found that adverse effects on the sale price of smaller properties could be greater than effects on the sale of larger properties³. Given that the majority of lots in the "Scheduled Lands" are in the order of 500 m² in area, this research would suggest that the potential impact on property prices in the "Scheduled Lands" would be much greater than the 0 - 2 per cent quoted in the Environmental Assessment.

The factors contributing to a reduction in property values include:

¹ Department of Planning Draft Standard LEP Template, 2005

² Sims, S. & Dent, P. (Apr 2005) "High Voltage Overhead Power Lines and Property Values: A Residential Study in the UK", *Urban Studies*, Vol. 42, No. 4, 665-694.

³ Public Service Commission of Wisconsin (Oct 2000) *Final Environmental Impact Statement, Arrowhead - Weston Electric Transmission Line Project*, Volume 1.

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- concern or fear of possible health effects from electric or magnetic fields;
- the potential noise and visual unattractiveness of the transmission line;
- concerns about the future value and marketability of the property – ie. how long it might take to sell the property and the debt that may be carried over this time.

In relation to the first dot point, it is acknowledged that there is conflicting research regarding the health implications of living near a HVOTL. However, the *perception* that it could be harmful to one's health has been found to be enough to result in a negative impact on property values.

3. Preferred Options

In light of the above adverse impacts of the proposed transmission line upgrade, **Council's preferred options for the upgrade are firstly, for undergrounding of the transmission lines and secondly for the relocation of the transmission line so that it aligns with a road, transport or drainage corridor.**

(a) Placing the transmission lines underground

The Environmental Assessment discounts the option of placing the transmission lines underground mainly on the basis of cost. The reconstruction of the existing overhead transmission lines is estimated to cost \$16.8 million. The undergrounding of the transmission lines is estimated to incur costs ranging from \$70 million to \$130 million. The Environmental Assessment also acknowledges that whilst the inspection and fault/emergency costs associated with underground cabling are higher than for overhead cables, the vegetation management costs are considerably lower for underground cables.

Furthermore, it should be noted that underground cabling is not as susceptible to damage from extreme storm conditions (other than flooding). Therefore, it can be argued that the need for repairs to underground transmission lines would be considerably less than for overhead transmission lines. This would be expected to result in long term cost savings.

Council accepts that there are additional costs associated with placing high voltage transmission lines underground, but is also aware that these costs are not entirely prohibitive as there have been at least 2 instances in recent years where such infrastructure has been placed underground:

- The Picnic Point to Haymarket project by Transgrid, approved in December 2001, involved the undergrounding of 28 kilometres of 330kV cables following existing road corridors. The estimated cost of this project at the time of application was \$132 million. This estimate per kilometre is considerably less than the estimate for the Feeder 9JA proposal, even when the fact that the

Transgrid estimate is 4 years old is taken into account (ie. \$4.7 million compared to \$8.2 - \$15.2 million).

- On the Sydney Olympic site, at Homebush, two twin circuit 132kV lines, 4 kilometres in length, from Mason Park and Newington North were placed underground prior to the 2000 Olympics. A third twin circuit 132kV line which traversed the western border of the site adjacent to Newington Village was also placed underground. This work is understood to have cost \$40 million at the time.

Council's view is that if HVOTLs have been able to be placed underground elsewhere in Sydney in recent years, then it must also be possible to underground Feeder 9JA. Whilst the **Environmental Assessment** identifies that there is a considerable difference in price between overhead and underground high voltage transmission lines, it **does not satisfactorily explore alternative funding arrangements that could help to meet the cost of undergrounding this infrastructure. This is considered to be a significant flaw of the Environmental Assessment.**

Furthermore, it is noted that Integral Energy may reconfigure or relocate the Vineyard to Rouse Hill transmission line in the future. Surely the costs associated with upgrading and then relocating the subject transmission lines would come close to the cost of placing the infrastructure underground. **Council urges Integral Energy not to proceed with the current proposal if it intends to relocate the transmission lines in the near future.** Council would rather that the money being committed to the duplication of works be redirected to placing the transmission lines underground.

(b) *Alignment of transmission lines with road, floodplain or transport corridors*

Council's second preferred option would be for the subject transmission line to be redirected along the First Ponds Creek floodplain corridor, an existing road (eg. Windsor Road, Schofields Road) or an existing or proposed transport corridor (eg. the Richmond rail line or the future rail connection from Rouse Hill to the Richmond line). As noted earlier in this submission, such a co-location of services and/or land constraints would result in a much more efficient use of land and free up considerably more land for urban development. This is preferable to simply writing off Feeder 9JA as "just one of a number of such constraints" in the area (in Section 8.1.3 of the Environmental Assessment).

It is therefore recommended that Integral Energy consult directly with the Department of Planning, to identify appropriate service corridors consistent with the proposed North West Growth Centre draft Structure Plan as the basis for the future planning of land use and infrastructure in the North West Sector.

The above investigation of an alternative corridor is consistent with the undertakings given by representatives of Integral Energy at a meeting held on 24 June 2004 with

The Hon. John Aquilina MP, Member for Riverstone, together with representatives of then DIPNR, Blacktown City Council, Landcom, the Office of the Minister for Infrastructure and Planning and the Vineyard Riverstone Marsden Park Development Inc.

5. Estimated number of lots to be affected by the proposal

Certain "issues" used to justify the proposed reconstruction of Feeder 9JA along the existing route included an estimation of the 'Number of Lots Affected 2004' and 'Number of Lots Affected 2007'. Clearly figures for post 2007 will be beneficial for this assessment. When the larger rural lots in Riverstone and Schofields are developed, post 2007, there will be significantly more properties affected by the subject high voltage transmission line. This omission from the Environmental Assessment is another fundamental flaw that must be addressed before a determination is made.

Conclusion

For the above reasons Council **objects in the strongest possible manner** to the proposed upgrade of the existing high voltage aboveground transmission line between Vineyard and Rouse Hill, known as Feeder 9JA, and requests that these comments be taken into full consideration.

Council officers would be happy to meet with you in order to further discuss these issues. Please contact the officer nominated at the bottom of this letter with any queries regarding Council's objection.

Please also note that a number of submissions from the public in relation to the upgrade proposal have been forwarded to Council. These are enclosed for your consideration.

Yours faithfully,

RON MOORE
GENERAL MANAGER

Per: 

Your contact for this matter is: Robert Scott, Manager Planning Policy & Strategy
Phone: 9839 6000 Ext. 6229
File No.: 54-3-1/15



SYDNEY WEST
Area Health Service

Centre for Population Health

Nepean Hospital Campus
Kingswood NSW 2747

Phone: (02) 47342022
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PO BOX 63
PENRITH NSW 2751

The Project Manager
Vineyard to Rouse Hill Electricity Upgrade
Parsons Brinckerhoff
GPO Box 5394
SYDNEY NSW 2000

Dear Sir/Madam

Environmental Assessment - Vineyard to Rouse Hill Electricity Upgrade

The Sydney West Area Health Service (AHS) would like to comment on the environmental assessment of the proposed Vineyard to Rouse Hill electricity upgrade.

The AHS is the regional administrative body directed by NSW Health to oversee the protection of the community in greater western Sydney from public health hazards. The proposed Vineyard to Rouse Hill electricity upgrade falls within its area of oversight.

The predominant area of concern is the exposure of the current and future local population to electromagnetic fields associated with the upgrade.

It is acknowledged that the existing system (9JA) will need to be upgraded to meet increased demand resulting from population growth in the northwest sector of Sydney. The need for a secure and adequate supply of electricity over the next 50 years is imperative to the continued urban development of these areas.

Currently there is uncertainty regarding health effects resulting from long-term exposure to electromagnetic fields (EMF). Although risks have not been conclusively established, the World Health Organization has released a document outlining a number of cautionary policy approaches to EMF.¹ 'Prudent avoidance' is one example of these approaches and is defined as "undertaking those avoidance activities that carry modest costs", even in the absence of a demonstrable risk.

The AHS supports the application of prudent avoidance to this upgrade and recommends that Integral Energy implement low to moderate cost measures to reduce EMF. This allows for the possibility that new evidence could emerge that demonstrates a greater risk to human health from EMF than currently recognised. It also promotes Integral Energy as a responsible corporate entity with a view of development that focusses primarily on the health and safety of its customers and the general population.

When determining a prudent level of expenditure, future patterns of development and the projected population in the area surrounding the easement should be considered. The AHS understands that the area surrounding the easement is likely to include high-density housing

¹ Electromagnetic Fields and Public Health: Cautionary Policies (WHO Backgrounder, March 2000)
http://www.who.int/docstore/peh-emf/publications/facts_press/EMF-Precaution.htm

when it is developed. Exposing this population to levels of EMF that are, at most, roughly equal to levels currently generated would be desirable over the life of the upgrade.

When setting a benchmark for comparisons, it is more applicable to use EMF levels currently generated by 9JA (incorrectly labelled in Volume 1, Fig 4.16 as 'abnormal operating conditions'). This is more representative of EMF currently experienced on the fringes of the easement than the level estimated if 9JA was operating continuously at its maximal capacity (incorrectly labelled in Volume 1, Fig 4.16 as 'normal operating conditions').

The preferred option in the environmental assessment, Option C, is a fully above ground system with two poles, 22 metres in height. EMF generated in 2007 and 2019 is estimated as being below the current level produced by 9JA, but is projected to exceed current levels in 2031 and 2043. This would result in a progressively larger population being exposed to higher levels of EMF than is currently the case.

The best option from a health risk minimisation perspective is the Option E, in which all cables are placed underground. Projected levels of EMF in 2043 for this option are estimated to be approximately 15 milliGauss at the centre of the easement, well below the current levels produced by 9JA. The AHS acknowledges that this is also the costliest option available.

The next best option from a health risk minimisation perspective is Option I, in which some cables are placed underground. Projected EMF levels for this option in 2043 are only slightly higher than the current levels produced by 9JA and, based on current knowledge, would not result in any significant increase in risk to the population exposed in the vicinity of the easement. The AHS believes that selecting this option would satisfy the requirements of an approach based on prudent avoidance. Although the capital cost of Option I is 2.3 times greater than Option C, there are potential costs associated with future health impacts not currently able to be factored into the environmental assessment that could be averted. Furthermore, the additional cost to each of Integral Energy's ratepayers for the lifespan of the asset would amount to \$3.06 per annum (Volume 2 – Technical Paper 1, Table 5.6).

The prediction that energy consumption will rise at the rate of 14% per annum is concerning. The CPH supports the investigation of new technologies for renewable sources of energy as well as the implementation of strategies to reduce energy usage.

In conclusion, the AHS recognises the need to upgrade the system carrying electricity between Vineyard and Rouse Hill. However, it advises that appropriate caution be exercised in selecting an option that balances affordability with the need to minimise the risk of harm should future research establish a greater risk to health from EMF. At the very least, the option selected should not result in population exposures to EMF that are significantly greater than levels currently being experienced.

I trust that the comments here provided will assist the decision-making process. Please contact Helen Ptolemy, Environmental Health Officer, Sydney West AHS Centre for Population Health on 4734 2022 if you wish to discuss anything mentioned here.

Yours sincerely



Dr Conrad Moreira
A/Regional Health Officer
13 December 2005

H05/11589

The Project Manager
Vineyard to Rouse Hill Electricity Upgrade
Parsons Brinckerhoff
GPO Box 5394
Sydney NSW 2000

**Re: Environmental Assessment on Vineyard to Rouse Hill
Electricity Upgrade**

Dear Sir/Madam,

The NSW Department of Health has reviewed the Environmental Assessment (EA) for the above development. In its assessment the Department has identified that exposure to electromagnetic fields is a public health issue associated with the development that warrants further consideration.

Need for Upgrading to existing infrastructure

Section 3 of the EA clearly establishes the need for an upgrade of the existing infrastructure with an estimated "load at risk" in 2004/05 of approximately 55 MVA (figure 3.3) and a prediction that beyond 2008/9 there will be no capacity to supply additional customers (section 3.2.2). The potential demand resulting from likely future urban development is acknowledged and further establishes the need to upgrade the existing infrastructure.

Magnetic fields and Health

There continues to be uncertainty about the role of magnetic fields in the incidence of cancer. In response to the scientific evidence available up to 2002 the International Agency for Research on Cancer (IARC) classified extremely low-frequency magnetic fields as *possibly carcinogenic to humans (Group 2B)*. The 2002 IARC evaluation of the evidence relating to carcinogenic effects of ELF EMF on humans determined that there is *limited evidence* in humans for the carcinogenicity of extremely low-frequency magnetic fields in relation to childhood leukaemia¹.

¹ IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Volume 80. Non-ionizing Radiation, Part 1: Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields. Lyon: International Agency for Research on Cancer, 2002
<http://www-cie.iarc.fr/htdocs/monographs/vol80/80.html>

It is the NSW Health Department's view that current evidence is not sufficient to establish definite causation. Furthermore even if causation could be assumed, based upon current scientific knowledge it is not possible to quantify the level of risk for a certain level of magnetic field and it is unclear whether there is a threshold level below which magnetic fields do not pose a risk. Consequently, the Department's policy is one of employing prudent avoidance when assessing risks from developments such as the upgrading of a power line within an existing easement.

Prudent Avoidance

In 1991 the NSW government commissioned Sir Harry Gibbs to conduct an inquiry into community needs and high voltage transmission line development². In this report he advocated the policy of prudent avoidance by stating;

" when new lines are being constructed, it may be prudent to do whatever can be done without undue inconvenience and at modest expense to avert the possible risk, remembering that if that is not done and future research establishes the existence of a real risk to health, serious problems may arise which can be remedied only at great cost".

When interpreting prudent avoidance it is important to emphasise that "prudence" should be interpreted in terms of reasonable cost and that it does not relate to health risk. It is difficult to define what a reasonable cost would be when addressing development proposals and consequently this should be done on a case-by-case basis.

When considering what level of expenditure to minimise magnetic fields is prudent when upgrading a power line in an existing easement one factor that could be considered is the likelihood of future development. It is the Department's understanding that the land surrounding 9JA will almost certainly be used for higher density development in the future. It is the Department's view that when upgrading a power line in an area where future higher density development is likely, it is highly desirable to avoid creating levels of magnetic field exposure higher than those that existed prior to the upgrade. Furthermore, in this situation it is also desirable to explore options that decrease magnetic field exposure to levels below those that existed prior to the upgrade.

Magnetic fields & Upgrade Options discussed in EIS

The EA has identified the proponent's preferred option (option C) and briefly outlined alternate options along with broad costings (section 4.2.4). Estimates of magnetic field strengths generated by these options are described in the Environmental Assessment, volume 1, figure 7.3 & in appendix D "Environmental Assessment for the Vineyard to Rouse Hill Electricity Upgrade Electric and Magnetic Fields Study of Project Options,

²

Gibbs H. Inquiry into community needs and high voltage transmission line development. Sydney, NSW Government, 1991

26 October 2005". There is also an assessment of the level of magnetic field strength that 9JA currently produces (labelled "abnormal operating conditions in figure 7.3 & 9JA:2005/6 in figure 1 of appendix D) and a hypothetical estimate of magnetic field level that could be produced assuming the 9JA feeder was to operate closer to maximal capacity (82 MVA). It is the Department's view that the current level of magnetic field generated by 9JA i.e. the level identified as "abnormal operating conditions" and "9JA:2005/6" should be used as a benchmark against which to compare the magnetic fields produced by the options considered.

The upgrading of power lines in existing easements has the potential to increase levels of magnetic fields above those that already exist. In the case of upgrading the existing 9JA feeder it can be seen that the preferred option C is predicted to result in an increase of approximately 8 milliGauss (or 80%) above the existing level of magnetic field at the edge of the existing easement by 2043 (figure 7.3). Prior to 2043 the level of magnetic field will be less with lower levels than those that currently exist being present prior to 2019.

It should be noted that option E involving total underground cabling is estimated to produce magnetic fields much lower than existing levels up to and including 2043. Option I involves a combination of underground and overhead cabling and is predicted to initially produce magnetic field levels lower than those that currently exist. With increasing electricity demand the level of magnetic field produced by this option is predicted to be similar to those that currently exist by 2043. All options exclusively using overhead cabling only, whilst also initially producing lower magnetic field levels are predicted to produce magnetic field levels similar to existing levels by 2019 and higher levels thereafter with options A & B producing marginally lower levels than the preferred option C.

Capital and Externality Costs

As demonstrated in the EIS there are considerable marginal construction costs generated when comparing underground options to the preferred option proposed. The cost above that for the preferred option have been estimated as; option E \$56M (72.8 M-16.8M) and option I \$22 M (38.8M-16.8M). The overhead cabling option A has a lower capital cost of \$11.8M compared to \$16.8M for the preferred option.

The NSW Health Department notes the economic assessment of "social & environmental externalities" presented in section 4.3.6. This assessment has been based upon a survey of real estate and property professionals and is limited to "property values". As such this cost only takes into account impacts upon existing land holders and does not address costs that future residents may have. It is important to note that this sort of assessment does not include any cost associated with potential health issues.

As referred to earlier Gibbs stated in relation to taking prudent measures to minimise exposure to magnetic fields "...if that is not done and future research establishes the existence of a real risk to health, serious problems may arise which can be remedied only at great cost". The financial and

economic analysis included in table 4.4 does not consider this component.

Conclusion

There is a clear need to upgrade the existing infrastructure and in choosing an option one of the factors that needs to be considered is the level of magnetic field that the new infrastructure generates. The likely outcome of the preferred option will be that an increased number of people (in newly developed homes) will be exposed to higher magnetic field levels than those that currently exist. It is the view of the NSW Health Department that further consideration should be given to options for the density of adjacent residential development, the width of the easement and at least an element of underground cabling.

Should you wish to discuss this matter further please contact Dr Michael Staff, Director, Environmental Health Branch on (02) 9816 0234.

Yours sincerely,



22/12/05.

DR DENISE ROBINSON
Chief Health Officer and
Deputy Director General, Population Health

Appendix C

Revised economic analysis report

Environmental Assessment for the Vineyard to Rouse Hill Electricity Upgrade

Economic Analysis Report

October 2005.

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1.0 Introduction to Economic Analysis Requirements

This economic modelling report has been prepared to fulfil the obligations imposed upon Integral Energy under the *National Electricity Rules* in regard to the Vineyard to Rouse Hill Electricity Upgrade *network augmentation*. This report reviews the *alternative options* for *network augmentation*, and recommends a preferred action, as required by s5.2.3 (d) (12) and s5.6.2 (g) and (h) of the *National Electricity Rules*.

In addition, Integral Energy is also subject to NSW Treasury's Policy and Guidelines for Economic Appraisal, which requires it to undertake economic analysis for proposed projects which require an Environmental Impact Statement to be undertaken, such as the Vineyard to Rouse Hill Electricity Upgrade *network augmentation*.

(Note all *italicised terms* are as defined in the Glossary of the *National Electricity Rules*.)

1.1 The National Electricity Rules and the *regulatory test*

National Electricity Rules Requirements

As a *Distribution Network Service Provider* ("*DNISP*"), Integral Energy is subject to the National Electricity Rules ((1), the "*Rules*"), and hence must comply with s5.6.2(g), which requires *DNISP*'s to carry out an economic cost effectiveness analysis of possible options to *identify alternative options* that satisfy the *regulatory test*, as promulgated by the Australian Energy Regulator ("*AER*").

Under clause 5.6.2(b) of the Rules, a *DNISP* must undertake an annual planning review with its *Transmission Network Service Provider(s)* to identify any requirements for *augmentation* of the *network*, and communicate these requirements to *affected Registered Participants* and *interested parties* with its preferred action to address the *network augmentation* requirement. Under clause 5.6.2(f), the *DNISP* must consult with *affected Registered Participants* and *interested parties*:

"... on the possible options, including but not limited to demand side options, *generation* options and market network service options to address the projected limitations of the *relevant distribution system* except that a *Distribution Network Service Provider* does not need to consult on a *network option* which would be a *new small distribution network asset*."

The term *new small distribution network asset* is limited to an asset of a *Distribution Network Service Provider* requiring capital expenditure of less than \$10,000,000, and hence the exclusion for *new distribution small network assets* in clause 5.6.2(f) is irrelevant for this upgrade, as it will be in excess of \$10,000,000.

Integral Energy has already examined a range of non-network options, including demand side options, *generation* options, and market network service provider options, and concluded that they are incapable of addressing the identified requirement, and hence that a *network augmentation* is required. The various *alternative options* for this *network augmentation* (the Vineyard to Rouse Hill Electricity Upgrade) are the subject of this economic modelling report.

Economic Analysis

Under clause 5.6.2(g) of the National Electricity Rules, a *DNISP* must:

“... carry out an economic cost effectiveness analysis of possible options to identify options that satisfy the *regulatory test*, while meeting the technical requirements of schedule 5.1 of the Rules, and where the *Network Service Provider* is required by clause 5.6.2(f) to consult on the option this analysis and allocation must form part of, the consultation on that option.”

and under clause 5.6.2(h) a *DNISP* must:

“... prepare a report that is to be made available to affected *Registered Participants*, *NEMMCO* and *interested parties* which:

- (1) includes assessment of all identified options;
- (2) includes details of the *Distribution Network Service Provider's* preferred proposal and details of:
 - (A) its economic cost effectiveness analysis in accordance with clause 5.6.2(g); and
 - (B) its consultations conducted for the purposes of clause 5.6.2(g);
- (3) summarises the submissions from the consultations; and
- (4) recommends the action to be taken.”

The *DNISP* must then negotiate in good faith with *affected Registered Participants* and *interested parties* to reach agreement on the action to be taken.

The *regulatory test*

The AER is required to promulgate a *regulatory test* under s5.6.5A of the National Electricity Rules. The *regulatory test* was originally promulgated by the ACCC in December 1999 (2), but was revised in August 2004 (3). This is now the responsibility of the AER.

The reliability arm of Version 1 of the *regulatory test* was used in Integral's March 2005 consultation with Code Participants and interested parties¹. This current document uses Version 2 of the Regulatory Test (which is the current version of the test). The change in versions has resulted in slight differences in the analysis presented in the two consultation documents.

The current *regulatory test* is contained in an ACCC Decision, and provides (4) as follows:

“The *regulatory test*

- (1) An option satisfies the *regulatory test* if:
 - a) in the event the option is necessitated solely by the inability to meet the minimum network performance requirements set out in schedule 5.1 of the Rules or in relevant legislation, regulations or any statutory instrument of a participating jurisdiction – the option minimises the present value of costs, compared with a number of *alternative options* in a majority of *reasonable scenarios*;

¹ Integral, *Final Report - Vineyard to Rouse Hill Electricity Upgrade Augmentation of 132KV Feeder 9JA*, March 2005.

- b) in all other cases – the option maximises the expected net present value of the *market benefit* (or in other words the present value of the *market benefit* less the present value of costs) compared with a number of *alternative options* and timings, in a majority of *reasonable scenarios*.”

The *regulatory test* is commonly considered as having two “limbs” – part a) above is referred to as the “reliability” limb, while part b) is referred to as the “market benefits” limb.

Definition of Costs and Market Benefit

The terms *Costs* and *Market Benefit* are defined the *regulatory test* as follows:

“For the purposes of this test:

...

- (2) *Costs* means the total cost of an option (or an *alternative option*) to all those who produce, distribute or consume electricity in the National Electricity Market.

In determining the *costs*, the analysis may include, but need not be limited to, the following:

- a) costs incurred in constructing or providing the option;
- b) operating and maintenance costs over the operating life of the option;
- c) the cost of complying with existing and anticipated laws, regulations, and administrative decisions such as those dealing with health and safety, land management and environment pollution and the abatement of pollution (including greenhouse gas abatement). An environmental tax should be treated as part of a project’s costs. An environmental subsidy should be treated as part of a project’s benefits or as a negative cost.
- d) other costs that are determined to be relevant to the case concerned.

...

- (5) *Market benefit* means the total benefits of an option (or an *alternative option*) to all those who produce, distribute, and consume electricity in the National Electricity Market. That is, the change in consumers’ and producers’ surplus or another measure that can be demonstrated to produce an equivalent ranking of options in a majority of *reasonable scenarios*. For clarity, *market benefit* does not include the transfer of surplus between consumers and producers.

In determining the *market benefit*, the analysis may include, but need not be limited to the following benefits:

- a) changes in fuel consumption arising through different generation despatch;
- b) changes in voluntary load curtailment caused through reduction in demand-side curtailment;

- c) changes in involuntary load shedding caused through savings in reduction in lost load, using a reasonable forecast of the value of electricity to consumers, or deferral of reliability entry plant;
- d) changes in costs caused through:
 - (1) deferral of market entry plant. This must be excluded if reliability benefits are determined using deferral of reliability entry plant;
 - (2) differences in capital costs;
 - (3) differences in the operational and maintenance costs;
 - (4) deferral of transmission investments;
- e) changes in transmission losses;
- f) changes in ancillary services;
- g) *competition benefits*; and
- h) other benefits that are determined to be relevant to the case concerned.”

Selection of the Appropriate Limb

Integral Energy must select which limb of the *regulatory test* for the Vineyard to Rouse Hill Electricity Upgrade which it is attempting to satisfy.

The Vineyard to Rouse Hill Electricity Upgrade is being undertaken to increase N-1 capacity from 84MVA to 500 MVA. In 2004/05, the peak load supplied by the existing infrastructure was 141 MVA. Hence, the upgrade is being undertaken to both improve reliability and substantially increase capacity for expected growth in the future. Integral has decided to build the 500 MVA now rather than to increase capacity incrementally over the next twenty or so years, as it more cost effective to upgrade the line once in twenty years than rather than upgrade two or three times during the period, given the long asset lives and low residual value of these assets.

Given the upgrade is for reliability reasons, both for an immediate short-term constraint, and over the longer term as demand grows in the area, Integral understands the upgrade to come under the reliability limb of the Regulatory Test. The results of the economic analysis consider the present value of costs.

- The selection and estimation of costs and benefits is also a difficult exercise due to some ambiguity in *the regulatory test*, The definitions of both *Costs* and *Market benefit* are non-exhaustive, and allow the inclusion of “other” *Costs* and *Market benefits* “that are determined to be relevant to the case concerned”. This report has identified possible “other” *Costs* which **may** be appropriate, but it is not possible to state conclusively that the will be accepted by the AER as satisfying the *regulatory test*. The specific issues of concern are:
 - a. distribution losses – the definition of *Market benefit* specifically includes “transmission losses” as a *Market benefit*, in the market benefit arm of the *regulatory test*. However “transmission losses” is not a defined term, and hence it is unclear whether a reduction in

losses in electrical energy due to resistance in the network is a *Market benefit* available to both TNSP's and DNSP's, or solely applies to TNSP's. However, given the list of *Market benefits* is intended to be interpreted in an expansive fashion, the term "transmission losses" has been assumed to include distribution losses as a *Market benefit* for the purpose of this report.

- b. network losses under the reliability arm - the *regulatory test* does not describe whether transmission (or distribution) losses should be defined as a cost if the reliability arm of the test is used (where no market benefits are calculated). While this has not been explicitly stated as a cost for the reliability arm of the test, the test includes reference to 'all costs to those who produce, distribute or consume electricity, and to not include losses seems to be an omission. Distribution losses are treated as a cost in this analysis.
- Property values – the definitions of *Costs* and *Market benefit* do not explicitly include any impact on property values resulting from a *network augmentation*. Again, it is not possible to state conclusively that they are *Costs* eligible for consideration in a *regulatory test*.

1.2 NSW Treasury policies and guidelines

As a NSW Government State Owned Corporation, Integral Energy is also subject to New South Wales Treasury's policy and guidelines on Economic Appraisal of Capital Works. As noted in NSW Treasury's Guidelines for Financial Appraisal (6):

"... proposed projects of GTEs and SOCs which require an Environmental Impact Statement to be undertaken, are Social Program Projects, or are classified as Projects of State Significance require both financial and economic appraisals to be conducted. Economic appraisals should be conducted in accordance with the NSW Government Guidelines for Economic Appraisal ..."

Under NSW Treasury's Policy and Guidelines for Economic Appraisal ((7), the "Guidelines"), both cost benefit and effectiveness analysis are defined, although cost benefit analysis is noted as the preferred alternative.

Thus, under both the Rules and NSW Treasury guidelines, Integral Energy is required to undertake economic modelling of the Vineyard to Rouse Hill Electricity Upgrade *network augmentation*.

The *regulatory test* and Economic Appraisal are forms of cost benefit analysis used to assess the efficiency of investments. Cost benefit analysis, broadly speaking, involves comparing a potential investment project with the situation when the project is not undertaken (the base case) to determine whether the project offers overall net benefits. The difference between discounted benefits and discounted costs – the net market benefit – is an indication of how valuable an investment project is to society and whether it should be undertaken. This is captured in the market benefits arm of the *regulatory test*.

Cost minimisation analysis is often undertaken when the benefits of a project are not easily calculated, and involves comparing the cost (and any quantifiable benefits) of various options that produce the same or similar outputs. This is defined by NSW Treasury as cost-effectiveness analysis, and what is captured in the reliability arm of the *regulatory test*. There seems to be an inconsistency in the definitions of cost effectiveness analysis under the Rules and the NSW Treasury guidelines. In the case of the reliability limb of the Regulatory Test cost minimisation is

adopted in recognition that the network service provider is effectively bound to undertake reliability augmentations (i.e. failure to undertake the augmentation would mean that the network service provider is in breach of its reliability standards).

In these economic analysis only incremental costs and benefits, i.e. those associated extra costs and benefits resulting from adopting a particular option above the base case (or status quo) are included in the analysis.

2.0 Overview of the *alternative options* Identified

In this section each of the *alternative options* for the Vineyard to Rouse Hill Electricity Upgrade will be briefly described, and the more economically significant differences between the *alternative options* identified and discussed.

2.1 Brief Description of the *alternative options*

Nine *alternative options* for the Vineyard to Rouse Hill Electricity Upgrade *network augmentation* were modelled in detail. Variations of these *alternative options* were also considered, but not incorporated individually into the economic model, as they were not significantly different from the options actually modelled. The *alternative options* identified are briefly described below

Option A

This *alternative option* advocated the construction of overhead 36m steel lattice towers with twin mango conductors in the Vineyard to Rouse Hill Electricity Upgrade easement, which has a route length of 8.69 kilometres.

Option B

This *alternative option* advocated the construction of overhead 36m double circuit steel poles with twin mango conductors in the Vineyard to Rouse Hill Electricity Upgrade easement, again with a route length of 8.69 kilometres.

Option C

This *alternative option* advocated the construction of overhead twin 22m steel poles with twin mango conductors in the Vineyard to Rouse Hill Electricity Upgrade easement, again with a route length of 8.69 kilometres.

Option D

This *alternative option* advocated the construction of overhead twin 22m steel poles with twin Invar conductors in the Vineyard to Rouse Hill Electricity Upgrade easement, again with a route length of 8.69 kilometres.

Option E

This *alternative option* advocated the construction of underground twin circuit 1600sqmm cables with two cables/phase in the Vineyard to Rouse Hill Electricity Upgrade easement, again with a route length of 8.69 kilometres.

Option F

This *alternative option* advocated the construction of underground twin circuit 1600sqmm cables along an alternative easement in Railway Terrace and Schofields Road, with a route length of

11.0 kilometres. The existing 17m overhead wooden poles are assumed to be retained in the Vineyard to Rouse Hill Electricity Upgrade easement, but not utilised to carry any capacity, and hence no *Costs* or *Market benefits* have been incorporated into the economic model in regard to the enhanced capacity and security provided by the retention of this asset.

Option G

This *alternative option* advocated the construction of overhead 36m double circuit steel poles with twin mango conductors along Eastern Creek, then two single 30m steel poles with mango conductors along Railway Terrace, and finally two single 22m steel poles with mango conductors along Schofields Road, with a total route length of 10.90 kilometres. The existing 17m overhead wooden poles are assumed to be retained in the Vineyard to Rouse Hill Electricity Upgrade easement, but not utilised to carry any capacity, and hence no *Costs* or *Market benefits* have been incorporated into the economic model in regard to the enhanced capacity and security provided by the retention of this asset.

Option I

This *alternative option* advocated the construction of both overhead twin 22m steel poles with twin mango conductors **and** underground twin circuit 1600sqmm cables with one cable/phase in the existing easement, with a route length of 8.69 kilometres.

Option K

This *alternative option* advocated the construction of overhead 30m double circuit steel poles with single Invar conductors along Eastern Creek, then underground twin circuit 1600sqmm cables with two cables/phase along Railway Terrace, and finally two single 22m steel poles with Invar conductors along Schofields Road, with a total route length of 11.90 kilometres. The existing 17m overhead wooden poles are assumed to be retained in the Vineyard to Rouse Hill Electricity Upgrade easement, but not utilised to carry any capacity, and hence no *Costs* or *Market benefits* have been incorporated into the economic model in regard to the enhanced capacity and security provided by the retention of this asset.

2.2 Economically Significant Differences between the *alternative options*

A number of economically significant differences exist between the *alternative options*, which impacted the results obtained from economic analysis. These differences were:

2.2.1 Type of Asset

The type of asset constructed had a very strong effect on the relative attractiveness of the different *alternative options*. Overhead construction is much cheaper than underground construction, and hence overhead alternatives always resulted in lower capital expenditure costs per kilometre. Likewise, operating expenditure also depends on the type of asset constructed, with significant differences existing between *alternative options*, as detailed in the table below:

Type of Asset Constructed	Inspection Costs	Fault & Emergency Costs	Vegetation Management Costs	Commentary

Overhead - 30m and above	Low	Low	Moderate	Moderate number of assets to inspect; assets clearly visible, as they are above tree height
Overhead - 22m and below	Moderate	Moderate	High	High number of assets to inspect, less visible as they are at tree height
Underground	High	High	Low	Low number of assets, but they are difficult to inspect or repair. Less F & E, but more expensive to repair when they do occur. Some vegetation management still required to keep the easement clear and avoid root encroachment

A series of assumptions have been made to reflect the different economies of scale for each type of operating expenditure.

2.2.2 Route Length

Longer routes lead to higher costs to deliver the same capacity. Both capital and operating expenditure costs were modelled assuming a direct correlation to the route length of each *alternative option*.

2.2.3 Line Losses – Distribution Losses and Greenhouse Gas (“GHG”) Emissions

Underground cables produce smaller distribution losses than overhead feeders, both in terms of direct energy losses (due to the lower electrical resistance of underground cables), and lower greenhouse gas emissions (when these distribution losses are converted to greenhouse gas emission equivalents, at three different assumed values for equivalent tonnes of CO₂ emitted).

2.2.4 Property Values

Environmental, health, safety, and other relatively intangible and difficult to quantify factors also impact on the relative attractiveness of the different *alternative options*. Property values have been investigated as a surrogate means of incorporating the impact of many of these factors into the *regulatory test*.

The impact on property prices can also be seen as capturing a major cost of the augmentation on users of electricity, that is, the impact on their housing values.

Property values do not seem to have been quantified in any previous *regulatory test* conducted by an *NSP*, and only rarely discussed, possibly due to the fact that past *regulatory tests* have:

- mainly utilised the original version of the *regulatory test*, and not the revised version; and

- mainly been conducted by TNSP's not DNSP's, and hence property values may not have had a significant impact on a *regulatory test*. For example, most TNSP assets *network augmentations* are not located in areas with high property values, unlike most *DNSP* assets.

2.2.5 Other Differences

A range of other factors were considered (including differences in the value of 'lost' load). Investigation of these issues led to the conclusion that either the differences between the *alternative options* were not significant, or not relevant to the Vineyard to Rouse Hill Electricity Upgrade, or were already incorporated, at least in part, through the factors already discussed.

3.0 Sources and Calculation of Input Data

The data inputs into the Vineyard to Rouse Hill Electricity Upgrade economic cost minimisation analysis model have been entered through a series of separate worksheets, each of which identifies the type of input, and the source of the relevant data. These worksheets are as follows:

3.1 Capital Expenditure

The capital expenditure required to construct each *alternative option* was determined through an independent report provided by Maunsell. The details of these *Costs* are provided in the table below (8):

<i>alternative option</i> (IE lettering system)	<i>Alternative option</i> (per Maunsell)	Total Capital Expenditure
A	1	-\$ 11,767,027
B	2	-\$ 13,649,406
C	3	-\$ 16,752,413
D	4	-\$ 17,444,505
E	5	-\$ 72,837,576
F	6	-\$ 95,691,070
G	7	-\$ 19,897,923
I	9	-\$ 38,752,726
K	11	-\$ 59,277,562

3.2 Variable Operating Expenditure (Inspection, Fault & Emergency, Vegetation Management)

Operating expenditure assumptions for each *alternative option* was obtained from Integral's Capital Solutions business unit, based on Integral's experience of the operation of similar infrastructure. These assumptions were utilised to calculate the variable component of operating expenditure as a *Cost* for each *alternative option*.

The sources of variable operating expenditure were as follows:

- ground inspection, for both overhead and underground feeders
- climbing inspection, for overhead feeders
- link box inspection, for underground feeders
- fault & emergency, for both overhead and underground feeders
- vegetation management, for both overhead and underground feeders

The total variable operating expenditure for each *alternative option* was determined to be:

<i>alternative option (IE lettering system)</i>	<i>alternative option (per Maunsell)</i>	Total Variable Operating Expenditure (p.a.)
A	1	-\$ 21,249.21
B	2	-\$ 21,249.21
C	3	-\$ 27,933.11
D	4	-\$ 27,933.11
E	5	-\$ 39,662.49
F	6	-\$ 74,894.24
G	7	-\$ 54,353.68
I	9	-\$ 57,178.74
K	11	-\$ 68,031.90

3.3 Line Losses

Line losses (distribution losses, plus GHG emissions) were calculated for each *alternative option* based on the impedance of each type of line employed, its length, the average price of NSW Flat wholesale electricity over the preceding 12 months, and greenhouse gas emission factors as published by the Australian Greenhouse Office (“AGO”) under three different carbon trading price scenarios. Under a medium forecast carbon trading price of \$50/tonne, the net present value of line losses calculated for each *alternative option* were as follows:

Distribution losses and GHG emissions are both included as costs in this model.

<i>alternative option (IE lettering system)</i>	<i>alternative option (per Maunsell)</i>	Total Distribution Losses (NPV over 50 years)	Total GHG Emissions (NPV over 50 years)
A	1	-\$ 211,924	-\$ 276,914
B	2	-\$ 211,924	-\$ 276,914
C	3	-\$ 211,924	-\$ 276,914
D	4	-\$ 234,550	-\$ 306,479
E	5	-\$ 49,007	-\$ 64,036
F	6	-\$ 61,323	-\$ 80,129
G	7	-\$ 265,576	-\$ 347,019
I	9	-\$ 248,496	-\$ 324,702
K	11	-\$ 205,842	-\$ 268,967

3.4 Property Values

Low and high estimates of property value impacts from the Vineyard to Rouse Hill Electricity Upgrade *network augmentation* were derived from a report prepared by Hill PDA (9). This report detailed the property value impacts for each *alternative option* as follows:

<i>alternative option (IE lettering system)</i>	<i>alternative option (per Maunsell)</i>	Low Estimate (January 2005)	High Estimate (January 2005)
A	1	- \$17,000,000	- \$51,000,000
B	2	- \$3,400,000	- \$17,000,000
C	3	\$0	- \$3,400,000
D	4	\$0	- \$3,400,000
E	5	+ \$11,900,000	+ \$25,500,000
F	6	\$0	- \$4,400,000
G	7	- \$33,192,000	- \$65,112,000
I	9	\$0	+ \$4,280,000
K	11	- \$20,520,000	- \$40,920,000

While the Vineyard to Rouse Hill Electricity Upgrade *network augmentation* generally resulted in negative impacts on property values, *alternative options* involving undergrounding in the existing Vineyard to Rouse Hill easement (options E, and to a lesser extent, I) did produce a positive impact on property values.

The impact on property prices has been included as a cost. In the case of options E and I, the positive property price impacts have been incorporated as negative costs.

3.5 Other Data Inputs

Two other significant data inputs have also been modelled, and sensitivities provided for them in the economic model. These data inputs are:

- weighted average cost of capital

The model provides for a regulated rate of a 7.0% real, pre-tax weighted average cost of capital (“WACC”), as allowed to Integral by IPART in its 2004 Final Network Determination, with a sensitivity which allows for automatic re-calculation at a user-defined “scenario rate”. This “scenario rate” can be adjusted to:

“... a commercial discount rate appropriate for the analysis of a private enterprise investment in the electricity sector ...”

as required under the *regulatory test (10)*. A real, pre-tax basis is applied consistently to both the WACC and the cash flows being discounted, as required by the *regulatory test (11)*. The ability to adjust the scenario rate as a sensitivity test is also consistent with the *regulatory test*, as it allows the user to input a selected regulated rate as:

“... the lower boundary of the discount rate, but not the mean value around which sensitivity testing is conducted. The ACCC has amended the *regulatory test* to ensure that the regulatory WACC can only be considered a lower boundary in a *regulatory test* assessment. “

The economic model provides a user with the ability to set the scenario rate at their preferred mean value, and then conduct sensitivity testing around this mean value by adjusting the scenario rate further.

- assumed timing of capital expenditure

The model provides for the timing of capital expenditure to be altered over a five year construction timetable, the maximum likely period of construction. A base case of the anticipated construction timetable for Option A is available; however any other five year timing profile can be entered as an alternative scenario.

4.0 Sensitivity Tests

Sensitivity testing has been built into the Vineyard to Rouse Hill Electricity Upgrade economic model, in the Scenario worksheet. A graph of the NPV for each *alternative option* has been included on this worksheet, to enable the effect of varying each sensitivity to be observed interactively. In addition, a full scale version of this graph has also been provided on a separate worksheet.

4.1 Capital Expenditure

Capital expenditure has the most significant impact on the Vineyard to Rouse Hill Electricity Upgrade economic model, due to a very large difference in total capital expenditure between the different *alternative options*. This is readily illustrated by altering the capital expenditure sensitivity on the Scenario worksheet, which allows user-defined scenarios to be created interactively.

4.2 Variable Operating Expenditure

Variable operating expenditure does not have a significant impact on the Vineyard to Rouse Hill Electricity Upgrade economic model as, while there is a significant difference in total operating expenditure between the different *alternative options*, these differences are smaller in relative terms, and operating expenditure is less significant in absolute terms, than capital expenditure or property values. This is readily illustrated by altering the operating expenditure sensitivity on the Scenario worksheet.

4.3 Line Losses

Line losses also do not have a significant impact on the Vineyard to Rouse Hill Electricity Upgrade economic model as, while there is a significant difference in line losses between the different *alternative options* in relative terms; line losses are less significant, in absolute terms, than capital expenditure or property values. This is readily illustrated by altering the line losses sensitivity on the Scenario worksheet.

4.4 Property Values

Property values have a significant impact on the Vineyard to Rouse Hill Electricity Upgrade economic model, as there are significant differences between the different *alternative options* in relative terms, and property values are also significant in absolute terms, although this sensitivity is less than for capital expenditure. This is readily illustrated by altering the property values sensitivity on the Scenario worksheet.

4.5 Other Data Inputs

These data inputs have also been incorporated with appropriate sensitivities into the Scenario worksheet. Neither the weighted average cost of capital nor the timing of capital expenditure

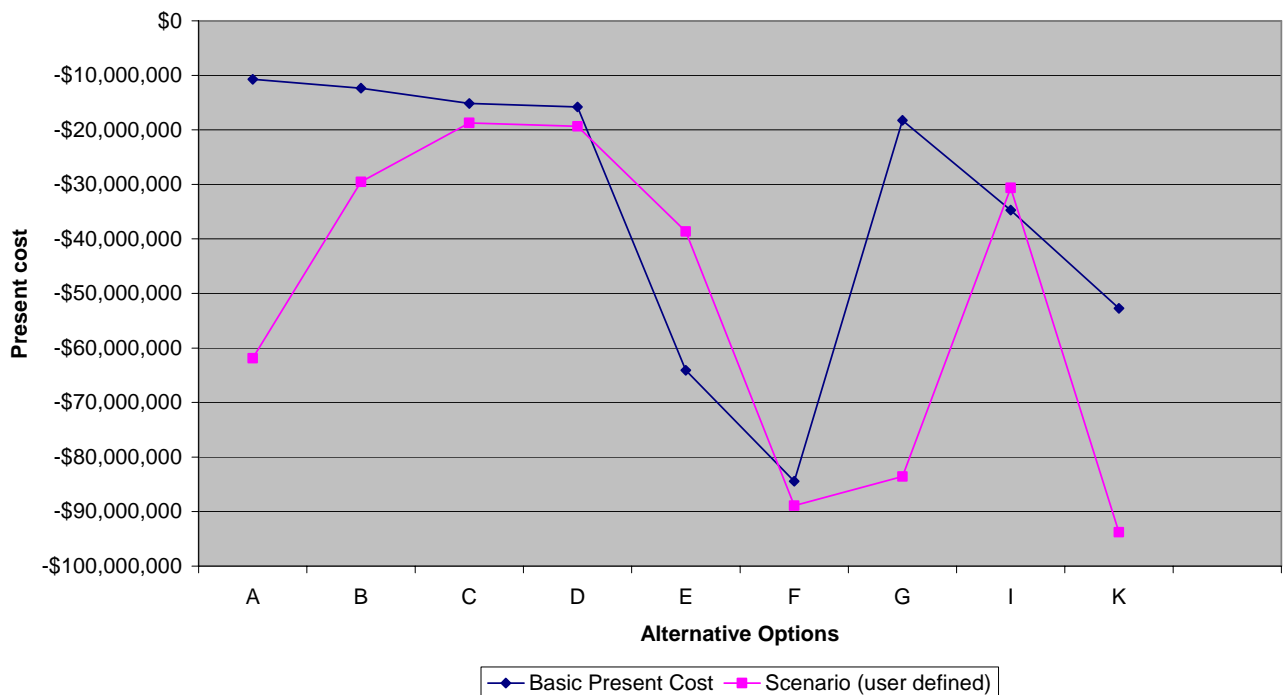
has a significant impact on the Vineyard to Rouse Hill Electricity Upgrade economic model. This is readily illustrated by altering the relevant sensitivities on the Scenario worksheet.

5.0 Results and Discussion

If the *alternative options* are compared solely on their relative capital expenditure, operating expenditure, and line losses, then option A would be the preferred *alternative option*, as shown in the graph attached below, which has been excerpted from the net present value of costs graph in the Vineyard to Rouse Hill Electricity Upgrade economic model. The inclusion of GHG emissions does not affect this result, and option A remains the least cost option.

However, the inclusion of the impact on property values does alter preferences, with Option C becoming the preferred action (under both the low and high property price impact estimates). Under the high estimate of property values Option C's preferred status becomes particularly apparent. The 'scenario' line in the chart shows the inclusion of GHG emissions and the impact of property prices on the present value of costs. The inclusion of the impact of property prices as a cost can be justified on the grounds of a cost internalised by customers in the area, and also as a proxy to capture environmental, health and safety issues that are difficult to capture by other measures.

Vineyard to Rouse Hill Electricity Upgrade



6.0 References

- (1) *National Electricity Rules, National Electricity Rules Administrator, Version 1.0 – Amendment 8.0, 1 May 2003*
- (2) *Regulatory Test for New Interconnectors and Network Augmentations, Australian Competition and Consumer Commission, 15 December 1999*
- (3) *Review of the Regulatory Test for Network Augmentations, Australian Competition and Consumer Commission, Decision, 11 August 2004*
- (4) *Review of the Regulatory Test for Network Augmentations, Australian Competition and Consumer Commission, Decision, 11 August 2004, page 7*
- (5) *Review of the Regulatory Test for Network Augmentations, Australian Competition and Consumer Commission, Decision, 11 August 2004, page 79*
- (6) *NSW Treasury, Office of Financial Management, Guidelines for Financial Appraisal (TTP97-4), July 1997, page 3*
- (7) *NSW Treasury, Office of Financial Management, Policy and Guidelines Paper “Economic Appraisal: Principles and Procedures Simplified” (TPP99-1), March 1999, page 7*
- (8) *Maunsell, Vineyard to Rouse Hill Electricity Upgrade - Independent Report to Examine Upgrade Cost Options, prepared for Integral Energy, 26 April 2005, Executive Summary, Summary of Costs table, page 35*
- (9) *Hill PDA, Effect on Social and Environmental Externalities of Electricity Infrastructure in the North West Sector, prepared for Parsons Brinkerhoff, on behalf of Integral Energy, January 2005, Executive Summary, page 7*
- (10) *Review of the Regulatory Test for Network Augmentations, Australian Competition and Consumer Commission, Decision, 11 August 2004, page 10*
- (11) *Review of the Regulatory Test for Network Augmentations, Australian Competition and Consumer Commission, Decision, 11 August 2004, page 48*

Appendix D

Flora and fauna habitat issues

Assessed pole position

Proposed pole number¹	Vegetation	Flora issues	Fauna issues
1	Previously cleared. Predominantly introduced grasses on artificially-constructed embankment of Vineyard substation. Weedy. Few native shrubs.		Man made water retention pond with emergent vegetation.
2	Previously cleared, currently with planted Eucalyptus trees. Grassy, weedy understorey.		
3	Cleared. Heavily grazed grassy paddock.		
4	Cleared. Heavily grazed grassy paddock.		Nearby large Grey Box with dead limbs forming hollows. Should be left undisturbed if possible
5	Cleared. Heavily grazed grassy paddock.		Nearby large Broad-leaved Ironbark with dead limbs and forming hollows. Should be left undisturbed if possible.
6	Heavily grazed grassy paddock. Few regenerating Forest Red Gum		
7	Cleared. Lightly grazed grassland.		
8	Cleared. Lightly grazed grassland. Has been recently cleared of remnant native vegetation.		
9	Previously cleared and maintained slashed (part mown). Native and introduced grasses with sparse cover of native shrubs.	Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to smallest area feasible, and to existing easement only.	
10	Cleared. Mown grassland.		

Assessed pole position

Proposed pole number¹	Vegetation	Flora issues	Fauna issues
11	Previously cleared and maintained slashed (part mown). Native and introduced grasses with sparse cover of native shrubs.	Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to smallest area feasible, and to existing easement only. Site is approx. 30 m north of <i>Dillwynia tenuifolia</i> population. Access to this site should be from Hamilton St only and construction should be limited to within 20 metres of edge of Hamilton Rd.	
12	Previously cleared and maintained slashed. Native and introduced grasses with sparse cover of shrubs.	Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to smallest area feasible.	
13	Previously cleared and maintained slashed. Native and introduced grasses with sparse cover of shrubs.	Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to smallest area feasible. to existing easement only.	Discarded building materials - potential habitat for Cumberland Plain Snail
14	Cleared. Heavily grazed grassy paddock. Some <i>Bursaria spinosa</i> and unmown grass in adjacent road verge.		
15	Cleared. Mown grassland.		
16	Previously cleared and maintained slashed. Native and introduced grasses with isolated islands of native shrubs. Very degraded site with many vehicular tracks.	Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to smallest area feasible. to existing easement only.	

Assessed pole position

Proposed pole number¹	Vegetation	Flora issues	Fauna issues
17	Previously cleared and maintained slashed. Native and introduced grasses with moderate cover of native shrubs.	Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to smallest area feasible. to existing easement only.	Discarded building materials - potential habitat for Cumberland Plain Large Land Snail.
18	Previously cleared and maintained slashed. Native and introduced grasses with moderate cover of native shrubs.	Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to smallest area feasible within existing easement only.	Discarded building materials - potential habitat for Cumberland Plain large Land Snail. An old disused shell of the species was previously recorded.
19	Previously cleared and maintained slashed. No shrubs except few Grey Box regeneration.	Very young regrowth Grey Box forest adjacent to easement may constitute Endangered Ecological Community. Potential habitat for threatened species.	
20	Cleared roadside edge.	Remnant Forest Red Gum forest in adjacent property may constitute Endangered Ecological Community. Potential habitat for threatened species.	
21	Cleared. Mown grassland. Single Grey Box close by on E side.		
22	Cleared. Unmown, predominantly introduced grassland.	Endangered Ecological Community adjacent to easement on east side only. Potential habitat for threatened species. Construction impact should be limited to existing easement only.	
23	Cleared. Heavily grazed grassy/bare paddock.		
24	Cleared. Unmown grassland, lightly grazed.		
25	Cleared roadside edge. Adjacent land is citrus orchard.		
26	Cleared. Mown grassland.		

Assessed pole position

Proposed pole number¹	Vegetation	Flora issues	Fauna issues
27	Within industrial site yards.		
28	Cleared. Unmown grassland. Single regrowth Grey Box.	Endangered Ecological Community adjacent to easement on east side only. Potential habitat for threatened species. Construction impact should be limited to existing easement only.	
29	Cleared. Unmown grassland.	Endangered Ecological Community adjacent to easement on east side only. Potential habitat for threatened species. Construction impact should be limited to existing easement only.	
30	Cleared. Unmown grassland. Couple of small regrowth Narrow-leaved Ironbark.	Endangered Ecological Community adjacent to easement on east side only. Potential habitat for threatened species. Construction impact should be limited to existing easement only.	
31	Cleared. Unmown grassland.		
32	Cleared. Mown and grazed grassy paddock.		
33	Not accessible	Endangered Ecological Community adjacent to easement (unlikely within). Potential habitat for threatened species. Construction impact should be limited to existing easement only	
34	Cleared. Mown and grazed grassy paddock. Couple of regrowth Narrow-leaved Ironbark near edge of easement.		Large farm dam within 20 metres.
35	Cleared. Mown and grazed grassy paddock.		
36	Cleared. Mown and grazed grassy paddock.		
37	Cleared. Unmown grassland.	Degraded Endangered Ecological Community adjacent to easement. Potential habitat for threatened species. Construction impact	

Assessed pole position

Proposed pole number¹	Vegetation	Flora issues	Fauna issues
		should be limited to existing easement only.	
38	Previously cleared and maintained slashed. Native and introduced grasses with low cover of native shrubs.	Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to smallest area feasible within existing easement only.	
39	Not accessible		
40	Previously cleared and maintained slashed. Native and introduced grasses with moderate cover of native shrubs.	Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to smallest area feasible within existing easement only.	
41	Cleared. Unmown grassland.		
42	Partially cleared. Remainder previously cleared, but now native and introduced grasses with moderate native shrubs and eucalypt regeneration.	Degraded Endangered Ecological Community within and adjacent to easement. Potential habitat for threatened species. Construction impact should be limited to existing cleared roadside easement only if possible.	
43	Cleared. Mown grassy paddock.		
44	Cleared. Mown grassland. Adjacent creek vegetation highly modified with introduced species.		Proximate to flowing creek reported containing fish.

Notes: 1 Refer to *Figure 6.1* of this report for details of the proposed pole locations

Appendix E

Statement of Commitments

Statement of Commitments

General

1. The Project will be carried out consistent with:
 - (a) The proposal contained in the EA, Submissions Report and Preferred Project Report (if required).
 - (b) All identified plans, safeguards and mitigation measures identified in the EA and Submissions Report.
 - (c) The Conditions of Approval granted by the Minister.

Despite the above, the Conditions of Approval granted by the Minister prevail in the event of any inconsistency.

Compliance

General

2. The Project will be designed, constructed and operated in accordance with all necessary statutory regulations, applicable guidelines, licences, approvals and permits required and in accordance with the Environmental Assessment.
3. It is the responsibility of the Proponent to ensure compliance with all Conditions of Approval granted by the Minister and to implement any measures arising from the Conditions of Approval.
4. The Proponent will bring to the attention of the Director-General any matter that may require further issuing of instructions from the Director-General.
5. The Proponent will comply with any requirements of the Director-General arising from the Director-General's assessment of:
 - (a) Any reports, plans or correspondence that are submitted to satisfy these Conditions of Approval.
 - (b) The implementation of any actions or measures contained in such reports, plans or correspondence.

Staging Report

6. The Proponent may elect to construct the Activity in Stages provided that these are consistent with the Conditions of Approval. Where Stages are proposed, the Proponent will submit a Staging Report to the Director-General at least four weeks before Construction commences (or within any other time agreed to by the Director-General). The Staging Report will:
 - (a) Describe the Stages.
 - (b) Identify how the Conditions will be addressed in each Stage.

Pre-Construction Compliance Report

7. The Proponent will submit a Pre-Construction Compliance Report to the Director-General at least four weeks before Construction commences (or within any other time agreed to by the Director-General).

The Pre-Construction Compliance Report will include:

- (a) Details of how the Conditions of Approval required to be addressed before Construction were complied with.

- (b) The time when each relevant Condition of Approval was complied with, including dates of submission of any required reports and/or approval dates.
- (c) Details of any approvals or licences required to be issued by Relevant Government Departments before Construction commences.

Pre-Operation Compliance Report

- 8. The Proponent will submit a Pre-Operation Compliance Report to the Director-General at least four weeks before Operation commences (or within any other time agreed to by the Director-General).

The Pre-Operation Compliance Report will include:

- (a) Details of how the Conditions of Approval required to be addressed before Operation were complied with.
- (b) The time when each relevant Condition of Approval was complied with, including dates of submission of any required reports and/or approval dates.
- (c) Details of any approvals or licences issued by Government Departments for the Activity's Operation.

Project Commencement

- 9. The Proponent will notify the Director-General and all relevant authorities in writing at least two weeks prior to the commencement of construction and operation.

Contact Telephone Number

- 10. Prior to the commencement of construction, the Proponent will institute, publicise and list with a telephone company a 24 hour toll free complaints contact telephone number, which will enable any member of the general public to reach a person who can arrange an appropriate response action to the complaint.

Community Consultation

- 11. A Community Involvement Plan will be prepared prior to the commencement of works detailing the proposed method of communication with local landholders as well as a complaints handling process.
- 12. The community will be kept informed throughout the construction process by means such as community newsletters or public notices and a project website advising of issues such as key activities, road closures, night works etc.
- 13. The Community Advisory Group (CAG) will be maintained throughout the construction period and will hold its first meeting prior to construction commencement. The CAG will include the EMR and representatives from the Proponent and head contractor. Community representatives will be identified and selected from relevant community and business groups, individual members of the community adjoining the Activity and representative from Council.

The Proponent will, at its own expense:

- (a) Maintain the CAG for the duration of construction unless otherwise approved by the Director-General.
- (b) Provide a chairperson for the CAG. The chairperson will be independent of the Proponent and may be elected from the CAG membership.
- (c) Nominate two representatives to attend all CAG meetings.
- (d) Provide to the CAG regular information on the progress of construction and related environmental performance.

- (e) Promptly provide to the CAG information that the CAG chair may reasonably request concerning the Activity's environmental performance.
- (f) Provide access for site inspections by the CAG.
- (g) Provide meeting facilities for the CAG and take notes of CAG meetings. These meeting notes will be available to CAG members within 14 days of the meeting and will be endorsed by the chair.
- (h) Where reasonably required by the chair, arrange consultant(s) to explain technical information to the CAG.
- (i) Where reasonably required by the chair, invite representatives from Government Departments or other individuals to attend CAG meetings.

Issues for discussion by the CAG include the dissemination of information to the community, issues related to the Conditions or mitigation measures, the CEMP and construction activities. The CAG may make comments about these issues which will be considered by the Proponent. The Proponent will report back to the CAG on its considerations of the comments.

The Proponent may review a CAG's membership and/or the need for the CAG at any time during construction. The Proponent will seek the Director-General's approval to dissolve a CAG. Any request for dissolution will demonstrate why the CAG is no longer required.

In the event of a dispute between the CAG and the Proponent, the Proponent's decision is final provided it is consistent with these Conditions of Approval.

14. Ongoing communication will occur with the Community Advisory Group to observe and monitor the construction process and, if necessary, to review any operational aspects of the proposal for a period of one year following commission.
15. The Proponent will consult all potentially affected landowners and occupiers. Consultation will address, but not be limited to, final pole locations, construction activities and mitigation measures that may affect workings of properties and timing of such activities to minimise disruption; proposed site accesses; restoration / rehabilitation measures; and the nature and timing of maintenance activities.
16. The Proponent will take into consideration all reasonable and feasible requests from landowners. The Proponent will maintain records of consultation undertaken and these records will be made available to the Director-General on request.
17. Specific activities that require road closures or may cause disruptions to properties (eg. noisy activities, changes to access etc) will be communicated directly to landholders.

Advertisement of Activities

18. Prior to commencement of construction, the Proponent will undertake consultation with Council and the local community, including all affected landowners and occupiers along the route. As a minimum, the Proponent will, prior to the commencement of construction, and then at three-monthly intervals, advertise in relevant local newspapers the proposed works for the forthcoming three months, the areas in which these works are proposed to occur, the hours of operation and a contact telephone number. The Proponent will ensure that the local community is kept informed of the progress of the proposal, including but not limited to prior notice of:
- (a) The nature of the works proposed for the following period.
 - (b) A 24 hour toll free contact telephone number during construction and operation.
 - (c) Any traffic disruptions or controls or changes to property access.
 - (d) Work required outside normal working hours.
 - (e) Any irregular work practices such as the use of helicopters.
 - (f) Individual's rights under the conditions of approval.
19. The Proponent will establish a project Internet web site prior to the commencement of construction and maintain the Internet web site until 12 months after commencement of operation of the project. This internet website will contain monthly updates of work progress and consultation activities including, but not limited to:
- (a) A description of relevant approval authorities and their areas of responsibility.
 - (b) A list of environmental management plans and reports that are publicly available and the executive summaries of those reports.
 - (c) Minutes of local community working group meetings.
 - (d) Links to any relevant newsletters.
 - (e) Contact names and phone numbers of the project communications staff.
 - (f) 24 hour toll-free complaints contact telephone number.
- The internet address will be made publicly available.

Dispute Resolution

20. The Proponent will endeavour, as far as possible, to resolve any dispute with relevant public authorities arising out of the implementation of the conditions of this approval. Should this not be possible, the matter will first be referred to the Director-General and if the matter cannot be resolved, then to the Minister for resolution. The Minister's determination of the disagreement will be final and binding on all parties.

Complaints Register

21. The Proponent will record details of all complaints received during construction and ensure that an initial response to the complaint is provided within 24 hours, and a detailed response within 10 days. Information on all complaints received will be made available on request to the Director-General, Council and all relevant government agencies. The Proponent will nominate an appropriate person(s) to receive, log, track and respond to complaints within the specified timeframe. The name and contact details of this person(s) will be provided to Council and the Director-General upon appointment or upon any changes to that appointment.

Environmental Management System

22. The Proponent will ensure the appointment of construction and/or operation head contractors that have an Environmental Management System prepared in accordance with the AS/NZS ISO 14000 series and/or have a proven environmental management performance record.

Environmental Management Representative

23. The Proponent will employ an Environmental Management Representative (EMR). Construction will not commence until the Director-General has approved the EMR. The Proponent will clearly demonstrate to the Director-General that the EMR is independent of the Proponent's implementation team. In considering the appointment, the Director-General will take into account:
 - (a) The qualifications and experience of the EMR including demonstration of general compliance with AS/NZS ISO 14012:1996 Guidelines for Environmental Auditing: Qualification Criteria for Environmental Auditor.
 - (b) The role and responsibility of the EMR.
 - (c) The authority and independence of the EMR including details of the Proponent's internal reporting structure.
24. The EMR will be available during construction activity at the site and be present on-site during any critical construction activities as defined in the Construction Environmental Management Plan. The EMR will have responsibility for:
 - (a) Considering and advising the Proponent on matters specified in the conditions of approval and compliance with such.
 - (b) Certifying the environmental/community impacts as minor for all activities defined by the Proponent as not constituting construction.
 - (c) Reviewing the Proponent's environmental induction and training programme for all persons involved in the construction activities and monitoring implementation.
 - (d) Periodically monitoring the Proponent's environmental activities to evaluate the implementation, effectiveness and level of compliance of on-site construction activities with the EMP and associated plans and procedures, including carrying out site inspections at least fortnightly.
 - (e) Recording and providing a written report to the Proponent of non-conformances with the EMP and requirements of the Proponent to undertake mitigation measures to avoid or minimise any adverse impacts on the environment including reporting required changes to the EMP.
 - (f) Directing the Proponent to stop work immediately where considered necessary, if in the view of the EMR an unacceptable impact on the environment is likely to occur, or require other reasonable steps to be taken to avoid or minimise any adverse impact.
 - (g) Reviewing corrective and preventative actions to ensure the implementation of recommendations made from the audits and site inspections.
 - (h) Reviewing and approving minor revisions to the construction EMP.
 - (i) Providing information for community consultation.
 - (j) Liaising with regulators and responding to customer environmental complaints as required.
 - (k) Providing regular (as agreed with the Department) reports to the Department on matters relevant to the carrying out of the EMR role including notifying the Department of any stop work notices.
 - (l) Certifying the Construction and Operation EMPs in accordance with Conditions 19 and 23.

The EMR will immediately, and at the same time, advise the Proponent and the Director-General of any major issues resulting from the construction of the project that have not been dealt with expediently or adequately by the Proponent.

Environmental Management Plan – Construction

25. Prior to the commencement of construction, a Construction Environmental Management Plan (CEMP) will be prepared, following consultation with the Department, DEC, RTA, RailCorp, Sydney Water and Council. Where construction activities are undertaken in discrete stages, the Proponent may prepare individual CEMPs relating to specific stages or sections of construction.

The CEMP will be certified by the EMR as being in accordance with the conditions of approval prior to seeking approval of the Director-General. Construction will not commence until the Director-General has approved the CEMP. The CEMP will be made available to relevant stakeholders if requested.

26. The CEMP document will, but is not limited to:
- (a) Address construction activities associated with all key construction sites, including staging and timing of the proposed works.
 - (b) Describe management measures to be implemented in respect of key environmental elements.
 - (c) Cover specific environmental management objectives and strategies for environmental system elements including, but not limited to: water quality; noise and vibration; air quality; erosion and sedimentation; access roads; construction access and traffic; heritage and archaeology; acid sulphate soils; contamination; waste management; flora and fauna; weed control; rehabilitation; refuelling and fuel storage areas; energy use, resource use and recycling; and utilities.
 - (d) Address, but not be limited to:
 - (i) Identification of the statutory and other obligations which the Proponent is required to fulfil during project construction, including all approvals and consultations/agreements required from other authorities and stakeholders, and key legislation and policies which control the Proponent's construction of the project.
 - (ii) The role of the EMR.
 - (iii) Definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the EMP.
 - (iv) Measures to avoid and/or control the occurrence of environmental impacts.
 - (v) Measures (where practicable and cost-effective) to provide positive environmental offsets to unavoidable environmental impacts.
 - (vi) Strategies (where reasonable and feasible) for reducing exposure of residences or sensitive receivers to electric and magnetic fields.
 - (vii) Environmental management procedures for all construction processes which are important for the quality of the environment in respect of permanent and/or temporary works.
 - (viii) Environmental management instructions for all complex environmental control processes which do not follow common practice or where the absence of such instructions could be potentially detrimental to the environment.
 - (ix) Monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental management of the project, including performance criteria, specific tests, protocols (eg. frequency and location) and Sub Plans to follow.

- (x) Steps the Proponent intends to take to ensure that all Plans are being complied with.
- (xi) Consultation requirements with relevant government agencies.
- (xii) Community consultation and notification strategy (including local community, Local Aboriginal Land Councils, relevant government agencies, and Council), and complaint handling procedures.

Specific requirements for some of the main environmental system elements referred to (c) will be as required under the conditions of this approval and/or as required under any licence or approval.

27. The CEMP will include the following:

- (a) Soil and Water Management Sub Plan (refer Condition 33)
- (b) Noise and Vibration Management Sub Plan (refer to Condition 73)
- (c) Flora and Fauna Management Sub Plan (refer Condition 93)
- (d) Indigenous Heritage Management Sub Plan (refer Condition 122)
- (e) Hazards and Risk Management Sub Plan (refer Condition 136).

Environmental Monitoring – Construction

28. The Proponent will submit to the Director-General, a report(s) in respect of the environmental performance of the construction works and compliance with the Construction EMP and any other relevant conditions of this approval. The report(s) will be prepared within six months of the start of construction and thereafter at six monthly intervals or at other such periods as requested by the Director-General to ensure adequate environmental performance over the duration of the construction works. The report(s) will include, but not be limited to, information on:

- (a) Applications for consents, licences and approvals, and responses from relevant authorities.
- (b) Implementation and effectiveness of environmental controls and conditions relating to the work undertaken.
- (c) Identification of construction impact predictions made in the EA and any supplementary studies and details of the extent to which actual impacts reflected the predictions.
- (d) Details and analysis of results of environmental monitoring.
- (e) Number and details of any complaints, including summary of main areas of complaint, action taken, response given and intended strategies to reduce complaints of a similar nature.
- (f) Any other matter relating to the compliance by the Proponent with the conditions of this approval or as requested by the Director-General.

The report(s) will be provided to the Community Advisory Group, Council and any government agency if requested. The report(s) will also be made publicly available. The report(s) will be certified by the EMR.

29. The Proponent will undertake independent auditing of construction sites at three monthly intervals to include compliance with EMS procedures, Construction Environmental Management Plan, Statement of Commitments and Environmental Assessment conditions of approval.

Environmental Management Plan – Operation

30. An Operation Environmental Management Plan (OEMP) will be prepared prior to the commencement of operation. The OEMP will be prepared in consultation with the Department, DEC, Council, the Community Advisory Group and any other relevant

government agency nominated by the Director- General. The OEMP will be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted best practice management procedures. Where operational activities are undertaken in discrete stages, the Proponent may prepare individual OEMPs relating to specific stages or sections of operations.

The OEMP will be certified by the EMR as being in accordance with the conditions of approval prior to seeking the approval of the Director-General. Operation will not commence until the Director-General has approved the OEMP unless otherwise agreed to by the Director-General. The OEMP will be made publicly available.

31. The Operation EMP will include, but not be limited to:
- (a) Identification of the statutory and other obligations which the Proponent is required to fulfil, including all licences/approvals and consultations/agreements required from authorities and other stakeholders, and key legislation and policies which control the Proponent's operation of the project.
 - (b) Monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental performance of the project during its operation including description of potential site impacts, performance criteria, specific tests and monitoring requirements, protocols (eg frequency and location) and procedures to follow.
 - (c) Steps that the Proponent intends to take to ensure compliance with all plans and procedures.
 - (d) Description of the consultation requirements/arrangements with relevant government agencies, the local community and Council, including complaints handling procedures.
 - (e) The main management strategies for the environmental system elements including, but not limited to: television and radio interference; magnetic field monitoring; Heritage issues; erosion and sedimentation; visual screening, landscaping and rehabilitation, including access tracks; maintenance regime, including vegetation management within the transmission line easement; easement access protocols; access and traffic; landholder requirements; flora and fauna matters; weed and pest management; emergencies, hazards and risks (including bushfire issues); minimising energy use and losses; and waste management.

Specific requirements for some of the environmental system elements referred to in (e) will be as detailed under the conditions of this approval and/or as required under any licence or approval.

Environmental Impact Audit Report

32. An Environmental Impact Audit Report will be prepared 12 months after commissioning of Feeder 9JA and at any additional periods thereafter that the Director-General requires. The Report will be submitted to the Director-General and, upon written request by the Director-General, to any other relevant government authority within 14 months of the Project's commissioning.

An independent person or organisation approved by the Director-General, will prepare the report at the Proponent's expense. The Report will assess the key impact predictions made in the EA and any supplementary studies and detail the extent to which actual impacts reflect the predictions. The suitability of implemented mitigation measures and safeguards will also be assessed. The Report will also assess compliance with the OEMP.

The Report will discuss results of consultation with the local community particularly any feedback/complaints on the Project's operation and any issues of concern raised. The Proponent will comply with all reasonable requirements of the Director-General and other relevant authorities with respect to any reasonable measure arising from, or recommendations in, the Report.

The Report will be made publicly available.

Soil and Water Management

Pre-Construction

33. As part of the EMPs referred to in Conditions 25 and 30, the Proponent or their selected contractor will prepare a comprehensive Soil and Water Management Sub Plan in consultation with the Department and Council. The Sub Plan will be prepared in accordance with the Department of Housing's Guideline Managing Urban Stormwater – Soils and Construction (1998) or as revised.
34. The Soil and Water Management Sub Plan will incorporate detailed erosion and sedimentation controls and site rehabilitation requirements. Erosion and sedimentation mitigation measures will be implemented for all areas that are considered at risk. These measures will include, but are not limited to:
- (a) Mitigation measures identified in the EA and Submissions Report.
 - (b) Minimisation of disturbance to peripheral vegetation and use of hand clearing methods as required.
 - (c) Maximising retention of vegetation.
 - (d) Maximisation of use of existing tracks.
 - (e) Procedures to define the potential for contamination in any area of excavation and a contingency plan to deal with unexpected occurrences of contaminated material during the course of work.
 - (f) Construction of diversion banks upslope of the work to divert water around the disturbed area, where necessary.
 - (g) Provision of level spreaders or straw bales at the end of the diversion bank of any overland flow paths leading from the disturbed area, to dissipate flows and trap sediments.
 - (h) Placement of geotextile filter fabric fences downslope of the work areas.
 - (i) Progressive rehabilitation of disturbed areas.
 - (j) Regular inspections and maintenance of sedimentation controls, particularly following significant rain events.

35. Detailed geotechnical investigations, including sampling the groundwater to determine the risk to foundations from potentially saline conditions will be undertaken prior to construction commencing.
36. The Construction Contractor will identify the need for, design and location of access tracks and supplementary investigations will be undertaken with regard to potential environmental impacts of their construction and maintenance. The design, construction and maintenance of these tracks will incorporate necessary soil and water management devices.

Construction

37. Vegetation will not be cleared below a height of 300mm except where it is necessary to construct access tracks and for pole foundations.
38. Any topsoil or turf that is removed will be reserved and used to re-establish ground covering.
39. Ground disturbance between pole locations will be minimised as far as practical.
40. All exposed areas will be stabilised (compacted, sealed or vegetated) as soon as practicable following completion of works.
41. Geotextile filter fences will be placed downslope of works occurring near watercourses, on slopes of more than 5 degrees or on South Creek soils.
42. Inspections and maintenance of sedimentation controls will be undertaken regularly, particularly during and following significant rain events.
43. Truck wheel washing facilities will be provided where any easement access exits directly onto a sealed bitumen road.
44. Spill response kits will be accessible at all construction sites and staff will be trained in their use.
45. Fuel, oil and chemicals will be stored in accordance with Australia Standard 1940B1993, the *Storage of Flammable and Combustible Liquids*, and the *Dangerous Goods Act 1975*.
46. Excavated materials will be spread level on site prior to the site being rehabilitated. Any necessary stockpiles will be covered and filter fences provided downslope.
47. Concrete mixers and pump trucks will not be washed out on site, and excess slurry will be contained in plastic lined pits or skips for off-site disposal.
48. Refuelling and maintenance of vehicles or plant equipment will only occur in bunded areas and preferably off site where possible.
49. Vehicle movement, vegetation clearance and construction activities will be minimised within proximity of watercourses where practicable.

50. Should groundwater be identified in any excavations, it will be assessed for contamination and turbidity. If no indication of contamination or turbidity is found, it will be disposed of onto local vegetation.

Operation

51. Where necessary, appropriate permanent retaining structures, such as ground cover plantings and drainage embankments, will be constructed to minimise erosion after construction.
52. Vehicles used by inspection crews will keep to the established access tracks as far as reasonable and practicable to minimise unnecessary soil and water impacts.
53. Any permanent water-retaining structures or other erosion and water management controls will be routinely maintained.
54. Procedures for handling and use of pesticides contained in the Australian Standard 1940B:1993, the *Storage and Handling of Flammable and Combustible Liquids*, the *Dangerous Goods Act 1999* will be adhered to.

Infrastructure, Utilities and Services

Pre-Construction

55. The Proponent will, in consultation with the relevant service authorities, identify all infrastructure facilities, utilities and services potentially affected by construction activities to determine requirements for diversion, protection and/or support. Any alterations to these facilities, utilities and services will be carried out to the satisfaction of the relevant authorities. The costs of any alterations will be borne by the Proponent unless otherwise agreed by the affected authorities.
56. A detailed database of all utilities potentially affected by the proposal will be assembled prior to construction in order to confirm potential impacts and the necessary mitigation measures.
57. The Proponent will negotiate and seek agreement with all potentially affected utility companies regarding crossings or works in proximity to existing infrastructure. The Proponent will ensure that any disruptions to services resulting from the proposed works are minimised and that these disruptions are advised to customers.
58. Appropriate clearances from all existing buildings/structures will be maintained in the construction of the transmission line. The Proponent will ensure that there are no known development proposals within the vicinity of the proposal that would be potentially restricted by the need to maintain clearances to overhead electricity transmission lines.
59. Any crossing of the Railway Corridor and use of railway easements will be in accordance with the Rail Infrastructure Corporation's and State Rail Authority's requirements. Any disturbed land and facilities will be restored at the Proponent's cost to the satisfaction of the RIC. Should the Proponent and the RIC be unable to reach agreement on any of the RIC requirements, any party may refer the matter to the Director-General in accordance with Condition 20.
60. The Proponent will develop a contingency plan, in consultation with the relevant service provider(s), to deal with accidental damage and repair of facilities/services.
61. Where possible, the proposed works will be coordinated with the works program of other utility companies, for example RailCorp's annual shutdown of the Blacktown to Rooty Hill Rail link for maintenance activities.

Energy, Greenhouse Gases and Resource Use Construction Stage

62. The Proponent will promote the reduction of greenhouse gases by adopting energy efficient work practices including, but not limited to:
 - (a) Developing and implementing procedures to minimise energy waste.
 - (b) Conducting awareness programmes as part of induction for all site personnel regarding energy conservation methods.
 - (c) Conducting regular energy audits during the project to identify and address energy wastage.
63. No rainforest timbers will be used in any construction activities.

Operation Stage

64. The Proponent will contribute to a special purpose fund to underwrite a programme of demand management and energy minimising activities (during the operational phase of the project) to offset the environmental and social impacts of providing additional electricity supplies to all classes of consumers in the North West Sector.
65. The fund will receive a total injection of \$500,000.
66. The fund will be established by Integral Energy. It will be managed by a Committee to be formulated by Integral Energy and comprising nominees of Baulkham Hills and Blacktown City Councils and the Department of Energy, Utilities and Sustainability. The region covered by the activities of the fund will be the area between Vineyard bulk supply point and Parklea zone substation.
67. The Committee will produce guidelines describing how the fund will operate and be administered. The guidelines will include provisions for independent auditing to ensure transparency and the prudent disposition of the funds in achieving the required outcomes.
68. In setting up and running the activities under the fund, the Committee will be cogniscent of the opportunities and experiences of a similar fund jointly operated by TransGrid and Energy Australia.
69. A report on the activities supported by the fund and its administration will be prepared and made publicly available at the end of each financial year.
70. The Operation EMP (refer Condition 30) will identify strategies, applicable to the Feeder 9JA catchment and relevant to the Distribution Network Service Provider for all classes of customers to reduce the demand for energy and encourage the use of energy sources that have lower greenhouse gas emissions than coal-fired power stations.

Visual Impact Management

71. The locations of all pole structures will be refined as a result of detailed technical investigations and discussions with individual landholders.
72. As part of the EMPs referred to in Conditions 25 and 30 the Proponent will detail visual impact mitigation measures. The Proponent will undertake measures to minimise the visual impacts of the proposal including, but not limited to, the following mitigation measures along the length of the alignment where reasonable and feasible:
 - (a) Use of conductors having low or non-reflecting surfaces in preference to those having high reflecting surfaces.

- (b) Selective planting of trees or other suitable vegetation outside of the easement to screen views of the line from nearby residences in consultation with affected landowners/occupiers.
- (c) Painting of structures in appropriate colours.
- (d) Consultation with affected landowners/occupiers regarding pole locations and appropriate plantings.
- (e) Minimising vegetation clearing during both construction and operation of the line.

Construction Noise

Pre-construction

73. As part of the Construction EMP referred to in Condition 25, a specific Noise *and* Vibration Management Sub Plan will be prepared. The Sub Plan will include, but not be limited to, the following:
- (a) Tests for ascertaining acoustic parameters.
 - (b) Anticipated airborne noise for all major noise generating activities and locations and duration of these activities.
 - (c) Noise control equipment to be fitted to machinery.
 - (d) Temporary noise mitigation measures where practical and necessary, such as noise barriers to be installed prior to the commencement of pole installation.
 - (e) Predicted noise levels at any sensitive receivers (such as schools, churches, hospitals etc).
 - (f) Noise monitoring and reporting procedures.
 - (g) Measures for dealing with exceedences.
 - (h) Arrangements to inform residents of construction activities likely to affect their amenity, and contact point for residents.
 - (i) Compliance with relevant DEC guidelines as far as practicable, including the Environmental Noise Control Manual. The Sub Plan will clearly demonstrate how compliance will be achieved.
 - (j) Noise monitoring to be undertaken if noise complaints are received.
 - (k) Procedures for complaints receipt and handling.

Construction

74. The Proponent will aim to ensure that construction noise meets the following guideline levels:
- (a) For a construction period affecting any one residence or other sensitive noise receiver, of four weeks and under, the L10 level, measured over a period of not less than 15 minutes when the construction works are in operation, will not exceed the background level by more than 20dB(A).
 - (b) For a construction period affecting any one residence or other sensitive noise receiver, for a period of between 4 and 26 weeks, the L10 level, measured over a period of not less than 15 minutes when the construction works are in operation, will not exceed the background level by more than 10dB(A).
 - (c) For a construction period affecting any one residence or other noise sensitive receiver, of greater than 26 weeks, the L10 level, measured over a period of not less than 15 minutes when the construction works are in operation, will not exceed the background level by more than 5dB(A).
- A value of 5 dB(A) will be added to the sound pressure levels recorded from construction activities if the noise is substantially tonal or impulsive in character.

75. Achievement of the above levels in Condition 74 will be sought through best practicable means. In situations where it is identified that these levels will not be achieved, then all reasonable measures will be undertaken to reduce the level of noise impact.
76. The distance between noisy plant and equipment and nearby noise sensitive receptors will be maximised wherever possible.
77. Where practicable, the coincidence of noisy plant working simultaneously close together and adjacent to sensitive receivers will be avoided.
78. The number of consecutive days worked in the same locality will be minimised wherever possible
79. Noisy equipment will be oriented away from noise sensitive areas
80. Loading and unloading activities will be carried out away from noise-sensitive receivers
81. Construction noise levels will be monitored to verify compliance with the Construction Noise Management Plan and where non-compliant, additional mitigative measures will be undertaken
82. Appropriate noise controls, such as silencers, low-noise mufflers and alternatives to reversing alarms on vehicles and machinery, will be implemented
83. Entry and departure of heavy vehicles at respective work sites will be restricted to standard daytime working hours
84. Site access points and tracks will be located as far as possible from sensitive receivers
85. Noise models and further mitigation designs will be developed to assess the effectiveness of recommended noise controls and to demonstrate compliance with environmental noise criteria
86. Internal compliance audits of all plant and equipment will be conducted
87. Where practicable, the construction timetable will be implemented to minimise noise impacts
88. Noise monitoring will be undertaken in accordance with the Construction Noise Management Plan and in response to complaints. Where necessary, and in consultation with affected landholders, additional mitigative measures may be required.
89. Notice will be given to potentially affected dwellings of general progress of upcoming works and potential impacts and mitigation measures
90. The design will utilise polymeric insulators to reduce the effect of corona noise.
91. Integral Energy will investigate complaints of television and radio interference as necessary.

Construction Hours

92. All construction activities including entry and departure of heavy vehicles will be restricted to the hours 7:00 am to 6:00 pm (Monday to Friday); 8:00 am to 4:00 pm (Saturday); and at no time on Sundays and public holidays. Works outside these hours that may be permitted include:
 - (a) Any works where agreement of affected landowners/occupiers is obtained prior to work.

- (b) Any works which do not cause noise emissions to be audible at any nearby residential property.
- (c) The delivery of materials which is required outside these hours as requested by police or other authorities for safety reasons.
- (d) Emergency work to avoid the loss of lives and/or property and/or to prevent environmental harm.
- (e) Any other work as approved by the Director-General.

Flora and Fauna

Pre-Construction

93. As part of the EMPs referred to in Conditions 25 and 30 the Proponent will prepare a Flora and Fauna Management Sub Plan in consultation with DEC and Council. The Flora and Fauna Management Sub Plan will include, but not be limited to, the following:
- (a) The Flora and Fauna mitigation measures identified in the EA and Submissions Report.
 - (b) Specific construction, maintenance and monitoring strategies for wildlife corridors.
 - (c) Results of targeted (seasonal) surveys of *Dillwynia tenuifolia*.
 - (d) Detailed site specific methods for minimising vegetation clearance and protection of other vegetated areas.
 - (e) Detailed site specific methods to manage drainage crossings and minimise bank disturbance and erosion.
 - (f) Strategies to avoid hollow-bearing trees where practical.
 - (g) The use of existing access tracks and avoidance of new tracks where practical.
 - (h) Identification of any new tracks and results of targeted flora and fauna surveys.
 - (i) Weed and pest management.
 - (j) Rehabilitation and revegetation strategies.
 - (k) Provision of measures to offset the impacts of clearing consistent with any development consent issued under the Native Vegetation Conservation Act 1997.
 - (l) Ongoing maintenance procedures.
94. Detailed surveys will be undertaken to more precisely determine the likely presence of threatened plants along the selected route(s) of proposed new and upgraded access tracks and at any new or modified pole locations resulting from detailed design or other causes. Surveys will be done during appropriate seasons to maximise the chance of detection.
95. Where the species *Dillwynia tenuifolia* is identified, pole locations, site entry and access tracks and any other ancillary works will be designed and constructed to avoid populations and minimise impacts where practical.
96. Prior to commencement of construction activities at each pole location, the area to be disturbed will be surveyed for the Cumberland Plain large land snail. Any Cumberland Plain large land snails found will be translocated to another area. The proponent will need to liaise with DEC regarding their requirements, prior to any translocating activities taking place.
97. The Proponent will develop a noxious weed control management plan for the construction and maintenance of the easement. The plan will include appropriate control strategies and methods appropriate to the weeds present.

Construction

98. The removal of mature trees will be avoided wherever possible, particularly at pole locations 4 and 5. If this is not possible then the number of trees affected will be minimised. Dead limbs will also be left undisturbed where possible to retain hollows.
99. Excavated material will not be stockpiled within 20 metres of any drainage line.
100. Where possible, construction machinery will be brought into the construction zone via public roads and existing access tracks within the existing easement in order to minimise further disturbance to vegetation.
101. Construction and clearing will be limited to the current easement. The edges of the easement will be clearly marked by survey to prevent accidental clearing of adjoining vegetation. This applies particularly to the bushland in the Cudgegong Road – Schofields Road area that was identified as a primary conservation area within the Blacktown Local Environmental Plan.
102. Where it is considered likely that there would be damage to root systems of mature trees, digging will be carried out using hand tools
103. Materials, spoil or machinery will not be stored or parked within the drip line of any trees
104. When accessing construction sites, contractors will use designated access tracks and entry points unless further investigations are conducted
105. Access to pole site 11 will be only from Hamilton Street and not via the easement to the east to minimise disturbance to the *Dillwynia tenuifolia* population. The boundaries of the population of *Dillwynia tenuifolia* will be marked on maps and on the ground using protective fencing prior to works commencing in the vicinity of this site. A 15 metre buffer zone will be maintained around the marked boundaries of the *Dillwynia tenuifolia* population and vehicle movement and construction activities will be restricted in this buffer zone. All staff including contract workers will be informed of the presence and importance of the species as part of general environmental inductions.
106. Any routine slashing or clearing works required in the area of the *Dillwynia tenuifolia* population will be conducted by hand to a specified height to no less than 300mm.
107. Access to pole location 12 will be from Perth Street only. Access will not be allowed along the easement from Hamilton Street
108. Access to pole site 1 will be through the substation compound to the east, where practicable. Otherwise, removal and replanting of the *Grevillia juniperina ssp. juniperina* species will be considered prior to construction.
109. The boundaries of the *Grevillia juniperina ssp. juniperina* (pole location 1) will be marked on maps and on the ground using protective fencing prior to construction. Vehicle movement and construction activity will be restricted in this area and all staff and contractors will be informed of the presence and importance of the species as part of general environmental inductions.
110. Exposed subsoil and spread excavated material will be covered with topsoil before it is rehabilitated
111. When construction work is completed, all disturbed areas will be restored as close as practicable to their condition prior to the works commencing. This will include the rehabilitation of ground cover vegetation from local seed provenance.

112. Where the ground surface has been exposed and excessively compacted, it will be ripped before revegetation
113. Selective spraying of noxious weed populations along easement will be undertaken at the completion of development activities.

Operation

114. As part of the Operation EMP referred to in Condition 30, the Proponent will include consideration of the following issues:
 - (a) Maintenance and monitoring of rehabilitation areas, wildlife corridors and habitat for *Dillwynia tenuifolia*.
 - (b) Easement maintenance including the need for restricted lopping in sensitive areas.
 - (c) Weed management.
 - (d) Monitoring strategies to determine the effectiveness of the Flora and Fauna Management Sub Plan. The results of such monitoring will be included in the environmental impact audit report required by Condition 32.
115. A Management Plan for *Dillwynia tenuifolia* population will be developed. All staff and contractors will be required to abide by the requirements of this plan.
116. Any routine slashing or clearing works required in the area of the *Dillwynia tenuifolia* population will be conducted by hand to a specified height no less than 300mm.
117. Routine monitoring of the *Dillwynia tenuifolia* population will be carried out periodically, and particularly after slashing works, to ensure the population remains viable.

Traffic Management

118. As part of the Construction EMP referred to in Condition 25, the Proponent will identify all proposed accesses to the site and ancillary areas and adjacent receivers or species likely to be affected and outline the key safety and traffic control and mitigation measures that will be applied to minimise disruption and ensure that public safety and adequate access are maintained.
119. A road dilapidation report will be prepared for all public roads likely to be used for construction prior to the commencement of construction and after construction is complete. Any road/footpath damage (aside from that resulting from normal wear and tear) attributable to the construction of the proposal, will be repaired to a standard at least equivalent to that existing prior to the damage, at the cost of the Proponent and will be compliant with relevant RTA standards.
120. The proponent will be responsible for minimising any disruption to services resulting from such work and will be responsible for advising local residents and businesses on disruption to services.
121. A Traffic Management Plan will be prepared for any works that may disrupt traffic flows on public streets.

Heritage and Archaeology

Indigenous Heritage

Pre-construction

122. As part of the Construction EMP referred to in Condition 25, the Proponent will prepare an Indigenous Heritage Management Sub Plan. This Sub Plan will be prepared in consultation with the DEC and appropriate local Aboriginal groups/individuals. The Sub Plan will include, but not be limited to, the following:
- (a) The Indigenous Heritage mitigation measures identified in the EA and Submissions Report.
 - (b) Provision for the participation of appropriate local Aboriginal groups/individuals in: pre-construction surveys of areas of planned ground disturbance in all sensitive locations; in the management of PAD sites; and during clearing and initial construction works in sensitive locations.
 - (c) Discussion of procedures to be implemented if previously unidentified items/areas of potential indigenous archaeological significance are identified during construction works. The procedures will include immediate cessation of work and notification of DEC and appropriate local Aboriginal groups/individuals to determine an appropriate course of action. The procedures will also include provisions to ensure that all relevant contractors and construction personnel are trained regarding the identification of items/areas of potential indigenous archaeological significance and procedures to follow.
 - (d) Monitoring strategies to determine the effectiveness of the implementation of the Sub Plan. The results of such monitoring will be included in the environmental monitoring reports required by Condition 28.
123. An Aboriginal archaeological test excavation will be undertaken by a qualified archaeologist in conjunction with recognised Aboriginal stakeholder groups to investigate subsurface profiles across the various landform units and to ascertain the density, integrity and significance of Aboriginal cultural heritage items and deposits. Testing will be limited to the proposed pole locations and immediate areas in the northern section / Vineyard bulk supply point of the proposal (pole locations 1 to 8) and involve recording and collection of artefacts identified on the surface in the surrounding locale.
124. A detailed archaeological survey involving recording and collection of identified Aboriginal artefacts will be undertaken within all areas other than sealed or gravel roads where continual tracking of heavy machinery is proposed; at the three proposed site compounds; and at all pole construction sites.
125. Alternative access routes to poles 17 and 18 will be determined prior to construction works commencing to avoid the need to access through the aboriginal camp site.
126. All contractors and staff will be made aware of the importance of the exclusion zone between poles 17 and 18.

Construction

127. An exclusion zone will be established around the Registered Aboriginal Site RL3 (poles 17 and 18). There will be no clearing of vegetation or movement of vehicles or heavy machinery within this area other than that strictly necessary for the installation of the electricity line between poles 17 and 18. The area will not be used for general access purposes. The northern and southern boundaries of this area will be fenced (with self-supporting fencing) within the easement prior to works commencing. Any activity within this area will be conducted under the supervision of an archaeologist and representatives of the Deerubbin Aboriginal Land Council, the Darug Tribal Aboriginal Corporation and the Darug Custodian Aboriginal Corporation.
128. In areas of previous disturbance, a program of Aboriginal archaeological monitoring and salvage collection will be conducted by a qualified archaeologist in partnership with recognised Aboriginal stakeholder groups.

129. In areas where the proposed new poles are not located in the shadow of existing poles, an Aboriginal archaeological test excavation will be undertaken by a qualified archaeologist and recognised Aboriginal stakeholder groups.
130. Any fencing required in association with the establishment of the three site compounds will be of a self supporting barrier type (i.e. not involving any ground breaking).

Non-indigenous Heritage

131. All relevant contractors and construction personnel will be made aware (as part of the site induction procedures) regarding the identification of items/areas of potential non indigenous archaeological significance and procedures to follow, including their responsibility to notify the NSW Heritage Office if such sites are disturbed.
132. If previously unknown or unassessed sites of potential non-indigenous heritage are disturbed during the course of the work, work will stop at that site, until the NSW Heritage Office has been notified, the site assessed by a qualified archaeologist and relevant procedures and guidelines prescribed by DEC implemented.

Electric and magnetic Fields

133. Integral Energy will implement engineering standards as described in Section 6.2 of the Submissions Report. These standards will include:
- The construction of poles and conductors at the heights described in Table 6.2 of the Submissions Report.
 - The adoption of a phasing arrangement for each circuit which will minimise magnetic fields due to mutual cancellation.
 - The adoption of a triangular circuit geometry.
134. Information regarding the latest research on electric and magnetic fields and potential health effects will be made available on Integral Energy's website.
135. Integral Energy will undertake readings of electric and magnetic fields following completion of the proposal, consistent with the modifications described in Section 5.1.

Hazards and Risk

136. As part of the Construction and Operation EMPs, the Proponent will prepare and implement a Hazards and Risk Management Sub Plan. The Sub Plan will include, but not be limited to the following:
- (a) Identification of the hazards and risks associated with the project.
 - (b) Pro-active and reactive mitigation measures to manage the hazards and risks.
 - (c) Contingency plans to be implemented in the event of a pollution incident. Hazards and risks are to include refuelling and storage of fuels and oils; fire; the encountering of acid sulphate soils or contaminated soils and bush fire.
137. Vegetation will be cleared to the edge of the easement and maintained clear of the transmission line to avoid contact with the conductors.
138. Integral Energy will conduct annual inspections of the line and rectify any problems prior to the onset of the bushfire season. This will include identification of inadequate vegetation clearances, impact damage, lightning damage or any other defect.

Air Quality

139. As part of the Construction EMP referred to in Condition 25, specific construction stage Air Quality procedures will be prepared. The procedures will specify details of all dust control measures to be implemented during the construction stage. These mitigative measures will include:
- minimising the area of bare earth exposed as far as practicable
 - stabilising all exposed areas as soon as practicable (i.e. compacting, sealing or re vegetating)
 - covering all stockpiled material
 - switching off engines of plant and equipment when not in use
140. Where there is a risk of losing material, construction vehicles using public roads will be maintained and covered to prevent any loss of load, whether in the form of dust, liquid or solids. Construction vehicles will be maintained in such a manner that they will not track mud, dirt or other material onto any road, which is open and accessible to the public. In the event of any spillage, the Proponent is required to remove the spilt material within 24 hours.
141. No burning or incineration of materials will be permitted on project sites.
142. A water cart will be made available for use on site during dry or windy conditions.

Construction Sites, Compounds and Access

143. Locations and means of access to the easement and the need for tracks paralleling the easement will be determined prior to works commencing. Appropriate environmental studies and management controls will be implemented prior to construction commencing.
144. All utilities such as water, power etc will be obtained from existing services adjacent to the site compound.
145. Contractor will make safe all construction sites and compounds at the end of each working day.

Waste Management and Recycling

146. As part of the Construction and Operation EMPs the Proponent will prepare a Waste Management Plan. The waste management plan will address the management of wastes during the construction and operation stages in accordance with Government's Waste Reduction and Purchasing Policy and the *Waste Avoidance and Resource Recovery Act 2001*. The plan will include:
 - (a) The application of the waste minimisation hierarchy principles of avoid-reduce-reuse-recycle dispose.
 - (b) Identification of the types and amounts of waste likely to be generated.
 - (c) Waste handling and storage procedures.
 - (d) Transport and disposal methods of wastes: specifically contaminated soil or water, concrete, demolition material, cleared vegetation, oils, grease, lubricants, sanitary wastes, timber, glass, metal, etc.
 - (e) Implementation of energy conservation best practice.
 - (f) Identification of sites for final disposal of any material and any remedial works required at the disposal site before accepting the material.
147. All waste will be assessed and stored in accordance with the *Environmental Guidelines: Assessment, Classification and Management of Liquid and Nonliquid Wastes* (NSW Environmental Protection Agency 1999).
148. Any waste material that is unable to be recycled or reused will be disposed at a landfill licensed by the DEC to receive that type of waste. The Waste Management and Reuse procedures will be framed using the waste minimisation hierarchy principles of avoid-reduce-reuse-recycle-dispose. This will also include the demand for water.
149. If suspected contaminated materials are encountered during construction, work will halt at the site until the material has been assessed and removed, or stabilised, in accordance with the guidelines mentioned above.
150. Existing power poles will be recycled depending on their condition.
151. All site waste generated by construction staff, such as lunch waste, will be appropriately managed.
152. Reuse of materials will be maximised in order to minimise the quantity of material to be located to landfill.

Notes:

1. These conditions do not relieve the Proponent of its obligations to obtain all other approvals and licences from all relevant authorities required under any other Act. Without affecting the

generality of the foregoing, the Proponent will comply with the terms and conditions of such approvals and licences.

2. Any modification to the proposal, which would be inconsistent with the conditions of approval, will only be carried out with the prior approval of the Minister.