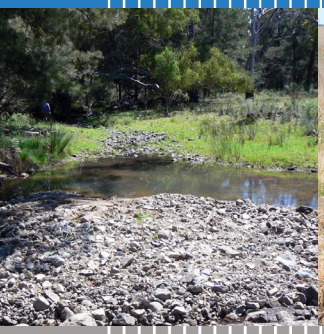
Appendix I
Hazard, Risk and EMF





Appendix I-1
Hazard and Risk Screening Report

REPORT OF THE HAZARD AND RISK SCREENING OF TRANSGRID'S PROPOSED LISMORE TO DUMARESQ DEVELOPMENT

Prepared for: URS Australia Pty Ltd

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Revision D2

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Report of the Hazard and Risk Screening of Trans Grid's Proposed Lismore to Dumaresq Development

Acknowledgment

The author would like to thank Kathryn Tinker and Will Miles from URS and the team from TransGrid for their assistance in preparing this report.

Disclaimer

Rev	Date	Description	Prepared By	Reviewed By	Authorised By
A	18/02/2010	Draft for Comment	Karin Nilsson	Maarten Tentij	Kathryn Tinker
B	15/06/2010	Draft II for Comment	Karin Nilsson	Maarten Tentij	Rachel O'Hara
C	20/10/2010	Final Report	Karin Nilsson	Maarten Tentij	William Miles
D	21/02/2011	Final Report II	Karin Nilsson	Maarten Tentij	William Miles
D2	09/03/2011	Update with comments re explosives handling	Karin Nilsson	Maarten Tentij	William Miles

PLANAGER
Risk Management Consulting

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EXECUTIVE SUMMARY

E1 Introduction

TransGrid is the owner, operator and manager of the high voltage electricity transmission system throughout New South Wales, connecting generators, distributors and major end users. TransGrid is proposing to establish a 205km 330kV transmission line between Dumaresq Switching Station near Bonshaw and Lismore substation, together with associated substation, access track and upgrade works. The new transmission line is required to improve the reliability of electricity supply to far north New South Wales.

Approximately 96km of the proposed transmission line would be built from the Dumaresq Switching Station to the proposed Tenterfield 330kV Substation approximately 14km north east of Tenterfield. The proposal is to install a new transmission line for this part of the development.

Approximately 109km of the proposed transmission line will connect the existing substation in Lismore to the new Tenterfield 330kV Substation. The proposal is to remove the existing 132kV line between the new Tenterfield 330kV Substation and Casino and replace it with a new 330kV transmission line. For this section of the alignment the existing 45m 132kV transmission line easement would be widened to 60m. To ensure a reliable and continued supply of electricity to Casino and the townships between it and Lismore, the 132kV line will be retained for this section and the 330kV line will be built alongside it. This section is approximately 14km in length and the easement would be approximately 90m in width.

New access tracks would be required and upgrade work to the 132kV line between the existing 132kV Tenterfield Substation and the proposed 330kV Substation would also take place.

E2 Aim and Scope

As part of the Project application process for the proposed transmission line, the NSW Department of Planning has requested, via the Director General Requirements (DGRs), that hazard and risk screening be conducted. This assessment should be carried out in accordance with the *State Environmental Planning Policy No. 33 — Hazardous and Offensive Development* (SEPP 33) and as described in the guideline document entitled *Applying SEPP 33* (Ref. 1). SEPP 33 represents the approach used in NSW for planning and assessing proposals for industrial development. Through the policy, the permissibility of an industrial proposal is linked to its safety and pollution control performance.

SEPP 33 ensures that only those industrial proposals which are suitably located, and able to demonstrate that they can be built and operated with an adequate level of safety, can proceed.

SEPP 33 applies to any proposals which fall under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'. For development proposals classified as 'potentially hazardous industry' the policy establishes a comprehensive test by way of a preliminary hazard analysis (PHA) to determine the risk to people, property and the environment at the proposed location and in the presence of controls.

SEPP 33 is based on the quantity of dangerous goods involved in the proposal and, in some cases, the distance of these materials from the site boundary.

Therefore, the aim of the hazard and risk screening is to:

1. Determine whether the on-site hazards and risks from the use and processing of potentially hazardous material (in this case flammable liquids, e.g. insulating oil) may have the potential to cause off-site risks to the landuses around the proposed substation and transmission line, and

2. Determine whether a Preliminary Hazard Analysis (PHA) is required for the project.

The screening process enables the merits of a proposed development to be assessed in terms of off-site risk. The potential for the proposal in the absence of safeguards to emit a polluting discharge is assessed. Further, the quantities of dangerous and/or hazardous materials transported to and from the proposed facilities are also assessed.

Potential hazards to human health from any electromagnetic fields (EMF) and from bushfires are addressed in **Chapter 16 Bushfire, Hazard and Risk** and Chapter **17 EMF** in the EA (Volume 1).

E3 Hazard Screening Method

SEPP 33 provides a systematic screening method to determine whether a development has a hazard potential to people, property or the environment. The risk screening method is used to decide if a proposal is a 'potentially hazardous industry' under SEPP 33. The screening method has been applied to the Project.

E4 Results and Conclusions

The hazards associated with potentially hazardous materials and dangerous goods storage would be minimal as there is no handling or processing of dangerous goods or other potentially hazardous materials associated with the transmission line. The handling of potentially hazardous materials during the operational phase of the Project is limited to the handling of insulating oil, a combustible liquid. There is minimal hazardous materials transport during this phase of the development, and no *other* substantial activities associated with the hazardous materials.

During the construction phase, small quantities of explosives will be transported to construction sites to enable preparation of the work sites. The transportation of explosives to the construction sites is regulated through a number of Codes and Standards and will be further managed by TransGrid construction personnel and contractors. There would be no explosives handling or transport associated with the operational phase of the facilities. Therefore SEPP 33 does not apply.

As there are no Dangerous Goods or other potentially hazardous material to be held or handled during the operational phase of the three substations/switching stations (Lismore, Dumaresq and Tenterfield 330kV), the SEPP 33 threshold limits for potentially hazardous or dangerous storages do not apply.

During operation minimal amounts of hazardous materials will be transported and no other substantial activities associated with the hazardous materials will be required.

From the above assessment, the hazard and risk screening for the Lismore to Dumaresq TransGrid development has determined that the proposed development is not *Potentially Hazardous* (as defined in the *SEPP 33*), and a PHA is not required as per the standard requirements for so called *Potentially Hazardous Development*, as part of NSW Department of Planning requirements.

GLOSSARY

EIS	Environmental Impact Statement
EMF	Electro Magnetic Fields
kV	kilo Volts
MVA	Mega Volt Ampere
PHA	Preliminary Hazard Analysis
SEPP 33	State Environmental Planning Policy No. 33

REPORT

1 INTRODUCTION

1.1 BACKGROUND

TransGrid is proposing to establish a 330kV transmission line between Dumaresq Switching Station near Bonshaw and Lismore Substation, together with associated substation works (refer to Figure 1) The new transmission line is required to improve the reliability of electricity supply to far north New South Wales. A full description of the Project is provided in **Chapter 4 Project Description** of the EA (Volume 1).

1.2 SCOPE AND AIM OF THIS REVIEW

This report has been undertaken in response to the Director-General's Requirements (DGRs) for the Project. The DGRs require hazard and risk screening be conducted in accordance with the State Environmental Planning Policy No. 33 — Hazardous and Offensive Development (SEPP 33) and as described in the guideline document entitled *Applying SEPP 33* (Ref 1).

SEPP 33 represents the approach used in NSW for planning and assessing proposals for industrial development. Through the policy, the permissibility of an industrial proposal is linked to its safety and pollution control performance.

SEPP 33 ensures that only those industrial proposals which are suitably located, and able to demonstrate that they can be built and operated with an adequate level of safety, can proceed.

SEPP 33 applies to any proposals which fall under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'. For development proposals classified as 'potentially hazardous industry' the policy establishes a comprehensive test by way of a preliminary hazard analysis (PHA) to determine the risk to people, property and the environment at the proposed location and in the presence of controls.

SEPP 33 is based on the quantity of dangerous goods involved in the proposal and, in some cases, the distance of these materials from the site boundary.

As such, the NSW Department of Planning through the DGRs, has requested that the "*EA must include a screening of potential hazards on site to determine the potential for off site impacts, particularly at the substations, and any requirement for a Preliminary Hazard Analysis (PHA)*".

Therefore, the aim of the hazard and risk screening for the proposed works was to:

- determine whether the on-site hazards and risks have the potential to cause off-site risks to the landuses around the proposed Tenterfield 330kV Substation and transmission line, and

- determine whether a Preliminary Hazard Analysis (PHA) is required for the project.

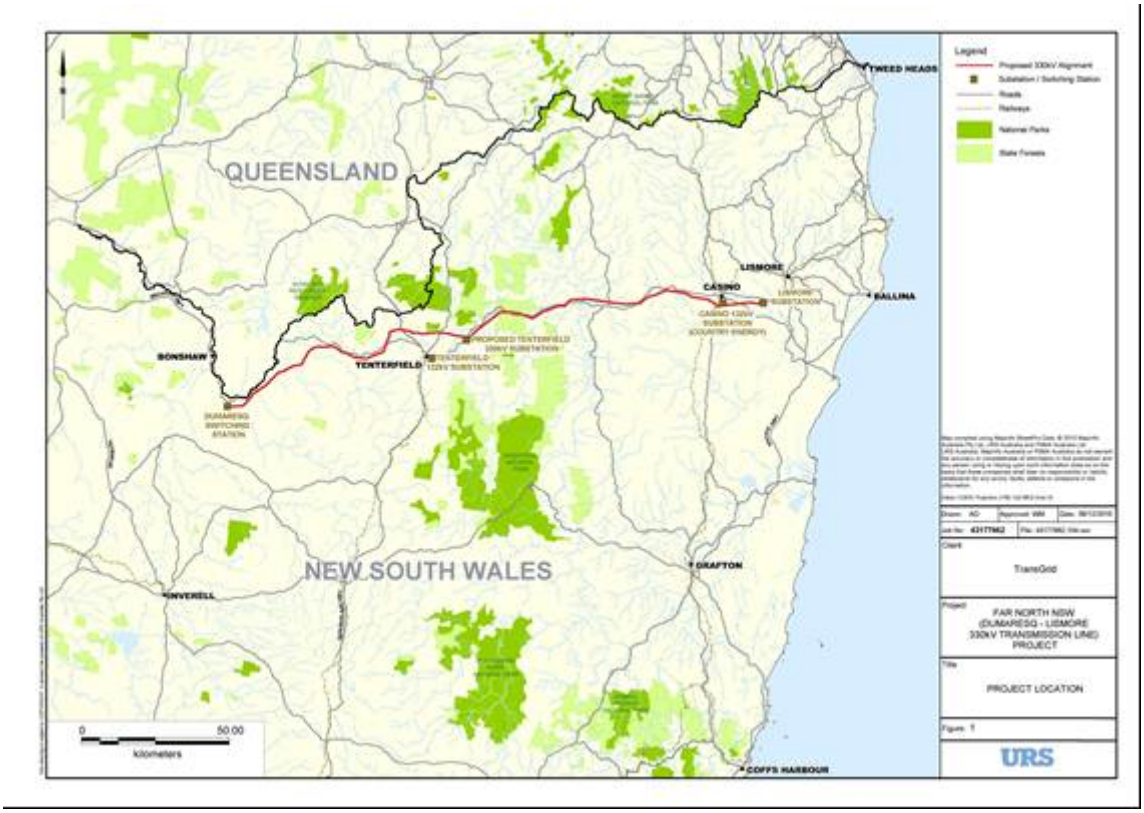
The screening process enables the merits of a proposed development to be assessed in terms of off-site risk. The screening procedure is primarily based on the quantity of dangerous goods and other potentially hazardous materials involved in the proposal and, in some cases, the distance of these materials from the site boundary.

Dangerous and/or hazardous materials are substances or articles that pose a risk to people, property or the environment, due to their chemical or physical properties. They are usually classified with reference to the immediate hazard they pose rather than the long-term health effects. In Australia, they are defined by the Australian Dangerous Goods Code (ADG).

The potential for the proposal in the absence of safeguards to emit a polluting discharge is assessed. Further, the quantities of dangerous and/or hazardous materials transported to and from the proposed facilities are also assessed.

Potential hazards to human health from any electromagnetic fields (EMF) and from bushfires are addressed in EA **Chapters 16 Bushfire, Hazard and Risk** and **17 EMF** in the EA (Volume 1).

Figure 1 –Dumaresq to Lismore Transmission Line Layout



2 INFORMATION RELATING TO THE PROJECT

2.1 LOCATION

The proposed 330kV transmission line would extend between Dumaresq Switching Station near Bonshaw and Lismore Substation, in northern NSW (refer to above) and is divided into two sections:

Alignment and Tracks West: this section of the proposed alignment would be approximately 96km long and would traverse eastward from the existing Dumaresq Switching Station just south of Bonshaw to a point on the existing 132kV alignment approximately 14km north east of Tenterfield. Within this area, there is no existing transmission line. To maintain the existing 132kV supply to Tenterfield, a substation (Tenterfield 330kV Substation) would be established at this point. Access to supporting structures for both construction and maintenance during operation would be required. Alignment west, the associated access tracks and the proposed 330kV substation are shown as an overview on **Figure 3-1a** and in detail on **Figures 3-2a** – **3-2ae** in **Section 2, Volume 3 of the EA**.

Alignment and Tracks East: the proposed alignment runs from the location of the proposed Tenterfield 330kV Substation to the Lismore Substation and would be approximately 109km in length. From the Tenterfield 330kV Substation to the south of Casino, the existing 132kV transmission line would be dismantled and replaced with the new 330kV transmission line. The existing easement would be widened from 45m to 60m. To allow the 330kV line to be built parallel to the existing 132kV transmission line, the easement would be 90m wide from south of Casino to Lismore (14km). This would maintain the existing 132kV supply to Country Energy's Casino Substation from TransGrid's 330/132kV Lismore Substation. The majority of access tracks in alignment east are currently established to provide access to the existing 132kV line. Some upgrading and/or re-alignment would be required in parts. Alignment east and the associated access tracks are shown as an overview on **Figure 3-1b** and in detail on **Figures 3-2p** - **3-2ae** in **Section 2, Volume 3 of the EA**.

The following substations and switch station would be included in the Project:

- Upgrade to the existing Dumaresq Switching Station.
- Construction and installation of the new Tenterfield 330kV Substation to step down the 330kV line to a 132kV line.
- Upgrade to the existing Lismore Substation.

All electricity for the switching station and substations would be supplied directly from the transmission lines and there would be no electricity generation conducted as part of the proposal. Existing electricity supply would remain

unchanged for the Dumaresq Switching Station and Lismore Substation. Electricity supply would be configured for the Tenterfield 330kV Substation.

Land use in the Study Area includes a mixture of grazing, cropping and forested land, interspersed with access track, road and rail infrastructure.

Further details on the Project Location can be found in **Chapter 3 Project Location** in of the EA (Volume 1).

2.2 DESCRIPTION OF THE TRANSMISSION LINE

The proposed transmission line would comprise a 330kV single circuit construction.

Supporting structures are required at regular intervals along the line to ensure that adequate and safe clearance is maintained. Supporting structures would predominantly be twin concrete pole H-frame arrangements. Steel lattice tower structures would be used as tension structures where engineering requirements dictate the use of a more robust support structure. The support structures would be located on average at approximately 350m to 400m intervals along the centreline of the easement. The intervals can be greater than 400m over gullies.

The structures would extend to a height of approximately 35 to 40m with an average of 28m to 30m.

2.3 DESCRIPTION OF THE SUBSTATION AND SWITCHING STATION WORKS

New 330kV line switchbays would be constructed and electrical equipment installed within the switchyards at both Dumaresq Switching Station and Lismore Substation. The work is necessary to allow connection of the line to the existing TransGrid network. Lismore Substation would further receive a new shunt reactor (330kV).

The new Tenterfield 330kV Substation would be used to step down the 330kV line to a 132kV line. For this it requires either a 150MVA, 200MVA or 215MVA 330/132kV transformer[1].

The proposed layouts of the substations and switching station are presented in Figures 2, 3 and 4 below.

[1] Exact configuration would be decided once design has commenced.

Figure 2 – Indicative Layout of the New Tenterfield 330 kV Substation

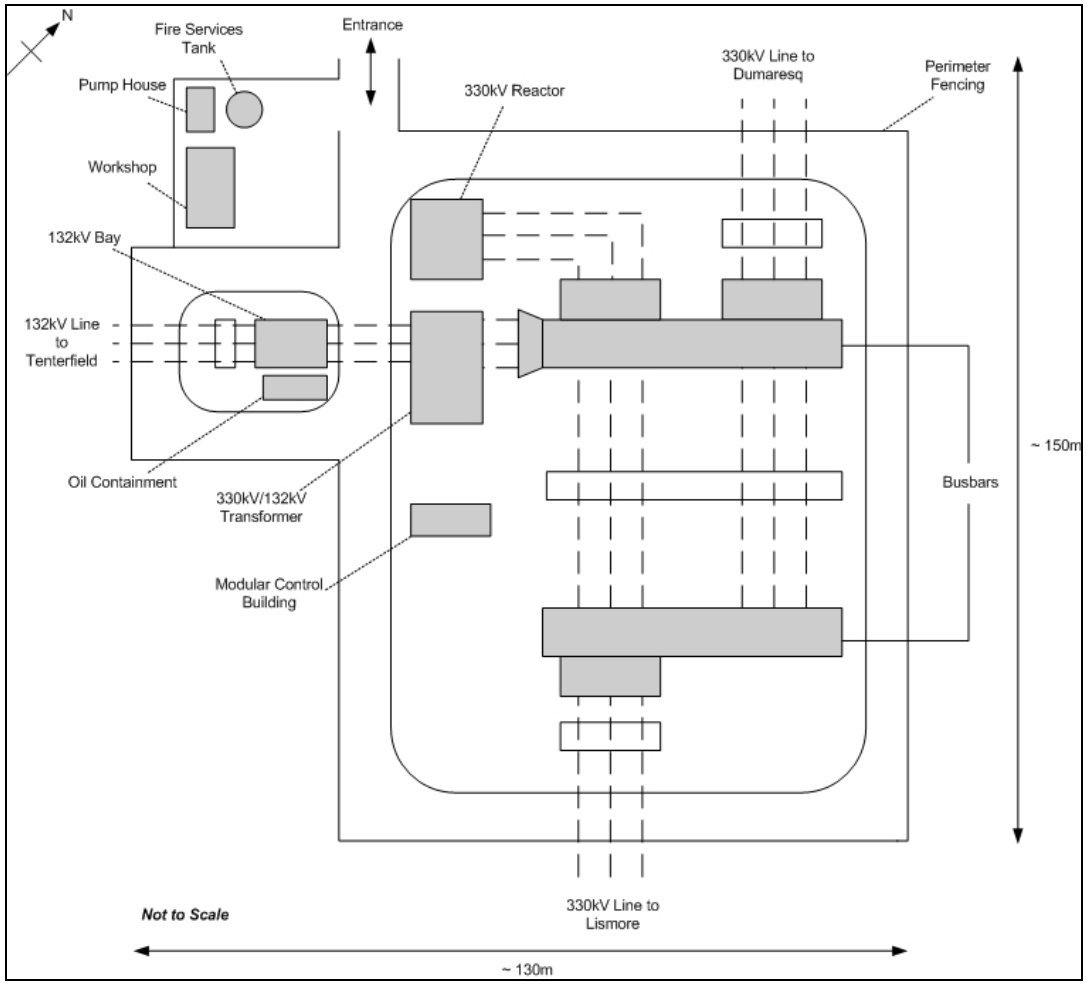


Figure 3 – Layout of the Upgraded Dumaresq Substation

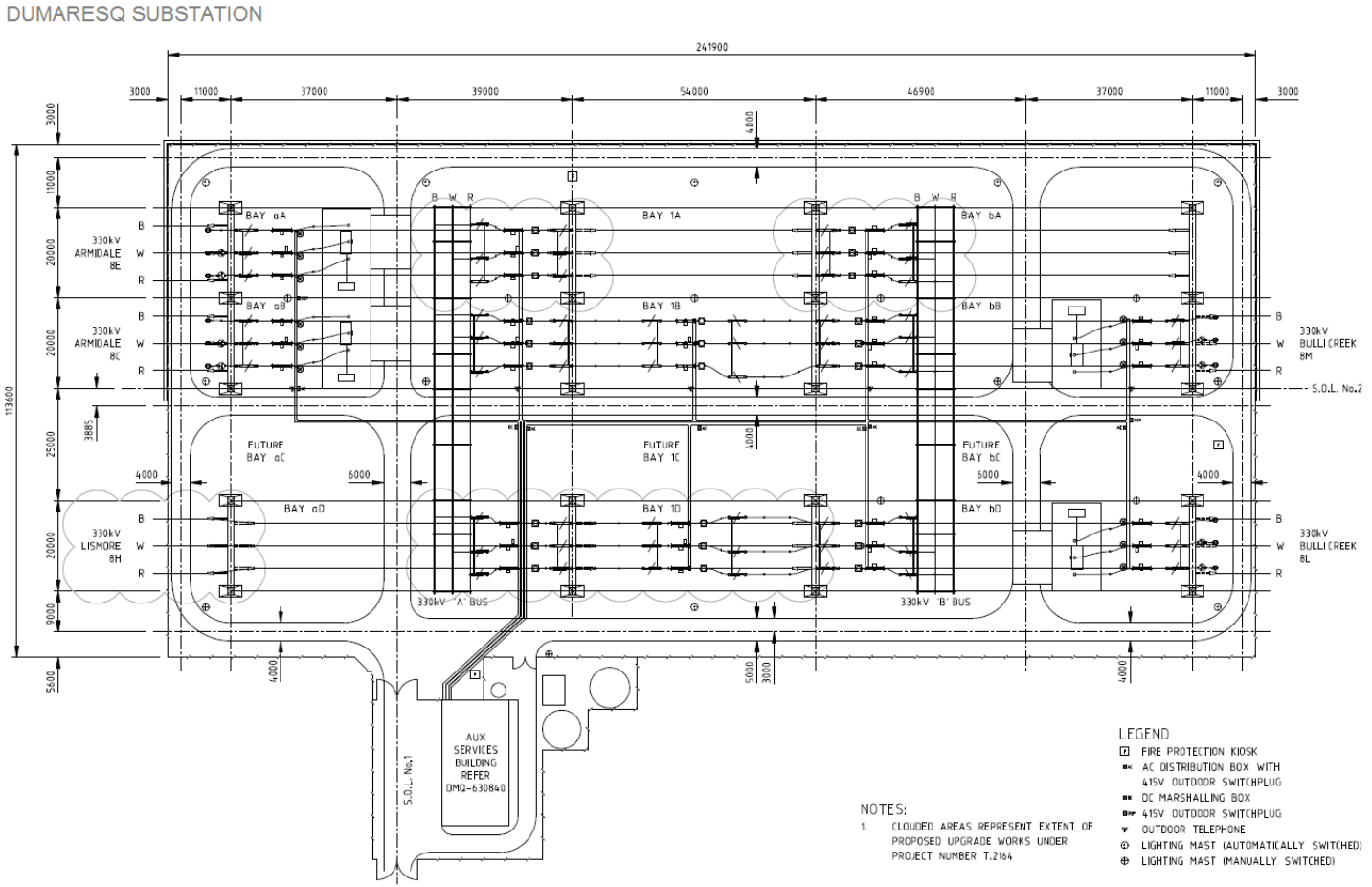
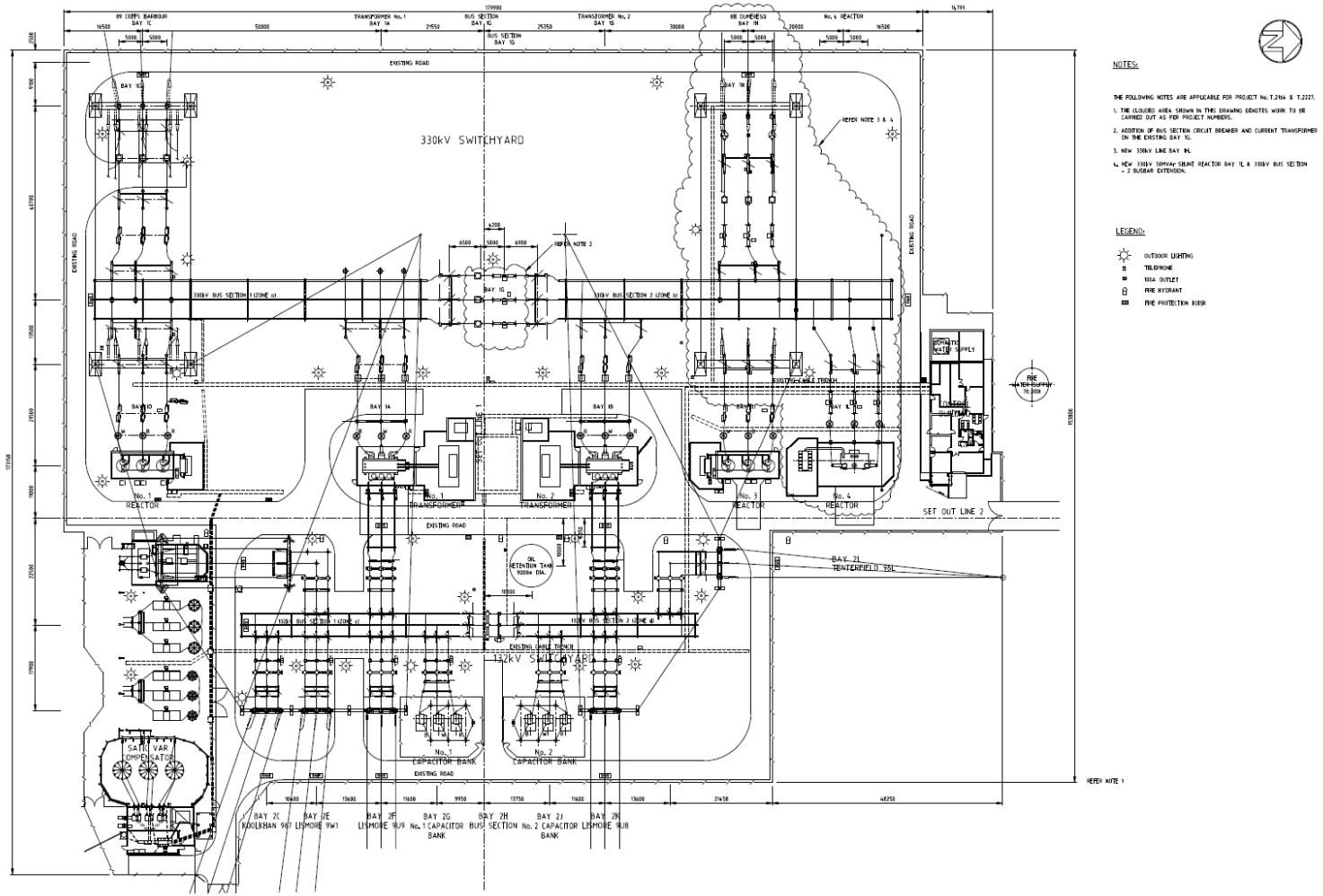


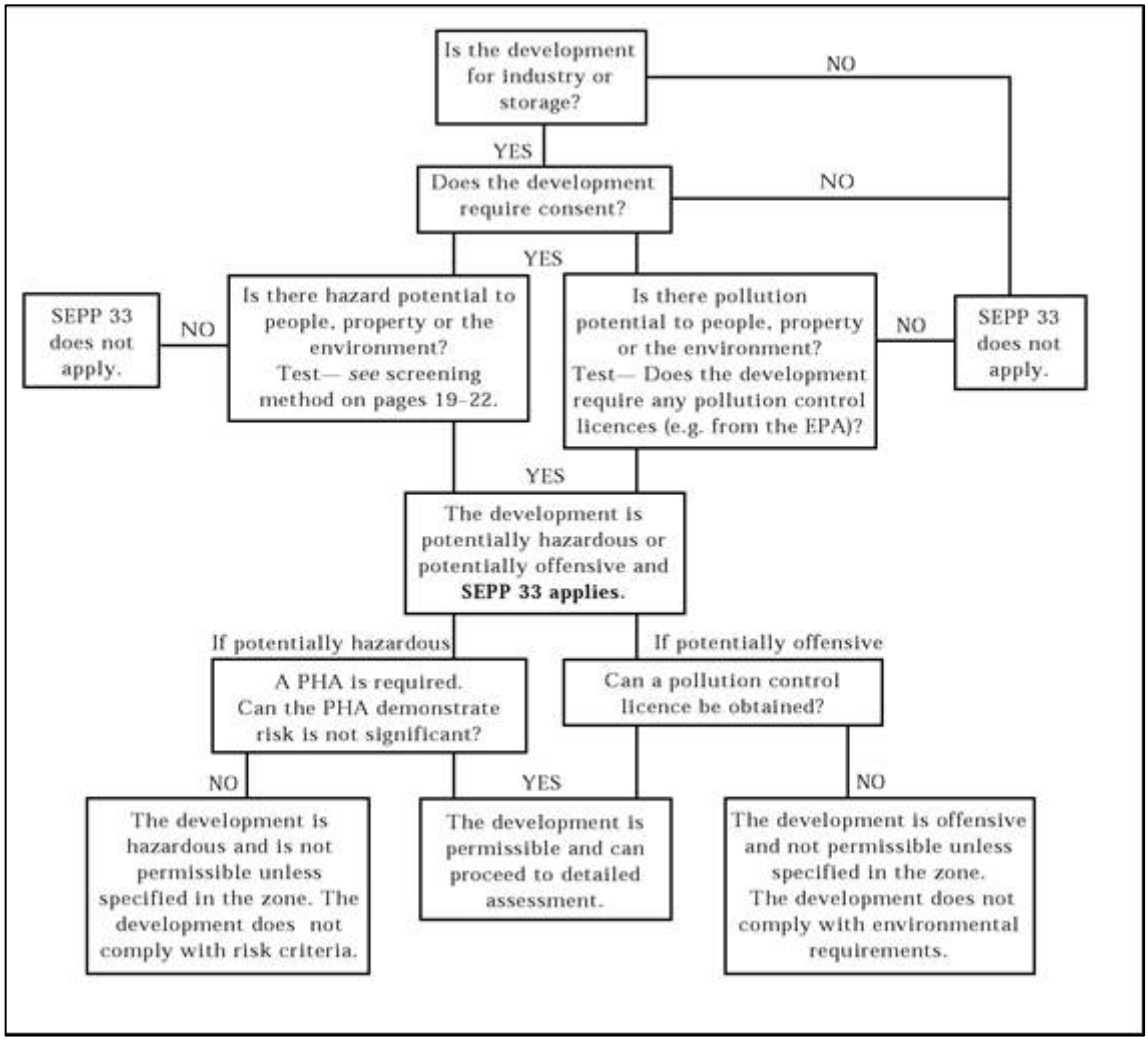
Figure 4 – Layout of the Upgraded Lismore Substation



3 HAZARD IDENTIFICATION

The hazard and risk screening has been completed for the Project in accordance with SEPP 33 (Ref 1, and as updated in Ref **Error! Bookmark not defined.**). The SEPP 33 process is described in Figure 5 below (Ref 1).

Figure 5 – The SEPP Process



The screening process enables the merits of a proposed development to be assessed in terms of off-site risk.

The screening procedure is primarily based on the quantity of dangerous goods and other potentially hazardous materials involved in the proposal and, in some cases, the distance of these materials from the site boundary.

The screening method includes the following three steps:

Step 1. Potential Hazardous Materials and Dangerous Goods Storage: Evaluation against the SEPP 33 thresholds of the quantities in storage

of dangerous and/or hazardous materials that can pose a risk to people, property or the environment, due to their chemical or physical properties.

Step 2. **Hazardous Materials Transport:** Evaluation against the SEPP 33 thresholds of the quantities of dangerous and/or hazardous materials transported to and from the proposed facilities.

Step 3. **Types of activities associated with the Hazardous Material:** Evaluation of other types of activities which may impact on the risk associated with a proposal, using the SEPP 33 screening method.

These steps are further detailed below, constituting the screening process for hazards and risks in accordance with SEPP 33 (Ref 1, and as updated in Ref **Error! Bookmark not defined.**).

3.1 POTENTIAL HAZARDOUS MATERIALS AND DANGEROUS GOODS STORAGE

SEPP 33 sets threshold limits for storage of potentially hazardous or dangerous materials to be stored and handled. The first step in the screening process is to compare these limits with the quantities of materials proposed for the Project.

There would be no material classified as 'Dangerous Goods' stored at the substation sites or along the easement. Table 1 lists other potentially hazardous materials that would be stored and handled.

Table 1 – Potentially Hazardous Material to be Stored and Handled

Name	Type of Potentially Hazardous Material (DG Class if Applicable)	Type of Storage	Storage Conditions	Quantities	Distance from boundary
Substations					
Insulating Oil	Not Dangerous Goods. Defined as a combustible liquid C1 in accordance with AS1940.	In various items of plant & electrical switching equipment (e.g. transformers & reactors)	Atmospheric	Lismore: 450,000L* Tenterfield 330kV: 200,000L Dumaresq: 150,000L*	Minimum 5 metres.

*Total Insulating Oil at Lismore and Dumaresq includes the existing quantities and any new oil as required by the new switchgear and/or shunt reactors.

As no dangerous goods or other potentially hazardous materials would be stored or handled at the premises, the combustible liquids above do not need to be incorporated into SEPP 33 threshold quantity calculations.

No dangerous or hazardous materials would be held or stored along the transmission line.

3.2 HAZARDOUS MATERIALS TRANSPORT

SEPP 33 sets threshold limits for the number of transportations to and/or from the site of hazardous or dangerous materials. The second step is to assess the Proposal against these threshold limits.

Initial transport of oil to the site would be required at Tenterfield and for the new shunt reactor at Lismore. No additional oil would be required at Dumaresq. There may be some periodic top-up required throughout the life of the substations.

Small levels of blasting may be required for the removing rock as part of supporting structure foundation excavations. In achieving this, some small quantities of explosives may need to be handled during the construction phase.

Once the supporting structures have been constructed there will be no further need for explosives.

At no stage would any explosives be stored on any site location. When brought to the work site the explosives and detonators would be kept in separate strong boxes. The explosive material and detonators would be kept in separate strong boxes to ensure that they cannot be involuntarily exposed to each other, for example in a vehicle collision. All storage, transport and use of the explosives would be in line with the relevant Codes and Standards applicable for the management of these types of materials (refer to Refs 2, 3, 4, 5 and 6).

While hazards associated with the construction are in general not included in the Hazard and Risk Screening process they have been considered in this report for consistency with the overall EA process where blasting activities are discussed.

The quantity of explosives used for blasting and transported to each site location would be very small and would never exceed the 100kg threshold limit stated in the *Applying SEPP 33, Hazardous and Offensive Development Application Guidelines* (Ref 1). Typically, the explosive substances used for this type of construction are limited to *Anfo* (most common), *Powergel* or *Magnum*.

The subcontractor would typically leave their main company depot (with it's licensed premises) in the morning and only travel to each site with the requisite quantity of explosives to complete the work for that day. Each new site location generally requires a new mobilisation from the contractor's depot.

The blasting activities would be planned and implemented using all appropriate and approved safe work method statements that comply with the relevant Operational Health and Safety (OH&S) legislation, including all relevant NSW Acts and Australian Standards, Codes and Guidelines covering the storage, handling, transport and use of explosives. TransGrid's nominated site

construction personnel would review and approve the contractor's proposed work method statements several days beforehand.

The explosives transported to and from the site during the construction phase would be limited to the light 4WD construction contractor vehicles carrying the strong boxes with explosives and detonators.

The transport of explosive to and from building sites is covered under the Australian Dangerous Goods (ADG) Code No.7 for the Transport of Dangerous Goods by Road and Rail (Ref 5).

The handling and use of explosives at a construction site is managed under the requirements under the Australian Standard AS 21872, *Explosives—use of* (Ref 6).

There would be no need for any blasting activities once the facilities have been constructed. Hence, SEPP 33 does not apply for the explosives handling during construction phase, and handling these materials does not initiate the need for a PHA for this development.

The transport of hazardous materials entering or leaving the substations during operation and maintenance phases is minimal and is limited to materials discussed in Section 3.1 above.

Therefore it ca be concluded that the SEPP 33 transport screening threshold is not exceeded for this Project.

3.3 TYPES OF ACTIVITIES ASSOCIATED WITH THE HAZARDOUS MATERIALS

The guidelines for hazard and risk screening (Ref 1) further calls for a review of *other* types of hazards that may be related to the handling or processing of the materials. The third step is therefore to assess the proposal against these *other* types of hazards.

The activities involved with the potentially hazardous materials handled at the substations are limited to the use of the insulating oil in various items of plant and electrical switching equipment to provide insulation and cooling.

As shown in Table 2, the hazards and risks associated with the handling of potentially hazardous materials which would be required for the substations would be limited to the possible loss of containment of insulating oil to ground. The risk management for potential releases would include a combination of preventive and containment measures such as:

- bunding and design of the drainage and oil containment system to collect and contain any small spillages, and
- training and implementation of procedures (including the TransGrid procedure of Oil Management in Substations - GM EN G2 001).

Table 2 – Other Types of Hazards

Other Types of Hazards	Substations - Applicable (Yes or No)	Transmission Line - Applicable (Yes or No)
Any incompatible materials (hazardous and non hazardous materials).	No	No
Any wastes that could be hazardous.	No	No
The possible existence of dusts within confined areas.	No	No
Types of activities the dangerous goods and otherwise hazardous materials are associated with (storage, processing, reaction, etc.) – if different to Table 1 above.	No	No
Incompatible, reactive or unstable materials and process conditions that could lead to uncontrolled reaction or decomposition.	No	No
Storage or processing operations involving high (or extremely low) temperatures and/or pressures.	No	No
Details of known past incidents (and near misses) involving hazardous materials and processes in similar industries.	Spillages of oil to ground have occurred in similar industries.	No

Spillages to ground of oil have occurred in the past, e.g. during maintenance activities. These incidents normally involve small quantities of oil which have been easily and quickly cleaned up. Design principles and management of the sites have been incorporated into TransGrid's risk management practices, as discussed above.

3.4 LICENCES AND PERMITS

All DECCW related licences/permits for safe transportation and handling of insulating oils would be held by the Contractors/Sub-contractors who would be undertaking the works on behalf of TransGrid.

All oil would be handled in accordance with TransGrid's Oil Management in Substations standard – GM EN G2 001.

4 RESULTS AND CONCLUSION

The hazards associated with potentially hazardous materials and dangerous goods storage would be minimal as there would be no handling or processing of dangerous goods associated with the Project and the handling of potentially hazardous materials at the substations would be limited to the handling of insulating oil, a combustible liquid.

As no dangerous goods or other potentially hazardous material would be held or handled at the three substation sites the SEPP 33 threshold calculations do not apply.

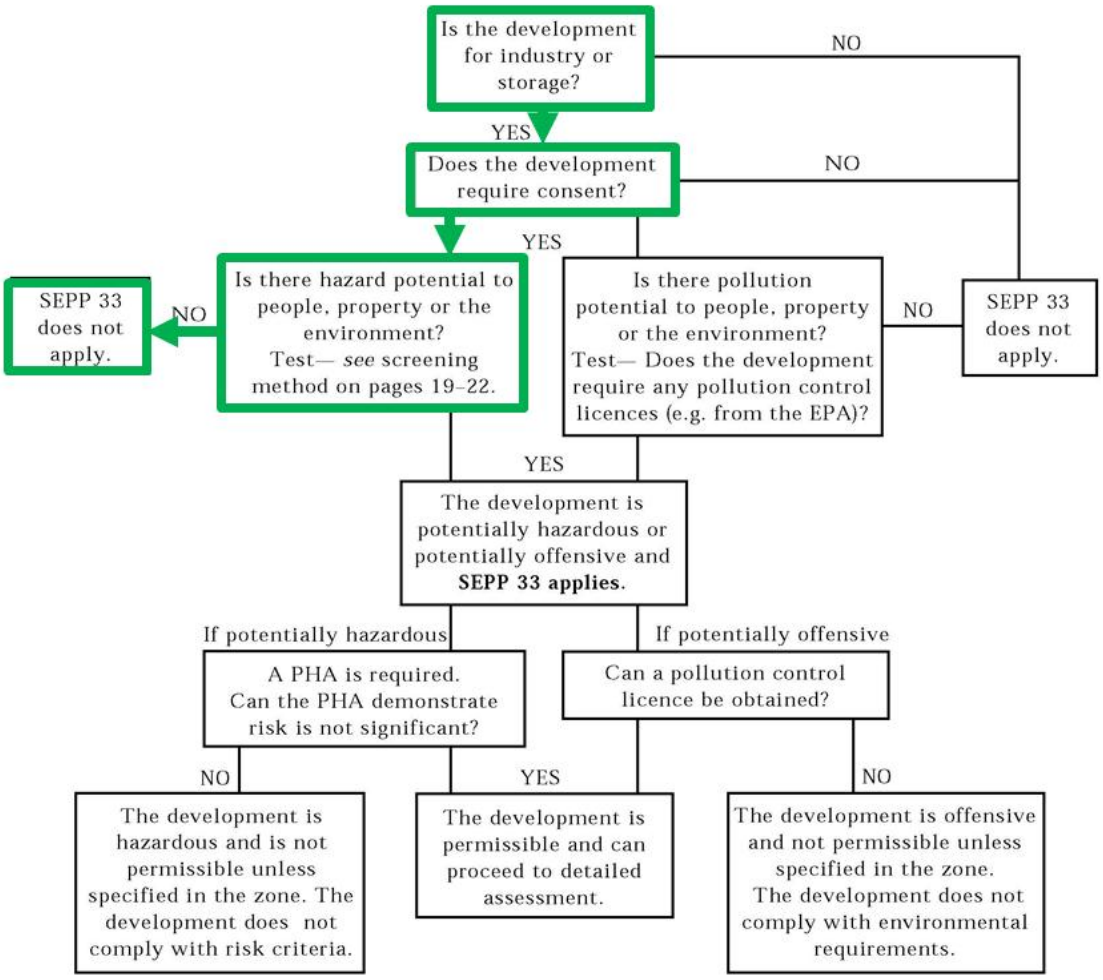
During operation minimal amounts of hazardous materials will be transported and no other substantial activities associated with the hazardous materials will be required.

During the construction phase small quantities of explosives will be transported to the supporting structure work sites. The transportation of explosives to construction sites is regulated through a number of Codes and Standards and will be further managed by the construction personnel. There would be no explosives handled or transported as part of the operational phase of the Project. Therefore SEPP 33 does not apply.

The result of the SEPP 33 hazard screening process is depicted in the Figure 6 below. The areas highlighted in green show the route that this Project has followed through the flowchart.

From the above assessment, the hazard and risk screening for the Lismore to Dumaresq TransGrid Project has determined that the proposed development is not *Potentially Hazardous* (as defined in the *State Environmental Planning Policy No 33*), and a *Preliminary Hazard Analysis* (PHA) is not required as per the standard requirements for so called *Potentially Hazardous Development*, as part of NSW Department of Planning requirements.

Figure 1 – Result of the SEPP 33 Process Hazards Screening



5 REFERENCES

1 *Applying SEPP 33, Hazardous and Offensive Development Application Guidelines*, Department of Planning, January 2011

2 Explosives Act 2003 No 39 (NSW)

3 Dangerous Goods Act 1975 (NSW)

4 Explosives Regulations 2005 (NSW

5 Australian Explosives Code, the ADG Code No.7, Australian Code for the Transport of Dangerous Goods by Road and Rail

6 Australian Standard AS 21872, Use of Explosives