Environmental Impact Statement

Uungula Wind Farm

Appendix F: SEPP 33 – Preliminary Risk Screening

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Uungula Wind Farm

Preliminary Risk Screening

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Contents

1 Executive Summary

This report presents a preliminary risk screening analysis of the proposed Uungula Wind Farm (UWF) development, on the 150 MW energy storage facility (ESF) system. The risk screening was carried out in accordance with the New South Wales (NSW) Department of Planning and Environment's (DPE) SEPP 33 Guidelines (SEPP 33).

As the ESF technology for the project has not yet been selected, a range of potential technologies were considered, allowing for flexibility to select within the parameters of this assessment. Each identified potential technology was assessed against the SEPP 33 guidelines. The future selection of any of the technology options falls within the conclusions of this report. Any alternative technology option considered in future project development shall be assessed using the same process.

The risk screening considered lithium-ion, advanced lead acid, vanadium flow, sodium sulphur, sodium and nickel-metal hydride, cryogenic storage and compressed air battery storage options, and determined that, even adopting a conservative approach, a Preliminary Hazard Analysis (PHA) would not be required in most cases for the UWF irrespective of capacity. The sodium hydride battery could potentially require a PHA at a quantity of one tonne.

Arup recommends that, as part of the detailed design and post-approval process, a Fire Safety Study is conducted, as the primary hazard to the discrete ESF is an external fire. Additionally, within the fire mitigation strategy, fire water containment should be addressed to ensure runoff does not enter the Burrendong Dam.

2 Introduction

Arup has been engaged by CWP Renewables Pty Ltd (CWP) to perform a Preliminary Risk Screening for Uungula Wind Farm Pty Ltd (the Proponent) to support the development of the proposed Uungula Wind Farm (UWF), and to assess whether a Preliminary Hazard Assessment (PHA) is required under NSW DPE State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33, 1992).

UWF is a proposed wind turbine farm with battery storage located in the Dubbo Regional Council Local Government Area between Wuuluman and Twelve Mile, approximately 14 km east of Wellington, NSW. The proposed electricity generation capacity of the facility is approximately 400 MW at the point of connection. The addition of an ESF at the Site (approximately 150 MW capacity) will, among other uses, allow UWF to dispatch scheduled and reliable renewable energy to the National Electricity Market (NEM).

This report details the process, findings and recommendations of the Preliminary Risk Screening completed for the proposed wind farm and BESS at UWF, using the NSW Department of Planning and Environment's SEPP 33 Guidelines.

As the ESF technology for the project has not yet been selected, a range of potential technologies were considered, allowing for flexibility to select within the parameters of this assessment. Each identified potential technology was assessed against the SEPP 33 guidelines.

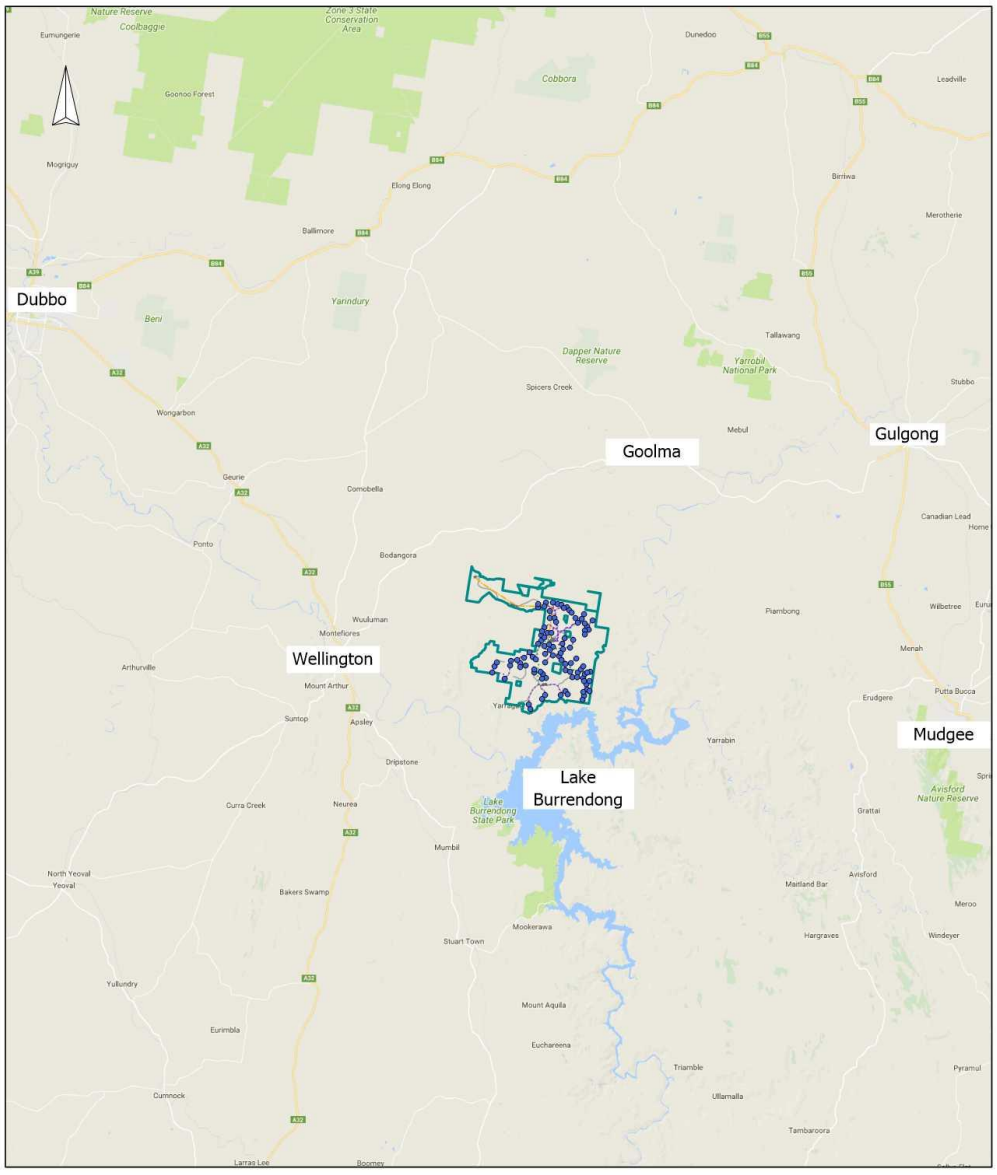
3 Project Context

3.1 The Site

The proposed UWF is to be located in the Dubbo Regional Council Local Government Area between Wuuluman and Twelve Mile, approximately 14 km east of Wellington, NSW (see Figure 1). The project generally consists of the installation, operation, maintenance and decommissioning of up to 109 Wind Turbine Generators (WTGs), an Energy Storage Facility (ESF), ancillary infrastructure and temporary facilities. The UWF is designed to accommodate a contemporary WTG of up to 250 m in height with a nameplate capacity of approximately 4 MW or greater. On these terms, and subject to Development Consent and market changes, the project is estimated to have an installed generating capacity of approximately 400 MW.

The region is dominated by agriculture, including sheep, cattle and goat grazing, cropping for stock feed and sheep studs. Renewable energy projects have also entered the landscape since 2017, including the operational Bodangora wind farm located 7 km north of the site and the operational Beryl solar farm located 30 km east. Other approved, but yet to be constructed, solar farm developments are also located in proximity to the UWF.

The town of Wellington, located approximately 14 km west of the UWF, is the nearest population centre, with the small village of Goolma located approximately 16 km north of the UWF. Lake Burrendong is located to the south of the project site which is part of the Water NSW bulk water storage complex and drains into the Macquarie River. Most of the project site drains into local tributaries feeding ultimately into Lake Burrendong.



LEGEND Wind Turbine Generator (97) Project Site Wind farm access tracks Site Compound Substation Energy Storage Facility Proposed Powerlines: Underground (medium to low voltage) Overhead (medium to low voltage) Overhead (high voltage)	COMPANY UUNGULA WIND FARM PTY LTD				cwp Renewables
	TITLE Project Location				
	DATE 18/02/2020	SCALE 1:430000	DWG NO UWF-048	REV A	VER 1
SCALE BAR 0 >5 km	DRAWN BY J PETERSEN	CHECKED BY M FLOWER	SHEET 1 OF 1	JOB NO 110247	SIZE A3

Figure 1: Proposed UWF site location

3.2 Proposed Development

This assessment only considers the development of the ESF.

The electrical capacity of the ESF has been considered nominally as 150 MW, which is as an indicative capacity and is not intended as an upper limit.

The energy storage technology is not yet decided, and the most commercially viable type will be deployed for use on this site, depending on the detailed design and financial modelling process. The range of technologies considered is outlined in Section 5.

The ESF will consist of buildings, shipping containers, and/or other infrastructure, and will connect to the WTGs, collector substation and switching station via underground and/or overhead cables.

Proposed stand-alone locations of the ESF have been identified in Figure 2.

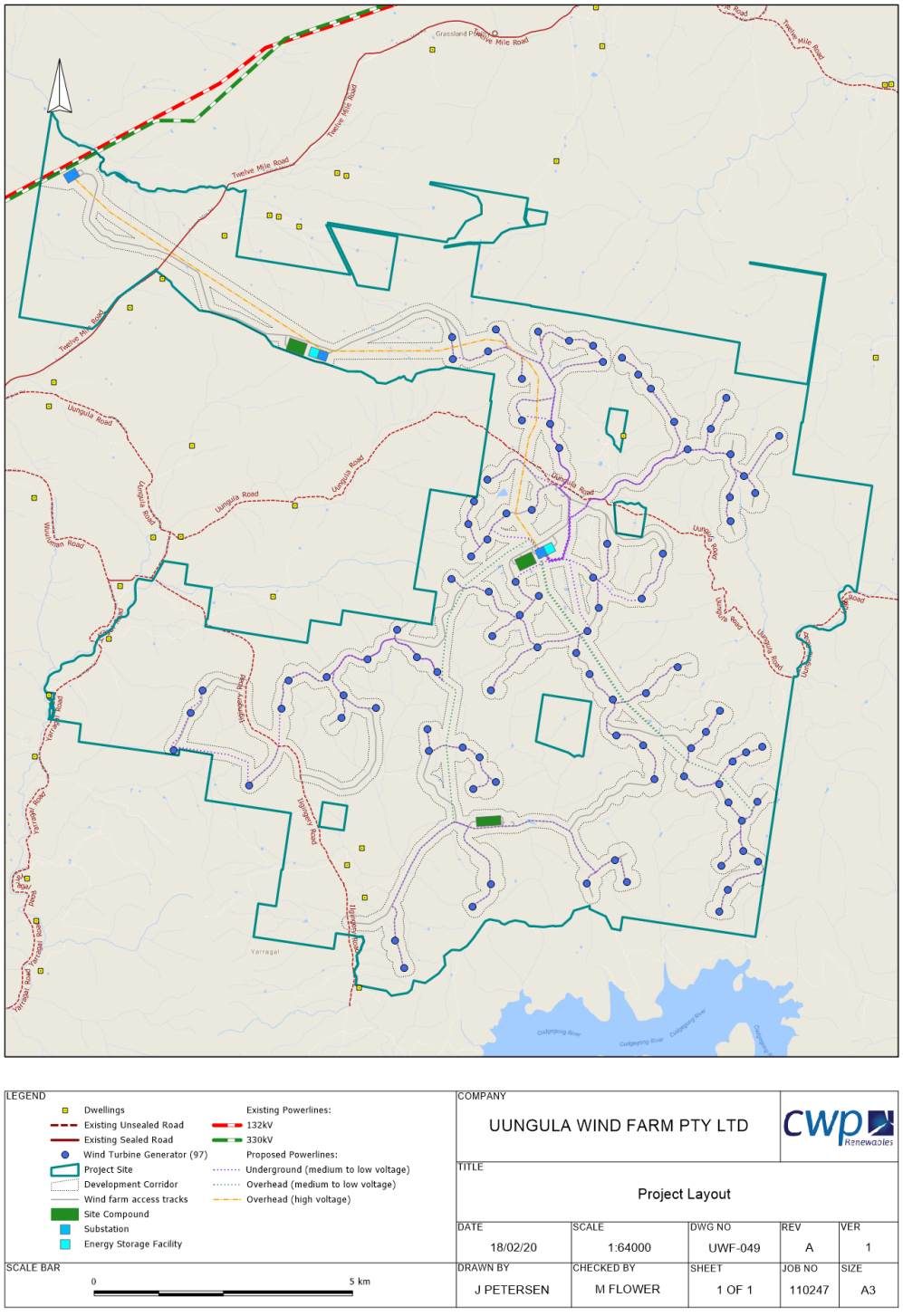


Figure 2: Proposed Energy Storage Facility layout for site

4 State Environmental Planning Policy No. 33

4.1 SEPP 33 Process

The NSW Department of Planning and Environment's *Applying SEPP33* document (Applying SEPP 33, 2011) outlines the screening and risk assessment process for a potentially hazardous development. The process is outlined graphically in Figure 2. The document suggests that the potential risk of a proposed development typically depends on five main factors:

- the properties of the substance(s) being handled or stored;
- the conditions of storage or use;
- the quantity involved;
- the location with respect to the site boundary; and
- the surrounding land-use.

4.2 Assessing a Potentially Hazardous Industry

A risk screening analysis was completed for the battery options under consideration at UWF following the procedures outlined in both Figure 3 and as detailed in the SEPP33 guidelines.

The potential hazardous materials within the ESF are presented in Section 5.1. Table 1 lists the hazardous materials present on site for each different battery option, the material class according to the Australian Dangerous Goods Code[1] (ADG Code, 2011) and United Nations (UN) systems, the screening method applicable in SEPP 33 and threshold to trigger a PHA for each material.

[1] *Applying SEPP 33* specifically refers to the ADG Code rather than the Global Harmonised System (GHS). This report therefore references the ADG Code.

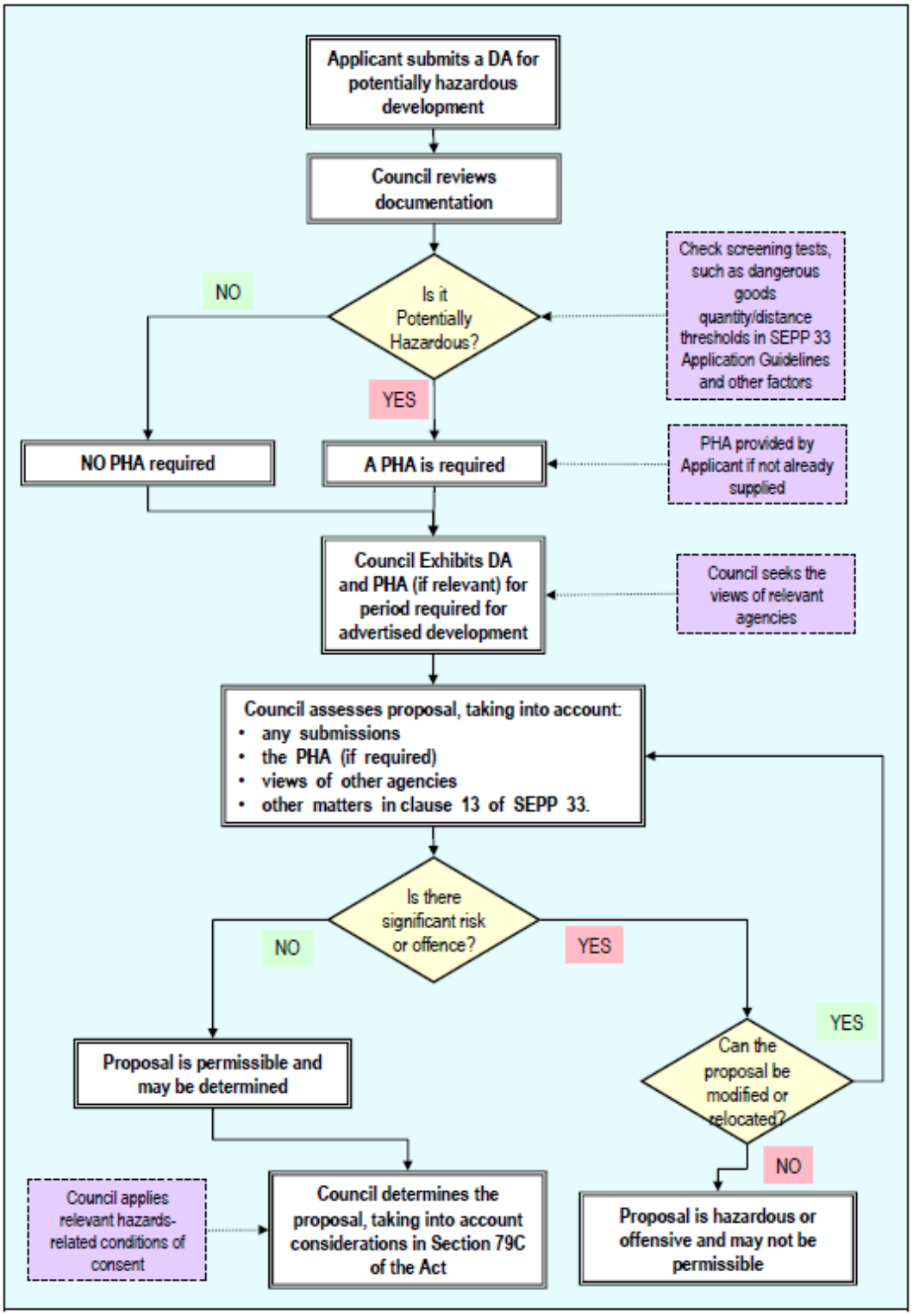


Figure 3: The potentially hazardous industry risk screening procedure outlined in the *Applying SEPP33*

5 Preliminary Risk Screening

5.1 Hazardous Materials

Some types of battery for energy storage are classified as dangerous goods (DGs) according to the ADG Code, while others remain unclassified. This report adopts a conservative approach, as outlined in the SEPP 33 Guidelines. The screening analysis included all technology options under consideration and where a technology type was not listed specifically in the ADG Code, its chemical constituents were considered.

For clarity, only one "Technology Option" listed in Table 1 will be selected in the development of UWF. The options are shown here to allow for flexibility in the design process, and the 'Quantity on Site' of hazardous materials is for the full battery system. The 150 MW capacity for the ESF is approximate as design is still in the preliminary stages. The ESF consists of discrete packages i.e. battery units. This mitigates against impacts associated with the potential loss of containment of the entire quantity of hazardous materials. The major hazard incident having escalation potential is an external fire, which is addressed in Section 7.1.

The energy storage options considered in the UWF development are:

- lithium-ion batteries;
- lead acid (advanced) batteries;
- vanadium flow batteries (VFBs);
- sodium sulphur batteries;
- sodium or nickel hydride batteries;
- cryogenic storage; and
- compressed air.

Nickel hydride and lithium-ion batteries are listed specifically in the ADG Code, while VFBs, sodium sulphur and sodium hydride batteries are not. Lead acid batteries do not have a Packing Group (PG), as the lead acid is already packaged within each battery in small quantities. Therefore, no assessment is required in the screening process in SEPP 33.

The ADG Code distinguishes between batteries filled with acid (or, similarly, alkali), and bulk storage of battery fluid. All are Class 8, but while the battery fluid is defined as Packing Group II (both acid and alkali), the batteries themselves do not have a packing group, as the battery fluid is already packaged within the battery unit. There is no screening limit for batteries filled with acid (or alkali).

While VFBs can be prepared using vanadium pentoxide, a Class 6.1 DG, the active components of the VFB are vanadium (IV) oxide ions (VO^{2+}), vanadium (V) dioxide ions (VO_2^{+}), and two vanadium ions of two different valences (V^{3+} and V^{2+}), none of which are DGs.

The hazardous materials potentially present on site for each of the ESF options are shown in Table 1.

Application of the SEPP 33 Guidelines for an ESF is different to a hazardous goods store. Quantities listed are estimated based on the mass of the batteries without container and ancillary services (e.g. BMS, cabling, HVAC), and represent both an average and maximum mass for the purpose of the screening tests. Material Safety Data Sheets (MSDS) are typically not available for batteries themselves but are available for the chemical constituents.

Table 1: List of hazardous materials on site in each of the possible ESF types, their quantities and screening thresholds

Technology Option	Hazardous Material	UN Number	DG Class	Assessment Method	Screening Limit	Threshold Exceeded?
Lithium ion batteries certified to UN 34.80	Lithium Ion Batteries	3480	9	No assessment required in screening process	No limit in screening process	No
Wet lead acid batteries	Batteries, Wet, Filled with Acid, electrical storage	2794	8	No assessment required in screening process	No limit in screening process	No
Vanadium Flow Battery	Batteries, Wet, Filled with Acid, electrical storage	2794	8	No assessment required in screening process	No limit in screening process	No
Sodium Sulphur Battery	N/A	-	-	No assessment required in screening process	No limit in screening process	No
Sodium Hydride Battery	Sodium Hydride	1427	4.3	SEPP33 Table 3	1 tonne	Potentially*
Nickel-Metal Hydride Battery	Nickel-Metal Hydride Batteries	3496	9	No assessment required in screening process	No limit in screening process	No
Cryogenic Storage	N/A	-	-	No assessment required in screening process	No limit in screening process	No
Compressed Air	N/A	-	-	No assessment required in screening process	No limit in screening process	No

*Further assessment regarding the proposed storage quantities and methods would be required if the sodium hydride battery option were to be selected. As sodium hydride is not currently a commercially viable energy storage option, it is not necessary to undertake this assessment at present. Should this option be pursued further, a more detailed screening assessment (and potentially a subsequent PHA) shall be performed.

5.2 Surrounding Land Use

There are no off-site populations at risk as a result of potential incidents at the proposed UWF (excluding fire risks, which are addressed in Section 7.1).

The two proposed locations for the ESF are located at least 2 km from any off-site occupied buildings. The materials assessed in the Preliminary Risk Screening would not be expected to have any off-site impacts at such a distance.

6 SEPP 33 Conclusions

With the possible exception of sodium hydride batteries, none of the energy storage options under consideration trigger the requirements for a PHA.

Given that sodium hydride batteries are currently not commercially viable and are therefore unlikely to be selected, a PHA is not required in accordance with the SEPP 33 process (see Figure 3).

The future selection of any of the technology options falls within the conclusions of this report. Any alternative technology option considered in future project development shall be assessed using the same process.

7 Additional Comments and Recommendations

7.1 Fire Mitigation

A Fire Safety Study (FSS) should be undertaken following the requirements of Hazardous Industry Planning Advisory Paper No 2 – Fire Safety Study Guidelines (HIPAP 2) (NSW DPE, 2011) to address the risk of an external fire impacting on the ESF, and a fire initiated in the ESF spreading off the site.

The FSS will require specific information regarding the ESF technology and the layout of the facility, so must necessarily be completed at a later stage of the approval and design process.

7.2 Fire Water Containment

As the site is located in the catchment area for the Burrendong Dam, Arup recommends that fire water containment is addressed as part of any fire mitigation strategy in the detailed design phase.

8 References

Australia Federal Office of Road Safety, (2011), Australian Code for the Transport of Dangerous Goods by Roads & Rail (ADG Code), (2018), 7.6 ed.

New South Wales Department of Planning and Environment (NSW DPE), (2011), Hazardous Industry Planning Advisory Paper No. 2 (HIPAP 2, Fire Safety Study Guidelines.

New South Wales Department of Planning and Environment (NSW DPE), (2011). Planning guidelines for hazardous developments, various working papers, http://www.planning.nsw.gov.au/Policy-and-Legislation/Hazards/Industrial-Hazards.

New South Wales Department of Planning and Environment (NSW DPE), (1992), State Environmental Planning Policy No. 33 - Hazardous and Offensive Development (SEPP 33).

New South Wales Department of Planning and Environment (NSW DPE), (2011), State Environmental Planning Policy No. 33 - Hazardous and Offensive Development (Applying SEPP 33), Applying SEPP 33.