

Preliminary Site Investigation (PSI)

for potential contamination at

86 Woodlands Road Armidale NSW

(Lot 1 DP246878, Lot 1 DP573787 and Lot 145 DP755826)



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- ◆ Ensuring Synergy between People, Productivity and Natural Resources
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1 INTRODUCTION

In July 2024 Cadeema were engaged by ACenergy to undertake a Preliminary Site Investigation (PSI) to assess for the presence of and the potential for land contamination on part of 86 Woodlands Road Armidale NSW 2350 (approximately 11 km southeast of the township of Armidale) in response to the New South Wales Department of Primary Industries - Agriculture's ('DPI Agriculture's') input to the Gara Battery Energy Storage System (BESS) Scoping Report (P000974/REP, Rev: 001B, 28 May 2024) (the 'Gara BESS Project').

ACenergy propose to construct a 400 megawatt (MW) /1,760 MWh Battery Energy Storage System (BESS) and associated infrastructure (transmission and connection works) at 86 Woodlands Road Armidale, NSW. The total area of the property is approximately 423 ha, the proposed '**site**' within the property, is approximately 35.24 ha (defined as the land that is subject to application and depicted as a 'red boundary in Appendix B - Site Plans). The proposed BESS '**development footprint**' is approximately 22.43 ha and is partially situated on Lot 1 DP246878 and Lot 1 DP573787. This area is referred to herein as the '**study site**' and is the focus of this PSI (*Appendix B - Site Plans* -Image B1).

The study site is zoned RU1 Primary Production under the Armidale Regional Land Environmental Plan 2012, is in the Armidale Local Government Area (LGA) and is within the New England Renewable Energy Zone. The 'Gara BESS' project is a State Significant Development (SSD) as declared by Section 2.6(1)(b) and under Section 20, Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021 (Systems SEPP). (*Appendix A - Locality Plan; Appendix C - Property Report*).



Image 1: The centre of the site, facing towards the southern boundary. High voltage power lines pictured in the horizon on the hill which the BESS will connect into.

This PSI includes a review of historical site land use, assessment of environmental features on and adjoining the study site, assessment of public records relating to planning and contamination, an assessment of historical aerial imagery, a detailed site inspection, representative soil sample collection, soil contaminant laboratory analysis, and the subsequent assessment of the risk of, potential for, or existence of contamination on the study site including whether further investigation is needed. This process satisfies the requirements set out in the Contaminated Land Management Act 1997 (NSW) ('CLM Act'), the NSW Environment Protection Authority ('EPA') published Consultants Reporting on Contaminated Land: Contaminated Land Guidelines ('Guidelines'), and the National Environment Protection (Assessment of Site Contamination) Measure 1999 ('ASC NEPM').

2 POTENTIALLY CONTAMINATED LAND ASSESSMENTS

Where a land contamination status is unknown (that is, it is potentially contaminated land), the first step in the assessment process is typically to undertake a Preliminary Site Investigation (PSI). The aim of the PSI is to assess the risk of, potential for, or existence of contamination and whether further detailed investigation is needed. When assessing land for potential contamination, typically gradual incremental investigation procedures are employed as the risk of contamination is progressively clarified. A typical process might include:

Stage 1 – Preliminary Site Investigation (PSI) - a preliminary investigation which may entail:

- a. no soil/water sample analysis - on straightforward sites with a low risk of soil contamination
- b. limited/selected soil/water sample analysis - where a low risk of contamination is identified and some clarification of soil/water status is deemed necessary

Stage 2 – Detailed Site Investigation - alternatively (or where a PSI identifies some risk (typically a moderate or high risk) of contamination), a Detailed Site Investigation should be undertaken in accordance with the Guidelines, ASC NEPM, and *AS 4482.1 – 2005 Guide to the sampling and investigation of sites with potentially contaminated soil – Non-volatile and semi-non-volatile compounds*.

A Stage 1 PSI assessment (be this 1a or 1b) may conclude that there is a low likelihood of contamination and the site is therefore safe for the current or intended use. Alternatively, the Stage 1 PSI assessment may identify some minor contamination and subsequently recommend and/or formulate an appropriate Remedial Action Plan (RAP). Where more significant contamination (or a heightened risk of contamination) is identified, a Stage 2 Detailed Site Investigation is typically required.

A PSI would usually involve outlining the purpose of the investigation followed by a complete site history account documenting past and present potentially contaminating activities (on and off site sources). A site investigation is required and a detailed account of environmental features on and surrounding the site should be compiled. A PSI will also include a Conceptual Site Model, identification of data gaps, or recommendations for further investigation. A detailed account should be provided of the presence of, risk of, and/or likelihood of contamination on the site. Where a heightened risk of contamination is identified, the PSI should identify potential human and ecological receptors on and off-site, identify potentially affected media, detail all contaminants of potential concern, and/or perform or recommend preliminary sampling and analysis to assess the need for a further investigation.

A Stage 2 Detailed Site Investigation is a more detailed level of assessment and potentially includes soil, surface water and groundwater laboratory analysis of statistically selected representative environmental samples to verify or refute the presence of contamination. The Detailed Site Investigation may conclude that either; there is a low likelihood of contamination and the site is therefore safe for development; or, where contamination is identified, quantify the contamination (type and extent) and recommend a Remedial Action Plan (RAP). A RAP typically outlines a detailed remediation strategy which then needs to be implemented prior to development.

This PSI correlates with Stage 1b above and includes site history, site environmental features, site inspection results, soil sample laboratory analysis, and the subsequent assessment of the risk of, potential for, or existence of contamination and whether further investigation is needed.

3 METHODOLOGY

3.1 Desktop Assessment

A desktop review of publicly available land use and environmental information was undertaken including assessment of site history, environmental features/history (vegetation, soil, surface water, groundwater etc), Council zoning/planning and a public records search along with searches of relevant regulatory authority registers in relation to environmental assessments, environmental impacts and contamination (*Appendix D - Desktop Assessment Data Sources*). Aerial photography was also sourced and assessed for the study site as this can provide insights into historical land use (*Appendix E - Historical Aerial Imagery*).

3.2 Fieldwork

On the 7th of August 2024, two appropriately qualified and experienced agricultural and environmental consultants from Cadeema inspected the study site noting evidence of prior land-use, the current condition of the land and relevant environmental features. This site inspection included soil physical characteristic assessments to assess the soils and to determine the presence of refuse, dumped foreign material and/or fill. Soil physical characteristics were assessed utilising a decontaminated 100 mm

diameter hand auger exposing the soil profile to depths of approximately 40 to 80 cm (*Appendix F - Site Environmental Features*).

3.3 Assessment & Reporting

After the review of relevant publicly available and historical site information, an assessment and interpretation of the data collected in the field and received from the laboratory was undertaken. A detailed account was compiled of the environmental features on and adjoining the study site and this is provided in the appendices (*Appendix F - Site Environmental Features*). Evidence of relevant site anthropogenic interventions was compiled along with details of land uses on and adjoining the study site, and in the district. The collation and assessment of this information facilitated assessment of the potential for contaminated land to exist on the study site. The results are compiled in this report including conclusions on the potential for site contamination along with recommendations for remedial action if required. Where required, the assessment makes recommendations for further work.

4 THE SITE

4.1 Location & Extent

The proposed BESS 'development footprint' (referred to as the 'study site'), would occupy approximately 22.43 ha across Lot 1 DP246878 and Lot 1 DP573787. . Site access would be provided from Waterfall Way/Grafton Road involving works affecting the road reserve Lot 7003 DP1060212 and Lot 7009 DP1060213. Subject to final design, the proposed transmission easement would impact Lot 1 DP246878 and Lots 144, 145 and 153 DP755826. Included in the appendices is the location of the property (*Appendix A – Locality Plan*) and a development layout plan of the proposed site and development footprint (*Appendix B – Site Plans*).

The study site is located within an undulating landscape, where elevation ranges between 990 - 1090m Australian Height Datum (AHD). The study site has been historically cleared and grazed for sheep and cattle production and is typical of farmland in the region. Surrounding land uses include

- Agriculture;
- Transportation – Waterfall Way/Grafton is a major road connecting Armidale to the coast;
- Mineral exploration and mining; and
- Residential – Armidale township is located approximately 11 km east

The study site (Lot 1 DP246878 Lot1 DP573787) does not contain any dwellings. There is no existing infrastructure on the study site however, a residential dwelling, agricultural shedding, farm fencing and farm dams form part of the larger property. The study site is located within the Macleay River freshwater

catchment. Designated waterways in the vicinity of the study site include Burying Ground Creek 500m to the east, Gara River 2.5km to the west and Commissioners Waters 3.5km to the south of the site. Several solar farms, including Metz, New England, Uralla, and Tilbuster, are situated near the proposed study site. The nearest of these is the Oxley solar farm, located about 6 kilometres to the south.

Several nature reserves are situated around the study site, including Gara Dam (2km east), Yina Nature Reserve (3km northwest), and Imbota Nature Reserve (5km southeast). Designated waterways in the area include Burying Ground Creek 500 m east, Gara River 2.5 km west and Commissioners Waters 3.5 km to the south of the study site. The study site is near several other solar projects, including the Oxley solar farm, situated approximately 6km to the south of the study site (across Waterfall Way/Grafton Road) and the Metz solar farm, situated approximately 10 km east of the study site. Further details on environmental features on and adjoining the study site are provided in the appendices (*Appendix F - Site Environmental Features*).

4.2 Zoning

The study site is in the Armidale Local Government Area (LGA) and is within the New England Renewable Energy Zone (REZ). The study site is covered by the Armidale Regional Land Environmental Plan 2012 and as detailed in the Property Report (*Appendix C - Property Report*) is zoned RU1 - Primary Production. The project is to be known as the 'Gara BESS'. The 'Gara BESS' project is a State Significant Development (SSD) as declared by Section 2.6(1)(b) and under Section 20, Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021 (Systems SEPP). Land to the immediate north, south, east, and west of the study site is primarily zoned RU1 – Primary Production. Land approximately 600 m east of the study site is zoned RU4 – Primary Production Small Lots and constitutes agricultural land.

4.3 Existing Land Use

The study site is primarily used for agricultural activities, such as dryland grazing and is positioned within an undulating, rural area. (*Image 3*) The landowner indicated he took ownership of the land approximately 10 years ago and advised that the property was historically used for sheep and beef grazing. The landowner advised that he currently conducts rotational grazing on the study site, growing predominately winter crops (Ryegrass, Fescue, Phalaris and Clover) in the north and west paddocks. The landowner indicated that in the past 12 months he has also included perennial grasses such as Cocksfoot, Chickery, Plantain, Peri grass into the pasture mix in the north and west paddocks. Pasture species are not sown in the southern paddocks due to the poor draining waterlogging soils (*Image 4*).



Image 3: Facing east across the undulating dryland northern paddock on the study site: farming infrastructure in the background (pictured).



Image 4: Looking north across the southern paddock, which is not sown with agricultural pasture species, remnant trees pictured.

5 POTENTIAL FOR CONTAMINATION

5.1 History

The potential for a site to be contaminated is initially assessed based on the risk of contamination associated with historical land use on and in the vicinity of the study site. Details on site history were obtained from historical regulatory and planning reports, ownership records, land use records, site environmental information (*Appendix D - Desktop Assessment Data Sources*) and from aerial photography (*Appendix E - Historical Aerial Imagery*) along with interviews with the landowner. The aerials indicate land on and adjoining the study site was cleared for agriculture prior to 1945. Since 1945 anecdotal evidence indicates the study site has been utilised for open dryland grazing. Agricultural infrastructure including a residence and shedding appears to have been established in the western section of the property between 1956 and 1964. A farm dam north of the proposed northern study site boundary which connects in with existing drainage seems to have been constructed after 1956. By 2006 vegetation had been established parallel to the northern drainage line (adjacent to the farm dam). Farm fencing and established tracks were more evident on the property by 2023. Evidence of pasture establishment is shown in north and western sections of the study site from 2014 to 2023. Based on historical land use, the highest risk of land contamination is associated with the potential for land contamination presented by agricultural activities.

5.2 Records

In addition to historical records, the potential for a site to be contaminated should also consider publicly available historical regulatory records to determine if these indicate an elevated risk of land contamination (*Appendix D - Desktop Assessment Data Sources*). Based on such a search, there is no evidence to suggest that the study site, or land within 1 km of the study site, has been, or is listed/highlighted/mentioned or is covered by any of the following:

- the NSW EPA Contaminated Land List
- a Former Gasworks
- the National Waste Management Site Database or National Liquid Fuel Facilities
- the NSW EPA PFAS Investigation Program, Department of Defence PFAS Investigation Program, Department of Defence PFAS Management Program, or Airservices Australia National PFAS Management Program
- a Department of Defence Site or Unexploded Ordnance
- the NSW EPA Other Sites with Contamination Issues (including, James Hardie asbestos manufacturing and waste disposal sites, Radiological investigation sites in Hunter's Hill, Pasminco Lead Abatement Strategy Area)
- Delicensed Activities still regulated by the EPA
- Potentially contaminative business activities in historical Business Directory Records, including Dry Cleaners, Motor Garages & Service Stations
- Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018

- Naturally Occurring Asbestos Potential
- Current Mining & Exploration Titles/Applications
- a State Environmental Planning Policy Significant Precinct
- Commonwealth Heritage List, National Heritage List, State Heritage Register – Curtilages, Environmental Planning Instrument – Heritage

The 'Armidale Regional Council Landfill' listed on the National Waste Management Facilities Database is located approximately 1.5km south of Lot 1 DP246878. It is noted in the Gara Battery Energy Storage System Scoping Document (May 2024) that "it is unlikely that the landfill will be in use during the development and construction phase of the BESS as Council intends to exhaust the capacity of the landfill prior to use". While the landfill site is located 1.5 km away and is currently inactive, it is unlikely to have significant implications on the BESS once it becomes operational, given the distance, position in the landscape and the measures typically in place to mitigate any potential impacts and therefore does not present any cause for concern.

There is no evidence to suggest past land activities occurred on the study site that may cause contamination such as acid/alkali plant and formulation, airports, asbestos production and disposal, chemicals manufacture and formulation, defence works, drum re-conditioning works, dry cleaning establishments, electrical manufacturing (transformers), electroplating and heat treatment premises, engine works, explosives industry, gas works, iron and steel works, landfill sites, metal treatment, mining and extractive industries, oil production and storage, paint formulation and manufacture, pesticide manufacture and formulation, power stations, railway yards, scrap yards, service stations, sheep and cattle dips, smelting and refining, tanning and associated trades, waste storage and treatment or wood preservation (*Managing Land Contamination: Planning Guidelines*; ANZECC & NHMRC 1992 *The Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites* (the '*Managing Land Contamination: Planning Guidelines*'). However, there is evidence of agricultural/horticultural activities but the risk for contamination associated with same is deemed low.

5.3 Observations

The desktop assessment, site inspection and interviews investigated potential sources of contamination on the study site and noted the following:

- there was no evidence of waste being stored
- there was no evidence of extensive imported fill material
- there was no visual evidence of extensive chemical usage or storage
- there was no evidence of underground or aboveground fuel storage tanks
- there was no evidence of wastewater treatment systems
- there was no evidence of potential asbestos containing materials on the soil surface
- there was no evidence of plant stress or unhealthy vegetation
- there was no evidence of odours or soil staining

6 CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between sources and receptors. It is advantageous to compile a CSM to identify any potential contamination pathways or receptors which theoretically may be exposed to contamination. Based on the results of this PSI, we have compiled a basic CSM, given the study site is deemed uncontaminated.

Whilst no soil contamination was identified, the study site is within an undulating landscape and therefore the most significant risk of potential contaminant mobilisation is through either excess surface water run-off or percolation of surface water down through the soil profile to groundwater beneath the study site. Limited site and district hydrogeological information is available, however groundwater beneath the study site is likely to occur at depths greater than 10 m and therefore is not particularly vulnerable to surface contamination. The soils on the study site are clay dominant and this, combined with adequate soil cation exchange capacity, limits the potential for excessive leaching of soil water solution borne contaminants down through the soil profile. Due to the undulating landscape, excess surface water collecting and moving off the study site has the potential to mobilise contaminants. The study site will be subject to earthworks as part of the construction phase and should include construction of shallow earthen surface water drains designed to capture and remove excess surface water from the study site. Further details on the management of surface water runoff will be provided in the site Operational Environmental Management Plan (OEMP)

In the cases of both groundwater and surface water, possible receptors include human and ecological receptors, and exposure pathways are potentially continuous, particularly in relation to the surface waters. The possible exposure pathways in connection with groundwater are more limited; likely being confined to groundwater bores and/or where groundwater enters incised district waterways. It is not likely that surface water or groundwater from the study site is a source of untreated drinking water for humans however, some stock watering from these resources could occur. Because the study site is deemed uncontaminated, and the probability of significant leaching to groundwater and/or excess surface water run-off leaving the study site are both limited, there is a low likelihood of contaminant mobilisation on or adjoining the study site.

7 SUMMARY & CONCLUSIONS

This PSI concludes that there is no evidence of potentially land contaminating activities having occurred on the study site other than agricultural/horticultural uses, which we deem to present a negligible risk of contamination. The detailed assessment of site history, environmental features on and adjoining the study site and site inspection did not indicate any heightened risk of land contamination. Based on the results detailed herein, it can be concluded that there is low potential for contamination and therefore there is no need for further investigation or an audit of the study site.

8 APPENDICES

8.1 Appendix A - Locality Plan

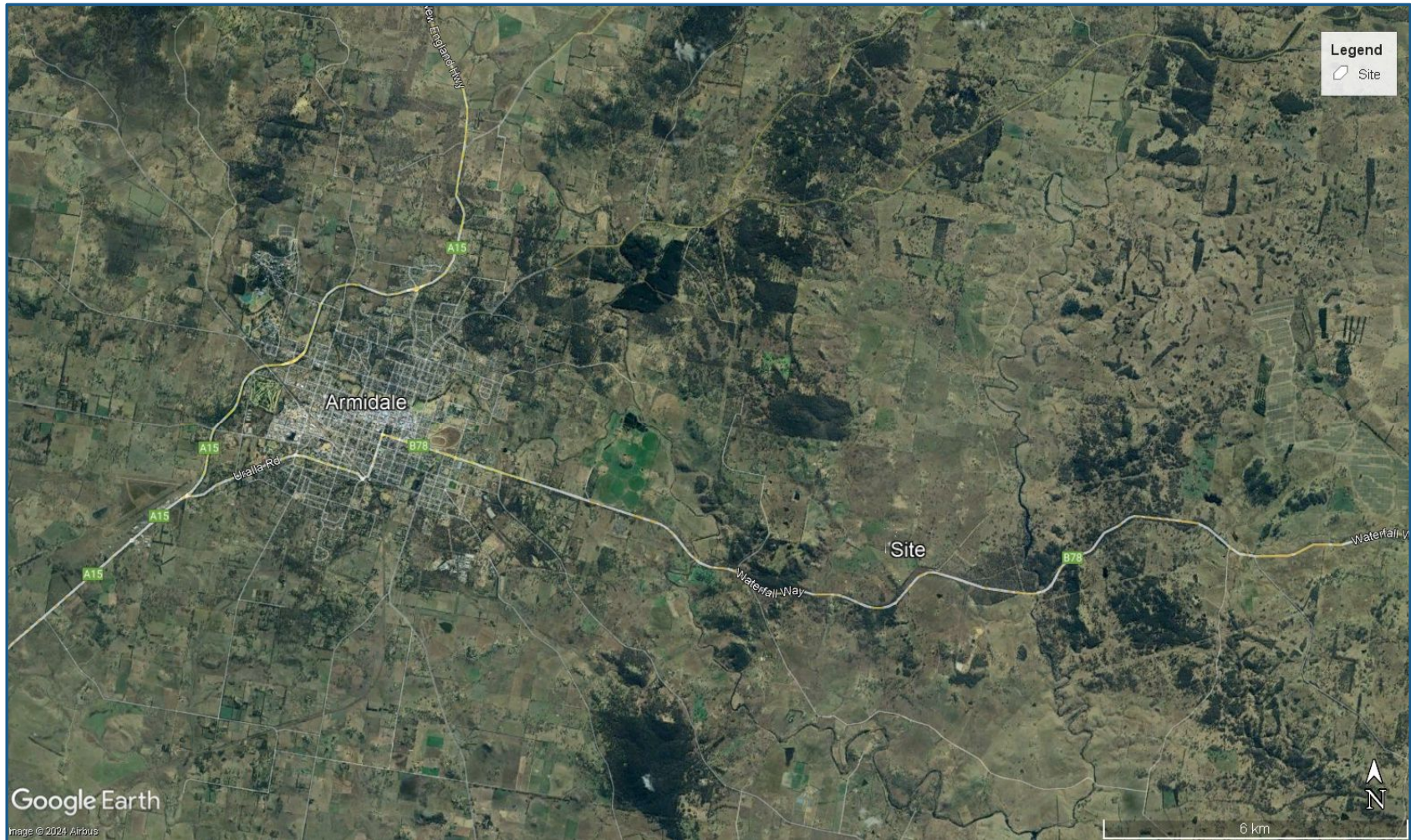


Image sourced from Google Earth 2024.

8.2 Appendix B - Site Plans

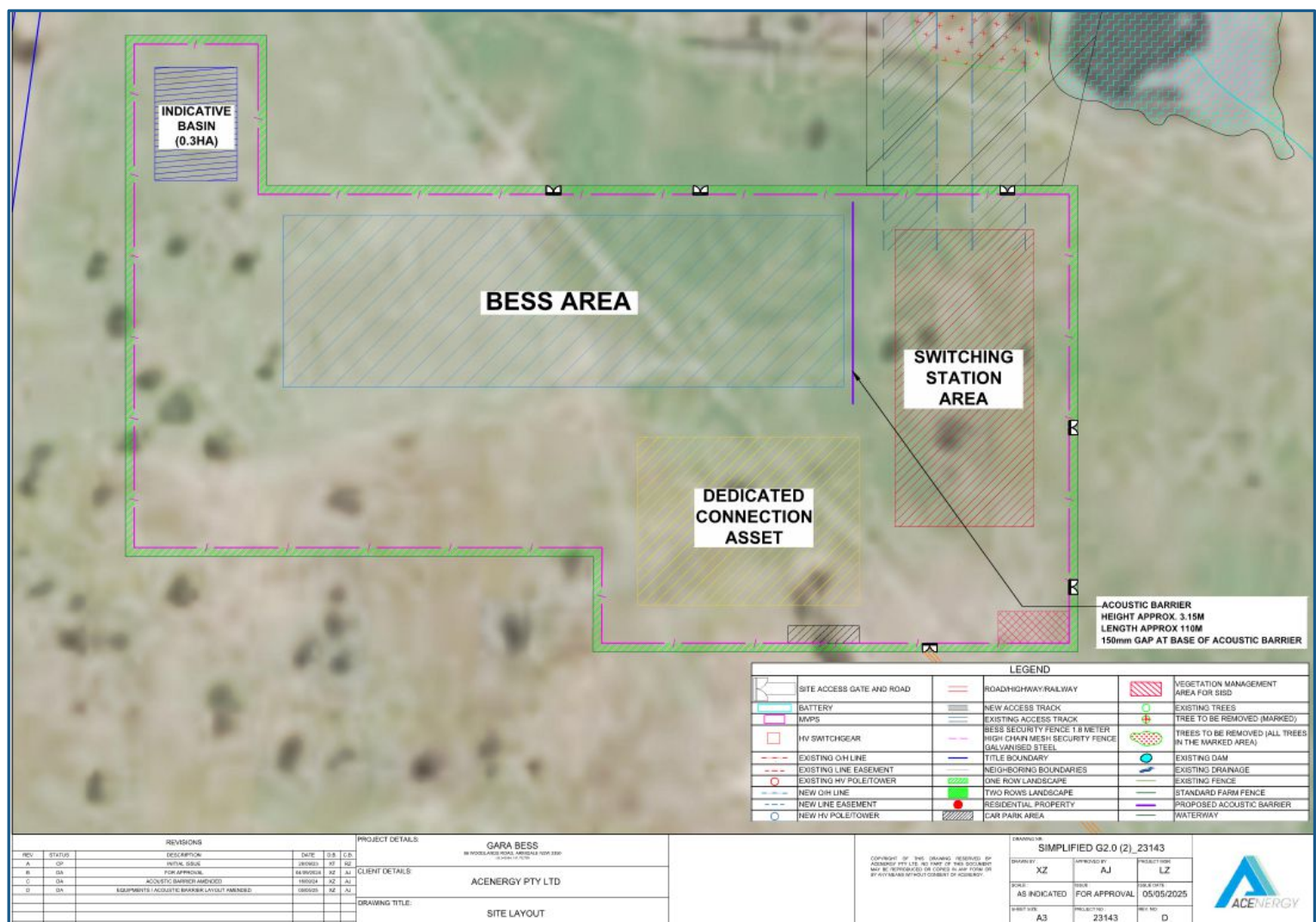


Image B1: Proposed layout of the Battery Energy Storage System (BESS)

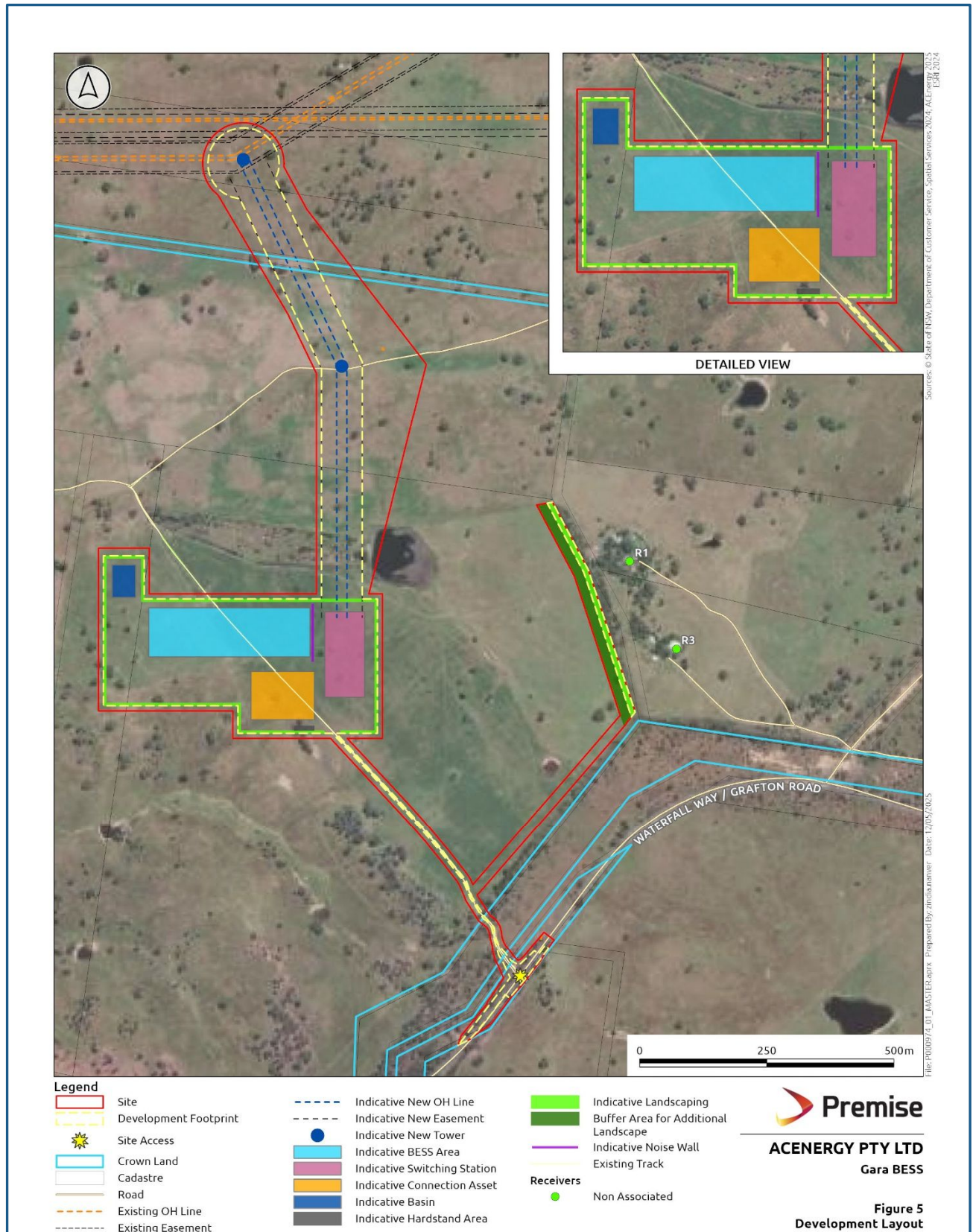


Image B2: The Proposed BESS development site layout, showing the battery energy storage system (BESS) site, transmission connection corridor and site access.

8.3 Appendix C - Property Report

8.4 Appendix D - Desktop Assessment Data Sources

8.5 Appendix E - Historical Aerial Imagery

8.6 Appendix F - Site Environmental Features

8.6.1 Geology

The study site is located in New England fold belt of north-eastern New South Wales, also known as the New England Tableland and is a plateau and a region of the Great Dividing Range. The New England fold belt consists of sedimentary rocks of Carboniferous and Permian age that were extensively faulted during a period of rapid continental plate movement associated with granite intrusions in the late Carboniferous. Much of the bedrock is now overlain by Tertiary basalt flows rarely exceeding 100m in thickness that lie on river gravels and sands or on lake sediments. Landform within the study site consists of undulating hill sides with relatively low gradient. The landscape grades gently from hillsides with granite outcroppings, to alluvial basins with moderately fertile soils. The valleys are broad and there are no cliffs, escarpments, or gorges which are known from the region.

8.6.2 Climate

An indication of typical climatic variables was obtained from the Bureau of Meteorology Armidale Airport Weather Station (No. 056238) (with data from 1994 to 2024) which is located approximately 15.5 km east of the study site. This indicates that the district is generally characterised by warm to hot temperatures averaging 10 to 37°C in the summer months, and cool temperatures averaging 0 to 16°C in the winter months. High rainfall occurs, throughout the autumn to spring months with the average monthly rainfall ranging between 83 mm and 304 mm. The long-term average annual rainfall approximates 900 mm and average annual evaporation approximates 1,500 mm.

8.6.3 Groundwater

A search of publicly available groundwater information indicated a number of groundwater monitoring bores and an irrigation bore in the vicinity of the study site. These bores however, did not have any recorded information on groundwater depth or quality and the status of the bores was generally unknown. Lot 1 DP246878 is not mapped as groundwater vulnerable under the Armidale Regional Local Environmental Plan (ARLEP) 2012. The study site is not generally susceptible to shallow water table induced salinity due to its moderate elevation position in the landscape. No evidence of shallow groundwater or salinity were evident on or adjoining the study site.

8.6.4 Topography & Drainage

The study site is predominantly within an undulating rural landscape where elevation ranges between 990 - 1090 m Australian Height Datum (AHD). The study site is predominately cleared for grazing with some scattered vegetation and dams evident (*Image F1*). The topography of the northern part of the study site slopes northwest towards an existing drainage line and farm dam, while the central and southern sections of the study site slope southwest towards Burying Ground Creek. There was no evidence of excessive surface water pooling or water accumulation on the study site.



Image F1: Positioned at the most northern boundary of Lot 1 DP755286, looking south towards the study site which is within an undulating rural landscape.

8.6.5 Soils

The soils on the study site were investigated utilising a 100 mm (4 inch) diameter hand soil auger (*Image F2*) with the soil profile examined to depths of 40 to 80 cm below the surface at numerous locations across the study site. This soil survey facilitated detailed assessment of soil physical characteristics and of soil variations across the study site.

The New South Wales Government central resource for sharing and enabling environmental data (<https://datasets.seed.nsw.gov.au> (SEED facility)) documents the study site as consisting of Great Soil Group *Yellow Podzolic Soils* and the Australian Soil Classification (ASC) (*Isbell 2021*) *Kurosols*. The site assessment of soil physical characteristics confirmed that the soils across the study site consist of Yellow Podzolic Soils (Great Soil Group) and are Kurosols (ASC). Yellow Podzolic Soils are duplex soils with dominant red, orange or yellow colouring, particularly in the subsoils. The soils across the study site consist of approximately 10 cm of brown loam surface soil overlying dull to bright yellow-brown clay, medium clay subsoils (*Image F2*). In the elevated, rocky, skeletal areas across the study site, rock fragments were found in the surface soil with shallower surface soil depths and lighter clay/rocky subsoil.



Image F2: The soils on the site are duplex and consist of approximately 10-20 cm of brown silty loam with a relatively abrupt change to a light grey brown bleach, structureless light clay and bright yellow-orange, medium clay subsoil layers.

8.6.6 Vegetation

The study site occurs on the Armidale plateau and contains some scattered trees and native vegetation (*Image F3*). Much of the study site has been extensively cleared of native vegetation and has been modified by historical farming practices. Remnant vegetation within the study site is restricted to fragment areas and isolated paddock trees. The Armidale plateau landscape which would have originally supported New England Grass Woodlands which would naturally have consisted of New England Hills Stringybark-Box Woodland, which includes *Eucalyptus blakelyi* (Blakely's red gum), *Eucalyptus bridgesiana* (apple box), *Eucalyptus caliginosa* (broad-leaved stringybark), *Eucalyptus laevopinea* (silver-top stringybark), *Eucalyptus melliodora* (yellow box), and *Eucalyptus youmanii* (Youmans stringybark). A small area of open woodland exists in the southwest of the study site that may fall within the definition of the NSW BC ACT and the Commonwealth EPBC ACT CEEC – White Box - Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Planted native and exotic trees are located within a fenced area parallel to drainage line north of the study site (*Image F4*). Land on the study site has been utilised for rotational dryland grazing. Areas in the west and north of the study site contain pasture species such as Ryegrass, Clover, Fescue and Phalaris. The landowner indicated that in the previous 12 months other species such as Cocksfoot, Chickery and Plantain have been sown in these areas.



Image F3: Looking south across the proposed study site which contains some scattered trees and native vegetation.



Image F4: Planted native and exotic vegetation within a drainage line fenced area north of the study site