

CESSNOCK CITY COUNCIL
10 APR 2018
RECEIVED

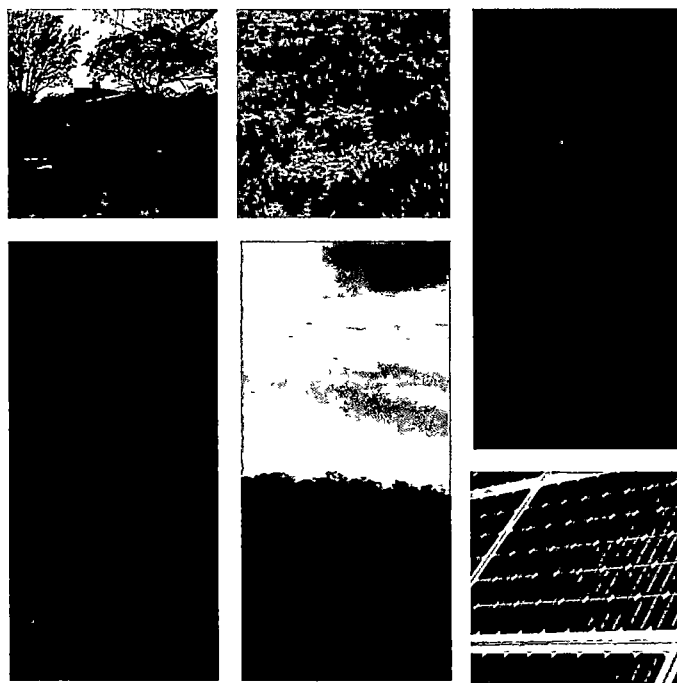
CESSNOCK CITY COUNCIL
10 APR 2018
SCANNED



Statement of Environmental Effects

Installation of 5 MW Solar Farm

66 Wills Hill Rd Lovedale NSW 2325



Schwartz Family Company

9 March 2018



Renewable Energy Specialists

Statement of Environmental Effects

Installation of 5 MW Solar Farm

66 Wills Hill Rd Lovedale NSW 2325

Kleinfelder Document Number: NCA17R69414

File Name: NCA17R69414_SEE_SolarFarm_v2

Project No: 20182251

All Rights Reserved

Prepared for:

EARTHCONNECT PTY LTD

1/5 ARUNGA DRIVE

BERESFIELD NSW 2322

for

SCHWARTZ FAMILY COMPANY

LEVEL 13, 111 LIVERPOOL STREET

SYDNEY NSW 2000

Only Schwartz Family Company, its designated representatives or relevant statutory authorities may use this document and only for the specific project for which this report was prepared. It should not be otherwise referenced without permission. Refer to **Appendix 3** for the applicable limitations applying to this report.

Document Control:

Version	Description	Date	Author	Technical Reviewer
1.1	Draft for client review	15 January 2018	B Deane / J Berry	J Berry
2	Final	9 March 2018	B Deane / J Berry	J Berry / A James

Kleinfelder Australia Pty Ltd

95 Mitchell Road

Cardiff NSW 2282

Phone (02) 4949 5200

ABN 23 146 082 500

EXECUTIVE SUMMARY

This Statement of Environmental Effects (SEE) has been prepared by Kleinfelder Australia Pty to support the development application by the Schwartz Family Company for a 5 MW Solar Farm Project upon Lot 5 DP 1048155 (the Subject Land) at 66 Wills Hill Road in Lovedale New South Wales. The Schwartz Family Company operate the adjoining golf course and Crowne Plaza. The solar farm will assist in improving the sustainability of the Schwartz Family Company assets through reducing dependency on wine and tourism.

Earthconnect Pty Ltd has developed the plans for the solar farm and propose to construct and operate the solar farm on behalf of the Schwartz Family Company on the subject land. Following an assessment of the constraints on the land the proposed site was selected for the 8.3 hectare solar farm development.

Key elements of the solar farm include a 5 MW solar panel array and inverters, battery bank, control room and a new overhead line through to the AusGrid controlled point of attachment for the transfer of electricity into the electrical grid. The development will be serviced by an extension of the existing gravel access road, and is intended to be fenced with rural fencing unless otherwise instructed by AusGrid. Infill vegetation plantings and riparian plantings are proposed to provide improved screening to surrounding lands and the existing riparian vegetation.

Construction is anticipated to take 5-6 months operating during standard construction hours. Surrounding receptors are considered unlikely to be noise affected (background plus 10dB) during the construction period, and no dwelling will be highly noise affected (75 dB(A)). Traffic will be highest during construction where materials will be delivered to site via Wine Country Drive and Wills Hill Road primarily within 12 m shipping containers and unloaded on laydown areas adjacent to the access road. A Traffic Management Plan will be developed prior to construction to minimise traffic issues.

The development is situated on mixed exotic and native grasslands and requires the removal of one isolated Forest Red Gum. It is located within water front land associated with Black Creek and a first order tributary, no riparian vegetation will be cleared and riparian plantings is proposed. Drainage from the development is via the first order tributary, no part of the development drains directly to Black Creek. Backwater flooding from Black Creek may occur.

and the key development elements have been positioned and designed to be erected above the anticipated flood level

A flora and fauna assessment has been completed and determined that the proposed development that will remove one non-hollow bearing Eucalyptus tereticornis (Forest Red Gum) and be located in mixed native and exotic grassland is unlikely to significantly affect any threatened biodiversity in the area. No referral to the Commonwealth under the Environment Protection Biodiversity Conservation Act 1999 is considered necessary.

Being located within 200 m of a waterway the site is located within a potentially sensitive Aboriginal heritage landscape, however no sites have been recorded on the property. Considering the long history of agriculture in the area of the proposed solar farm and minimal excavation required it is considered unlikely that the project will impact Aboriginal Heritage. However, in the event that items are discovered during the construction, works will need to cease in the immediate area and an Aboriginal Heritage Impact Permit sought.

The Subject Land is listed within the Cessnock Local Environmental Plan 2011, titled as Weronga and being of landscape heritage value, however, Weronga homestead was located over a 1.7 km north of the Subject Land. Notwithstanding, the Subject Land does contain an area with former structures and a remnant concrete silo and sheet metal barn. The solar farm development as taken these areas into account and will not affect the heritage value of the Subject Land.

The visibility of the solar farm has been considered from lands surrounding lands. Publicly the filtered views of the solar farm will be possible from a small section of Lovedale Road and Wills Hill Road. Visibility from private property will be possible from elevated properties to the north and north west and south east. Infill planting has been proposed to minimise visibility to properties to the north and north east. In all cases, as the solar farm is located at on the lower slopes, it will occupy a relatively small area of any view as it is surrounded by mature vegetation on higher ground.

The development is consistent with the objects of both the RU4 small rural holdings zone and the objectives for the vineyards district. The solar farm is permissible pursuant to State Environmental Planning Policy (Infrastructure) 2007 and is consistent with the objectives of the RU4 Zone and the Vineyards District chapter of the development control plan.

In many respects the proposed solar farm is consistent with agriculture in the area, the panels are erected in rows (like vines), harvest the sun's energy to produce a product, require minimal modification to the landscape, can be removed when no longer suitable, and do not restrict or obstruct land use on adjoining properties

Cessnock airport is located over 1200 m to the south west of the proposed solar array. The solar array is located outside the fixed wing aircraft approach path and is well below the obstacle height limitation surface. With anti-reflective coatings on the solar panels, the solar panels will not affect the operations of the airport, which is supported by the outcomes of numerous airports around the world that operate safely without hazard in proximity to nearby solar farms, or other large reflective surfaces

On the basis of the information presented within this Statement of Environmental Effects, the development is well suited to the proposed site and there are no apparent constraints to the granting of approval for this development

Contents

1.	INTRODUCTION	12
1.1	LOCATION	12
1.2	THE PROPOSED DEVELOPMENT	12
1.3	STRUCTURE OF THE STATEMENT OF ENVIRONMENTAL EFFECTS	14
1.4	THE PROPONENT	14
1.5	THE NEED	15
1.6	CONSULTATION	15
1.7	STUDY TEAM	16
2.	PROPOSED DEVELOPMENT	17
2.1	INFRASTRUCTURE	17
2 1 1	Solar Array Area	17
2 1 2	Inverters and battery bank	18
2 1 3	Control Room / Site Office	19
2 1 4	Overhead Lines and Point of Attachment	21
2 1 5	Site Access	22
2 1 6	Driving Range	22
2 1 7	Fencing and Security	22
2 1 8	Colours and Finishes	23
2 1 9	Landscaping	23
2 1 10	Employment and Usage	25
2.2	UTILITIES AND SERVICES	26
2 2 1	Water	26
2 2 2	Stormwater	26
2 2 3	Effluent	26
2 2 4	Electricity and Telecommunication Services	26
2 2 5	Bushfire and Fire-fighting systems	26
2.3	CONSTRUCTION	27
2 3 1	Construction Hours	27
2 3 2	Construction Areas	27
2 3 3	Traffic and Access	28
2 3 4	Construction Personnel	28
2 3 5	Site Preparation	28
2.4	ANALYSIS OF ALTERNATIVES	29
2 4 1	Form	29
2 4 2	Location	31

2 4 3	No Development Alternative	31
3.	SITE ANALYSIS	33
3.1	PROPERTY OWNERSHIP	33
3.2	SITE DESCRIPTION	33
3.3	SURROUNDING LAND USE	38
3 3 1	Comment in relation to the Development	39
3.4	CLIMATE	41
3 4 1	Comment in relation to the Development	42
3.5	SOILS AND AGRICULTURE	42
3 5 1	Viticulture	43
3.6	TOPOGRAPHY AND HYDROLOGY	44
3 6 1	Comment in relation to the Development	45
3.7	ACCESS AND ROAD NETWORK	48
3 7 1	Comment in relation to the Development	50
3.8	FLORA AND FAUNA	50
3 8 1	Vegetation	51
3 8 2	Fauna Habitat	53
3 8 3	Threatened Species	54
3.9	HERITAGE	57
3 9 1	Aboriginal Heritage	57
3 9 2	European and Landscape Heritage	58
3.10	VISUAL AMENITY	63
3.11	ACOUSTICS	69
3 11 1	Comment in relation to the Development	69
3.12	BUSHFIRE	71
3 12 1	Comment in relation to the Development	71
3.13	UTILITIES AND SERVICES	71
3 13 1	Comment in relation to the Development	72
4.	LEGISLATIVE CONTEXT	73
4.1	<i>ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979</i>	73
4 1 1	Capital Investment Value	73
4 1 2	Determining Authority	73
4.2	STATE ENVIRONMENTAL PLANNING POLICIES	74
4 2 1	State Environmental Planning Policy (Infrastructure) 2007	74
4 2 2	State Environmental Planning Policy 44 – Koala Habitat Protection	74
4.3	WATER MANAGEMENT ACT 2000	75
4.4	ROADS ACT 1993	77

4.5	CESSNOCK LOCAL ENVIRONMENTAL PLAN 2011	77
4.6	CESSNOCK DEVELOPMENT CONTROL PLAN 2010	81
4 6 1	Part A Introduction	81
4 6 2	Part B General Information	81
4 6 3	Part C General Guidelines	82
4 6 4	Part D Specific Development	87
4 6 5	Chapter E3 Vineyards District	88
4.7	STRATEGIES	100
4 7 1	Lower Hunter Regional Conservation Plan	100
4 7 2	Hunter Regional Plan 2036	100
5.	SUMMARY OF IMPACTS AND CONTROLS	102
6.	SUMMARY AND JUSTIFICATION	110
6.1	SECTION 79C CONSIDERATIONS	110
6.2	ECOLOGICALLY SUSTAINABLE DEVELOPMENT	112
7.	CONCLUSION	114
8.	REFERENCES	115

Tables

Table 1	Indicative design of proposed solar panel array	18
Table 2	Solar inverter dimensions	18
Table 3	Estimated vehicle trips (one way) required during construction	28
Table 4	Land use surrounding the proposed solar farm	38
Table 5	Long-term climate data from Cessnock Airport AWS	41
Table 6	Assessment of the proposed solar farm against Chapter E 3, Appendix 1 of DCP	91
Table 7	Assessment of the proposed solar farm against Standard Design Requirements listed in Chapter E 3, Appendix 1 of DCP	... 92
Table 8	Summary of environmental impacts and controls	102

Figures

Figure 1	Site locality	13
Figure 2	Indicative solar panel design (Schletter Australia Pty Ltd)	17
Figure 3	Example of Inverter with open panels (not coloured as proposed)	 19
Figure 4	Proposed Solar Farm Design	. 20

Figure 5	Indicative control room section	21
Figure 6	Indicative landscape plan of proposed planting areas	24
Figure 7	Indicative erosion and sediment control plan	30
Figure 8	Land use surrounding the proposed solar farm	40
Figure 9	Topography and drainage of the Subject Land	46
Figure 10	Section of the proposed development in relation to Black Creek at the nearest point	47
Figure 11	Vegetation and potential fauna habitat within the Subject Land	56
Figure 12	Fourth edition of the 1897 Rothbury Parish Map (Historical Lands Record Viewer)	59
Figure 13	Heritage site upon the Subject Land	62
Figure 14	Zoning of the Subject Land under the Cessnock Local Environmental Plan 2011	77
Figure 15	Site Constraints	85
Figure 16	Indicative OHLS for Cessnock Airport	95

Photographs

Photograph 1	Solar panel array at the Royalla Solar Farm in Canberra demonstrating the grass cover achievable within array areas	25
Photograph 2	Existing site access to the Subject Land	34
Photograph 3	Looking south west along the existing overhead line and access road from the area of the point of attachment	34
Photograph 4	Looking south east along the approximate alignment of the proposed access road toward the control room and solar array in the background	35
Photograph 5	Looking north along the eastern boundary of the proposed solar array, Black Creek on right of shot, the shed and silo on back left	35
Photograph 6	Looking east along the southern boundary of the proposed solar array and the driving range	36
Photograph 7	Looking north along the sedges located with the shallow depressions that drain to the first order tributary	36
Photograph 8	Isolated Forest Redgum proposed to be removed on the western side of the proposed solar array, taken from the approximate location of the control room	37
Photograph 9	Looking north across the proposed solar array toward the shed and silo	37
Photograph 10	Wine Country Drive, Wills Hill Road intersection showing line marking, passing and turning lanes	48
Photograph 11	Facing south along Wills Hill Rd from the entrance to the Subject Land	49
Photograph 12	Existing access road within the Subject Land	49

Photograph 13	Sheet metal barn and silos located 120 m northwest of the proposed solar array area	60
Photograph 14	View 1 - Photomontage of view to south east toward the solar farm from the top of the cutting on Peacock Hill on Wine Country Drive adjacent to 180 Wills Hill Road, Lovedale	65
Photograph 15	INSET from Photograph 6	65
Photograph 16	View 2 - Photomontage of view to south west toward the solar farm from Carabobla	66
Photograph 17	INSET from Photograph 16	66
Photograph 18	View 3 - Photomontage of view east toward the solar farm from Wills Hill Road	67
Photograph 19	INSET from Photograph 18	67
Photograph 20	View 4 - Photomontage of view north west toward the solar farm from Lovedale Road	68
Photograph 21	Existing panels on Peacock Hill, visible from Wine Country Drive	68

Appendices

Appendix 1	Flora and Fauna Assessment
Appendix 2	Waste Management Plan
Appendix 3	Statement of Limitations

1. INTRODUCTION

This Statement of Environmental Effects (SEE) has been prepared by Kleinfelder Australia Pty Ltd to accompany a development application to Cessnock City Council for the installation of a 5 MW Solar Farm at Lot 5 Deposited Plan (DP) 1048155, at 66 Wills Hill Rd Lovedale NSW 2325

The purpose of this SEE is to describe the existing environment associated with the Subject Land, undertake an assessment of the construction and operation of the development and propose controls and mitigation measures to minimise the effects of the development on the locality

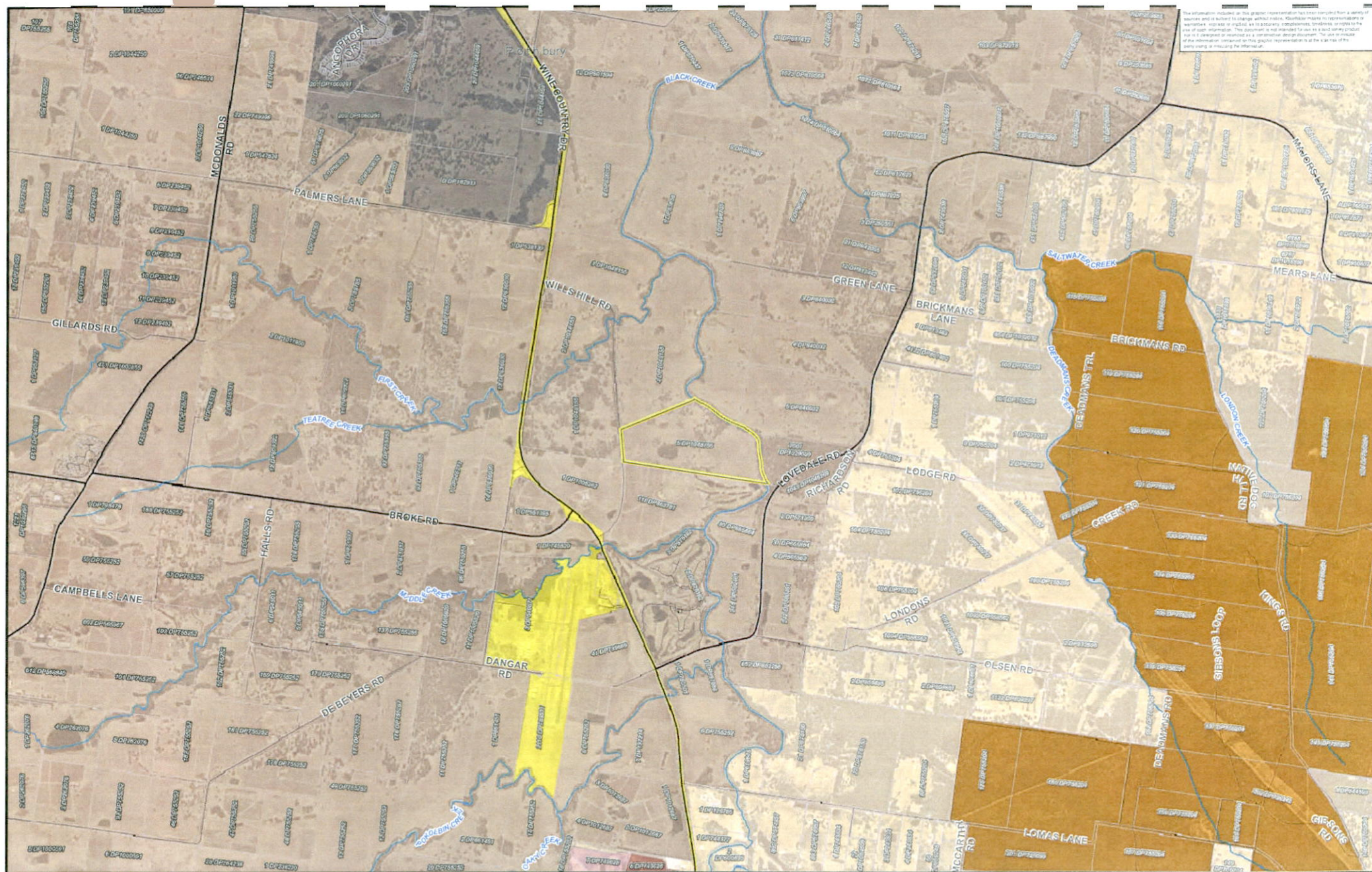
1.1 LOCATION

Lot 5 of DP 1048155 is located approximately 6.5 kilometres north of the central business district of Cessnock in the heart of the vineyards district. The location of the proposed development is situated approximately 630 metres north of the intersection of Wine Country Drive and Wills Hill Rd, Lovedale as shown in **Figure 1**

1.2 THE PROPOSED DEVELOPMENT

The précis of the proposal is provided below. A description of each of the development components is presented in Section 2 of the SEE.

Proposal	Installation of a 5 MW Solar Farm
Proponent:	Schwartz Family Company
Site:	66 Wills Hill Rd, Lovedale
Real Property Description:	Lot 5 of Deposited Plan (DP) 1048155, Lovedale Parish of Rothbury, County of Northumberland
Landowner:	Schwartz Family Company
Environmental Assessment:	Nominated Integrated Development, Part 4 of the <i>Environmental Planning and Assessment Act, 1979</i>
Main Planning Instruments:	State Environmental Planning Policy (Infrastructure) 2007 Cessnock Local Environmental Plan (LEP) 2011 Cessnock Development Control Plan (DCP) 2010
Consent Authority:	Joint Regional Planning Panel on behalf of Cessnock City Council



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. It should be used as a guide only and not as a basis for any decision. The accuracy of the information is not guaranteed. The use of the information is at the user's risk.

0 110 220 440
metres
1:25,000
GDA 1994 MGA Zone 56



- Site Boundary
- Named Watercourse
- Major Roads
- Local Roads
- Cadastre

- Land Zones**
- Infrastructure (SP2)
 - Large Lot Residential (R5)
 - National Parks and Nature Reserves (E1)

- Primary Production Small Lots (RU4)
- Rural Landscape (RU2)
- Tourist
- Village (RU5)

PROJECT REFERENCE: 20162251
DATE DRAWN: 20/10/2017 14:27 Version 1
DRAWN BY: BDeane
DATA SOURCE:
Nemap - 2017
LPI - 2017
NSW Crown Copyright - Department of Planning and Environment - 2017

Site Locality and Land Zoning

Earthconnect Pty Ltd
Flora and Fauna Impact Assessment
Lovedale Solar Farm
Wills Hill Rd, Cessnock NSW

FIGURE

1

1.3 STRUCTURE OF THE STATEMENT OF ENVIRONMENTAL EFFECTS

The SEE has been structured as follows:

- **Section 1 – Introduction**, provides a summary of the project, identifies members of the study team and contains background information about the proposed development.
- **Section 2 – Proposed Development**, provides a detailed description of the proposed development, including an assessment of alternatives.
- **Section 3 – Site Analysis**, provides a description and analysis of the site proposed for development.
- **Section 4 – Legislative Context**, provides the legislative context of the development and an assessment of the potential environmental and socio-economic impacts of the proposal.
- **Section 5 – Summary of Impacts and Controls**, provides a summary of the potential impacts of the project and details the mitigation measures that are to be implemented to ameliorate adverse impacts.
- **Section 6 – Summary and Justification**, provides a summary of the environmental impact assessment and a justification for the proposal with reference to the principles of ecologically sustainable development and advises that the proposed development meets the objects of the *Environmental Planning and Assessment Act, 1979* (EP&A Act 1979).
- **Section 7 – Conclusion**, provides a conclusion and requests that Cessnock City Council grant conditional consent to the proposed development.
- **Section 8 – References**, provides a list of references utilised in the compilation of the SEE.

1.4 THE PROPONENT

The Subject Land is held owned by the Schwartz Family Company who have a local land holding in the area consisting of the Crowne Plaza Hunter Valley, adjoining vineyards, golf course and adjacent Weronga property (one which this application is based) amounting to an area of over 191 hectares.

The Schwartz Family Company has a sustainability commitment being:

"Schwartz Family Company is committed to being a responsible company and conserving the wealth that our earth has to give us.

We are continually upgrading our systems to become "more efficient" and all new developments incorporate the very best in minimising waste and well as recycling of water and energy"

This project is consistent with the Schwartz Family Company's commitment to sustainability and provides an opportunity to further diversify the income base within its Hunter Valley holdings.

1.5 THE NEED

The proposed Solar Farm assists in satisfying the following needs:

- Assisting Australia to meet or exceed its 2030 Climate Change Targets through assisting to satisfy the 2020 large scale renewable energy target of 33 000 GWh (as of 2016 this was at approximately 20,000 GWh).
- Diversifying the economic income from the Schwartz Family Company's Hunter Valley assets that ensures less reliance on wine price sales or the tourism industry.
- Diversifying the economic income improves the sustainability of the Schwartz Family Company's Hunter Valley assets that enable employment stability for existing businesses.

1.6 CONSULTATION

The project has been developed in consultation with the following entities:

- AusGrid to determine the requirements to connect the solar farm to the local power network. EarthConnect are able to satisfy the technical requirements of AusGrid.
- Cessnock City Council, including a Pre-DA meeting (Ref 54/2016/31/1) and subsequent meeting on 30 November 2017.
- Civil Aviation Safety Authority to determine if the solar farm is likely to adversely affect the operation of the Cessnock Airport. As the Cessnock Airport is not controlled through the

use of a control tower and the panels are of a non-reflective nature the solar farm will not affect the operation of airport.

1.7 STUDY TEAM

The preparation of the SEE has been undertaken by Kleinfelder Australia Pty Ltd in conjunction with representatives from Earthconnect Pty Ltd, building on advice and guidance provided during consultation with Cessnock City Council and AusGrid.

2. PROPOSED DEVELOPMENT

Earthconnect Pty Ltd, on behalf of the Schwartz Family Company, is assisting gaining the approval for the delivery of a 5 MW Solar Farm project upon Lot 5 DP 1048155 (hereafter referred to as the Subject Land) at 66 Wills Hill Road in Lovedale New South Wales.

2.1 INFRASTRUCTURE

The proposed Solar Farm consists of the following key elements:

- Solar array area.
- Inverters and battery bank.
- Control room.
- Overhead power connection to the public network.
- Ausgrid Point of Attachment Yard at the connection to the public network.
- Vehicle access, construction compound and laydown areas.

See **Figure 4** for the location of the key infrastructure elements within the Subject Land.

2.1.1 Solar Array Area

The proposed solar array will consist of solar panels arranged in east-west rows directed to the north covering an area of approximately 6.5 hectares. The panels will be erected on a pile driven type foundation similar to that shown by in **Figure 2** below.

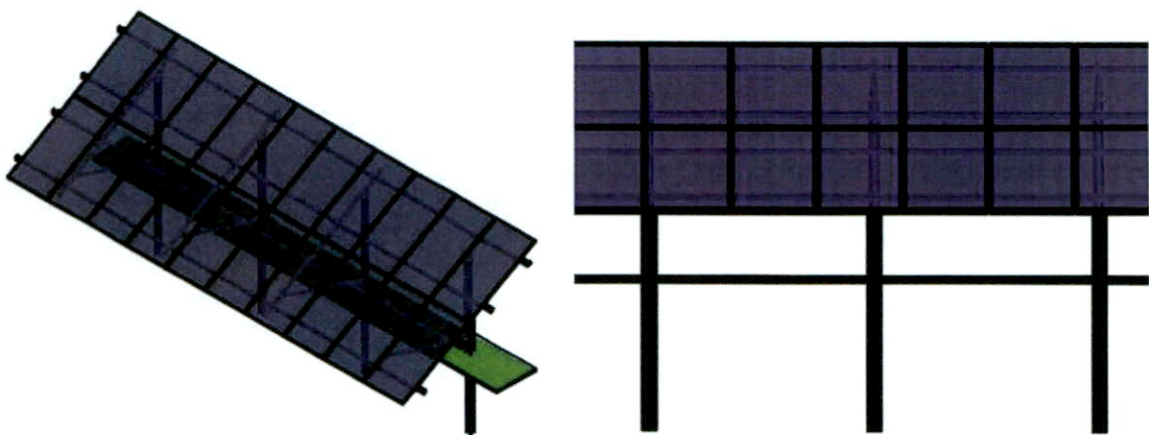


Figure 2: Indicative solar panel design (Schletter Australia Pty Ltd)

A summary of the indicative design of the solar panel array is shown in **Table 1**. The panels are non reflective to minimise glare. The panels are not designed to track solar paths as such no motorised components exist within the array area.

Table 1: Indicative design of proposed solar panel array

Design	Dimension
Row width	3.8 m
Gap between rows	6 m
Individual panel dimension	2 m x 1 m
Gap between panels – same row	0.02 m
Height - high side	2.8 - 3 m
Height – low side	0.8 - 1 m

Power from the panels will be conveyed through both above ground cabling attached to the panels and within subsurface trenching through to one of two inverters located on the western side of the array.

2.1.2 Inverters and battery bank

The Inverters will convert the power from a direct current (DC) to an alternating current (AC) to enable connection to the mains power network. The inverters are contained within 6 m shipping containers, **Figure 3** illustrates the form of the inverters with access panels open. The inverters will be installed on elevated piers at a height of approximately 2 m (approximately 4.5m total height) within the fenced solar farm boundary (**Figure 4**). Dimensions of the two solar inverters are shown in **Table 2**. The inverters will be painted in a natural Colourbond (or similar) colour.

Table 2: Solar inverter dimensions

Dimension	Inverter
Height	2.6 m (+2 m elevation)
Length	6.1 m
Width	2.4 m

The inverted power will be transferred through subsurface cabling to the Control Room before being transferred to an overhead power line through to the point of attachment and the mains network. A Battery Bank of similar size and colour to the Inverters may be required to assist in the smooth delivery of AC current into the network.

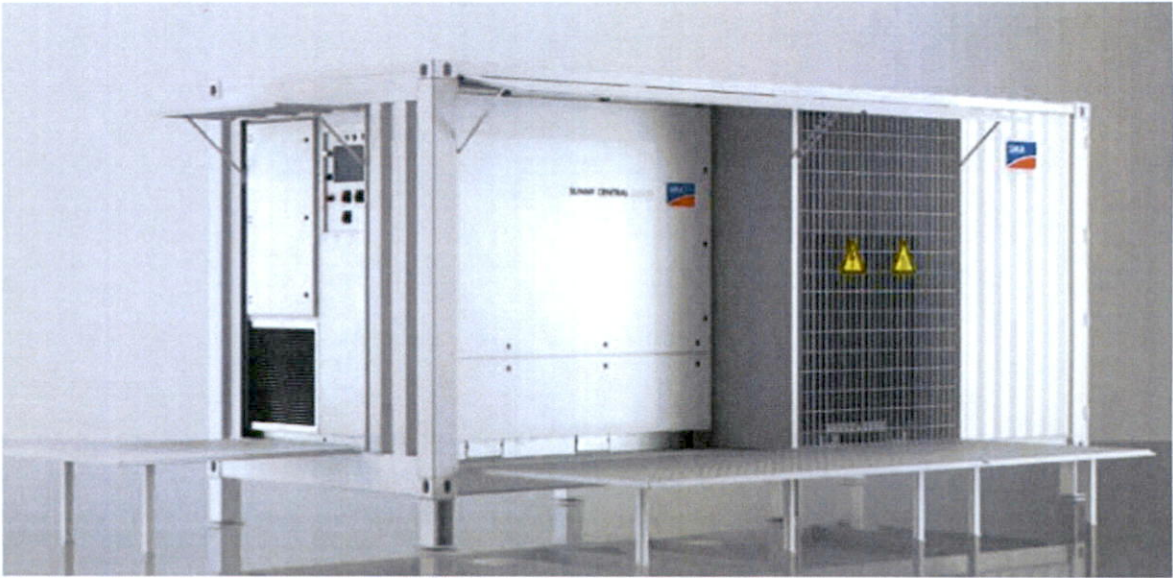


Figure 3: Example of Inverter with open panels (not coloured as proposed)

2.1.3 Control Room / Site Office

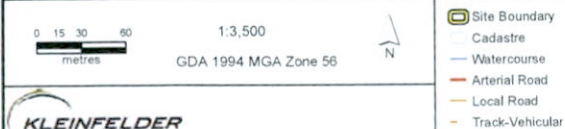
A 7m x 5m x 3-5 m (length, width, height) site control room is to be constructed along the north western boundary of the solar farm as shown in **Figure 4**. The Control Room will include equipment necessary to manage the transfer of power to the mains network, with provision of work areas for onsite technicians for maintenance and operational activities.

It is proposed to construct the Control Room from concrete block / panel walls with corrugated iron roofing. Verandahs will be erected on the western and eastern facades to provide a more rural looking building. The control room will be painted in Colourbond (or similar) colours consistent with rural dwellings in the area. An indicative section of the control room is provided in **Figure 5**.

A 22,500 L water tank will be located adjacent to the control room to collect roof runoff and provide an onsite water supply for cleaning solar panels and potential bushfire suppression.



- Solar Farm Design**
- Riparian Planting
 - Site Office, Cub and Toilets
 - Control Room
 - Equipment Drop Off Area
 - Battery Bank
 - Inverter
 - Point of Attachment
 - Gravel car parks
 - Gravel access road
 - Maintenance of existing access road
 - Trenching Area
 - Solar panel area
 - Easement - 10m
 - 22,500L Water Tank
 - 10m High Golf Ball Screening Net
 - Existing O/H
 - New O/H
 - ✕ Perimeter Fencing
 - ✕ Proposed Vegetation Screens - Dominant Species Listed
 - *Casuarina glauca* (Swamp Oak)
 - *Eucalyptus tereticornis* (Forest Red Gum)



PROJECT REFERENCE: 20182251

DATE DRAWN: 4/01/2018 09:55 (am) [Signature]

DRAWN BY: [Signature]

DATA SOURCE:
Nashville - 2017
DPSI - 2017

Proposed Solar Farm Design

Earthconnect
Statement of Environmental Effects
Lovedale Solar Farm
Wills Hill Rd, Cessnock NSW

FIGURE
4

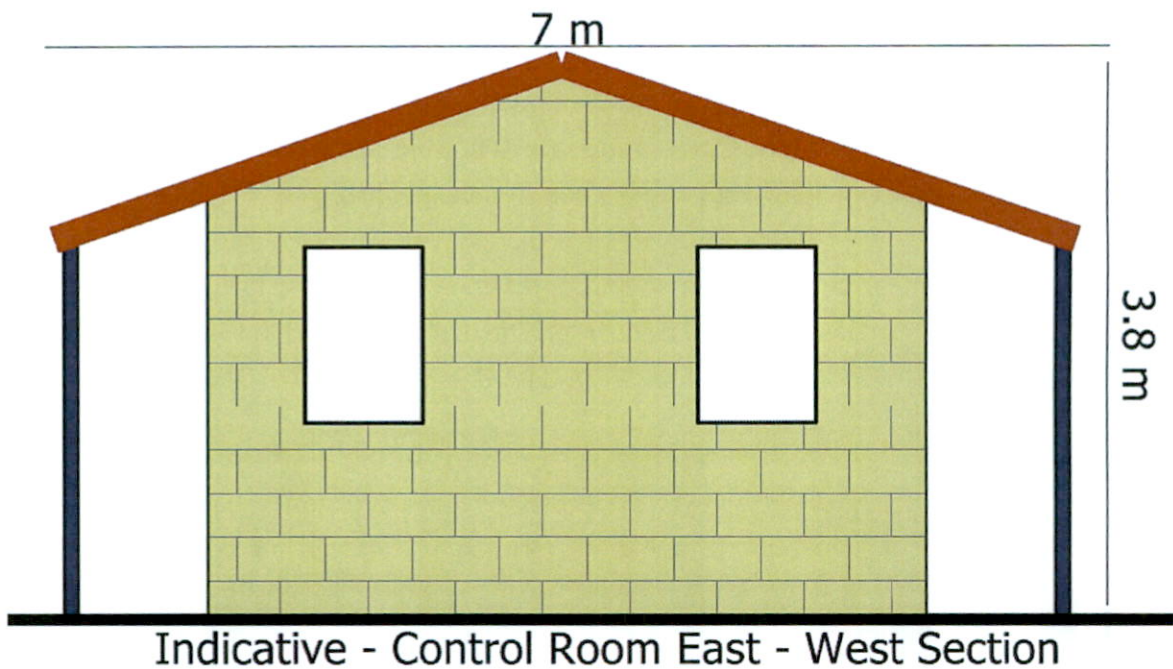


Figure 5: Indicative control room section

2.1.4 Overhead Lines and Point of Attachment

A new overhead line will be constructed to transfer the power from the Control Room north west to the Ausgrid Point of Attachment located on an existing overhead powerline.

The Point of Attachment design will be subject to Ausgrid and may be yard or pole based. The Point of Attachment provides for the safe and uniform transfer of power into the mains network.

The existing overhead powerline may require some maintenance and improvement to ensure the current required specifications are achieved. A 10 m wide easement will be maintained on both new and existing overhead powerlines through to the property boundary on Wills Hill Road. The overhead network from this point will become the responsibility of Ausgrid.

The overhead powerline easements within the Subject Land as shown on **Figure 4**.

2.1.5 Site Access

2.1.5.1 Internal Access

No formal access roads within the solar array area are proposed. Access throughout the array will be via traversing managed grasslands using the 10 m wide perimeter buffer (5 m on the southern boundary) and within 6 m wide breaks between panel rows.

As the array covers three shallow north-south depressions that appear to be intermittently water logged, gravel crossings may be installed within the depressions in the event of extended wet weather and the need for maintenance. Under recent climatic conditions, access is typically unconstrained.

2.1.5.2 External Access

Access to the Subject Land is via Wine Country Drive and Wills Hill Rd. An existing gravel access road within the Subject Land will be maintained and connect to a new gravel access road to the Solar Array area. The access road will have a turning head and provision of laydown areas along the road shoulder to facilitate construction related deliveries. A car park for the provision of three maintenance vehicles is included adjacent to the control room (See **Figure 4**).

Parking during construction will be limited to the solar farm perimeter and the sides of the access road.

2.1.6 Driving Range

Immediately south east of the proposed array area is a private golf driving range (owned by the same land owner). To limit the potential for golf ball strike of the panel array area a 10 m high screen is proposed to be constructed along the common boundary. See **Figure 4** for the location of the driving range within the Subject Land and proposed screen.

2.1.7 Fencing and Security

Fencing of the perimeter of the Subject Land will remain as rural style fencing. It is proposed preferably maintain a rural style perimeter fence around the Solar Farm assets, given the limited potential interaction with the general public. However, if specified by AusGrid a 1.8m security style fence may be required to ensure no unauthorised access.

2.1.8 Colours and Finishes

Adopted colours for all painted surfaces are to be of natural tones to compliment the rural landscape.

2.1.9 Landscaping

Landscaping for the development is illustrated within will include the following key elements:

- Infill planting between existing remnant and regenerating vegetation to create visual screens that include the following:
 - o One Forest Red Gum screen to minimise visibility from the north.
 - o One Forest Red Gum screen to minimise visibility from Wills Hill Road and adjacent dwelling.
 - o One Forest Red Gum screen to minimise visibility from the agriculture structure and silos on the same property north of the proposed solar array.
 - o Two areas of infill planting of Swamp Oak along the western bank of Black Creek to minimise visibility from the north east.
- Revegetation of a 10 m wide approximately 60 m long riparian corridor along the 1st order drainage line on the northern side of the Solar Array area. Plantings within this area will be native ground cover and shrub species consistent with adjacent vegetation communities. No canopy species will be planted within this area so as to avoid shading of the panel area.
- Grasslands within the solar farm complex will be managed through routine mowing to prevent the build-up of flammable materials. A grass surface is expected to be maintained throughout the solar panel array area. See **Photograph 1** of the Royalla Solar Farm near Canberra that demonstrates grass cover is adequately maintained within an operating solar farm.
- The 10 m strip around the perimeter of the fenced area will be routinely slashed and or trimming of vegetation to limit vegetation heights to less than 10 m. This will minimise fuel loads and limit regrowth that may reduce the panel efficiency.





Photograph 1: Solar panel array at the Royalla Solar Farm in Canberra demonstrating the grass cover achievable within array areas.

2.1.10 Employment and Usage

The proposed solar farm will effectively operate on 24 hours per day, 7 days per week, while of course generating power during daylight hours. Public access to the site will not be permitted. Site access will be restricted to site personnel and inducted contractors where required.

Operation and maintenance of the solar farm will involve the following personnel:

- Two part-time staff onsite for operations and monitoring of the solar arrays.
- Six part-time maintenance staff.

Operational maintenance will typically be undertaken during standard business hours:

- Monday to Friday 7.00am to 6.00pm.
- Saturday 8.00am to 1.00pm.

With exception to emergency circumstances where maintenance activities may be conducted outside that period.

2.2 UTILITIES AND SERVICES

2.2.1 Water

A 22,500 L water tank will be installed onsite for maintenance of the solar farm, use by site personnel for cleaning solar panels and to aid in emergency bushfire management.

2.2.2 Stormwater

The proposed solar farm will not result in any significant changes to the topography of the Subject Land. Grassed swales along gravel roads will be utilised as necessary to control runoff, with a rainwater tank connected to the control room building.

As the solar panels do not directly cover the soil, any temporary concentration of runoff on the panels is able to infiltrate throughout the solar array area. The relatively level existing topography of the area ensures runoff from the site does not flow directly to Black Creek but via overland flows into a first order drainage line to the north of the array area.

2.2.3 Effluent

No permanent toilet facilities are to be constructed as part of the proposed solar farm. Portable ablutions are to be used during construction and will be removed from site at the completion of construction.

2.2.4 Electricity and Telecommunication Services

The Subject Land is serviced by the Telstra 4G network. No formal telecommunication service connections are proposed as part of the current solar farm design.

The proposed solar farm is designed to produce up to 5 MW of electricity to be transmitted back to the local energy grid.

2.2.5 Bushfire and Fire-fighting systems

The 22,500 L water tank located onsite will aid in emergency bushfire management. Road widths and the cul-de-sac have been designed to allow emergency access for fire fighting

vehicles during an emergency. A 6 m spacing between panels will provide enough spacing for access of emergency vehicles within the solar farm while a 10m separation distance between the solar array and boundary fence will provide both defensible space and perimeter access around the solar farm array. Grasslands within the solar farm boundary are to be managed to prevent the accumulation of fuels potentially increasing the intensity of bushfire / grassfire within the locality.

2.3 CONSTRUCTION

Construction of the Solar Farm is anticipated to take in the order of 5-6 months.

2.3.1 Construction Hours

Site preparation and construction will occur consistent with the Interim Construction Noise Guideline (NSW EPA) being:

- Monday to Friday 7.00am to 6.00pm.
- Saturday 8.00am to 1.00pm.
- No work on Sundays or public holidays, without prior approval from Cessnock City Council.

2.3.2 Construction Areas

Construction will include the following key areas:

- Laydown areas for placement of 12 m shipping containers used for the transport and storage of materials along the edge of the access road. These areas will require minimal preparation, other than basic grading to remove any significant undulation.
- Portable site office, crib huts and toilet facilities located within the construction compound area.
- Within the construction compound, a temporary builders' structure may be erected to enable construction to occur under cover.

All temporary structures will be consistent with the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* and will be removed on completion of construction.

2.3.3 Traffic and Access

Table 3 provides an estimate of construction vehicles required during construction. Heavy vehicle deliveries will general occur near the start of each activity, and as such will be effectively staged over the construction period. It is intended that heavy vehicles, will primarily deliver 12 m shipping containers to site that provide dry and secure storage of materials.

Access to the site will be via Wine Country Drive and the southern end of Wills Hill Road through to the existing site entry.

Prior to the commencement of construction, a Traffic Management Plan will be prepared to ensure vehicle access and egress to the site is undertaken in a safe manner without undue delay to the local road network.

Table 3: Estimated vehicle trips (one way) required during construction

Activity	Estimated Heavy Vehicle	Estimated Light Vehicles
Site preparation	3 only	3 daily
Pylons and racking	3 only	Up to 25 daily
Control room	3 only	
Solar Panels	18 only	
Inverters and battery	2 only	
Cabling and poles	2 only	
Other deliveries	Up to 2 per week	

2.3.4 Construction Personnel

During construction there will typically be up to 10 contractors working onsite at anyone time, with up to 30 different contractors (e.g. 10 civil, 10 in construction, 10 in electrical) employed over the duration of construction. It is unlikely that any more than 20 contractors would be employed onsite at any one time.

2.3.5 Site Preparation

As the site is relatively level already, the site will require minimal site preparation, however the following earthworks are likely to be required:

- Grading for the access road and construction compound.
- Minor levelling for the construction of the control room.
- Minor grading and levelling of divots and undulations within the solar array area, while maintaining the existing topography (see **Photograph 1**).

- Trenching for installation of electrical cabling.
- Excavation associated with the installation of overhead power poles and piers for the solar inverters.
- The solar panels are rack mounted on driven pylons and as such will not require excavation. The installation of the pylons will occur over an estimated 3 - 4 weeks of pile driving of the uprights into the ground.

Panels will be attached to the pylons above ground and will not require excavation of the ground surface with exception to subsurface cable trenching.

Erosion and sediment controls will be in accordance with an *Erosion and Sediment Control Plan* prepared prior to construction of the proposed solar farm. An indicative erosion and sediment control plan is included as **Figure 7** showing the anticipated extent of controls required given the limited disturbance extent.

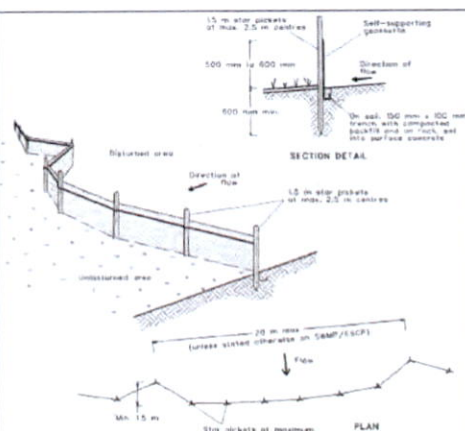
2.4 ANALYSIS OF ALTERNATIVES

Kleinfelder conducted a constraints analysis of the land prior to the current design being chosen. The constraints analysis was able to identify the required boundary setbacks, remnant vegetation, riparian corridors, habitat trees and past land uses and possible heritage values of the Subject Land. The current design was developed to minimise disturbance to the majority of these features.

2.4.1 Form

With consideration to capital expenditure fixed panels as opposed to solar tracking panels were adopted. However, for this site the fixed panels will also result in less soil disturbance and grading, less operational maintenance and no noise source during operation.

The orientation and height of the solar panels has been designed to optimise the potential for solar generation and enable maintenance of the ground cover.



Construction Notes

- Construct sediment fences as close as possible to being parallel to the contours of the site. But with small setbacks as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
- Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
- Drive 1.5 metres along star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are filled with safety caps.
- Fit self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fit the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
- Join sections of fabric at a support post with a 150-mm overlap.
- Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE

SD 6-8

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representation or warranty, express or implied, as to accuracy, completeness, timeliness, or value of the information. This document is not intended for use as a legal instrument or as a design or construction document. The use or reliance on the information contained on this graphic representation is at the sole risk of the user relying on or misusing the information.

0 15 30 60
metres
1:3,500
GDA 1994 MGA Zone 56

KLEINFELDER
Design People. Right Solutions.
www.kleinfelder.com

Site Boundary
Cadastral
Installation of Sediment Fence
Watercourse
Arterial Road
Local Road
Track-Vehicular

PROJECT REFERENCE: 20142251
DATE DRAWN: 4/01/2018 11:27, Version 1
DRAWN BY: SCHINE
DATA SOURCE:
Newman - 2017
08/01/2017
Landscape 2008, Managing Urban Development
Soils and Construction, NSW Government
Schine, 10/01/2017 10:00:00

Erosion and Sediment Controls

Earthconnect
Statement of Environmental Effects
Lovedale Solar Farm
Wills Hill Rd, Cessnock NSW

FIGURE

7

Changes in design to the installation of solar panels may decrease the amount of solar radiation transmitted by the panels, therefore reducing the potential capacity of the solar farm to produce electricity.

Solar panels will face in a northerly direction, away from potential receivers to the south. This design has been proposed to increase the potential for solar generation, however a significant benefit to this design is that properties to the south who may be able to see the solar will not be facing towards the solar panel array.

2.4.2 Location

The proposed solar farm is located within grassed fields to the northeast of the Subject Land. Several siting options were investigated as part of the CA, with the presence of EEC vegetation and potential fauna habitat limiting the feasibility of applying assessed alternative locations. As such, it is considered that the proposed solar farm has been sited in the location with the least possible environmental impacts within the Subject Land. Relocating the solar farm may increase environmental impacts from the construction of the solar farm through the removal of EEC vegetation and potential fauna habitat.

2.4.3 No Development Alternative

Irrespective of the proposed development, the Subject Land is likely to be subject to development of some form in the future. At this point, only development permissible in the zone may occur on the land, however this does not preclude future applications by others for the rezoning of the land (e.g. to permit residential, industrial or commercial development).

The proposed solar farm will involve the generation of 5 MW of 'clean' energy to be added to the local power supply. The implementation of 'clean' energy resources will mitigate prescribed impacts through anthropological enforced climate change. If the proposed development is not constructed, this potential source of 'clean' energy will not be realised, and conventional energy sources (i.e coal) will continue to generate the 5 MW of power attributed to the proposed development.

The no development alternative will result in the following consequences:

- No economic benefit from construction.
- No economic / environmental benefit from the generation of 5 MW of 'clean' energy.

- Land would remain in its current state and land use.
- Failure to realise a more productive use of the land.
- Maintain existing scenic value of the area, no potential for visual impacts to surrounding land uses.

3. SITE ANALYSIS

3.1 PROPERTY OWNERSHIP

The Subject Land is owned by the Schwartz Family Company.

The Subject Land has an area of 41.06 hectares (ha) and is bounded by lands cleared for grazing to the northwest, Black Creek to the northeast and east, viticulture and Hunter Valley Golf & Country Club to the south and Wills Hill Rd to the west.

Lot 1 DP 1073823 (Crowne Plaza Hunter Valley), Lot 111 DP 863781 and Lot 3 DP 1073823 (Hunter Valley Golf & Country Club), located south of the Subject Land, along with Lot 4 DP 1048155 (cleared fields), located north-west of the Subject Land are all also owned by Schwartz Family Company. (**Figure 8**).

3.2 SITE DESCRIPTION

The Subject Land has been previously cleared for agriculture (primarily grazing), containing a mixture of remnant forest vegetation, regrowth forest vegetation, exotic and native grasslands.

Historically, it is understood that the property contained a milking dairy and was used for grazing and wheat, there is little evidence of any vines having being planted on the Subject Land. It is apparent from aerial imagery and topography that the lower portion of the Subject Land (and area of proposed solar array) may have been used for cropping at some point in the past, the area is now partly used for The Hunter Golf Academy – Private Tuition Range and grazing.

Current infrastructure on the Subject Land includes:

- Perimeter fencing, with an additional fence generally in the area of the proposed location of the solar farm.
- A sheet metal barn with two attached concrete silos (see **Section 3.9.2**).
- A shipping container storage area.
- Gravel access tracks.
- Two, overhead power lines, one in a north-easterly alignment, and a secondary in a southerly alignment supplying power to a pump infrastructure on the adjacent properties dam.



Photograph 2: Existing site access to the Subject Land



Photograph 3: Looking south west along the existing overhead line and access road from the area of the point of attachment



Photograph 4: Looking south east along the approximate alignment of the proposed access road toward the control room and solar array in the background



Photograph 5: Looking north along the eastern boundary of the proposed solar array, Black Creek on right of shot, the shed and silo on back left



Photograph 6: Looking east along the southern boundary of the proposed solar array and the driving range



Photograph 7: Looking north along the sedges located with the shallow depressions that drain to the first order tributary



Photograph 8: Isolated Forest Redgum proposed to be removed on the western side of the proposed solar array, taken from the approximate location of the control room



Photograph 9: Looking north across the proposed solar array toward the shed and silo

3.3 SURROUNDING LAND USE

Surrounding land uses include viticulture, tourism, rural dwellings, and livestock grazing. See **Figure 8** for an illustration of land uses within the locality of the proposed solar farm.

Land use surrounding the site including several well known tourist destinations amongst other land uses are listed in **Table 4**. The Schwartz Family Company, the proponent of the proposed solar farm, owns highlighted properties.

Table 4: Land use surrounding the proposed solar farm

Bearing	Adjacent Land Use	Properties in Locality
North	- Glenmore (grazing). - Carabola (grazing).	- Weronga - Peacock Hill Vineyard. - Daisy Hill. - Hunter Valley Air Balloon. - Lillian's on Lovedale. - Rosedale Estate. - Dandaloo Cottages. - Cracklewood Country Accommodation. - Several large-lot residences.
South	- Hunter Golf Academy – Private Tuition Range (located within Subject Land). - Crowne Plaza Vineyard. - Hunter Valley Golf Course.	- Davlea. - Allandale. - Lovedale Riding Academy. - Brycefield Homestead. - Myrtle Grove. - Dawson Estate - Rothbury RFB - Baulkham - Glen Dean - Capercaillie. - Crowne Plaza Hunter Valley. - Hunter Valley Visitor Centre. - Cessnock Airport. - Cessnock District RFS Headquarters - Magio - Large-lot residences.
East	- Black Creek - Vegetated Wildlife Sanctuary. - Carabola (grazing).	- Vineyard Hill Resort. - Balloon Safaris. - Balloon Aloft. - Jeanfield. - Allandale Pastoral Company. - Wingfield. - Large-lot residences.

Bearing	Adjacent Land Use	Properties in Locality
West	- Wills Hill Road. - DeBortoli Wines (cellar door and vineyard).	- Peterson House. - Restaurant Cuvee. - Hungerford Hill Wines. - Petersons Wines Broke Road. - Lambloch Estate. - Wombat Cottage. - Lakes Folly Vineyard. - Hunter Valley Chocolate Company. - The Dairy Cottage. - Large-lot residences.

3.3.1 Comment in relation to the Development

The proposed development is located such that it will not affect the ability of adjacent properties to utilise the land for permitted land uses.

The proposed use of the land for a solar farm further diversifies land use within the area, using the available natural resources (sun) to produce electricity within a market not influenced by tourism or wine sales (of which vineyards, golf courses and accommodation are all influenced by changes in these markets).

Current design plans include the provision for installation of glare resistant panels to reduce potential glare to surrounding properties. Vegetation screens designed to filter views of the solar farm from neighbouring properties will be planted generally as per **Figure 4**. The location of vegetation screens has been determined via an inspection of the site and surrounds on 3 November 2017.

The effects of the potential influence of the solar farm on the Cessnock Airport have been taken into consideration through discussions with CASA and investigations of panel installations surrounding other airports (see **Section 4.6.5.10**). It is concluded that it is highly unlikely that glare from the panels would affect the airport operations.

While located on the same property, a 100m long, 10m high screening net will be installed along the southern boundary of the solar array to enable the Hunter Golf Academy – Private Tuition Range to continue operating with reduced potential for damage to solar panels from golf balls (**Figure 4**).



0 55 110 220 metres 1:12,500 GDA 1994 MGA Zone 56 KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com	Site Boundary Lots owned by proponent Proposed Solar Farm Boundary Construction Footprint Cadastre Watercourse Arterial Road Local Road Path Track-Vehicular Neighbouring Properties	Photo Montage Locations View 1 View 2 View 3 View 4	PROJECT REFERENCE: 20182251 DATE DRAWN: 4/01/2018 17:53 Version 1 DRAWN BY: ECKINE DATA SOURCE: NABARD: 2011 DPST: 2011	Surrounding Land Use Earthconnect Statement of Environmental Effects Lovedale Solar Farm Wills Hill Rd, Cessnock NSW	FIGURE: 8
--	---	---	--	---	--------------------------------

3.4 CLIMATE

The climate of the Cessnock LGA is characterised by warm, wet summers with cool, dry winters, with summer temperatures often exceeding 30°C and winter temperatures falling below 5°C. Climate statistics from Cessnock Airport AWS, located approximately 1 km southwest of the Subject Land, are illustrated in **Table 5** (Bureau of Meteorology, 2017).

Table 5: Long-term climate data from Cessnock Airport AWS

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Temperature °C													
Mean max	30.1	29.2	27.3	24.1	20.7	17.9	17.4	19.5	22.6	25.3	26.9	28.9	24.2
Mean min	16.9	16.9	14.7	10.5	7.5	5.8	4.1	4.5	7.0	9.7	13.0	15.0	10.5
Rainfall (mm)													
Mean rainfall	81.2	97.8	72.6	57.7	41.0	58.3	28.1	33.7	44.1	51.1	74.4	80.3	743.3
Rain days	6.4	7.8	7.3	5.8	5.1	5.5	4.0	4.4	5.5	6.6	7.4	7.1	72.9
9 am Conditions													
Rel humidity %	68	76	80	76	79	80	76	69	63	60	65	65	71
Wind speed kph	11.5	10.2	8.7	10.1	10.4	11.5	11.5	13.0	14.0	13.7	12.7	11.8	11.6
3 pm Conditions													
Rel humidity %	46	53	53	52	54	55	49	42	42	44	47	46	49
Wind speed kph	18.5	17.3	15.7	14.6	14.2	15.1	15.3	17.3	19.1	18.7	18.6	18.3	16.9

Both morning (9am) and afternoon (3pm) wind patterns are dominated by southern and south-eastern vectors during warmer months of the year (November – March) with a shift to dominance of north-western vectors during cooler months of the year (April – October). Afternoon (3pm) (Bureau of Meteorology 2017).

3.4.1 Comment in relation to the Development

Climate is of obvious importance to the output of the solar panels, but has limited otherwise effect on the operation of the solar farm.

During construction, the north-west / south east wind vectors may influence the received noise at surrounding properties (refer to **Section 3.10**).

With respect to potential spray drift from adjoining vineyards, the solar farm is located >150 m from the nearest vineyard to the southwest (owned by the proponent) and as such is unlikely to affect the operation of the panels (e.g. spray drift) especially on account of the prevailing winds. Other vineyards not controlled by the proponent are in excess of 600m from the panels and likewise would be affected.

3.5 SOILS AND AGRICULTURE

The Subject Land is located within the Branxton Soil Landscape, containing Yellow Podzolic Soils along midslopes, Red Podzolic Soils at higher elevations and Yellow Soloths along lower slopes and along drainage lines. Some creeklines within the Branxton Soil Landscape contain alluvial soils, with some occurrences of acidic soils throughout the landscape (Kovac and Laurie 1991).

The Subject Land is not mapped as containing Acid Sulfate Soils under CLEP.

A geotechnical investigation report has been completed over the site by Valley Civillab Pty Ltd (2017). The investigation included 38 boreholes across the site to depths of up to 3.0 m. The site was characterised by the following soils:

- Surface soils comprising a mixture of silty sands, sandy silts and silty clays or silty clayey sands to depths ranging from surface to 0.5 m, typically coloured pale brown to grey.
- Subsoils comprising silty clayey sands coloured grey or brown with orange and/or red weathering (typical of soils with low drainage).

Soil pH in the upper 1 m (typically measured from 0.2 – 0.8 m depth) was typically acidic ranging from 5.7 to 6.9, with some areas exhibiting alkaline conditions to a pH of 7.9. Soil conductivity ranged from 3.3 dS/m to 0.16 dS/m with a median conductivity of 0.7 dS/m or a medium soil salinity.

3.5.1 Viticulture

The entire suburbs of Lovedale and Rothbury are mapped within the Upper Hunter Strategic Regional Land Use Plan as Strategic Agricultural Land – Viticulture Critical Industry Cluster. It is important to note that this reflects the need to consider the effect on viticulture as opposed to the land being mapped as suitable for viticulture.

Historical land use of the property does not appear to have included viticulture on the Subject Land, with dairy farming, grazing and at some point wheat being cropped. The current land use is now predominantly grazing.

Prime viticultural soils are generally taken to be well drained with good aeration and adequate nutrition. Native sedges grow within the depressions on the site, these sedges suggest that drainage is limited in some areas, which is supported by the clayey subsoils and colouring of orange/ red and grey which is typical of poorly drained soils. Soil testing also suggests the site would generally be considered to be at the higher limit of salinity for salt sensitive grape varieties and would typically require saline tolerant rootstocks to be successful.

Land located on a similar landscape (adjacent to Black Creek) to the south was previously planted with grapes. These grapes were removed after 2005 with the expansion of the Crowne Plaza and the golf course. Topographically higher areas were retained for grape production. Similar observations can be made in several locations along Black Creek, where vineyards that were present in 2004 have now been removed, with the retention of topographically higher lands further from Black Creek.

The above observations on soil conditions and past viticulture on similar landscapes suggest that the area for the proposed solar array could be used for viticulture, however, it is unlikely to be prime viticultural soils that would enable a long term commercially viable vineyard to be established.

Notwithstanding the limited viticultural suitability, as the solar panels do not require substantial modification to the landscape, the panels could be removed and vines established should viticulture be preferred in this location at some time in the future.

3.6 TOPOGRAPHY AND HYDROLOGY

The topography and drainage of the Subject Land is illustrated in **Figure 9**. The elevation on the site ranges from approximately 46 m Australian Height Datum (AHD) on Black Creek along the eastern boundary through to 58 m AHD on Wills Hill Road on the western boundary. The Subject Land drains generally in a north to north easterly direction through shallow depressions meeting two first order drainage lines that then flow into Black Creek.

Within the solar array area there are several sub-catchments that drain to the north over an elevation change of less than 1.5 m via shallow depressions at gradients of 0.05 to 0.25 %. The low gradient results in sedge growth through parts of these depressions. The western sub-catchments include flows from the neighbouring golf course and vineyards area, while the eastern sub-catchments are contained within the Subject Land. The solar array area does not drain directly into Black Creek, as shown on **Figure 9** and **Figure 10** the bank of Black Creek is elevated resulting in surface runoff flowing north west to a first order tributary.

The solar array area has been positioned such that there is approximately 16 m from the trenching and the solar arrays to the bank of the first order drainage, and over 35 m from the array to the bank of Black Creek (or over 50 m to the centre of Black Creek).

Black Creek is incised 5-6 m adjacent to the site within a bank to bank channel width of approximately 35 m. Black Creek flows from south to north passing through the suburbs of Rothbury, North Rothbury and Branxton before converging with the Hunter River.

Flooding heights on the Subject Land are unknown. The nearest known calculated 1 in 100 year flood height is 55.6 m at Lovedale Road (Cardno, 2016) approximately 2300 m upstream of the site's first order tributary. At Lovedale Road, the channel dimensions are similar to those adjacent to the site. Extrapolation of flooding or bed gradients downstream equate to an expected flood level range between 51.5 m AHD and 53 m AHD. Topographically these elevations correlate with changes in slope and historical building locations on the site. The silos are located at an elevation of 52 m AHD. At the anticipated heights, flooding onsite is more likely to be slower moving back water flooding from the first order tributaries, as opposed to high velocity flows.

3.6.1 Comment in relation to the Development

The proposed development will not result in any significant modification of the existing topography or drainage patterns on the Subject Land. While panels may result in temporary concentration, there is minimal additional impervious surfaces due to the solar array, allowing water to infiltrate after leaving panels in the 5-6 m spacing between rows (and under the subsequent row) on the near flat ground surface.

With respect to flood risk, the following precautions have been incorporated into the design:

- Low side of solar panels 0.8 m above ground (51.6m AHD to 53.2m AHD).
- Rack cabling, where not buried, is approximately 2 m above ground level (52.8 m to 54.4 m).
- Solar inverters and the battery bank will be elevated approximately 2 m above current ground level to approximately 53.6 m AHD.
- The concrete constructed control room will have a floor elevation of approximately 52 m AHD, with internal equipment positioned a minimum of 1m above floor level.
- The point of attachment to the public network is located at an elevation of 53.4 m AHD.

During construction, suitable erosion and sediment controls will be applied to prevent run-off of sediment from the construction area entering the 1st order tributary of Black Creek.

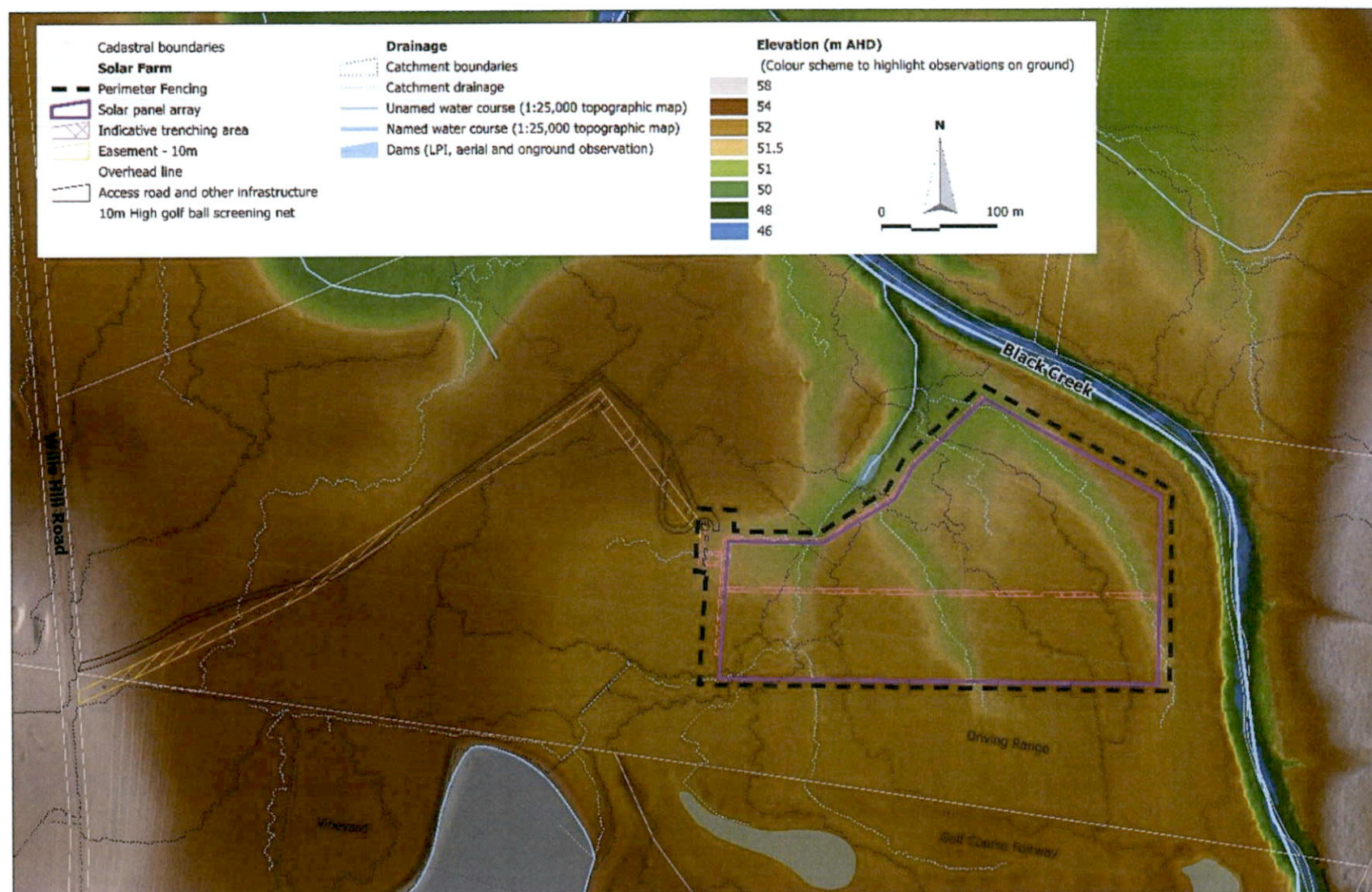


Figure 9: Topography and drainage of the Subject Land

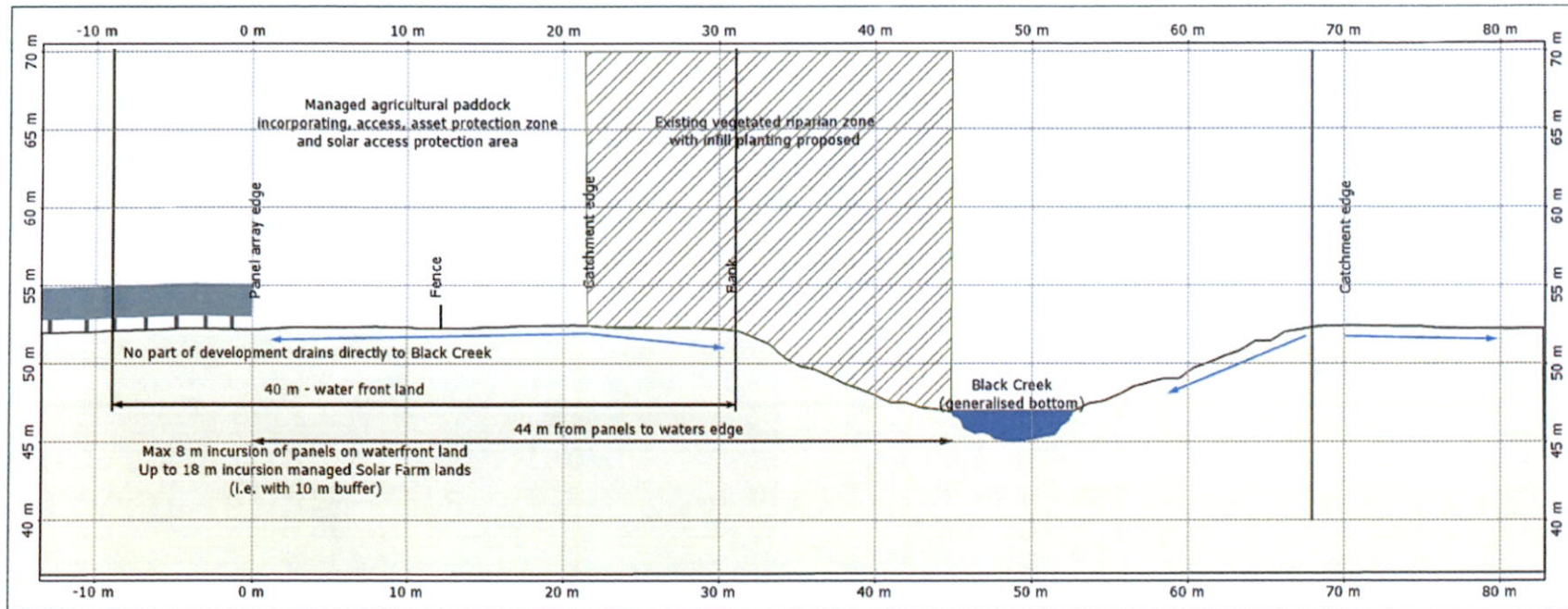


Figure 10: Section of the proposed development in relation to Black Creek at the nearest point.

3.7 ACCESS AND ROAD NETWORK

The Subject Land is situated on the eastern side of Wills Hill Road, approximately 700 m north-east of the Wine Country Drive, Wills Hill Road intersection. There are no turning lanes at the Wills Hill Rd, Wine Country Drive intersection. Egress from the site is controlled by 'Give Way' markings at the Wills Hill Rd, Wine Country Dr intersection, with clear visibility along Wine Country Drive as shown in **Photograph 10**. Visibility is good in both directions.

Access to the Subject Land is provided along Wills Hill Rd, a 5 m wide gravel road with two 8 m wide passing bays (**Photograph 11**). Two vehicular tracks are maintained within the Subject Land to facilitate access to the private golf range and buildings on site:

- **Primary Access:** located to the southwest of the property, connected to Wills Hill Rd to the east (**Photograph 12**).
- **Secondary Access:** allows access to the Subject Land from Lot 111 DP 863781 (used for viticulture) and Lot 3 DP 1073823 (Golf Course for Crowne Plaza Hunter Valley) and is currently used for access to the Driving Range located to the south of the proposed solar farm.



Photograph 10: Wine Country Drive, Wills Hill Road intersection showing line marking, passing and turning lanes



Photograph 11: Facing south along Wills Hill Rd from the entrance to the Subject Land.



Photograph 12: Existing access road within the Subject Land

Access roads within the Subject Land are shown in **Figure 4**.

3.7.1 Comment in relation to the Development

Construction traffic will vary with each phase of development over the 5 - 6 month period of construction. Access to the site via Wine Country Drive and Wills Hill Road is considered adequate for construction purposes with good site visibility and road conditions. However, to ensure the safe and timely access of vehicles to the site, a Traffic Management Plan will be prepared and submitted for approval of Council prior to the commencement of construction.

Operational traffic to the solar farm will be negligible.

Internal access roads will be maintained on a regular basis to ensure a smooth trafficable surface with minimal dust generation. Water carts will be utilised if needed to limit vehicle generated dust during construction. The access road will have a turning head to ensure forward vehicle travel onsite and when leaving the site. A gravel car park for three vehicles will be constructed adjacent to the control room. Along the edge of the constructed access road, 2.5m and 12 m wide parking and equipment drop-off zones will be designated (see **Figure 4**), these areas will not be constructed, though minor levelling of undulations may be required. If necessary, gravel, geofabric or similar foundations may be used to improve footings for containers, this will be removed on completion of construction.

The secondary access road currently utilised by visitors to the Hunter Golf Academy – Private Tuition Range will not be used during the construction or operation of the solar farm.

See **Figure 4** for an outline of construction and maintenance of access as part of current design plans.

3.8 FLORA AND FAUNA

See **Appendix 1** for the Flora and Fauna Impact Assessment prepared by Kleinfelder for the the proposed solar farm.

3.8.1 Vegetation

Two vegetation communities were identified within the Subject Land (study area for the Flora and Fauna Assessment). The proposed project footprint of 8.3 ha is located within the exotic / mixed grassland and is bounded by the Central Hunter Riparian Forest Vegetation. The two variants of each community are described as follows:

- **Central Hunter Riparian Forest Vegetation.** Areas of vegetation within the study area are dominated by *Eucalyptus amplifolia* subsp. *amplifolia* (Cabbage Gum), *Angophora floribunda* (Rough-barked Apple) and *Casuarina glauca* (Swamp Oak) with *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus moluccana* (Grey Box) also occurring along Black Creek. The understorey contains a mixture of native and exotic species, with some areas along Black Creek dominated by exotic species *Cardiospermum grandiflorum* (Balloon Vine) and *Cestrum parqui* (Green Cestrum). A large proportion of this community is classified as re-growth vegetation as defined by the NV Act.
 - o This vegetation community is equivalent to the Central Hunter Riparian Forest (MU13) under the LHCCREMS mapping project (NPWS 2002) and both the Cabbage Gum Floodplain Woodland (13e) and Central Hunter Swamp Oak Forest (MU13a(i)) under the *Vegetation of the Cessnock-Kurri Region* (DECC 2008). The Central Hunter Riparian Forest within the study area is consistent with the *River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* Endangered Ecological Community (EEC) listed under the TSC Act.
- **Managed Grassland.** The study area contains large areas of managed exotic grassland (that is, areas having a greater than 50% cover of exotic species) and areas identified as managed mixed grassland (areas having a mixture of exotic and native grass and herb species). The project is located within this vegetation community.

See **Figure 11** for an outline of vegetation communities within the Subject Land.

3.8.1.1 Comment in relation to the Development

The proposed solar farm has been designed to avoid the EEC and the riparian vegetation along Black Creek and the adjoining tributary. The development area is 8.3 ha and is located within the exotic / mixed grassland. No additional clearing or fragmentation of vegetation will result from the construction of the solar farm. One tree (*E. tereticornis*) will be removed along the western boundary. The tree contains no hollows or significant habitat features.

The development will occur on water front land (40 m from the creek bank), however the design has been adapted to be generally consistent with the recommended vegetated riparian zone (VRZ) for Black Creek and the unnamed first order creek as defined by the *Guidelines for riparian corridors on waterfront land* (NSW Government 2012).

Under the guideline, the 1st order watercourse on the site is afforded a recommended VRZ of 10 m each side of the watercourse. The fenced solar array boundary has been positioned 10m from the bank, with the nearest trench and panel installation occurring 16 to 20 m away respectively. A 60 m long section of riparian plantings are proposed along the nearest and most exposed section of the water course. On this basis, the proposed development is consistent with the guideline.

Black Creek is a 6th order water course and as such has a recommended VRZ of 40 m either side of the watercourse. The fenced boundary of the solar array area has been positioned such that there is approximately 44 m from the array to the water edge on Black Creek (approximately 35 m to the bank and over 50 m to the centre of Black Creek).

Under existing conditions there is a vegetated riparian corridor extending approximately 10 m west of the bank, making a vegetated corridor width of approximately 25m from the waters edge. Beyond that area the land is currently used for agricultural activities. Activities proposed on waterfront land and within the VRZ (40 m from the bank) would be limited to the following key activities:

- Installation of a fence line (not a controlled activity - will not reduce or change water flows or quality and is permitted within the land use zone and not in its own right a work under EP&A Act 1979).
- Maintenance of groundcover within the Solar Farm fenced area through routine slashing (not a controlled activity - will not reduce or change water flows or quality and is permitted within the land use zone and not in its own right a work under EP&A Act 1979).
- Maintenance vegetation (trimming) within 10 m of the fence line to limit trees growing into the solar access area for the panels (e.g. limit vegetation to less than 10 m high). This is not a controlled activity as it will not reduce or change water flows or quality and is permitted within the land use zone and not in its own right a work under EP&A Act 1979).
- Installation of pylons for the solar panels and erection of panels. This constitutes a controlled activity, though will not result in a change in water quality or flows in Black Creek. There is less than 400 m² that is located on water front land.

Two additional plantings of *Casuarina Glauca* with an area of approximately 1,000 m² are proposed along the bank to improve screening and the VRZ.

Direct impacts to vegetation, and flora and fauna species are considered to be minimal provided recommendations provided in **Table 8** (Section 5) of this SEE and Section 5 of **Appendix 1** are implemented.

There is the potential for runoff from vehicles, potential spills, increased waste and the spread of weeds from machinery and equipment that will be used on site pre, post and during construction. The proposed solar farm will not impact upon surface or groundwater hydrology within the study area or the locality. Indirect impacts to vegetation, and flora and fauna species can be managed and are considered to be minimal as long as recommendations provided in **Section 5 of Appendix 1** are implemented.

Results from the Assessment of Significance for the *River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions* EEC concluded that the proposal is unlikely to have a significant impact on this ecological community (**Appendix 1**). Therefore, a Species Impact Statement is not considered necessary.

3.8.2 Fauna Habitat

Both the remnant and regrowth areas of the Central Hunter Riparian Forest Vegetation Community were assessed as having moderate to high fauna habitat value. A total of 21 trees containing hollows three dead stags were identified within this community during the ecological survey (**Figure 11**).

The vegetation along Black Creek also provides additional fauna habitat values to this community. Although this area has a higher level of weed infestation than in the other parts of the study area, it provides an interface between terrestrial and aquatic ecosystems as well as valuable habitat for a variety of fauna. Woody debris and living vegetation provides shelter, feeding and spawning habitat for many native fish, birds, and invertebrates (Oates 2000).

Modified and managed vegetation in the west and north of the study area has low fauna habitat value due to the lack of native tree / midstorey species and foraging resources, and due to the absence of other key habitat features such as fallen timber/logs.

3.8.2.1 Comment in relation to the Development

The proposed solar farm has been designed to not directly impact upon the identified EEC or on any riparian habitat along Black Creek. The subject site (impact area) is 8.3 ha and is positioned solely over the exotic / mixed grassland within the study area with no clearing of potential fauna habitat beyond one *E. tereticornis* that will be removed along the western boundary. The tree contains no hollows or significant habitat features. Direct impacts to vegetation, and flora and fauna species are considered to be minimal as long as recommendations provided in **Table 8 (Section 5)** of this SEE are implemented.

3.8.3 Threatened Species

3.8.3.1 Flora

A total of 63 flora species were recorded during field surveys. No species of flora listed under the *Threatened Species Conservation Act 1995* (TSC Act) and/or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were identified within the study area during survey.

3.8.3.2 Comment in relation to the Development

No flora species listed under the TSC Act or EPBC Act will be impacted through the construction of the proposed solar farm.

3.8.3.3 Fauna

Threatened Species Conservation Act 1995 (NSW)

No species listed under the EPBC Act were identified onsite during surveys. However, 18 threatened fauna species listed under the TSC Act were considered to potentially use identified habitat on the Subject Land. These include: Green and Golden Bell Frog, Giant Burrowing Frog, Dusky Woodswallow, Brown Treecreeper, Swift Parrot, Little Lorikeet, Powerful Owl, Grey-crowned Babbler, Spotted-tailed Quoll, Eastern False Pipistrelle, Little Bentwing-bat, Eastern Bentwing-bat, Eastern Freetail-bat, Yellow-bellied Sheath-tail-bat, Southern Myotis, Yellow-bellied Glider, Squirrel Gilder and Grey-headed Flying-fox.

Environment Protection and Biodiversity Conservation Act 1999 (NSW)

No species listed under the EPBC Act were identified onsite during surveys. However, the following species, listed under the EPBC Act were determined to have habitat within the Subject Land. These include:

- *Lathamus discolor* (Swift Parrot) – listed as Critically Endangered and Migratory under the EPBC Act.
- *Dasyurus maculatus* (Spotted-tailed Quoll) – listed as Endangered under the EPBC Act.
- *Pteropus poliocephalus* (Grey-headed Flying-fox) – listed as Vulnerable under the EPBC Act.
- *Hirundapus caudacutus* (White-throated Needletail) – listed as Migratory under the EPBC Act.

SEPP 44 – Koala Habitat Protection

One feed tree species listed under Schedule 2 of SEPP 44 was identified within the study area. *Eucalyptus tereticornis* does not constitute greater than 15% of the canopy species across the study area and there is a lack of connectivity to any larger patches of vegetation. No signs of koala presence (scats and/or trunk scratches) were identified during survey.

3.8.3.4 Comment in relation to the Development

Threatened Species Conservation Act 1995 (NSW)

An Assessment of Significance was applied to each of the species identified as having potential habitat on the site and concluded that the proposal is unlikely to have a significant impact. Therefore, a Species Impact Statement is not considered necessary.

Environment Protection and Biodiversity Conservation Act 1999 (NSW)

An Assessment of Significance against the EPBC Significant Impact Guidelines was applied to each of the species identified to use potential habitat on the site and concluded that the proposal is unlikely to have a significant impact. A referral to the Commonwealth Minister for the Environment is not considered necessary.

SEPP 44 – Koala Habitat Protection

With the limited connectivity on the Subject Land, it is unlikely that the Koala would use the study area for foraging. As such, it is considered that the proposed solar farm will not impact upon Koala populations that occur in the locality. No further assessment is required.



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representation or warranty, express or implied, as to accuracy, completeness, timeliness, or quality of the use of such information. This document is not intended for use as a land survey product and is not designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the user relying on or misusing the information.

0 12.5 25 50 metres 1:3,000 GDA 1994 MGA Zone 56 KLEINFELDER Sustainable. Right Solutions. www.kleinfelder.com	Site Boundary Cadastral Watercourse Local Road Track-Vehicular Construction Footprint Riparian Planting	Proposed Vegetation Screens - Dominant Species Listed <i>Casuarina glauca</i> (Swamp Oak) <i>Eucalyptus tereticornis</i> (Forest Red Gum)	Vegetation Communities Central Hunter Riparian Forest (Remnant) Central Hunter Riparian Forest (Regrowth) Mixed Grassland Exotic Grassland	Potential Habitat Dead Stag Hollow-bearing Tree Nest	PROJECT REFERENCE: 35182251 DATE DRAWN: 30/10/2018 BY: 15 Version 1 DRAWN BY: B. Kane DATA SOURCE: 2017 DATE: 2017	Ecological Features Earthconnect Statement of Environmental Effects Lovedale Solar Farm Wills Hill Rd, Cessnock NSW
--	---	---	--	--	---	--

FIGURE:

11

3.9 HERITAGE

3.9.1 Aboriginal Heritage

The Subject Land is located in the Mindaribba Local Aboriginal Land Council Boundary.

A search of the Aboriginal Heritage Information System (AHIMS) database showed one listed Aboriginal site recorded within 200m of the Subject Land, while a second using a 50m buffer recorded no Aboriginal sites or places.

Construction of the proposed solar farm and associated infrastructure will not involve the removal of any remnant trees with potential to be a culturally modified.

The proposed solar farm:

- Is within 200m of Black Creek.
- Is not located in a sand dune system.
- Is not located on a ridge top, ridge line or headland.
- Is not located within 200m below or above a cliff face.
- Within 20m of or in a cave, rock shelter or cave mouth.
- Is located on lands that have been disturbed and modified through clearing, grubbing, fencing and cropping.
- The activity involves minimal earth works due to panels being mounted on driven piles.

3.9.1.1 Comment in relation to the Development

The activity will not impact upon any known Aboriginal Heritage and given the limited disturbance from the activity and extensive historical disturbance and modification of the land surface it is considered unlikely that the proposed development will impact upon sites of Aboriginal Heritage.

However, during the construction of the proposed solar farm, work must be stopped and the NSW Office of Environment and Heritage (OEH) must be notified immediately if any skeletal material or suspected Aboriginal artefacts are found. Where verified, and unavoidable, the proponent may then be required to the apply for an AHIP for works to continue. Furthermore,

consistent with the requirements for protection listed under the *National Parks and Wildlife Act 1974* if an object of potential Aboriginal heritage is encountered during site works than works will cease in the immediate vicinity and OEH and the Mindaribba LALC notified accordingly.

3.9.2 European and Landscape Heritage

A search of the Australian Heritage Database for items listed on the National Heritage List and Commonwealth Heritage List found no locations of heritage significance located in the suburbs of Rothbury or Lovedale (Australian Heritage Database 2017; Australian Heritage Database 2017).

Items listed as being of local environmental heritage significance in the local area include:

- Glenmore Cemetery, at 189 Wills Hill Rd (1.2 km north west of Subject Land).
- “Weronga” is shown on the NSW Heritage Database (NSW Office of Environment and Heritage 2017) as an item of local environmental heritage located at 790 Wine Country Drive, Rothbury (approximately 1.7 km north of the Subject Land). The listing notes; *“This place includes a closed road from the Allandale Road across Wills Hill returning to the Allandale Road; the Weronga homestead, (c1900) of timber, with remains of timber gate posts and established garden; farm outbuildings, cattle yards and fences, barn and a second house (c1940). Victorian Italianate style.”*
- Schedule 5 of the CLEP, the Subject Land (66 Wills Hill Road) is listed as ‘Weronga’ and shown within the CLEP maps of being of Landscape Heritage.

It is unclear as to the reasons for the above discrepancy, though appears likely that all of the above listings relate to the former larger property of ‘Glenmore’, where the Subject Land was located on the southern boundary (refer to **Figure 12**). The NSW Heritage Database notes:

The land forms part of a 500 acre grant to John McDonald in 1825. He named the property Glenmore (SHI record 1340501). In 1833 he received title to a further 1000 acres in the Parish of Pokolbin. The properties were used for cattle grazing and wheat. His youngest son, George Frederick, was placed on Glenmore and descendants still live on Weronga. George donated the land for the nearby Glenmore cemetery (SHI record 1340020) where he is buried along with many other pioneers.

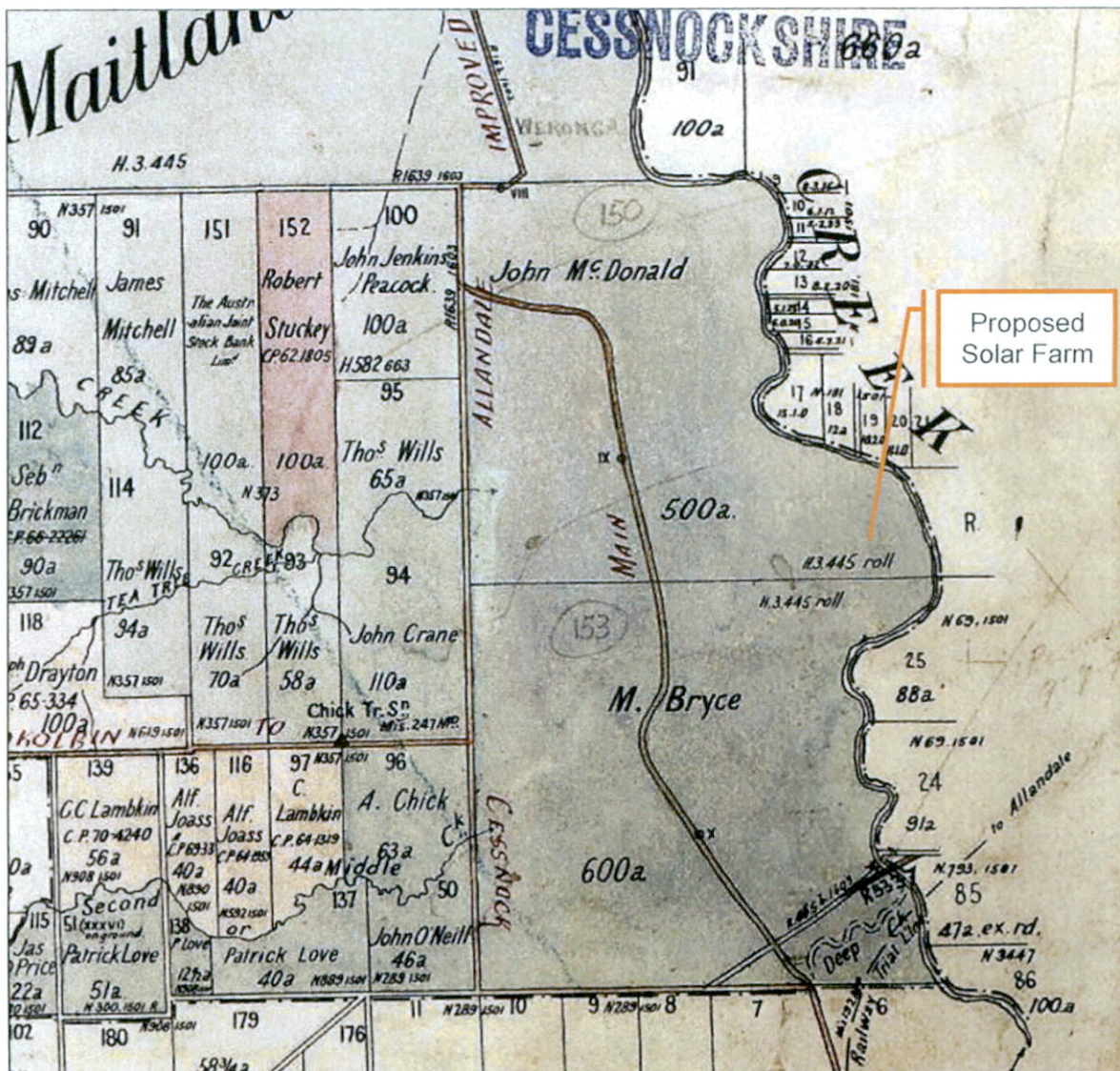


Figure 12: Fourth edition of the 1897 Rothbury Parish Map (Historical Lands Record Viewer)

Within the Subject Land one remnant building remains that is likely to be related to the former Glenmore property. The building consists of a sheet metal building with two attached concrete silos (**Photograph 13**), with recently constructed yards on the southern side of the barn. There is some evidence on-ground and from aerial photographs of the location of other buildings on the Subject Land in the vicinity of this building as shown by **Figure 13**. Several large remnant Forest Red Gums (*Eucalyptus tereticornis*) are also located in this area. Younger regrowth is also present.

As noted within Section 3.5 buildings on the Subject Land have been located on a small topographic knoll above an elevation of 52 m AHD. The area of the proposed solar panels is

topographically separated from the knoll by a first order ephemeral stream. The solar panels are located on the adjoining flats that were likely to have been used historically for cropping and grazing activities.

Contextually, it is unclear if the silos were used for storage of wheat harvested on Glenmore (potentially from the area of solar panels or the larger expanses of land to the north), or for the storage of a more contemporary supply of feed to the former dairy on the Subject Land.

Given the remnant vegetation, historically, views from the building would have been filtered in all directions, including to the south, though a corridor through to the proposed solar array area appears likely. Likewise, with the location of building in the context of the property boundaries external views to the building would have been minimal. Glimpses of the silo roof are possible from Peacock Hill to the north and other elevated locations in the area.

There is approximately 120 m between the nearest solar panels and the remnant building, with remnant and regrowth vegetation providing screening between the remnant building and proposed solar array.



Photograph 13: Sheet metal barn and silos located 120 m northwest of the proposed solar array area

3.9.2.1 Comment in relation to the Development

The 120 m separation to the south of the remnant building along with the remnant and regrowth vegetation will retain the amenity of the building and its immediate surrounds. Additional Red Gum tubestock will be planted between the two features (**Figure 13**) to improve screening.

The use of the area for solar panels will continue the historical agricultural cropping use in a contemporary sense through the harvesting of solar energy (similar to wheat).

The use of the land for the solar farm does not require significant modification of the ground surface and as such will not limit the potential for interpretation of past uses of the land associated with the remaining buildings. In addition, the solar panels are located between the infrastructure and the property boundary, and will not obscure site lines (if they existed) to other infrastructure on the original larger Glenmore property.

Any views to the silo from surrounding lands will not be affected by the proposal.

3.10 VISUAL AMENITY

The locality surrounding the Subject Land is characterised by largely cleared lower mid and upper slopes broken by vegetated creek lines and some road corridors. Land use is predominantly viticulture and tourism based properties with medium to large rural properties. The Vineyards District within the Cessnock LGA is known for its aesthetic values, with development controls (discussed in **Section 4.6**) imposed to maintain the aesthetic values of the area.

3.10.1.1 Comment in relation to the Development

The proposed solar farm is to be located on low-lying lands adjacent to Black Creek. The solar panels are 3 m in height that allows the surrounding Casuarinas (of 6-10m height) along the creek banks and adjacent Red Gums (10 – 20 m) to filter and screen the visibility of the panels from most surrounding public vantage points and private land holdings. Visibility from the golf course is screened through fairway plantings and is owned by the proponent.

Consideration of the visibility of the proposed solar panels was undertaken at the following locations, with photomontages prepared for each viewpoint. The four locations are shown on (**Figure 8**) and include:

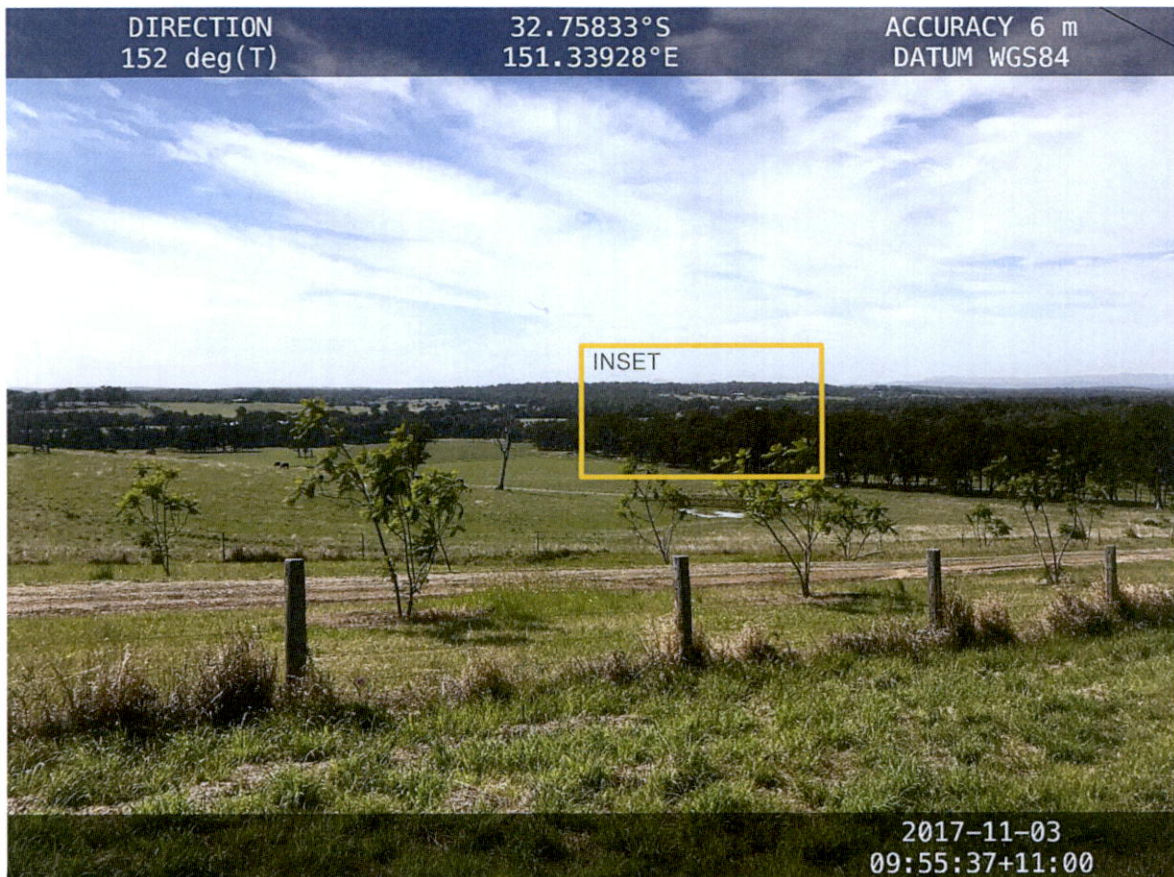
- **View 1** to south east toward the solar farm from the top of the cutting on Peacock Hill on Wine Country Drive adjacent to 180 Wills Hill Road, Lovedale. Approximately 1.8 km north west of solar array. Refer to **Photograph 14** and **Photograph 15**. Visibility of the solar farm in relation to View 1 and mitigation proposed includes:
 - o Existing remnant and regrowth vegetation on topographically higher land north of the solar farm provides good existing screening of the proposed solar farm, with exception to one area of low regrowth between two remnant patches.
 - o Infill plantings of *Eucalyptus tereticornis* are proposed to further screen the visibility of the panels (see **Figure 4**).
- **View 2** to south west toward the solar farm from Carabobla, located north-east of the array. Approximately 0.7 km north-east of the solar array. Refer to **Photograph 16** and **Photograph 17**. Visibility of the solar farm in relation to View 2 and mitigation proposed includes:
 - o Current stands of *Casuarina glauca*, located to the northeast of the Subject Land, were measured onsite as approximately 8-9 m in height.

- o As can be seen in **Photograph 17**, this vegetation height provides a suitable barrier to obstruct the field containing the proposed solar farm from view, with exception two sections with minimal tree cover.
 - o Infill planting of *Casuarina glauca* in those areas of minimal cover on the banks of Black Creek has been proposed as part of the proposed development. This will further screen the visibility of the solar farm from Carabobla (see **Figure 4**).
- **View 3** to east toward the solar farm from Wills Hill Road. Approximately 0.5 km from the solar array. Refer to **Photograph 18** and **Photograph 19**.
 - o Existing regrowth and remnant vegetation provide screen for much of the solar array.
 - o Infill plantings of *Eucalyptus tereticornis* are proposed to further screen the visibility of the panels (see **Figure 4**).
- **View 4** to north west toward the solar farm from Lovedale Road. Approximately 0.3 km south east of solar array. Refer to **Photograph 20**.
 - o The proposed solar farm will be periodically visible for a stretch of approximately 200 m along Lovedale Road (**Photograph 20**).
 - o Given the 80 km/h speed limit along this section of Lovedale Road, passing motorists will only view the solar farm for a matter of seconds and therefore it is not expected that the proposed solar farm will cause any detrimental impacts to the visual amenity of the vineyards district from Lovedale Road.

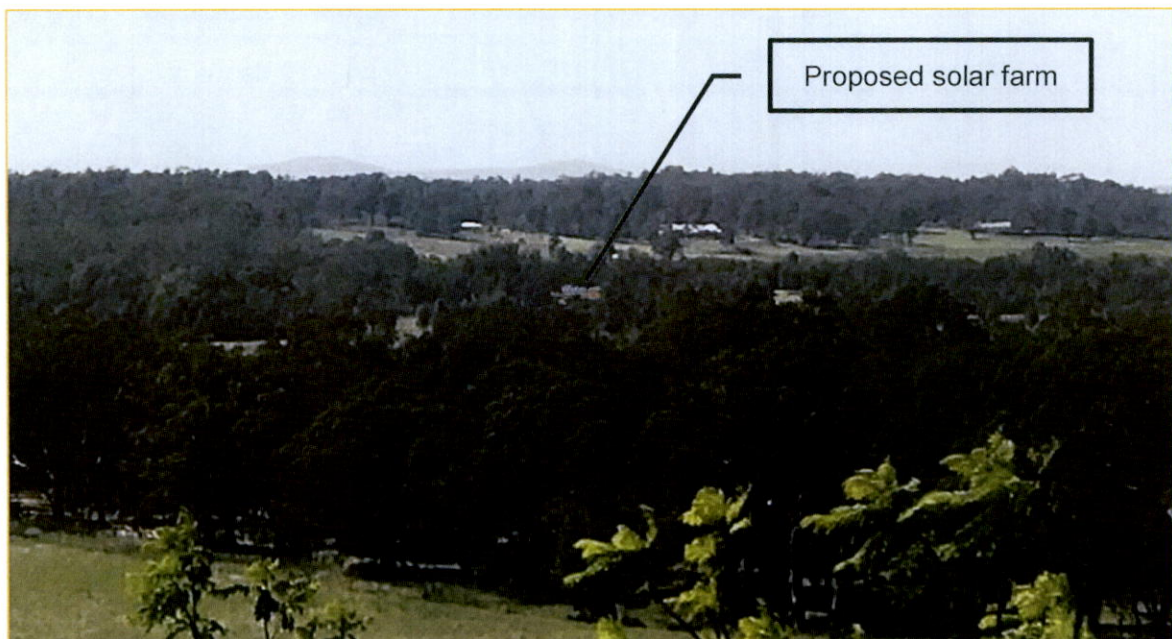
Elevated private dwellings located on the eastern side of Lovedale Road may have some visibility of the southern face (or back) of the solar panels. The view of the array will occupy midfield views in excess of 600 m from the dwellings. With the elevated tree line north of the solar array and Peacock Hill in the background, the expected change to visual amenity will be minimal. The dwellings also have screening in the foreground associated with vegetation on those properties, Black Creek and the golf course.

Existing panels located on Peacock Hill and visible from Wine Country Drive are shown in **Photograph 21**. These panels demonstrate a commitment to renewable energy, and while in a relative prominent position (relative to the proposed solar farm) have minimal effect on the visual amenity.

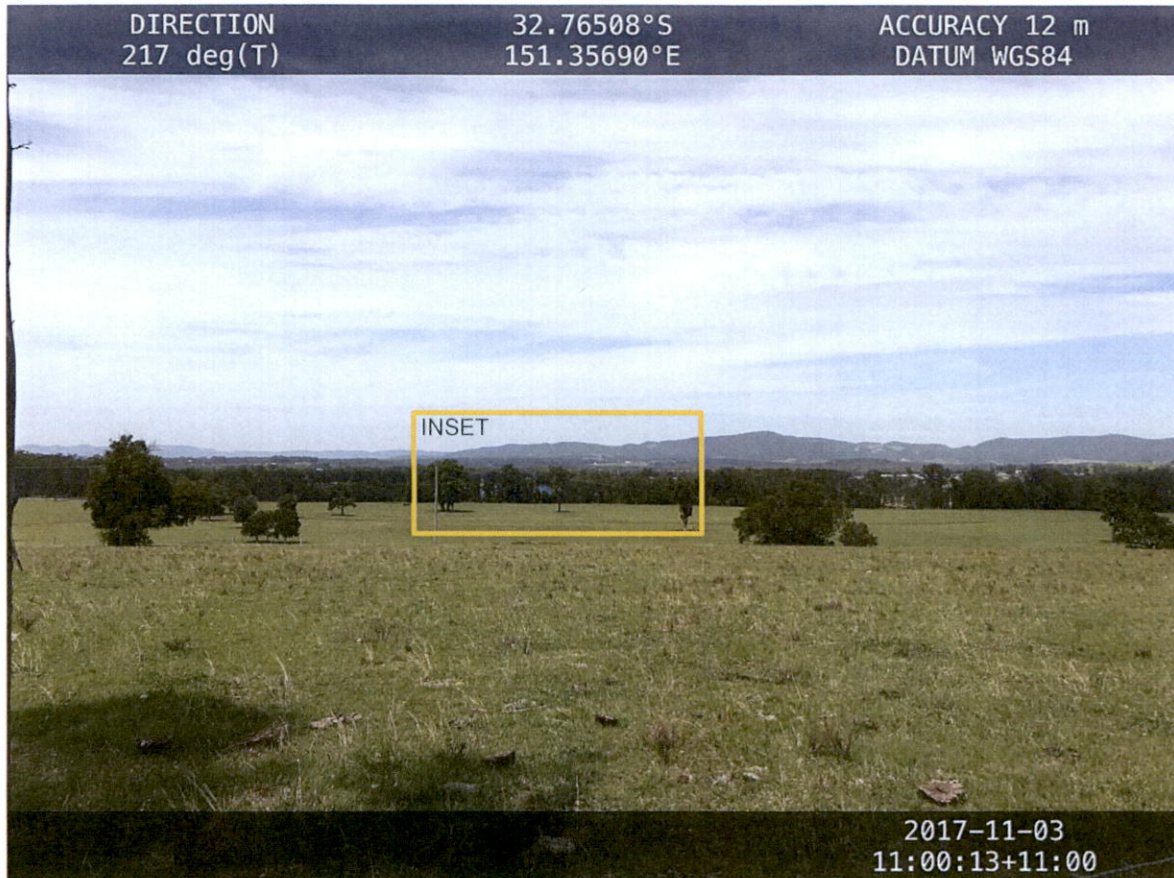
With the location of the solar panels in a topographically low area, the existing remnant and maturing surrounding vegetation and infill planting proposed the potential for the solar farm to detract from the visual amenity of the vineyards district is considered minimal. In addition it is worth noting the renewable values associated with the solar farm is likely to be viewed favourably by many visitors to the area, such that any views of the panels has the potential to enhance the values associated with the vineyards district.



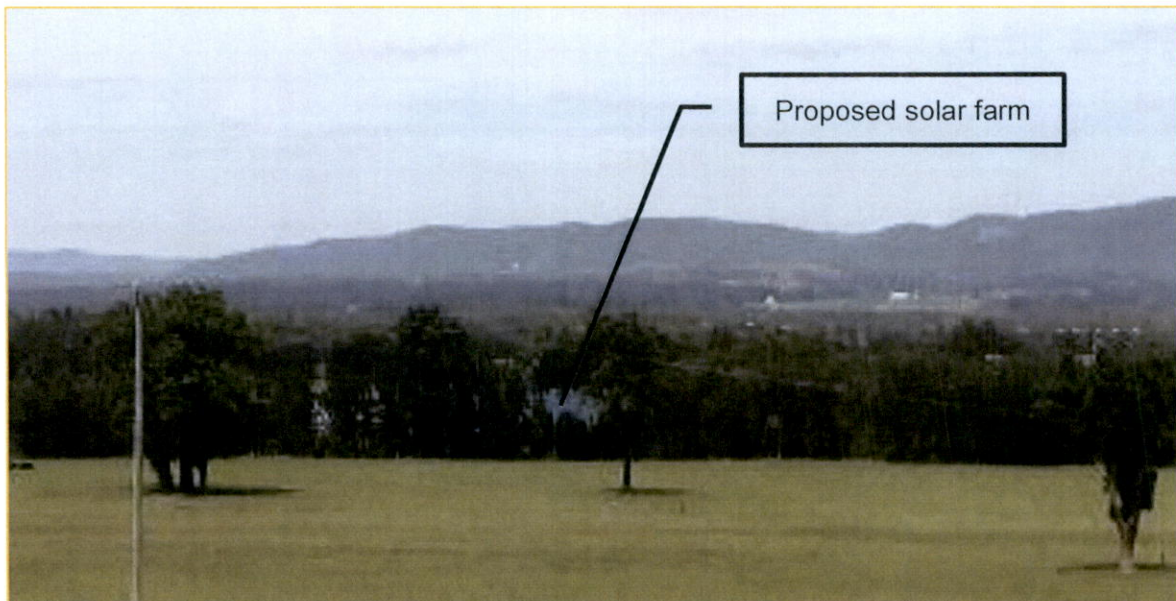
Photograph 14: View 1 - Photomontage of view to south east toward the solar farm from the top of the cutting on Peacock Hill on Wine Country Drive adjacent to 180 Wills Hill Road, Lovedale.



Photograph 15: INSET from Photograph 6.



Photograph 16: View 2 - Photomontage of view to south west toward the solar farm from Carabobla



Photograph 17: INSET from Photograph 16

DIRECTION
39 deg(T)

32.77260°S
151.34477°E

ACCURACY 8 m
DATUM WGS84



Photograph 18: View 3 - Photomontage of view east toward the solar farm from Wills Hill Road



Photograph 19: INSET from Photograph 18



Photograph 20: View 4 - Photomontage of view north west toward the solar farm from Lovedale Road.



Photograph 21: Existing panels on Peacock Hill, visible from Wine Country Drive

3.11 ACOUSTICS

The locality is expected to have ambient noise levels typical of a rural environment. The ambient noise levels in rural environments is typically below 40 dB(A), with a drop to <30 dB(A) at night (EPA, 2017). A background noise level of 40 dB(A) is the assumed background noise level to be used for assessment of the proposed activity within standard operating hours, with a background noise level of 30 dB(A) adopted for periods outside standard operating hours.

With an adopted background noise level of 40 dB(A), the NSW Interim Construction Noise Guidelines (DECC, 2009) stipulate the following noise impact levels for residences near a construction activity:

- "Noise affected" is considered to be background + 10 dB (i.e. approx 50 dB(A)) for activities within recommended standard hours (Monday to Friday 7 am to 6pm, Saturday 8am to 1pm, with no work on Sundays or public holidays, unless approved)
- "Noise affected" is considered to be background + 5 dB (i.e. approx 35 dB(A)) for activities outside the recommended standard hours
- "Highly noise affected" 75 dB(A) for activities within recommended standard hours

3.11.1 Comment in relation to the Development

Construction of the proposed solar farm will occur within the recommended standard hours under the NSW Environment Protection Authority's (EPA) *Interim Construction Noise Guideline*. Standard operating hours will be as follows:

- Monday to Friday 7 am to 6 pm
- Saturday 8 am to 1 pm
- No work on Sunday or Public Holidays

The highest potential for annoyance associated with the construction of the solar farm will be the installation of the pylons. This phase of the construction is expected to take up 3 - 4 weeks. During this phase, communication with neighbouring receptors will be important to ensure noise levels are minimised and maintained within the Interim Construction Noise Guidelines.

The nearest receptor is located over 400m from the piling activity. For comparison, a quantitative noise assessment undertaken for a large scale solar farm near Beryl (Renzo Tonin & Associates (NSW) Pty Ltd 2017) determined that with up to three of the noisiest plant operating concurrently, noise levels at receptors of at 330 m, 470 m and 710 m would

experience maximum $L_{eq(15min)}$ levels of 50 dBA, 47 dBA and 36 dBA respectively. The same assessment determined construction noise would be manageable (max of 52 dBA) for a receptor only 135 m from the activity. While it is important to note that this assessment was site specific, on these levels it is reasonable to determine that construction noise from the proposed development is unlikely to exceed noise levels established under the Interim Construction Noise Guidelines.

Contact details of the project manager will be provided via letter box drop to neighbouring properties and a sign will be displayed at the entrance to the Subject Land to provide a point of contact for complaints and enquiries to be made. If any complaints are made by neighbouring landowners, further discussions towards noise mitigation techniques may be made. In the unlikely event excessive noise levels are experienced at neighbouring properties, reasonable and feasible controls may be implemented that could include:

- Use of barriers (between the source and receiver)
- Additional noise suppression equipment or silencing equipment
- Suspension of high noise generating activities during adverse weather conditions (e.g. gentle source to receiver winds)

Over the 5-6 month construction period it is considered unlikely that neighbouring properties will be "noise affected" and would not be "highly noise affected" during the construction period.

During construction and operational maintenance of the solar farm, the following noise management controls will be implemented:

- Adoption of quieter equipment where reasonable and feasible in preference of noisier equipment
- Broadband reverse alarms will be used in lieu of beeper alarms
- Machinery is to be turned off when not in use
- Contractors are to be informed of courteous noise limiting methods during construction
- Contact details of the project manager will be displayed at the entrance to the Subject Land to provide a point of contact for complaints to be made. If any complaints are made by neighbouring landowners, further discussions towards noise mitigation techniques may be made
- Adoption of standard controls for noise under the Interim Construction Noise Guidelines

During operation of the solar farm, vehicle movements (sparse throughout the day), noise from maintenance crews working onsite and noise generated by the Solar PV Inverters (enclosed

by steel fence) constitute the most likely potential source of noise pollution. These sources of noise are generally consistent with existing rural activities and will not cause neighbouring properties to be noise affected during the operation of the solar farm.

3.12 BUSHFIRE

The proposed solar farm is located on lands mapped as Vegetation Category 1 and Vegetation Category 2 under the Cessnock City Council Online Mapping System (Cessnock City Council 2017).

The proposed solar farm is not expected to increase the likelihood of bushfires in the locality.

3.12.1 Comment in relation to the Development

The following Bushfire Protection Measures will be required for the proposed activity:

- Regular maintenance of grasslands to a nominal height of about 100mm within the solar farm boundary to reduce ignition / spread potential
- Minimum 10m defendable space between assets (e.g. solar panels) and unmanaged vegetation (including unmanaged grasslands)
- Installation of Asset Protection Zones (APZs) surrounding any building onsite in accordance with the provisions of the Australian Standard *Construction of buildings in bushfire-prone areas 2009* and *Planning for bush fire protection 2006* (Standards Australia 2009, NSW Rural Fire Service 2006)
- Installation of a 22,500L water tank with a storz valve to aid bushfire suppression

3.13 UTILITIES AND SERVICES

One overhead power line maintained by Ausgrid is located on the Subject Land that formerly fed the dwelling on the property. A smaller overhead line is connected to this line providing power to the pumping infrastructure on the adjacent dam.

A search of the NSW Dial Before You Dig Web Service, undertaken on 21 November 2017, found no other service or utilities that may be affected during the construction of the proposed solar farm (Dial Before You Dig Australia 2017).

3.13.1 Comment in relation to the Development

Construction of the solar farm will require trenching for burying cables between the two solar inverters and the solar array generally as per **Figure 4**. It is not expected that trenching will impact upon any utility structures, however if any underground structures are encountered during trenching work must be stopped and the corresponding utility company notified.

Construction of the proposed solar farm will include the installation of a new overhead line from the solar inverters to a new point of attachment at the existing Ausgrid overhead line easement. New overhead lines are to be installed above existing lines as per **Section 2.1.2**. Installation of new lines will involve an upgrade of the existing overhead lines and mounted transformers to facilitate the convection of power generated by the solar panel array into the local energy grid.

The proposed solar farm has the potential to generate 5 MW of energy into the local power grid, providing a source of sustainable energy to be distributed within the local energy market.

4. LEGISLATIVE CONTEXT

4.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The application is subject to Part 4 of the *Environmental Planning & Assessment Act 1979* (EP&A Act)

The development is located within land defined as waterfront land (defined as 40m from the bank of a 1:25,000-scale mapped watercourse). As such, the proposal is likely to be considered Integrated Development pursuant to Division 5 of the EP&A Act, and as such require the concurrence of the Department of Primary Industries – Water for any activities on water front land. Refer to Sections 3.5 and 3.7 for further information regarding proximity to adjacent watercourses.

The capacity of the development (electricity generating works) is 5 MW. The development is does not meet the following definitions:

- Designated development pursuant to Section 77 of the EP&A Act and Schedule 2 of the *Environmental Planning & Assessment Regulation 2000* (EP&A Regulations) set at a capacity of 30 MW or more
- State Significant Development pursuant to Section 89C of the EP&A Act and *State Environmental Planning Policy (State and Regional Development) 2011* that requires a capital investment value of more than \$ 30 million or more than \$ 10 million in an environmentally sensitive area

4.1.1 Capital Investment Value

Pursuant to the Clause 3 definitions provided within the EP&A Regulations the capital investment value for the project is estimated at \$ 10 million.

4.1.2 Determining Authority

Pursuant to Schedule 4(A) of the EP&A Act and clause 21 (1) of the *State Environmental Planning Policy (State and Regional Development) 2011* the Joint Regional Planning Panel (JRPP) is the determining authority for this development. The JRPP is authorised to exercise

consent authority functions of councils for private infrastructure works (including electricity generating works) with a capital investment value greater than \$ 5 million

4.2 STATE ENVIRONMENTAL PLANNING POLICIES

4.2.1 State Environmental Planning Policy (Infrastructure) 2007

The *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) facilitates the effective delivery of infrastructure in NSW

Solar Energy Systems are managed under Part 4, Division 3 of ISEPP as per the following

“(7) Solar energy systems

Except as provided by subclause (8), development for the purpose of a solar energy system may be carried out by any person with consent on any land

(8) Development for the purpose of a photovoltaic electricity generating system may be carried out by a person with consent on land in a prescribed residential zone only if the system has the capacity to generate no more than 100kW”

The proposed solar farm is located on lands designated as RU4 - Primary Production Small Lots under the *Cessnock Local Environmental Plan 2011*, designated as a *prescribed rural zone* under Clause 33 of ISEPP. As such, the proposed activity is permitted upon the Subject Land pending development consent from Cessnock City Council

4.2.2 State Environmental Planning Policy 44 – Koala Habitat Protection

SEPP 44 encourages the conservation and management of Koala habitats, to ensure permanent free living Koala populations will be maintained over their present range. The policy applies to 107 local government areas including Cessnock City. Development cannot be approved in the areas covered by the policy without a prior investigation into the presence of potential and core Koala habitat.

Potential impacts from the proposed solar farm upon Koala's has been assessed in **Section 3.5** Koala populations will not to be adversely impacted by the solar farm

4.3 WATER MANAGEMENT ACT 2000

The *Water Management Act 2000* governs activities undertaken on waterfront land in NSW Under the *Water Management Act 2000*, waterfront land is defined as

"(a) the bed of any river, together with any land lying between the bed of the river and a line drawn parallel to, and the prescribed distance inland of, the highest bank of the river, or

(a1) the bed of any lake, together with any land lying between the bed of the lake and a line drawn parallel to, and the prescribed distance inland of, the shore of the lake, or

(a2) the bed of any estuary, together with any land lying between the bed of the estuary and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the estuary, or

(b) if the regulations so provide, the bed of the coastal waters of the State, and any land lying between the shoreline of the coastal waters and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the coastal waters,

where the prescribed distance is 40 metres or (if the regulations prescribe a lesser distance, either generally or in relation to a particular location or class of locations) that lesser distance Land that falls into 2 or more of the categories referred to in paragraphs (a), (a1) and (a2) may be waterfront land by virtue of any of the paragraphs relevant to that land "

Construction of the solar farm perimeter fenceline, a portion of the solar array and trenching for the installation of underground cables will occur upon waterfront land (**Figure 15**) Under Section 91 (2) of the *Water Management Act 2000* "A controlled activity approval confers a right on its holder to carry out a specified controlled activity at a specified location in, on or under waterfront land " Where controlled activities are defined as

*“(a) the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
(b) the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
(c) the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
(d) the carrying out of any other activity that affects the quantity or flow of water in a water source ”*

The proposed construction is being assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*. Activities proposed on waterfront land are considered below with respect to being a controlled activity

- Installation of a fence line (not a controlled activity - will not reduce or change water flows or quality and is permitted within the land use zone and not in its own right a work under EP&A Act 1979)
- Maintenance of groundcover within the Solar Farm fenced area through routine slashing (not a controlled activity - will not reduce or change water flows or quality and is permitted within the land use zone and not in its own right a work under EP&A Act 1979)
- Maintenance vegetation (trimming) within 10 m of the fence line to limit trees growing into the solar access area for the panels (e.g. limit vegetation to less than 10 m high) This is not a controlled activity as it will not reduce or change water flows or quality and is permitted within the land use zone and not in its own right a work under EP&A Act 1979)
- Installation of pylons for the solar panels and erection of panels This constitutes a controlled activity, though will not result in a change in water quality or flows in Black Creek or the first order tributary
- Trenching for the installation of electrical cables This constitutes a controlled activity, though will not result in a change in water quality or flows in Black Creek or the first order tributary

On the above basis, the proposed activity is likely to constitute a controlled activity for a small extent of the development, and as such will be referred to NSW Office of Water for review and concurrence

4.4 ROADS ACT 1993

If any works are to be located within the Wills Hill Rd road reserve, at least 10 days prior to excavation the proponent or a nominated contractor must lodge a application under Section 138 of the *Roads Act 1993* to Cessnock City Council. Minimal works are considered necessary, though maintenance may be necessary during construction.

4.5 CESSNOCK LOCAL ENVIRONMENTAL PLAN 2011

The land is zoned RU4 - Primary Production Small Lots under the *Cessnock Local Environmental Plan 2011* (CLEP) as shown by **Figure 14** below. Surrounding lots are also zoned RU4.

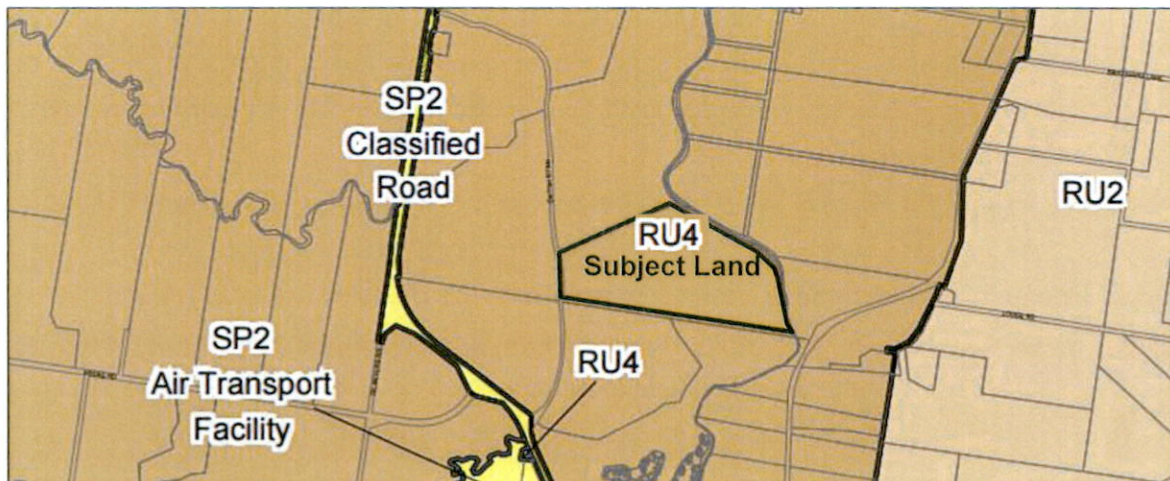


Figure 14: Zoning of the Subject Land under the Cessnock Local Environmental Plan 2011

Consideration of the development against the RU4 Zone objectives is provided below:

- *"To enable sustainable primary industry and other compatible land uses".*
 - o The proposed solar farm is a compatible land use, as it does not restrict the ability of neighbouring properties to utilise their properties to the fullest extent permissible under the zone. In addition, the solar farm may be considered as sustainable primary industry, i.e. converting a natural resource (the sun) into a product.
 - o The proposed solar farm will also improve the sustainability of the Schwartz Group's Hunter Valley business, by providing an income source unrelated to viticulture or tourism.

- *To encourage and promote diversity and employment opportunities in relation to primary industry enterprises, particularly those that require smaller lots or that are more intensive in nature.*
 - The proposed solar farm is consistent with the objective.
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
 - The proposed solar farm has been designed such that impacts on adjoining land uses are avoided or minimised. In addition the solar farm will provide electricity for the grid, that may be used on adjoining properties.
- *To maintain prime viticultural land and enhance the economic and ecological sustainability of the vineyards district.*
 - The project has had regard to prime viticultural land. In the event the solar farm is no longer viable, the infrastructure can be readily removed with minimal effect on the agricultural properties of the land. The development has been positioned to avoid ecological values on the Subject Land and as detailed above improves the economic sustainability of the vineyards district through providing an income stream independent of viticulture and tourism.
- *To encourage appropriate tourist development (including tourist-related retail) that is consistent with the rural and viticultural character of the vineyards district.*
 - The proposed solar farm is not inconsistent with this objective.
 - It may also be feasible (though not proposed by this application) to provide tourism related viewing of the operational solar farm.
- *To enable the continued rural use of land that is complementary to the viticultural character of the land."*
 - The proposed use of the land for the generation of electricity through solar means is complementary the character of the viticultural values of the area through its generation of power for potential consumption in the vineyards.\
 - The proposed solar array has many similarities to vineyards including:
 - Row like structure.
 - Conversion of the sun's energy into a product.
 - Requires minimal earthworks to establish the rows of panels.
 - When not viable, the panels can be removed with minimal effect on the future agricultural properties of the land.

4.5.1 Permissibility under the zone

Under the RU4 Zone of the CLEP the following uses are permitted with consent:

"Agricultural produce industries; Animal boarding or training establishments; Cellar door premises; Child care centres; Community facilities; Dwelling houses; Environmental facilities; Environmental protection works; Farm buildings; Function centres; Home businesses; Home industries; Information and education facilities; Intensive plant agriculture; Neighbourhood shops; Plant nurseries; Respite day care centres; Restaurants or cafes; Roads; Roadside stalls; Rural supplies; Rural workers' dwellings; Secondary dwellings; Signage; Tourist and visitor accommodation; Waste or resource management facilities."

Prohibited within the zone includes Hotel or motel accommodation and any other development not specifically permitted with or without consent.

With the absence of electricity generating works (solar energy system) being specifically permitted, the proposed solar energy system is not permissible within the zone under the CLEP. However, pursuant to Clause 34 (7) of the Infrastructure SEPP, *"development for the purpose of a solar energy system may be carried out by any person with consent on any land"*. As such the SEPP Infrastructure overrides the CLEP and the proposed solar energy system is permissible pending development consent from Cessnock City Council.

4.5.2 Clause 5.9 Preservation of Trees or Vegetation

Clause 5.9 of the LEP requires the approval of Council prior to the removal of any vegetation defined by Council within the Development Control Plan (DCP). The proposed activity will involve the clearing of one isolated paddock tree (forest red gum). Permission from Cessnock City Council will be required for all clearing of vegetation for the installation and maintenance of the proposed solar farm.

4.5.3 Clause 5.10 Heritage Conservation

Clause 5.10 of the LEP requires the approval of Council prior to the disturbance of an Aboriginal object, Heritage item or works within a Heritage Conservation Zone, or land on which a Heritage Item is located.

The Subject Land is defined as "Weronga" under Schedule 5 of CLEP, however, on the NSW Heritage Database Weronga is located approximately 1.7 km north of the Subject Land. Refer to **Section 3.8.2** for further detail on heritage.

The proposed development is not expected to significantly impact the heritage values of the Subject Land for the following key reasons:

- Over 120 m separation between the proposed solar array and the known location of heritage related structures on the site.
- Remnant and regrowth screening in addition to infill planting to screen the solar farm from the heritage features.
- Minimal topographical modification required such that the ability to interpret the former heritage values is not lost.
- Located on lands used historically for grazing and cropping on the far corner of the property, and as such is unlikely to obscure views between internal property features.
- Will not affect the visibility of the silos from neighbouring lands.

4.5.4 Clause 7.3 Flood Planning

Refer to **Section 3.5** for more information on Flooding.

Pursuant to Clause 7.3 (3) of the LEP, development consent must not be granted to development on land to which this clause applies unless the consent authority (Cessnock City Council) is satisfied that the development:

- *"Is compatible with the flood hazard of the land;"*
 - The land is expected to be subject to backwater flooding at low velocities.
 - Infrastructure has been raised such that key elements are located above the anticipated 1 in 100 year flood level.
- *"Is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties;"*
 - The development requires no substantial filling or excavation and as such will have negligible effect on flood storage area.
 - The development is located within an area of backwater flooding from Black Creek and will cause an obstruction to flows upstream. It is worth noting that the most sensitive property (golf course and Crowne Plaza) upstream is under the same ownership.
- *"Incorporates appropriate measures to manage risk to life from flood;"*
 - Access into and out of the solar farm is via elevated land at no particular risk of flooding.

- *"Is not likely to significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses; and"*
 - o An Erosion and Sediment Control Plan is to be prepared prior to the construction of the solar farm. Erosion and sediment controls outlined within the Plan are to be applied to manage potential impacts from localised run-off of sediment and sediment-laden water entering riparian vegetation surrounding Black Creek.
 - o Infill planting on the banks of Black Creek and the first order tributary will improve the stability of the existing banks.
- *"Is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding."*
 - o Construction of the proposed solar farm will not impact upon flood patterns in the locality.

4.6 CESSNOCK DEVELOPMENT CONTROL PLAN 2010

The Subject Land is located in the Cessnock Vineyards district and is managed under Chapter E3 of the *Cessnock Development Control Plan 2010* (DCP). Other chapters within the DCP, such as Part B (notification requirements) and Part C (parking and access) will also be considered.

4.6.1 Part A: Introduction

Part A details the aims, purpose and statutory requirements for the DCP under the EP&A Act 1979, the structure of the DCP and its application and interpretation. This section also provides guidance on the submission of a Development Application. This application has been prepared with consideration to the matters raised in Part A, Part B, Part C and Part E (Chapter E3) are considered relevant to this application and have been considered below.

4.6.2 Part B: General Information

Part B sets out the process for the notification of development applications.

Pursuant to Table 1 of Part B of the DCP "nominated integrated development", on account of works being required on water front land, requires a minimum of 30 days notice from which the

notice is first published in the newspaper. If waterfront land were avoided, the development would remain as advertised development, with the same notification, though only over a 14 day notice period. Notification for the project is to be provided as follows:

- Letters to:
 - Adjoining owners.
 - Adjoining occupiers.
 - Interested public authorities.
 - Registered community groups.
- Classified advertisement published in a local newspaper on one occasion.
- There is no requirement for a site notice under the Act or notice to potentially affected others.

4.6.3 Part C: General Guidelines

4.6.3.1 C.1 Parking and Access

Parking

Current designs for the proposed solar farm include the construction of a gravel carpark north of the control building, allowing for three parking spaces.

The proposed solar farm may be considered as an *Industrial Premises* within this Chapter and would require “1 space per 75m² of gross floor area, or 1 space per 2 employees, whichever is greater”. With the solar farm employing two part time staff for operations and up to six part time for maintenance, the provision of three parking spaces is considered adequate. The use of floor area, unless relating to the 35 m² control room is not a reasonable method for approximation of required spaces. Alternatively, the proposed solar farm may not be considered as meeting the definition of an industrial premises, in which the category *Any other building or land use (not elsewhere defined)* will apply. Minimum park standards for developments in this category are to be determined by Cessnock City Council in individual cases.

Due to the location of site infrastructure, the local topography and existing vegetation screens the proposed carpark will not be visible from adjacent landholdings.

Access

Construction of the proposed solar farm will involve maintenance of the existing property access of Wills Hill Road in the southeast corner of the property (**Figure 4**). Under the DCP

the existing driveway appears to generally satisfy the provisions of a Category 1 access for frontage to a local road.

Current designs of the solar farm include the construction of a 5m wide cul-de-sac road joining the existing access road to the entrance of the solar farm. Construction of this road will include the allowance for approximately 600 m² of equipment drop off area (**Figure 4**).

4.6.3.2 C.2 Flora and Fauna Survey Guidelines

Applicable flora and fauna survey guidelines have been applied during the preparation of the Flora and Fauna Assessment and SEE.

4.6.3.3 C.3 Contaminated Lands

The RU4 zoned Subject Land does not have a history of contamination or contaminating land use activities. The agricultural land use is unlikely to have had any significant application of fertiliser or pesticides.

Considering the history of the site and the development of the land for the installation of a solar farm with minimal ground disturbance of soils, there is unlikely to be any constraint to the development of the land for the proposed purpose.

4.6.3.4 C.4 Land Use Buffers

The proposed solar farm has been assessed as a **Category B – Light Industry** under Part C, Chapter C4 of the DCP, whereby the proposed development will *“neither generate significant residual emissions nor warrant specific protection from them unless the emission is harmful to health”*. The solar farm itself is considered unlikely to impact upon neighbouring land uses.

The proposed solar farm is located >150m from adjacent viticultural fields within Lot 111 DP 863781 (Category C Land Use) that are under the same ownership or over 500 m from viticulture under separate ownership.

The proposed solar farm is located >50m from the boundary of adjacent landholdings, with the exception of a small section along the northwest of the development within 50 m of the boundary of lot 5 DP 1048155 (**Figure 15**). However, given the separation distance between the Subject Land boundary and the closest freehold lot (Lot 5 DP 840032), along with the

location of Black Creek and adjacent banks, a minimum distance of 50m between the proposed solar farm and neighbouring land uses can be demonstrated.



4.6.3.5 C.5 Waste Management

Waste generation by the proposed development will occur in two distinct stages; construction and operation. A description of the waste generated in each stage is provided below, and included within a Waste Management Plan included as **Appendix 2**.

Construction

Construction waste generation will consist of the following key waste streams:

- Minor green waste generated by the removal of paddock tree that will be reutilised on the Subject Land for landscaping or timber.
- Excess concrete, tin and timber formwork and framing waste following construction of the control room and footings.
- Excess wiring from installation and attachment of new power lines.
- Steel offcuts from framing.
- Cardboard and plastic from packaging.
- Putrescible waste from onsite personnel.
- Effluent associated with onsite portable toilet facilities provided for construction personnel.
- Waste management will follow the fundamental waste management practices that includes:
 - Avoidance – design, measure and calculate materials required to avoid generation of excess materials for disposal.
 - Reuse – while limited potential during construction, items such as redundant fencing may be reutilised where feasible.
 - Recycling – waste materials onsite will be segregated such that recyclable elements can be appropriately disposed to recycling facilities to reduce the volume of waste entering landfill.
- Construction waste will be contained within clearly identified covered receptacles and waste zones with sufficient barricading to prevent spreading of waste during wind.

Operation

Operationally, the development would be expected to generate very minor volumes of waste, as on a typical daily basis access to the site is restricted to a maximum of eight staff onsite at any one time. As such the conventional 240L Council waste collection service is likely to be more than adequate to cater for the proposed development, the bin will be stored alongside the control room building. Consistent with the DCP, waste storage and recycling facilities will be provided discretely in the control room to provide for miscellaneous waste.

As only part-time personnel are required onsite, no toilet or ablutions facility will be located onsite during operation of the solar farm.

The site will be serviced by Cessnock City Council's waste collection service that runs along Wine Country Drive. Other waste will be collected by licenced contractors.

4.6.3.6 C.6 Access and Mobility

The proposed solar farm is not classified as development that is subject to the provisions of Part C, Chapter 6 of the DCP.

4.6.3.7 C.7 Trees and Vegetation Management

This chapter of the DCP does not apply to lands within the RU4 zone, the provisions of the *Local Land Services Act 2013* and *Biodiversity Conservation Act 2016* apply to the site.

4.6.3.8 C.8 Social Impact Assessment and Crime Prevention

Given the relatively remote location of the solar farm on private rural lands with limited visibility to surrounding properties, no social impact assessment is considered warranted for the proposed solar farm.

4.6.4 Part D: Specific Development

The proposed solar farm is not designated as a Specific Development to which Parts D, Chapter 1-4 and 6-11 of the DCP applies. Outdoor Signage parameter listed in Part D of the DCP are superseded by those listed under Part E, Chapter 3 *Vineyards District*. Control measures for signage within the Vineyards District, as applied under Part E, are discussed in **Section 4.6.5**.

4.6.4.1 D.12 Heritage Conservation and Design Guidelines

The Subject Land is listed as "Weronga", an area of landscape heritage listed under Schedule 5 of CLEP. Section 12.8.1 of Part D, Chapter 12 of the DCP states the following:

"It is essential that the scale and siting of new development does not detract from the scale, form, unity, and character of the surrounding area.

New development shall therefore respect the character of its surrounds. However, respect does not mean copying. While architectural replicas may appear visually compatible with their surroundings, they can confuse the original buildings in the area and give a false impression of historical development.

New development can be contemporary in design when it is well integrated with and related harmoniously to its older neighbours."

The proposed control room will be constructed using concrete besser blocks, a tin roof, with an attached wooden verandah. Access roads are to be lined with gravel. This design has been proposed to follow the intent of the DCP whereby the solar farm is constructed to serve its intended purpose while also respecting the cultural heritage of the Subject Land.

Refer to Section 3.9 for further detail on heritage.

4.6.5 Chapter E3 Vineyards District

The Subject Land is located within the *Vineyards District* of the Cessnock LGA. The Vineyards District is managed under Part E, Chapter 3 (Chapter E.3) of the DCP. The objectives of the Vineyards District are as follows:

- *"to maintain prime viticultural land and promote the economic and ecological sustainability of the Vineyards District;*
 - *The project has had regard to prime viticultural land. In the event the solar farm is no longer viable, the infrastructure can be readily removed with minimal effect on the agricultural properties of the land. The development has been positioned to avoid ecological values on the Subject Land and as detailed above improves the economic sustainability of the vineyards district through providing an income stream independent of viticulture and tourism.*
- *to recognise and protect vineyards and wineries (dominant land uses) from inappropriate uses in the zone;*
 - *The proposed solar array will not reduce the ability of neighbouring land holders to utilise the land for vineyards and wineries.*

- *to encourage appropriate tourist development consistent with the rural and viticultural character of the Vineyards District;*
 - *The proposed solar farm is not inconsistent with this objective.*
 - *It may also be feasible (though not proposed by this application) to provide tourism related viewing of the operational solar farm.*
- *to minimise conflict between viticultural and non-viticultural land uses by the sympathetic location and design of those uses, and the maintenance of the rural/viticultural character of the landscape;*
 - *The solar array has been positioned with respect to neighbouring land uses and a review of the visibility of the development shows the development is unlikely to significantly affect the visual amenity or rural character of the area.*
- *to enable the continued rural use of land which is complimentary to the viticultural character of land within the Vineyards District;*
 - *The solar array provides a rural compatible land use that harvest the suns energy, similar to cropping. Following establishment the development has minimal acoustic emissions.*
- *to protect the water quality of receiving streams and to reduce land degradation;*
 - *The development requires minimal excavation and over the solar array area will not result in a significant increase in impervious area and runoff. All runoff from the development will enter a first order tributary before reaching black creek. Riparian plantings on the tributary will improve bank stability and water quality.*
- *to actively promote the need to conserve and enhance the biodiversity of the Vineyards District; and*
 - *The development has been positioned so as to avoid remanent vegetation and hollow bearing trees, and includes addition native plantings.*
- *to conserve the aboriginal archaeology and European heritage of the Vineyards District."*
 - *The development has had regard to the heritage of the Subject Land and can be undertaken without significant impact to the heritage values.*

As shown above the proposed development is consistent with the objectives of the vineyards district.

4.6.5.1 Consideration of Surrounding Land Use

See **Section 3.3** and **Section 4.6.3.4** for an assessment of land uses surrounding the proposed solar farm.



The proposed development has been designed consistent with the DCP requirements that ensures separation distances are adequate to avoid adverse impacts to surrounding land use.

4.6.5.2 Soils and Viticulture

Refer to **Section 3.5** for further information pertaining to soils and viticulture.

Based on soil analysis, site observations and broader historical observations of vineyards on similar landscapes, the site is unlikely to be prime viticultural land. In addition, as little modification to the landscape is required, the solar array could be removed if vineyards were a preferable land use. The development will not restrict use of adjoining lands for viticulture.

Potentially Contaminated Land

See **Section 4.6.3.3** for an assessment of potentially contaminated soils within the Subject Land.

The site is not considered to have a land use that has resulted in land contamination. There are no considered limitations to land use due to contamination.

4.6.5.3 Building Siting and Design

Pursuant to the DCP, all developments in the Vineyards District are to be *"appropriately sited and designed having regard to the opportunities and constraints of a site and its surrounds and the special qualities of the Vineyards District."*

The Subject Land is not located in lands mapped as *visually significant areas* in Figure 3 of Chapter E.3 of the DCP.

Appendix 1 – Vineyards District Landscape and Design Guidelines

Developments within the Vineyards District are to be sited and designed in accordance with *Vineyards District Landscape and Design Guidelines* (Chapter E.3, Appendix 1 of the DCP). See **Table 6** for an assessment of the proposed solar farm with regards to design parameters listed under Chapter E.3, Appendix 1 of the DCP.

Table 6: Assessment of the proposed solar farm against Chapter E.3, Appendix 1 of DCP

Parameter	Analysis
Local Climate	See Section 3.4 .
Topography	See Section 3.5 , Figure 9 and Figure 11 .
Flora and Fauna	See Section 3.8 .
Bushfire	See Section 3.12 .
Flooding	See Section 3.5 .
Visual Amenity	See Section 3.10 and Section 4.6.5.3 .
Aboriginal Heritage	See Section 3.9.1 .
European Heritage	See Section 3.9.2 .
Landscape Heritage	See Section 3.9.2 .
Surrounding Land Use	See Section 3.3 .
Acoustics	See Section 3.11 .
Potential Spray Drift	See Section 3.4 .
Landscaping	Landscaping design is to be as per Section 2.1.9 . Landscaping has been designed to allow maintenance of the solar panels while providing bushfire mitigation. No planting of trees is to occur as part of current designs.
Access	See Section 2.1.5 .
Solar Access	The location of solar panels has been designed to produce the most photovoltaic energy as possible within the confines of the Subject Land. The local area including the Subject Land is mapped as "Solar Energy Potential 15MJ/m ² " in Figure 9 of the Hunter Regional Plan 2036 (see Section 4.7.2).
Dams	No dams are located within the Subject Land or will be impacted by the proposed activity.

See **Table 7** for an assessment of the proposed solar farm against Standard Design Requirements listed under Chapter E.3, Appendix 1 of the DCP.

Table 7: Assessment of the proposed solar farm against Standard Design Requirements listed in Chapter E.3, Appendix 1 of DCP

Requirement	Solar Farm Design
Front Setback (>75 m from roads)	The proposed solar farm is located >75 m from Wills Hill Rd.
Side Setback (>50 m from adjoining property boundaries)	The proposed solar farm is located >50m from the boundary of adjacent landholdings, with the exception of a small section along the northwest of the development within 50 m of the boundary of Lot 5 DP 1048155 (see Figure 15). However, given the separation distance between the Subject Land boundary and the closest freehold lot (Lot 5 DP 840032), along with the location of Black Creek and adjacent banks, a minimum distance of 50m between the proposed solar farm and neighbouring land uses can be demonstrated. Approximately 65 m to opposite bank of Black Creek.
Height of Buildings (no more than 2 storeys height)	The development is not above two stories in height.
Sympathetic Site Design	The proposed solar farm has been designed as per Section 2. With regards to 'sympathetic design': • Roadside Development – The solar is to be located within the eastern extent of the Subject Land, located >500m from Wills Hill Rd. • Scattered Development – Solar panel spacing have been designed so as to produce the most photovoltaic energy per panel while also allowing sufficient access between panels for maintenance / emergencies. The site control room, proposed cul-de-sac and solar inverters are all located within the solar farm fenceline. Elevation of Development – The solar farm is to be located at lower elevations along the eastern extent of the Subject Land. Visibility of the solar farm will be limited to receivers located along ridgelines within the locality and those travelling along Wills Hill Rd.

Appendix 5 – Signage Code for the Vineyards District

Signage, if required will be installed in accordance with *Appendix 5 – Signage Code for the Vineyards District* in Chapter E.3 of the DCP.

4.6.5.4 Development Densities

The proposed solar farm is located in lands zoned RU4 – Primary Production Small Lots under CLEP. Section 3.2.4(3) of the DCP states "*Council will not grant consent to development within the RU4: Rural Small Landholdings Zone which exceeds a floor space ratio of 0.1:1*".

With the surface area of the solar panel, inverters and control room compared to the entirety of the Subject Land, the floor space ratio equates to approximately 0.06:1.

4.6.5.5 Front and Side Development Setbacks

Minimum front and side setbacks have been assessed in **Table 7** under **Appendix 1 – Vineyards District Landscape and Design Guidelines** of Chapter E.3 of the DCP.

4.6.5.6 Requirements for the Establishment of New / Expanded Vineyards

This section does not apply to the proposed solar farm.

4.6.5.7 Ground Spraying and Aerial Spraying Considerations

See **Table 6** for an assessment of the potential spray drift for the proposed solar farm. See **Table 7** for an assessment of buffer zones for the proposed solar farm.

No additional planting of vegetation buffers have been proposed for the solar farm due to the presence of existing spray buffers given the adequate separation distance between existing vineyards and the proposed solar farm

Water Tanks

The installation of a 22,500 L water tank located onsite will be installed equipped with a 'first flush' system pursuant to Section 3.2.7 "Other Requirements" within Chapter E.3 of the DCP. Though the water will not be used for potable water purposes.

4.6.5.8 Noise Generation and Odour Considerations

The proposed solar farm does not conform to either 'human habitation' or a 'new winery' and is therefore not considered to be subject to Section 3.2.8 of Chapter E.3 of the DCP.

Construction noise has been considered in this application and operational noise is negligible.

4.6.5.9 Development alongside Main Road 220

The proposed solar farm is not located alongside Main Road 220 and is therefore not subject to Section 3.2.9 of Chapter E.3 of the DCP.

4.6.5.10 Development in the Vicinity of Cessnock Airport

The proposed solar farm will be located over 1200 m northeast of the northern runway at Cessnock Airport, refer to **Figure 16**. The site is located east of the fixed wing aircraft approach and departure path. Proposed solar panels are glare resistant and are not expected to impact upon aircraft visibility in the vicinity of Cessnock Airport.

Discussions with CASA on the matter of glare and the airport operations suggest that while each airport site should be considered independently, airports without control towers (like Cessnock) are unlikely to be adversely impacted (as visibility from the airport to the plane is not relevant). Spaven Consulting 2011 undertook a review of the potential impacts of solar photovoltaic energy facilities on airports for RPS Planning and Development. The review concluded the following:

- Glare or dazzle to pilots caused by sunlight is the only significant aviation issue likely to be the only potential issue, given the low height of panels and lack of effect on magnetic fields.
- Solar panels are designed to absorb rather than reflect light. Typically panels reflect only 2% of sunlight (98% effective absorption), significantly lower than the glare from direct sun light.
- No evidence could be found of solar energy facilities causing adverse impacts at airports around the world, including at Adelaide Airport (with panels located on the roof of terminal building).

Coloured steel corrugated rooves have a solar adsorption of as low as 23% for light colours increasing to 40-70 % for mid tones and 70-96% for the darker colours, in comparison to solar panels at approximately 98%. Sunpower (2010) provide a further comparison using reflectivity indexes for common materials, that includes:

- Steel: Index of 2.5.
- Standard glass: Index of 1.517.
- Smooth water: Index of 1.333
- Solar glass: Index of 1.329.
- Solar glass with anti-reflective (AR) coating: Index of 1.250.

On this comparison it is evident that solar glass with anti-reflective coatings (as proposed) is likely to reflect about half the light of steel and less than smooth water.

When viewed in the context of the reflective surfaces within the approach path to many major metropolitan airports, (where dwellings extend to within 500 m of the runway and water within



0 20 40 80 metres 1:5,000 GDA 1994 MGA Zone 56 KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com	- Site Boundary - Proposed Solar Farm Boundary - Construction Footprint - Cessnock Airport Runway - Indicative Airport OHLS - Cadastre - Named Watercourse - Arterial Road - Local Road - Track-Vehicular	PROJECT REFERENCE: 20182251 DATE DRAWN: 2017/01/17 14:23 Version 1 DRAWN BY: EDwne DATA SOURCE: Naamap - 2017 DPSI - 2017 Cessnock City Council - 2011	Cessnock Airport OHLS Earthconnect Statement of Environmental Effects Lovedale Solar Farm Wills Hill Rd, Cessnock NSW	FIGURE: 16
---	--	--	--	---------------------------------

100 m), the potential for the proposed solar farm to affect the operation of the Cessnock Airport at a distance of over 1200 m outside of the approach path is likely to be negligible.

The maximum height of solar panels is approximately 3 m, while solar inverters are up to 4.5 m height. The proposed control room is to be single storey with a sloped roof. The tallest structures related to the development will be the power pole and associated lines to a maximum height of 14 m. These heights will not exceed the designated Obstacle Height Limitation Surface (OLS) that is estimated to be in excess of 15.5 m on the approach pathway west of the Subject Land.

With the low reflectivity, low height and location relative to the airport the proposed solar farm is highly unlikely to affect the operations of Cessnock Airport.

4.6.5.11 Singleton Military Area

The Subject Land is located > 10 km from the eastern boundary of the Singleton Military Area. The proposed solar farm will not result in any changes in the local landscape that may affect operations within the Singleton Military Area.

4.6.5.12 Native Vegetation Corridors and Mass Plantings

Black Creek is mapped as a Priority Vegetation Corridor in Figure 11 of Chapter E.3 of the DCP. Priority corridors are established at 20m from the creek line.

The proposed solar array is located in excess of 35 m from the banks of Black Creek, and 20 m from a first order tributary (**Figure 15**). No clearing of vegetation within the mapped Priority Corridor will be undertaken during construction of the solar farm. As part of measures to improve screening to adjoining lands and riparian corridors, plantings of riparian shrubs and groundcover, Redgum and Swamp Oak are proposed on the Subject Land. This is in addition to the 11.5 hectares of remnant and regrowth vegetation retained on the Subject Land partly due to the avoidance incorporated into the solar farm design.

Additional plantings are recommended in the DCP for those developments seeking to maximize the density of tourist accommodation. No tourist development is sought by this application, as such it is not considered relevant. However, the plantings proposed and avoidance of vegetation in the design support the intent of the DCP.

4.6.5.13 Clearing of Vegetation

See **Section 3.8** for an assessment of the environment impacts from the proposed solar farm. The proposed solar farm has been sited to minimise clearing of vegetation within the Subject Land.

An ecological assessment, prepared for the development, has concluded that it will not significantly affect threatened biodiversity in the area. One isolated paddock tree is proposed to be removed by the development.

Plantings proposed for the screening and riparian corridors is considered adequate to offset the loss of the isolated paddock tree.

4.6.5.14 Flora and Fauna Considerations

See **Section 3.8** for an assessment of the proposed development with regards to Flora and Fauna.

4.6.5.15 Aboriginal Archaeology

See **Section 3.9.1** for an assessment of the proposed development with regards to potential Aboriginal Archaeology.

4.6.5.16 European Heritage

See **Section 3.9.2** for an assessment of European Heritage for the proposed development.

4.6.5.17 Water Management Plan

See **Section 3.6** for an assessment of hydrology on the Subject Land. The development will not draw surface or groundwater and will utilise roof collected rainwater for site purposes and emergency fire control. No waste water is likely to be generated by the development.

Key considerations for water management within the development include:

- Erection of panels on pylons requiring minimal excavation or increase in the impervious area on the Subject Land.

- Surface water drainage from the development is on relatively flat land that drains via a first order tributary of Black Creek. Additional plantings on the first order tributary will improve water quality from the site.
- Roof drainage from the control room will be directed to a 22,500L water tank. Overflow will discharge via overland flow to the first order drainage line.
- Erosion and sediment controls implemented during construction.
- Maintenance of a grass across the solar array area, consistent with existing established systems.
- No waste water is likely to be developed by the development. Cleaning of the panels where necessary will utilise water from the captured roof water onsite.

4.6.5.18 Disposal of Waste

Waste management is to be in accordance with **Section 4.6.3.5**

4.6.5.19 Solid Waste

Waste management is to be in accordance with **Section 4.6.3.5**

4.6.5.20 Servicing

See **Section 2.2** for a summary of services for the proposed solar farm.

4.6.5.21 Outdoor lighting

Lighting for the proposed development will consist of low level, shielded security lighting erected around the Control Room, similar to that found on a typical rural house. Given the expanse of panels, and location relative to public areas, security lighting of this area is not warranted.

Shielded task specific lighting may be used on occasion for emergency based maintenance activities.

4.6.5.22 Fencing

It is proposed to maintain typical rural plain wire fencing around the solar array with security fencing or enclosure around the control room, inverters and point of attachment. However, if instructed by electricity authority security fencing will be erected around the perimeter of the whole development.

Given the location of the development and limited visibility from surrounding properties, the provision of rural or security fencing is not expected to affect the rural or viticultural character of the area.

4.6.5.23 Car Parking

See **Section 4.6.3.1** for an assessment of the current design with regards to access and parking. Three spaces will be provided for the operation of the solar farm. Construction parking will occur in nominated areas alongside the access road.

4.6.5.24 Section 94 Contributions

Section 94 contributions will be payable pursuant to Cessnock Section 94A Levy Contributions Plan 2017, that commenced on 20 December 2017, and applies to all relevant development, including those under application, that are not specifically covered by an existing S94 plan.

The levy is calculated at 1% of the estimated development cost, in this case the approximate development cost is \$10,000,000, resulting in a required \$100,000 in S94A contributions.

S94 fees are typically recouped to account for the additional demand on the broader services and facilities that occur as a result of a development (e.g. additional employees moving to area). In this case, with a relatively low employment rate compared to the capital expenditure, that demand on services is likely to be substantially below the fee levied by this contributions plan.

4.7 STRATEGIES

4.7.1 Lower Hunter Regional Conservation Plan

This Lower Hunter Regional Conservation Plan sets out a 25-year program to direct and drive conservation planning and efforts in the Lower Hunter Valley. It has been designed to guide conservation in the Lower Hunter, particularly with respect to the Lower Hunter Regional Strategy.

The Subject Land is contained in lands mapped as having the potential for Spotted Gum Ironbark EEC and threatened woodland birds under the Lower Regional Conservation Plan. The proposed solar farm and associated infrastructure has been sited so as to not impact upon vegetation beyond native and modified grasslands. As such, the construction and maintenance of the proposed solar farm will not impact any EEC listed under the *Environment Protection and Biodiversity Conservation Act 1999* and TSC Act or *Biodiversity Conservation Act 2016*.

4.7.2 Hunter Regional Plan 2036

The Hunter Regional Plan 2036 (HRP) provides an overarching framework to guide development and investment in the Hunter region to 2036. It consolidates strategic planning considerations for land use and infrastructure for 11 local government areas of the Hunter Valley.

The plan is built on the NSW Government's vision for the Hunter Region that is becoming

"The leading regional economy in Australia with a vibrant new metropolitan city at its hearth"

To achieve the vision four regionally focussed goals have been set, these are

- Grow the largest regional economy in Australia
- Protect and connect natural environments
- Support robust regional communities
- Provide greater housing choice and job opportunities

Relevant to the Project and the Subject Land the plan notes and proposes the following

- The Cessnock LGA, including Subject Land is mapped as containing “Solar Energy Potential 15MJ/m²” in Figure 9 of the HRP
- Protect strategic agricultural lands and industry clusters and avoid land use conflicts by improving land use compatibility
- Promoting diversification in the energy sector and encouraging renewable opportunities
- Identify and protect biodiversity values

As demonstrated throughout this SEE, the proposed plan is consistent with the intent of the Hunter Regional Plan 2036

5. SUMMARY OF IMPACTS AND CONTROLS

Table 8 provides a summary of the various environmental aspects of the development, the potential impacts and the controls proposed by the development to avoid or minimise the impacts

Table 8: Summary of environmental impacts and controls

Aspect	Potential Impact	Description	Proposed Controls
Construction	Noise impacts on adjoining properties	- It is considered unlikely that the proposed development will cause neighbouring dwellings to be "noise affected" during construction - No surrounding dwelling will be "highly noise affected"	- Adoption of quieter equipment where reasonable and feasible in preference of noisier equipment - Broadband reverse alarms will be used in lieu of beeper alarms - Machinery is to be turned off when not in use - Contractors are to be informed of courteous noise limiting methods during construction - Investigate complaints and instigate controls where feasible to minimise noise disturbance - Implement relevant controls during construction activities consistent with the Interim Construction Noise Guideline - All contractors are to be informed of courteous driving practices during induction to the site - Contact details of the project manager will be displayed at the entrance to the Subject Land to provide a point of contact for complaints to be made. If any complaints are made by neighbouring landowners, further discussions towards noise mitigation techniques may be made - Adoption of standard controls for noise under the Interim Construction Noise Guidelines
	Air quality / dust impacts on adjoining properties	There is potential for minor nuisance dust on adjoining properties during high wind periods	Implement standard dust control measures during construction including regular dust suppression by water carts, seeding / stabilisation of stockpiles and bare earth as soon as feasible

Aspect	Potential Impact	Description	Proposed Controls
	Minor increases in traffic along Wine Country Drive and Wills Hill Road	- The existing road network and site access from Wills Hill Road are considered adequate to service the development during construction - Expected traffic increases are considered to be negligible during operations	- Prior to the commencement of construction, a Traffic Management Plan will be prepared to address site access during construction - All contractors are to be informed of courteous driving practices during induction to the site
	Security on the site during construction	Negligible potential for vandalism given the remote nature and locality of the Subject Land	Site appropriately fenced to prevent public access
	Safety to site personnel	There is potential for site personnel to be struck by an errant shot from the adjacent driving range	The Hunter Golf Academy – Private Tuition Range (owned by proponent) will need to be closed or risks otherwise managed during construction of the solar farm
	Pollution of water due to sediment or other pollutants leaving the site and entering drainage lines	Without adequate controls there is potential for sediment or possible hydrocarbon (i.e. equipment failure / spills) pollution of adjoining drainage lines to occur during rain events	- Prepare detailed erosion and sedimentation control plan (ESCP) for implementation within Construction Certificate documentation - Spill kits available onsite in event of a spill
	Hazardous Substances	- Diesel fuel and oil will be used by machinery during the construction of the solar farm - Diesel fuel will be carried on service vehicles to the site, and will not be stored on the site - There is limited potential for spills of these substances	- Appropriate spill kits (relevant to the chemicals kept onsite) are carried on the drill rig. Spill kits at a minimum will contain absorbent socks and pillows, chemical specific absorbent materials and personal protective equipment (PPE) - Spills of any chemicals will be assessed and removed from the site consistent with relevant contamination criteria - Any spills with the potential for material harm to the community or environment will be reported to OEH
	Emissions	Exhaust emissions will be generated at the site from equipment and vehicles	- All machinery and equipment used on the site must be maintained to the relevant manufacturer's standards - All vehicles and machinery should be turned off when not in use - Transport of materials from the site is coordinated such that they are carrying the legal capacity of materials to avoid excess vehicle trips to and from site

Aspect	Potential Impact	Description	Proposed Controls
	Waste	Waste generated during construction from offcuts, packaging and site personnel etc	- During construction, a toilet will be maintained on the site and emptied by a third party contractor as required - Appropriate waste bins will be available at the site including those used for products suitable for recycling Bins will be secured/covered to prevent loss and wildlife scavenging - All waste material (e.g. concrete waste) will be contained onsite for the duration of construction (or as necessary) before being disposed of to a facility licenced to accept that material - Erosion and sediment controls, as applied, will be inspected daily and cleared of any waste products - Construction materials, including PPE, will be reused and recycled where practicable - Products with excessive packaging will be avoided where possible - All wastes will be transported in secured or covered waste vehicles

Ecology	Clearing or removal of threatened flora, fauna or communities	Survey of the site identified an EEC on the site. The proposed solar farm has been designed so as to not impact upon the identified EEC and will not require the removal of potential fauna habitat on the site.	- Temporary exclusion fencing will be installed where practical to avoid accidental incursion into surrounding vegetation - Implement best practice erosion and sediment controls - The use of insecticides and herbicides will be avoided where feasible to reduce potential impacts on surrounding vegetation and retain the integrity of habitat for insectivorous bat and amphibian species that may use the creek line and Subject Land - Weed control within areas of retained vegetation within 50 m of the proposed development footprint will be undertaken to enhance the retained vegetation, prevent weed spread into disturbance areas and prevent deterioration of threatened species' habitat - Control of <i>Senecio madagascariensis</i> (Fireweed), <i>Opuntia stricta</i> (Prickly Pear), <i>Anredera cordifolia</i> (Madeira Vine) and <i>Lantana camara</i> (Lantana) is required to be undertaken consistent with the <i>Biosecurity Act 2015</i> - Any other environmental weeds should be controlled, as required - Weed control works will be undertaken by a suitably qualified person with appropriate plant identification skills and chemical application and handling qualifications for works in native vegetation communities - Weed control works in native vegetation communities are to be conducted in accordance with the Bradley method described by Buchanan (1999). This method aims to remove weeds with minimal disturbance and allow native species to re-establish naturally from the existing seed bank and rootstock. The following steps are to be followed when controlling weeds on the site: - Manual weed removal: Where there is native understorey present, dominant weeds will need to be manually treated where possible, - Weed vegetative material collected during weed control activities is to be taken offsite (where practical). This will stop weed material smothering native plants and prevent re-establishment. This material is to be taken to an appropriate waste disposal centre to prevent further weed spread in the region.
---------	---	--	--

Aspect	Potential Impact	Description	Proposed Controls
			Chemical weed control Chemical should be applied only where application to larger weeds can be isolated (ie no broad application) No spraying should be conducted if there is a high potential of spraying native species
	Impacts to native fauna	- Low potential for impacts to native fauna from vehicles accessing the solar farm - Removal of single isolated <i>Eucalyptus tereticornis</i> (Red Gum)	- Speed limits are to be restricted to 40km/h along access tracks - Increased care should be taken when driving around dawn or dusk - Prior to the removal of the <i>Eucalyptus tereticornis</i> tree undertake the following - Daytime inspection for nests and any occupying fauna species - Nocturnal inspection (spotlighting at dusk) by a qualified ecologist, to ensure that no species of fauna are using an unidentified hollow not visible from the ground - If any fauna are identified, the tree must be shaken and then softly felled (ensuring that the hollow is not blocked) and left in situ overnight to allow fauna to vacate - If a nest is present, appropriate measures must be taken to ensure that no eggs or juvenile birds are present during the felling
	Introduction of exotic species	- There is the potential for machinery and equipment to introduce weed species and plant diseases In particular noxious weed species and plant diseases such as Phytophthora Root Rot (<i>Phytophthora cinnamomi</i>) must be considered - Soil disturbance has the potential to increase the prevalence of weed species within the sites	- The spread of weeds will be controlled by ensuring 'new' vehicles and machinery to the site are free of mud or dirt (with the potential to contain seed) and inspected before entering the site - Maintenance of the site is to involve treatment of weed species within the disturbance area

Aspect	Potential Impact	Description	Proposed Controls
Visuals and lighting	Impact to visual qualities of rural area for passing motorists and neighbouring properties	- The proposed solar farm will be visible for a stretch of approximately 200m along Lovedale Rd - The southern side of the solar array will be visible from elevated properties on the southern end of Lovedale Road. However, given the panels are surrounded by vegetation, screened by vegetation on those properties, Black Creek and the golf course and the view will be to the more "broken" face of the rear of the panels the potential for visual impacts is likely to be minor	- Infill vegetation plantings are proposed to screen views of the solar farm from Wine Country Drive, Wills Hill Road and surrounding properties (Figure 4) - Proposed panels will face northwards - Glare resistant panels are to be used, reducing the potential impacts on views of the site from surrounding properties
Safety	Safety of site personnel and damage to infrastructure	There is a potential for golf balls from the Hunter Golf Academy – Private Tuition Range will strike exposed solar panels or site personnel	A 10 high, approximately 100m long mesh screen is to be placed along the southern fenceline, adjacent to the driving range
Heritage	Aboriginal Heritage	- Is within 200m of Black Creek - Is not located in a sand dune system - Is not located on a ridge top, ridge line or headland - Is not located within 200m below or above a cliff face - Within 20m of or in a cave, rock shelter or cave mouth - Is located on lands that have been disturbed and modified through clearing, grubbing, fencing and cropping - The activity involves minimal earth works due to panels being mounted on driven piles	During the construction of the proposed solar farm, work must be stopped and the NSW Office of Environment and Heritage (OEH) must be notified immediately if any Aboriginal artefacts/remains are found. The proponent may then be required to apply for an AHIP for works to continue. Furthermore, consistent with the requirements for protection listed under the <i>National Parks and Wildlife Act 1974</i> if an object of potential Aboriginal heritage is encountered disturbed during site works then works will cease in the immediate vicinity and OEH and the Mindaribba LALC notified accordingly

Aspect	Potential Impact	Description	Proposed Controls
	European Landscape Heritage and	The Subject Land has been mapped as the landscape heritage item "Weronga" under Schedule 5 of the CLEP The proposed development is not expected to significantly impact the heritage values of the Subject Land for the following key reasons • Over 120 m separation between the proposed solar array and the known location of heritage related structures on the site • Remnant and regrowth screening in addition to infill planting to screen the solar farm from the heritage features • Minimal topographical modification required such that the ability to interpret the former heritage values is not lost • Located on lands used historically for grazing and cropping on the far corner of the property, and as such is unlikely to obscure views between internal property features • Will not affect the visibility of the silos from neighbouring lands	• A vegetation screen is to be planted between the solar farm and identified heritage building, preserving the rural amenity of the structures

Aspect	Potential Impact	Description	Proposed Controls
Water	Changes to stormwater flow and quality due to the development	- Water use onsite is limited to isolated cleaning activities and dust suppression. Water will be sourced from water captured from the control panel roof area. - With minimal increase in impervious areas, the pre and post storm water flows are not expected to change significantly. - With minimal excavation of the site, and implementation of buffers from drainage lines and erosion and sediment controls, impacts to water quality are expected to be negligible. - Existing solar facilities demonstrate that grass cover can be maintained beneath panels to limit site erosion. - Runoff from the site is through a first order tributary of Black Creek; the development does not drain directly to Black Creek.	- Erosion and sediment control plan to be implemented during construction. - Roof drainage from the Control Room is directed to a 22,500 L water tank for operational water uses. Overflow will be via grassed overland flow. - Solar array area to be maintained with grassed vegetation cover to limit soil erosion.
	Flooding	- The 1 in 100 year ARI or 1 % AEP flood level for the subject land is estimated to be at 51.5 to 53 m AHD. - Flooding onsite is expected to be dominated by backwater flooding from the first order tributary. - The point of attachment with the main electrical network is located on land above the estimated 1% AEP flood height. - Access to and from the control room is unlikely to be limited by flooding.	- Minimum panel height of 0.8 m above ground. - Inverters and battery elevated 2 m above ground level (and above estimated 1% AEP flood height). - Critical plant within the control room will be elevated above estimated 1% AEP flood height.

6. SUMMARY AND JUSTIFICATION

6.1 SECTION 79C CONSIDERATIONS

Section 79C of the EP&A Act 1979 sets out the matters a consent authority must take into account when determining a development application. These include

“(a) the provisions of:

(i) any environmental planning instrument, and

(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and

(iii) any development control plan, and

(iiia) any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F, and

(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and

(v) any coastal zone management plan (within the meaning of the Coastal Protection Act 1979).”

Comment: Statutory considerations relevant to the proposed development are presented in **Section 4** of this SEE. The assessment indicates that the proposed development is able to be conducted in a manner that is consistent with the objectives and requirements of the applicable planning instruments, plans and the development control plan.

“(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality”.

Comment: Potential impacts associated with the development and the measures proposed to ameliorate any adverse impacts, are detailed in **Sections 3, 4 and 5** of this SEE. The development has been designed such that there are few physical impacts on the environment with the ecology, visibility, traffic, noise and potential land use issues adequately managed or avoided.

“(c) the suitability of the site for the development”

Comment: An analysis of the site is presented in **Section 2** of this SEE. It is considered that the site is well suited for the proposed development. The development has space onsite to account for the solar farm, car parking and the placement of buildings on the site without adversely impacting adjoining land owners utilising their land.

The location of site within the vineyards district is consistent with the ideals of viticulture and tourism through the lowering of the net carbon footprint for the area and also provides improved sustainability for the land owner and area through addition of an industry that is not affected by wine markets or tourism.

The environmental assessment indicated that the proposed development is able to be conducted in accordance with environmental and regulatory guidelines.

“(d) any submission made in accordance with this Act or the regulations”.

Comment: The Development Application will be notified to landowners and occupiers consistent with the DCP. If issues arise which have not been considered by this SEE, the proponent should be afforded an opportunity to address such matters.

“(e) the public interest”.

Comment: The development provides a ‘clean’ source of energy for residents and businesses both inside and outside the Cessnock LGA.

The development is positioned to maximise existing screening and the existing surface topology of the Subject Land. The solar farm and associated infrastructure have been designed to minimise environmental impacts. These matters, combined with the typically low intensity of

use will reduce impacts on the amenity of the area. The development will not adversely affect the land uses permitted on the neighbouring properties.

6.2 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Ecologically Sustainable Development (ESD) is a concept firmly entrenched in New South Wales environmental legislation and government policy. The four guiding principles of ESD, and their relation to the proposal, are outlined below from the EP&A Regulations.

- a) *The precautionary principle*** – namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Based on the environmental investigations associated with this SEE, no threats of serious or irreversible environmental damage or lack of scientific certainty have been identified.

- b) *Inter-generational equity*** – namely, that the present generation should ensure the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

The proposed development is not expected to have any significant long-term, irreversible impacts upon the environment. The proposed solar farm will provide a net benefit with regards to intergenerational equity through providing a sustainable source of energy with minimal changes to the natural environment.

- c) *Conservation of biological diversity and ecological integrity*** – namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

The proposed solar farm has been designed to avoid clearing of remnant Central Hunter Riparian Forest (EEC) or potential fauna habitat trees. The proposed solar farm will not impact upon surface or groundwater hydrology in the locality or the vegetation or fauna that may depend on it.

- d) *Improved valuation and pricing of environmental resources*** – namely, that environmental factors should be included in the valuation of assets and services, such as polluter pays, full life cycle costing, and utilising incentive structures/market mechanisms to meet environmental goals.

The proposed development will make a small, yet meaningful contribution to Australia's effort in meeting its climate change commitments and renewable energy targets and has been designed within the framework the available market mechanisms set to achieve these goals

All waste generated during construction will be required to be recycled or disposed of at the cost to the proponent, providing incentive for the reduction of waste during construction and operation of the solar farm

With the implementation of the mitigation measures provided in this SEE, the development is considered to be able to be conducted in accordance with the principles of ecologically sustainable development

7. CONCLUSION

Kleinfelder on behalf of Earth Connect and the Schwartz Family Company have undertaken an assessment of the proposed 5 MW solar farm to be installed at 66 Wills Hill Road, Lovedale in the Cessnock local government area

The solar farm is permissible within the RU4 Zone pursuant to *State Environmental Planning Policy (Infrastructure) 2007* and is consistent with the objectives of the RU4 Zone and the Vineyards District chapter of the development control plan

The solar farm design has taken into account the ecological, heritage, visual and water constraints on the Subject Land to minimise the potential impacts of the development. The solar farm can be constructed and operated with minimal effects on surrounding land use or the environment

Construction of the solar farm will be undertaken over a period of 5-6 months, and will require the removal of one isolated paddock tree and minimal excavation or modification of the topography. Controls have been developed to minimise the impacts of the development on the environment and surrounding lands during construction

On the basis of the information presented within this Statement of Environmental Effects, the development is well suited to the proposed site and there are no apparent constraints to the granting of approval for this development

8. REFERENCES

Australian Heritage Database (2017) *Commonwealth Heritage List* Australian Government Department of Environment and Heritage, accessed 28 September 2017 <

[http://www.environment.gov.au/cgi-](http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=search_results,state=NSW,list_code=CHL,legal_status=35)

[bin/ahdb/search.pl?mode=search_results,state=NSW,list_code=CHL,legal_status=35](http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=search_results,state=NSW,list_code=CHL,legal_status=35) >

Australian Heritage Database (2017) *National Heritage List* Australian Government Department of Environment and Heritage, accessed 28 September 2017 <

[http://www.environment.gov.au/cgi-](http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=search_results,list_code=NHL,legal_status=65)

[bin/ahdb/search.pl?mode=search_results,list_code=NHL,legal_status=65](http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=search_results,list_code=NHL,legal_status=65) >

Bell, S & Driscoll, C (2008) *Vegetation of the Cessnock-Kurri Region Survey, Classification & Mapping*, Cessnock LGA, New South Wales NSW Department of Environment and Climate Change, ISBN 9781741227482

Bureau of Meteorology (2017) *Climate Statistics for Australian locations Summary statistics Cessnock Airport AWS* Australian Government, accessed 01 November 2017 <

http://www.bom.gov.au/climate/averages/tables/cw_061260.shtml >

Cardno, (2016) *Floodplain Risk Management Study and Plan Report Cessnock City (Black Creek)* Prepared for Cessnock City Council February 2016

Cessnock City Council (2017) *Council Online Mapping. Planning*, Cessnock City Council, accessed 28 September 2017 < <https://www.cessnock.nsw.gov.au/community/about-our-region/Mapping/disclaimer> >

Dial Before You Dig Australia (2017). Job Number 13299306, PelicanCorp, accessed 21 November 2017 < <https://www.1100.com.au/> >

NSW Environment Protection Authority (2017) *Noise Policy for Industry*, State of NSW, 59 Goulburn Street, Sydney NSW 2000

NSW Office of Environment and Heritage 2017 *Search for NSW Heritage* NSW Government, accessed 28 September 2017 <

<http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx> >

NSW Office of Environment and Heritage 2017 *Weronga* NSW Government, accessed 21 November 2017 <

<http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=1340617>
>

NSW Rural Fire Service 2006, *Planning for bush fire protection* NSW Rural Fire Service, Lidcombe NSW 2141, ISBN 0 9751033 2 6

Office of Environment and Heritage (2017) AHIMS Basic Search, NSW Government, accessed 10 October 2017 <

<http://www.environment.nsw.gov.au/awssapp/SimpleSearch.aspx> >

Spaven Consulting (2011), *Solar Photovoltaic Energy Facilities Assessment of Potential for Impact on Aviation* Prepared for RPS Planning & Development Accessed from <https://www.solarchoice.net.au/blog/solar-panels-near-airports-glare-issue/>

Standards Australia (2009), *Construction of buildings in bushfire-prone areas* (AS3959 – 2009), Committee FP-020, ISBN 0 7337 9051 8

Sunpower, (2010), (M Shields) *PV Systems Low Levels of Glare and Reflectance vs Surrounding Environment* Accessed at <https://us.sunpower.com/sites/sunpower/files/media-library/white-papers/wp-pv-systems-low-levels-glare-reflectance-vs-surrounding-environment.pdf>

APPENDIX 1. FLORA AND FAUNA ASSESSMENT

APPENDIX 2. WASTE MANAGEMENT PLAN

APPENDIX 3. STATEMENT OF LIMITATIONS

This report has been prepared by Kleinfelder Australia Pty Ltd (*Kleinfelder*) exclusively for use by Earthconnect Pty Ltd and its assigns only and for the specific purpose to which it refers. This report cannot be reproduced without the written authorisation of Kleinfelder and then can only be reproduced in its entirety. The findings and conclusions presented in this report are relevant to the conditions of the site and the state of legislation currently enacted in the relevant jurisdiction in which the site is located as at the date of this report.

The findings and conclusions contained within this report are made following a review of certain information, reports, correspondence and data noted by methods described in this report including information supplied by Earthconnect Pty Ltd or its assigns. Kleinfelder has designed and managed the program for this report in good faith and in a manner that seeks to confirm the information provided and test its accuracy and completeness. However, Kleinfelder does not provide guarantees or assurances regarding the accuracy, completeness and validity of information and data obtained from these sources and accepts no responsibility for errors or omissions arising from relying on data or conclusions obtained from these sources. Kleinfelder does not make any representation or warranty that the findings and conclusions in this report will be applicable in the future as there may be changes in the condition of the site, applicable legislation or other factors that would affect the findings and conclusions contained in this report. Kleinfelder disclaims any obligation to update the report for events taking place or information becoming available or known to us, after the preparation of this report.

Kleinfelder has used a professional standard of skill and care ordinarily exercised by reputable members of the same profession practicing in the same or similar locality. Kleinfelder accepts no responsibility for errors or omissions arising from relying on data or conclusions provided in studies conducted previously. The findings and conclusions are made assuming that the survey results detailed within this report are accurate and remain applicable to the site at the time of writing. The findings and conclusions are based on representative samples of locations at the site, the intensity of those samples being in accordance with relevant legislation and guidelines. Kleinfelder cannot warrant that the whole overall condition of the site is identical or substantially similar to the representative samples due to the variability over time.

Any representation, statement, opinion or advice expressed or implied in this report is made in good faith but on the basis that Kleinfelder, its agents and employees are not liable to any



other person taking or not taking (as the case may be) action in respect of any representation, statement, opinion or advice referred to above. As may be required, any requests by other persons for reliance upon this report must be provided to Kleinfelder in writing and subject to the terms of Kleinfelder's then effective reliance policy, which Earthconnect Pty Ltd acknowledges includes additional fees and additional terms and conditions. Notwithstanding the foregoing, any duly authorised and competent regulating authority or governmental body whether local, state or federal may rely upon the contents of this report, subject to limitations as stated hereinabove, for the sole purpose of reviewing and evaluating its contents as authorised by any applicable law.