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Mr John Goodall

Program Leader – Building and Development

Armidale Regional Council
PO Box 75A
Armidale NSW 2350

28 October 2019

Our ref: 19ARM 13082

Dear John,

RE: Stringybark Solar Farm DA - 112-2019 - Request for additional information

I am writing on behalf of Stringybark Solar Farm Pty Ltd (the 'Proponent') in response to your email requesting additional information dated 8th October 2019.

This letter is set out under the following headings with appendices supporting each section:

1. RMS submission
2. Potential for contaminated land
3. Potential for leaching from panels

1. RMS Submission

Your email request raises the following issue with respect to the RMS response to the Proposal:

"Given the RMS response [in the attached email] *and the apparent need for the upgrading of the intersection of Gara and Grafton Roads and access to 1060 Grafton Road, it is noted that the BDAR undertaken for the development has not taken these matters into consideration. As the works, particularly on Grafton Road, will potentially impact on native vegetation it is considered that these matters should be addressed in the BDAR for the development".*

Proponent Response:

In response to your request to address the potential impact on native vegetation associated with any future works required to upgrade the intersection of Grafton Road and Gara Road, as well as the access at 1060 Grafton Road, a conceptual design (requested by RMS) based on Austroads specifications has been completed for each intersection (attached as Appendix A). Based on this footprint, a BDAR assessment is currently being undertaken, which will be provided to the Council on Thursday the 31st of October, 2019. With respect to the other responses provided by RMS, it is considered appropriate that these matters be addressed post-consent, as part of the conditioning process, during detailed design. However, the following is noted:

- In regard to potential cumulative impacts associated with other proposed developments in the vicinity of the proposed Stringybark Solar Farm, it is not possible to provide an accurate response at this point in time, given current uncertainty regarding the viability, timing and final specifications associated with the listed developments.

- While the BDAR takes into account the possibility of the intersection of Grafton Road and Gara Road being developed as a BAR/BAL, the Proponent does not agree with RMS that there would necessarily be traffic movements from the substation site to the array site.

- It is noted that RMS has raised the issue of swept path analysis regarding access points. Both intersections relating to Waterfall Way will be upgraded to an agreed standard with RMS during the WAD process. The concept designs will safely accommodate 19m semi-trailers.

- Provision for parking at both locations has been outlined in the Statement of Environmental Effects (SEE).

- It is envisioned that the mini buses will be provided by a local contractor, as such the contractor would need to ensure that they have suitable parking in Armidale.

2. Potential for contaminated land

The Council has requested further clarification regarding the assessment for potential contamination to occur onsite based on the horticultural/agricultural activities previously undertaken at the Site:

***"SEPP No 55** – As specified within the SEE, under Clause 7 of the SEPP, a consent authority must not consent to the carrying out of any development on land unless it has taken into consideration the matters specified in (a)- (c). In this regard, it is noted that the SEE has provided some commented on this, but it is considered that some additional detail should be provided as agricultural /horticultural activities are identified under the Planning Guidelines for Managing Land Contaminated as an activity that may cause contamination. As such, some additional assessment and detail such as a PSI should be provided to Council advising of matters such as previous ownership, site history and uses, and the location if any, of any sites on the property such as sheep dips etc. that may have used chemicals in the treatment of animals that may have leached into the soils".*

Proponent Response:

As submitted, the SEE provided baseline advice regarding potential for contamination at the Site, including database searches and on-ground inspections as part of the biodiversity, heritage, agronomy and strategic planning assessment processes.

Cognisant of the requirements to address SEPP 55 as part of the approvals process, a separate, stand-alone Preliminary Site Investigation (PSI) has been undertaken in response to Council's request, and is attached to this letter as Appendix B. The PSI provides additional information regarding previous ownership, site history and land use, as well as an integrated response to on-ground assessments for potential contamination.

The PSI found no evidence suggesting prior contamination at the Site and concludes that further assessment is not warranted.

3. Potential for leaching from panels

Council has raised an issue around the potential for the leaching of toxic materials from panels:

Council has reviewed the environmental pollution components of the Stringybark Solar Farm Statement of Environmental Effects and attempted to cross-reference findings and some concerns raised in public submissions with an array of scholarly scientific literature. While extant literature on solar modules' contamination of the environment is conflicting on a number of analytic metrics, and on spatiotemporal differences, there are some studies that appear to point toward rainwater-leaching and life-cycle toxicity of cadmium, copper, lead, silver, nickel, tin and zinc from solar modules. For example, silver and zinc were leached from operational intact and damaged solar modules observed for 6 months in Denmark (see Figure 1). Another study showed that copper (I) thiocyanate and lead (II) iodide can leach out quickly during PV use phase.

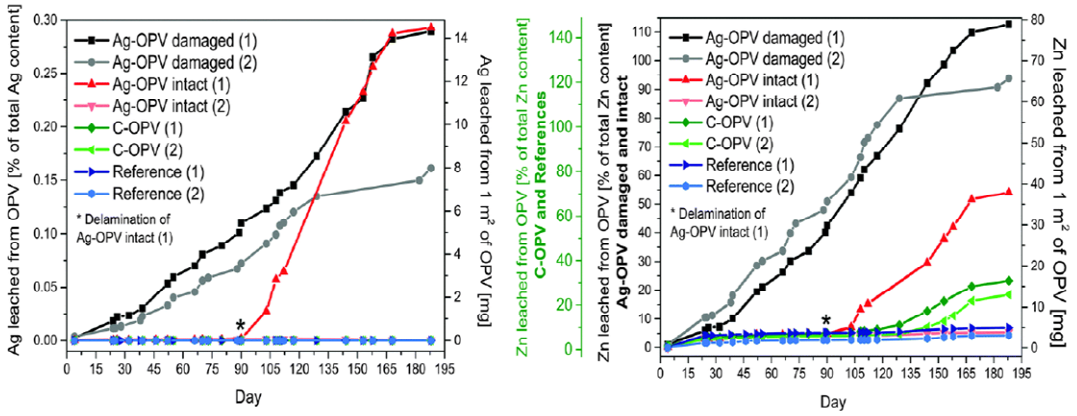

Figure 1: Cumulative silver (left) and zinc leaching from the samples in the rain run-off experiment conducted in duplicate. The amounts are expressed in mg per m2 of Organic photovoltaics (OPV) (right axis) and the corresponding share of leached material (left axis).

However, extensive search of databases and currently operational solar farms in Australia and elsewhere reveals inadequate issue-based and data-driven precedents that can support specific decisions – refusal or approval – in cross-examinations and assessments of solar farm development proposals. Pervasive arguments thus far focus on comparing the toxic metal releases of the photovoltaic cells (PVs) to today's coal power plants, where it's seen that the metal emissions from PVs are expected to be several times less than the emissions from coal. So, the cleaner energy race in the present energy mix is a selection of lesser devil, or alternative(s) with least polluting potential.

Suggestions/recommendations

As such, could you please provide some manufacturing details of the solar panels. It is noted in a number of studies that encapsulation of some PV structural components reduces potential incidence of rainwater-induced leaching. Consequently, newer PVs have solder and other components produced without lead and toxic metals.

Proponent response:

There is no clear evidence that the leaching of toxic elements from solar panels during the operational phase is an environmental issue in Australia or abroad (see for example Robinson and Meindi, 2019). Although there are a number of materials used in the manufacture of Panels that are considered toxic, "*for <u>intact</u> PV panels, leaching of these elements is unlikely to occur*" because they are encased in a

number of protective layers as explained below (Robinson and Meindi, 2019, emphasis added). During the manufacturing process of a solar panel, the PV cells are typically encapsulated in a clear hardened resin with strengthened glass protecting the front side, as well as a back side made from a polymer such as Tedlar PVF material (Clean Energy Review, 2019). The completed panel is then further protected by an aluminium frame.

These features protect the panel from the environment including extremes in temperature, rainfall, hail and humidity (Clean Energy Review, 2019). A robust design, combined with a standard 25-year warranty (DNV-GL, 2017) ensures that the likelihood of cell material being exposed to the environment is very low. Indeed, discussions with manufacturers on this point support this view, with one Australian manufacturer stating that: "*In a high-quality module, the encapsulant prevents the deterioration and emission of these elements from the module*". The full reply from the manufacturer is provided as Appendix C to this letter.

Nonetheless, the following procedures would be adopted to ensure that; firstly, panels are unlikely to become structurally compromised; and secondly, if panels do become compromised, potential environmental effects will be avoided:

1. **Due Diligence Process**
   As a minimum, panels should meet the Australian standard AS/NZS 5033 for photovoltaic modules and the international standard IEC 62804 (Clean Energy Council, 2018); panels should be backed by a 25 year warranty (DNVGL, 2017); and panels should be tested and checked for structural deficiencies (particularly after delivery to site and before installation).
2. **Robust operational protocols governing procedures for ensuring panel integrity**
   The Operation Environmental Management Plan (OMEP) would include clear provisions for routinely checking panels to ensure structural integrity and performance throughout the operational period. Any panel found to be defective would be assessed and dealt with in line with the requirements of the WARR (2001) and POEO (2014) Acts (See Section 7.13.3, pg 113 on panel recycling).

Lastly, it should be noted that Organic Solar Panels (referred to in Figure 1 in the correspondence provided by Council) are not available for commercial use for utility scale solar farms due to a current lack of commercially viable technology and would not be considered for the Proposal.

I trust that the information above provides adequate detail for your assessment but please do not hesitate to contact me should you have any further questions.

Yours sincerely,

Robert Cawley
Senior Consultant

References

Clean Energy Council. (2018). *Product Assurance Program*. Accessed on 14 October 2019. Available from https://assets.cleanenergycouncil.org.au/documents/products/2018-products-annual-report.pdf.

Clean Energy Review. (2019). *Solar Panel Construction*. Accessed on 15 October 2019, Available at: https://www.cleanenergyreviews.info/blog/solar-panel-components-construction.

DNV-GL. (2017). *PV Module Reliability Scorecard*. Report. Available from www.dnvgl.com.

Robinson, S. and Meindi, G. (2019). *Potential for leaching of heavy metals and metalloids from crystalline silicon photovoltaic systems*. Journal of Natural Resources and Development 2019: 09: 19-24. Accessed on 15.10.2019, Available at: https://www.jnrd.info/2019/05/10-5027-jnrd-v9i0-02/.

Appendix A Intersection Concept Design

REV	DATE	REVISION DETAILS	APPROVED
B	18-10-19	FOR INTERNAL REVIEW	MB
A	17-10-19	FOR INTERNAL REVIEW	MB

DRAWN	L. YOUNG
DESIGNED	L. YOUNG
CHECKED	M. BLOEM
APPROVED	M. BLOEM

PROJECT

SOLAR FARM TRAFFIC & TRANSPORT ASSESSMENT

DRAWING TITLE

OLIVE GROVE ACCESS STRATEGY

CLIENT

constructive solutions
providing total solutions

PRELIMINARY

CSPL PROJECT No.	SIZE
201948	A1
DRAWING NUMBER	**REV**
201948-003	B

PLAN LAYOUT
1:250

REV	DATE	REVISION DETAILS	APPROVED
B	18-10-19	FOR INTERNAL REVIEW	MB
A	17-10-19	FOR INTERNAL REVIEW	MB

DRAWN	L. YOUNG
DESIGNED	L. YOUNG
CHECKED	M. BLOEM
APPROVED	M. BLOEM

PROJECT

SOLAR FARM TRAFFIC & TRANSPORT ASSESSMENT

DRAWING TITLE

GARA ROAD ACCESS STRATEGY

CLIENT

constructive solutions
providing total solutions

PRELIMINARY

CSPL PROJECT No.	SIZE
201948	A1
DRAWING NUMBER	REV
201948-002	B

Appendix B Preliminary Site Investigation (PSI)

Stringybark Solar Farm Preliminary Site Investigation

Stringybark Solar Farm Pty Ltd

ecological AUSTRALIA
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DOCUMENT TRACKING

Project Name	Stringybark Solar Farm Preliminary Site Investigation
Project Number	19ARM - 13082
Project Manager	Robert Cawley
Prepared by	Matt Elsley, Kate Blackwood, Eliza Biggs
Reviewed by	Robert Cawley
Approved by	Robert Cawley
Status	**Final**
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Last saved on	**28 October 2019**

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Template 2.8.1

Contents

List of Figures

List of Tables

Abbreviations

Abbreviation	Description
AHD	Australian Height Datum
Armidale LEP	*Armidale Dumaresq Local Environment Plan 2012*
CLM Act	*Contaminated Land Management Act 1997*
DA	Development Application
ELA	Eco Logical Australia Pty Ltd
EPA	Environmental Protection Agency
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environment Protection Licence
ha	Hectare
kV	Kilovolt
LEP	Local Environment Plan
LGA	Local Government Area
MW	Megawatt
OEH	Office of Environment and Heritage
POEO Act	*Protection of the Environment Operations Act 1997*
Proponent, the	Stringybark Solar Farm Pty Ltd
Proposed Development	Stringybark Solar Farm
PSI	Preliminary Site Investigation
PV	Photovoltaic
RU1	Primary Production land use zone
SEE	Statement of Environmental Effects
SEPP 55	*State Environmental Planning Policy No. 55 – Remediation of Land*

Executive Summary

This Preliminary Site Investigation has been prepared on behalf of Stringybark Solar Farm Pty Ltd to support a Development Application to build and operate a utility-scale photovoltaic solar farm of up to 29.9 megawatts, including a new substation located approximately 14 km east of Armidale, NSW, in the Armidale Regional Council Local Government Area.

A Preliminary Site Investigation was requested by Armidale Regional Council to provide evidence that the Site has been assessed for possible contamination to the satisfaction of *State Environmental Planning Policy 55 – Remediation of Land*.

The Proposed Development comprises approximately 94 ha within the following landholdings:

- 597 Gara Road, Metz, NSW, 2350 (Lot 3 DP 1206469) – proposed for the Development Envelope which would contain the solar panel array area and associated infrastructure
- 1060 Waterfall Way, Metz, NSW, 2350 (Lot 3 DP 786950 and Lot 13 DP 822753) – proposed for a new substation, that would connect to an existing 66 kV powerline that runs through the landholding, and associated infrastructure.

This Preliminary Site Investigation, comprising desktop site assessment, preliminary contamination assessment, including examination of current and historical land use, and multiple site inspections has determined there is a very low potential for land and water contamination and further assessment is not warranted.

1. Introduction

This Preliminary Site Investigation (PSI) has been prepared on behalf of Stringybark Solar Farm Pty Ltd (the Proponent) to support a Development Application (DA) to build and operate a utility-scale photovoltaic (PV) solar farm of up to 29.9 megawatts (MW) including a substation (Proposed Development).

This PSI has been prepared to provide evidence that the land on which the Proposed Development is located (the Site) has been assessed for possible contamination. The Site is approximately 14 km east of Armidale, NSW, in the Armidale Regional Council Local Government Area (LGA). It is currently accessible via Gara Road to the south and Waterfall Way/Grafton Road to the north (**Error! Reference source not found.**).

The Proposed Development comprises land within the following landholdings:

- 597 Gara Road, Metz, NSW, 2350 (Lot 3 DP 1206469) – proposed for the Development Envelope which would contain the solar panel array area and associated infrastructure; and
- 1060 Waterfall Way, Metz, NSW, 2350 (Lot 3 DP 786950 and Lot 13 DP 822753) – proposed for a new substation, that would connect to an existing 66 kV powerline that runs through the landholding, and associated infrastructure.

The Site consists of the approximately 91 ha Development Envelope in conjunction with an additional 2.3 ha accounting for the Substation Location Area and its new access way, and an underground connection cable within a 2 m easement (0.4 ha). The Site is shown in **Error! Reference source not found.**.

The Development Envelope has been strategically located in the most disturbed southern section of the 597 Gara Road landholding, adjacent to Gara Road, to minimise impacts to native vegetation. This area has been historically cleared for grazing purposes and, apart from 1st and 2nd order drainage lines, the Development Envelope is relatively featureless (no farm buildings or any other associated agricultural infrastructure) and as such, is very suitable for solar development.

The substation would be located adjacent to an Essential Energy 66 kV distribution line, 1.5 km to the north-west of the Development Envelope. The location of the substation is within an unsuccessful section of an Olive Grove, which has not been actively managed since it was planted. The location has been selected in order to minimise potential visual impacts associated with the Proposed Development and fine-tuned to minimise impacts to biodiversity and Bush Fire Prone Land.

1.1 Objectives of the Preliminary Site Investigation

Clause 7(1) of *State Environmental Planning Policy 55 – Remediation of Land* (SEPP 55) requires that land contamination must be considered as part of a Development Application, and should consider both current and historical use of the land in question.

The objectives of this PSI are to:

- Identify past and present potentially contaminating activities;
- Identify potential contamination types;
- Determine the potential for land contamination and identify potential land use constraints; and
- Provide recommendations for further assessment and or management, as required.

1.2 Scope of Works

In order to achieve the above objectives, the following scope of works was undertaken:

- Desktop site assessment, comprising:
  - Property details and location;
  - Site zoning;
  - Current and proposed land use;
  - Surrounding land use;
  - Physical setting, including topography, geology, soils and hydrology and
  - Groundwater records.
- Preliminary Contamination Assessment, comprising:
  - NSW EPA contaminated land and licenced premises search;
  - Dangerous Goods search;
  - Review of current and historical title certificates;
  - Consideration of historic building plans;
  - Landholder interviews regarding current and past land use of the site; and
  - Review of aerial imagery.
- Site inspection; and
- Preparation of this PSI.

2. Desktop Site Assessment

2.1 Site Information

Site information is provided in Table 1.

Table 1: Summary of site details

Parameter	Information
Site Location:	• Part of Lot 3 DP 1206469 (597 Gara Road, Metz) • Part of Lot 3 DP 786950 & part of Lot 13 DP 822753 (1060 Waterfall Way, Metz)
Area:	Approximately 94 ha
Current Zoning:	RU1 – Primary Production under *Armidale Dumaresq Local Environment Plan 2012* (Armidale LEP)
Current Land use:	Agriculture with ancillary residential dwellings (outside of the Proposal Site).
Proposed Land use:	Electricity Generating Works (Solar Farm)
Surrounding Land use:	Land surrounding the Site is primarily used for agricultural activities and is zoned RU1. The newly developed Armidale Regional Landfill is located north of the Development Envelope (Lot 1 DP 1206469). At the time of writing, construction for the landfill is well advanced, however, the landfill is not operational.

2.2 Site Topography, Geology and Hydrology

Details of site topography, geology and hydrology are provided in Table 2.

Table 2: Summary of site topography, geology and hydrology

Parameter	Information
Topography:	The Development Envelope is located within an undulating landscape, where elevation ranges between 940 – 980 m Australian Height Datum (AHD), and slopes gently to the south. The Substation Location Area is located north-west of the Development Envelope in a similar landscape, where elevation ranges between 980 m – 990 m AHD.
Geology:	The Site lies within the New England Orogen and is located on the Sandon Beds, and Girrakool Beds underlie parts of the Site. The Soil Landscapes of the Armidale mapsheet (King, 2009) covers the Site, and identified the following soil landscapes occurring under the Site (Figure 2): • Middle Earth - occurring on the undulating plains, rise and footslopes of the Sandon Beds • Argyle - occurring on the rolling low hills and occasional hills on greywacke/chert and related sediments. Middle Earth is the dominant landscape unit, while the Argyle landscape is restricted to higher elevations in the north of the Development Envelope. These soil landscapes have an erodibility potential ranging from moderate to very high. The Site is dominated by Kurosols and Kandosols.
Acid sulfate soils:	The Australian Soil Resource Information System online data base indicates that there is a low probability of occurrence of acid sulfate soils within the Development Envelope, the Substation Location Area, and in the surrounding area (Fitzpatrick, Powell & Marvanek 2011). The Site is at high altitude approximately 110 km from the coast, and as such the potential for acid sulfate soils to occur is negligible. Additionally, based on the soil landscapes, iron sulphide minerals or their oxidation products are not abundant in the soil profile, hence sulfuric acid is unlikely to be produced as a result of ground disturbance.

Parameter	Information
Land and Soil Capability	The Middle Earth landscape in the majority of the Site has severe limitations (Class 5) for more intensive agricultural use other than grazing, but remains suitable for a variety of land uses if careful management to prevent long-term degradation is implemented. The Development Envelope is interspersed with patches of lower capability land (Class 6) associated with the Argyle landscape, and land capability is restricted to low impact land uses.
Hydrology	The Development Envelope contains ephemeral 1st and 2nd order streams (Strahler, 1952) intercepted by a number of farm dams. The Substation Location Area contains no surface water bodies.

2.3 Groundwater

The Site does not contain any groundwater bores, however a review of the WaterNSW (n.d.) online All Groundwater Map and the BoM (2018) Groundwater Explorer database identifies two bores within a 2 km radius of the Site, both used for stock and domestic purposes (**Error! Reference source not found.** of the SEE; WaterNSW, n.d.). Data for these bores (GW305317 and GW307568) indicates relatively deep groundwater levels, with standing water level (SWL) depths of 31.4 metres below ground level (mbgl) and 19 mbgl, respectively (Table 3).

Table 3: Observed yields and depths of nearby bores

Bore ID	Latitude	Longitude	Registered use	Total depth (m)	SWL (mbgl)	Yield (L/s)	Salinity
GW305317	-30.552745	151.781245	Stock/Domestic	38.72	31.4	0.76	potable
GW307568	-30.561664	151.765009	Stock	61	19	0.3	potable

Available groundwater yield records suggest the fractured rock aquifer has low productivity with reported groundwater yields of < 1 L/s. Limited baseline groundwater quality data is available, with the salinity of the bores merely being described as potable. The use of groundwater for stock and domestic purposes, implies fitness for purpose.

Figure 1: Site location

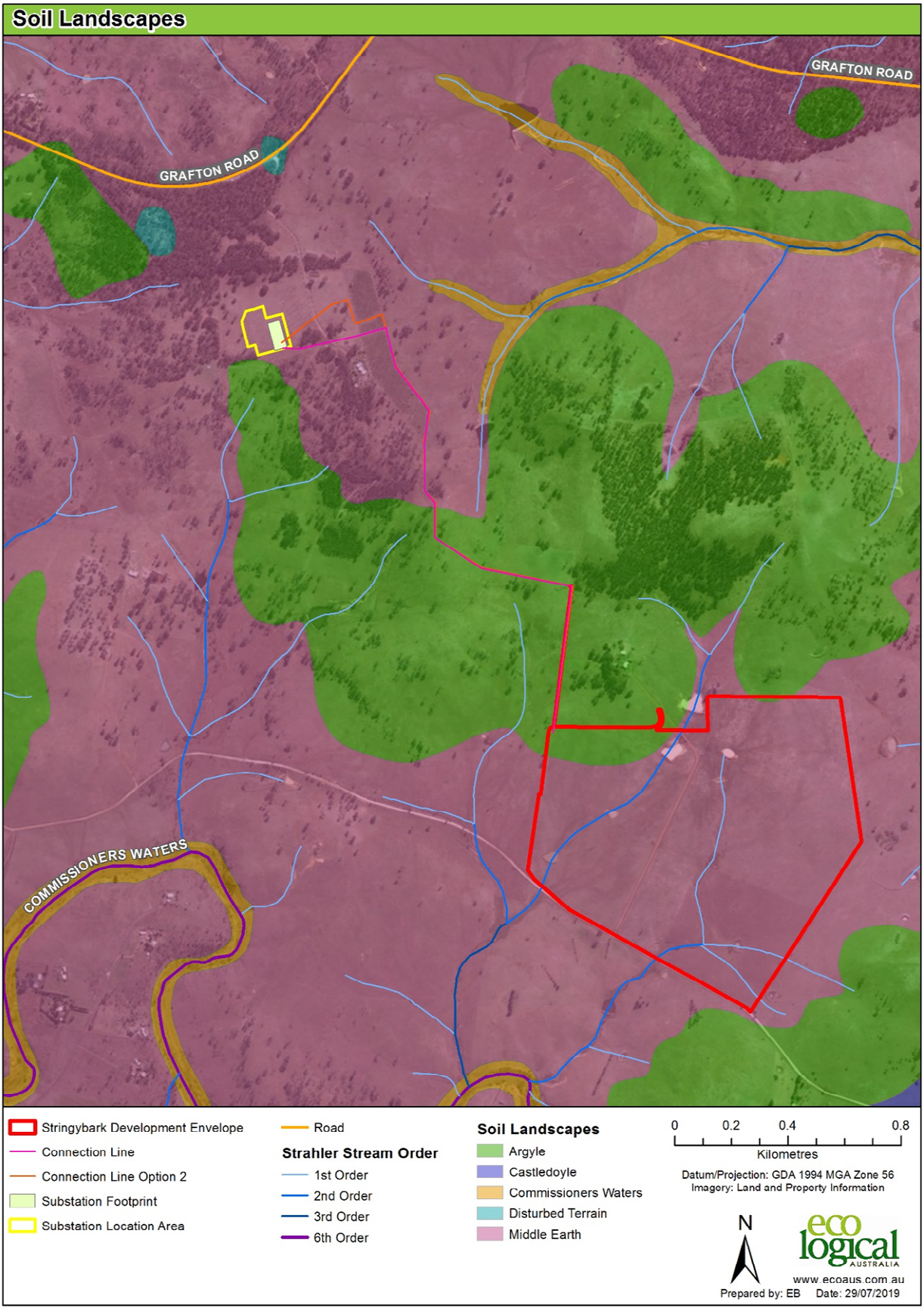

Figure 2: Soil landscapes in the Site and surrounds (King, 2009)

3. Preliminary Contamination Assessment

3.1 NSW EPA records – Contaminated Lands Search

A review of the NSW EPA Contaminated Land Records under section 58 of the *Contaminated Land Management Act 1997* (CLM Act) and the List of NSW contaminated sites notified to the NSW EPA under section 60 of CLM Act, did not reveal any registered contaminated land sites within or surrounding the Development Envelope or Substation Location Area.

A review of premises currently regulated by an Environmental Pollution Licence (EPL) under the *Protection of the Environment Operations Act 1997* (POEO Act) and premises that are no longer required to be licensed under the POEO Act, did not reveal any identified premises within or surrounding the Site. The new Armidale Landfill is located north of the Development Envelope, however at the time of this assessment, the landfill had not yet been commissioned, and an EPL not yet issued.

3.2 Dangerous Goods Search

Due to the nature of the Site as greenfield, and the lack of any indicators in this assessment suggesting historical commercial/industrial development, a dangerous goods search is not deemed necessary as part of this assessment. Risks associated with encountering underground storage tanks or surface stores of dangerous goods is considered to be low.

3.3 Land Title Search Results

Land title searches for both the Development Envelope and the Substation Location were undertaken to assess land use change which may suggest potential change in use and/or activities that may be associated with potential contamination risk.

Land upon which both the Development Envelope and the Substation Location Area are located have been subject to numerous land title applications and sales, however, the land-use of the site has not changed throughout this period. Key events are identified below.

Development Envelope – part of Lot 3 DP 1206469

- Date of Grant - 1919
- A paper road at Lot 1 DP 820271 was transferred to the landholding on 25 October 1993. The Lot was de-registered and it is assumed to have been consolidated into Lot 3 DP 1206469

Substation Location – part of Lot 3 DP 786950 and Lot 13 DP 822753

- Date of Grant - 1905
- Lease Conveyancing Records indicated that paper roads comprising Lot 3 DP 786950 and Lot 13 of DP 822753 received Certificate of Torrens Title on 16/1/1997.

From the information available, the primary land-use of all landholders throughout the title history of this site has been for the agricultural grazing purposes. This continuous history implies low potential for contaminating uses or intensive industries.

3.4 Historical Building Plans and / or Records

Historic building plans and / or records were not investigated as part of this PSI due to:

- The current and historical uses of the site comprise of grazing areas;
- An absence of contemporary buildings and/or structures within both the Substation Location Area and Development Footprint;
- Archaeological and LiDAR assessment that do not indicate historical works or buildings; and
- A search of Heritage databases conducted on 25 October 2019, which found no previously recorded historic heritage items within the Site.

3.5 Landholders Interview

Current landholders were interviewed to ascertain current land-use associated with the Site, their knowledge of past land uses, chemical use and storage. Responses are provided in Table 4.

Table 4: Results of interviewing key people current and past land use

Question/ Discussion Topic	Answer
Landowner 1 – Development Envelope and underground connection cable	
How long has the current landholder been on the property, and during this time what has their land-use been; what types of chemicals or products have they used as a result of their main use of the site?	The current landowners have owned the site from 2016, during which sheep and cattle grazing has been the only agricultural activity on Site. Paraquat was used for weed suppression in November 2016 in accordance with label directions.
Is the landholder aware of any previous historic land use and what did the site look like when they began ownership?	The previous landowner owned the Site between 1993 – 2016. During this time Landowner 1 understands that the site was primarily used for grazing and some cropping.
Any other historical information they may have, or contamination issues they may have noticed during their time of ownership of the site.	All infrastructure to support agricultural activities such as farm buildings and cattle and sheep yards have, to the landowner's knowledge, been located outside the Site area on other parts of the Property. No extra information is known, with no issues of contamination evident at the Site.
Landowner 2 – Substation Location Area and underground connection cable	
How long has the current landholder been on the property, and during this time what has their land-use been; what types of chemicals or products have they used as a result of their main use of the site?	The current landowners have owned the site from 1997, during which grazing and the planting of a 10 ha Olive Grove was undertaken on the wider property. The Substation Location Area has been located within an unsuccessful area of the olive plantation, which has not been actively managed since it was planted. Roundup has been used for weed suppression in the olive grove and wider property, as well as Grazon for blackberry control.
Is the landholder aware of any previous historic land use and what did the site look like when they began ownership?	Between 1989 – 1997 the site was owned by the current landowners' parents. During this time the site was used for grazing and partial clearing for timber milling.
Any other historical information they may have, or contamination issues they may have noticed during their time of ownership of the site.	No infrastructure such as farm buildings, sheep or cattle yards or chemical storage sites have been located within the substation location area to the knowledge of the landowner. No extra information is known, with no issues of contamination evident at the Site

3.6 Aerial Imagery Review

Currently available online aerial imagery sources (e.g. Google maps, Google Earth, SIX Maps) were reviewed to assess evidence of current and prior land use activities which may indicate potential for contamination. No evidence of risk factors were identified within the available resources assessed.

Because of the continuous grazing history and the assessed low-probability risk for contamination, historic aerial photography (the earliest of which captured is from 1943) is not deemed necessary for this PSI. The lack of changes in land-use and previous structures or installations indicates a very low risk for contamination.

4. Site Inspection

A site inspection comprising representatives from Eco Logical Australia (environmental consultants), GrazAg (agronomist) and Stringybark Solar Farm Pty Ltd (Proponent) was undertaken on 17 October 2019, during which evidence of current and/or prior land use and contamination risks were discussed and assessed.

In addition, as part of the broader assessment process for the Proposal, ecologists, archaeologists and environmental consultants have visited and traversed the entirety of the Site on multiple occasions.

During all of these activities, no evidence was observed that indicated previous site contamination, or that suggested previous major land-use changes. Specifically, the following were NOT observed:

- Sheep dips or intensive animal handling facilities;
- Portions of unusually bare or discoloured soils;
- Scums or discoloured waterbodies;
- Operational, or disused, sheds or other built structures;
- Chemical storage facilities;
- Evidence of land-based waste disposal or dumping; and
- Evidence of land disturbance, filling or excavation.

5. Areas of Environmental Concern

This assessment has found no areas of environmental concern in relation to contamination within the Site.

6. Conclusions

Based on a review of the site history data and contemporary investigations, the following observations are made:

- The Site comprises open grassland, with scattered areas of woodland, which has been historically cleared and used for agricultural purposes;
- No evidence of other historical land uses (such as commercial/industrial), which have the potential to cause contamination, have occurred on the Site;
- Database searches, land title searches, aerial imagery and landholder interviews provide no indication of potential contamination within the Site; and
- A site inspection did not identify evidence to suspect potential contamination within the Site.

This Preliminary Site Investigation, comprising desktop site assessment, preliminary contamination assessment, including examination of current and historical land use, and multiple site assessments, concludes that there is a very low potential for land and/or water contamination and that further assessment is not warranted. Specifically:

- Pursuant to clause 7 of the *State Environmental Planning Policy No 55 – Remediation of Land*, there is no apparent reason to consider that land to be utilised by the Proposal would be contaminated; and
- Based on the information provided in this report, no further assessment of contamination is required to determine the suitability of the subject land for the Proposal.

References

Armidale Dumaresq Council. (2012). *Local Environmental Plan 2012*.

Armidale Regional Council. (2019). *New Landfill - Armidale Regional Council*. Retrieved from https://www.armidaleregional.nsw.gov.au/council/newsroom/works-and-projects/new-landfill. Accessed 13 August 2019

Bureau of Meteorology (BoM). (2018). *Groundwater Explorer database.* Retrieved from http://www.bom.gov.au/water/groundwater/explorer/map.shtml

Fitzpatrick, R., Powell, B. & Marvanek, S. (2011). *Atlas of Australian Acid Sulfate Soils v2*. Retrieved from http://doi.org/10.4225/08/512E79A0BC589. Accessed 5 June 2019.

King, D. (2009). *Soil Landscapes of the Armidale 1:100,000 Sheet.* NSW Department of Environment and Climate Change, Sydney.

WaterNSW. (n.d.). *All Groundwater Map*. Retrieved from https://realtimedata.waternsw.com.au/?ppbm=206_MACLEAY&ag&1&aglm_org

NSW EPA. (2019). *POEO Public Register Search: Armidale*. Retrieved from https://apps.epa.nsw.gov.au/prpoeoapp/SearchResult.aspx?SearchTag=all&searchrange=general&range=general. Accessed 28 October 2019.

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Appendix C Tindo Solar Manufacturer response

Biggs, Eliza

From: Richard Seymour
Sent: Thursday, 24 October 2019 1:09 PM
To: Richard Seymour
Subject: Additional information re DA-112-2019

From: Robert Sporne [mailto:robert.sporne@tindosolar.com]
Sent: Wednesday, 16 October 2019 3:43 PM
To: Richard Seymour <R.Seymour@infinergy.co.uk>
Subject: Re: Fw: Additional information re DA-112-2019

Hi Richard,

Thanks for your call today.

Regarding the charts provided, they are for organic photo voltaic systems. The typical installation of solar farms in Australia is of the form of Crystalline Silicon Photo Voltaics. There is no zinc present inside these modules and minimal silver.

In a high quality module, the encapsulant prevents the deterioration and emission of these elements from the module. I have seen no evidence of any leakage of heavy metals or dangerous chemicals from C-Si modules.

If a module glass smashed in the field and was left for an extended period of time before replacement, it is conceivable that some corrosion could take place and under the right circumstances of heavy rain some silver could leave the module. This can be mitigated by the close monitoring and ongoing maintenance of the array to ensure this type of loss is picked up before corrosion occurs.

If you would like some more expert advice you might like to contact Renate who has experience in providing expert testimony. She currently works for UNSW and has access to suitable research resources. Her email is renate@solaranalytics.com.au.

Thank you

Robert Sporne

General Manager

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http://www.youtube.com/watch?v=9huyt02r_Ww