Submission Re:
New England Solar Farm
Application Number SSD 18_9255

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1. Introduction

This submission refers to the following documents and methodologies, and uses the following abbreviations:

(NES)	*Proposed New England Solar Project*
(EIS)	*Environmental Impact Statement of the NES project*
(SEA)	*Soil Erosion Assessment – Appendix G of the EIS*
(SWA)	*Surface Water Assessment – Appendix H of the EIS*
(MUS:S&C)	*Managing Urban Stormwater: Soils and Construction: Volume 1, March 2004*
(RUSLE)	*Revised Universal Soil Loss Equation*

By way of personal introduction, I have extensive professional and academic experience in mathematical modelling, including research and teaching service courses in mathematics for Rural Sciences and Natural Resources students at UNE Armidale. I regard myself to be more than sufficiently qualified to understand the principles of these published assessments (SEA and SWA), and in particular the mathematical principles of the RUSLE methodology adopted.

Also, I have been a resident of both the Uralla and Dumaresq Shires since 1971, and a frequent bushwalker in the Oxley Wild Rivers National Park throughout my residency. I am acutely aware of how improved land management practices in the last five decades have seen astonishing improvements in the local tablelands watercourses; in reducing erosion, sediment and contaminant mobilisation through the watercourses, and consequential improvements in the downstream water quality, with untold improvements for the flora and fauna in the pristine wilderness of this gorge country. These depend so much on the health of the tablelands catchments.

After close reading and analysis of the documents above, **I have come to the inescapable conclusion that, in consideration of the matter of soil erosion alone, the NES project represents an extreme and unacceptable risk of significant and potentially catastrophic environmental degradation of the Salisbury Waters catchment and downstream Macleay River watercourses.**

Simply put, using the figures presented in the SEA, the NES project could see the mobilisation of potentially <u>hundreds of thousands of tonnes of sediment every year</u>, through soil erosion, directly into the Salisbury Waters watercourse and its tributaries. This could occur not only throughout the construction stage but continue for the duration of its operational phase. The conclusions of the SEA and subsequently the SWA that this represents a manageably “low risk” is in my opinion deeply flawed (apparently based on risk assessment principles for managing the effects of urban development on urban stormwater).

On this basis alone, the entire project should be abandoned.

2. Analysis of SEA and SWA Assessments

The assumptions, data and application of the RUSLE methodology adopted in the SEA are for the most part conservative and acceptable, however there are significant omissions leading to the flawed “low risk” assessment that are not properly addressed in either the SEA or SWA.

A summary of relevant points is as follows:

2.1. NES Project Location

- The NES project is situated entirely within the Salisbury Waters catchment area (Refer catchment map, Figure 4.1, p. 26, SWA).
- The NES footprint is in close proximity to Salisbury Waters and its high (4^{th} to 6^{th} Strahler) order tributaries; indeed the Southern Array is *adjacent to the banks of 6^{th} order sections of Salisbury Waters that are measureable in kilometres.*
- The border of this project is only some 10 km away from Dangars Falls, where Salisbury Waters flows into the gorge country of the Oxley Wild Rivers National Park.

So it is reasonable to conclude a large proportion of any sediment mobilised as a result of soil erosion caused by the construction and operation of the NES project will be washed directly into the Salisbury Waters catchment watercourses, and from there directly into the downstream Macleay basin gorges of the Oxley Wild Rivers National Park, especially during extreme weather conditions. The SWA confirms this (e.g. p. ES -2) but does not introduce an estimate or analysis of the total extent, which is a significant omission:

> “The primary risk to water quality will occur as a result of ground disturbance during construction, and poor ground cover revegetation or stabilisation during operation. This could lead to exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses.”

So the obvious question is: what could be the total extent of this soil erosion?

2.2. Total Yearly Soil Erosion (Construction Stage)

Applying RUSLE methodology, the SEA arrives at the following figure and conclusion (p. 29, SEA):

- "... the worst case soil surface erosion loss potential (ie 196.46 t/ha/yr), is considered to be a low erosion hazard risk."

Close analysis of the document shows this is a reasonable figure, based on conservative application of RUSLE methodology, and representing the worst case of erosion during the construction phase (hence P-factor = 1.3 to represent soil disturbance caused by vehicles etc.). However the conclusion that this can be considered a "low risk" in these circumstances is impossible to support on the basis of the SEA.

It appears the qualitative classification system represented in Table 4.3 (p. 29, SEA) was developed to assess the risk as it relates to urban stormwater management and the effects of soil erosion from urban construction projects, measurable in hectares, *but most certainly not relevant for assessment of environmental hazards relating to rural projects of this scale, measurable in thousands of hectares, adjacent to environmentally sensitive watercourses, and only 10 kilometres away from a National Park wilderness downstream.*

A simple calculation that has been omitted from either the SEA or the SWA is as follows:

- The rate of 196.46 t/ha/yr, when multiplied by the total area of the NES footprint, 2787 ha (p.2, SWA), results in an estimate for the **worst case total soil erosion loss potential in the Salisbury River catchment of approximately 550,000 tonnes per year.**

Put simply, worst case or not, this is a staggering figure, and to simply dismiss it in a single sentence as "low risk" on the basis of a table of unclear origin that apparently relates to the management of stormwater in an urban environment is not acceptable. (Here I also note that I could find no resemblance to "Table 3.2" of the MUS:S&C handbook as cited in the notes to Table 4.3 of the SEA. That should be clarified, but is neither here nor there in this context.)

2.3. Current and Ongoing Total Yearly Soil Erosion

To put the figure of 550,000 t/yr soil erosion in perspective, it should have been compared in the SEA to estimates of current total yearly soil erosion rates over the project area, and further, estimates of total yearly ongoing erosion during the operational stage. This was not done in the SEA, nor the SWA, but there are sufficient data in the MUS:S&C handbook (*Managing Urban Stormwater: Soils and Construction: Volume 1, March 2004)* referred to in both assessments to make some nominal estimations, as the effects of pasture on the C-factor in the RUSLE equation are well understood.

Also, the effects of the solar panels on revegetation rates, in consideration of the shade cast and the concentration of rainfall beneath their lower edges, and their maintenance, should have been presented in the SEA in some quantified form.

Further, grazing may continue under and around the solar panels during the operational stage, which would have significant effects on revegetation and thus ongoing erosion. This was not adequately addressed in either the SEA or the SWA.

These are all significant omissions.

Nevertheless, by referring to the MUS:S&C handbook and making some nominal but conservative estimations, it is possible to get some indication of both the current and ongoing erosion rates. Supposing current vegetation rates are around 85%, and revegetation after construction varies between 10% and 35% (possibly depending on grazing rates or other practices), we obtain the following RUSLE estimations (here using the same factors K, R and Ls as the SEA):

Figure 2.3.1 – Estimations of Current and Ongoing Total Soil Erosion Rates

Project Stage & Conditions	P-factor	Vegetation (Grass) Cover	C-factor	RUSLE Soil Erosion Rate (t/ha/yr)	Total Soil Erosion Rate (t/yr, 2787 ha footprint)
Current, mostly grazed pasture	1	85%	0.01	1.51	4212
Construction stage	1.3	0%	1	196.46	547534
Operation stage (no/light grazing, assisted revegetation)	1	35%	0.25	37.78	105295
Operation stage (weed control and/or heavy grazing)	1	10%	0.65	98.23	273767

Notes

1. Construction phase RUSLE figures taken directly from *EIS New Engand Solar - Appendix G – Soil Erosion Assessment.pdf (SEA)*

2. Other RUSLE calculations based on same K, R and Ls factors and RUSLE equation adopted in SEA (p.28), and looking at worst case (Sodosol erosion)

3. C-factor based on grass cover, assuming recent soil disturbance post construction, taken from Figure A5, Appendix A, page A-12 of *Managing Urban Stormwater: Soils and Construction: Volume 1 March 2004 (Landcom 2004)*

Even this rudimentary analysis, based on the SEA figures, and using other data in the MUS:S&C handbook, with conservative nominal revegetation rates, shows there is good reason to be extremely concerned about the potential for ongoing erosion during the operational phase of the project.

In summary:

- **Currently**, erosion rates could be expected in the order of **4,000 tonnes per year** total over the entire NES footprint, and possibly much less.
- According to the SEA, during the **construction stage**, this erosion could in the worst case increase more than a hundredfold to a staggering **550,000 tonnes per year**.
- Thereafter, worst case, if grass coverage remains patchy for a period of years after construction because of the combined effects of shading and rainfall concentration by the panels, maintenance, grazing and weed control, **total ongoing erosion** could conceivably remain in the order of **several hundreds of thousands of tonnes per year, every year, for the life of the project**.

This is entirely unacceptable, and its assessment as a “low risk” to the environment must be completely rejected in the absence of quantitative analysis of its environmental impact or any proposed control measures.

3. Conclusion

Close analysis of the SEA indicates that soil loss due to erosion caused by the construction of the NES project could total in the order of 550,000 tonnes per year over the entire 2787 ha footprint. During its operation this could remain in the order of hundreds of thousands of tonnes per year, each year, for the life of the project.

The SWA indicates the risk that this erosion will result in the “mobilisation of sediment into receiving watercourses,” potentially millions of tonnes over the life of the project.

Given the NES project is located entirely within the Salisbury Waters catchment, adjacent to 5th and 6th order streams, and only some 10km from Dangars Falls downstream, where it enters the pristine wilderness of the Oxley Wild Rivers National Park, this represents an extreme and potentially catastrophic environmental hazard.

Given the NES project location, and the inevitability that construction, operation and maintenance of the solar arrays will destroy vegetation, disturb and compact soils and heavily suppress revegetation over such a large area, it is almost inconceivable that this scale of erosion could be effectively mitigated, let alone prevented by any control measures described in the SWA. In the absence of comprehensive design plans for, and quantitative scientific analysis of the effectiveness of any such proposed control measures, any assurances to that effect should be rejected out of hand.

It is an inescapable conclusion that the proposed site is entirely unsuitable for solar arrays of the scale of the NES project, and the entire project should be abandoned.