

Ref- B46 CofC

G.A. PIPER

what do they contain.

National Rational Energy Network Inc.

To protect and advance public welfare and the natural environment by opposing Commonwealth, State or Territory Law, or Corporate actions, that impose counterproductive energy policies and costs on all citizens.

- 500MW of monocrystalline panels contain:
- Aluminium ~350 tonne
- Copper ~34 tonne
- Silver ~385 kg
- Lead ~9.6 tonne
- Nickel ~688kg
- Tin ~1.4 tonne
- Zinc ~3.4 tonne
- No data on Cadmium, Tellurium, Selenium, Indium.

Not including cabling + supports etc.
How do they fail?



Spontaneous Glass Breakage — Increasing incidents of tempered glass shattering without impact have been documented (PV Magazine USA, June 21, 2024). Once compromised, moisture ingress can trigger corrosion and leaching.

- 870ha **Now 1000ha.**
- 500MW solar plus 500mW BESS
- Good grazing and farming land
- Productive
- Solar for 38 years
- To be returned to agricultural production
- Many waterways and Tallawang Creek
- Local bores and groundwater
- Contamination from panels, BESS plus infrastructure not even mentioned as a risk.

Weather-Related Damage — Damage rates from hail, wind, and storms have exceeded modeling expectations by up to 300% (PV Magazine USA, June 11, 2024). Each breakage point becomes a new vector for leaching.

7 **Long-Term Storage Degradation** — Panels stored improperly have been found to degrade before installation, raising the odds of early failure (PV Magazine, March 27, 2025).

10 In a field study of a 750-kW crystalline silicon array in New York, Robinson and Meindl measured soils directly beneath the panels and compared them to soils 100 feet away.

Selenium concentrations were 97% higher beneath the panels; lithium was elevated by 386%, strontium by 86%, nickel by 37%, and barium by 61%.

8 **UV-Induced Degradation** — Research from Fraunhofer ISE, reported in PV Magazine (Aug. 15, 2025), found that standard accelerated UV testing—equivalent to roughly one year of European sunlight—.... revealing that current testing methods may underrepresent or mischaracterize real-world degradation patterns.

11 In central Italy, Moscatelli et al. (2022) monitored soils beneath ground-mounted PV arrays for seven years. They found substantial, lasting changes in soil chemistry and biology, including:

Higher pH and electrical conductivity,

Reduced water-holding capacity and soil temperature,

A 61% loss of total organic carbon and a 50% reduction in total nitrogen under panels compared to controls,

Lower microbial activity and "striped" patterns of soil degradation across the installation.

9 As Yousuf, H., Yi, J., et al. (2024) explain in Heliyon:

"Heavy metals such as cadmium (Cd), copper (Cu), arsenic (As), mercury (Hg), lead (Pb), hexavalent chromium (Cr+6), zinc (Zn), and nickel (Ni) are known to have adverse effects on soil quality and can potentially leach into groundwater or be taken up by crops, entering the food chain *and later*

...Secondly, the decomposition of materials utilized in solar photovoltaic (PV) installation poses a potential risk..

12 Italy's own policymakers took note — the country now bans the installation of ground-mounted solar arrays on active agricultural land, explicitly to protect soil health and food production.

Likely at some time 35 yrs.

Not rare in Oz.

- Beryl solar has had two fires since 2019.
- Stubbo solar had a fire early 2025.
- Two semi-trailers carrying panels for Stubbo solar crashed scattering panels on roadside.
- No knowledge of who did the cleanup or where panels were disposed of.
- Is anyone monitoring contamination?

Stormwater discharging from the Project Area post-development is anticipated to be of a quality that will not impact the surface water receiving environment, which is currently considered to be 'Moderately Disturbed' (DEHP, 2013). Specific treatment and/or detention of stormwater for the removal of sediments and gross pollutants prior to the release to the environment are not considered necessary.

- No awareness of contamination potential.
- Only concerned with sediment and detritus.

- Report.
- eg. Table B4 Surface Water Risk Assessment
 - No mention of probable contamination from panels or BESS at all.

NSW RURAL FIRE SERVICE

OP 1.2.22 OPERATIONAL PROTOCOL FOR INCIDENTS INVOLVING PHOTOVOLTAIC (SOLAR) ARRAYS AND BATTERY ELECTRIC STORAGE SYSTEMS

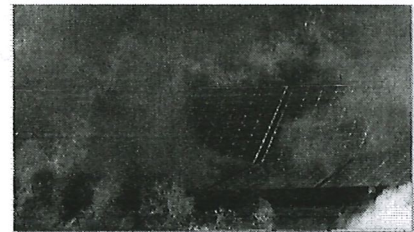


Table B4 Risk Assessment and Mitigation Measures

Source of Impacts to Asset Value	Impacts to Asset Value	Asset Value	Mitigation Measures	Residual Risk	Residual Risk
Discharge of stormwater from the Project Area to the receiving environment	• Aquatic ecosystems • Agriculture • Farm usage • Visual impacts • Visual amenity • Cultural & Spiritual Values	High	• A Construction Environmental Management Plan (CEMP) will be developed for the Project which will manage the impacts of the Project on the receiving environment. • Management of stormwater in the Project Area will be managed in accordance with the requirements of the Environmental Protection Act 1970 (EPA) and the Environmental Protection Regulation 2010 (EPR).	Low	Low
Discharge of stormwater from the Project Area to the receiving environment	• Aquatic ecosystems • Agriculture • Farm usage • Visual impacts • Visual amenity • Cultural & Spiritual Values	High	• The Project will require a stormwater management plan to be developed for the Project which will manage the impacts of the Project on the receiving environment. • Management of stormwater in the Project Area will be managed in accordance with the requirements of the Environmental Protection Act 1970 (EPA) and the Environmental Protection Regulation 2010 (EPR).	Low	Low
Discharge of stormwater from the Project Area to the receiving environment	• Aquatic ecosystems • Agriculture • Farm usage • Visual impacts • Visual amenity • Cultural & Spiritual Values	High	• The Project will require a stormwater management plan to be developed for the Project which will manage the impacts of the Project on the receiving environment. • Management of stormwater in the Project Area will be managed in accordance with the requirements of the Environmental Protection Act 1970 (EPA) and the Environmental Protection Regulation 2010 (EPR).	Low	Low

- RFS guidance barely addresses large solar and BESS.
- Shower BESS with water to keep cool
- Don't let runoff into ground or waterways!
- Bushfire and Emergency Plan yet to be published

Access problems.

Disposal Hazard - Landfill

19 *Assessing the Hazardous Waste Potential of Photovoltaic Modules: A Statistical Evaluation of Leaching Test Data* by Siegfried, G., et al. (2024) shows that even new silicon-based PV modules have measurable odds of failing the EPA's hazardous waste limits for lead

In Leaching of Cadmium and Tellurium from Cadmium Telluride (CdTe) Thin-Film Solar Panels under Simulated Landfill Conditions (Ramos-Ruiz, A., Wilkening, J.V., Field, J.A., & Sierra-Alvarez, R., Journal of Hazardous Materials, 2017).

Conditions of Consent

- 22
- Baseline soil and water testing
 - Annual repeat testing
 - Thorough testing after decommissioning and removal of infrastructure
 - All raw data immediately publicly available
 - Significant fines for ANY level of contamination above baseline as proponent and DPHI imply none will occur.

Ref.
IRENA / IEA-PVPS Task 12. End-of-Life Management: Solar Photovoltaic Panels. (2016)

Fraunhofer ISE. Material and Energy Flows of the Solar Industry. (2020)

IEA-PVPS Task 12. Photovoltaic Module End-of-Life Management: A State-of-the-Art Review. (2016)

20 Liu, H., Kim, J., Zhang, J., & Kim, J. H. (2024). A Review of Toxicity Assessment Procedures of Solar Photovoltaic Modules.

Siegfried, G. et al. (2024). Assessing the Hazardous Waste Potential of Photovoltaic Modules.

PV Magazine USA. Various field-failure reports (2024–2025).

Ramos-Ruiz, A. et al. (2017). Leaching of Cadmium and Tellurium from CdTe Thin-Film Solar Panels.

Robinson, R. & Meindl, A. (2022). Soil Contamination Beneath a 750-kW PV System.

Yousuf, H. et al. (2024). Heavy Metal Impacts on Soil Under Solar Installations

Credit: JW Thompson

In Summary:

- 21
- Both the Proponent and DPHI exhibit flippant disregard to contamination
 - 'must grind it up and eat it' – Matt Riley DPHI
 - Unprofessional and disingenious
 - Ignoring reality does not make it go away
 - PFAS and asbestos examples should inform
 - Negligent?

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