Arriscar Pty Limited
ACN 162 867 763
www.arriscar.com.au

Sydney
Level 26
44 Market Street
Sydney NSW 2000
T: +61 2 9089 8804

Melbourne
Level 2 Riverside Quay
1 Southbank Boulevard
Southbank VIC 3006
T: +61 3 9982 4535

TECHNICAL NOTE

To:	Tom Parry, Environmental Resources Management
cc:	Mark Davey, Environmental Resources Management
From:	Ryan Fernando
Checked By:	Raghu Raman
Date:	15 January 2026

Subject: **Response to DPHI on Keri Keri PHA RFI (J-000887-TN-01-Rev 0)**

1 BACKGROUND

A Preliminary Hazard Analysis (PHA) was prepared by Arriscar Pty Limited (Arriscar) for the Keri Keri wind farm [1], commissioned by Environmental Resources Management (ERM). The assessment identified that the 10 per million per year (10 pmpy) Location Specific Individual Risk (LSIR) of fatality contour from wind turbine generator (WTG) blade throw hazards, which represents the criterion for active open spaces, encroaches part of the Willowvale rest area.

The Department of Planning, Housing and Infrastructure (DPHI) has requested further clarification on two items:

(a) Consider additional risk reduction measures to reduce the public risk profile associated with blade throw events at the Willowvale rest area.

"DPHI-01:

- *From the projectile throw risk assessment in PHA Section 5.2.4 and Figure 29, it is understood that the HIPAP 4 location specific individual risk criteria (LSIR) for 'active open space' (10 pmpy) is exceeded at the rest area along the Sturt Highway. From PHA Figure 29, it appears that the cumulative risk at the rest area was based on risks originating from Turbines 166, 177 and 26. However, PHA Figure 2 and the detailed maps in EIS Appendix F only shows Turbines 177 and 26 without showing Turbine 166. As such:*
- *Confirm if Turbine 166 will be installed as part of the SSD. If not, reassess the risk based on the finalised location of turbines (PHA Figure 2, EIS Appendix F or otherwise) and confirm if the LSIR criteria for 'active open space' (10 pmpy) is still exceeded at the rest stop.*
- *If Turbine 166 is confirmed to be installed as part of the SSD or if the LSIR criteria for 'active open space' (10 pmpy) is still exceeded at the rest stop despite the removal of Turbine 166, provide further recommendations on how the risk at the rest stop can be minimised (turbine repositioning, slew/rotation restrictions, smaller turbines, etc.)."*

(b) Hazards – BESS

"DPHI-02:

- *From the BESS hazard analysis, PHA Sections 5.1.3.2 and 8.2 recommended a minimum 3 m separation distance between adjacent BESS containers. However, it remains uncertain from the PHA and EIS if the proposed 200 MW / 800 MWh total BESS capacity would be able to fit within the BESS area footprint shown in PHA Figure 2 and EIS Appendix F while considering the required area spacing from implementing this recommendation. We also note from EIS Table 3-1 that the BESS area footprint can be estimated to be 17.39 ha. As such, confirm if the proposed total BESS capacity can fit within the BESS area footprint while considering the estimated number of BESS containers and the 3 m separation distance between containers."*

2 OBJECTIVES

The objectives of this technical note are to address the matters raised by DPHI regarding the blade throw risk at the rest area and to provide an updated assessment of the risk profile. Specifically, this study aims to:

a) Identify the dominant risk contributors to the Willowvale rest area;

b) Identify risk reduction measures and conduct sensitivity analysis for risk reduction;

c) Evaluate compliance with Hazardous Industry Planning Advisory Paper (HIPAP) No.4 [2] for individual fatality risk at the Willowvale rest area.

d) Demonstrate there is adequate available space within the BESS area footprint for a proposed 200 MW / 800 MWh BESS.

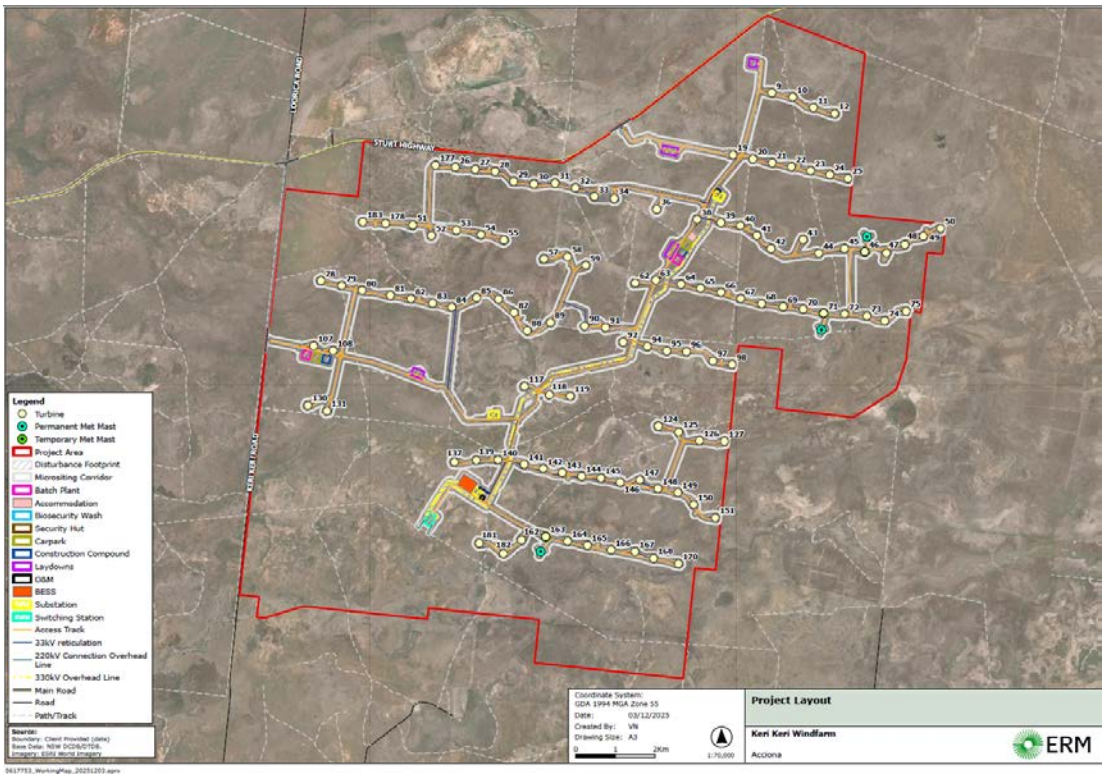
e) Respond to DPHI-02 query above with reference to the PHA as well as other guidelines and practices in the industry.

3 BLADE THROW RISK ANALYSIS AND ASSESSMENT RESULTS

3.1 Revised Risk assessment for Amended Project Layout

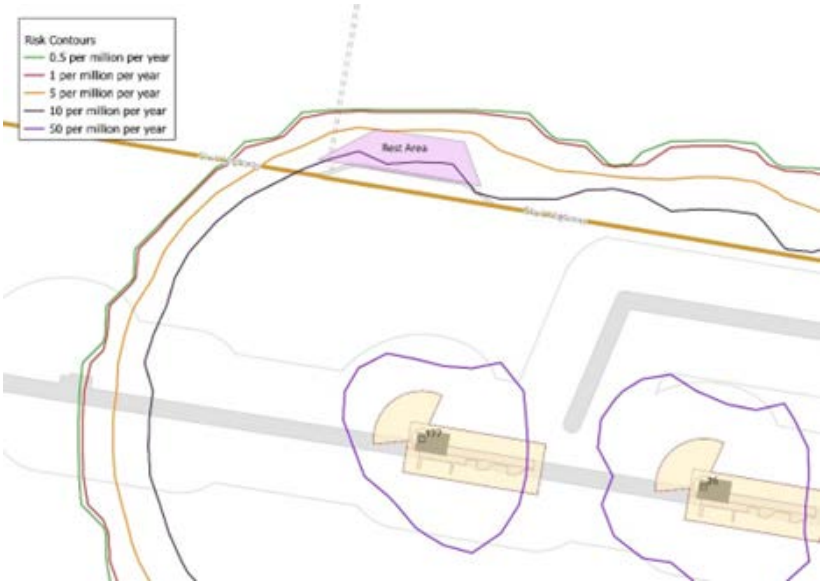
The previous risk analysis in the PHA [1] found that WTGs 26, 27, 177, 186 and 187 contribute to the risk at the Willowvale rest area. As per the amended project layout of the Keri Keri wind farm shown in Figure 1, WTGs 186 and 187 have been removed.

Figure 1: Amended Project Layout of Keri Keri Wind Farm



Based on the amended project layout in Figure 1, the risk at the rest area was recalculated and the updated risk contours are shown in Figure 2. The rest area remained encroached by the 10 pmpy contour. It was found that the principal contributor to blade throw risk to Willowvale rest area is WTG 177.

Figure 2: Updated LSIR Contours for Amended project Layout



Note: In Figures 2,3 and 4 below, the risk contours have been overlaid onto the layout considered in the EIS PHA.

3.2 Risk reduction Measure

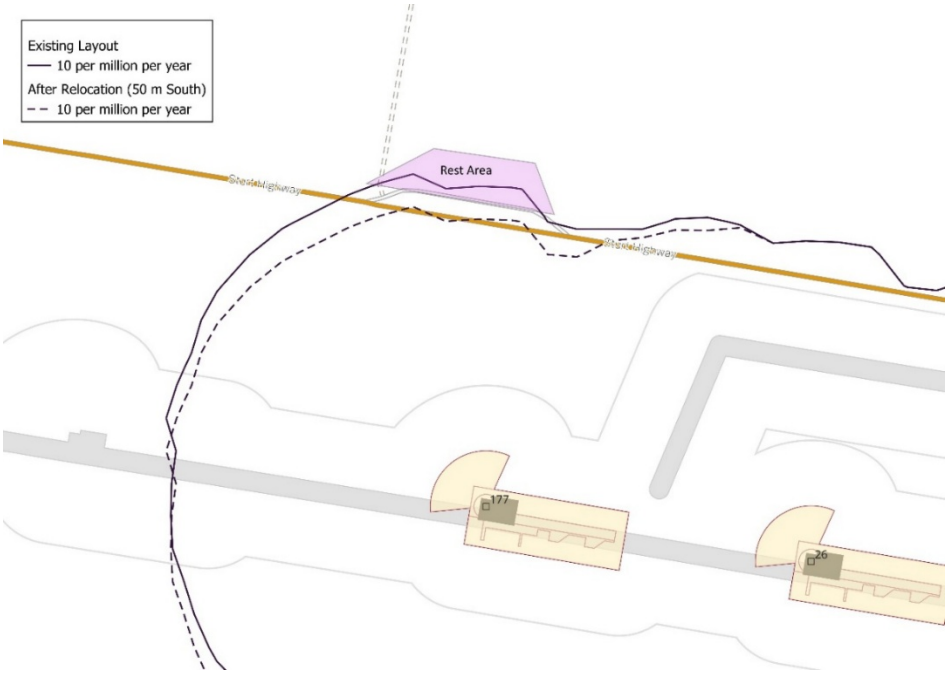
Since WTG 177 was the largest contributor to risk at Willowvale rest area, a sensitivity analysis was carried out by relocating WTG 177 at distance of 50 m to the south of the current proposed location. The revised risk contour is shown in Figure 3.

Figure 3 LSIR Contours After Relocation of WTG 177

It is seen that the 10 pmpy contour falls outside the Willowvale rest area, satisfying the HIPAP 4 risk criteria.

A comparison of the risks for the amended project layout and for the layout with relocated WTG 177 is shown in Figure 4.

Figure 4 Comparison of the 10 pmpy LSIR Contours



4 BESS CONTAINER SEPARATION DISTANCES

4.1 Industry Guidelines

There is no prescriptive separation distance between BESS containers in the standards and guidelines. The recommended 3m in the PHA was based on an assessment of explosion consequences in the container, without a frequency assessment.

A review of literature gives the following guidance, listed in Table 1.

Table 1: Suggested Separation Distances between BESS Containers

No.	Standard/ Guideline	Separation Distance, m	Reference	Comments
1	Envision Energy	3	[3]	Maintenance and inspection access. Not based on any fire codes.
2	AEGIS Loss Control	7.6	[4]	Insurance industry guideline to prevent escalation between containers, unless a shorter distance can be justified by testing. The distance of 7.6m is not supported by any established standards.
3	FM Global Loss Prevention Data Sheet 5-33 (April 2025)	1.5 minimum	[4]	For outdoor non-combustible enclosures with only one side having doors or vents, aisle separations for sides that contain openings.
4	AIG Risk Engineering	3 minimum	[4]	Conservative distance to limit fire spread between containers.
5	Munich Re	Not specified	[4]	Refers to NFPA 855 and UL 9540A.
6	NFPA 855-2023	1	[5]	For indoor units.
7	FRNSW	1	[6]	Applies to BESS units temporarily stored in open yards in ports, depot or project siting area. Access must be provided for fire brigade vehicles.

The distance varies between 1m and 7.6m, with most guidelines specifying 1m to 3m. The larger distances are mainly specified by insurers with exceptions allowed for testing based on UL 9540A [7].

4.2 BESS Layout of Keri Keri Project

An indicative BESS layout is shown in Figure 5. This layout is indicative only and intended for the purpose of demonstrating that adequate space is available for BESS containers within the proposed BESS area. The detailed BESS layout may be subject to further detailed design prior to construction.

The main features are:

- Containers arranged in clusters of 4 units.
- A separation distance of 3m between containers on the sides.

- A separation distance of 1m between the cluster end-to-end, with no access doors.
- Access doors at the ends having a separation distance of 3m.

Figure 5: Indicative BESS Layout

In a fire of a BESS facility in Victoria in 2021 [8], the spacing between containers was shorter than what has been provided in the Keri Keri project. A photograph of the fire incident in Figure 6 [9] shows that the fire is essentially confined to a single container and the adjacent container downwind.

Figure 6: BESS Fire Incident in Victoria, 2021

The fire occurred during testing, prior to commissioning of the facility. The fire was allowed to burn out. Figure 5 shows that up to a maximum of 2 containers could be affected, depending on the wind speed and direction.

In the proposed layout, several safeguards have been built in to prevent a thermal runaway, such as emergency shutdown (ESD on loss of cooling). Further, the mitigation measures include gas detection and ESD, and fire protection. Therefore, the likelihood a fire, while difficult to quantify, is significantly reduced. Further, on a consequence basis alone, there is no offsite risk from BESS fires or gas releases.

The separation distance of 3m on the sides and 1m at one end of a cluster of 2 containers is considered appropriate.

5 CONCLUSIONS AND RECOMMENDATIONS

- The amended project layout of the WTGs near the Willowvale Rest Area does not satisfy the HIPAP 4 risk criteria for active open space (i.e.10 pmpy).
- The risk criteria would be satisfied if WTG 177 is removed or relocated.
- Based on a sensitivity analysis, it is recommended that WTG 177 be relocated a minimum of 50 m to the south of the current location to satisfy the risk criteria, which is expected to be able to be accommodated within the Micro-siting Corridor.
- Section 4.2 demonstrates there is adequate available space within the BESS area for a proposed 200 MW / 800 MWh BESS with separation distances of BESS containers consistent with available guidelines.

6 REFERENCES

[1] Arriscar Pty Limited, “Preliminary Hazard Analysis of Keri Keri Wind Farm and BESS,” 2024.

[2] NSW Department of Planning, “Hazardous Industry Planning Advisory paper (HIPAP) No.4: Risk Criteria for Land Use Safety Planning,” Sydney, 2011.

[3] Envision Energy Group, “Layout Instructions for Envirion's DC Container BESS system,” [Online]. Available: https://www.scribd.com/document/818038973/EE-Layout-Instructions-Container-BESS-System-v1-2-0. [Accessed 06 January 2026].

[4] John Munno, Director of Energy Risk Engineering at Arthur J. Gallagher and Co., “Insurer Guidelines on Utility Scale BESS Module Spacing,” 30 May 2025. [Online]. Available: https://www.linkedin.com/pulse/insurer-guidelines-utility-scale-bess-module-spacing-john-munno-7xv8c/. [Accessed 06 January 2026].

[5] National Fire Protection Association (NFPA), *NFPA 855- Installation of Stationary Energy Storage Systems,* Quincy, Massachusetts, USA, 2023.

[6] Fire & Rescue NSW, “Open yard storage of battery energy storage systems (BESS), v.1.0,” 5 December 2024.

[7] UL Solutions, “UL 9540A Test Method for Battery Energy Storage Systems (BESS),” 2026. [Online]. Available: https://www.ul.com/services/ul-9540a-test-method. [Accessed 07 January 2026].

[8] Energy Safety Response Group, “Victorian Big Battery Fire July 30, 2021: Report of Technical Findings,” https://victorianbigbattery.com.au/wp-content/uploads/2023/10/VBB-Fire-Independent-Report-of-Technical-Findings.pdf, 25 January 2022.

[9] Australian Broadcasting Corporation, “Fire at Tesla giant battery project near Geelong,” ABC News, 28 September 2021. [Online]. Available: https://www.abc.net.au/news/2021-09-28/fire-at-tesla-giant-battery-project-near-geelong-investigation/100496688. [Accessed 05 January 2026].