Attachment F: Supplementary Information in support of the Hunter Transmission Project Aviation Impact Assessment

Aviation Impact Assessment

Since lodging the Amendment Report and Submission Report for HTP EnergyCo has reviewed feedback from the Civil Aviation Safety Authority (CASA) to the Department of Planning, Housing and Infrastructure (DPHI). This document provides supplementary information on EnergyCo's approach to addressing aviation-related matters in the context of the project. In particular the information below speaks to a peer review report prepared by To70 on the aviation assessment prepared for the EIS (Attachment F.1) and a Warkworth Airfield Risk Assessment report (Attachment F.2).

Peer review (November 2025)

In response to aviation-related matters raised during the EIS public exhibition and consultation for the Hunter Transmission Project (HTP), EnergyCo engaged To70 to undertake peer review of the aviation impact assessment prepared (Technical Report 16 (Aviation impact assessment) of the HTP EIS). The peer review concluded that while the aviation impact assessment did not fully consider the operational implications for the Warkworth Aerodrome, however, with appropriate mitigation measures and operational controls in place, aviation impacts associated with the project are manageable. This is consistent with the findings of the aviation impact assessment.

The key recommendations from this peer review relate to further work with Warkworth Aerodrome operators regarding an aviation risk assessment and the need to further validate data and assumptions with the operators of the aerodrome. EnergyCo has accepted these recommendations and has worked with the Hunter Valley Gliding Club (HVGC) and Gliding Australia (GA) to both review and verify assumptions used in the aviation assessment. In addition, EnergyCo has been working with HVGC through the recommended risk assessment framework via in-person meetings and workshops using verified assumptions and information obtained from HVGC.

Notwithstanding, ongoing consultation with aviation stakeholders, particularly the HVGC, will occur during the detailed design and construction of the HTP. Existing frameworks detailed in assessments and the projects community engagement strategies will shape consultation, information sharing, and the management of construction-phase aviation risks, including communication regarding the height and location of infrastructure and construction equipment.

Warkworth Airfield risk assessment (May 2026)

Aviation safety and operational decision-making are primarily the responsibility of aircraft pilots and aerodrome operators under established aviation regulatory frameworks. Accordingly, many of the controls identified through the facilitated aviation risk assessment workshop relate to aviation operations that fall outside EnergyCo's direct control. EnergyCo's role as the project proponent is therefore limited to implementing and supporting control measures that are feasible and appropriate within this framework.

The potential controls identified through the risk assessment broadly relate to the aerodrome's operational procedures, pilot training, information and situational awareness, aircraft equipment and maintenance and

to a lesser degree HTP design control measures. Operational procedures, pilot training, and aircraft equipment and maintenance are implemented by pilots and aerodrome operators, which prohibits EnergyCo from directly implementing these controls for the aerodrome.
In addition, EnergyCo is constrained where controls would require access to or permanent use of land not owned or controlled by EnergyCo.

Nevertheless, EnergyCo is actively assisting the Warkworth Aerodrome operator in the establishment of an additional or replacement emergency landing area to the east of the Warkworth Aerodrome, subject to agreement with the relevant landowner. A letter of intent has been developed and signed by EnergyCo and the landowner to demonstrate this commitment. EnergyCo has reviewed the outcomes of the risk assessment and is committed to supporting the HVGC to implement appropriate operational controls to allow for the continued operation of the Warkworth Aerodrome. Whilst these controls are more appropriately implemented by those with direct operational control over aviation activities, EnergyCo will work with the HVGC during detailed design to support agreement on the interface between EnergyCo's obligations and HVGC's operational responsibilities, including confirmation of the support required from EnergyCo.

The risk assessment (Attachment F.2), the Aviation impact assessment (Technical Report 16 of EIS) and the Amendment Report all indicate that aviation operations can continue at Warkworth Aerodrome with appropriate controls to minimise aviation risks. Accordingly, EnergyCo commits to the following mitigation measures (included in an update to Appendix D (Updated mitigation measures) dated May 2026) of the Amendment Report:

- installation of high-visibility paint and marker balls on HTP infrastructure, consistent with Aviation Impact Assessment mitigation measure AS5, to improve detectability during aviation operations
- consult with the HVGC to finalise the aviation risk assessment for Warkworth Aerodrome and issuing the outcomes to the HVGC and CASA
- provide reasonable funding, subject to consultation with HVGC and landholder agreement, to support the establishment and maintenance of an emergency landing site east of the Warkworth Aerodrome, as described within the Warkworth Airfield Risk Assessment (May 2026)
- provide funding to support the HVGC to update relevant safety procedures and material by agreement with HVGC, as described in the Warkworth Airfield Risk Assessment (May 2026).

All other controls identified through the risk assessment relate primarily to aviation operations, pilot competency, aircraft performance, or aerodrome management and are more appropriately developed and implemented by the HVGC and its members.

Warkworth Aerodrome Risk Assessment Letter of Advice (May 2026)

Following completion of the Warkworth Airfield Risk Assessment, EnergyCo requested a letter from To70 summarising the conclusions of the assessment, interpreting the risk outcomes, and considering the potential benefits and consequences associated with the availability of emergency landing areas to the east of Warkworth Aerodrome.

The letter identifies three scenarios relating to the availability of emergency landing areas east of the aerodrome. It notes that residual aviation risks remain broadly comparable to pre-HTP conditions where existing landing areas remain available and agreed controls are implemented; that residual risks may increase where those areas or controls are not available; and that residual risks may be further reduced where a formal agreement is secured to preserve or enhance emergency landing opportunities.

To70 further advises that aviation risks associated with the HTP arise primarily during abnormal or non-routine operating conditions, such as equipment failure, reduced aircraft performance, or high-workload contingency scenarios. Where aircraft operate as intended, performance is nominal, and established procedures are followed, the HTP does not introduce additional aviation risk during normal operations at Warkworth Aerodrome.

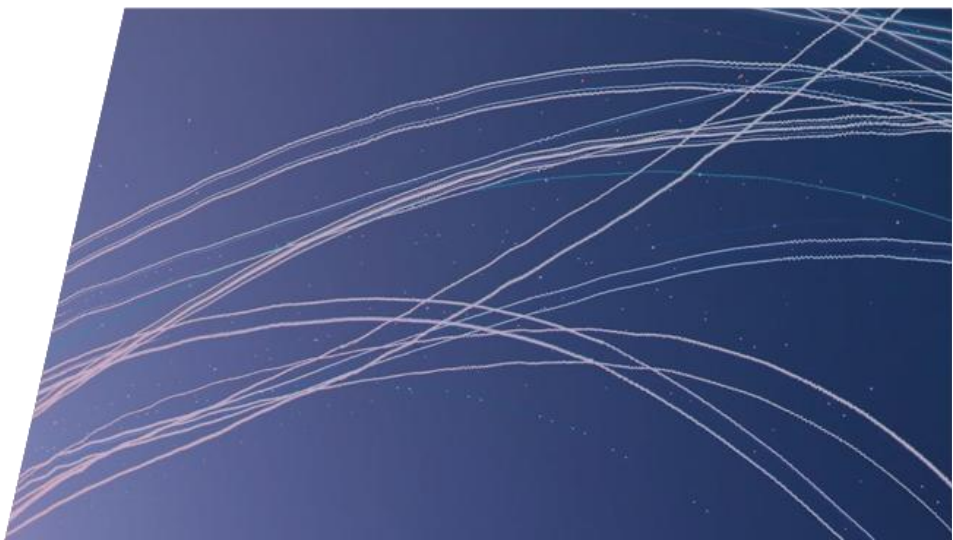
Determination of risk acceptability and decisions regarding the implementation of operational controls remain the responsibility of pilots and aerodrome operators, in accordance with their Safety Management Systems and regulatory obligations.

Attachment F.1 Peer review of the Aviation Impact Assessment

Hunter Valley Transmission Project

Aviation Impact Assessment Peer Review

November 2025



Aviation Safety • Efficiency
Capacity • Environment

Hunter Valley Transmission Project

Aviation Impact Assessment Peer Review

Version 4.1

Client	EnergyCo
	Dominic Oldfield
	Box 5469, Sydney NSW 2001
Author	Rob Morris, Elvira Marques, Adam Webb, Chris Kumar
Project Manager	Adam Webb
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To70 Aviation (Australia)
30 119 069 911
Level 5, 447 Collins St
Melbourne VIC 3000
info@to70.com.au

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Peer Review

Date	Version	Name	Title	Organisation
24-11-25	1.0	Chris Kumar	Senior Aviation Consultant	To70 Aviation Australia
24-11-25	1.0	Rob Morris	Managing Director	To70 Aviation Australia
21-05-26	4.1	Rob Morris	Managing Director	To70 Aviation Australia

Terms and Acronyms

Term or Acronym	Definition
AAAA	Aerial Application Association of Australia
AC	Advisory Circular
ADS-B	Automatic Dependent Surveillance-Broadcast
AHD	Australian Height Datum
AGL	Above Ground Level
AIA	Aviation Impact Assessment
AIP	Aeronautical Information Publication
AMSL	Above Mean Sea Level
ARP	Aerodrome Reference Point
A-SMGCS	Advanced Surface Movement Guidance and Control System
ATC	Air Traffic Control
CASA	Civil Aviation Safety Authority
CNS	Communications, Navigation, Surveillance
CTAF	Common Traffic Advisory Frequency
CSR	Civil Aviation Safety Regulations
DAH	Designated Airspace Handbook
EFB	Electronic Flight Bag
EIS	Environmental Impact Statement
ERC-H	En-route Chart High
ERC-L	En-route Chart Low
ERSA	En Route Supplement Australia
Gaus	Gliding Australia
HLS	Helicopter Landing Site
HTP	Hunter Transmission Project
HVGC	Hunter Valley Gliding Club
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
IPT	Integrated Project Team
kV	Kilovolt
LSALT	Lowest Safe Altitude
MOS	Manual of Standards

MSA	Minimum Sector Altitude
NASF	National Airports Safeguarding Framework
Nm	Nautical Mile
OLS	Obstacle Limitation Surface
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations
PRM	Precision Runway Monitor
PSR	Primary Surveillance Radar
RNP	Required Navigation Performance
RSR	Route Surveillance Radar
RTCC	Radar Terrain Clearance Chart
SMS	Safety Management System
SSR	Second Surveillance Radar
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WAM	Wide Area Multilateration

Executive Summary

EnergyCo engaged To70 Aviation Australia (To70) to conduct a peer review of the Aviation Impact Assessment (AIA) prepared by Aviation Projects for the Hunter Transmission Project (HTP). The review examined aviation safety and operational impacts, with particular attention to Warkworth Aerodrome and its significant gliding operations. This included evaluation against the SEARs, as well as compliance with CASA and ICAO standards where applicable, as well as impacts on the existing operations. This review further discusses the impact on aviation operations outside of the SEARs and regulations. Following the completion of the draft peer review, To70 conducted further work, including a site visit to Warkworth Aerodrome, allowing further clarification of impacts, which are also discussed in this document.

The AIA focuses on regulatory compliance rather than structured risk analysis. Thus, the document provides adequate coverage of certified aerodromes, air routes, LSALT, and PANS-OPS protections, but it does not fully address the impact of the HTP on non-certified aerodromes. This includes a discussion of the operational risks for gliding activities and emergency scenarios at Warkworth Aerodrome. While Warkworth is not a certified aerodrome and does not require assessment against regulatory requirements, impacts on the safety of operations should still be considered within the AIA.

Key gaps include the lack of quantified operational activity at Warkworth and assumptions about climb speeds and clearance margins that are not supported by verifiable data. The emergency response table is limited in scope and does not address hazards such as tow ropes, partial engine failures, or varying conditions, and the discussion of Obstacle Limitation Surfaces (OLS) does not clearly distinguish between requirements for certified aerodromes and considerations relevant to uncertified contexts.

The proposed management measures do not incorporate CASA-aligned Safety Management System principles or provide a structured implementation plan. To address these issues, the peer review recommended a CASA-aligned risk assessment focused on gliding operations and emergency scenarios, validation of all data sources with official publications and Hunter Valley Gliding Club (HVGC), and development of gliding-specific controls and mitigations, such as tow procedure reviews, emergency training updates, and consideration of marker balls for improved conspicuity.

In addition to Warkworth Aerodrome, consultation with helicopter landing site operators, including those used for medevac services, is not documented, and supporting maps of these sites are absent. Singleton aerodrome also has insufficient information regarding the operations, and no documented stakeholder engagement.

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1 Introduction

1.1 Purpose of the report

EnergyCo engaged To70 to conduct a peer review of the Aviation Impact Assessment (AIA) prepared by Aviation Projects for the Hunter Transmission Project. In addition to the broader AIA, specific focus has been placed on aviation safety and operational impacts associated with Warkworth Aerodrome, addressing concerns raised by the Hunter Valley Gliding Club (HVGC), Gliding Australia, and CASA during the public exhibition of the Environmental Impact Statement.

It is noted that the requirements of the initial AIA were outlined in the SEARs, the aviation section of which is listed below:

> *[The requirement is to] assess potential impacts on aviation safety, including:*
>
> - *defined air traffic routes, aircraft operating heights, approach / departure procedures, radar interference, communication systems, navigation aids, use of emergency helicopter access, aerial baiting and culling in the National Parks, safe and efficient aerial application of agricultural fertilisers and pesticides, and aerial fire control;*
> - *identify aviation marking requirements;*
> - *identify certified aerodromes within 30 km of the transmission line and uncertified aerodromes and landing areas within 10 km of the transmission line, and consider the impact to nearby aerodromes and aircraft landing areas; and*
> - *address impacts on obstacle limitation surfaces*

The *potential impacts on aviation safety* beyond what is outlined in the points, and the *impact on nearby aerodromes and aircraft landing areas*, are not well defined and could be wide-ranging. Therefore, this review considers the impacts on aviation that To70 believe are appropriate to consider for a project such as HTP.

This peer review aims to provide an independent, evidence-based evaluation of the AIA's methodology, assumptions, and conclusions. It considers whether the assessment addressed all operational realities, regulatory requirements, and stakeholder concerns, particularly those related to gliding operations and emergency scenarios. The review seeks to ensure compliance with CASA and ICAO standards.

The scope of the peer review included an assessment of the comprehensiveness of the AIA's conclusions, the suitability of its risk assessment methodology, the categorisation of Warkworth Aerodrome, the adequacy of proposed mitigation measures, and the sufficiency of stakeholder engagement.

In undertaking this review, it was acknowledged that Warkworth Aerodrome is an uncertified aerodrome and, as such, is not granted formal regulatory protection. The consideration of Code 1 and Code 2 runway classifications was therefore used solely as a baseline point of comparison to inform the assessment. While different runway codes may theoretically be applied, the nature of the potential infringements and the associated operational issues were considered to be fundamentally consistent across both classifications.

In addition, this review incorporates feedback from stakeholder submissions and meetings, including operational insights from HVGC and Gliding Australia and site visits to Warkworth Aerodrome by To70. These inputs are critical to understanding the unique risks posed by the proposed transmission line alignment and its interaction with gliding operations.

1.1.1 Background

The Hunter Transmission Project (HTP) is a critical state-significant infrastructure initiative designed to connect renewable energy zones to the NSW electricity grid. The proposed 500kV transmission line passes through areas near Warkworth Aerodrome, an uncertified airfield operated by HVGC.

The AIA concluded that the HTP would not adversely impact certified or uncertified aerodromes, including Warkworth, providing mitigations were put in place. However, stakeholder submissions raised concerns regarding:

- Potential infringement of a hypothetical Obstacle Limitation Surfaces (OLS), including HVGC's proposed Code 1 OLS and the possibility that Warkworth's runway length warrants Code 2 classification.
- The adequacy of proposed mitigation measures, which were limited to low-level controls such as obstacle marking and stakeholder notification.
- Insufficient consultation with key stakeholders, including HVGC and Gliding Australia, and a lack of operational data to support conclusions.

These concerns highlight the need for a robust, independent review to validate the AIA's findings and ensure that aviation safety risks are properly identified, assessed, and mitigated. This peer review addresses these issues and provides recommendations for improving safety outcomes and stakeholder confidence.

2 Methodology

2.1 Scope of works

The scope of this peer review encompassed the following key activities:

- Evaluation of the overall methodology, assumptions, and conclusions presented in the AIA report
- Assessment of the AIA's conclusions regarding Warkworth Aerodrome, including operational impacts and safety risks
- Review of runway categorisation, including advice on whether Warkworth should be compared to Code 1 or Code 2 based on its operational characteristics
- Recommendations for further assessments, if warranted, to support decision-making
- Review of stakeholder engagement, including adequacy of consultation with HVGC and Gliding Australia
- Provide knowledge transfer deliverables, including lessons learned presentations, templates, and documentation to support EnergyCo's internal capability post-contract

2.2 Our approach

The peer review was undertaken using the following approach:

1. **Document review**
    - Reviewed the overall methodology, assumptions, and conclusions in the AIA report, EIS, and stakeholder submissions (HVGC, Gliding Australia, CASA).
    - Assessed compliance with CASA regulations, ICAO PANS-OPS, and NASF guidelines.
2. **Technical analysis**
    - Evaluated the risk assessment framework and scenarios considered.
    - Assessed the validity of OLS modelling and emergency procedures.
    - Analysed safety implications across all relevant sites.
    - Reviewed categorisation of Warkworth Aerodrome and safety implications.
3. **Stakeholder engagement**
    - Observed the stakeholder meeting with HVGC and Gliding Australia to understand operational context and concerns.
    - Met with Aviation Projects to clarify assessment methodology and rationale.
    - Met with EnergyCo's engagement team to understand consultation history.
    - Participated in IPT activities and maintained open communication with other service providers to support integrated project delivery.
4. **Reporting**
    - Prepared a draft peer review report with findings, recommendations, and mitigation options.
    - Provided regular status updates to the HTP Environment and Planning Lead, including issues identified and proposed actions.
    - Finalised the report following feedback from EnergyCo and stakeholders.

3 Analysis

3.1 Obstacle Limitation Surface (OLS) considerations

The OLS is discussed in the AIA, responses from the Civil Aviation Safety Authority (CASA) and the Hunter Valley Gliding Club (HVGC)'s feedback. This section provides a high-level overview of OLS concepts and how they should be considered in this project.

OLS form a 3-dimensional surface around certified aerodromes to protect aircraft during take-off and landing, and while flying in the vicinity of the aerodrome. CASA defines these surfaces in CASR Part 139, and CASA must approve any intrusions penetrating these surfaces. Each intrusion is assessed on a case-by-case basis, and intrusions into the OLS may be approved depending on the level of risk to aviation operations at the aerodrome. OLS surfaces are defined based on the code of the runway (based on runway length), the aerodrome reference point (ARP) and runway threshold locations.

It is important to note that a formal OLS only exist for certified aerodromes, and Warkworth is not a certified aerodrome. The OLS included in the AIA is not official and provides no formal protection under CASA regulations. The OLS can also be approximate, as there are no ARP or runway threshold locations defined for uncertified aerodromes.

The unofficial OLS does, however, provide a useful comparison with certified aerodromes, and illustrates what similar protections would be in place if Warkworth were a certified aerodrome, and shows that the HTP is likely to intrude into the inner horizontal surface.

CASA also raised feedback on the classification of Warkworth aerodrome used when evaluating hypothetical OLS surfaces the OLS surfaces. Under CASA MOS 139 Chapter 4, the Aerodrome Reference Code (ARC) comprises three elements: the reference field length (code number), aeroplane wingspan (code letter), and outer main gear wheel span (OMGWS). The operator nominates the ARC as the minimum requirement for the aerodrome, and pavement classification is a separate consideration and is not related to the ARC. Runways are classified as code 1, 2, 3, or 4 based on their length and aircraft usage, and this code affects the dimensions of the OLS surfaces. As no formal runway strip is defined at uncertified aerodromes, it is not possible to classify Warkworth's runway based on these definitions. If based on runway length in isolation, a nominal comparison could be made against a Code 1 or 2 runway to provide context.

The unofficial OLS included in the AIA was based on a code 1 runway. Should this be increased to a code 2 or 3 runway, then it is possible that the HTP would intrude into additional surfaces; however, without formal assessment, it is not possible to confirm this. The OLS, however, remains unofficial, and it is important to note that formal protections would still not apply in these situations.

On review of the AIA, To70 believes that the discussions around the OLS are confusing, as approvals are irrelevant for an uncertified aerodrome. However, it should acknowledge that the inner horizontal surface is likely to be infringed if Warkworth had a formal OLS.

3.2 Technical review of AIA

The following analysis reviews each major section of the AIA prepared by Aviation Projects for the Hunter Transmission Project. Where the section is considered appropriate and no issues were identified, this is noted. Where concerns were identified during the review, these are detailed with reference to the relevant page in the AIA.

3.3 Terminology and Accuracy

The AIA report contains a terminology error in the acronyms section (p.7), where VFR is incorrectly defined as "Visual Meteorological Conditions" instead of "Visual Flight Rules." This should be corrected to maintain technical accuracy. In the certified aerodrome analysis (p.18), language refinements are required: "an instrument flying rules" should be replaced with "and Instrument Flight Rules (IFR)," and "visual flight conditions" should be updated to "visual meteorological conditions (VMC)." On page 19, the RAAF Williamtown section incorrectly states that NAPL leases from the Federal Government; this

should be corrected to the Department of Defence, and the term "IAP" should be clarified as "Instrument Flight Procedure (IFP)." The Minimum Sector Altitude (MSA) findings on pages 18–19 would also benefit from being presented in a table format for clarity.

3.4 Introduction (AIA Section 1, p. 11)

This section is appropriate; it adequately considers aviation aspects and provides a clear overview of the project and its objectives. No issues were identified.

3.5 The Hunter Transmission Project (AIA Section 2, p. 12)

This section is appropriate; it adequately considers aviation aspects and provides a clear overview of the project and its objectives. No issues were identified.

3.6 Methodology (AIA Section 3, pp. 13-14)

The section outlines the legislative context, assessment criteria, and methodology in a structured manner, and outlines how the aviation impact assessment is carried out. Furthermore, while the methodology addresses compliance with CASA and ICAO standards, it does not adequately consider operational realities, particularly those affecting Warkworth Aerodrome. The report fails to recognise the unique hazards associated with gliding operations and emergency scenarios, limiting its scope to regulatory frameworks rather than incorporating practical risk considerations. To strengthen the assessment, the methodology should explicitly acknowledge these risks and outline how they will be evaluated and mitigated.

3.7 Existing Environment (AIA Section 4, p. 16)

This section is appropriate; it accurately describes the airspace classification and surrounding aerodromes. No issues were identified.

3.8 Assessment of Impacts (AIA Section 5, pp. 17-37)

This section contains several subsections:

3.8.1 Aviation Impact Statement (AIA Section 5.1, pp. 17-21)

This subsection is appropriate; the analysis of certified aerodromes and instrument procedures is consistent with CASA and ICAO standards. No issues were identified.

3.8.2 Airspace Protection (AIA Section 5.2, p. 21)

This subsection is appropriate; it correctly identifies the project's location within Class G airspace and Restricted Area R564A. No issues were identified.

3.8.3 Aviation Navigation and Communication Facilities (AIA Section 5.3, p. 23)

The section addressing aviation navigation and communication facilities (p.23) does not confirm whether the Hunter Transmission Project introduces interference to the Common Traffic Advisory Frequency (CTAF). This omission leaves a gap in understanding potential impacts on local communication systems, which is critical for maintaining situational awareness in uncontrolled airspace.

Modern transmission lines are designed to minimise electrical interference with other devices such as radios and televisions. The CTAF frequency (126.7 MHz) operates under the Radiocommunications (Aircraft and Aeronautical Mobile Stations) Class License and forms part of the aeronautical mobile service, which is recognised as safety-critical under Australia's radiocommunications framework. ACMA has the statutory power to intervene if an unintentional emitter disrupts this frequency to require investigation and remediation using AS 2344:2016 as the applicable technical standard

Built to AS 2344:2016, HV transmission lines are required to limit electromagnetic emissions to levels that protect aeronautical and other radio services, and statutory mechanisms exist for ACMA to investigate and remedy any verified CTAF interference.

3.8.4 ATC Surveillance Radar Facilities (AIA Section 5.4, p. 24)

This subsection is appropriate. No issues were identified.

3.8.5 RAAF Williamtown Radar Terrain Clearance Chart (AIA Section 5.5, p. 24)

This subsection is appropriate; it confirms no infringement of RTCC protection surfaces. No issues were identified.

3.8.6 Uncertified Aerodromes (AIA Section 5.6, p. 24)

The AIA lists four uncertified aerodromes, also known as Aircraft Landing Area (ALA), located within a 10 km band spanning the HTP, as published in the AIP. The AIA does not acknowledge that other, unpublished aircraft landing areas may exist within this band. While a rapid assessment using publicly available information did not identify any additional aircraft landing areas, there should be an explicit acknowledgment that additional private or informal landing sites could be present within the vicinity. This recognition is important for demonstrating due diligence and understanding potential residual risks.

In addition to the above, it should be noted that no certified aerodromes are located within this band, and while uncertified aerodromes may be subject to planning controls or have precedence due to historic operations, they are not protected by CASA, nor are they subject to CASR Part 139 certification or oversight. Operations at an uncertified aerodrome are largely conducted at the risk of the operator or pilot in command.

3.8.6.1 Warkworth Aerodrome (AIA Section 5.6.1, pp. 25-31)

To70 believes that this section of the AIA does not adequately assess the impact of the HTP on the unique operations at Warkworth Aerodrome, especially the factors specific to the significant gliding operation.

The following concerns were identified in this section:

- **Context on gliding (p. 25):** To70 believes that this section should provide more detail on what gliding entails and the nature of operations at HVGC to assist readers unfamiliar with these activities. A significant gliding operation, such as that at Warkworth, differs in many ways from a typical general aviation airfield, presenting unique factors that should be considered in an AIA. Gliding operations may include cross-country flying, competition, and aerobatics, all of which present unique considerations. HVGC uses aerotow as its primary means of launching gliders, in which a powered aircraft tows a glider into the air. The impact of the HTP and risks associated with aerotow operations have not been adequately considered in the AIA, as described in the following sections.
- **Scale of operations (p. 25):** The AIA does not quantify operational activity at Warkworth Aerodrome (3,719 movements per year, as advised by HVGC). To70's opinion is that understanding the scale of operations is key to assessing the significance of the operation and the project's impact.
- **Existing restrictions (p. 25)**: The AIA omits discussion of existing restrictions on Warkworth Aerodrome. Given the surroundings of Warkworth Aerodrome, including existing transmission lines, mining, and terrain, To70 believes it is important to consider the impact of the HTP alongside existing restrictions and operational challenges.
- **Reliance on unverified data (p. 26):** The AIA references OzRunways for runway details and operational context. It is important to consider that, while OzRunways is approved by CASA as an Electronic Flight Bag (EFB), some information, including the *OzRunways Airfield Guide* and *Pilots Touring Guide*, may not be official and may therefore be unregulated. The AIA should clearly state whether this information was validated by the Hunter Valley Gliding Club (HVGC) or other official sources. Following subsequent work by To70, these figures have been confirmed to be correct.
- **Runway designation and ALA status (p.26):** The runway is not gazetted and should be referred to as an Aircraft Landing Area (ALA), not designated as 10/28 without proper markings and signage.
- **Take-off point assumptions (p.26):** The AIA states: *"The operation huts are located beside the runway at both ends and provide a sound indication of the take-off points used in both directions (p.26)."* While subsequent stakeholder engagement by To70 has confirmed that this is correct, this assumption should be validated, as the presence of huts does not reliably indicate actual take-off points. The report should avoid inferring operational practices from infrastructure placement and instead confirm take-off locations through verifiable sources such as aerodrome

operators, documented procedures or consultation with operators. Accurate identification of take-off points is essential for assessing circuit patterns and obstacle clearance.

- **Source for operational performance (p. 26):** The AIA states that glider/tow combinations are usually airborne within 600 m from the start of the take-off point, and in a worst case, within 1,000 m. The report should provide the source for these figures, indicating whether they are based on documented performance data, consultation with HVGC, or another verifiable reference. Clear attribution is necessary to ensure accuracy and transparency.
- **Assumed climb performance and speed (p. 26):** The AIA assumes an indicated airspeed of 60 knots for the tow plane/glider combination when estimating climb profile over the HTP corridor, and no source was provided for this information. This figure appears low for an aerotow; To70's research, including referencing Pilot Flight Manuals, shows that typical aerotow speeds for glider and tug combinations that typically operate from Warkworth are between 65-75kts. Using 70 knots would result in a reduced climb gradient, placing the aircraft at approximately 430 ft above the runway at the corridor, about 150 ft above the transmission line. The report should justify the basis for the 60-knot assumption and clarify whether it is derived from operational data, consultation with HVGC, or another verifiable source.
- **Statements on acceptable height (p.27):** The claim that tow plane/glider combinations would achieve an "acceptable height" over the transmission corridor is inappropriate, as this determination rests solely with the pilot. The clearance over the transmission corridor is also highly dependent on weather conditions, glider and tow plane types and weights, tow patterns, and other factors. Further analysis of flight tracks should be used to confirm whether acceptable clearance is obtained on a glider launch.
- **Emergency response considerations (p.30):** The emergency response table fails to consider the hazard posed by a 50–60 metre tow cable hanging or draping across transmission lines during an abnormal event.
- **Circuit height variability (p. 31):** The AIA states that when joining the circuit from the east, aircraft would be at a minimum height of 1,000 ft above the runway when over the HTP corridor. This assumption requires clarification on how it was derived. Aircraft in the circuit typically turn on to their final approach at least 500 ft above aerodrome elevation (CASA AC 91-10 v1.6). If the 1,000 ft figure is based on specific data, such as flight tracking, consultation with the flight school, or other documented sources, the report should explicitly state this. Without clear attribution, the validity of this assumption remains uncertain.
  A short assessment carried out by To70 below shows a typical circuit pattern based on a one-nautical-mile final approach, as determined by experience with other projects and analysis of publicly available flight tracks. While it is important to consider that circuits can vary significantly depending on aircraft performance, pilot decisions, and weather conditions, this shows that a base-to-final turn, the aircraft is descending, and may be conducted over and in proximity to the transmission line. Figure 1 illustrates a representative left-hand circuit pattern based on a one-nautical-mile approach, informed by To70's experience on comparable projects and review of publicly available flight tracks. As shown in the diagram below, a base-to-final turn may be conducted over, or in close proximity to, the transmission line alignment.

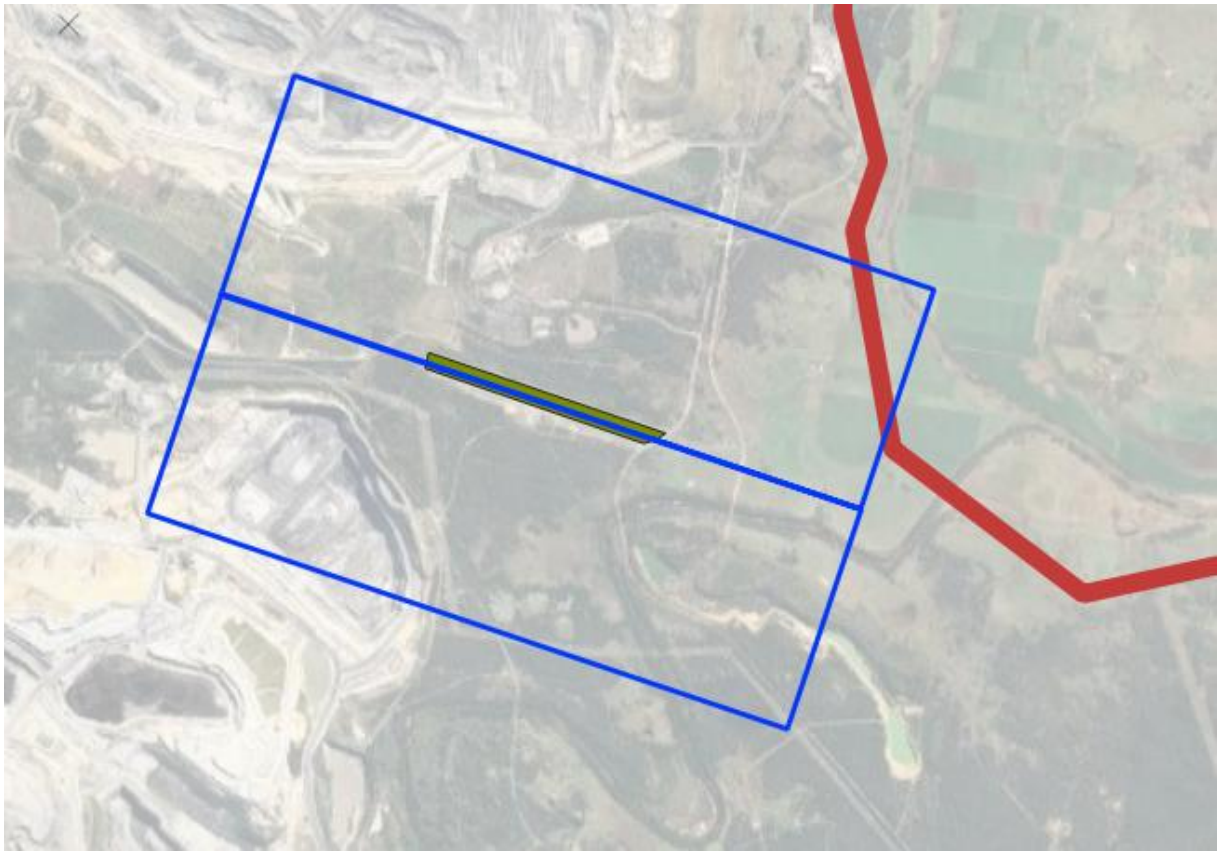

Figure 1: Indicative circuit pattern at Warkworth Aerodrome showing a one-nautical-mile final approach and the relative position of the HTP corridor

3.8.6.2 Singleton Aerodrome (AIA Section 5.6.2, p. 32)

To70's opinion is that this AIA does not provide enough detail on the nature and frequency of operations at Singleton Aerodrome. No information is provided regarding the types of use of the aerodrome. Understanding whether the aerodrome primarily supports recreational general aviation, agricultural aerial work, flight training, or emergency services is essential for assessing potential impacts. Each type of operation has distinct characteristics, such as circuit patterns, altitude profiles, and sensitivity to obstacles, that directly influence hazard evaluation and compliance with CASA guidelines. Without this information, the assessment cannot accurately determine risk levels or identify appropriate mitigation measures. As such, it is not possible to determine whether the AIA's assertion that there will be no impact on the operations at Singleton Aerodrome is correct. However, the AIA concludes that the Hunter Transmission Project will not impact aircraft operations at Singleton Aerodrome, on the basis that the aerodrome is located approximately 5.7 km (3 NM) from the HTP corridor and outside the standard circuit area (AIA Section 5.6.2, p. 32).

Additionally, consultation details are vague. The report should confirm whether the aerodrome operator was engaged and clearly document the outcomes of that consultation, including any concerns raised or confirmation that no issues were identified. Transparency in this regard is critical to validating the conclusions presented.

3.8.6.3 Coolmore Stud Aerodrome (AIA Section 5.6.4, p. 33)

The AIA notes that aircraft larger than single-engine light aircraft operate at Coolmore Stud Aerodrome and concludes that the HTP corridor is not anticipated to impact operations (AIA Section 5.6.4, p.33). However, the report does not specify the types of operations conducted, circuit patterns, or whether consultation with the aerodrome operator occurred. It should clarify whether engagement was undertaken and, if so, whether the operator confirmed no issues or if no response was

received. This transparency is essential for validating the conclusion. As such, it is not possible to determine whether the AIA's assertion that there will be no impact on the operations at Coolmore Stud Aerodrome is correct.

3.8.7 Helicopter Landing Sites (AIA Section 5.7, p. 34)

This subsection is generally appropriate and adequately considers helicopter operations and landing sites. However, there is no mention of whether the proponent reached out to operators of the closest helicopter landing sites to confirm operational impacts or obtain feedback. The report also does not confirm whether operators of helicopter landing sites within one kilometre of the corridor were consulted, despite at least one site being used for medevac services. Including maps of these sites would provide better context for assessing potential obstacles and ensuring that emergency operations are not compromised.

3.8.8 Marking and Lighting of the HTP (AIA Section 5.8, p. 35)

This subsection is appropriate; it references Australian Standards for marking and lighting. No issues were identified.

3.8.9 Aerial Application Operations (AIA Section 5.9, p. 36)

This subsection is appropriate; it considers aerial spraying and firefighting operations. No issues were identified.

3.9 Consultation (AIA Section 6, pp. 38-47)

Further analysis of consultation outcomes is provided in Section 4: Stakeholder Engagement

3.10 Management (AIA Section 7, pp. 48-50)

This section outlines proposed management measures for aviation safety during the construction and operation of the HTP. While the measures address stakeholder notification and obstacle marking requirements, the section is insufficient as a standalone framework. It does not provide a structured approach to hazard identification or risk analysis for unique operations at Warkworth Aerodrome, nor does it incorporate formal safety management principles. These gaps mean that the effectiveness of the proposed measures cannot be fully validated at this stage. Therefore, this section should be considered preliminary and subject to further detailed safety work, including a CASA-aligned risk assessment and consultation with affected stakeholders.

3.11 Conclusion (AIA Section 8, p. 51)

The conclusion did not fully address the operational implications for Warkworth Aerodrome. The Hunter Valley Gliding Club will need to reassess its risk profile, implement appropriate mitigations, and educate members and visitors as a direct consequence of the transmission line's location. These changes may result in operational impacts that should be acknowledged in the assessment. However, the peer review considers that, with appropriate mitigation measures and operational controls in place, the aviation impacts associated with the project are manageable. These measures support the continued safe operation of Warkworth Aerodrome despite the additional operational considerations introduced by the transmission line.

4 Stakeholder engagement

As part of this peer review, To70 reviewed previous stakeholder engagement and submissions regarding the HTP, with a focus on those from CASA, Gliding Australia (GAus), and the HVGC. To70 also attended meetings with HVGC and GAus, alongside EnergyCo and Aviation Projects.

Engagement with key stakeholders was a critical component of this peer review, particularly given the operational complexity of Warkworth Aerodrome and the concerns raised during the EIS process. HVGC and GAus provided detailed submissions outlining perceived safety risks associated with the proposed HTP. These concerns included:

- **Loss of emergency landing options:** HVGC highlighted that the eastern sector, historically used for outlandings during launch failures, would be obstructed by the transmission corridor.
- **Operational constraints:** The club noted that the proposed alignment would require launches and circuits to be flown directly toward the transmission line, increasing perceived and actual risk for low-hour pilots.
- **Inadequate consultation:** HVGC and GAus reported limited engagement during the AIA preparation, resulting in inaccurate assumptions about runway length, circuit patterns, and emergency procedures.
- **Absence of formal risk assessment:** Both stakeholders emphasised that the AIA relied on subjective statements rather than CASA-compliant safety risk management methodologies.

Gliding Australia also provided a *bow-tie risk analysis* as part of their submission, focusing on the increased risk in the event of a towplane or self-launch failure on, or shortly following, take-off. Initial analysis suggests that the issues raised are valid; however, further independent study is required to confirm, evaluate, and explore mitigations for these and other risks.

To70 has also reviewed the submission received by CASA. CASA's feedback supports the potential for increased risks associated with the HTP's proximity to Warkworth airfield, describing them as credible in terms of Aviation Safety.

In response, this peer review recommends a structured risk assessment aligned with CASA SMS principles to evaluate these concerns objectively. At this stage, we cannot confirm whether the issues raised will result in unacceptable safety impacts. This determination requires a formal hazard identification process and subsequent risk analysis to quantify likelihood and severity. Only then can the validity of stakeholder concerns be assessed and appropriate mitigation measures developed.

5 Conclusion and recommendations

The construction of the transmission lines will introduce additional operational risk for glider operations at HVGC. Under this scenario, the recommended process is to conduct a risk assessment with operators to understand the scope of those risks and develop appropriate mitigations. Although not directly referenced in the SEARs, the impact on operations at uncertified aerodromes, such as Warkworth, should be considered when assessing the aviation impact of the HTP.

Importantly, this is not a case of introducing a single new constraint into an otherwise unrestricted environment. Warkworth Aerodrome already operates under significant limitations due to surrounding mining activity, terrain, and existing infrastructure. These constraints have shaped operational practices, including launch directions, circuit patterns, and emergency planning. Adding a high-voltage transmission corridor adjacent to the airfield exacerbates these challenges, reducing flexibility and increasing risk in situations where pilots have limited options, particularly during abnormal or emergency situations.

Gliding operations depend on having safe, unobstructed areas for launch, climb-out, and potential outlandings. At Warkworth, the eastern sector has historically provided strongly preferred emergency landing options when launching toward the east to mitigate hazards at the western end. The cumulative effect of layering new obstacles on top of existing ones adds pilot safety risk. It is not merely an incremental change; it fundamentally alters the airfield's risk profile and undermines the resilience of its safety systems.

As part of this peer review, we believe that implementing a structured Risk Assessment specifically for the Hunter Valley Gliding Club operations would make the management of aviation safety concerns significantly easier and more transparent. The original Aviation Impact Assessment did not fully address the unique operational risks associated with gliding activities, nor did it provide a clear framework for mitigating these hazards.

We recommend that the proponent undertake a Risk Assessment incorporating hazard identification and analysis for gliding operations, aligned with industry best practices. This should include:

- Identification of hazards such as winch launch cables, proximity to transmission infrastructure, and emergency landing areas.
- Assessment of likelihood and severity using a recognised risk matrix.
- Development of mitigation measures in consultation with the gliding club and relevant stakeholders.

This approach will ensure that potential hazards are systematically identified, assessed, and managed, thereby improving safety outcomes and stakeholder confidence.

Following the initial submission of this review, To70 notes that a risk assessment was completed. The results are covered in a separate report.

to70

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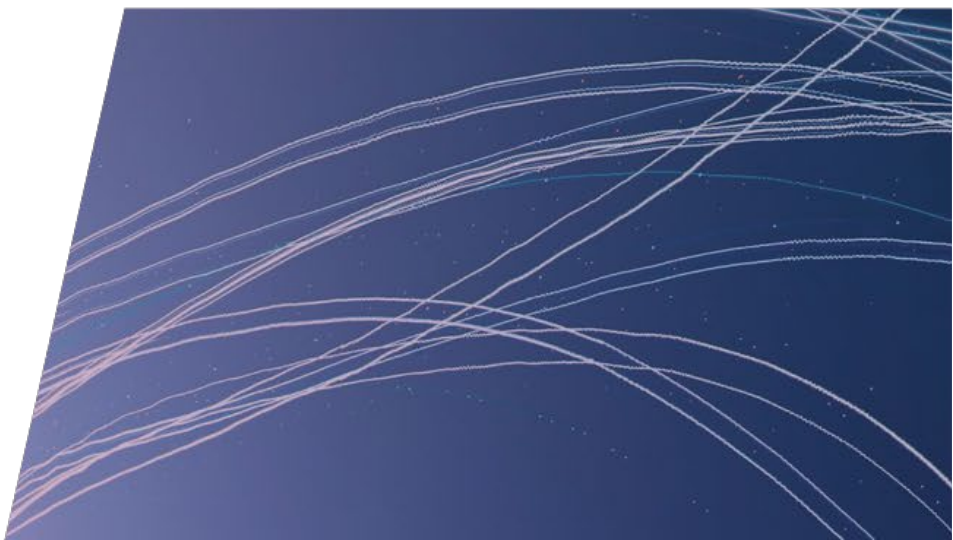
Attachment F.2 Warkworth Airfield Risk Assessment

Warkworth Airfield

Risk Assessment



Aviation Safety • Efficiency
Capacity • Environment

Warkworth Airfield

Risk Assessment

Version 1.2

Client	Energy Corporation of NSW (EnergyCo) Dominic Oldfield Box 5469, Sydney NSW 2001
Author	Rob Morris, Adam Webb, Chris Kumar, Elvira Marques
Project Manager	Adam Webb
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To70 Aviation (Australia)
30 119 069 911
Level 5, 447 Collins St
Melbourne VIC 3000
info@to70.com.au

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Peer Review

Date	Version	Name	Title	Organisation
5 March 2026	0.1	Chris Kumar	Senior Aviation Consultant	To70 Aviation
12 May 2026	1.0	Rob Morris	Managing Director	To70 Aviation

Terms and Acronyms

Term or Acronym	Definition
AIA	Aviation Impact Assessment
ATSB	Australian Transport Safety Bureau
AWIS	Automatic Weather Information Service
CFI	Chief Flying Instructor
CFIT	Controlled Flight into Terrain
CASA	Civil Aviation Safety Authority
GA	General Aviation
GAus	Gliding Australia (Trading name of the Gliding Federation of Australia)
HVGC	Hunter Valley Gliding Club
HTP	Hunter Transmission Project
ISO	International Organisation for Standardisation (ISO 31000)
LOC-I	Loss of Control In-Flight
MOSP	Manual of Standard Procedures
NOTAM	Notice to Air Missions
RAAF	Royal Australian Air Force
SLMG	Self-Launching Motor Glider
SMS	Safety Management Systems
YWKW	ICAO code for Warkworth Aerodrome

Executive Summary

This report presents an aviation risk assessment of the Hunter Transmission Project (HTP) in relation to operations at Warkworth Aerodrome, with particular emphasis on the activities of the Hunter Valley Gliding Club. The assessment was undertaken to understand how the introduction of a new 500 kV transmission line corridor in proximity to the aerodrome may affect the safety of gliding, towing and associated general aviation operations, and how those risks can be mitigated or controlled.

Warkworth Aerodrome supports a high volume of gliding activity, including ab-initio training, cross-country flying and competition operations. These activities involve routine low-level manoeuvring, reliance on visual cues, and frequent decision-making around outlanding and contingency landing options. The proposed transmission corridor lies within areas commonly overflown during take-offs, glider aerotowing, arrivals, and circuit joining, and is considered for emergency landings, which could influence pilot workload, available margins, and decision-making during critical phases of flight.

In addition to gliding, Warkworth Aerodrome is regularly used by regional flight schools for power flight training and by emergency services, including ambulance and firefighting aircraft. The aerodrome also hosts fly-ins of vintage and recreational aircraft and is used for commercial operations, including power line inspections and charter flights associated with local mining operations. The National Parks and Wildlife Service also uses the airfield to support vital firefighting activities in Wollemi National Park.

The scope of the risk was informed by the submissions and key issues raised by the Hunter Valley Gliding Club, with a focus on the hazards the Hunter Transmission Project would pose to gliding activities, which are the airfield's dominant activity, as noted in HVGC's submission to DPHI. The assessment was informed by a structured hazard identification workshop involving representatives from Hunter Valley Gliding Club, Gliding Australia, EnergyCo and To70 Aviation, and was conducted in accordance with CASA safety risk management guidance and Gliding Australia Safety Management System (SMS) requirements. A bow-tie framework was used to identify credible threat scenarios, consequences, controls and additional mitigation measures.

Across the assessment, the dominant safety concerns relate to Controlled Flight Into Terrain (CFIT) and Loss of Control In-Flight (LOC-I). These risks arise both from the direct presence of transmission towers and wires and from indirect effects such as constrained manoeuvring space, loss of preferred outlanding paddocks, altered visual cues, and increased pilot workload or distraction. Given the operating environment and aircraft types involved, the consequences of CFIT or LOC-I events are consistently Major and Severe, meaning overall risk levels are driven primarily by changes in likelihood rather than by changes in consequences.

Several risks were assessed as Extreme in the inherent condition, particularly where the transmission infrastructure increases exposure during departure, final glide, circuit operations or low-level emergency manoeuvring. These include scenarios involving launch failures on runway 10, reduced climb performance, circuit misjudgement due to distraction or fixation, and forced outlandings into inferior terrain.

A set of controls and mitigation measures to address these risks has been identified and assessed. These focus on increasing obstacle clearance, improving obstacle visibility, enhancing situational awareness and information availability, strengthening training and preserving safe operating contingency options. Measures proposed include high-visibility treatments on transmission infrastructure, such as paint and lighting; updates to charts and obstacle databases; NOTAMs and pilot briefings; changes to training and instructional materials; standardisation of departure and circuit procedures; and the provision of emergency landing areas to replace those removed by HTP. During the risk assessment, the establishment of emergency landing areas to the east of the aerodrome, offsetting reduced outlanding opportunities, was identified as the highest impact in reducing residual risks associated with HTP.

Following the application of these measures, all risks are assessed as High in the residual condition. This reflects a reduction in likelihood across all scenarios, while acknowledging that the severity of outcomes associated with CFIT and LOC-I events cannot be reduced.

This risk assessment provides a basis for ongoing, informed consideration by planning authorities, EnergyCo, and aviation stakeholders. Further work should be undertaken by these parties to determine the measures that are both feasible and would reduce the risk level to as low as is reasonably practicable.

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1 Introduction

1.1 Purpose of the report

To70 Aviation was engaged by EnergyCo to facilitate an independent aviation risk assessment focused on the impacts of the Hunter Transmission Project (HTP) on gliding and aviation operations at Warkworth Aerodrome. The assessment included a structured hazard identification (HAZID) workshop with representatives from Hunter Valley Gliding Club (HVGC), Gliding Australia, EnergyCo and To70. The purpose of the workshop was to identify, analyse, and evaluate risks associated with the proposed transmission line corridor. This report summarises the workshop methodology and risk assessment outcomes.

At the time of publication, this report has not been formally endorsed by HVGC nor Gliding Australia. Therefore, it should not be considered an agreed-upon position of these parties.

1.2 Background

Warkworth Aerodrome (YWKW) is an uncertified aerodrome constructed in 1942 and used extensively by HVGC for gliding operations, including ab-initio training, cross-country flying, and competition activities. HVGC has operated from Warkworth for over 60 years, with launches predominantly via aerotow, with some self-launching motor-gliders also based at the airfield. The airfield is also used by general aviation (GA) aircraft, both based at Warkworth and at other airfields in the region.

The aerodrome is owned and operated by HVGC, except for a portion to the north-west of the runway, which includes land owned by United Wambo Joint Venture (UWJV). HVGC has a Deed of Agreement for the use of this land for current operations. This Deed remains in operation until the finalisation of UWJV's mining operations.

The HTP involves the construction of a 110 km overhead 500 kV transmission line between Bayswater and Olney. The planned corridor for the power line crosses approximately 1.4km of Warkworth Aerodrome's eastern boundary and crosses fields offering emergency landing areas for operations from the aerodrome.

The aerodrome location and proposed HTP corridor are illustrated in Figure 1 below. While the exact height of the HTP at every point is not yet available, the maximum height of the infrastructure (excluding construction) is estimated at 80m above ground level (AGL). A conservative estimation of 80m above airfield elevation has therefore been used for this risk analysis.

Power lines represent a known risk to aviation safety. Australian Transport Safety Bureau (ATSB) accident records indicate that power lines remain a significant factor in aviation accidents, and in most incidents, the presence of power lines was known to the pilot.[1]

In this report, a towplane refers to the aircraft used for aerotowing gliders, and a self-launching motor glider (SLMG) includes both touring and motor gliders with retractable engines that can take off under their own power. Powered aircraft refers to other users of the airfield, excluding gliding operations, including general aviation, pilot training, emergency services, charter operations and other airfield users.

[1] Australian Transport Safety Bureau (ATSB), Wire-strike Accidents in General Aviation: Data Analysis 1994-2004, Aviation Research and Analysis Report B2005/0055, https://www.atsb.gov.au/sites/default/files/media/32640/wirestrikes_20050055.pdf

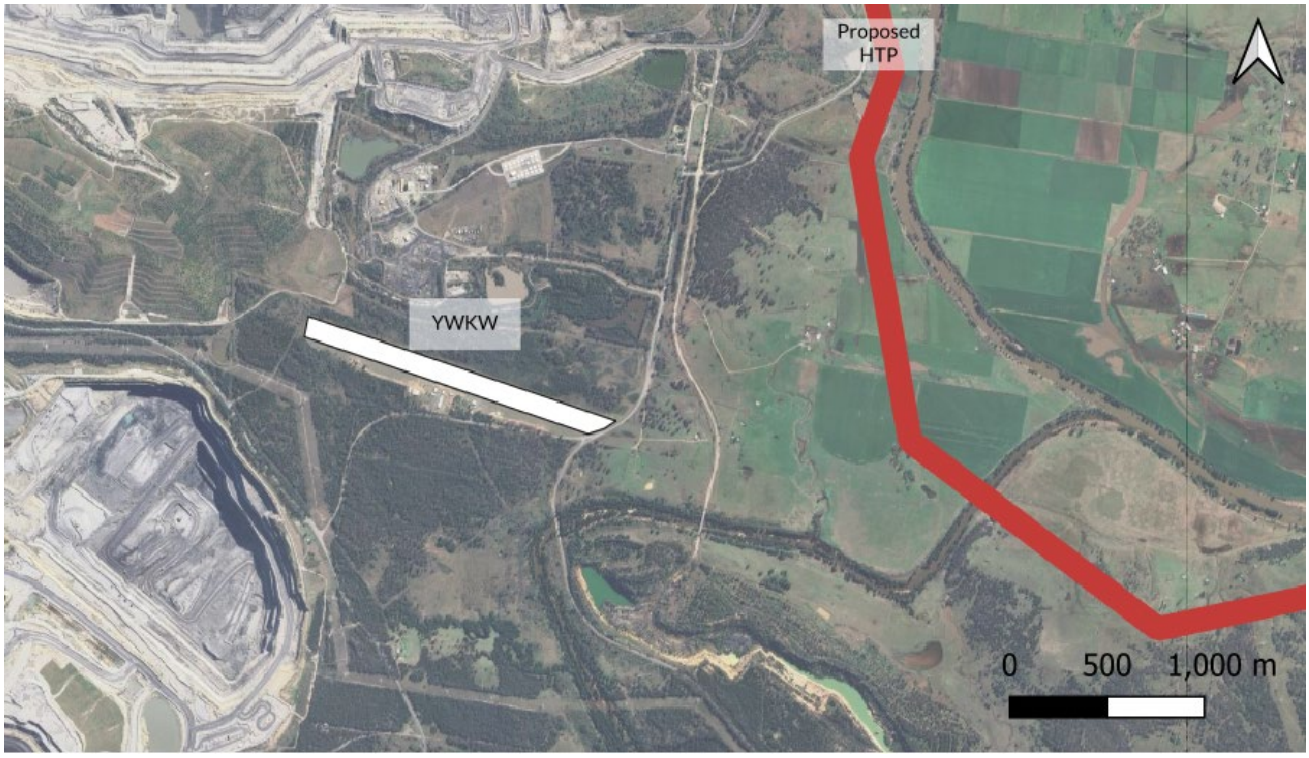

Figure 1 - Warkworth Aerodrome and proposed HTP corridor

1.3 Scope and limitations

This risk assessment makes an overarching assumption that:

- Operations, including gliding and general aviation, will continue at Warkworth Aerodrome; and
- The HTP is to be constructed in alignment with the corridor as proposed within the Environmental Impact Statement (EIS) and detailed on the EnergyCo website.

It is therefore out of the scope of this document to consider:

- The closure of Warkworth Aerodrome, or moving HVGC's operations to an alternative site;
- The cancellation of the HTP project;
- Moving the proposed alignment of the HTP infrastructure; and
- Burying the HTP underground.

Best practice in risk treatment refers to the hierarchy of controls, which states that the most effective controls for mitigating risks are eliminating the source of the risk, substituting the source of the risk, or cancelling the activity. While these controls will likely reduce or eliminate risks, they are not considered part of this risk assessment due to the overarching assumptions outlined above. To70 notes HVGC's strong desire for EnergyCo to consider relocating or burying HTP infrastructure, and that these measures would likely remove or reduce the identified risks. This is outside the scope of this document due to limitations imposed by EnergyCo on the Risk Assessment process.

The scope of this risk assessment is confined to risks to operations at Warkworth Aerodrome associated with or impacted by HTP infrastructure. This includes both new risks introduced by the HTP and existing risks whose severity may change following construction. Existing operational risks are not included in this risk assessment.

The construction of the proposed HTP, including the erection of cranes, is also excluded from the scope of this analysis. It may be appropriate to conduct a separate risk assessment to address additional risks during this period.

1.4 Underlying risks

Gliding and sport aviation activities have obvious safety risks.[2] While it is outside the scope of this report to analyse the underlying risks not associated with the HTP, it is important to consider the risk context within this report. Existing risks are managed by HVGC, Gliding Australia and other operators using the aerodrome within their respective Safety Management Systems and operating procedures.

We have been informed that risks to aviation safety previously introduced by the mining-related activities of Hunter Valley Operations (HVO) and the United Wambo Joint Venture (UWJV) have been managed through conditions imposed on those operations as part of the planning approval process and through direct negotiation with HVGC.

Warkworth Aerodrome has a significant number of existing risks surrounding the airfield, including mining operations to the north and west, power transmission lines (less than 45m high) approximately 280m to the south-west and unlandable terrain to the south and west. Landable terrain east of the airfield, in the area surrounding the Hunter River, exists; however, it is privately owned. While the continued availability of this land cannot be assured. This area consists of cultivated fields along the Hunter River flood plain and will, in all probability, remain suitable for outlanding and emergency landings into the future

It is also important to consider the compounding nature of risks and the interactions and connections among risks, mitigations, and controls. For example, the mining operations and surrounding areas pose a risk, which may be mitigated by conducting a larger portion of operations east of the aerodrome, an area to be impacted by the proposed HTP.

Analysis has shown that HVGC operates in both runway directions, including taking off on runway 28 towards the mining sites and existing power transmission lines. The risk of this operation is managed in accordance with the HVGC SMS and operating procedures. It is beyond the scope of this work to provide further analysis into this.

To70 has also received and reviewed a copy of the HVGC SMS and Risk Assessment (V9, September 2021), as well as a risk assessment conducted by HVGC and Gliding Australia on the impacts of the HTP.

[2] Gliding Federation of Australia, *Manual of Standard Procedures (MOSP) Part 5: Safety Management System*, Version 0.1.4 (November 2023).

2 Methodology

The risk assessment process followed:

- Gliding Australia MOSP Part 5 – Safety Management System (SMS)
- ISO 31000 – Risk Management Principles and Guidelines
- CASA Safety Risk Management Guidelines (2022)

A bow-tie framework was used to structure hazards, risks, threats (causes), consequences, existing controls and potential mitigations. Risks were rated at three stages:

1. Initial risk – Existing operations without HTP infrastructure
2. Inherent risk – Assuming power line construction with no new controls
3. Residual risk – After implementation of proposed controls and mitigations

2.1 Hazards

A hazard is defined with the Gliding Australia SMS as "A condition or object with potential to cause or contribute to an aircraft incident or accident", and a single overarching hazard has been identified related to the scope of this report:

> **Proposed HTP infrastructure, including power transmission lines and towers, constructed through fields in the vicinity of Warkworth Aerodrome**

This was discussed and agreed upon in the risk workshop.

2.2 Risks

Risks are defined as "the effect or realisation of a hazard". Two categories of risks were identified related to the above hazard:

1. **Controlled Flight into terrain (CFIT)**, including collision with power lines, towers or supporting HTP infrastructure.
2. **Loss of Control In-Flight (LOC-I)** during outlanding or emergency manoeuvring.

These were discussed in the HAZID workshop and further extended into detailed risks.

2.3 Threats

Threats are defined as "the sources of danger which may lead to a risk" and are also known as *causes*. These are the situations in which a risk may be realised and refer to specific cases, allowing further analysis.

Threats were listed and discussed during the HAZID workshop and are included under respective risks within this document.

2.4 Consequences

Consequences are defined as "the result of the risk being realised" and include the real-world outcomes of the risk occurring. Consequences can include aircraft damage, pilot injury or death, damage to third-party infrastructure, and reputational or corporate damage.

2.5 Controls and mitigations

Controls are defined as "measures introduced that reduce the likelihood of the event occurring", and any threat may have multiple controls. Mitigations are defined as "measures that may reduce the level of consequence if an event occurs", and again any threat may have multiple mitigations.

2.6 Risk evaluation

All risks have been evaluated in accordance with the Gliding Australia SMS, with current, inherent, and residual consequences and likelihoods assessed. The reasoning behind the assessment was discussed at the HAZID workshop and has been detailed in each applicable section of this report.

In the analysis of inherent risk, it is assumed that only those controls and mitigations discussed within this document and agreed between EnergyCo and HVGC to be practicable and effective are in place. Should a subset of these be proposed, additional analysis should be conducted to ensure the inherent risk remains accurately assessed.

3 Outcomes

3.1 Risk 1 – CFIT: A glider or tug collides with HTP power lines or poles when returning to the airfield

Risk description and context

This risk is defined as a glider, tug or other powered aircraft colliding with Hunter Transmission Project (HTP) power lines or poles while returning to Warkworth Aerodrome.

The transmission infrastructure introduces new vertical and linear obstacles in areas that are currently overflown during final glide, circuit joining, and used for outlandings. These areas are routinely used by Hunter Valley Gliding Club pilots, including low-experience pilots and visiting pilots unfamiliar with local hazards, and may be used by powered aircraft conducting straight-in approaches onto runway 28 from the east.

Threats

Credible threat scenarios identified include:

- A glider on a marginal, low-energy, final glide from the east, returning to Warkworth Aerodrome, colliding with HTP infrastructure due to late or no sighting of the infrastructure. Pilots will likely focus on the destination airfield and plan a final glide, increasing workload and reducing the chance of identifying power cables and poles.
- A glider on a high-speed, high-energy final glide from the east, returning to Warkworth Aerodrome, collides with HTP infrastructure. This is a high-workload situation for the pilot, who will likely be focusing on the destination airfield and planning a final glide, which increases workload and reduces the chance of identifying power cables and poles.
- A glider or powered aircraft approaching from the East collides with HTP infrastructure, having not seen the poles or wires due to approaching into the setting sun, reducing visibility.
- A glider or powered aircraft making a (non-standard) right-hand circuit onto runway 28 collides with HTP infrastructure due to pilot distraction or focus on the aiming point.
- A glider or powered aircraft overshooting a downwind-to-base or base-to-final turn onto runway 28, colliding with HTP infrastructure due to pilot distraction or focus on the aiming point.
- A powered aircraft conducting a straight-in approach to runway 28 from the east, colliding with HTP infrastructure due to pilot distraction, focus on the aiming point or unfamiliarity with obstacles.

Consequences

A collision with HTP infrastructure would likely result in loss of the aircraft and could lead to serious injury or fatalities to aircraft occupants. With a significant portion of flights out of Warkworth being dual training flights, there is a high chance of multiple fatalities.

While third-party injury is considered unlikely, damage to transmission infrastructure is possible and would carry broader safety, reputational, and economic consequences for the gliding club and Gliding Australia.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.
- High visibility paint and marker balls on HTP infrastructure to improve detection and avoid last-minute manoeuvring.
- Instructor standardisation with reinforced circuit SOPs and discipline during periodic check flights.
- NOTAMs (during construction)
- Training manual updates for HTP identification and avoidance.
- Updated aeronautical charts and ERSA entries

No mitigations have been identified that would decrease the level of consequence should the threat be realised. It is expected that HVGC and other operators have mitigations in place to increase aircraft survivability in the event of a crash; no specific additions are required to address this threat.

Risk evaluation

As this risk arises only after construction of the HTP, the initial risk has not been assessed.

The consequences of this threat being realised are an aircraft crash, which is likely to result in severe injury or multiple fatalities, and are therefore assessed as Severe. With no mitigations identified to reduce this risk, the inherent and residual risks remain unchanged.

The inherent likelihood of the risk occurring has been assessed as *possible* because the planned HTP corridor lies in the direct path commonly flown by gliders on final glide, and there is a reasonable chance that a glider or powered aircraft would, in the current operating environment, fly in close proximity to the HTP infrastructure. **The inherent risk, without any of the listed controls or mitigations in place, has therefore been assessed as *extreme*.**

The implementation of the identified controls has been assessed and, in aggregate, reduces the likelihood of this threat to an unlikely extent. Key to this assessment was ensuring that all pilots had good knowledge of the location and heights of HTP infrastructure, increasing the visibility of the wires and poles, and providing safe and reliable outlanding options for gliders returning from the East. **The residual risk is therefore assessed as High.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
N/A	N/A	N/A	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]

3.2 Risk 2a – CFIT: Departing glider and tug combination collides with HTP following a sudden launch or engine failure

Risk description and context

This risk is defined as a departing glider and/or towplane colliding with HTP infrastructure following a sudden launch failure.

Launch failures can occur due to towplane engine failures, rope, release, or weak-link failures, or during a simulated training event. Following a launch failure, the pilot of the glider, and where applicable, the towplane, must make an emergency landing in the safest location available. This may include returning to the departure airfield, or, where a safe return is not possible, landing in a field. When departing from runway 10 at Warkworth, a launch failure at a certain height and location may make the safest option to land in fields identified for HTP infrastructure.

This risk is limited to *sudden* launch failures, in which a launch otherwise proceeding normally suddenly fails. Launches with lower-than-expected performance (e.g., partial power failures) are covered under a separate risk.

A powered aircraft engine failure requires a pilot to conduct an emergency landing in the safest available area. Therefore, a scenario in which a towplane experiences sudden launch failure increases both pilots' workload, as they may have to locate a landing area for two aircraft. In this scenario, the flight performance of a fixed-wing aircraft with no power and a glider will differ, adding further complexity.

While departures from both runways may overfly the HTP corridor, departures from runway 10 are likely to be lower and in closer proximity to the corridor.

This risk refers only to launch failures at the height and location where a collision with HTP infrastructure is unavoidable, or where the only safe options for emergency landings are through the HTP infrastructure proposed for construction. The risk of a launch failure at another point in the launch sequence is out of scope of this risk assessment.

Figure 2 below shows a sample of 21 aerotow departures on runway 10 with the proposed HTP corridor overlaid. These flights were sourced from WeGlide.org[3] and were collected from multiple days and limited to single-seat gliders with high wing loadings and two-seat gliders, which are likely to have shallower climb-out profiles.

Flights are coloured by altitude above airfield height (QFE), according to three bands:

- Red shows altitude below 80m QFE, the approximate maximum height of the HTP
- Yellow shows altitude between 81-160m (approximately 525ft), below which it is estimated that, following a launch failure, a return to the airfield may not be safely possible
- Green shows altitude above 160m, above which a safe return to the airfield is expected to be possible for a glider; however is unlikely for a powered aircraft

It is important to note that every aerotow launch is different and highly dependent on multiple factors, including departure airfield, glider type, towplane type, weather conditions, tow pattern and pilot experience. As such, the above numbers are a conservative estimation of the height at which a safe return to the airfield may be possible, and an altitude above 160m QFE does not guarantee a safe return to the airfield, nor does an altitude below 160m QFE preclude one. The Gliding Australia Training Manual states that a 180° turn and return to the runway may be attempted from 200ft (61m). [4]

Figure 2 shows that, based on this sample of flights, most flights would have sufficient altitude for the glider to make a safe return to the airfield following a launch failure in the vicinity of the HTP. However, for some flights (for example, those marked as 1 and 2), a launch failure during a short period may leave them in a situation where the safest landing option is in areas that could be obstructed by the HTP infrastructure. Due to poorer glide performance, a powered aircraft or towplane

[3] WeGlide.org an online platform allowing glider pilots to upload flight tracks for analysis and participation in a decentralised competition
[4] Gliding Australia Training Manual - Unit 20A - Launch Emergencies (Aerotow)

would be less likely to have sufficient height to return to the airfield, and it would be more likely to conflict with the HTP infrastructure following an engine failure.

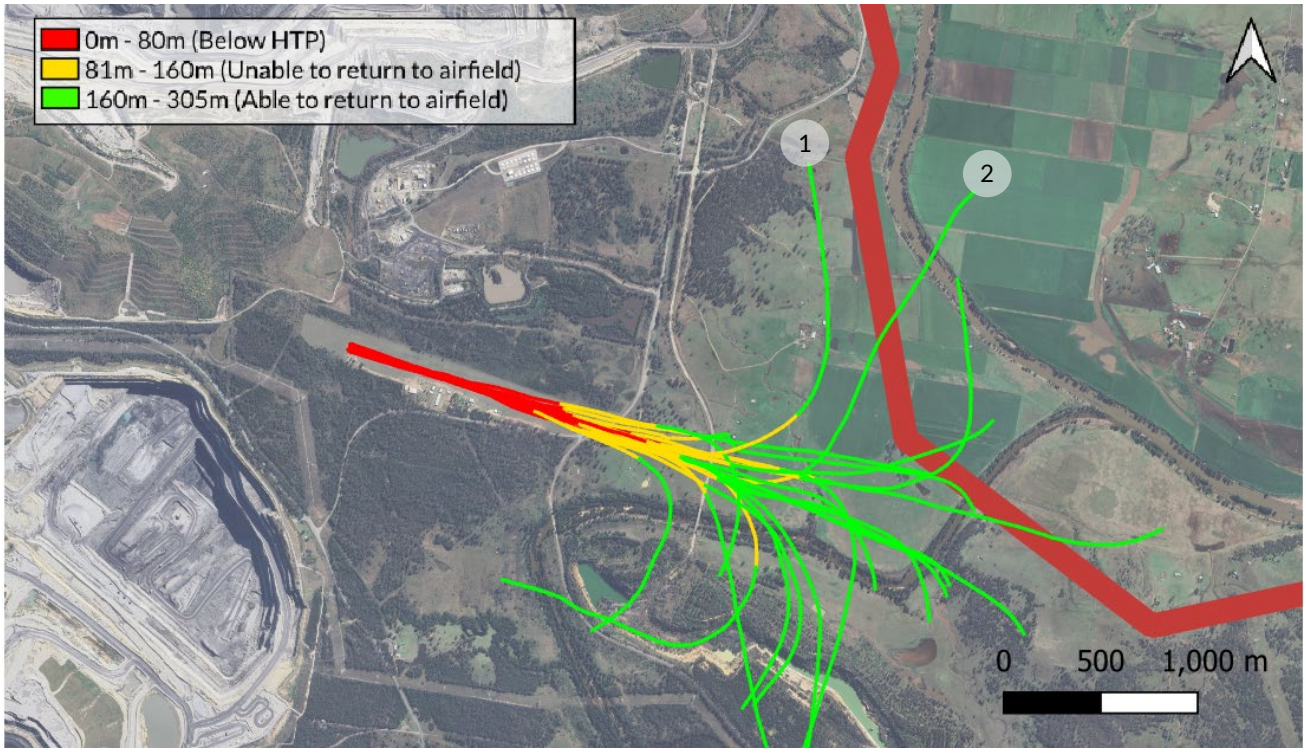

Figure 2 - Examples of aerotow departures from runway 10

Threats

Threats associated with this risk include all circumstances whereby a sudden launch failure results in a collision with HTP infrastructure. This includes scenarios such as:

- An aerotow tow rope or weak-link failure, or a sudden SLMG engine failure when departing from runway 10, at a height and location whereby a collision with HTP infrastructure is unavoidable.
- A sudden towplane engine failure when departing from runway 10, at a height and location whereby a collision with HTP infrastructure is unavoidable for the towplane and/or the glider.
- A simulated launch failure when departing from runway 10, as part of training, at a height and location where a collision with HTP infrastructure is unavoidable.

Consequences

A collision with HTP infrastructure would likely result in loss of the aircraft and could lead to serious injury or fatalities to aircraft occupants. This could include towplanes and/or gliders, and with a significant portion of flights out of Warkworth being dual training flights, there is a high chance of multiple fatalities.

While third-party injury is considered unlikely, damage to transmission infrastructure is possible and would carry broader safety, reputational, and economic consequences for the gliding club and Gliding Australia.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Establishment of a new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO).
- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.
- High-visibility paint and marker balls on HTP infrastructure to improve detection and avoid last-minute manoeuvring.
- Tow rope inspection and maintenance.
- NOTAMs (during construction).
- Pre-take-off performance briefings addressing density altitude, wind, turbulence and sink.
- Standardised aerotow and SLMG departure patterns to avoid low flight over HTP.
- Tug performance monitoring and maintenance to RAAus standards.
- Updated aeronautical charts and ERSA entries.
- Training manual updates for HTP identification and avoidance.

No mitigations that decrease the level of consequence should the threat be realised have been identified. It is expected that HVGC and other operators have mitigations in place to increase aircraft survivability in the event of a crash; no specific additions are required to address this threat.

Risk evaluation

As this risk arises only after construction of the HTP, the initial risk has not been assessed.

The consequences of this threat being realised are an aircraft crash, which is likely to result in severe injury or multiple fatalities, and are therefore assessed as Severe. With no mitigations identified to reduce this risk, the inherent and residual risks remain unchanged.

The inherent likelihood of the risk occurring has been assessed as *unlikely*. This rating is due to the short period during the aerotow when this threat is present, should the launch fail. If the launch fails before or after this period, then the risk rating is not impacted by the HTP. **The inherent risk, without any of the listed controls or mitigations in place, has therefore been assessed as High.**

The implementation of the identified controls has been assessed and, in aggregate, reduces the likelihood of this threat to rare. This is due to the reduced likelihood of a rope break in close proximity to the HTP following the implementation of standardised tow and departure patterns, and to the increased height over the HTP corridor provided by a longer take-off run. While the calculated severity value drops from 7 to 6, **the residual risk remains within the High band.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Rare [1]	High [6]

3.3 Risk 2b – CFIT: Departing Self-Launching Motor Glider (SLMG) or powered aircraft collides with HTP following a sudden launch or engine failure

Risk description and context

This risk is defined as a departing SLMG or powered aircraft colliding with HTP infrastructure following a sudden engine failure on departure.

A powered aircraft engine failure requires a pilot to conduct an emergency landing in the safest available area. The glide performance of an aircraft in such a situation is poor, and options for an emergency landing following an engine failure at low level are thus limited.

While departures from both runways may overfly the HTP corridor, departures from runway 10 are likely to be lower and in closer proximity to the corridor.

This risk refers only to engine failures at the height and location where a collision with HTP infrastructure is unavoidable, or where the only safe options for emergency landings are through the HTP infrastructure proposed for construction. The risk of an engine failure at another point in the launch sequence is out of scope of this risk assessment.

Threats

Threats associated with this risk include all circumstances whereby a sudden launch failure results in a collision with HTP infrastructure. This includes scenarios such as:

- A SLMG or powered aircraft engine failure when departing from runway 10, at a height and location whereby a collision with HTP infrastructure is unavoidable.

Consequences

A collision with HTP infrastructure would likely result in loss of the aircraft and could lead to serious injury or fatalities to aircraft occupants. With a significant portion of flights out of Warkworth being dual training flights, there is a high chance of multiple fatalities.

While third-party injury is considered unlikely, damage to transmission infrastructure is possible and would carry broader safety, reputational, and economic consequences for the gliding club or powered aircraft operator.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Establishment of a new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO).
- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.
- High-visibility paint and marker balls on HTP infrastructure to improve detection and avoid last-minute manoeuvring.
- NOTAMs (during construction).
- Pre-take-off performance briefings addressing density altitude, wind, turbulence and sink.
- Standardised SLMG and powered aircraft departure patterns to avoid low flight over HTP.
- Updated aeronautical charts and ERSA entries.
- Training manual updates for HTP identification and avoidance.

No mitigations that decrease the level of consequence should the threat be realised have been identified. It is expected that HVGC and other operators have mitigations in place to increase aircraft survivability in the event of a crash; no specific additions are required to address this threat.

Risk evaluation

As this risk arises only after construction of the HTP, the initial risk has not been assessed.

The consequences of this threat being realised are an aircraft crash, which is likely to result in severe injury or multiple fatalities, and are therefore assessed as Severe. With no mitigations identified to reduce this risk, the inherent and residual risks remain unchanged.

The inherent likelihood of the risk occurring has been assessed as *unlikely*. This rating is due to the short period during the aerotow when this threat is present, should the launch fail. If the launch fails before or after this period, then the risk rating is not impacted by the HTP. **The inherent risk, without any of the listed controls or mitigations in place, has therefore been assessed as High.**

The implementation of the identified controls has been assessed and, in aggregate, reduces the likelihood of this threat to rare. This is due to the reduced likelihood of a rope break in close proximity to the HTP following the implementation of standardised tow and departure patterns, and to the increased height over the HTP corridor provided by a longer take-off run. While the calculated severity value drops from 7 to 6, **the residual risk remains within the High band.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Rare [1]	High [6]

3.4 Risk 3a – CFIT: Glider and towplane collision with HTP on departure due to reduced climb performance

Risk description and context

A departing glider and towplane collide with transmission power lines or poles due to reduced climb performance, resulting in insufficient obstacle clearance margin during departure.

The risk is most relevant during departures from runway 10, when aircraft may be lower and closer to the HTP corridor during the initial climb. Reduced climb performance can erode planned obstacle clearance margins that would otherwise be adequate under normal conditions.

Threats

Identified threat scenarios include:

- Reduced climb performance of towplane due to environmental factors such as high-density altitude, tailwind components, turbulence, or sinking air.
- Incorrect towplane configuration, such as incorrect power settings or carburettor heat.
- Incorrect glider configuration, such as inadvertent airbrake deployment.
- Degraded towplane performance or mechanical issues reducing available power.
- Delayed recognition of reduced climb performance during the early departure phase.

Consequences

A collision with HTP infrastructure would likely result in loss of the aircraft and could lead to serious injury or fatalities to aircraft occupants. This could include towplanes and/or gliders, and with a significant portion of flights out of Warkworth being dual training flights, there is a high chance of multiple fatalities.

While third-party injury is considered unlikely, damage to transmission infrastructure is possible and would carry broader safety, reputational, and economic consequences for the gliding club and Gliding Australia.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Establishment of new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO).
- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.
- High-visibility paint and marker balls on HTP infrastructure to improve detection and avoid last-minute manoeuvring.
- NOTAMs (during construction).
- Pre-take-off performance briefings addressing density altitude, wind, turbulence and sink.
- Standardised aerotow and SLMG departure patterns to avoid low flight over HTP.
- Training manual updates for HTP identification and avoidance.
- Tug performance monitoring and maintenance to RAAus standards.
- Updated aeronautical charts and ERSA entries.

No mitigations have been identified that would decrease the level of consequence should the threat be realised. It is expected that HVGC and other operators have mitigations in place to improve the survivability of aircraft in the event of a crash; no specific additions are required in response to this threat.

Risk evaluation

As this risk arises only after construction of the HTP, the initial risk has not been assessed.

The consequences of this threat being realised are an aircraft crash, which is likely to result in severe injury or multiple fatalities, and are therefore assessed as Severe. With no mitigations identified to reduce this risk, the inherent and residual risks remain unchanged.

The inherent likelihood of the risk occurring has been assessed as *unlikely*, reflecting that reduced climb performance requires a specific combination of environmental, configuration, or performance-related factors, but remains credible during departure in proximity to the HTP corridor. **The inherent risk, without any of the listed controls in place, has therefore been assessed as High.**

After assessing the implementation of the controls, the likelihood remains *unlikely*. **As a result, the calculated severity value remains High.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Unlikely [2]	High [7]

3.5 Risk 3b – CFIT: SLMG or powered aircraft collision with HTP on departure due to reduced climb performance

Risk description and context

A departing SLMG or powered aircraft collides with transmission power lines or poles due to reduced climb performance, resulting in insufficient obstacle clearance margin during departure.

The risk is most relevant during departures from runway 10, when aircraft may be lower and closer to the HTP corridor during the initial climb. Reduced climb performance can erode planned obstacle clearance margins that would otherwise be adequate under normal conditions.

Threats

Identified threat scenarios include:

- Reduced climb performance of SLMG or powered aircraft due to environmental factors such as high-density altitude, tailwind components, turbulence, or sinking air.
- Incorrect SLMG or powered aircraft configuration, such as incorrect power settings or carburettor heat.
- Degraded aircraft performance or mechanical issues reducing available power.
- Delayed recognition of reduced climb performance during the early departure phase.

Consequences

A collision with HTP infrastructure would likely result in loss of the aircraft and could lead to serious injury or fatalities to aircraft occupants. With a significant portion of flights out of Warkworth being dual training flights, there is a high chance of multiple fatalities.

While third-party injury is considered unlikely, damage to transmission infrastructure is possible and would carry broader safety, reputational, and economic consequences for the gliding club and Gliding Australia.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Establishment of a new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO).
- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.
- High-visibility paint and marker balls on HTP infrastructure to improve detection and avoid last-minute manoeuvring.
- NOTAMs (during construction).
- Pre-take-off performance briefings addressing density altitude, wind, turbulence and sink.
- Standardised departure patterns to avoid low flight over HTP.
- Training manual updates for HTP identification and avoidance.
- Updated aeronautical charts and ERSA entries.

No mitigations have been identified that would decrease the level of consequence should the threat be realised. It is expected that HVGC and other operators have mitigations in place to improve the survivability of aircraft in the event of a crash; no specific additions are required in response to this threat.

Risk evaluation

As this risk arises only after construction of the HTP, the initial risk has not been assessed.

The consequences of this threat being realised are an aircraft crash, which is likely to result in severe injury or multiple fatalities, and are therefore assessed as Severe. With no mitigations identified to reduce this risk, the inherent and residual risks remain unchanged.

The inherent likelihood of the risk occurring has been assessed as *unlikely*, reflecting that reduced climb performance requires a specific combination of environmental, configuration, or performance-related factors, but remains credible during departure in proximity to the HTP corridor. **The inherent risk, without any of the listed controls in place, has therefore been assessed as High.**

After assessing the implementation of the controls, the likelihood remains *unlikely*. **As a result, the calculated severity value remains High.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Unlikely [2]	High [7]

3.7 Risk 4a – CFIT: Circuit misjudgement leading to a glider colliding with non-HTP obstacles

Risk description and context

This risk is defined as a misjudged circuit by a glider pilot when landing at Warkworth Aerodrome, resulting in collision with non-transmission obstacles, including trees, existing power lines or terrain.

Introducing a large object, such as HTP infrastructure, close to the circuit area may lead to distraction or fixation, resulting in misjudgement of circuits or approaches to land.

Threats

Identified threat scenarios include:

- Overshoot on turn to final approach requiring corrective manoeuvres at low altitude.
- Pilot distraction, fixation on transmission towers or wires or degraded situational awareness within the circuit area, resulting in poor circuit management and failure to reach the airfield or collision with obstacles.

Consequences

A collision with obstacles would likely result in loss of the aircraft and could lead to serious injury or fatalities to aircraft occupants. This could include towplanes and/or gliders, and with a significant portion of flights out of Warkworth being dual training flights, there is a high chance of multiple fatalities.

While third-party injury is considered unlikely, damage to third-party infrastructure is possible and would carry broader safety, reputational, and economic consequences for the gliding club and Gliding Australia.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.
- Instructor standardisation with reinforced circuit SOPs and discipline during periodic check flights.
- NOTAMs (during construction).
- Training manual updates for HTP identification and avoidance.
- Updated aeronautical charts and ERSA entries.

No mitigations have been identified that would decrease the level of consequence should the threat be realised. It is expected that HVGC and other operators have mitigations in place to increase aircraft survivability in the event of a crash; no specific additions are required to address this threat.

Risk evaluation

The consequences of this threat being realised are an aircraft crash, which is likely to result in severe injury or multiple fatalities, and are assessed as Severe. With no controls identified to reduce the level of consequence, the level of consequence remains unchanged for both inherent and residual risk. The initial likelihood of the risk occurring has been assessed as u*nlikely*. **The initial risk has therefore been assessed as *High*.**

The likelihood of the risk occurring has been assessed as possible, reflecting the increased potential for distraction or fixation associated with new transmission infrastructure during close or low-circuit operations. Therefore, the calculated severity increases from High to Extreme, and the inherent risk is assessed as Extreme**.**

The implementation of the identified controls has been assessed and, in aggregate, reduces the likelihood of this threat to an unlikely extent. This reduction is justified through layered controls aimed at reducing distractions, improving situational awareness, and reinforcing circuit discipline behaviour. As a result, the residual risk drops from extreme to High, and it **is assessed as High.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
Severe [5]	Unlikely [2]	High [7]	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]

3.8 Risk 4b – CFIT: Circuit misjudgement leading to a powered aircraft colliding with non-HTP obstacles

Risk description and context

This risk is defined as a misjudged circuit by a powered aircraft pilot when landing at or departing from Warkworth Aerodrome, resulting in collision with non-transmission obstacles, including trees, existing power lines or terrain.

Introducing a large object, such as HTP infrastructure, close to the circuit area may lead to distraction or fixation, resulting in misjudgement of circuits or approaches to land.

It should be noted that Warkworth Aerodrome is used for training flights by multiple local flight schools and training operations, and, as such, presents increased risks associated with training flights, including exercises such as practice precautionary inspections, emergency training, and touch-and-gos.

Threats

Identified threat scenarios include:

- Overshoot on turn to final approach requiring corrective manoeuvres at low altitude.
- Low-level manoeuvring following take-off from runway 10 to avoid HTP infrastructure
- Pilot distraction, fixation on transmission towers or wires or degraded situational awareness within the circuit area, resulting in poor circuit management

Consequences

A collision with obstacles would likely result in loss of the aircraft and could lead to serious injury or fatalities to aircraft occupants. With a significant portion of flights out of Warkworth being dual training flights, there is a high chance of multiple fatalities.

While third-party injury is considered unlikely, damage to third-party infrastructure is possible and would carry broader safety, reputational, and economic consequences for the gliding club and Gliding Australia.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.
- Instructor standardisation with reinforced circuit SOPs and discipline during periodic check flights.
- NOTAMs (during construction).
- Training manual updates for HTP identification and avoidance.
- Updated aeronautical charts and ERSA entries

No mitigations have been identified that would decrease the level of consequence should the threat be realised. It is expected that HVGC and other operators have mitigations in place to increase aircraft survivability in the event of a crash; no specific additions are required to address this threat.

Risk evaluation

The consequences of this threat being realised are an aircraft crash, which is likely to result in severe injury or multiple fatalities, and are assessed as Severe. With no controls identified to reduce the level of consequence, the level of consequence remains unchanged for both inherent and residual risk. The initial likelihood of the risk occurring has been assessed as u*nlikely*. **The initial risk has therefore been assessed as *High*.**

The likelihood of the risk occurring has been assessed as possible, reflecting the increased potential for distraction or fixation associated with new transmission infrastructure during close or low-circuit operations. Therefore, the calculated severity increases from High to Extreme, and the inherent risk is assessed as Extreme**.**

The implementation of the identified controls has been assessed and, in aggregate, reduces the likelihood of this threat to an unlikely extent. This reduction is justified through layered controls aimed at reducing distractions, improving situational awareness, and reinforcing circuit discipline behaviour. As a result, the residual risk drops from extreme to High, and it **is assessed as High.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
Severe [5]	Unlikely [2]	High [7]	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]

3.9 Risk 5 – CFIT: Forced outlanding in inferior terrain due to constraint of preferred paddocks

Risk description and context

This risk is defined as a forced outlanding in inferior terrain due to HTP infrastructure that constrains access to preferred paddocks for outlanding. This increases the risk of landing in rough or small fields and of colliding with obstacles, such as fences or irrigation systems.

An outlanding is an unplanned landing that occurs when a glider pilot must make an unscheduled landing at an airfield or in a field due to an unexpected change in weather conditions or other operational need. In this situation, the pilot is trained to select a field based on multiple criteria, including size, orientation, surface, slope, obstacles (such as power poles and wires), and surroundings. When flying east and north of Warkworth Aerodrome, areas where a safe outlanding could be carried out are restricted by mining sites, forested areas, the Hunter River, and terrain. In Figure 3 the aerial view shows this area, and while options will change depending on stock or crop, the area through which the HTP corridor is currently deemed by HVGC to be suitable for outlandings, if required. These are also privately owned and may be subject to changes in use or development that may impact their suitability for outlandings. The area east of the Hunter River may offer similar options, less affected by the HTP corridor; these are farther from the airfield.

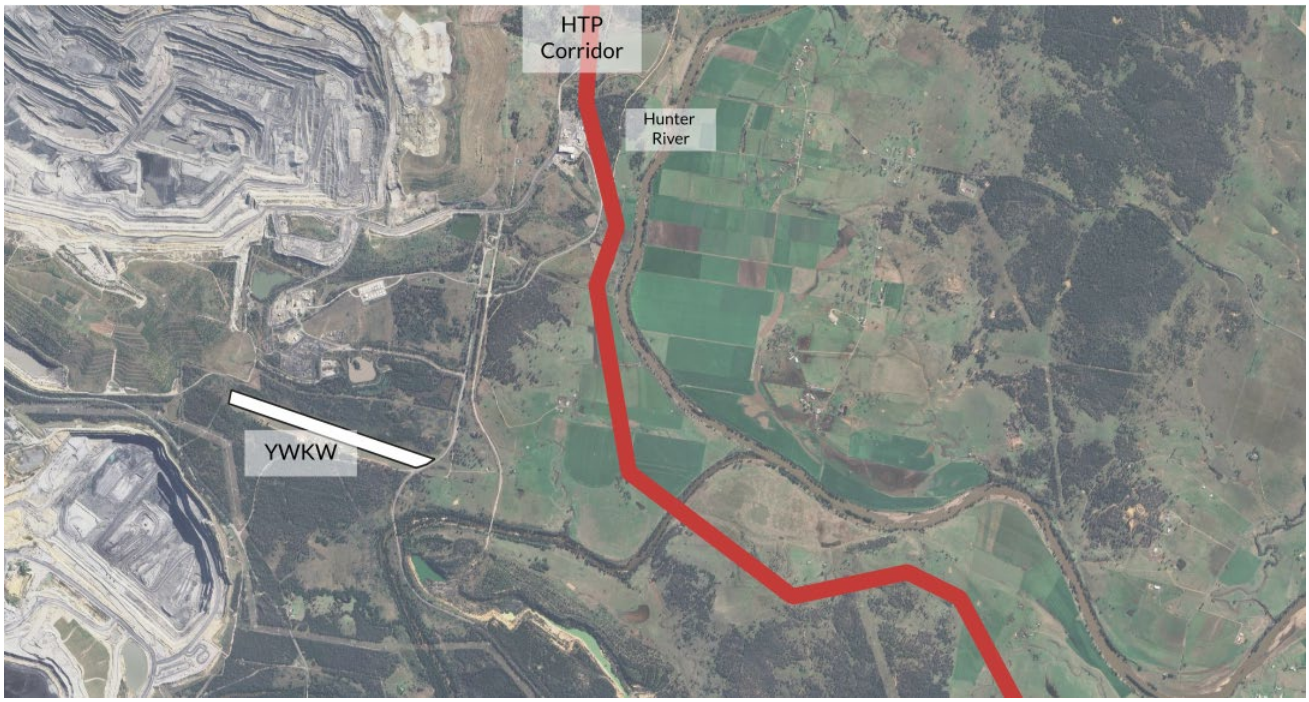

Figure 3 - Aerial view of the area to the east of Warkworth Aerodrome showing approximate HTP corridor

Threats

Identified threat scenarios include:

- Glider is forced to land in a less-suitable field due to the unavailability of options due to HTP infrastructure, resulting in a landing accident or incident.
- Glider collides with fences, irrigation infrastructure or uneven terrain during off-field landings because of the unavailability of suitable outlanding options due to HTP.

Consequences

The consequences of an outlanding accident or incident could vary in severity and are likely to result in damage to the glider and serious injury or trauma.

While third-party injury is considered unlikely, damage to third-party infrastructure, such as fences or irrigation equipment, is possible and would carry broader safety, reputational, and economic consequences for the gliding club and Gliding Australia.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Establishment of a new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO)
- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.

No mitigations have been identified that would decrease the level of consequence should the threat be realised. It is expected that HVGC and other operators have mitigations in place to increase aircraft survivability in the event of a crash; no specific additions are required to address this threat.

Risk evaluation

The consequences of this threat being realised are an aircraft crash, which may result in extensive injuries and serious damage to, or loss of, the aircraft, and are therefore assessed as *major*. With no controls identified to reduce the level of consequence, the level of consequence remains unchanged for both inherent and residual risk.

The initial likelihood of an outlanding incident occurring in the current situation (without HTP infrastructure) has been assessed as u*nlikely* due to the outlanding-suitable fields available with minimal obstacles. It is also noted that these areas are privately owned and could be subject to other development or a change in use, which may impact their suitability for landing. **The initial risk has therefore been assessed as High.**

The likelihood of the risk occurring has been assessed as possible, due to the constraint of preferred fields, which may increase the frequency with which pilots are compelled to select smaller, rougher, or obstacle-rich fields. The calculated severity value increases from 6 to 7, however remains within the High band. Thus, **the inherent risk is assessed as High.**

The implementation of the identified controls has been assessed and reduces the likelihood of this threat to *unlikely*. This reduction is justified by measures that increase the availability of suitable landing options (emergency landing areas) and improve decision quality and awareness, supported by instructional and procedural reinforcement. As a result of the identified controls, the residual risk drops from 7 to 6; however, it **remains within the h*igh* band.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
Major [4]	Unlikely [2]	High [6]	Major [4]	Possible [3]	High [7]	Major [4]	Unlikely [2]	High [6]

3.10 Risk 6 – LOC-I: Stall or spin while manoeuvring to avoid HTP infrastructure while outlanding

Risk description and context

This risk is defined as a glider aerodynamically stalling or spinning while manoeuvring to avoid HTP infrastructure, including while outlanding in the vicinity of the HTP corridor or returning to the airfield from the north or east.

Gliders flying north or east of Warkworth Aerodrome may need to avoid HTP infrastructure at low level. This could include conducting an outlanding during a cross-country flight or when on a shallow final glide from the east. Any low-level manoeuvring in a glider requires careful management of the aircraft's energy (airspeed and altitude) to prevent stalling or spinning at an unrecoverable altitude. In this situation, HTP infrastructure could create additional obstacles, increasing the pilot workload and the likelihood that this risk will be realised. A last-minute sighting of HTP infrastructure could further increase risk due to sudden control inputs, increasing the probability of a high-speed stall.

Threats

Triggers include a cross-country glider being forced to outland in an unsuitable field due to transmission constraints; distraction or fixation with transmission infrastructure on the final or base turn; and low-energy manoeuvring resulting from late selection of a right-hand circuit onto runway 28.

Identified threat scenarios include:

- Distraction or fixation on HTP infrastructure during low-level manoeuvring.
- Last-minute sighting of HTP infrastructure causing sudden control inputs while flying at low altitude and airspeed.
- Late selection or last-minute change of outlanding field selection due to HTP infrastructure.

Consequences

A loss of control, such as a spin or stall, at a height where recovery is not possible, would likely result in a serious accident and a high probability of serious injury or fatalities. With a significant portion of flights out of Warkworth being dual training flights, there is a reasonable chance of multiple fatalities as a result of such an accident.

While third-party injury is considered unlikely, such an accident would carry broader safety, reputational, and economic consequences for the gliding club and Gliding Australia.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.
- Instructor standardisation with reinforced circuit SOPs and discipline during periodic check flights.

No mitigations have been identified that would decrease the level of consequence should the threat be realised. It is expected that HVGC and other operators have mitigations in place to improve the survivability of aircraft in the event of a crash; no specific additions are required in response to this threat.

Risk evaluation

The consequences of this threat being realised are an aircraft crash, which is likely to result in severe injury or multiple fatalities, and are therefore assessed as Severe [5]. With no controls identified to reduce the level of consequence, the initial, inherent, and residual risk states remain unchanged.

The initial likelihood of the risk occurring has been assessed as Unlikely [2]. **The initial risk has therefore been assessed as High [7].**

The inherent likelihood of the risk occurring has been assessed as Possible [3], reflecting the increased potential for distraction, altered visual cues, and constrained manoeuvring and decision-making associated with the introduction of transmission infrastructure. The calculated severity value increases from High [7] to Extreme [8]. Consequently, the inherent risk is assessed as Extreme.

The implementation of the controls identified has been assessed and, in aggregate, reduces the likelihood of this threat occurring to **Unlikely [2]**. **Although the calculated severity value drops from Extreme [8] to High [7], the residual risk remains within the High band.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
N/A	N/A	N/A	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]

3.11 Risk 7 – LOC-I: Stall or spin while avoiding transmission infrastructure following low-level launch failure

Risk description and context

This risk is defined as a glider or SLMG aerodynamically stalling or spinning after a low-level launch failure caused by avoiding HTP infrastructure.

Following a launch failure, a pilot must manoeuvre the aircraft to return to the airfield or carry out a safe landing in a field. This requires careful management of aircraft energy (airspeed and altitude) to prevent stalling or spinning to an unrecoverable altitude. In this situation, HTP infrastructure could create additional obstacles, increasing the pilot workload and the likelihood that this risk will be realised.

This risk is most likely to be realised following a launch failure when departing from runway 10.

Threats

Identified threat scenarios include:

- A glider stalls or spins while avoiding HTP infrastructure following a sudden low-level aerotow launch failure
- A glider stalls or spins while avoiding HTP infrastructure following a glider or tug release, following poor launch performance.
- An SLMG stalls or spins while avoiding HTP infrastructure following an aborted self-launch due to degraded climb performance.

Consequences

A loss of control, such as a spin or stall, at a height where recovery is not possible, would likely result in a serious accident and a high probability of serious injury or fatalities. With a significant portion of flights out of Warkworth being dual training flights, there is a reasonable chance of multiple fatalities as a result of such an accident.

While third-party injury is considered unlikely, such an accident would carry broader safety, reputational, and economic consequences for the gliding club and Gliding Australia.

Controls and mitigations

Controls which would decrease the likelihood of this threat being realised include:

- Establishment of a new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO).
- Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.

No mitigations have been identified that would decrease the level of consequence should the threat be realised. It is expected that HVGC and other operators have mitigations in place to improve the survivability of aircraft in the event of a crash; no specific additions are required in response to this threat.

Risk evaluation

The consequences of this threat being realised are an aircraft crash, which is likely to result in severe injury or multiple fatalities, and are therefore assessed as Severe. With no controls identified to reduce the level of consequence, the initial, inherent, and residual risk states remain unchanged.

The initial likelihood of the risk occurring has been assessed as Unlikely. **The initial risk has therefore been assessed as High.**

The likelihood of the risk occurring has been assessed as Possible due to increased workload, reduced margins, and constrained recovery options associated with low-level launch abnormalities near transmission infrastructure. **As the calculated severity value increases from High to Extreme, the inherent risk is assessed as Extreme.**

The identified controls have been assessed and reduced the likelihood of this threat occurring to Unlikely. **While the calculated severity value drops from Extreme to High, the residual risk remains within the High band.**

Initial Risk			Inherent Risk			Residual Risk		
Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
N/A	N/A	N/A	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]

4 Conclusion

The Hunter Transmission Project introduces a new and permanent obstacle environment in proximity to Warkworth Aerodrome, within areas routinely used for gliding operations, aerotow departures, circuit flying and emergency or contingency landings. These introduced obstacles pose several new risks to aviation that do not currently exist east of Warkworth Aerodrome. As shown by the risk summary in Table 1, the presence of transmission infrastructure influences both CFIT and LOC-I risk pathways across multiple phases of flight in the event of abnormal operations such as equipment failures, pilot miscalculations or adverse weather.

Table 1: Risk evaluation summary

Risk ID	Initial Risk			Inherent Risk			Residual Risk		
	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
Risk 1	N/A	N/A	N/A	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]
Risk 2a	N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Rare [1]	High [6]
Risk 2b	N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Rare [1]	High [6]
Risk 3a	N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Unlikely [2]	High [7]
Risk 3b	N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Unlikely [2]	High [7]
Risk 4a	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]
Risk 4b	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]
Risk 5	Major [4]	Unlikely [2]	High [6]	Major [4]	Possible [3]	High [7]	Major [4]	Unlikely [2]	High [6]
Risk 6	N/A	N/A	N/A	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]
Risk 7	N/A	N/A	N/A	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]

The assessment suggests that, in the absence of additional controls, several scenarios would present an Extreme level of inherent risk. These are primarily associated with low-level operations where pilot workload is high, margins are limited, and opportunities for recovery are constrained, such as during launch failures, reduced climb performance, circuit operations, final glide, and outlanding decision-making.

The identified control measures collectively reduce the likelihood of these events occurring. Improvements to obstacle visibility, training, operational procedures, and the provision of replacement emergency landing areas directly address the identified threats. As shown in Table 1, these measures reduce all assessed risks to a residual High level, reflecting a consistent and defensible reduction in likelihood while recognising that the potential consequences of CFIT and LOC-I events remain inherently Severe.

In accordance with the Gliding Australia Safety Management System (MOSP Part 5), risks assessed within the High severity band are those that require priority attention, with a treatment plan and action as appropriate, and for which management or acceptance must occur at the relevant Accountable Manager level. Continuation of operations in the presence of High risks is accordingly subject to the implementation of the identified controls, supported by monitoring and review, in accordance with the SMS governance framework. The introduction of HTP infrastructure, therefore, requires ongoing management by HVGC, as the risk owner, to manage the proposed control measures.

Residual risks remaining in the High category are not unexpected given the nature of gliding operations and the terrain and other surroundings of Warkworth Aerodrome, as well as the additional obstacle introduced by HTP. While the assessment has focused on the incremental risk associated with the proposed development, it is noted that multiple existing operational risks are present, including those impacted by the limited availability of suitable outlanding sites in the area.

The risk summary table provides a transparent overview of how each risk could potentially be treated and the residual risk that will remain. This can support further informed decision-making by planning authorities, EnergyCo, and aviation stakeholders as the project progresses.

5 Disclaimer

This assessment was conducted based on:

- The HTP transmission line location and design as provided by EnergyCo.
- The agreed workshop scope, excluding the evaluation of alternative alignments of the transmission line or relocation options.
- Outputs from the HAZID Workshop, including HVGC, Gliding Australia and EnergyCo
- Operational data supplied by HVGC and Gliding Australia.
- Industry standards as per ISO 31000 and CASA.

Only risks identified in the HAZID workshop are included in this risk assessment.

This report is issued in draft form and has been prepared for information purposes only. At the time of issue, the assessment had not been reviewed or formally endorsed by HVGC or Gliding Australia. Accordingly, the contents of this report should not be relied upon as a final or agreed position of these parties, nor as evidence of operational acceptance or approval of the assessed risks or proposed mitigations.

Appendices

A.1 Appendix 1: Consequence Rating definitions

This appendix presents the consequence rating definitions applied in this risk assessment. The consequence scale describes the potential severity of outcomes should a risk event occur, with descriptors ranging from Negligible to Severe. These definitions were adopted from the Gliding Australia Manual of Standard Procedures (MOSP) Part 5 – Safety Management System and were used consistently throughout the assessment to evaluate the potential outcomes of identified CFIT and LOC-I scenarios.

Table 2: Consequence Rating definitions

Level	Consequence	Descriptor
5	**Severe**	Catastrophic (one or more fatalities, loss of aircraft, cessation or suspension of operations, financial loss to person or organisation endangering future activity)
4	**Major**	Major (extensive injuries or trauma to one or more persons, major aircraft damage or loss, interruption or suspension of operations, major financial loss to person or organisation impeding future activity)
3	**Moderate**	Moderate (medical treatment required, repair activity for damage, restriction of operations, high financial loss impacting on future activity)
2	**Minor**	Minor (first aid treatment at the workplace, minor damage able to be repaired, possible interruption or rescheduling of operations, tolerable financial loss with low impact on future activity)
1	**Negligible**	Insignificant (consequences easily resolved, no injuries, minimal aircraft availability impact, minimal operational impact, minimal financial loss, nil or insignificant impact on future activity)

A.2 Appendix 2: Likelihood Rating definitions

This appendix defines the likelihood rating categories used to assess the probability of occurrence of each identified risk scenario. Likelihood ratings were assigned based on consideration of the operating environment and historical experience, in accordance with the Gliding Australia MOSP Part 5 Safety Management System. These likelihood definitions form the basis for determining risk severity when combined with consequence ratings.

Table 3: Likelihood Rating Definitions

Level	Likelihood	Descriptor
5	**Almost Certain**	Imminent – is expected to occur in most circumstances
4	**Likely**	Once in the next month, will probably occur in most circumstances
3	**Possible**	Once in the next 12 months, might occur at some time
2	**Unlikely**	Once in the next 1 to 5 years, could occur at some time
1	**Rare**	Once in the next 5 to 10 years; may occur in exceptional circumstances
0	**Extremely Rare**	Could only occur in specific conditions in exceptional circumstances

A.3 Appendix 3: Risk Severity Matrix and Classification

This appendix presents the risk-severity framework used in this assessment. It combines the consequence and likelihood ratings from Appendices A and B to determine overall risk severity levels and the corresponding management expectations. The framework is derived from the Gliding Australia Manual of Standard Procedures (MOSP) Part 5 – Safety Management System, and was used to classify risks as Extreme, High, Medium, or Low, and to identify the level of management attention required.

Table 4: Risk Severity Matrix

		Consequence				
		1: Negligible	2: Minor	3: Moderate	4: Major	5: Severe
Likelihood	5: Almost Certain	6	7	8	9	10
	4: Likely	5	6	7	8	9
	3: Possible	4	5	6	7	8
	2: Unlikely	3	4	5	6	7
	1: Rare	2	3	4	5	6
	0: Extremely Rare	1	2	3	4	5

Table 5: Risk Severity Classification and Management Actions

Index	Risk Severity Level	Action
8-10	Extreme Risk	Detailed treatment plan required, action needed, or activity stopped
6-7	High Risk	Needs priority attention, treatment plan and action as appropriate
4-5	Medium Risk	Needs attention and monitoring as appropriate
< 4	Low Risk	Manage by local level procedures, by club, pilot, maintainer, operator

A.4 Appendix 4: Risk evaluation summary

Type of risk	Risk ID	Risk description	Threats	Controls	Initial Risk			Inherent Risk			Residual Risk		
					Consequence	Likelihood	Severity	Consequence	Likelihood	Severity	Consequence	Likelihood	Severity
CFIT	Risk 1	A glider or tug collides with HTP power lines or poles when returning to the airfield	• A glider on a marginal, low-energy, final glide from the east, returning to Warkworth Aerodrome, colliding with HTP infrastructure due to late or no sighting of the infrastructure. Pilots will likely focus on the destination airfield and plan a final glide, increasing workload and reducing the chance of identifying power cables and poles. • A glider on a high-speed, high-energy final glide from the east, returning to Warkworth Aerodrome, collides with HTP infrastructure. This is a high-workload situation for the pilot, who will likely be focusing on the destination airfield and planning a final glide, increasing workload and reducing the chance of identifying power cables and poles. • A glider or powered aircraft approaching from the East collides with HTP infrastructure, having not seen the poles or wires due to approaching into the setting sun, reducing visibility. • A glider or powered aircraft making a (non-standard) right-hand circuit onto runway 28 collides with HTP infrastructure due to pilot distraction or focus on the aiming point. • A glider or powered aircraft overshooting a downwind-to-base or base-to-final turn onto runway 28, colliding with HTP infrastructure due to pilot distraction or focus on the aiming point. • A powered aircraft conducting a straight-in approach to runway 28 from the east, colliding with HTP infrastructure due to pilot distraction, focus on the aiming point or unfamiliarity with obstacles.	• Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks. • High visibility paint and marker balls on HTP infrastructure to improve detection and avoid last minute manoeuvring. • Instructor standardisation with reinforced circuit SOPs and discipline during periodic check flights. • NOTAMs (during construction) • Training manual updates for HTP identification and avoidance. • Updated aeronautical charts and ERSA entries.	N/A	N/A	N/A	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]
	Risk 2a	A departing glider and/or towplane colliding with HTP infrastructure following a sudden launch failure.	• An aerotow tow rope or weak-link failure, or a sudden SLMG engine failure when departing from runway 10, at a height and location whereby a collision with HTP infrastructure is unavoidable. • A sudden towplane engine failure when departing from runway 10, at a height and location whereby a collision with HTP infrastructure is unavoidable for the towplane and/or the glider. • A simulated launch failure when departing from runway 10, as part of training, at a height and location where a collision with HTP infrastructure is unavoidable.	• Establishment of new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO). • Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks. • High-visibility paint and marker balls on HTP infrastructure to improve detection and avoid last-minute manoeuvring. • Tow rope inspection and maintenance. • NOTAMs (during construction). • Pre-take-off performance briefings addressing density altitude, wind, turbulence and sink. • Standardised aerotow and SLMG departure patterns to avoid low flight over HTP. • Tug performance monitoring and maintenance to RAAus standards. • Updated aeronautical charts and ERSA entries. • Training manual updates for HTP identification and avoidance.	N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Rare [1]	High [6]
	Risk 2b	A departing SLMG or powered aircraft colliding with HTP infrastructure following a sudden engine failure on departure.	• A SLMG or powered aircraft engine failure when departing from runway 10, at a height and location whereby a collision with HTP infrastructure is unavoidable.	• Establishment of new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO). • Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks. • High visibility paint and marker balls on HTP infrastructure to improve detection and avoid last minute manoeuvring. • NOTAMs (during construction).	N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Rare [1]	High [6]

				• Pre take off performance briefings addressing density altitude, wind, turbulence and sink. • Standardised SLMG and powered aircraft departure patterns to avoid low flight over HTP. • Updated aeronautical charts and ERSA entries. • Training manual updates for HTP identification and avoidance.									
	Risk 3a	Glider and towplane collision with HTP on departure by due to reduced climb performance	• Reduced climb performance of towplane due to environmental factors such as high-density altitude, tailwind components, turbulence, or sinking air. • Incorrect towplane configuration, such as incorrect power settings or carburettor heat. • Incorrect glider configuration, such as inadvertent airbrake deployment. • Degraded towplane performance or mechanical issues reducing available power. • Delayed recognition of reduced climb performance during the early departure phase.	• Establishment of new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO). • Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks. • High visibility paint and marker balls on HTP infrastructure to improve detection and avoid last minute manoeuvring. • NOTAMs (during construction). • Pre take off performance briefings addressing density altitude, wind, turbulence and sink. • Standardised aerotow and SLMG departure patterns to avoid low flight over HTP. • Training manual updates for HTP identification and avoidance. • Tug performance monitoring and maintenance to RAAus standards. • Updated aeronautical charts and ERSA entries.	N/A	N/A	N/A	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Unlikely [2]	High [7]
	Risk 3b	SLMG or powered aircraft collision with HTP on departure due to reduced climb performance	• Reduced climb performance of SLMG or powered aircraft due to environmental factors such as high-density altitude, tailwind components, turbulence, or sinking air. • Incorrect SLMG or powered aircraft configuration, such as incorrect power settings or carburettor heat. • Degraded aircraft performance or mechanical issues reducing available power. • Delayed recognition of reduced climb performance during the early departure phase.	• Establishment of new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO). • Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks. • High visibility paint and marker balls on HTP infrastructure to improve detection and avoid last minute manoeuvring. • NOTAMs (during construction). • Pre take off performance briefings addressing density altitude, wind, turbulence and sink. • Standardised departure patterns to avoid low flight over HTP. • Training manual updates for HTP identification and avoidance. • Updated aeronautical charts and ERSA entries.	N/A	N/A	N/A						
	Risk 4a	Circuit misjudgement leading to a glider colliding with non-HTP obstacles	• Overshoot on turn to final approach requiring corrective manoeuvres at low altitude. • Pilot distraction, fixation on transmission towers or wires or degraded situational awareness within the circuit area, resulting in poor circuit management and failure to reach the airfield or collision with obstacles.	• Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks. • Instructor standardisation with reinforced circuit SOPs and discipline during periodic check flights. • NOTAMs (during construction). • Training manual updates for HTP identification and avoidance. • Updated aeronautical charts and ERSA entries.	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]
	Risk 4b	Circuit misjudgement leading to a powered aircraft collision colliding with non-HTP obstacles	• Overshoot on turn to final approach requiring corrective manoeuvres at low altitude. • Low level manoeuvring following take off from runway 10 to avoid HTP infrastructure • Pilot distraction, fixation on transmission towers or wires or degraded situational awareness within the circuit area, resulting in poor circuit management	• Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks. • Instructor standardisation with reinforced circuit SOPs and discipline during periodic check flights. • NOTAMs (during construction). • Training manual updates for HTP identification and avoidance. • Updated aeronautical charts and ERSA entries	Severe [5]	Unlikely [2]	High [7]	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]

	Risk 5	Forced outlanding in inferior terrain due to the constraint of preferred paddocks	• Forced outlanding in less-suitable fields due to loss of available options from HTP infrastructure • Collision with fences, irrigation infrastructure or uneven terrain during off-field landings due to constrained outlanding options	• Establishment of new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO) • Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.	Major [4]	Unlikely [2]	High [6]	Major [4]	Possible [3]	High [7]	Major [4]	Unlikely [2]	High [6]
LOC-I	Risk 6	Stall or spin while manoeuvring to avoid HTP infrastructure	• Distraction or fixation on HTP infrastructure during low-level manoeuvring • Last-minute sighting of HTP infrastructure causing sudden control inputs at low altitude and airspeed • Late selection or last-minute change of outlanding field due to HTP infrastructure	• Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks. • Instructor standardisation with reinforced circuit SOPs and discipline during periodic check flights	N/A	N/A	N/A	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]
	Risk 7	Stall or spin while manoeuvring to avoid HTP infrastructure	• Glider stalls or spins while avoiding HTP following a sudden low-level aerotow launch failure • Glider stalls or spins while avoiding HTP following glider or tug release after poor launch performance • SLMG stalls or spins while avoiding HTP following an aborted self-launch due to degraded climb performance	• Establishment of new emergency landing area east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO) • Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.	N/A	N/A	N/A	Severe [5]	Possible [3]	Extreme [8]	Severe [5]	Unlikely [2]	High [7]

to70

Dtkudcpg Ogrdqwtpg
Dcpi nqm Dgpi cnwtw Uj cpi j ck Ukpi cr qtg
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Vqtqpvq
Dqi qvc U®q'Rcwnq

Attachment F.3 Warkworth Aerodrome Risk Assessment Letter of Advice

To70 Aviation (Australia) Pty Ltd
ABN 30 119 069 911
info@to70.com.au

Level 5, 447 Collins St
MELBOURNE VIC 3000

Level 5, 25 King St
BRISBANE QLD 4006

to Energy Corporation of NSW (EnergyCo)

attn. Dominic Oldfield

address Box 5469, Sydney, NSW 2001

date 8 May 2026

subject HVTP Risk Assessment

our reference 26.254.01

Dear Dominic,

Please find attached the Hunter Valley Gliding Club Risk Assessment V1.0, prepared by To70 Aviation for Energy Corporation of NSW. This version reflects a refinement of the control set considered during the assessment, including the removal of a number of controls assessed as either duplicative or not materially contributing to further risk reduction when considered alongside the remaining measures. In To70's opinion, the removal of these controls does not change the assessed risk outcomes, and the inherent and residual risk ratings presented in the report remain unchanged.

There are three scenarios regarding the control associated with additional emergency landing areas to the east of the runway.

1) No formal areas for emergency landings are available, and the existing areas not excluded by the HTP infrastructure remain suitable for landings. In this situation the residual risk remains similar to the existing level prior to HTP construction, providing the other agreed controls are implemented.
2) No formal areas for emergency landings are available and the existing area becomes unsuitable as a result of changes in land usage, or the agreed controls are not implemented. This would increase the residual risks for Risks 1,5,6,7.
3) A formal agreement is reached with the landowner to preserve the availability of existing areas available for emergency landings, potentially including provisions for tailoring the land for emergency access (grading, marking, etc). In this case the level of residual risk may be reduced to levels similar to those prior to HTP construction.

As reflected in the assessment outcomes and conclusion, the risks associated with the Hunter Transmission Project arise only in the context of abnormal or non-routine operating conditions, such as equipment failure, degraded aircraft performance, or pilot misjudgement during high-workload or contingency situations. Where operations proceed as intended, aircraft performance is nominal, and pilots operate within established procedures and margins, the

assessment indicates that the presence of the HTP does not introduce additional risk during normal operations at Warkworth Aerodrome.

To70's role in this process has been to identify, analyse and evaluate aviation safety risk using recognised safety risk management frameworks. The determination of risk acceptability and the decision on which controls to implement rest with the relevant operators, in accordance with their Safety Management Systems and regulatory obligations. This assessment is therefore intended to inform decision-making rather than represent an endorsement of operational acceptance.

Should you wish to discuss any aspect of the assessment or the revised control set in further detail, please do not hesitate to contact us.

Yours sincerely,

Rob Morris

Managing Director

Attachment F.4 Letter of intent between EnergyCo and HVO regarding emergency landing area

EnergyCo

Hunter Valley Gliding Club

Dear Andrew,

This letter confirms that EnergyCo and the Hunter Valley Gliding Club (**HVGC**) have undertaken ongoing consultation in relation to the Hunter Transmission Project and its interaction with gliding operations in the Hunter region.

In addition, EnergyCo has engaged with Hunter Valley Operations (**HVO**) regarding the provision of a suitable parcel of land to be utilised by HVGC as an emergency landing area, if required. Subject to the agreement of final land access and operational arrangements between HVGC and HVO, the land will be appropriately graded and prepared to support emergency landing use by HVGC.

EnergyCo and HVO acknowledge the collaborative and constructive engagement undertaken to date, and commit to continuing to work together throughout the ongoing planning, detailed design and delivery phases of the project.

Signed for and on behalf of EnergyCo:

Name: Peter R Redwin

Title: Executive Project Director – Hunter Transmission Project

Date: 21 May 2026

Signed for and on behalf of Hunter Valley Operations:

Name: Tim Harris

Title: Interface Manager - HTP

Date: 25/05/2026

Attachment F.5 Gliding Australia letter

Gliding Australia
glidingaustralia.org

THE GLIDING FEDERATION OF AUSTRALIA INC,
PO Box 2306, Gladstone Park, VICTORIA 3043
Phone +61 (03) 9359 1613 ABN: 82 433 264

PROPOSED RISK CONTROL MEASURES ARISING FROM HUNTER TRANSMISSION PROJECT POWER LINE INSTALLATIONS NEAR WARKWORTH AERODROME (HUNTER VALLEY GLIDING CLUB)

GLIDING AUSTRALIA SAFETY MANAGER COMMENTS

References:

A. CASR Part 149 Approved Self-Administering Aviation Organisations
B. AS/NZS 31000 - 2018 Risk Management – Guidelines
C. GAus Manual of Standard Procedures 5 Safety Management System (SMS)
D. HVGC / EnergyCo / To70 / GAus online meeting 5 May 2026
E. Draft To70 / EnergyCo Aviation Safety Risk Assessment

Introduction

Gliding Australia (GAus) is approved by CASA under CASR Part 149 legislation as an Approved Self-Administering Aviation Organisation (ASAO). GAus has four prescribed key persons responsible for administering aviation safety outcomes for gliding operations including operations of gliders, sailplanes, powered sailplanes and glider towing aircraft:

- The Chief Executive Officer (Accountable Manager)
- Executive Manager Airworthiness (Head Aircraft Maintenance)
- Executive Manager Operations (Head Of Flying Operations) and
- Safety Manger

Hunter Valley Gliding Club (HVGC) is approved by GAus to conduct gliding operations at Warkworth Aerodrome (YWKW), an uncertified aerodrome, using aerotow launches and self-launching motor glider (SLMG) or powered sailplane operations. HVGC has raised safety concerns regarding the proposed installation of high voltage power lines and towers E of Warkworth via the EnergyCo Hunter Transmission Project (HTP). Environmental Impact Study (EIS) submissions have been provided to NSW Government, Department of Planning, including Aviation Risk submissions. These have been disputed, resulting in NSW Planning seeking additional information and T070 being contracted to conduct further aviation safety risk assessments. CASA and GAus key persons have also represented aviation safety risk concerns and planning approval considerations.

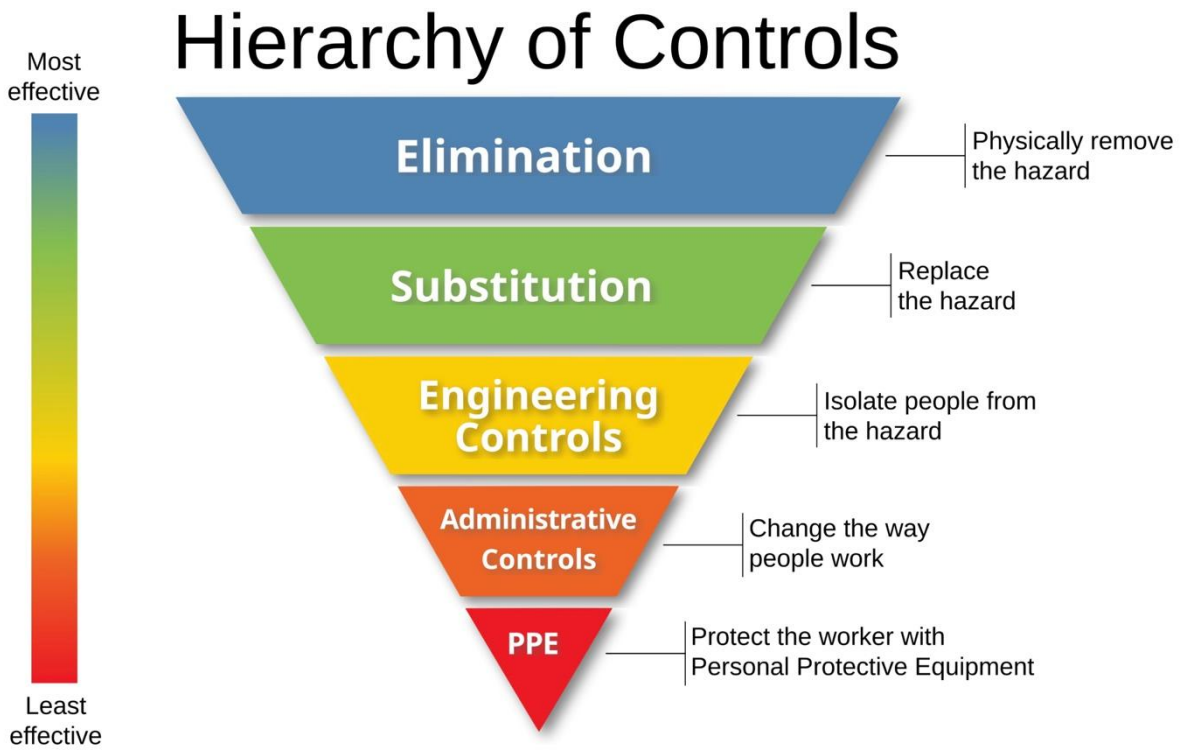
Risk Controls and Mitigation Measures

HVGC officers have consistently raised concerns regarding hazards and risk scenarios arising from the proposed towers and power lines being routed near the extended centreline of Warkworth runway 10, aligned about 100 degrees magnetic, just S of E. HVGC have represented concerns regarding poor consultation processes and the residual risks arising from EnergyCo ruling out relocation of the power lines and tower corridor.

AS/NZS 31000 – 2018 and GAus MOSP5 SMS both highlight the need for disciplined risk assessment and mitigation measures, to reduce aviation safety risks (as per the CASA definition) So Far As Is Reasonably Practicable (SFAIRP).

The hierarchy of risk controls refers to the range of risk controls, or mitigation measures, that may apply to managing risks to SFAIRP, noting also that cascade risks arising from adoption of risk controls must also be considered in an iterative process. The hierarchy denotes layers of risk control effectiveness, as follows:

- Most effective – Elimination - Physically remove the hazard
- Then Substitution - Replace the hazard
- Engineering Controls - Isolate people and operations from the hazard
- Administrative Controls - Change the way people work or operate
- Least effective – PPE - Protect people with Personal Protective Equipment



In Australian Law there is a clear onus to manage or control “obvious and foreseeable risks”, which has led to consideration of key aviation safety risks including (but not limited to):

- Gliders, sailplanes, powered sailplanes and towing aircraft colliding with HTP towers, wires and infrastructure
    - During launch and initial climb, as a result of engine power failure, rope break, environmental conditions etc
    - Returning to the aerodrome from cross country flight
    - Circuit training, emergency training and other normal operations
- Gliders, sailplanes, powered sailplanes and towing aircraft experiencing Loss Of Control (LOC), colliding with terrain or other obstructions while avoiding collision with HTP towers, wires and infrastructure.

As noted in previous submissions and meetings, EnergyCo has consistently rejected consideration of hazard elimination by moving the HTP corridor eastwards, or hybrid installation of underground transmission links in the Warkworth area. With much mining infrastructure and existing obstacles in the Warkworth area, the HTP has reduced contingency options in the sector E of runway 10.

GAus has sought consideration of hazard reduction, substitution and engineering control options, in particular alternate or emergency landing areas that might reduce LOC or collision risks in credible low altitude, low energy, low response time scenarios.

GAus commends the recent efforts by HVGC officers, Hunter Valley Operations (HVO) and tenant farmers, to survey emergency landing options to the E of Warkworth aerodrome.

Comments on Proposed Risk Controls

At Reference D detailed discussions were held on risk control measures identified in Reference E. Some were rejected as impracticable, ineffective, too costly, or combinations. Agreed controls worthy of further detailed investigation are tabulated below:

Appendix – Agreed controls

#	Control details	Risk
3	Establishment of new emergency landing area **east** of the aerodrome to offset reduced outlanding options (subject to agreement with HVO)	Risk 2, Risk 3, Risk 5, Risk 7
2	Enhanced pilot briefings, including PPR and pilot information sessions addressing distraction and fixation risks.	Risk 1, Risk 2, Risk 3, Risk 4, Risk 5, Risk 6, Risk 7
7	High-visibility paint and marker balls on HTP infrastructure to improve detection and avoid last-minute manoeuvring.	Risk 1, Risk 2, Risk 3
8	Tow rope inspection and maintenance.	Risk 2
9	Instructor standardisation with reinforced circuit SOPs and discipline during periodic check flights.	Risk 1, Risk 4, Risk 6
13	NOTAMs (during construction)	Risk 1, Risk 2, Risk 3, Risk 4
15	Pre-take-off performance briefings addressing density altitude, wind, turbulence and sink.	Risk 2, Risk 3
17	Standardised aerotow and SLMG departure patterns to avoid low flight over HTP.	Risk 2, Risk 3
18	Training manual updates for HTP identification and avoidance.	Risk 1, Risk 2, Risk 3, Risk 4
19	Tug performance monitoring and maintenance to RAAus standards	Risk 2, Risk 3
20	Updated aeronautical charts and ERSA entries	Risk 1, Risk 2, Risk 3, Risk 4

Control 3, establishment of new emergency landing area(s) east of the aerodrome to offset reduced outlanding options (subject to agreement with HVO), **is seen by GAus to be the most effective and most important risk control measure**, particularly in the absence of elimination (relocation) options. GAus welcomes HVGC efforts to explore one or several of the emergency landing options presented and agrees with HVGC on their viability.

Cascade risks from using these alternate landing areas can be appropriately managed by HVGC through training and operational safeguards.

If Control 3 alternate landing area measures are not adopted, then the residual risk for HVGC operations is considerably higher, even if other proposed risk controls are adopted.

GAus notes that Control 7, high visibility paint and marker balls on HTP infrastructure to improve detection and avoid last-minute manoeuvring, is higher up the hierarchy of controls than most other (administrative and procedural) measures. It may reduce likelihood of hazards being realised and some risk events occurring.

Other proposed risk controls overlap those that would normally be conducted by HVGC as part of normal operations management.

Control 2, enhanced pilot briefings; along with Control 18, training manual updates; Control 17, standardised SLMG and aerotow departure patterns to avoid low flight over HTP; and Control 9 instructor standardisation and reinforced circuit SOPs, should be considered as a group of measures addressing hazard awareness and maximising separation from HTP hazards. GAus has confidence that HVGC officials can address these controls effectively.

Control 8, tow rope inspection and maintenance; along with Control 15, pre-take off performance briefings; and Control 19, tug maintenance and performance monitoring, are existing controls, part of normal HVGC operations. They all reduce the likelihood of hazardous scenarios arising.

Control 13, NOTAMS during construction, and Control 20, upgraded aeronautical charts and ERSA entries, are necessary administrative risk controls, probably of more relevance to transient visiting GA traffic in the area.

GAus is assisting HVGC in managing their operational risk exposure and club viability. Safety Reviews and Operational Safety Audits are part of the GAus SMS, as defined in MOSP5 SMS and MOSP2 Airworthiness. These provide ongoing opportunities to assess safety and the viability of risk control measures. Further dialogue on these issues will be welcomed.

A.R. (Drew) McKinnie
Safety Manager Gliding Australia

6 May 2026

Attachment F.6 Clarification of Warkworth Airfield Risk Assessment

To70 Aviation (Australia) Pty Ltd
ABN 30 119 069 911
info@to70.com.au

Level 5, 447 Collins St
MELBOURNE VIC 3000

Level 5, 25 King St
BRISBANE QLD 4006

to Dominic Oldfield

address P.O Box 5469, Sydney NSW 2001

date 17 June 2026

subject Clarification of Warkworth Airfield Risk Assessment

our reference 26.254.01 Warkworth Airfield Risk Assessment

Dear Dominic,

To70 Aviation Australia would like to provide the following clarification in relation to the Risk Assessment for the Hunter Transmission Project in the vicinity of Warkworth Aerodrome, which is an uncertified aerodrome:

- The risk assessment explicitly considers a range of aircraft types operating at Warkworth Aerodrome, including gliders, towplanes, self-launching motor gliders and other powered aircraft (e.g. general aviation, training and emergency services), and identifies associated risks across both gliding and non-gliding/powered operations.
- The assessment further identifies controls applicable to all relevant aircraft types, including operational, procedural and infrastructure-related measures (e.g. pilot briefings, obstacle visibility enhancements, updated aeronautical information, and standardised procedures).
- To70 considers these controls to be feasible and reasonable within the context of the operating environment.

Please do not hesitate to contact us should further clarification be

required. Yours sincerely,

Adam Webb
Senior Aviation Consultant