Report

Preliminary Hazard Analysis

AAM Poultry Farm - Bective NSW

Prepared for:

PSA Consulting

Prepared by:

Advitech Pty Limited

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Executive Summary

Advitech Pty Ltd (Advitech) was engaged by PSA Consulting (PSA) on behalf of Agricultural Asset Management Pty Ltd (AAM) to prepare a Preliminary Hazard Analysis (PHA) for a broiler poultry farm to be located in Bective, NSW. The proposed broiler poultry farm can house up to 1,236,150 birds. The proposed development is located at 2342 Oxley Highway Bective NSW and lies approximately 20 km northwest of Tamworth.

A qualitative PHA assessment was undertaken to identify hazard scenarios and determine their potential for offsite impacts. The PHA was carried out with reference to the relevant state planning guidelines:

- NSW Department of Planning, Hazardous Industry Planning Advisory Paper (HIPAP) No. 6, Hazard Analysis; and
- NSW Department of Planning, Assessment Guideline: Multi-Level Risk Assessment.

From the hazard identification workshop, there were no risk scenarios identified with a high-risk score. Of the 22 scenarios discussed, there were 20 scenarios given a low-risk score and the remaining two scenarios was given a medium risk score. Risk scenarios were also assessed in terms of potential for offsite impact. The risk scenarios considered to have potential for offsite impacts include:

- Potential LPG fires causing a radiative heat impact; and
- Site operational noise (i.e., noise from exhaust fans or vehicles whilst under normal working conditions).
- Visual impact of the site.

Of the scenarios considered to have the greatest potential for offsite impacts, only the two LPG fire scenarios resulting in radiative heat impacts were scored as 'medium' risk. Subsequent radiative heat analysis showed that a worst-case scenario LPG fire would not cause harmful heat radiation levels offsite and would also not cause harmful heat radiation levels at the onsite sensitive receptor locations.

Prior to the construction of the proposed Bective poultry farm, the following recommendation (as identified during the PHA) should be completed:

- Install protective bollards if diesel tank is not located in a shed.

The PHA has demonstrated that if the recommendations of the hazard assessments above are addressed, risks associated with the development can be considered to be acceptable, in the context of societal, environment and human safety.

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1. Introduction

Advitech was engaged by PSA Consulting (PSA) on behalf of AAM to prepare a Preliminary Hazard Analysis (PHA) for a poultry farm to be located near Bective, NSW in the Tamworth Regional Council local government area. The proposed poultry farm will have 18 sheds and a maximum population of 1,236,150 birds.

It should be noted that this report was prepared by Advitech Pty Limited for PSA Consulting ('the customer') in accordance with the scope of work and specific requirements agreed between Advitech and the customer. This report was prepared with background information, terms of reference and assumptions agreed with the customer. The report is not intended for use by any other individual or organisation and as such, Advitech will not accept liability for use of the information contained in this report, other than that which was intended at the time of writing.

2. Site Details and Surrounding Land Use

2.1 Location

AAM are currently seeking approval for a poultry farm located on Lot 161, DP755319, 2432 Oxley Highway, Bective, approximately 20 km north-west of Tamworth, NSW. Lot 161 has an area of approximately 1,740,000 m^2.

Access to the farm will be from Soldiers Settlement Road to the south via Lots 5 and 147, DP755319, with the total property being approximately 2,155,000 m^2 in area. **Figure 1** presents the proposed site location.

Figure 1: Site Location (highlighted in red). Source: adapted from SIX Maps 2024

2.1.1 Surrounding Land Uses

The proposed poultry farm is located within the Tamworth Regional Council area. The project location lies within a land use zone classified as 'RU1 – Primary production', as depicted in Figure 2 adapted from the Tamworth Regional Council Local Environmental Plan 2012 Map LZN_002 (2011) [Ref 2]. Land surrounding the property is similarly zoned except for lot 186 DP 755319 (Brigalow Reserve) which is zoned as E2: 'Environmental Conservation'. Council has further classified Brigalow Reserve under its parks classification as an undeveloped landscape area.

The site is surrounded by rural properties, agricultural activities and intensive livestock production including the existing neighbouring poultry farm, Bon Accord, and Maybrook Spelling & Agistment. The nearest sensitive receptors (rural dwellings) are located approximately 0.8km and 1.2km east of the proposed poultry farm.

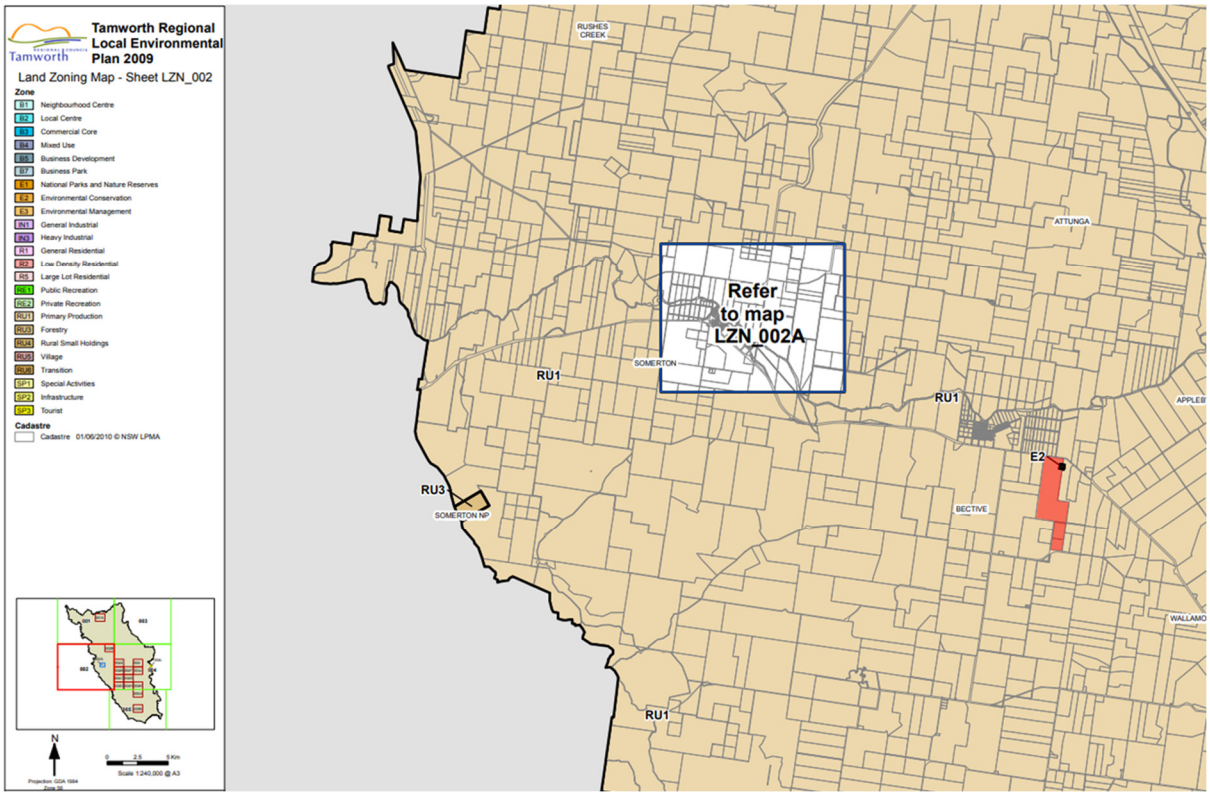

Figure 2: Land Use Zoning – Proposed Bective Poultry Farm (highlighted in red). Source: Tamworth Regional Council Local Environmental Plan Map 2012 (Sheet LZN_002 – 2011)

2.2 Proposed Development Description

The proposed layout of the poultry broiler farm is presented in **Figure 3**, as well as Appendix A.

The farm will be comprised of eighteen (18) poultry sheds where meat chicken birds (broilers) will be grown for human consumption. Each shed will accommodate a maximum of 68,675 birds giving the farm a maximum capacity of 1,236,150 birds. Production of broilers occurs in cycles with each production cycle completed over 8 – 10 weeks. As such, there is an average of 5.2 production cycles each year.

The proposed sheds will be constructed in two rows running east west across the site. Each shed will be ~152m long, ~22.19m wide with a floor area of ~3,350m². The sheds have a ridge height of ~4.8m and will be constructed with concrete and/or cement treated sealed floors, insulated panel walls and zincalume roofs. The poultry sheds will be fitted with purpose-built infrastructure associated with poultry production including fans, heaters, water and feed lines and lighting. Other ancillary buildings and supporting infrastructure will include grain storage silos, staff amenities, access roads, power supply, gas storage infrastructure, water pipes and pump, and two caretaker residences.

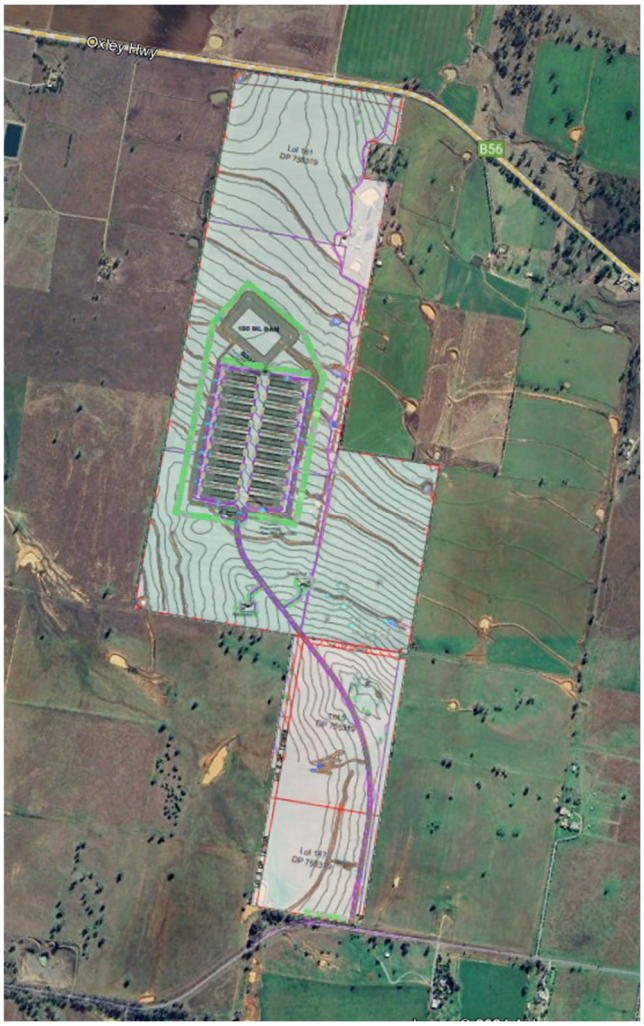

Figure 3: Proposed Site Plan

3. Preliminary Risk Screening

Materials that are expected to be stored on site are listed under **Table 1**. Details including United Nations (UN) Number, Global Harmonised System of Classification (GHS), Australian Dangerous Goods Code (ADG Code) class and packing group (PG), alongside quantities of materials to be stored where applicable, are given as reference of potential hazards that may arise from the store. It should be noted, the proposed Bective Poultry Farm will not store large quantities of materials classified as a Hazardous Chemical (HC) or a Dangerous Good (DG). The largest quantity is that of the Liquified Petroleum Gas (LPG), which under the ADG Code [Ref 1] is classified as 'Class 2.1 – Flammable Gas'.

3.1 State Environmental Planning Policy Hazardous & Offensive Development

The objective of *State Environmental Planning Policy – Resilience and Hazards 2021, Chapter 3: Hazardous and Offensive Development* (SEPP H&OD) is to link the permissibility of a development proposal to its safety and pollution control performance. It aims to ensure that the merits of proposals are properly assessed in relation to offsite risk and offence before being determined.

3.1.1 Potentially Hazardous Industry

SEPP H&OD applies to any proposals which fall under the definition of 'potentially hazardous industry'.

SEPP H&OD defines 'potentially hazardous industry' as:

> *A development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality;*
>
> - *To human health, life, or property; or*
> - *To the biophysical environment.*
>
> *And includes a hazardous industry and a hazardous storage establishment.*

If a development falls within the definition of a 'potentially hazardous industry', then the proponent, must prepare, or cause to be prepared, a Preliminary Hazard Analysis (PHA). SEPP H&OD provides the definition of a 'potentially hazardous industry' as a site which holds quantities of dangerous goods more than the screening threshold levels prescribed within the NSW Department of Planning document entitled '*Applying SEPP 33*' (January 2011).

As presented in **Table 1** below, the site is set to store quantities of dangerous goods in DG Class 2.1 in excess of the screening threshold levels prescribed within *Applying SEPP 33* (January 2011). As such, the proposed site falls within the above classification of a 'potentially hazardous industry' and a PHA must be prepared.

Any material with a DG classification (as previously identified in **Table 1**) are to be stored in approved compliant depots (stores) in accordance with legislative requirements.

3.1.2 Potentially Offensive Industry

SEPP H&OD would also apply where a development is a 'potentially offensive industry', which is defined as follows:

> ***Potentially offensive industry*** *means a development for the purposes of industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including, for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.*

In deciding if a proposal is a 'potentially offensive industry', it is necessary to consider whether, in the absences of safeguards, the proposal would emit a polluting discharge which would cause a significant level of offence. Generally, a development may be classified as potentially offensive where either:

- A licence is required under pollution control legislation; or
- Where no such licence is required, the proposal has the potential to cause offence having regard to the sensitivity of the surrounding environment.

Under the POEO Act Schedule 1 – Scheduled Activities, a site is considered a 'scheduled activity' and requires a licence should it meet the criteria of 'scheduled activity'. For livestock intensive activity, a site is considered a 'scheduled activity' if it has the capacity to accommodate more than 250,000 birds at any time. The proposed development is set to accommodate a maximum of 1,236,150 birds. Therefore, a licence is required, and the site is classified as potentially offensive. Further assessment may be required to determine potential emissions of polluting discharge (i.e., noise, odour, air emissions) as the site can be classified as 'potentially offensive'.

3.2 Storage Quantity Screening

Table 1: Hazardous Chemicals and Dangerous Goods to be stored at the Bective Poultry Farm

Material [1]	UN Number	GHS classification	Class and Packing Group	Maximum Quantity Stored on Site[3]	Screening Threshold from *Applying SEPP 33*	Closest Distance to Site Boundary[4]	SEPP H&OD Triggered?
LPG[2]	1075	Flammable Gas Category 1	2.1	16,500 kg 30,000 L	10,000 kg	390 m	YES
Diesel[2]	N/A	Flammable Liquid Category 4	N/A	3,400 kg 4,000 L	N/A	N/A	NO
Sodium hypochlorite[2]	1791	Skin Corrosion Category 1B	8 PG II	720 kg 600 L	25,000 kg	234 m	NO
Citric acid[2]	N/A	N/A	N/A	600 L	600 L	N/A	NO

Note:
[1]: Materials defined from resources provided by PSA Consulting and Agribiz.
[2]: No SDS was supplied for this chemical. SDS of commercially available products were used.
[3]: Maximum Quantity defined from resources provided by PSA Consulting and Agribiz.
[4]: Separation distance based on Figure 1-2: Locality Map from *Bushfire Threat Assessment for a Proposed Poultry Broiler Farm at 2432 Oxley Highway, Bective NSW 2340*. Separation distances are approximate only.
N/A: Not applicable (or not available) with reviewed documentation.

3.3 Transportation Screening Thresholds

A development may also be potentially hazardous if the Transportation Screening Thresholds are exceeded for vehicular movements to and from the site. **Table 2** presents the cumulative vehicle movement and minimum quantity per load (bulk and packaged) for the DG Classes set to be stored on or transported to the site, based on Table 2: Transportation Screening Thresholds from '*Applying SEPP 33*'.

Table 2: Transportation Screening Thresholds

DG Class	Cumulative / Annual Vehicle Movements	Peak Weekly Vehicle Movements	Bulk (min. quantity per load) (t)[1]	Packages (min. quantity per load) (t)
2.1	> 500	> 30	2	5
8	> 500	> 60	2	5

Notes:
[1]: As per *Applying SEPP 33*, as long as quantities are below this level, potential risk is unlikely to be significant unless number of traffic movements is high

As long as cumulative vehicle movements for DG Classes 2.1 and 8 remain below the transport thresholds for their respective DG Classes, as presented in **Table 2**, a transportation assessment will not be triggered. For LPG and water treatment chemicals, the number of vehicle movements per week or per year is expected to be below their thresholds. It should be noted, as the SEPP H&OD has already been triggered (based on quantities on site), a PHA must be prepared. A traffic impact assessment has also been completed for the site.

3.4 Risk Screening Conclusions

From **Tables 1-3** above, the chemical stores triggered SEPP H&OD screening thresholds, largely based on the total quantity of DG Class 2.1 set to be stored on site.

The proposed Bective Poultry Farm is deemed potentially hazardous due to the exceedance in threshold values. It is recommended that all DGs to be kept onsite be stored in approved compliant depots in accordance with legislative requirements.

As long as vehicle movements for each class set to be transported to and stored on site are below the relevant cumulative screening thresholds, the potential risk is unlikely to be significant. As the SEPP H&OD has already been triggered, based on the quantities to be stored on site, further detail will be provided as part of the PHA.

Under the POEO Act, the site can be classified as 'potentially offensive' due to the sites proposed capacity to accommodate a maximum of 1,236,150 birds (of either category of fertiliser). Further assessment may be required to determine potential polluting discharge caused through operation of the site.

As the site has been found to be a potentially hazardous industry (the proposed storage of DGs on site has exceeded the screening thresholds) and the site can be considered potentially offensive, a PHA has cause to be prepared and is required.

4. Hazard Identification

4.1 General

The aim of the hazard identification process is to highlight any residual risks associated with the interaction of Bective Operations broiler poultry farm with the surrounding environment. A qualitative PHA assessment was undertaken to determine their potential for offsite impacts. The PHA was carried out with reference to the relevant state planning guidelines:

- NSW Department of Planning, Hazardous Industry Planning Advisory Paper (HIPAP) No. 6, Hazard Analysis [Ref 6]; and
- NSW Department of Planning, Assessment Guideline: Multi-Level Risk Assessment [Ref 7].

Hazard identification is a systematic process designed to identify potential hazardous events, their causes and consequences (in qualitative terms). During this process reference is also made to the proposed operational and organisation safeguards that would prevent such hazardous events from occurring, or should they occur, that would protect the site, its equipment, people and the environment. This process provides an in-principle understanding of the adequacy and relevancy of proposed safeguards.

A range of possible hazard scenarios were developed and ranked in terms of qualitative risk in consultation with relevant stakeholders.

4.2 Objective

The objectives of this PHA include:

- Identification of hazard scenarios associated with the development of the Bective poultry farm;
- Analysis of the consequences (effects) for the people and the environment and outline the protective controls for each hazard scenario;
- Assessment of relative risks and potential for offsite impact, including risk to surrounding land users and environment;
- Evaluate whether the proposed safeguards are adequate and assess whether the operation will not impose a level of risk that is intolerable with respect to its surroundings;
- Of the hazards identified, undertake a qualitative assessment to determine their potential for both onsite and offsite impacts; and
- Identification of further investigations required where current information is not comprehensive and/or complete.

4.3 Assumptions

In undertaking hazard identification, a number of assumptions were made. These include:

- The location and layout of the proposed poultry farm is as provided. See layout drawing in Appendix A;
- The LPG, diesel and water treatment chemicals storage will be constructed to the appropriate Australian Standards;
- Site buildings and roads are to be designed and built in accordance with appropriate Australian and International Standards, codes and guidelines;
- All equipment, systems and infrastructure on site will be designed to be inherently safe;
- The LPG supplier will have safe LPG delivery procedures and appropriately licenced and trained personnel delivering the LPG;
- Water for fire-fighting is available onsite. The sheds housing the broiler chickens will have sprinkler systems installed. The fire management plan is yet to be formalised; and
- The hazard identification workshop focused on the operational stage of the Bective poultry farm project. Site specific construction or commissioning stage risks were not discussed in detail.

4.4 Methodology

Risk assessment and hazard identification was conducted in the form of a structured workshop, facilitated by Advitech and attended by Agribiz personnel (consultants to AAM). The facilitated workshop was conducted on 18 December 2024, and covered a broad range of potential hazards. Each hazard was assessed with the goal of identifying the risks requiring further consideration. The objective of the risk assessment workshop was to identify and evaluate risks with the potential to cause injury and/or death

to those present on site or with potential to cause offsite impacts. The workshop excluded occupational risks and detailed design issues.

The risk assessment workshop was conducted in the form of teleconference workshop, facilitated by Advitech and remotely attended by representation from Agribiz. The attendance list for the facilitated workshop is provided in **Table 3**.

Table 3: First Risk Assessment Workshop – Attendance

A systematic approach within the framework of *AS/NZS ISO 31000:2018 Risk Management – Principles and guidelines* [Ref 4] was used to identify risk scenarios and minimise the possibility of missing important information. The minutes of the risk assessment process provide a record of the procedure used and the information obtained (refer to **Appendix** B).

4.5 Terms and Definitions

At the commencement of the workshop, the team was briefed on the context of the risk assessment and the methodology that would be used. The terms and definitions shown in **Table 4** were discussed at relevant stages during the workshop.

Table 4: Risk Assessment Terms and Definitions

Term	Definition
Risk Assessment	The formalised means by which hazards are systematically identified, assessed, ranked according to perceived risk, and addressed by means of appropriate and effective controls. Such an assessment is generally undertaken by a group with extensive knowledge of the system or area being reviewed.
Asset	Tangible and intangible items of value or processes, procedures or tasks performing as intended.
Guidewords	Key supporting elements in the execution of a risk assessment. Identification of deviations from the design intent is achieved by a questioning process using predetermined 'guide words'. The role of these words is to stimulate imaginative thinking, to focus the study and elicit ideas and discussion.
Hazard	A source of potential harm or a situation with the potential to cause loss.
Risk Scenario	An identified situation where an asset and hazard could come together to create a risk event.
Barrier	The current intended systems, procedures or equipment in place (or included as part of the design) or actions taken to eliminate or mitigate a hazard, or render the risk of occurrence acceptable.
Risk	The chance of a potential hazard being realised that will have an impact on a desired outcome. It is measured in terms of consequence and probability.

4.6 Key Elements

The risk identification process was conducted in a comprehensive and systematic manner, so that as far as practicable, all possible risk scenarios were identified. Each component relating to the proposed development was paired systematically with Hazard Guidewords, provided to enable risk scenarios with offsite implications to be comprehensively identified. The hazard guidewords used during the risk assessment of the development of the poultry farm are listed in **Table 5**.

Table 5: Risk Assessment Guidewords

Hazard Guidewords			
Loss of Containment	Vibrations	Transport	Timing
Noise	Radiation Sources	Services	Materials of Construction
Visual Impact	Dangerous Goods	Sensitive Areas	Access
Air/dust	Fire / Explosion	Maintenance	Natural Hazards

4.7 Risk Identification

During the workshop, each asset within the facility, including but not limited to the LPG storage, diesel storage, water treatment chemical storage, and buildings on site etc., were paired systematically with each hazard guideword (refer to **Table 5**). For each asset-hazard pair, the workshop team determined verbally whether a plausible risk scenario existed. If a risk scenario did exist, it was registered and studied further according to **Section 4.8**. If no scenario existed or determined not to exist, the team moved to the next pair.

For each risk scenario identified, a description of the possible causes and potential consequences of the risk scenario, and the current barriers in place to prevent the risk scenario occurring or to minimise the consequences was made. Each potential scenario was than qualitatively assessed to provide a definition of risk level and potential for offsite impact.

The level of risk (i.e., high, medium, or low) associated with each scenario was based on the potential to cause harm to receptors (or the environment) offsite, as well as how effective the proposed control measures to prevent the hazard scenario from arising. The hazards identified are a result of deviation from normal operations and the qualitative risk assigned to each scenario takes into account the inherent and proposed physical, operational and organisation safeguards designed to reduce the consequence and probability of these hazards. **Table 6** presents the level of risk and the applied definition.

Table 6: Risk Level Definitions

Risk Level	Definition
High	Hazards that could lead to offsite severe injury, environmental pollution, illness, or damage, and are likely to occur. The conditions present allow for a significant probability of an accident; immediate action is needed to manage the risk.
Medium	Hazards that may lead to offsite moderate injury, environmental pollution, illness, or damage and could occur under certain circumstances. These conditions warrant attention to lessen the likelihood of an incident.
Low	Hazards that may result in offsite minor injury, environmental pollution, illness, or damage and are unlikely to occur, given the conditions. These risks are managed by routine procedures and precautions.

It should be noted that when determining consequences and how that applies to each risk level, the 'most probable' or 'most likely' consequence was addressed. Potential for impact off site was also considered and a defined risk level from **Table 6** was then determined and recorded in the minutes (**Appendix B**).

4.8 Risk Treatment

Risk treatment actions identified during the risk assessment aimed to reduce the identified risk to **As Low as Reasonably Practicable** (ALARP). Most identified risks cannot be eliminated but can be mitigated or reduced in some way. The preferred method of risk treatment uses engineered (physical) barriers to prevent the risk occurring, otherwise procedural controls may be proposed to prevent the risk or respond appropriately if the risk scenario does occur.

It should be noted that in a workshop setting, it is inefficient to discuss detailed design issues when determining the most appropriate treatment for a risk scenario. As such, the actions recorded tended to be general in nature. The AAM project team is responsible for realising (or designing) risk treatment solutions, as well as ensuring that personnel are assigned responsibility for actions, and that every identified risk scenario is addressed.

5. Hazard Identification Outcomes

Results of the risk assessment workshop were recorded during the workshop and input directly into a spreadsheet template provided by Advitech. The spreadsheet is treated as the formal minutes for the workshop. The risk assessment spreadsheet containing all minuted information is presented in **Appendix B**.

The plausible hazard scenarios as considered/identified by the workshop attendees during the risk assessment are listed in **Table** 7. Control measures that were considered during the workshop have also been included in **Table 7**. Further descriptions of the control measures are provided in Section 5.1.

The workshop also sought to evaluate the hazard scenarios and control measures, through a qualitative risk categorisation. Risk levels were assigned based on Advitech's experience both with poultry farming facilities and the undertaking of PHAs.

Table 7: Hazard Identification and Classification Table

Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk[1]	Action	Comments
LPG storage	Loss of containment	Tank is overfilled during a delivery. Delivery driver leaves a valve open. Valve, fitting or pipe degrades and leaks. Tank is impacted by a vehicle.	Filling operation. Material degradation over time, lack of maintenance. Vehicle collision.	Flammable cloud of LPG finds an ignition source leading to: Potential explosion, jet fire, or flash fire; Potential fatality in proximity of the tank; Environmental impact; Vaporisation of a pool on the ground close to leakage; Damage to structure and equipment; and Potential for fire to propagate to adjacent structure(s).	• Access to site restricted only to trained and authorised driver(s) and personnel. • Personnel are to be inducted under company induction policies. • LPG supplier tank filling procedures. • Protective metal guard rails around LPG tank. • Safety sign: "No Ignition Sources" • Storage tank separation distance from sheds, residences and site boundary. • Area surrounding the tank is ballast stone. • Construction of shed from "fire-proof" material. • Installation and maintenance to be carried and performed by a qualified and licensed personnel. • Construction and design of tank as per relevant AS Standards. • Farm roads to be designed so that LPG tanker will not need to reverse. • Fire hose reel on pressurised water system (as per Australian Standards). • Emergency response procedure.	No	Medium	Model the radiation effects of an LPG fire to determine the impact on the nearest receptors.	-
	Fire / Explosion	An external fire (bushfire / fire in the sheds) causes the tank to heat up and rupture due to overpressure.	Bushfire conditions. Extreme temperatures.	Flammable cloud of LPG finds an ignition source leading to: Potential explosion, jet fire, or flash fire; Potential of fatality in proximity of the tank; and Damage to structure and equipment.	• Farm is cultivated land, limiting bushfire spread. • Farm vegetation is regularly maintained. • Surrounding properties grassland (not densely forested). • Area surrounding the tank is ballast stone. • Sheds are to be construction from materials that limit the spread of fire. • In-building fire system in sheds. • Farm owner safety procedures. • Pressure relief valve on LPG tank • 144 kL water stored onsite for fire-fighting. • Water access points for fire truck(s). • Emergency response procedures • Construction and Design of tank as per relevant Australian Standards.	No	Medium	Model the radiation effects of an LPG fire to determine the impact on the nearest receptors.	A bushfire threat assessment has been completed for the proposed development.[2]
	Air / Dust	Air quality affected by LPG release.	See minutes 1 and 2.	See minutes 1 and 2.	See minutes 1 and 2.	No	Low	-	An air quality assessment has been completed for the development.[3]

Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk[1]	Action	Comments
LPG storage	Dangerous Goods	Chemical reaction with other stored chemicals	Incompatible chemicals stored together.	Chemical reactions release toxic gases or corrode equipment, leading to loss of containment.	• Each chemical storage (LPG, sodium hypochlorite, diesel) is in a separate location.(i.e. LPG stored at the front of the farm, whereas diesel is stored at the back.) • Each chemical storage location is separated from other chemical storage location by distances in excess of those required by Australian Standards.	No	Low	-	-
	Transport	Vehicle collides with tank, causing LPG leak. LPG is contaminated with another chemical during delivery.	Unauthorised access. Not following internal road rules.	Potential fatality. Fire / explosion. Environmental impact.	• Access to site restricted to trained and authorised driver(s) and personnel. • Site has automatic gate with PIN / Code for access control. • Internal road speed limit. • Farm roads to be designed so that LPG tanker will not need to reverse. • LPG supplier tank filling procedures. • Protective metal guard rails around LPG tank.	No	Low	-	A traffic impact assessment has been completed for the proposed development.
	Maintenance	Failure to isolate/purge equipment before performing routine maintenance	Maintenance performed by unqualified personnel.	Equipment failure. Fire / explosion. Additional cost.	• Access to site restricted only to trained and authorised driver(s) and personnel. • Installation(s), operation(s) and maintenance to be carried and performed by qualified and licensed personnel. • Installation carried as per relevant AS Standard(s). • Gas has isolation valves at each shed/heater as per Australian Standards. • Following lockout/tagout (LOTO) procedures.	No	Low	-	-
	Materials of construction	Failure in service of incorrect materials leads to loss of containment.	Use of inadequate construction material. Poor construction quality.	See minutes 1 and 2.	• Construction and design of tank and gas systems as per relevant AS Standards. • Installation(s), operation(s) and maintenance to be carried and performed by qualified and licensed personnel. • Construction quality checking procedures for materials.	No	Low	-	-
	Access	Person with unauthorised site access damages LPG tank or related equipment.	Unauthorised site access.	See minutes 1 and 2.	• Camera surveillance. • Site has automatic gate with PIN / Code for access control. • Access to site restricted only to trained and authorised driver(s) and personnel. • Secondary access control may be provided by bio-security control (if a gate is used).	No	Low	-	-
	Natural Hazards	See minute 2.	See minute 2.	See minute 2.	See minute 2.	No	Low	See minute 2	See minute 2

Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk[1]	Action	Comments
Diesel Storage Tank	Loss of containment	Tank is overfilled during a delivery.Valve, fitting or pipe degrades and leaks.Tank is impacted by a vehicle.	Filling operationMaterial degradation over time, lack of maintenance.Vehicle collision.	Environmental impact.	• Access to site restricted only to trained and authorised driver(s) and personnel. • Personnel are to be inducted under company induction policies. • Tank design is a self-bunded tank on a concrete slab. • Tank design is such that diesel removed from the tank will need to be pumped out (rather than drained). • Diesel tank is directly connected to the emergency generator and is not intended for use to fuel other equipment. • Storage tank separation distance from sheds, residences and site boundary. • Installation and maintenance to be carried and performed by a qualified and licensed personnel. • Farm roads to be designed so that diesel delivery vehicle will not need to reverse. • Spill containment kits will be located close by.	No	Low	-	-
	Fire / Explosion	An external fire (bushfire / fire in the sheds) causes the diesel to catch fire.	Bushfire conditions. Extreme temperatures.	Potential of fatality in proximity of the tank.	• Farm is cultivated land, limiting bushfire spread. • Farm vegetation is regularly maintained. • Surrounding properties grassland (not densely forested). • Storage tank separation distance from sheds, residences and site boundary. • Sheds are to be construction from materials that limit the spread of fire. • Farm owner safety procedures. • Safety sign: "No Ignition Sources" • Fire extinguishers available near diesel tank. • 144 kL water stored onsite for fire-fighting. • In-building fire system in sheds. • Water access points for fire truck(s). • Emergency response procedures.	No	Low	-	A bushfire threat assessment has been completed for the proposed development.[2]
	Air / Dust	Diesel particulate (likely from emergency generator) affects air quality.	Emergency generator running.	Reduced air quality.	• Emergency generator is located well away from site boundaries. Emergency generator will not operate often. • Emergency generator exhaust is small enough to only have localised effect.	No	Low	-	An air quality assessment has been completed for the development.[3]

Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk[1]	Action	Comments
Diesel Storage Tank	Dangerous Goods	Chemical reaction with other stored chemicals	Incompatible chemicals stored together.	Chemical reactions release toxic gases or corrode equipment, leading to loss of containment.	• Each chemical storage (LPG, sodium hypochlorite, diesel) is in a separate location.(i.e. LPG stored at the front of the farm, whereas diesel is stored at the back.) • Each chemical storage location is separated from other chemical storage location by distances in excess of those required by Australian Standards.	No	Low	-	-
	Transport	Vehicle collides with tank, causing diesel leak. Diesel is contaminated with another chemical during delivery.	Unauthorised access. Not following internal road rules.	Environmental impact.	• Access to site restricted to trained and authorised driver(s) and personnel. • Site has automatic gate with PIN / Code for access control. • Internal road speed limit. • Farm roads to be designed so that diesel tanker will not need to reverse. • Diesel will not be delivered with other chemicals.	No	Low	Install protective bollards if diesel tank is not located in a shed.	A traffic impact assessment has been completed for the proposed development.
	Maintenance	Diesel leaks from tank after maintenance.	Maintenance performed by unqualified personnel.	Environmental impact.	• Operation/maintenance carried out by licensed/qualified personnel/operators • If tank requires maintenance, it is the type that can be swapped out by supplier for maintenance to be carried offsite. • Spill containment kits will be located close by.	No	Low	-	-
	Natural Hazards	See minute 18.	See minute 18.	See minute 18.	See minute 18.	No	Low	-	-
Water Treatment Chemicals	Loss of containment	Tank is overfilled during a delivery. Valve, fitting or pipe degrades and leaks. Tank is impacted by a vehicle.	Filling operation Material degradation over time, lack of maintenance. Vehicle collision.	Environmental impact.	• IBCs will be not be filled on site - they will be delivered full and replaced when empty. • IBCs will be installed on full-catch bunds individual to each IBC. • Internal road speed limit. • Farm roads to be designed so that reversing is not required.	No	Low	-	-
	Dangerous Goods	Chemical reaction with other stored chemicals .	Incompatible chemicals stored together.	Chemical reactions release toxic gases or corrode equipment, leading to loss of containment.	• Each chemical storage (LPG, sodium hypochlorite, diesel) is in a separate location. (i.e. LPG stored at the front of the farm, whereas diesel is stored at the back.) • Each chemical storage location is separated from other chemical storage location by distances in excess of those required by Australian Standards.	No	Low	-	-
	Transport	See minute 32.	See minute 32.	See minute 32.	See minute 32.	No	Low	-	A traffic impact assessment has been completed for the proposed development.

Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk[1]	Action	Comments
Farm overview	Noise	Extraction fan noise creates disturbanceVehicle reversing beepers create disturbance.	Extraction fans motor noiseVehicles (poultry trucks and forklifts) operating around the clock.	Audible nuisance to neighbours.	• Noise modelling has been completed to demonstrate that fans will not exceed noise limits. • Trucks/forklifts fitted with low-frequency reversing beeper.	Yes	Low	-	A noise and vibration impact assessment has been completed for the development.[4]
	Visual Impact	Roofs and walls of buildings reflect light.	Reflective or light coloured surfaces.	Visual nuisance to neighbours.	• Tree/nature strips. • Building colour will be green to blend in with natural surroundings.	Yes	Low	-	-
	Air / Dust	Odour from the poultry waste impacts neighbours.	Poultry waste.	Odour nuisance to neighbours.	• Control of the fans and farming practices • Owner of nearest receptor has provided a letter saying that they are accepting of the farm impacts.	No	Low	-	An air quality assessment has been completed for the development that confirms that odour levels are below acceptable thresholds.[3]

Notes:
[1] Risk level (i.e., high, medium and low) is defined in **Table 6**, under Section 4.7.
[2] Shafie and Jones [Ref 13]
[3] Galvin [Ref 14]
[4] SoundIN [Ref 12]
- Where applicable, cells containing '-' have been deliberately left blank.

The hazard identification workshop determined that the most significant risks are associated with the potential fire or explosion at the LPG storage. The modes of failure which may lead to an LPG fire or explosion identified in the workshop include:

- Equipment fault;
- Operator error during tank loading or tanker disconnection; and
- External fire such as bushfire.

From the hazard identification, there were no risk scenarios identified with a high-risk score. Of the 22 scenarios discussed, there were 20 scenarios given a low-risk score and the remaining two scenarios were given a medium risk score. Risk scenarios were also assessed in terms of potential for offsite impact. The risk scenarios considered to have potential for offsite impacts include:

- Potential LPG fires causing a radiative heat impact;
- Site operational noise (i.e., noise from exhaust fans or vehicles whilst under normal working conditions); and
- Visual impact of the site.

In the risk assessment, an LPG fire caused by equipment fault or operator error, and a bushfire causing an LPG fire were addressed as two individual scenarios. Further detail is provided in **Table 7**. Of the four scenarios considered to have the greatest potential for offsite impact, only the two LPG fire scenarios resulting in radiative heat impacts were scored as 'medium' risk.

It should be noted that one of the low-risk scenarios identified had a further requirement in order to achieve this risk rating. This requirement is presented in more detail in Section 5.2.

As there were no risk scenarios scored as 'high', it can be concluded that the current proposed physical procedural and management barriers (alongside the additional requirements specified to meet the risk classification) are sufficient to maintain the identified risks to an acceptable level, in the context of societal, environment and human safety. Further quantitative assessment is reasonably considered not necessary, given the high number of low and single medium level risk level.

5.1 Offsite Impacts

5.1.1 Noise and Visual Impact

A noise and vibration impact assessment [Ref 12] has been completed for the Bective poultry farm that shows that, as designed, offsite noise and vibration impacts of the operational poultry farm fall within acceptable limits. Therefore, the risk of noise and vibration impacting offsite receptors was deemed to be low with no further action required.

Visual impact of the site will be minimised by trees and the colour of the building materials, so the risk of negative offsite impact was also deemed to be low with no further action required.

5.1.2 LPG fire

During the PHA session, it was not clear if an LPG fire at the storage tank would result in an offsite impact from heat radiation, so this risk was classed as medium with an action to determine if an offsite impact was likely.

The following scenario was modelled in a software package, ALOHA version 5.4.7, and the results are presented in **Table 9** and **Appendix C**.

The scenario chosen as a credible worst-case scenario was a full diameter pipe leak from the filling pipework (ø 50mm) with a "full" tank (approx. 30 tonne LPG, 85% liquid level in tank) resulting in a jet fire. From the wind rose data for the site contained in Galvin [Ref 14], two weather conditions were selected that occurred with a higher frequency than other weather conditions; and were conservative choices i.e., heat dispersion would be poor for those weather conditions. It should be noted that exact tank dimensions were not available so approximate dimensions were used that corresponded to the operational volumes and pressures provided by Elgas (chosen gas supplier) to Agribiz.

The heat radiation levels of interest were taken from HIPAP 4 [Ref 5] and the AFAC Fire Brigade Intervention Model Manual [Ref 11].

Table 8: Effect of Heat Radiation

Heat Radiation (kW/m^2)	Effect
2.1[1]	Minimum to cause pain after 1 minute
3[2]	Where firefighters would be expected to operate for a short period of time in high temperatures in combination with direct thermal radiation.
12.6[1]	▪ Significant chance of fatality for extended exposure. High chance of injury. ▪ Causes the temperature of wood to rise to a point where it can be ignited by a naked flame after long exposure. ▪ Thin steel with insulation on the side away from the fire may reach a thermal stress level high enough to cause structural failure.

1: Taken from Table 6, HIPAP 4 [Ref 5]

2: Taken from AFAC Fire Brigade Intervention Model Manual [Ref 11]

Table 9: Jet Fire Heat Radiation Modelling Results

Weather Condition	Distance from Release Point (m)	Heat Radiation (kW/m^2)
Pasquill Class: D Wind speed: 3.1 m/s 100% cloud cover	2.1	66
	3	56
	12.6	27
Pasquill Class: F Wind speed: 2 m/s 70% cloud cover	2.1	66
	3	56
	12.6	26

These results show that there would be no offsite impacts from a jet fire at the LPG storage tank. Additionally, the onsite residences, maintenance building/office, sheds and other chemical storage areas are all at least 100 m from the LPG tank and would therefore experience a very low heat radiation from a jet fire at the LPG storage tank.

5.2 Recommendations and Actions

This PHA was conducted during the project's planning stage, to identify potential hazards and evaluate risks associated with the proposed operations of the Bective poultry farm. As the project is only in the planning stage, the following recommendations should be confirmed and undertaken prior to the construction phase of the project commences.

The PHA was carried out following the methodology outlined in HIPAP No. 6 Hazard Analysis, as well as the guidelines provided in the Multi-Level Risk Assessment for assessment against the criteria specified in HIPAP No. 4.

Specifically, a Level 1 PHA, which involved qualitative analysis, was completed based on the information available at the time. The recommendations developed during this process include to demonstrate the residual risk of the development is as low as reasonably possible are:

- Model the radiation effects of an LPG fire to determine the impact on the nearest receptors.

  This model was completed (refer to Section 5.1.2) and the impact of an LPG fire on the nearest onsite and offsite receptors was determined to be negligible.

- Install protective bollards if the diesel tank is not located in a shed.

6. Conclusion

All risks as identified during the risk assessment workshops as having potential for offsite impacts (as presented in **Table 7**) have been qualitatively assessed. It was found there are no significant offsite risks associated with the Bective poultry farm.

From the risk assessment, four hazard scenarios were determined to have the greatest potential for offsite impacts, including an LPG fire, bushfire causing an LPG fire, site operational noise and visual impact of the site. Potential offsite impacts include:

- Radiative heat from an LPG fire;
- Noise; and
- Visual impact.

Of the scenarios with offsite impacts considered, only the two scenarios resulting in an LPG storage fire were assessed as a 'medium' risk. The remaining scenarios were assessed to be 'low' risk.

As none of the hazard scenarios assessed reached a 'high' classification, it is Advitech's opinion that it is unlikely any of the hazard scenarios identified will exceed the maximum risk acceptability criteria if the controls listed in the workshop minutes are implemented as described. This is under the provision that AAM implement the following recommendation prior to construction of the facility:

- Install protective bollards if diesel tank is not located in a shed.

7. References

The analyses in this report were based on the following Australian Standards, codes and/or design references:

1. National Transport Commission, 2023, *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG Code) *Edition 7.8*.
2. Department of Planning and Environment (DPE), 22 October 2010, *Land Zoning Map Sheet LZN_002 (Tamworth Regional Council Local Environmental Plan 2012)*, NSW Government.
3. AS 1940, 2017, *The Storage and Handling of Flammable and Combustible Liquids*.
4. AS/NZS ISO 31000, 2018, *Risk management – principles and guidelines.*
5. Department of Planning (DoP), 2011a, *Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning*, NSW Government.
6. Department of Planning (DoP), 2011b, *Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis*, NSW Government.
7. Department of Planning and Infrastructure (DP&I), 2011, *Multi-level Risk Assessment*, NSW Government.
8. Department of Planning and Environment (DPE), 2021, *State Environmental Planning Policy (Resilience and Hazards)*, NSW Government.
9. Department of Planning and Environment (DPE), 2011, *Applying SEPP 33: Hazardous and Offensive Development*, NSW Government.
10. NSW Government, 2023, *Protection of the Environment Operations Act 1997 No 156* (POEO Act).
11. AFAC, 2004, *Fire Brigade Intervention Model Version 2.2*, Australasian Fire Authorities Council.
12. SoundIN, December 2024, *AAM Bective Poultry Farm Noise and Vibration Impact Assessment Report No. 17273 Version 1.0*, SoundIN.
13. Shafie, A. and Jones, S., 10 July 2024, *Bushfire Threat Assessment for a Proposed Poultry Broiler Farm at 2432 Oxley Highway, Bective NSW 2340*, Firebird ecoSultants.
14. Galvin, G., 9 December 2024, *Bective South Air Quality Assessment Version D1-1 (draft)*, Astute Environmental Consulting.

Note: Reference has been made to *Applying SEPP 33*, as of at the time of writing, no updated procedure has been put in place for *State Environmental Planning Policy (Resilience and Hazards) – Chapter 3: Hazardous and Offensive Developments*.

Appendix A

Site Plan and Layout

OXLEY HIGHWAY

Lot 161
DP 755319

Lot 186
DP 755319
"Bective Reserve"

Lot 3
DP 592863

160 ML DAM

Pumps and Filter Station

Backup Generators

Shed 18
Shed 17
Shed 16
Shed 15
Shed 14
Shed 13
Shed 12
Shed 11
Shed 10
Shed 9
Shed 8
Shed 7
Shed 6
Shed 5
Shed 4
Shed 3
Shed 2
Shed 1

Amenities

Proposed:
Gas Storage30KL

Residence 'A'

Residence 'B'

Lot 4
DP 592863

Lot 11
DP 849425

Lot 163
DP 755319

Lot 1 DP 1274958

Part Lot 43
DP 755319

Lot 1 DP 127958

Lot 146
DP 755319

Lot 5
DP 755319

Lot 2 DP 127958

Lot 5
DP 755319

Lot 147
DP 755319

Lot 3 DP 127958

Lot 156
DP 755319

Lot 44
DP 755319

Part Lot 43
DP 755319

Proposed
New Access off Soldiers Settlement Road

Tamworth Approx 17km

SOLDIERS SETTLEMENT ROAD

AAM
Lot 161 DP 755319

PROPOSED LAYOUT PLAN

Ref Drawing: 24290 Display Rev E

Appendix B

Hazard Identification Workshop Minutes

Context: Preliminary Hazard Analysis - Hazard Identification (HAZID) Workshop Bective Poultry Farm **Date:** 18/12/2024

Section: Bective Poultry Farm

Ref	N/A	Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk	Action	Comments
1		LPG storage	Loss of containment	Tank is overfilled during a delivery. Delivery driver leaves a valve open. Valve, fitting or pipe degrades and leaks. Tank is impacted by a vehicle.	Filling operation Material degradation over time, lack of maintenance. Vehicle collision	Flammable cloud of LPG finds an ignition source leading to: Potential explosion, jet fire, or flash fire Potential fatality in proximity of the tank Environmental impact Vaporisation of a pool on the ground close to leakage Damage to structure and equipment Potential for fire to propagate to adjacent structure(s).	• Access to site restricted only to trained and authorised driver(s) and personnel. • Personnel are to be inducted under company induction policies. • Gas supplier tank filling procedures. • Protective metal guard rails around LPG tank. • Safety sign: "No Ignition Sources" • Storage tank separation distance from sheds, residences and site boundary. • Area surrounding the tank is ballast stone. • Construction of shed from "fire-proof" material. • Installation and maintenance to be carried and performed by a qualified and licensed personnel. • Construction and design of tank as per relevant AS Standards. • Farm roads to be designed so that LPG tanker will not need to reverse. • Fire hose reel on pressurised water system (as per Australian Standards). • Emergency response procedure	Yes	Medium	Model the radiation effects of an LPG fire to determine the impact on the nearest receptors.	-
2		LPG storage	Fire / Explosion	An external fire (bushfire / fire in the sheds) causes the tank to heat up and rupture due to overpressure.	Bushfire conditions Extreme temperatures	Flammable cloud of LPG finds an ignition source leading to: Potential explosion, jet fire, or flash fire Potential of fatality in proximity of the tank Damage to structure and equipment	• Farm is cultivated land, limiting bushfire spread. • Farm vegetation is regularly mantained. • Surrounding properties grassland (not densely forested). • Area surrounding the tank is ballast stone. • Sheds are to be construction from materials that limit the spread of fire. • In-building fire system in sheds. • Farm owner safety procedures. • Pressure relief valve on LPG tank • 144 kL water stored onsite for fire-fighting. • Water access points for fire truck(s). • Emergency response procedures • Construction and Design of tank as per relevant Australian Standards.	Yes	Medium	Model the radiation effects of an LPG fire to determine the impact on the nearest receptors.	A bushfire threat assessment has been completed for the proposed development.
3		LPG storage	Air / Dust	Air quality affected by LPG release	See minutes 1 and 2	See minutes 1 and 2	See minutes 1 and 2	No	Low	-	An air quality assessment has been completed for the development.
4	x	LPG storage	Noise	-	-	-	-	-	N/A	-	-
5	x	LPG storage	Vibrations	-	-	-	-	-	N/A	-	-
6	x	LPG storage	Visual Impact	-	-	-	-	-	N/A	-	-
7	x	LPG storage	Radiation sources	-	-	-	-	-	N/A	-	-

Ref	N/A	Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk	Action	Comments
8		LPG storage	Dangerous Goods	Chemical reaction with other stored chemicals	Incompatible chemicals stored together	Chemical reactions release toxic gases or corrode equipment, leading to loss of containment	• Each chemical storage (LPG, sodium hypochlorite, diesel) is in a separate location.(ie. LPG stored at the front of the farm, whereas diesel is stored at the back.) • Each chemical storage location is separated from other chemical storage location by distances in excess of those required by Australian Standards.	No	Low	-	-
9		LPG storage	Transport	Vehicle collides with tank, causing LPG leak. LPG is contaminated with another chemical during delivery.	Unauthorised access Not following internal road rules	Potential fatality Fire / explosion Environmental impact	• Access to site restricted to trained and authorised driver(s) and personnel. • Site has automatic gate with PIN / Code for access control. • Internal road speed limit. • Farm roads to be designed so that LPG tanker will not need to reverse. • Origin tank filling procedures. • Protective metal guard rails around LPG tank.	No	Low	-	A traffic impact assessment has been completed for the proposed development.
10	x	LPG storage	Services	-	-	-	-	-	N/A	-	-
11	x	LPG storage	Sensitive Areas	-	-	-	-	-	N/A	-	-
12		LPG storage	Maintenance	Failure to isolate/purge equipment before performing routine maintenance	Maintenance performed by unqualified personnel	Equipment failure Fire / explosion Additional cost	• Access to site restricted only to trained and authorised driver(s) and personnel. • Installation(s), operation(s) and maintenance to be carried and performed by qualified and licensed personnel. • Installation carried as per relevant AS Standard(s). • Gas has isolation valves at each shed/heater as per Australian Standards. • Following lockout/tagout (LOTO) procedures.	No	Low	-	-
13	x	LPG storage	Timing	-	-	-	-	-	N/A	-	-
14		LPG storage	Materials of construction	Failure in service of incorrect materials leads to loss of containment.	Use of inadequate construction material Poor construction quality	See minutes 1 and 2	• Construction and design of tank and gas systems as per relevant AS Standards. • Installation(s), operation(s) and maintenance to be carried and performed by qualified and licensed personnel. • Construction quality checking procedures for materials.	No	Low	-	-
15		LPG storage	Access	Person with unauthorised site access damages LPG tank or related equipment.	Unauthorised site access	See minutes 1 and 2	• Camera surveillance. • Site has automatic gate with PIN / Code for access control. • Access to site restricted only to trained and autorised driver(s) and personnel. • Secondary access control may be provided by bio-security control (if a gate is used).	No	Low	-	-
16		LPG storage	Natural Hazards	See minute 2	See minute 2	See minute 2	See minute 2	No	Low	See minute 2	See minute 2

Ref	N/A	Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk	Action	Comments
17		Diesel Storage Tank	Loss of containment	Tank is overfilled during a delivery. Valve, fitting or pipe degrades and leaks. Tank is impacted by a vehicle.	Filling operation Material degradation over time, lack of maintenance. Vehicle collision	Environmental impact	• Access to site restricted only to trained and authorised driver(s) and personnel. • Personnel are to be inducted under company induction policies. • Tank design is a self bunded tank on a concrete slab. • Tank design is such that diesel removed from the tank will need to be pumped out (rather than drained). • Diesel tank is directly connected to the emergency generator and is not intended for use to fuel other equipment. • Storage tank separation distance from sheds, residences and site boundary. • Installation and maintenance to be carried and performed by a qualified and licensed personnel. • Farm roads to be designed so that diesel delivery vehicle will not need to reverse. • Spill containment kits will be located close by.	No	Low	-	-
18		Diesel Storage Tank	Fire / Explosion	An external fire (bushfire / fire in the sheds) causes the diesel to catch fire.	Bushfire conditions Extreme temperatures	Potential of fatality in proximity of the tank	• Farm is cultivated land, limiting bushfire spread. • Farm vegetation is regularly mantained. • Surrounding properties grassland (not densely forested). • Storage tank separation distance from sheds, residences and site boundary. • Sheds are to be construction from materials that limit the spread of fire. • Farm owner safety procedures. • Safety sign: "No Ignition Sources" • Fire extinguishers available near diesel tank. • 144 kL water stored onsite for fire-fighting. • In-building fire system in sheds. • Water access points for fire truck(s). • Emergency response procedures	No	Low	-	A bushfire threat assessment has been completed for the proposed development.
19		Diesel Storage Tank	Air / Dust	Diesel particulate (likely from emergency generator) affects air quality	Emergency generator running	Reduced air quality	• Emergency generator is located well away from site boundaries. Emergency generator will not operate often. • Emergency generator exhaust is small enough to only have localised effect.	No	Low	-	An air quality assessment has been completed for the development.
20	x	Diesel Storage Tank	Noise	-	-	-	-	-	N/A	-	-
21	x	Diesel Storage Tank	Vibrations	-	-	-	-	-	N/A	-	-
22	x	Diesel Storage Tank	Visual Impact	-	-	-	-	-	N/A	-	-

Ref	N/A	Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk	Action	Comments
23	x	Diesel Storage Tank	Radiation sources	-	-	-	-	-	N/A	-	-
24		Diesel Storage Tank	Dangerous Goods	Chemical reaction with other stored chemicals	Incompatible chemicals stored together	Chemical reactions release toxic gases or corrode equipment, leading to loss of containment	• Each chemical storage (LPG, sodium hypochlorite, diesel) is in a separate location.(ie. LPG stored at the front of the farm, whereas diesel is stored at the back.) • Each chemical storage location is separated from other chemical storage location by distances in excess of those required by Australian Standards.	No	Low	-	-
25		Diesel Storage Tank	Transport	Vehicle collides with tank, causing diesel leak. Diesel is contaminated with another chemical during delivery.	Unauthorised access Not following internal road rules	Environmental impact	• Access to site restricted to trained and authorised driver(s) and personnel. • Site has automatic gate with PIN / Code for access control. • Internal road speed limit. • Farm roads to be designed so that diesel tanker will not need to reverse. • Diesel will not be delivered with other chemicals.	No	Low	Install protective bollards if diesel tank is not located in a shed.	A traffic impact assessment has been completed for the proposed development.
26	x	Diesel Storage Tank	Services	-	-	-	-	-	N/A	-	-
27	x	Diesel Storage Tank	Sensitive Areas	-	-	-	-	-	N/A	-	-
28		Diesel Storage Tank	Maintenance	Diesel leaks from tank after maintenance	Maintenance performed by unqualified personnel	Enviromental impact	• Operation/maintenance carried out by licensed/qualified personnel/operators • If tank requires maintenance, it is the type that can be swapped out by supplier for maintenance to be carried offsite. • Spill containment kits will be located close by.	No	Low	-	-
29	x	Diesel Storage Tank	Timing	-	-	-	-	-	N/A	-	-
30	x	Diesel Storage Tank	Materials of construction	-	-	-	-	-	N/A	-	-
31		Diesel Storage Tank	Natural Hazards	See minute 18	See minute 18	See minute 18	See minute 18	No	Low	-	-
32		Water Treatment Chemicals	Loss of containment	Tank is overfilled during a delivery. Valve, fitting or pipe degrades and leaks. Tank is impacted by	Filling operation Material degradation over time, lack of maintenance. Vehicle collision	Environmental impact	• IBCs will be not be filled on site - they will be delivered full and replaced when empty. • IBCs will be installed on full-catch bunds individual to each IBC. • Internal road speed limit. • Farm roads to be designed so that reversing is not required.	No	Low	-	-
33	x	Water Treatment Chemicals	Fire / Explosion	-	-	-	-	-	N/A	-	-
34	x	Water Treatment Chemicals	Air / Dust	-	-	-	-	-	N/A	-	-
35	x	Water Treatment Chemicals	Noise	-	-	-	-	-	N/A	-	-
36	x	Water Treatment Chemicals	Vibrations	-	-	-	-	-	N/A	-	-
37	x	Water Treatment Chemicals	Visual Impact	-	-	-	-	-	N/A	-	-

Ref	N/A	Asset	Hazard	Scenario	Cause	Consequence	Current Barriers	Offsite Impact Y/N	Risk	Action	Comments
38	x	Water Treatment Chemicals	Radiation sources	-	-	-	-	-	N/A	-	-
39		Water Treatment Chemicals	Dangerous Goods	Chemical reaction with other stored chemicals	Incompatible chemicals stored together	Chemical reactions release toxic gases or corrode equipment, leading to loss of containment	• Each chemical storage (LPG, sodium hypochlorite, diesel) is in a separate location.(ie. LPG stored at the front of the farm, whereas diesel is stored at the back.) • Each chemical storage location is separated from other chemical storage location by distances in excess of those required by Australian Standards.	No	Low	-	-
40		Water Treatment Chemicals	Transport	See minute 32	See minute 32	See minute 32	See minute 32	No	Low	-	A traffic impact assessment has been completed for the proposed development.
41	x	Water Treatment Chemicals	Services	-	-	-	-	-	N/A	-	-
42	x	Water Treatment Chemicals	Sensitive Areas	-	-	-	-	-	N/A	-	-
43	x	Water Treatment Chemicals	Maintenance	-	-	-	-	-	N/A	-	-
44	x	Water Treatment Chemicals	Timing	-	-	-	-	-	N/A	-	-
45	x	Water Treatment Chemicals	Materials of construction	-	-	-	-	-	N/A	-	-
46	x	Water Treatment Chemicals	Natural Hazards	-	-	-	-	-	N/A	-	-
47	x	Farm overview	Loss of containment	-	-	-	-	-	N/A	-	-
48		Farm overview	Noise	Extraction fan noise creates disturbance Vehicle reversing beepers create disturbance	Extraction fans motor noise Vehicles (poultry trucks and forklifts) operating around the clock	Audible nuisance to neighbours.	• Noise modelling has been completed to demonstrate that fans will not exceed noise limits. • Trucks/forklifts fitted with low-frequency reversing beeper	Yes	Low	-	A noise and vibration impact assessment has been completed for the development.
49		Farm overview	Visual Impact	Roofs and walls of buildings reflect light.	Reflective or light coloured surfaces.	Visual nuisance to neighbours.	• Tree/nature strips. • Building colour will be green to blend in with natural surroundings.	Yes	Low	-	-
50		Farm overview	Air / Dust	Odour from the poultry waste impacts neighbours	Poultry waste	Odour nuisance to neighbours.	• Control of the fans and farming practices • Owner of nearest receptor has provided a letter saying that they are accepting of the farm impacts.	No	Low	-	An air quality assessment has been completed for the development.
51	x	Farm overview	Vibrations	-	-	-	-	-	N/A	-	-
52	x	Farm overview	Radiation sources	-	-	-	-	-	N/A	-	-
53	x	Farm overview	Dangerous Goods	-	-	-	-	-	N/A	-	-
54	x	Farm overview	Fire / Explosion	-	-	-	-	-	N/A	-	-
55	x	Farm overview	Transport	-	-	-	-	-	N/A	-	Traffic impact and noise and vibration impact assessments have been completed for the development.
56	x	Farm overview	Services	-	-	-	-	-	N/A	-	-
57	x	Farm overview	Sensitive Areas	-	-	-	-	-	N/A	-	-
58	x	Farm overview	Maintenance	-	-	-	-	-	N/A	-	-
59	x	Farm overview	Timing	-	-	-	-	-	N/A	-	-
60	x	Farm overview	Materials of construction	-	-	-	-	-	N/A	-	-
61	x	Farm overview	Access	-	-	-	-	-	N/A	-	-
62	x	Farm overview	Natural Hazards	-	-	-	-	-	N/A	-	-

Appendix C

Radiation Heat Model Input/Output

SITE DATA:
Location: BECTIVE POULTRY FARM, AUSTRALIA
Building Air Exchanges Per Hour: 0.50 (enclosed office)
Time: January 8, 2025 1456 hours DST (user specified)

CHEMICAL DATA:
Chemical Name: PROPANE
CAS Number: 74-98-6 Molecular Weight: 44.10 g/mol
AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm
IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm
Ambient Boiling Point: -43.0° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
Wind: 3.1 meters/second from SSE at 3 meters
Ground Roughness: open country Cloud Cover: 10 tenths
Air Temperature: 30° C Stability Class: D
No Inversion Height Relative Humidity: 75%

SOURCE STRENGTH:
Leak from short pipe or valve in horizontal cylindrical tank
Flammable chemical is burning as it escapes from tank
Tank Diameter: 2.2 meters Tank Length: 9.314 meters
Tank Volume: 35.4 cubic meters
Tank contains liquid Internal Temperature: 30° C
Chemical Mass in Tank: 14,653 kilograms
Tank is 85% full
Circular Opening Diameter: 0.05 meters
Opening is 0 meters from tank bottom
Max Flame Length: 20 meters Burn Duration: 18 minutes
Max Burn Rate: 916 kilograms/min
Total Amount Burned: 14,653 kilograms
Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:
Threat Modeled: Thermal radiation from jet fire
Red : 27 meters --- (12.6 kW/(sq m))
Orange: 56 meters --- (3 kW/(sq m))
Yellow: 66 meters --- (2.1 kW/(sq m))

SITE DATA:
Location: BECTIVE POULTRY FARM, AUSTRALIA
Building Air Exchanges Per Hour: 0.50 (enclosed office)
Time: January 8, 2025 1456 hours DST (user specified)

CHEMICAL DATA:
Chemical Name: PROPANE
CAS Number: 74-98-6 Molecular Weight: 44.10 g/mol
AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm
IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm
Ambient Boiling Point: -43.0° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
Wind: 2 meters/second from SSE at 3 meters
Ground Roughness: open country Cloud Cover: 7 tenths
Air Temperature: 30° C
Stability Class: F (user override)
No Inversion Height Relative Humidity: 75%

SOURCE STRENGTH:
Leak from short pipe or valve in horizontal cylindrical tank
Flammable chemical is burning as it escapes from tank
Tank Diameter: 2.2 meters Tank Length: 9.314 meters
Tank Volume: 35.4 cubic meters
Tank contains liquid Internal Temperature: 30° C
Chemical Mass in Tank: 14,653 kilograms
Tank is 85% full
Circular Opening Diameter: 0.05 meters
Opening is 0 meters from tank bottom
Max Flame Length: 20 meters Burn Duration: 18 minutes
Max Burn Rate: 916 kilograms/min
Total Amount Burned: 14,653 kilograms
Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:
Threat Modeled: Thermal radiation from jet fire
Red : 26 meters --- (12.6 kW/(sq m))
Orange: 56 meters --- (3 kW/(sq m))
Yellow: 66 meters --- (2.1 kW/(sq m))