Appendix F

Bushfire Hazard Assessment, GHD 2024

Bushfire Hazard Assessment

Tocumwal Magazine Storage Upgrade

Orica Australia Pty Ltd

13 May 2024

→ The Power of Commitment

Project name	Orica Tocumwal Magazine Compound Upgrade						
Document title	Bushfire Hazard Assessment | Tocumwal Magazine Storage Upgrade						
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[Compliance statement]

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1. Introduction

Orica Australia Pty Ltd (Orica) proposes to redevelop the Tocumwal Explosives Reserve magazine site ('the project'). The project would bring the Tocumwal site in line with Australian Standard AS2187 Explosives - Storage, Transport and Use.

The project is located at 431 Newell Highway, approximately four kilometres north of the township of Tocumwal. The site is situated within the Berrigan Local Government Area (LGA) on Lot 2, DP 225459 and is operated by Orica. The location of the site is shown in Figure 1. The site is zoned as RU1 Primary Production under *Berrigan Local Environmental Plan 2013*. The Tocumwal Explosives Reserve is a fenced, open grazing property that is approximately 750 hectares in area, with a northern and an eastern frontage of 4.7 km to the Newell Highway.

GHD Pty Ltd (GHD) has prepared a Bushfire Assessment on behalf of Orica for the Tocumwal Magazine Storage Upgrade to address the NSW Department of Planning and Environment (DPE) Secretary's environmental assessment requirements (SEARs). The proposed activity would include the construction of four (4) new two hundred and fifty tonne high explosive (250 t HE) magazines and a single 10,000,000 capacity detonator (IE) magazine in new locations on the site. No change in the quantity of explosives to be stored is proposed. Operational procedures remain generally unchanged post redevelopment. The existing magazine buildings are to be decommissioned or demolished once the new magazines are commissioned.

The project is classified as a State Significant Development under the *Environment Planning and Assessment Act 1979* and is to be assessed via an Environmental Impact Statement (EIS).

1.1 Purpose of this report

The purpose of this report is to document any likely required bushfire mitigation measures that would be applicable for the design and construction of the proposed Tocumwal Explosives Reserve magazine site.

The proposed upgrade works are considered to be hazardous industry due to the storage of explosive materials, and assessment under 8.3.9 of Planning for Bushfire Protection (PBP) (NSWRFS 2019) is required. Consultation with the NSW Rural Fire Service (RFS) took place on 11 December 2023, and 14 February 2024, and the subsequent preparation of a performance-based solution was completed and is included in this report. It is noted that the proposal is not for new development, but upgrade works on an existing site.

1.2 Secretary's environmental assessment requirements

The DPE has issued SEARs for the project. A description of the SEARs requirements relating to bushfire and where they have been addressed in this report is provided in Table 1.

Table 1 SEARs

Requirement	Where addressed in this report
Bush Fire – a bush fire assessment report that addresses the aims and objectives of Planning for Bushfire Protection 2019, and includes:	This assessment has been prepared in accordance with Planning for Bushfire Protection 2019.
– Details of proposed operational access for emergency services personnel.	Section 3.3
– Details of emergency and evacuation arrangements for occupants/visitors.	Section 3.6
– A Bush Fire Emergency Management and Evacuation Plan prepared in accordance with relevant RFS guidance.	Section 3.6

1.3 Scope and limitations

This report: has been prepared by GHD for Orica Australia Pty Ltd and may only be used and relied on by Orica Australia Pty Ltd for the purpose agreed between GHD and Orica Australia Pty Ltd as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Orica Australia Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.4 Assumptions

Bush Fire Prone Land (BFPL) has been assessed using the NSW RFS BFPL mapping tool (Check if you're in bush fire prone land -NSW Rural Fire Service(RFS)) and the NSW ePlanner Spatial viewer (ePlanning Spatial Viewer (nsw.gov.au)) and has not been independently verified by GHD.
GHD conducted a site inspection and photos from this inspection have been used in this report. GHD has also relied upon publicly available spatial information for the assessment.
The report is based on site layout as presented in the plans provided to GHD on 20 December 2023 and the report relates to the new works only, as outlined in section 1.

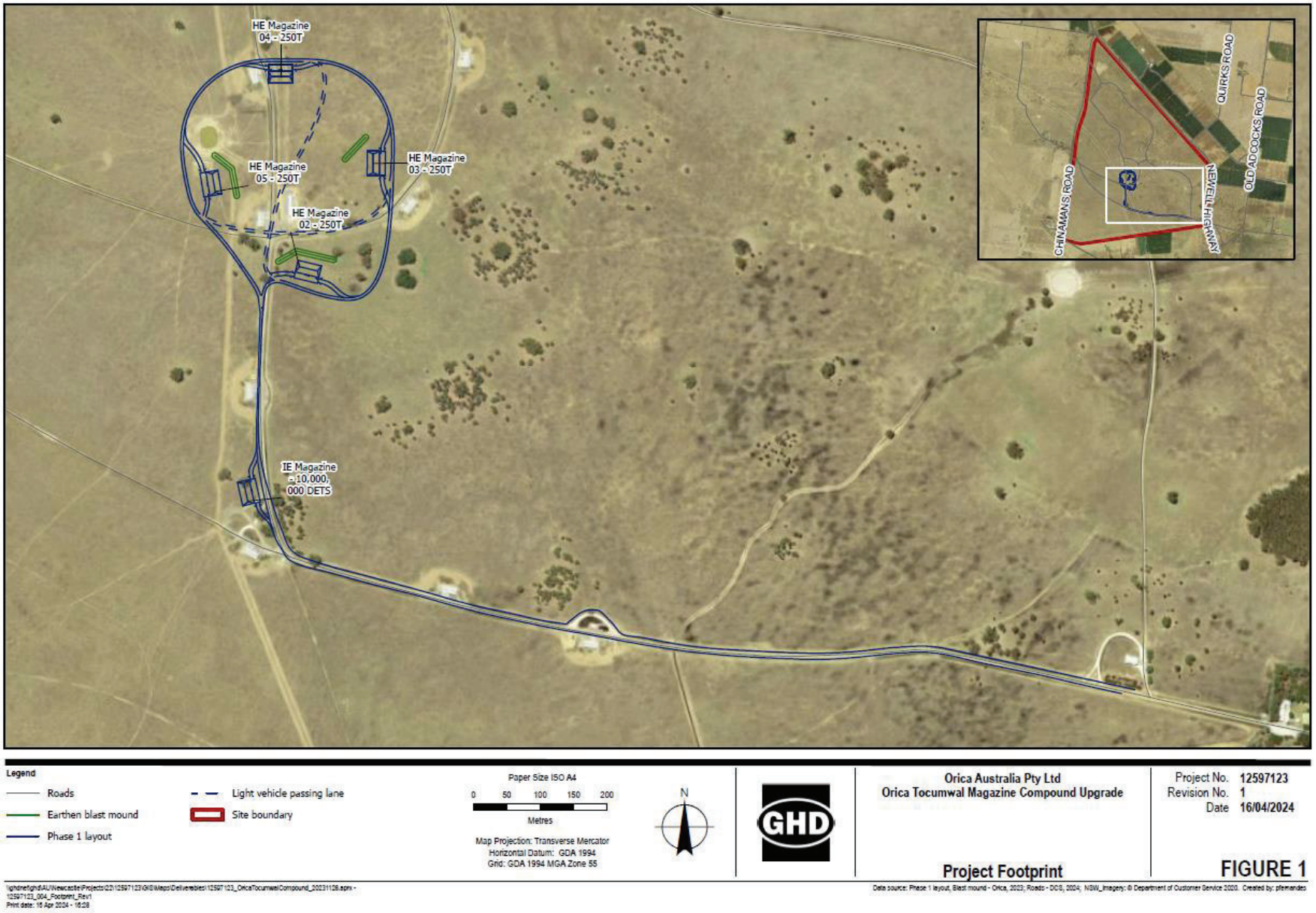


Figure 1 *Proposed location of new magazine storage buildings*

2. Bushfire assessment

2.1 Bushfire prone land classification

The identification of bushfire prone areas is required under Section 10.3 of the *Environmental Planning and Assessment Act 1979*. The site is not designated as bushfire prone (as per Berrigan Council and RFS mapping – see Figure 2). The closest mapped BFPL is located approximately 2km to the south and is associated with the riparian vegetation adjacent the Murray River. Site inspections have confirmed the majority of the site is actively grazed by livestock, however seasonal conditions may affect the level of grass growth and accumulation. On site vegetation may be considered a potential bushfire hazard.

2.2 Fire weather

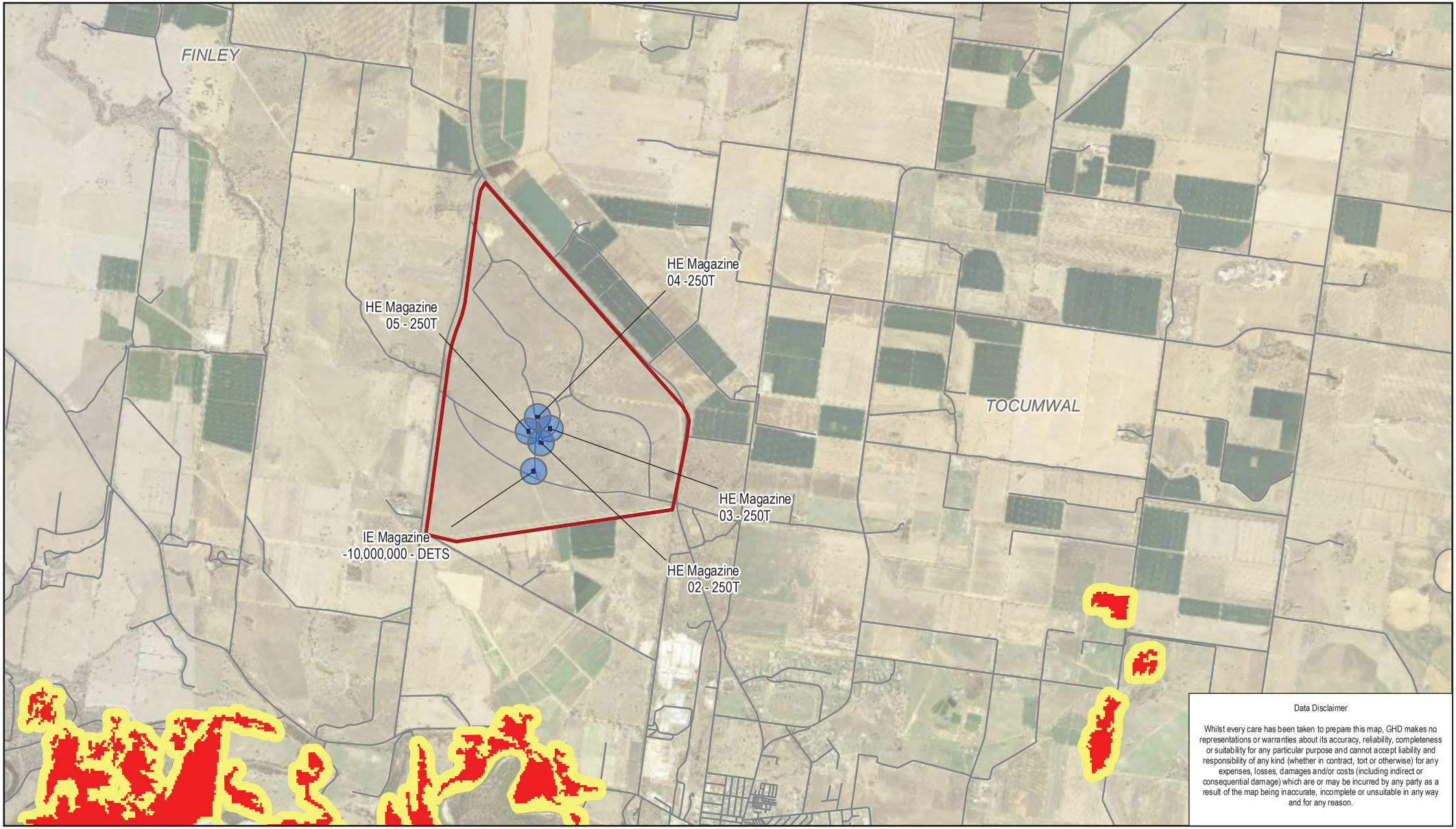
The site falls within the Berrigan LGA within the greater Southern Riverina area for which Fire Danger Index (FDI) of 80 is applicable for bushfire assessment (NSW RFS, 2019).

2.3 Vegetation

A desktop review of the State Vegetation Type Map (DPE 2023) indicates the site is dominated by grasslands Plant Community type (PCT) 44, with remnant islands (<11ha) of grassy woodland throughout. An ecological field assessment was carried out by OzArk Environment and Heritage in 2023. The ecological assessment indicates that the site is dominated by PCT 45 Plains Grass grasslands. There are small areas of freshwater wetlands and inland riverine wetlands located centrally on the western boundary of the site. Remnant “islands” of woodland occur within these grasslands, dominated either by River Red Gum (*Eucalyptus camaldulensis*) or by Yellow Box (*E. melliodora*). River Red Gum woodlands have been classified as PCT 9 River Red Gum - wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion. Yellow Box woodlands have been classified as PCT 74 Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion.

The predominant vegetation class formation from PBP is given in Table 2 and mapping is presented in Figure 3. Photographs of the site and surrounding vegetation are presented in Attachment 1. The site is generally maintained to a low fuel condition by livestock grazing, ploughing, and slashing adjacent roadways, magazines, and key fence lines.

The site visit confirmed there is substantial adjoining grassland vegetation (associated with agricultural cropping and grazing activities) in the surrounding landscape. Much of the adjoining land is subject to flood irrigation, with water supplied by a series of open irrigation channels.



Data Disclaimer

Whilst every care has been taken to prepare this map, GHD makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Legend

- Road
- 150m Assessment Buffer
- Site boundary
- Bushfire Prone Land
- Vegetation Category 1
- Vegetation Buffer

Paper Size ISO A4

0 500 1,000 1,500 2,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Orica Australia Pty Ltd
Orica Tocumwal Magazine Compound Upgrade

Bushfire Prone Land

Project No. **12597123**
Revision No. **0**
Date **24/04/2024**

FIGURE 2

\\ghdnetghd\AU\Newcastle\Projects\22\12597123\GIS\Maps\Deliverables\12597123_OricaTocumwa
Print date: 24 Apr 2024 - 13:02

Data source: NSW_Imagery: © Department of Customer Service 2020. Phase 1 layout, Blast mound - Orica, 2023, Bushfire Prone Land - NSW Government - 2023, Site Boundary , Buffer Zone - GHD - 2023.
Created by: pfernandes

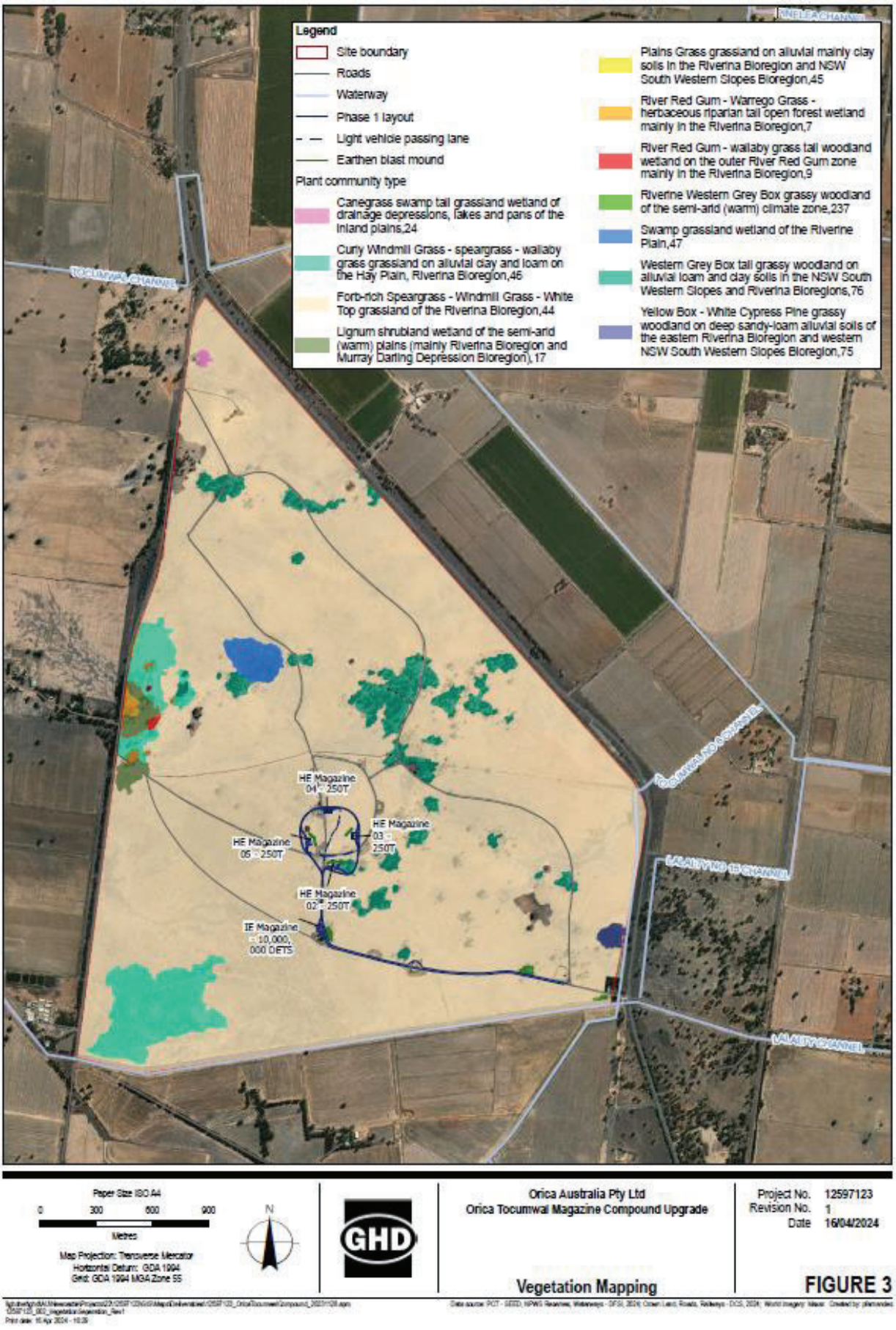


Figure 3 Vegetation within the project site (Source: NSW SEED database)

2.4 Effective slope

Effective slope was assessed using contour mapping from Nearmaps and confirmed by site assessment (refer Figure 4 and Table 2). The site can broadly be characterised as flat, with the main geographic feature surrounding the site being irrigation channels.

3. Bushfire protection measures

A suitable package of Bushfire Protection Measures (BPM) is proposed in Table 2, commensurate with the assessed level of risk associated with hazardous industry, and commercial and industrial development as outlined in 8.3.9 and 8.3.10 of PBP.

3.1 Asset protection zones (APZ) and bushfire attack level (BAL) assessment

To achieve deemed-to-satisfy acceptable solutions for Asset Protection Zones (APZ's) and building construction (Bushfire Attack Levels (BALs)) for hazardous industry development, structures are to be positioned, and vegetation managed such that the building can achieve a radiant heat exposure not exceeding 10kW/m2.

APZs provide protection from exposure, defendable space and hazard separation. APZs have been applied to meet the Special Fire Protection Purpose (SFPP) objectives of PBP. APZs are established between a building and vegetation hazard, and their calculation is based on vegetation and slope in accordance with Appendix 1 of the PBP. Deemed-to-satisfy APZs, determined in accordance with Table A1.12.1 of PBP for SFPP developments, are presented in Table 2. The required APZ for each vegetation type is shown in Figure 5 with the specifications for management detailed in Section 3.1.1.

3.1.1 PBP requirements for Asset Protection Zones

Vegetation management, including landscaping, within the subject site is to achieve the specifications of an Inner Protection Area (IPA) as described by PBP and outlined below:

Trees

– canopy cover should be less than 15% (at maturity);
– trees (at maturity) should not touch or overhang the building / structure;
– lower limbs should be removed up to a height of 2 m above ground;
– canopies should be separated by 2 to 5 m; and
– preference should be given to smooth barked and evergreen trees.

Shrubs

– create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings/ structures;
– shrubs should not be located under trees;
– shrubs should not form more than 10% ground cover; and
– clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

– should be kept mown (as a guide grass should be kept to no more than 100 mm in height); and
– leaves and vegetation debris should be removed.

3.2 Consultation and coordination with relevant authorities

Initial consultation with NSW RFS was completed over the phone on 19 December 2023 (confirmed in email received 26 March 2024), Steve Mckinnon, Development Assessment & Planning Coordinator of NSW RFS confirmed that the proposed application of APZ setbacks in accordance with Table A1.12.1 of PBP was a suitable approach. NSW RFS also confirmed the location of the stored water access point at / near the administration / entrance was a suitable approach, subject to practical accessibility to the access point for Category 1 appliances as described in Appendix 3 of PBP.

3.2.1 Firefighting aircraft exclusion zone

During the development of the State Significant Development (SSD) application for the replacement magazines project at the Orica Tocumwal Explosives Reserve, the Fire Services of NSW, namely the NSW Fire and Rescue Service (NSWFR) and the RFS, requested to be advised by Orica about the potential impacts of an under threat magazine creating a danger zone above that magazine for aerial firefighting apparatus such as fixed wing and rotary wing aircraft (Attachment 3).

Orica, in consultation with RFS and locally based operational RFS staff on 14 February 2024 concluded that if there was an emergency where a fire was directly involving the explosives magazines and evacuation occurred, recommended exclusion distances as explained below should be applied.

– Within the Quantity-Distance assessment there is a category of Protected Works – Class A (PWA). In the above emergency situation, Orica would classify aircraft in the 50% PWA category. This 50% PWA category allows between 20-500 vehicles to pass a potential explosion source per 24h period. To incorporate an additional safety factor, given that aircraft have the potential to fall from the sky, we recommend 100% PWA is used. This distance is equivalent to the allowable distance for between 500-10,000 vehicles per day to pass a Potential Explosion Source (PES). At this distance, the possibility of shrapnel or debris is small. The pressure wave at this distance may be noticeable, but it is not likely to cause major damage to the aircraft (or vehicle). It is expected that turbulence would be greater than the impact of the overpressure at this distance. The possibility of EMP (electromagnetic pulse) impact is literally nil as this is expected to diminish at very close distances to the PES (in the range of 50-100 m or less).

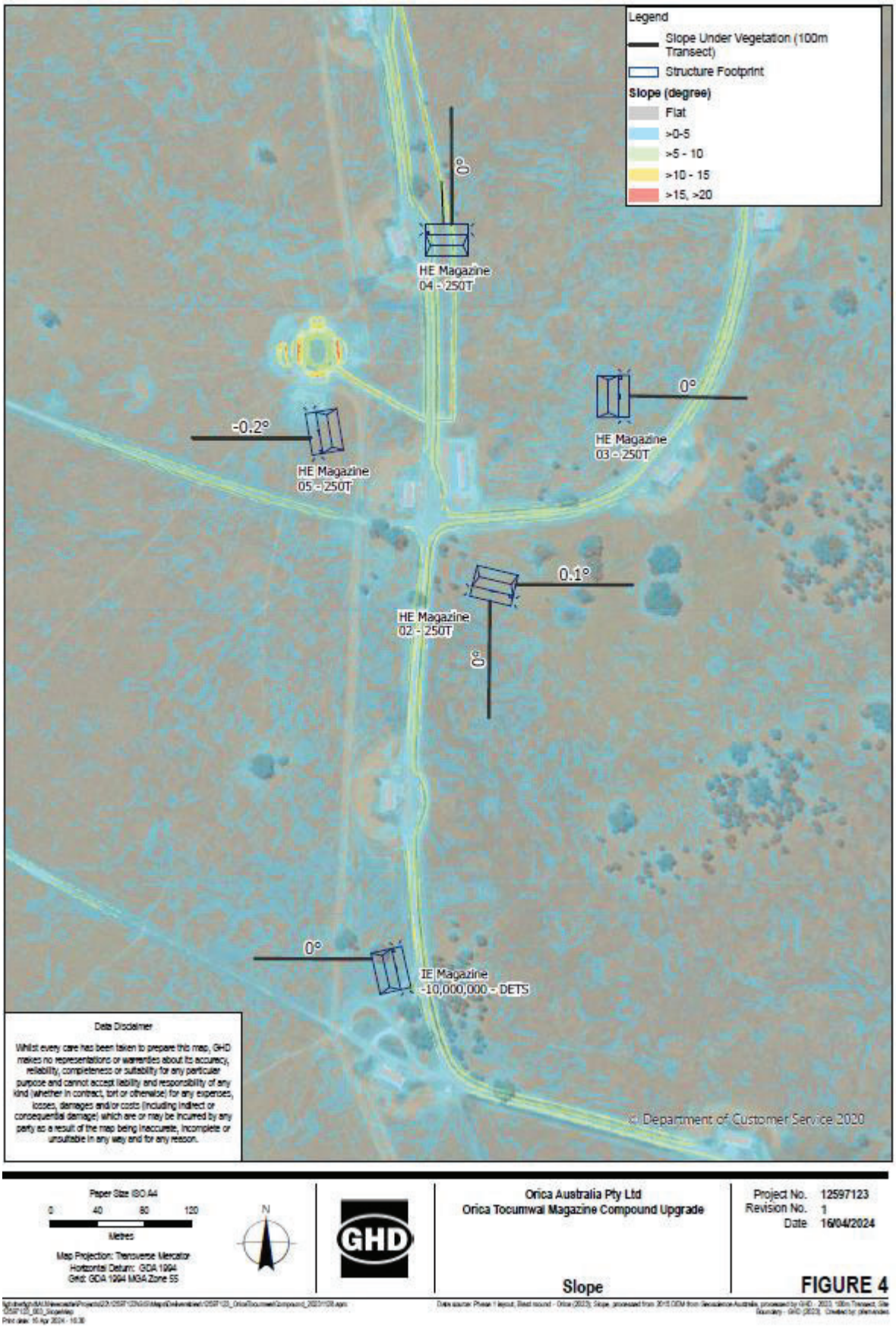


Figure 4 *Slope adjacent new magazine sites*

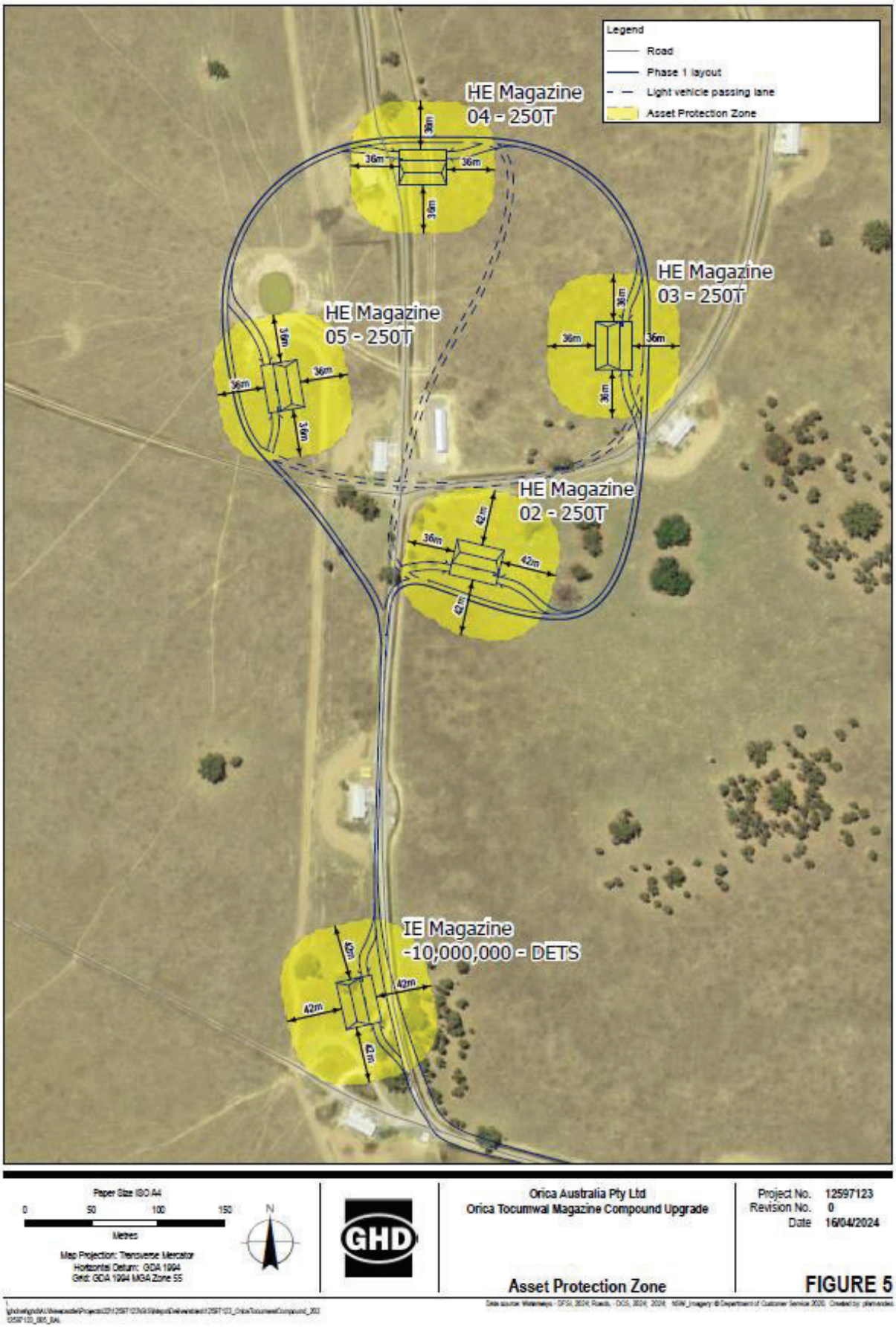


Figure 5 *Proposed new magazines and APZs*

Table 2 Determination of setbacks (APZs) for the proposal

Magazine	Direction	Nearest BF prone vegetation	Effective slope class	Required APZ (10kW/m^2)	Comments
HE 2	North	Woodland	Flat	42m	
	East	Woodland	Flat	42m	The internal access road will form part of the required APZ
	South	Grassland	Flat	42m	The internal access road will form part of the required APZ
	West	Grassland	Flat	36m	The internal access road will form part of the required APZ
HE 3	North	Grassland	Flat	36m	The internal access road will form part of the required APZ
	East	Grassland	Flat	36m	The internal access road will form part of the required APZ
	South	Grassland	Flat	36m	The internal access road will form part of the required APZ
	West	Grassland	Flat	36m	
HE 4	North	Grassland	Flat	36m	The internal access road will form part of the required APZ
	East	Grassland	Flat	36m	The internal access road will form part of the required APZ
	South	Grassland	Flat	36m	
	West	Grassland	Flat	36m	The internal access road will form part of the required APZ
HE 5	North	Grassland	Flat	36m	
	East	Grassland	Flat	36m	
	South	Grassland	Flat	36m	
	West	Grassland	Flat	36m	The internal access road will form part of the required APZ
IE (1)	North	Woodland	Flat	42m	The internal access road will form part of the required APZ
	East	Woodland	Flat	42m	The internal access road will form part of the required APZ
	South	Woodland	Flat	42m	The internal access road will form part of the required APZ
	West	Woodland	Flat	42m	

3.3 Access and egress

Internal access roads are proposed to link the existing site entrance to each of the new magazines. These roads will be gravel during the construction of the new magazines and would then be sealed prior to commissioning of the new magazines.

There is a single main access point to the site via the Newell Highway (existing dual lane, sealed public road). There is an alternative gated access to the west of the site via Chinamans Road, a sealed single lane road. The existing internal road network and onsite roadways are trafficable year-round and are sufficient for emergency vehicle access and site personnel egress.

There are currently between two to five permanent staff operating the Tocumwal Explosives Reserve during standard working hours. The operation of the new facility would continue to require the same number of staff after construction has been completed. As the proposed development will not result in additional personnel onsite the proposed upgrades to the internal road network will be sufficient to achieve the access/egress objectives of Planning for Bushfire Protection.

3.4 Water supply

No reticulated water is present on site. Water is supplied to the site via bore water. Channel water for example from the adjoining Tocumwal No. 6 Channel or the Lalalty Canal may also be used for fire suppression purposes. Orica proposes to install a single large 50,000 litre tank, immediately south west of the existing administration building (at the main entrance to the site) as water supply for firefighting purposes.

Three farm dams are located within and adjoining the site and may provide water for fire suppression purposes (refer Attachment 2). Dam 1, west of proposed magazines has a capacity of approximately 1,446m^3; Dam 2 within close proximity to HE Magazine 05, is approximately 2,556m^3 in capacity, and Dam 3 on the northeastern boundary of the site is approximately 2,900 m^3 in capacity (Source: Orica Tocumwal Emergency Management Plan, 2023, Revision 16).

Fire extinguishers are located in each magazine building, amenities and vehicles.

3.5 Utilities

Orica Pty Ltd proposes to power each magazine with a solar power system. Additionally, it is planned to connect the security system from each magazine back to the administration building using a data radio network powered by the solar power system. It is recommended the installation and location of electrical services limits the possibility of ignition of surrounding bush land or the fabric of the buildings. Where practicable, electrical transmission lines are underground; where overhead, electrical transmission lines are proposed as follow:

– lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and
– no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.

The site is not serviced by reticulated gas.

3.6 Emergency management, evacuation and bushfire plans

Emergency management arrangements are described in the site EMP which would be updated to cater for the site redevelopment. The EMP notes that Fire and Rescue NSW is the primary party for incident response and control. NSW RFS may also respond.

4. Summary

– The proposal site is not mapped as BFPL but has exposure to woodland and grassland vegetation which is currently grazed by livestock.
– The site has existing, functional magazine storage structures with existing APZs serviced by all-weather access tracks. Access tracks would be sealed as part of the redevelopment.
– As the proposed development is considered a hazardous industry, appropriate APZs will be required for each new magazine to achieve BAL10 APZ specifications (from Table A1.12.1). These are required to be between 36m (grassland) and 42m (woodland) width.
– RFS has confirmed the application of 10kw APZ for storage facilities was a suitable approach.
– RFS has confirmed the proposed location of a static water supply of 50,000 litre tank in the vicinity of the existing administration building is a suitable approach (subject to practical accessibility to the access point for Category 1 fire appliances as detailed in Appendix 3 of PBP.

5. References

Australian Standard (AS) AS3959:2018 – Construction of buildings in bushfire prone areas. Standards Australia.

New South Wales Rural Fire Service (2005). Standards for Asset Protection Zones. NSW Government. **https://www.rfs.nsw.gov.au/__data/assets/pdf_file/0010/13321/Standards-for-Asset-Protection-Zones.pdf**

New South Wales Rural Fire Service (2019). Planning for Bushfire Protection – A guide for councils, planners, fire authorities and developers. NSW Government.

New South Wales Rural Fire Service (2023). Check if you are in bush fire prone land. NSW Government. **https://www.rfs.nsw.gov.au/plan-and-prepare/building-in-a-bush-fire-area/planning-for-bush-fireprotection/bush-fire-prone-land/check-bfpl**

New South Wales Government (2023). ePlanning Spatial Viewer. NSW Government. **https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address**

Orica Australia Pty Ltd (2024). Fire Fighting Aircraft Exclusion Zones Above Explosive Storage Magazines.

Orica Australia Pty Ltd (2023) Orica Tocumwal Emergency Management Plan, Revision 16.

OzArk Environment and Heritage (2023) Ecological Field Assessment Tocumwal Magazine.

Appendix A

Site Photographs (April and November 2023)

Attachment 1 – Site photographs (April and November 2023)

View southwest existing magazines and graded access road

View east along access road towards site entrance

Grassland and open woodland

Existing magazine with ploughed/slashed APZ

View south west from Chinamans Road – alternative access

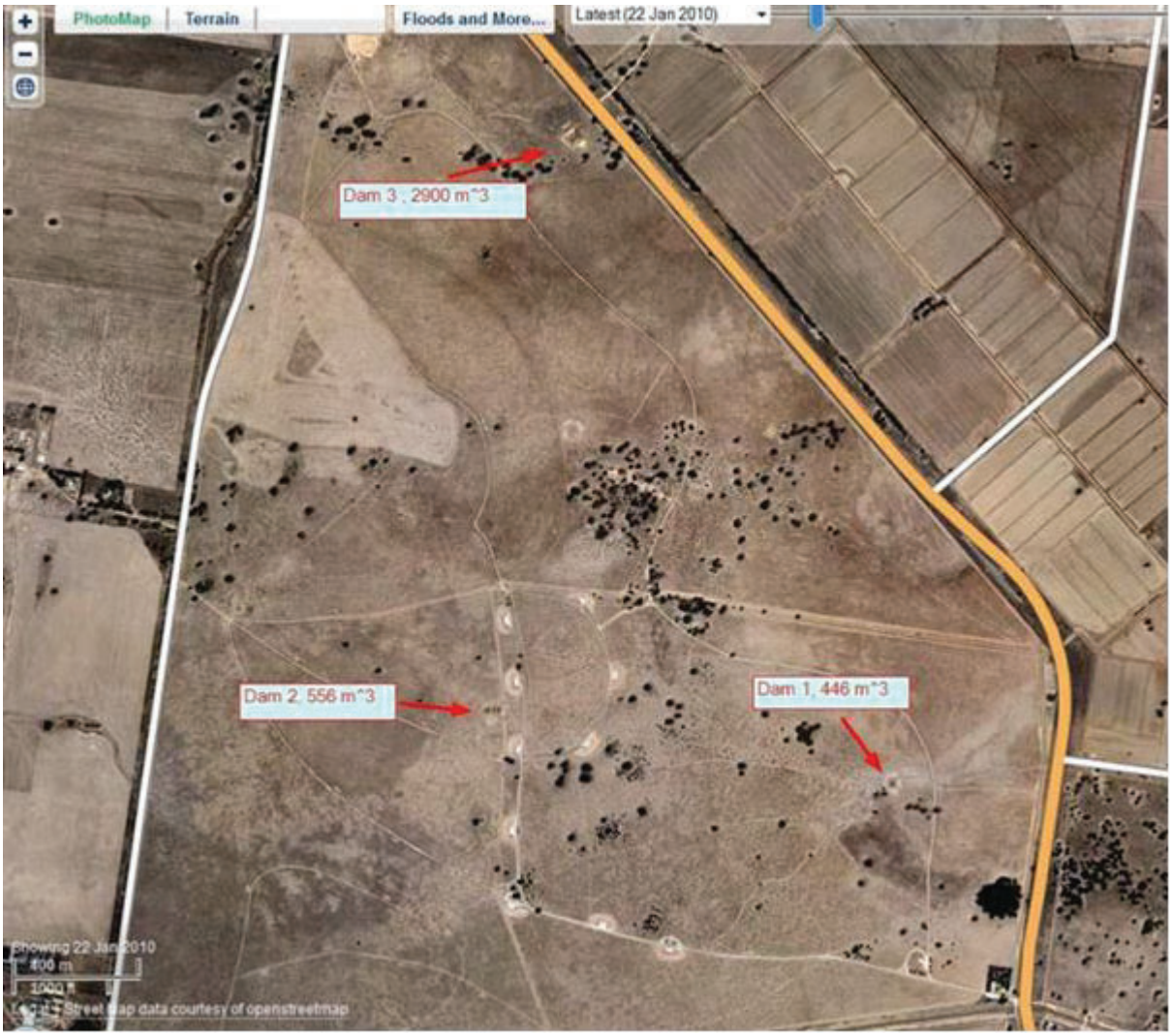
View west – main site access from Newell Highway

Appendix B

Map of farm dams

Attachment 2 – Map of farm dams

(Source: Orica Tocumwal Emergency Plan 2023 Rev16)



Appendix C

Aircraft exclusion zone

Advisory Notice

NSW Fire Services

Fire Fighting Aircraft

Exclusion Zones Above Explosives Storage Magazines

Rev	Status	Date	Created by	Checked/Passed by	Approved by
0	Issued for Fire Brigade Use	5-3-24	Peter Fuller	Michael Butler	Frank O'Grady

Table of Contents

1. Background

1.1 Tocumwal Explosives Reserve Magazines Replacement Project

During the development of the State Significant Development (SSD) application for the replacement magazines project at the Orica Tocumwal Explosives Reserve the Fire Services of New South Wales (NSW), namely the NSW Fire and Rescue Service (NSWFR) and the NSW Rural Fire Service (RFS) asked to be advised by Orica about the potential impacts of an under threat magazine creating a danger zone above that magazine for aerial fire fighting apparatus such as fixed wing and rotary wing aircraft.

1.2 Document Purpose

The purpose of this advisory notice is to provide both fire services with some explanatory text and guidance in how to deal with a magazine that is being directly threatened by a fire and what to do regarding procedures for any aerial fire fighting resources in the area of the threatened magazine.

1.3 Advice

Under normal circumstances, due to the very low number of aircraft that are in the vicinity of the storage for very short periods, Orica would not include them in a Quantity-Distance assessment (QD) conducted for the explosives storage facility. Runways or airports are classified differently and are included in QD. More information can be provided on this if required. Note: the QD assessment determines what safety distances apply for the maximum quantity of explosives being stored. Any magazine or storage with explosives in it will be referred to as a potential explosion source (PES).

If there was an emergency where a fire was directly involving the explosives magazines and evacuation occurred, we would recommend the exclusion distances as explained below:

Within the QD assessment there is a category of Protected Works – Class A (PWA). In the above emergency situation, Orica would classify aircraft in the 50% PWA category. This 50% PWA category allows between 20-500 vehicles to pass a PES per 24h period. To incorporate an additional safety factor, given that aircraft have the potential to fall from the sky, we recommend 100% PWA is used. This distance is equivalent to the allowable distance for between 500-10,000 vehicles per day to pass a PES. At this distance, the possibility of shrapnel or debris is small. The pressure wave at this distance may be noticeable, but it is not likely to cause major damage to the aircraft (or vehicle). It is expected that turbulence would be greater than the impact of the overpressure at this distance. The possibility of EMP (electro magnetic pulse) impact is literally nil as this is expected to diminish at very close distances to the PES (in the range of 50-100m or less).

The simplest way to convert the QD distance to a 3D exclusion shape would be to make it a half-sphere shape around the PES and use the PWA distance as the height and radius. This exclusion zone would be conservative, but also the easiest to calculate and potentially to implement.

It is more difficult to determine exclusion distances where there is a fire away from the magazines. Orica has a strict " do not fight a fire, and evacuate" policy for any fire within the "red zone". The red zone is 40m from any PES. Whilst a fire between the PWA distance and the Red Zone distance could be fought, it would depend on the circumstances. The assessment of the appropriate response, including the suitability of different fire-fighting methods, would need to be determined by the fire authority and Orica is able to provide 24 hr specialist advice in this situation.

Orica site leaders will always be working with the rural fire service if there is an emergency and can assist with any questions or concerns that may come up in an emergency scenario.

1.4 Summary

Orica is unable to provide direct instructions to the NSW fire services about the management of their aerial fire fighting assets.
However, if a Orica magazine is ever directly threatened by a fire that will encroach within the 40 metre red zone of a explosives storage magazine, Orica suggests that aerial fire fighting assets be directed not to approach the magazine.
Orica further suggests that if the fire is burning outside of the red zone it would be safe to utilise fire fighting aircraft to aid in extinguishing the fire.
If the situation ever arose that a fire was getting close to an Orica magazine there will be trained Orica personnel in attendance at the event who can be approached for further advice.

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