ATTACHMENTS EXCLUDED FROM AGENDA

Environment and Planning Committee

Monday, 09 March 2026

Committee meetings commence at 6.00pm and run consecutively

Dragon Room
Georges River Civic Centre,
Hurstville

GEORGES RIVER COUNCIL

ENVIRONMENT AND PLANNING COMMITTEE MEETING

ATTACHMENTS EXCLUDED FROM AGENDA

ENV005-26 Outcomes of Public Exhibition - Planning Proposal for Reclassification of Part of Moore Park, Beverley Park

Attachment 1 Amended Planning Proposal (12 November 2025) 2
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ENV006-26 Endorsement of the MSE Pipeline Hazard Analysis Planning Proposal for Gateway

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ENV008-26 Draft Wildlife Protection Area Policy 2025 - Outcome of Public Exhibition

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Mecone

Reclassification of part of Moore Park, Beverley Park

Part of 160/DP19098

Prepared for
Georges River Council

November 2025

MECONE.COM.AU

Mecone acknowledges the Traditional Custodians of the land on where this project is undertaken and across the Mecone offices that this report is prepared, paying respect to the Elders past and present. We recognise the ongoing connection of Aboriginal and Torres Strait Islander peoples to land, waters, and culture.

Project Director

Chris Shannon

Contributors

Margaret Paige – Associate

Prisha Singh – Student Planner

Revision	Revision date	Status	Authorised: Name & Signature	
1	10 October 2025	Draft	Chris Shannon	
2	11 November 2024	Final for lodgement	Chris Shannon	
3	12 November 2025	Update post Gateway	Chris Shannon	

* This document is for discussion purposes only unless signed and dated by the persons identified. This document has been reviewed by the Project Director.

Contact

MECONE

Suite 1204b, Level 12, 179 Elizabeth Street
Sydney, New South Wales 2000

info@mecone.com.au
mecone.com.au

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Executive Summary

Introduction

This Planning Proposal has been prepared by Mecone Group Pty Ltd (**Mecone**) on behalf of Georges River Council in relation to land forming part of Moore Park, Beverley Park. This planning proposal seeks an amendment to Georges River Local Environmental Plan 2021. It satisfies the requirements of Section 3.33 of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**) and aligns with NSW Department of Planning Housing and Infrastructure (**DPHI**) *Local Environmental Plan Making Guideline* dated August 2023 (the **Guidelines**).

The Site

The Moore Park Reserve is legally defined as Lot 160 in DP 19098 (22AFerry Avenue Beverley Park NSW 2217, also referred to by Georges River Council as 33 Lobb Cres, Beverley Park NSW 2217). The reserve includes public open space and an off leash dog-park. The subject site is a portion of open space to the rear of Moore Park as identified in **Figure 1** below.

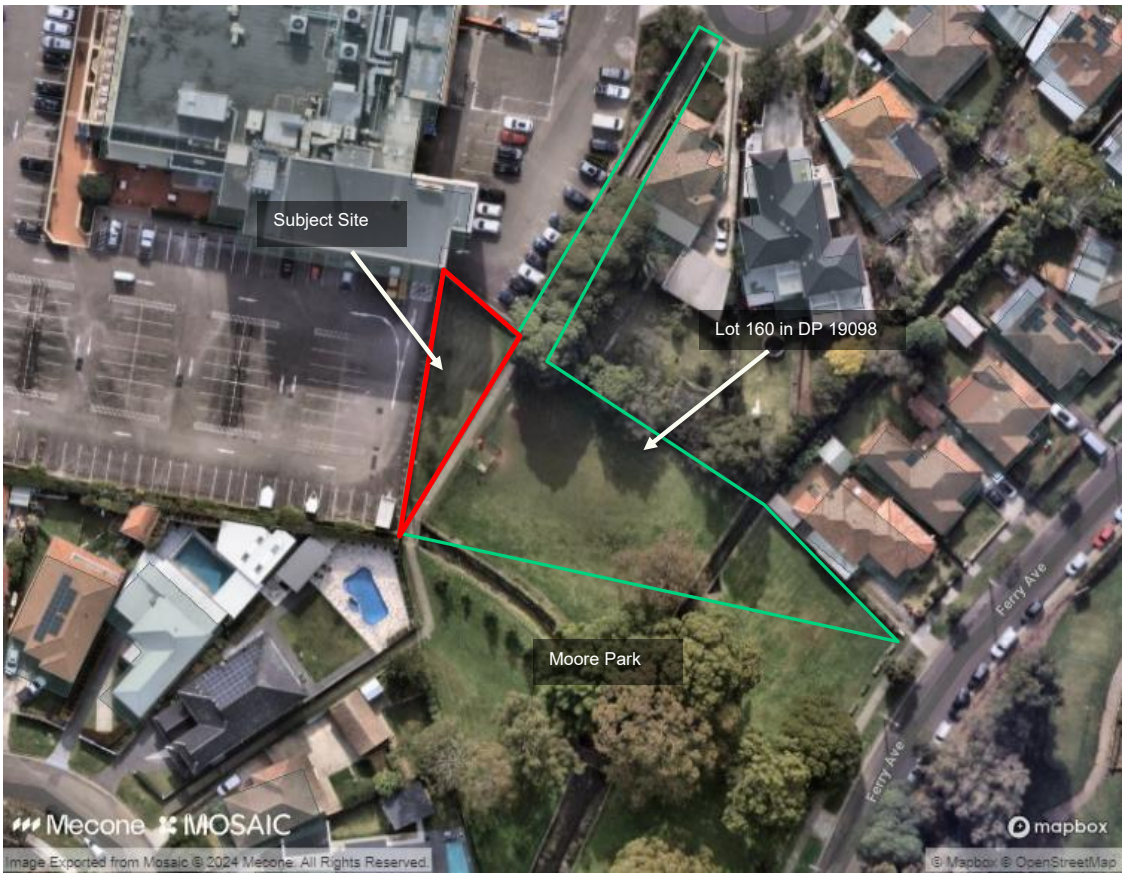


Figure 1: Subject Site Aerial

Source: Mecone Mosaic dated 18/09/2024

The proposal

The planning proposal seeks to reclassify the subject site in the northern portion of Moore Park from 'community land' to 'operational land' under the *Local Government Act 1993*.

Rationale for the proposed changes to the planning controls

The subject land is currently owned by Georges River Council. St Georges Leagues Club has expressed an interest in purchasing the subject land that borders the club for the purpose of providing access around the existing Leagues Club building. Council has resolved to sell the land. As the land is classified as 'community land' pursuant to Section 45 of the *Local Government Act 1993*, Council cannot sell or dispose of the land. Reclassification to 'operational land' is required to allow the Council to sell the land.

Strategic Merit

The proposal does not respond directly to any strategic directions or objectives in State or local strategic plans. However, it is not inconsistent with any of the strategic objectives of the plans relevant to the site, including the Metropolis of Three Cities: Greater Sydney Region Plan, South District Plan, Georges River Local Strategic Planning Statement 2040, Community Infrastructure Needs Assessment and Acquisition Area Strategy, and Open Space, Recreation and Community Facilities Strategy. The relevant objectives are outlined below.

A Metropolis of Three Cities: The Greater Sydney Region Plan

- Section 3: Infrastructure and Collaboration
  - Objective 1: Infrastructure supports the three cities
  - Objective 4: Infrastructure use is optimised.

Reclassification will facilitate the sale of poorly located and underutilised public open space, with the funds raised to be reinvested in the acquisition and/or embellishment of open space which better meets community needs in the Georges River LGA.

South District Plan

- Planning Priority S4: Delivering High Quality Open Space

The subject site is not embellished and forms an isolated corner of a larger open space. The reclassification to facilitate the sale of the land will have minimal impact on the overall provision of high quality open space in the District.

Georges River Local Strategic Planning Statement 2040

The Georges River Local Strategic Planning Statement 2040 aims to guide land use planning and the delivery of significant infrastructure for the Georges River LGA. The LSPS does not identify Moore Park as a priority open space.

Community Infrastructure Needs Assessment and Acquisition Area Strategy

This strategy prioritises the provision of sporting fields to meet community needs. The level of public open space provision in the Georges River LGA is comparable with the rate provided in nearby LGAs. The proposed reclassification will have no impact on the provision of public open space in the LGA. Residents who reside within proximity to the park will not be disadvantaged through reduced accessibility to public open space.

Open Space, Recreation and Community Facilities Strategy 2019- 2036

One of the key objectives of the strategy is to make the most efficient use of underutilised open spaces. The strategy aims to maximise the utility of open spaces for broader benefits, such as financial stability. The proposed reclassification will facilitate the sale of poorly located public open space, with the funds to be realised to be reinvested into improving the quality of public open space in the LGA.

The proposed reclassification is consistent with all relevant state environmental planning policies and Local Planning Directions.

Site Specific Merit

The proposed reclassification will not have any direct environmental impacts. The land is not identified as containing critical habitats or threatened species, populations or ecological communities, or their habitats.

The area of land subject to the proposal has limited accessibility and passive surveillance and is underutilised as public open space due to its location away from the main extent of Moore Park. The land is a grassed area with no embellishment. The land currently provides minimal benefit to the community.

Conclusion

Reclassification of the identified part of Moore Park from ‘community land’ to ‘operational land’ will facilitate the sale of the land by Council to St George Leagues Club. The funds from the use of the sale will be used to acquire and/or embellish public open space in the Kogarah Bay Ward within Georges River LGA. In the long term, this will provide a greater public benefit than retention of a portion of public open space that offers limited amenity to the community.

1 Introduction

This Planning Proposal has been prepared by Mecone Group Pty Ltd on behalf of Georges River Council to support an amendment to the Georges River Local Environmental Plan 2021.

1.1 Planning Proposal overview

The planning proposal seeks to reclassify a portion of land forming part of Moore Park, Beverley Park from Community land to Operational land under the *Local Government Act 1993* to allow the sale of the land.

1.2 Project background

Georges River Council was approached in 2023 by the St George Leagues Club regarding their interest in acquiring a part of Moore Park to assist with the traffic flow associated with the existing leagues club car park.

Georges River Council considered the matter on 8 May 2023 and resolved that a further report be presented to Council '*outlining all costs, considerations payable and options in regard to the replacement of open space'* (FIN021-23) (Appendix A)

A confidential report was considered by Council on 24 June 2024. The minutes indicate that Council resolved to proceed with the sale of the land as follows:

(a) That Council note the legal advice from Council's General Counsel in relation to this matter (Attachment 3).
(b) That the General Manager, in accordance with Section 377(h) of the Local Government Act 1993, be authorised to execute the Contract for Sale, Transfer Document and all other documentation in this matter, to effect the disposal of part Lot 160 in DP19098, pursuant to the advice and terms provided within Attachment 4 of the report.
(c) That prior to disposal, the subject part of Lot 160 in DP19098 (being approximately 330 square metres as shown in Attachment 1) be reclassified from Community to Operational land and any costs associated with the reclassification process are reimbursed by the purchaser.
(d) That any monies derived from the proposed land sale be held in restricted reserve for the future embellishment or acquisition of public open space within any suburbs of the current Kogarah Bay Ward.
(e) That any monies derived from the proposed land sale be made public within the relevant public document, after settlement takes place.
(f) That owner's consent for any development application or planning proposal for Part Lot 160 in DP19098, does not form part of the Contract for Sale, noting that the sale will not fetter Council's discretionary powers as the local Consent Authority.
(g) That if the counter offer is not accepted, other options outlined in this report from the legal advice received is communicated to the St George Leagues Club.

(CCL027A-24 – see Appendix B)

1.3 Report structure

The Planning Proposal has been prepared in accordance with:

- Section 3.33 of the Environmental Planning and Assessment Act 1979 (**EP&A Act**); and
- The NSW Department of Planning Housing and Infrastructure (**DPHI**) Local Environmental Plan Making Guideline dated August 2023 (the **Guidelines**)
- Planning Practice Note PN16-001 Classification and reclassification of public land through a local environmental plan.

Specifically, the planning proposal includes the following information:

- A description of the land to be reclassified and its context
- A statement of the objectives or intended outcomes of the proposed changes to the instrument
- An explanation of the provisions that are to be included in the instrument
- The justification for those provisions and the process for their implementation including:
    - whether the proposed instrument will comply with relevant directions under Section 9.1 of the EP&A Act
    - the relationship to the strategic planning framework
    - environmental, social and economic impacts
    - any relevant State and Commonwealth interests
    - details of the community consultation that is to be undertaken before consideration is given to the making of the proposed instrument.
- Details to address the Planning Secretary's requirements for reclassification of public land.

The Planning Proposal Report is accompanied by the list of Appendices in the Table of Contents.

2 Site description

2.1 The Site

The site is legally described as Part of Lot 160 DP 19098 and is referred to by Georges River Council as 33 Lobb Crescent, Beverley Park. The site forms part of Moore Park.

Moore Park includes a fenced dog park, as well as green public open space containing scattered trees that face the streets on Ferry Avenue. The park adjoins residential dwellings to either side and the St George Leagues Club to the North.

The land to be reclassified is located in the north-west portion of the Moore Park, immediately adjacent to St Georges Leagues Club. It is accessed via a footpath that runs between Lobb Crescent and Harslett Crescent. It is separated from the remainder of Moore Park by the enclosed dog park and open stormwater culverts.

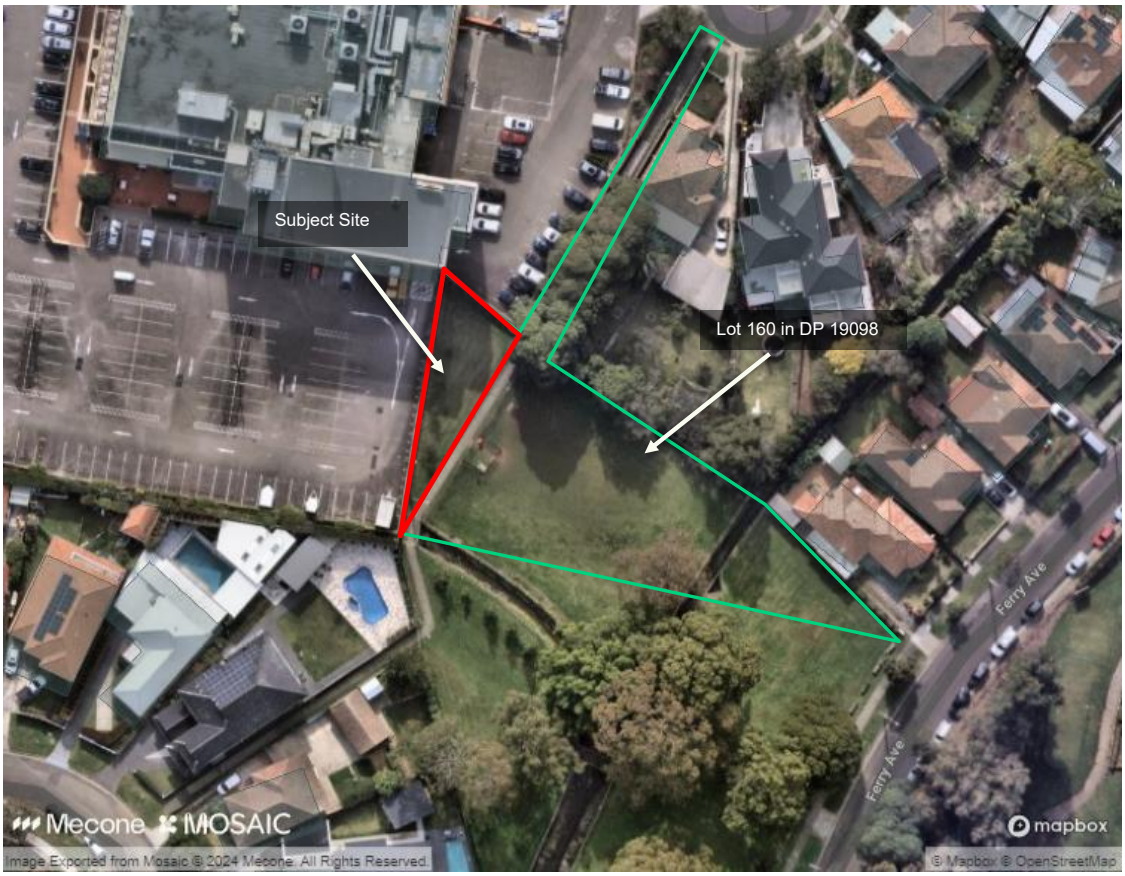


Figure 2: Subject Site Aerial
Source: Mecone Mosaic dated 18/09/2024



Figure 3: View from Ferry Avenue, Beverley Park
Source: Google Maps

Table 1: Summary of Key Features

Item	Description
Address	22A Ferry Avenue, Beverley Park.
Legal Description	Part of Lot 160 DP 19098
Total area to be reclassified	305m^2 (by survey – see Appendix C)
Description of the land to be reclassified	The triangular shaped land is located in the north-west portion of Moore Park. A footpath runs along the eastern side of the land. St George Leagues Club adjoins the land on the northern and western sides.
Topography	The land is flat and contains minimal vegetation.
Local Context	The majority of surrounding development comprises low-density residential. Moore Park contains a fenced dog park, as well as open green space with scattered trees that faces the streetscape on Ferry Avenue. Moore Park is located 120m from Spooner Park, and across the road from a privately owned golf course.
Surrounding uses and development	**North:** St Georges Leagues Club is located to the north of the site. **East:** Land to the north-east is residentially zoned land, characterised by one and two-storey single dwellings. Immediately east of the land proposed to be reclassified is Moore Park, which includes a dog park and passive recreation space.

Item	Description
	West: The parking area of St Georges Leagues Club is immediately adjacent to the land to be reclassified. **South:** Land to the south is public open space, being part of Moore Park and one and two storey single dwellings.
Access	The land is accessed by a pedestrian pathway linking Lobb Crescent and Harslett Crescent. There is no vehicular access to the site.

Moore Park is located within Beverly Park, in the eastern part of the Georges River LGA. Carlton Train Station is just over a 1km walking distance to the north. Residential development dominates the area, with some commercial and retail along Princes Highway. A large privately owned golf-course sits directly opposite the Moore Park.



Figure 4: Local context diagram
Source: Mecone/Mosaic (dated 29 September 2024)

2.2 Site history

Moore Park originally formed part of an approximate 4.04 hectare parcel of land that was resumed and vested in the Council of the Municipality of Kogarah by notification published in Government Gazette dated 13 August 1937 Folios 3302 to 3303 (see Appendix D). The land was later subdivided to provide residential, commercial and recreational land uses. Previous plans are displayed in **Figure 5 and 6** below.

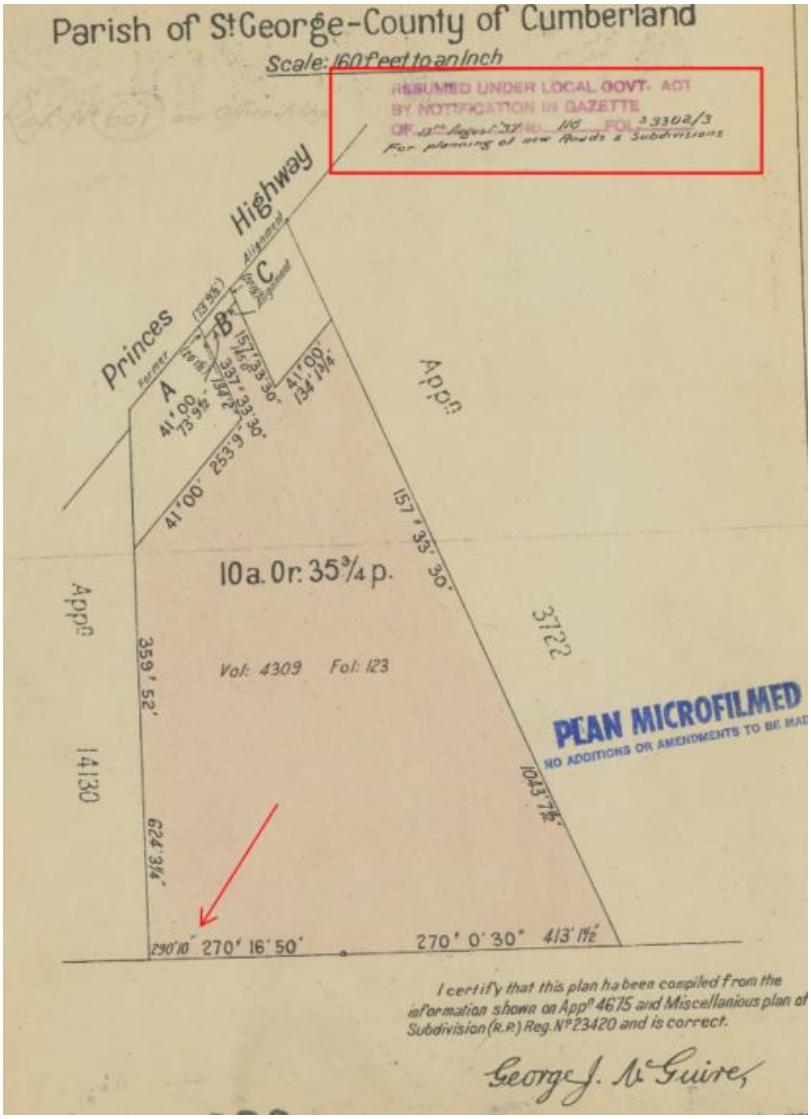


Figure 5: Plan dated 19 February 1937
Source: InfoTrack

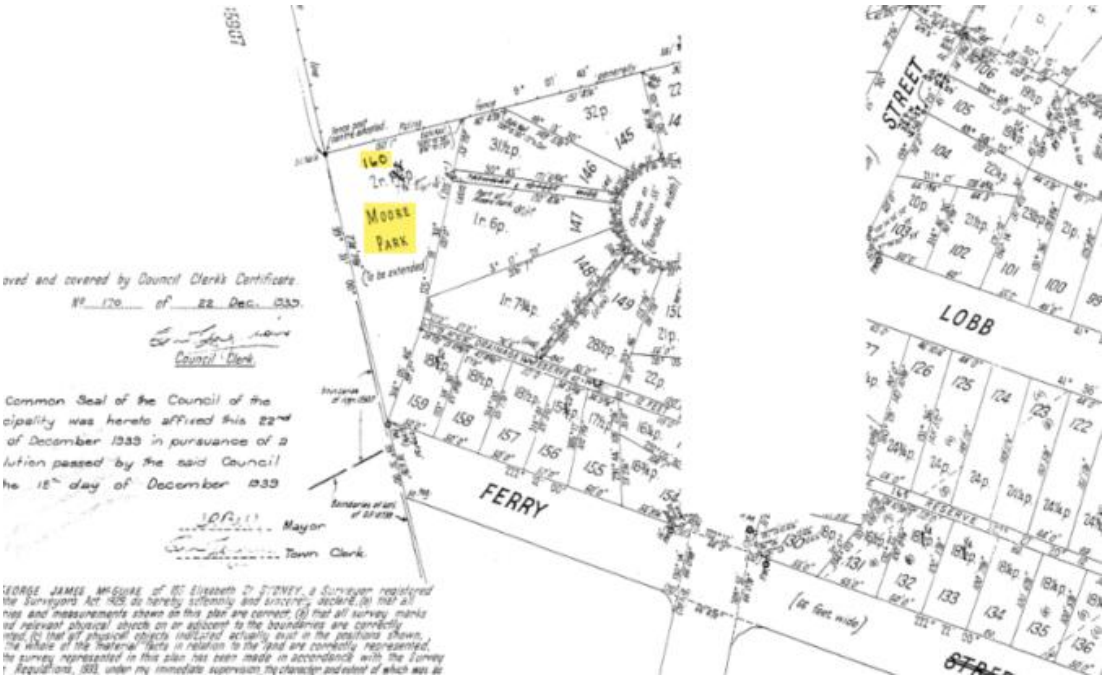


Figure 6: Deposited Plan dated 22 December 1939
Source: InfoTrack

2.3 Planning Context

2.3.1 A Metropolis of Three Cities – The Greater Sydney Region Plan

The Greater Sydney Region Plan: A Metropolis of Three Cities (2018) aims to provide cities where most residents live within 30 minutes of their jobs, education and health facilities, services and great places.

The proposal is consistent with objectives within the Greater Sydney Region Plan, notably within *Section 3: Infrastructure and Collaboration.* The planning proposal to reclassify the land aligns with *Objective 1: Infrastructure supports the three cities*, specifically Strategy 1.1 which prioritises infrastructure investments to support the vision of the three cities and *Objective 4: Infrastructure use is optimised*, which aims to increase infrastructure capacity to better support the community.

2.3.2 South District Plan

Greater Sydney's three cities reach across five districts, one of which being the South District in which Georges River Council is located. South District Plan *Planning Priority S4: Delivering High Quality Open Space* acknowledges that greater emphasis is needed on improving the quality and distribution of open space. Although reclassification of the land will facilitate its sale, this land is poorly located, not embellished and the sale will have minimal impact on the overall provision of public open space in the area. The district comprises of 42% of open space, provided including local parks, including National Parks, reserves and beaches. Almost 98% of the district's residents live within 400m of open space.

2.3.3 Working together for a better future – Community Strategic Plan 2022-2032

The Community Strategic Plan 2022-2032 represents the ambitions and expectations for the local government area (LGA) for the 10 years to 2032. It comprises six pillars, each with a range of goals. Pillar 4: Our built environment includes *Goal 4.4: Everyone has access to quality parks and open space and active and passive recreation facilities.*

2.3.4 Georges River Local Strategic Planning Statement 2040

The Georges River Local Strategic Planning Statement 2040 (**LSPS**) sets out the 20-year vision for land use in the LGA, special characteristics that contribute to the area, shared community values and how growth and change will be managed into the future. The plan recognises that most public open space in the LGA is of good quality and mostly accessible to the community. The LSPS identifies that the priority for open space is to acquire land to deliver an additional 7.6 ha of open space in identified locations. The area surrounding Moore Park is not identified as a priority for public open space, as shown in **Figure 5** below.



Figure 7: Open Space and Waterways Structure Plan
Source: Georges River Local Strategic Planning Statement 2040

2.3.5 Community Infrastructure Needs Assessment and Acquisition Area Strategy

The Community Infrastructure Needs Assessment and Acquisition Area Strategy (2023) provides strategic guidance around public open space and the provision of community facilities. In terms of open space, the strategy focuses on the provision of sporting fields as a priority.

The strategy reports that in Georges River LGA, open space is provided at a rate of 2.7 hectares per 1,000 residents, comparable to nearby LGA's, with the large majority of people within a 400m walking catchment of existing open space.

2.3.6 Open Space, Recreation and Community Facilities Strategy 2019- 2036

The Open Space, Recreation and Community Facilities Strategy 2019-2036 provides a high-level direction for community facilities in the Georges River area.

The strategy references the Australian Government's *Sport 2030 – National Sport Plan* to emphasise the importance of strengthening the country's sporting industry through the provision of sporting fields. The strategy recognises libraries, community centres and cultural facilities as social infrastructure that play in important role in enhancing public open space, with a key objective to make the most efficient use of underutilised open spaces.

3 Statutory planning framework

3.1 Existing planning controls under Georges River Local Environmental Plan 2021

3.1.1 Zoning

The site is zoned RE1 Public Recreation.

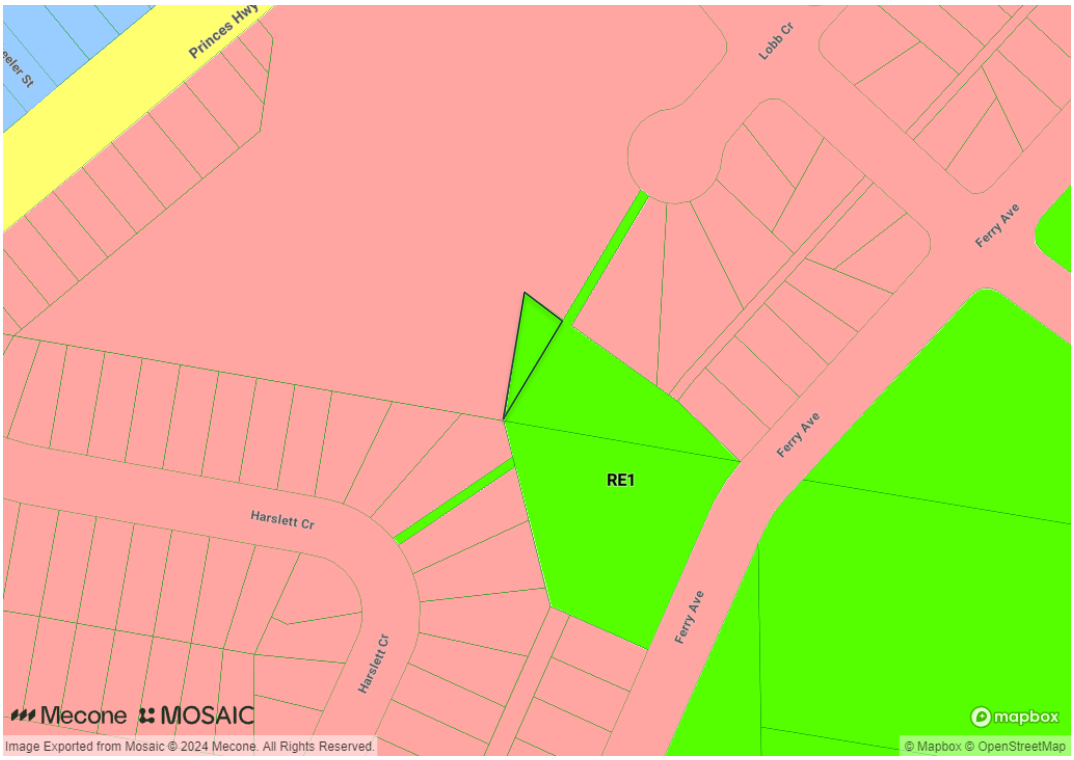


Figure 8: Zoning
Source: Mecone Mosaic

3.1.2 Building height

The site has no mapped maximum building height.

3.1.3 Floor space ratio

The site has no mapped floor space ratio.

3.1.4 Minimum lot size

The site has no mapped minimum lot size.

4 The proposal

4.1 Part 1 – Objectives and intended outcomes

4.1.1 Objectives

The key objective of the PP is to reclassify a portion of land owned by Georges River Council and forming part of Moore Park, Beverley Park from Community Land to Operational Land.

4.1.2 Intended outcomes

The intended outcome of this planning proposal is to enable the sale of the land to St Georges Leagues Club.

The planning proposal does not include any change to existing zoning and development standards that apply to the subject land. The land will remain zoned RE1 Public Recreation.

4.2 Part 2 – Explanation of the provisions

The Planning Proposal seeks to achieve the intended outcomes outlined under Section 4.1 (Part 1) above through an amendment to Schedule 4 Classification and reclassification of public land to insert the following into Part 1 of that Schedule:

Part 1 – Land classified, or reclassified, as operational land – no interests changed

Column 1	Column 2
Locality	Description
Beverley Park	Part of Lot 160 DP 19098

5 Part 3 - Justification of strategic and site – specific merit

This section provides an assessment of the proposal's strategic and site-specific merit, the environmental, social and economic impact of the proposed change and outlines any State and Commonwealth interests.

5.1 Strategic merit

The proposal does not respond directly to any strategic directions or objectives in State or local strategic plans. However, it is not inconsistent with any of the strategic objectives of the plans relevant to the site.

5.1.1 Section A – Need for the planning proposal

Q1. Is the planning proposal a result of an endorsed LSPS, strategic study or report?

The planning proposal is not the direct result of a strategic study or report. It is a response to a Council resolution to dispose of part Lot 160 in DP 19098 (CCL027A-24 24 June 2024).

Q2. Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The site is currently classified as community land and therefore Georges River Council is not able to develop, sell, exchange or dispose of community land under the provisions of the *Local Government Act 1993*. Amending the Georges River LEP 2021 is the only means of reclassifying the land to enable Council to divest the land. A Planning Proposal is required to reclassify the land.

5.1.2 Section B – Relationship to the strategic planning framework

Q3. Will the planning proposal give effect to the objectives and actions of the applicable regional or district plan or strategy (including any exhibited draft plan or strategies)?

The Planning Proposal is consistent with the objectives and outcomes of the applicable strategic plans, as outlined below.

The Greater Sydney Regional Plan 2056 was published in March 2018 and sets out a vision, objectives, strategies and actions for a metropolis of three cities across Greater Sydney. The Plan outlines 10 overarching directions supported by 40 objectives which aim to provide interconnected infrastructure, productivity, liveability and sustainability benefits to all residents. The Planning Proposal's consistency with the relevant objectives is discussed in the table below:

Table 2: Consistency with the Greater Sydney Regional Plan

Objective number / ref	Topic / Theme	PP Consistency with the objective
Objective 1: *Infrastructure supports the three cities*	Infrastructure and collaboration	The strategy emphasizes infrastructure investment to support local communities. The proposal supports the efficient use of land by reclassifying an underutilised portion of public open space for sale.
Objective 4: *Infrastructure use is optimised*	Infrastructure and collaboration	Reclassification of underutilised and poorly located open space will allow its sale, with the funds to be reinvested in the acquisition and/or embellishment of open space which better meets community needs in the eastern part of the LGA.

The South District Plan covers the Canterbury-Bankstown, Georges River and Sutherland Local Government Areas. It assists in informing local strategic planning statements and local environmental plans, and stems from the objectives of the Greater Sydney Region Plan. The table below provides a summary of the planning proposal's consistency with the relevant District Plan priority.

Table 3: Consistency with the South District Plan

Objective number / ref	Topic / Theme	PP Consistency with the objective
Planning priority S16: *'Delivering high quality open space'*	Sustainability	The site does not represent high quality open space. Reclassification to facilitate the sale of the land will have minimal impact on the overall provision of open space in the Georges River LGA. The proposal will have minimal effect of local resident's access to public open space as Spooner Park and Leighton Park are within 200m walking distance of Moore Park.

Q4. Is the planning proposal consistent with a council LSPS that has been endorsed by the Planning Secretary or another endorsed local strategy or strategic plan?

The Georges River Local Strategic Planning Statement 2040 aims to guide land use planning and the delivery of significant infrastructure for the Georges River LGA. The LSPS does not identify Moore Park as a priority open space.

Table 4 provides an overview of the LSPS planning priorities and the Planning Proposal's consistency with each priority.

Table 4: Consistency with the Georges River LSPS

Objective / Priority number / ref	Topic / Theme	PP Consistency with the priority / objective
P19. Everyone has access to quality, clean, useable, passive and active open and green spaces and recreation places	Environment and Open Space	The proposal to reclassify the land will not reduce access to open space as the land is a small portion of Moore Park. Ultimately, the reclassification will allow sale of the land which provide additional funds that will be reinvested into improving public open spaces within the LGA, benefiting the wider community.

The proposed reclassification is consistent with the Community Infrastructure Needs Assessment and Acquisition Area Strategy and Open Space, Recreation and Community Facilities Strategy 2019-2036. Reclassification will not reduce the local accessibility of open space. The land is not well located for co-location of other social infrastructure. Reclassification to facilitate its disposal aligns with the Open Space, Recreation and Community Facility Strategy's aim to maximise the utility of open spaces for broader benefits, including financial stability. Facilitating the sale will realise funds that can be strategically utilised to improve the utilisation of other open spaces.

Q5. Is the planning proposal consistent with any other applicable State and regional studies or strategies?

There are no other relevant studies or strategies.

Q6. Is the planning proposal consistent with applicable SEPP's?

The proposal is consistent with all relevant state environmental planning policies (SEPPs). The following table outlines the intent of the relevant SEPPs and consistency of the Planning Proposal.

Table 5: Consistency with State Environmental Planning Policies

SEPP	Consistency	Assessment
SEPP (Biodiversity and Conservation) 2021	Consistent	The proposal does not involve the clearing of any vegetation on the site.
SEPP (Exempt and Complying Development Codes) 2008	Not applicable	Not applicable
SEPP (Housing) 2021	Not applicable	Not applicable
SEPP (Industry and Employment) 2021	Not applicable	Not applicable
SEPP (Planning Systems) 2021	Not applicable	Not applicable
SEPP (Precincts – Central River City) 2021	Not applicable	Not applicable
SEPP (Precincts – Eastern Harbour City) 2021	Consistent	The proposal does not contravene any clauses within the SEPP.
SEPP (Precincts – Regional) 2021	Not applicable	Not applicable
SEPP (Precincts – Western Parkland City) 2021	Not applicable	Not applicable
SEPP (Primary Production) 2021	Not applicable	Not applicable
SEPP (Resilience and Hazards) 2021	Not applicable	Not applicable
SEPP (Resources and Energy) 2021	Not applicable	Not applicable
SEPP (Sustainable Buildings) 2022	Not applicable	Not applicable
SEPP (Transport and Infrastructure) 2021	Not applicable	Not applicable

Q7. Is the planning proposal consistent with applicable Ministerial Directions (section 9.1 Directions) or key government priority?

The planning proposal is consistent with the applicable Ministerial Directions as indicated in Table 6.

Table 6: Consistency with Ministerial Directions

Ministerial Direction	Consistent?	Comments
Focus area 1: Planning Systems		
1.1 Implementation of Regional Plans	Consistent	The proposal is consistent with the Greater Sydney Region Plan and South District Plan.
1.2 Development of Aboriginal Land Council land	Not applicable	The Planning Proposal is not on Aboriginal Land Council land
1.3 Approval and Referral Requirements	Consistent	The Planning Proposal does not introduce new concurrence, consultation or referral provisions and is designated development.
1.4 Site Specific Provisions	Not applicable	No development or rezoning of the site forms part the planning proposal.
1.4A Exclusion of Development Standards from Variation	Not applicable	No changes to development standards are proposed
Focus area 1: Planning Systems – Place-based		
1.5 Parramatta Road Corridor Urban Transformation Strategy	Not applicable	The site is not located in the Parramatta Road Corridor
1.6 Implementation of North West Priority Growth Area Land Use and Infrastructure Implementation Plan	Not applicable	The site is not located in the North West Priority Growth Area
1.7 Implementation of Greater Parramatta Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	Not applicable	The site is not located in the Greater Parramatta Priority Growth Area
1.8 Implementation of Wilton Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	Not applicable	The site is not located in the Wilton Priority Growth Area
1.9 Implementation of Glenfield to Macarthur Urban Renewal Corridor	Not applicable	The site is not located in the Glenfield to Macarthur Urban Renewal Corridor
1.10 Implementation of the Western Sydney Aerotropolis Plan	Not applicable	The site is not located in the area affected by the Western Sydney Aerotropolis Plan
1.11 Implementation of Bayside West Precincts 2036 Plan	Not applicable	The site is not located in the Bayside West Precincts
1.12 Implementation of Planning Principles for the Cooks Cove Precinct	Not applicable	The site is not located in the Cooks Cove Precinct
1.13 Implementation of St Leonards and Crows Nest 2036 Plan	Not applicable	The site is not located in St Leonards and Crows Nest
1.14 Implementation of Greater Macarthur 2040	Not applicable	The site is not located in Greater Macarthur
1.15 Implementation of the Pyrmont Peninsula Place Strategy	Not applicable	The site is not located in Pyrmont Peninsula
1.16 North West Rail Link Corridor Strategy	Not applicable	The site is not located in the North West Rail Link Corridor

Ministerial Direction	Consistent?	Comments
1.17 Implementation of the Bays West Place Strategy	Not applicable	The site is not located in Bays West
1.18 Implementation of the Macquarie Park Innovation Precinct	Not applicable	The site is not located in Macquarie Park Innovation Precinct
1.19 Implementation of the Westmead Place Strategy	Not applicable	The site is not located in Westmead
1.20 Implementation of the Camellia-Rosehill Place Strategy	Not applicable	The site is not located in Camellia-Rosehill
1.21 Implementation of South West Growth Area Structure Plan	Not applicable	The site is not located in the South West Growth Area
1.22 Implementation of the Cherrybrook Station Place Strategy	Not applicable	The site is not located in the Cherrybrook Station Precinct
Focus area 2: Design and Place		
Focus area 3: Biodiversity and Conservation		
3.1 Conservation Zones	Not applicable	The subject site is not within a conservation zone.
3.2 Heritage Conservation	Not applicable	The subject site does not contain any heritage items.
3.3 Sydney Drinking Water Catchments	Not applicable	The site is not within the Sydney Drinking Water Catchment
3.4 Application of C2 and C3 Zones and Environmental Overlays in Far North Coast LEPs	Not applicable	The site is not in the Far North Coast
3.5 Recreation Vehicle Areas	Not applicable	The site is not identified as or around sensitive land where impacts from recreational vehicles could occur
3.6 Strategic Conservation Planning	Not applicable	The site does not contain land that is identified as avoided land or a strategic conservation area
3.7 Public Bushland	Not Applicable	The site is does not contain bushland
3.8 Willandra Lakes Region	Not applicable	The site is not located in Willandra Lakes
3.9 Sydney Harbour Foreshores and Waterways Area	Not applicable	The site is not located in the Sydney Harbor foreshore or waterway
3.10 Water Catchment Protection	Not applicable	The site is not within a regulated catchment within the meaning of the *State Environmental Planning Polic (Biodiversity and Conservation) 2021*
Focus area 4: Resilience and Hazards		
4.1 Flooding	Consistent	No rezoning or change of the planning provisions affecting the land is proposed.

Ministerial Direction	Consistent?	Comments
4.2 Coastal Management	Not applicable	The site is not identified as being in a coastal area
4.3 Planning for Bushfire Protection	Not applicable	The site is not mapped as bush fire prone land
4.4 Remediation of Contaminated Land	Consistent	The planning proposal does not propose rezoning of the land
4.5 Acid Sulfate Soils	Consistent	The planning proposal does not include provisions relating to acid sulfate soils or propose intensification of use of the land.
4.6 Mine Subsidence and Unstable Land	Not applicable	The Proposal is not subject to mine subsidence
Focus area 5: Transport and Infrastructure		
5.1 Integrating Land Use and Transport	Not Applicable	The planning proposal does not seek to change the existing zoning of the land or provisions relating to urban land.
5.2 Reserving Land for Public Purposes	Consistent	The planning proposal does not seek to rezone the land.
5.3 Development Near Regulated Airports and Defence Airfields	Not applicable	The site is not located near regulated airports or a defence airfield
5.4 Shooting Ranges	Not applicable	The site is not located near or adjacent to a shooting range
5.5 High Pressure Dangerous Goods Pipelines	Not applicable	The site is not located near high pressure dangerous goods pipelines
Focus area 6: Housing		
6.1 Residential zones	Not applicable	Residential development is not permitted on the land
6.2 Caravan Parks and Manufactured Home Estates	Not applicable	The proposal does not involve any caravan or manufactured home estates
Focus area 7: Industry and Employment		
7.1 Employment Zones	Not applicable	The site does not include any employment or business zones
7.2 Reduction in non-hosted short-term rental accommodation period	Not applicable	The proposal does not include any non-hosted short-term rental accommodation
7.3 Commercial and Retail Development along the Pacific Highway, North Coast	Not applicable	The site is not located along the Pacific Highway, North Coast
Focus area 8: Resources and Energy		

Ministerial Direction	Consistent?	Comments
8.1 Mining, Petroleum Production and Extractive Industries	Not applicable	There is no proposal to carry out any mining of production industries on the site
Focus area 9: Primary Production		
9.1 Rural Zones	Not applicable	No rezoning is proposed
9.2 Rural Lands	Not applicable	The site is not within any of the LGAs where the Planning Direction applies
9.3 Oyster Aquaculture	Not applicable	No oyster aquaculture is proposed on the site
9.4 Farmland of State and Regional Significance on the NSW Far North Coast	Not applicable	The site is not located on the Far North Coast

5.2 Site-specific merit

5.2.1 Section C – environmental, social and economic impact

5.2.1.1 Environmental Effects

Q8. Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

The proposal does not apply to land that has been identified as containing critical habitats or threatened species, populations or ecological communities, or their habitats.

Q9. Are there any other likely environmental effects as a result of the Planning Proposal and how are they proposed to be managed?

The planning proposal does not result in any direct environmental impacts. Any environmental impacts which may arise as a result of a future rezoning or future development application will be assessed as part of the planning proposal or development application process.

Q10. Has the planning proposal adequately addressed any social and economic effects?

The planning proposal will facilitate the sale of land, which will result in the loss of approximately 305m^2 of public open space, representing 5% of the area of Moore Park. This open space is underutilised, being separated from the main extent of Moore Park by the dog park and drainage channel, with limited accessibility and passive surveillance.

The planning proposal will have no broader economic effects, aside from providing Georges River Council will funds for the provision and/or upgrade of other public open space in the Kogarah Bay Ward.

5.2.2 Section D – Infrastructure (Local, State and Commonwealth)

Q11. Is there adequate public infrastructure for the Planning Proposal?

The proposed reclassification does not result in any increased demand for public infrastructure. Any increased demand likely to result from the future use of the land will be assessed as part of a future planning proposal or development application process.

5.2.3 Section E – State and Commonwealth interests

Q12. What are the views of state and federal public authorities and government agencies consulted in order to inform the Gateway determination?

At this stage, the appropriate State and federal public authorities and government agencies have not been identified or consulted. Consultation with the government authorities, agencies and other stakeholders will be undertaken part of any Gateway determination condition and public exhibition.

5.3 Planning Secretary's requirements relating to the reclassification of land

Pursuant to Section 3.33 of the *Environmental Planning and Assessment Act 1979*, the Planning Secretary has issued requirements as to the specific matters that must be addressed in the justification of a planning proposal for the reclassification of land. The Local Environmental Plan Making Guideline sets out these requirements. These are addressed below.

Is the planning proposal the result of a strategic study or report?

The planning proposal is not the direct result of a strategic study or report. It is a response to a Council resolution to dispose of part Lot 160 in DP 19098 (CCL027A-24 24 June 2024).

Is the planning proposal consistent with the council's community plan, or other local strategic plan?

The planning proposal is consistent with the intent of the Georges River Council Community Strategic Plan, Local Strategic Planning Statement 2040, Community Infrastructure Needs Assessment and Acquisition Area Strategy and Open Space, Recreation and Community Facilities Strategy as discussed in Section 5.1.

If the provisions of the planning proposal include the extinguishment of any interests in the land, an explanation of the reasons why the interests are proposed to be extinguished should be provided

No easements or interests in the land have been identified.

The concurrence of the landowner must be obtained, where the land is not owned by the PPA

Council is the landowner of the site.

The effect of the reclassification, including loss of open space, any discharge of interests, and/or removal of public reserve status

The reclassification will not in itself result in the loss of any open space as the land is not proposed to be rezoned. Use of the land after acquisition of the land by St Georges Leagues Club is likely to result in the loss of approximately 305m^2 of public open space forming part of Moore Park. The area of open space to be reclassified is not well utilised as public open space. There will be approximately 5,535m^2 of public open space remaining as Moore Park, excluding the two access handles to the park.

An archive search has not identified any interests to be discharged and the land has not been identified 'public reserve'.

A copy of the Land Title is provided at Appendix E.

The strategic and site-specific merits of the reclassification and evidence to support this

The strategic and site specific merits of the reclassification are discussed in Sections 5.1 and 5.2 above.

Does the planning proposal deliver a public benefit?

The planning proposal will facilitate sale of the underutilised land. The funds derived from the sale will be utilised for the acquisition or embellishment of public open space to better serve the needs of the local community.

Have the implications for open space in the LGA in relation to current and future open space needs been considered and will there be a net gain to open space?

The open space needs of the Local Government Area have been considered in the Georges River Council Community Infrastructure Needs Assessment and the Area Acquisition Strategy, as well as the Open Space, Recreation, and Community Facilities Strategy, as discussed in Section 2.3 above.

The Georges River Community Infrastructure Needs Assessment and Acquisition Area Strategy highlights that open space provision in the LGA is comparable with the provision in nearby LGAs with the majority of residents enjoying high accessibility to open space within a 400m walking catchment.

The reclassification is to facilitate the sale of a small area of poorly located and underutilised open space, leading to a net loss of open space. To mitigate this, Georges River Council has resolved to designate the use of the funds generated from the disposal of the land to the acquisition or enhancement of open spaces, within the same proximity.

How funds obtained from any future sale of the land will be used

Georges River Council resolved on Monday 24 June 2024 (CCL027A-24):

> *that any monies derived from the proposed land sale be held in restricted reserve for the future embellishment or acquisition of public open space within any suburbs of the current Kogarah Bay Ward.*

Funds obtained from the sale will therefore be used to increase the supply or quality of public open space in the eastern part of Georges River LGA.

How council will ensure funds remain available to fund proposed open space sites or improvement referred to in justifying the reclassification, if relevant

The funds will be held in restricted reserve for the future embellishment or acquisition of public open space in accordance with the Council resolution of 24 June 2024 (CCL027A-024).

6 Part 4 – Maps

There are no proposed changes to the maps in *Georges River Local Environmental Plan 2021* and the proposal does not include additional changes to planning controls.

7 Part 5 – Community consultation

It is anticipated that the Planning Proposal will be exhibited for a period of twenty eight (28) days in accordance with Council's Community Participation Plan and any requirements of the Gateway determination.

As the Planning Proposal is seeking the reclassification of public land from the 'community' to 'operational' land, a public hearing will also be required in accordance with Section 29 of the LG Act and Section 57 of the EP&A Act.

Notification of the public exhibition will be through:

- newspaper advertisement in The St George and Sutherland Shire Leader
- exhibition notice on Council's website
- notices in Council offices and libraries
- letters to State and Commonwealth Government agencies identified in the Gateway determination
- letters to adjoining landowners.

8 Part 6 – Project timeline

The anticipated project timeframe is set out in Table 7.

Table 7: Indicative Project Timeline

Stage	Timeframe and/or date
Lodgement of the Planning Proposal	Mid November 2024
Consideration by Council	December 2024 – February 2025
Council (or Local Planning Panel) decision	24 February 2025
Issue to DPHI for Gateway Determination	Early March 2025
Gateway determination	Early April 2025
Pre-exhibition	Early – mid April 2025
Commencement and completion of public exhibition period	Late April – late May 2025
Public Hearing	End June 2025
Consideration of submissions	End May – July 2025
Post exhibition review	August 2025
Submission to the Department for finalisation	September 2025
Gazettal of LEP amendment	November 2025

Appendix A:

Council Report FIN021-23

MECONE.COM.AU

Appendix B: Council Minutes CCL027A-24

MECONE.COM.AU

Appendix C:

Draft Plan of Subdivision

MECONE.COM.AU

Appendix D: Property Report

MECONE.COM.AU

Appendix E: Title Search

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mecone.com.au
info@mecone.com.au
02 8667 8668

Engagement Outcomes Report

Reclassification of Part of Moore Park, Beverley Park

Georges River Council

17 February 2026

BUREAU VERITAS

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7. Conclusion and Recommendation 10

Appendix A Public Hearing Presentation

Appendix B Notification Letter

Appendix C Written Submissions

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1. Introduction

1.1. Purpose

This report has been prepared by independent planning consultants at Bureau Veritas to document the written submissions and verbal submissions at the public hearing on a Planning Proposal (PP2024/0006) to reclassify part of Moore Park, Beverley Park (the Site) from Community Land to Operational Land within the Georges River Local Government Area. The report is prepared pursuant to Section 47G of the Local Government Act 1993 and the Practice PN 16001 - Classification and reclassification of public land through a local environmental plan - issued by the then NSW Department of Planning and Environment.

1.2. Background

On 22 November 2024, a PP was lodged with Georges River Council seeking to reclassify a part (305sq.m) of Moore Park (the Site) at Beverley Park from 'community land' to 'operational land' under the *Local Government Act 1993* (LG Act) for the purpose of enabling the sale of the land to the adjoining St George Leagues Club. Council previously resolved in June 2024 to proceed with the sale of the Site, and for monies from the sale to be used for embellishment or acquisition of public open space within the same Ward.

In July 2025, the PP was reported to the Local Planning Panel (LPP) which resolved to support it.

On 27 October 2025, a Gateway Determination from the Department of Planning, Housing and Infrastructure (DPHI) was issued for the PP.

From 19 November to 19 December 2025, Council placed the PP on public exhibition and received a total of eight (8) submissions from the public. A submission was also received from The Hon. Steve Kamper, Member of Rockdale requesting Council give consideration to one of the public submissions.

A public hearing on the proposed reclassification of the Site to operational land was held on 28 January 2026. No member of the public attended the public hearing.

This report documents and gives consideration to the issues raised in submissions, reports on the public hearing, and makes recommendation on the PP.

2. Subject Site

Moore Park has a street address of 33 Lobb Crescent, Beverley Park and legal description of Lot 160 DP 19098 and Lot 269 DP 20568. The Park covers an area of approximately 5,840 sqm and has road frontage along Ferry Avenue (refer to **Figure 1** below).

Moore Park is currently classified as 'community land' under the LG Act. Council's Generic Plan of Management for Parks identifies objectives for Moore Park as being for use as an off-leash dog park and community events, and for natural value of the stormwater drainage corridor through it. It is used for public open space with the majority of it being a fenced off-leash dog park.

The subject Site (shown in Figure 1) proposed for reclassification is a triangular shaped area covering 305sq.m positioned on the north-west portion of Moore Park, immediately adjacent to St George Leagues Club. It is separated from the remainder of Moore Park by the fenced dog park and open stormwater culverts. The Site is a relatively small isolated part of the Park that is outside the fenced off-leash dog area, has constrained access and useability, and has no drainage corridor though it.

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The Site is accessed via a footpath that runs between Lobb Crescent and Harslett Crescent

The Site has a relatively flat to gentle sloping topography. Vegetation on the Site is limited to grass ground cover and four small trees.



Figure 1 – *Aerial view of the subject land outlined red (Source: Nearmap)*

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3. Planning Proposal

The Planning Proposal (PP2024/0006) seeks to amend the Georges River Local Environmental Plan LEP 2021 (GRLEP) to reclassify the Site from 'community land' to 'operational land'. The objective of the PP is to enable the sale of the land to the adjoining St George Leagues Club for improved access around a constricted part of the Club curtilage.

4. Public Exhibition

The PP was placed on public exhibition from 19 November to 19 December 2025. The notification for the public exhibition included the following:

- Letters sent to affected landowners and government authorities advising of the PP being placed on public exhibition;
- Advertisement in the St George and Sutherland Shire Leader Newspaper;
- Dedicated page on Council's Your Say website;
- Displays in Council's Customer Service Centres and libraries including the PP and supporting documentation; and
- Site notice installed on 19 November 2025; and
- Availability of telephone and email contact with planning officers.

A total of eight (8) submissions from the public were received. A submission was also received from The Hon. Steve Kamper, Member of Rockdale requesting Council give consideration to one of the public submissions. No submissions were received from any other public authority.

The submissions are considered in Section 6 of this report below.

5. Public Hearing

A public hearing was held for the proposed reclassification of land in the PP in accordance with Sections 29 and 47G of the Local Government Act 1993. The public hearing was held at Georges River Council Chambers at 24 Macmahon Street, Hurstville on 28 January 2026 from 6:00 to 6:45pm.

The public hearing was advertised to the public by Council with an invitation for interested parties to register to attend and to speak at the hearing. The advertising of the public hearing included:

- Letters sent to affected landowners, including those who made public submissions, advising of the public hearing;
- Dedicated page on Council's Your Say website; and
- Availability of telephone and email contact with planning officers.

The public hearing was chaired by Andrew Wilson NSW Planning Manager at Bureau Veritas as independent facilitator required under section 47G of the LG Act. A powerpoint presentation on the PP was prepared by the independent facilitator for the purpose of describing the agenda for the public hearing, the Site and the proposed reclassification for people attending the public hearing which is included in **Appendix A**.

The following Bureau Veritas staff were present at the hearing:

- Andrew Wilson NSW Planning Manager (Independent Chairperson),
- Sonya Hoh, Assistant Planner.

The power point presentation to be delivered by the independent chairperson at the hearing included at **Appendix A** included the following agenda and format for the hearing:

- Acknowledgement of Country
- Introduction by the Independent Chairperson
- Definition of Community vs. Operational land
- Outline of planning process
- Overview of the Planning Proposal and strategic context
- Objective and intended outcome
- Oral submissions by speakers
- Close of hearing

Council officers were also in attendance to observe the public hearing. The following Council staff were present at the hearing:

- Luke Oste, Manager Strategic Planning
- Andy Zhou, Strategic Planner/Information Management

No councillors were present.

No members of the public attended the public hearing.

The public hearing remained open to the public for a period of 45 minutes prior to concluding.

6. Submissions

6.1. Written Submissions

Eight (8) public submissions on the proposed reclassification of the Site were received by Council during the public exhibition period. A submission was also received from The Hon. Steve Kamper, Member of Rockdale requesting Council give consideration to one of the public submissions.

The issues raised in the written submissions and responses are summarised in the table below.

Submissions Summary of Points Raised	Response
• *Concern surrounding transition from public land to private. Particularly with respect to a loss of public green space and the off leash dog park.*	St George Leagues Club is a community based club facility. The Site is a small isolated and underutilised part of Moore Park which is outside and fenced off from the off-leash dog area of the Park. Council has previously resolved that proceeds from the sale are to be used for embellishment or acquisition of public open space within the Ward.

Submissions Summary of Points Raised	Response
• *Support for the Planning Proposal on the condition that it does not encroach on the path or dog park and the lane stays open.*	The Site is outside and fenced off from the off-leash dog area of the Park.
• *Proposes money from sale is invested into infrastructure for the dog park, particularly seating.*	Council has previously resolved that proceeds from the sale towards embellishment or acquisition of public open space within the Ward.
• *Council should consider fencing off the Leagues Club to limit intoxicated patrons from impeding on the surrounding residential area.*	Future use of the Site by the Leagues Club would need to be the subject of a Development Application in which treatment of the interface with the Park would be determined.
• *Posits minimal contribution to parking at the Leagues Club.*	The Site will improve potential for access around a currently constricted part of the Club curtilage.
• *Concerns surrounding whether reclassified Operational land will be leased or sold to the Leagues Club.*	Council has previously resolved to proceed with the sale of the Site to the Leagues Club, and for the proceeds from the sale to be used for embellishment or acquisition of public open space within the Ward.
• *Concerns surrounding privacy for surrounding dwelling homes with pools.*	Future use of the Site by the Leagues Club would need to be the subject of a Development Application in which any privacy issues with neighbours would need to be addressed.
• *Support for the Planning Proposal due to minimal use of the dog park, highlighting the benefit of investing money from sale into other infrastructure within the LGA.*	Noted.
• *Concern surrounding a shortage of off-leash dog parks within the local area, and thus in opposition of this reclassification.*	The Site is a small isolated and underutilised part of Moore Park which is outside and fenced off from the off-leash dog area of the Park.

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Submissions Summary of Points Raised	Response
• *Support for the Planning Proposal on the condition that the operational area will be consistent in height with the existing car park and a retaining wall separates the public pathway.*	Future development of the Site by the Leagues Club would need to be the subject of a Development Application in which levels, retaining walls and interface with the public pathway being retained would need to be addressed.
• *Additional concerns surrounding poor existing drainage at the site.*	Future development of the Site by the Leagues Club would need to be the subject of a Development Application in which stormwater management would need to be addressed.
• *Concern regarding the land being sold to private enterprise, particularly for vehicular movement.*	St George Leagues Club is a community based club facility. The Site is a small isolated and underutilised part of Moore Park which is outside and fenced off from the majority area of the Park. Council has previously resolved that proceeds from the sale are to be used for embellishment or acquisition of public open space within the Ward.
• *Concerns surrounding the car-reliant nature of the area and proposes that public and active transport forms should be encouraged.*	The PP does not affect any access path for active transport to, from or through Moore Park or through the surrounding area. The existing public path running between the subject Site and the remainder of Moore Park is being retained. Future use of the Site by the Leagues Club would need to be the subject of a Development Application in which access for active forms of transport would need to be addressed.
• *Concern regarding loss of public green space and vital tree canopy, particularly the Bottle Brush tree species.*	The Site is a small isolated and underutilised part of Moore Park which is outside and fenced off from the off-leash dog area of the Park. Future development of the Site by the Leagues Club would need to be the subject of a Development Application in which any tree removal and its replacement would need to be addressed.
• *Council should reconsider the reclassification of the site and prioritise green space over vehicular movement.*	The Site is a small isolated and underutilised part of Moore Park which is outside and fenced off from the more useable majority of the Park area. Council has previously resolved that proceeds from the sale are to be used for embellishment or acquisition of public open space within the Ward.



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Submissions Summary of Points Raised	Response
• *Submitter is a member of the Leagues Club, but expresses concern surrounding the delay in residents being notified of the land reclassification.*	The PP for the reclassification of the Site was notified in accordance with the requirements of planning statutes and Council's Community Participation Plan.
• *Concern regarding the window to provide a submission, citing proximity to Christmas as an issue.*	The PP for the reclassification of the Site was notified in accordance with the requirements of planning statutes and Council's Community Participation Plan.
• *Concern surrounding density increase within the Georges River LGA and its impact on the loss of green spaces.*	The PP retains the existing zoning and does not increase potential development density on the Site. Any future development would need to be the subject of a Development Application. Council has previously resolved that proceeds from the sale are to be used for embellishment or acquisition of public open space within the Ward.
• *Posits that the Club's existing footprint is significant and should not eat into public green space.*	The Site is a small isolated and underutilised part of Moore Park which is outside and fenced off from the more useable majority of the Park area. Council has previously resolved that proceeds from the sale are to be used for embellishment or acquisition of public open space within the Ward. Given the above, the PP s considered to have site specific merit and strategic merit. Future development of the Site by the Leagues Club would need to be the subject of a Development Application in which interface with Moore Park would need to be addressed.
• *Concern that the reclassification will set a precedent within the LGA, resulting in a loss of green space for development.*	The PP is assessed to have site specific merit and strategic merit due principally to St George Leagues Club being a community based club facility, the Site being an isolated and underutilised part of Moore Park, and Council resolving previously to use the proceeds from the sale of the land on embellishment or acquisition of other public open space in the same Ward. The circumstances of this PP are considered unique and not to set a precedent.

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Submissions Summary of Points Raised	Response
• *Proposes that the club should employ alternate methods to address traffic flow issues.*	The PP is assessed to have site specific merit and strategic merit due principally to St George Leagues Club being a community based club facility, the Site being an isolated and underutilised part of Moore Park, and Council resolving previously to use the proceeds from the sale of the land on embellishment or acquisition of other public open space in the same Ward.

6.2. Oral Submissions

No oral submissions from the public were given at the public hearing.

7. Conclusion and Recommendation

Nine (9) written submissions were received by Council during the public exhibition of the Planning Proposal PP2024/0006 and no oral submissions were made at the subsequent public hearing. All issues raised in the submissions have been addressed above in this report.

No change to the PP is recommended resulting from the public exhibition, public hearing and consideration of public submissions as the PP is considered to have site specific merit and strategic merit.

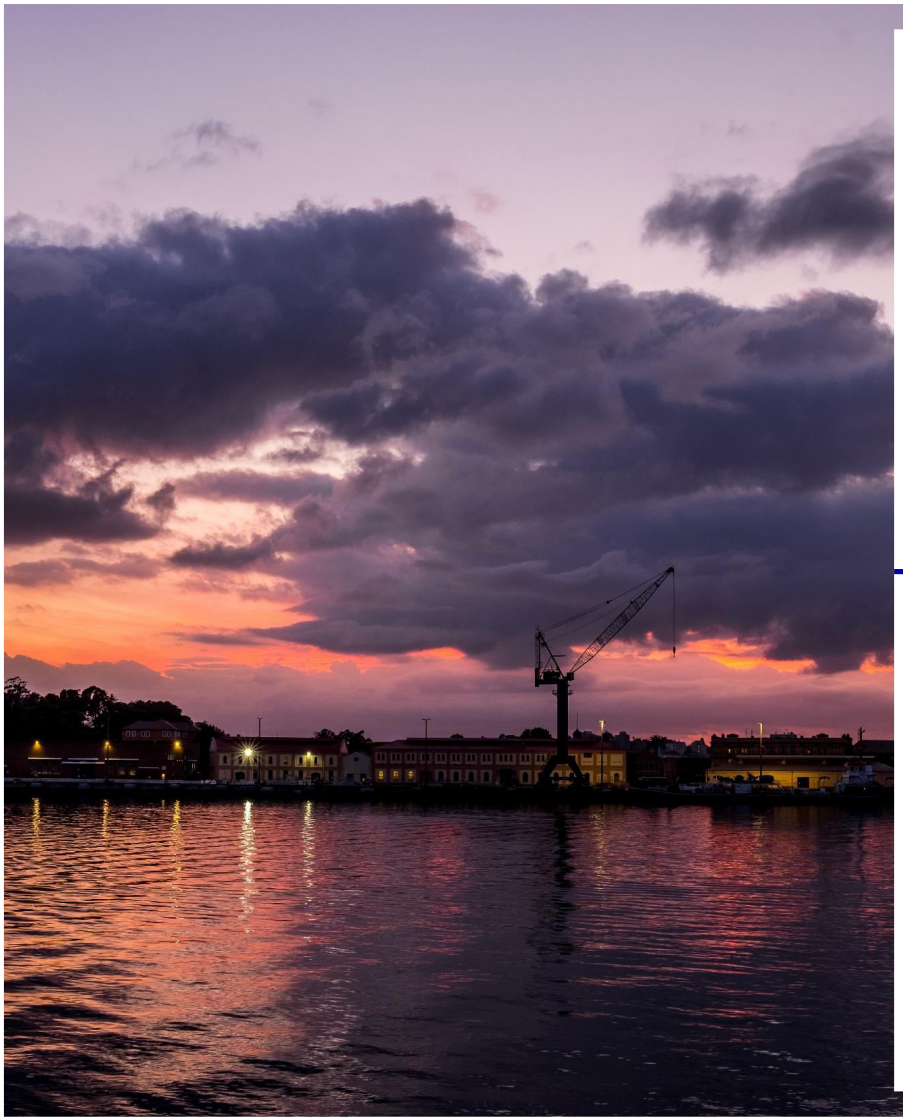
An amendment is recommended to the PP to change the proposed GRLEP instrument amendment from Part 1 to Part 2 in Schedule 4 of the GRLEP in accordance with legal advice received by Council and recommended by the LPP to discharge any possible trust or other interest in the land.

It is recommended that Council adopt the amendment to the GRLEP 2021 Schedule 4 Part 2 to reclassify the Site to 'operational land', and forward the amended PP to DPHI for finalisation and gazettal in accordance with Section 3.36 of the Environmental Planning and Assessment Act 1979.

This report is recommended to be submitted to Council for consideration and made available to the public in accordance with Section 47G of the Local Government Act 1993.

Appendix A

Public Hearing Presentation



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Public Hearing on Planning Proposal for Reclassification of Part of Moore Park in Beverley Park

Presentation by Independent Planner & Chair of Public Hearing

Andrew Wilson – NSW Planning Manager at Bureau Veritas

2026

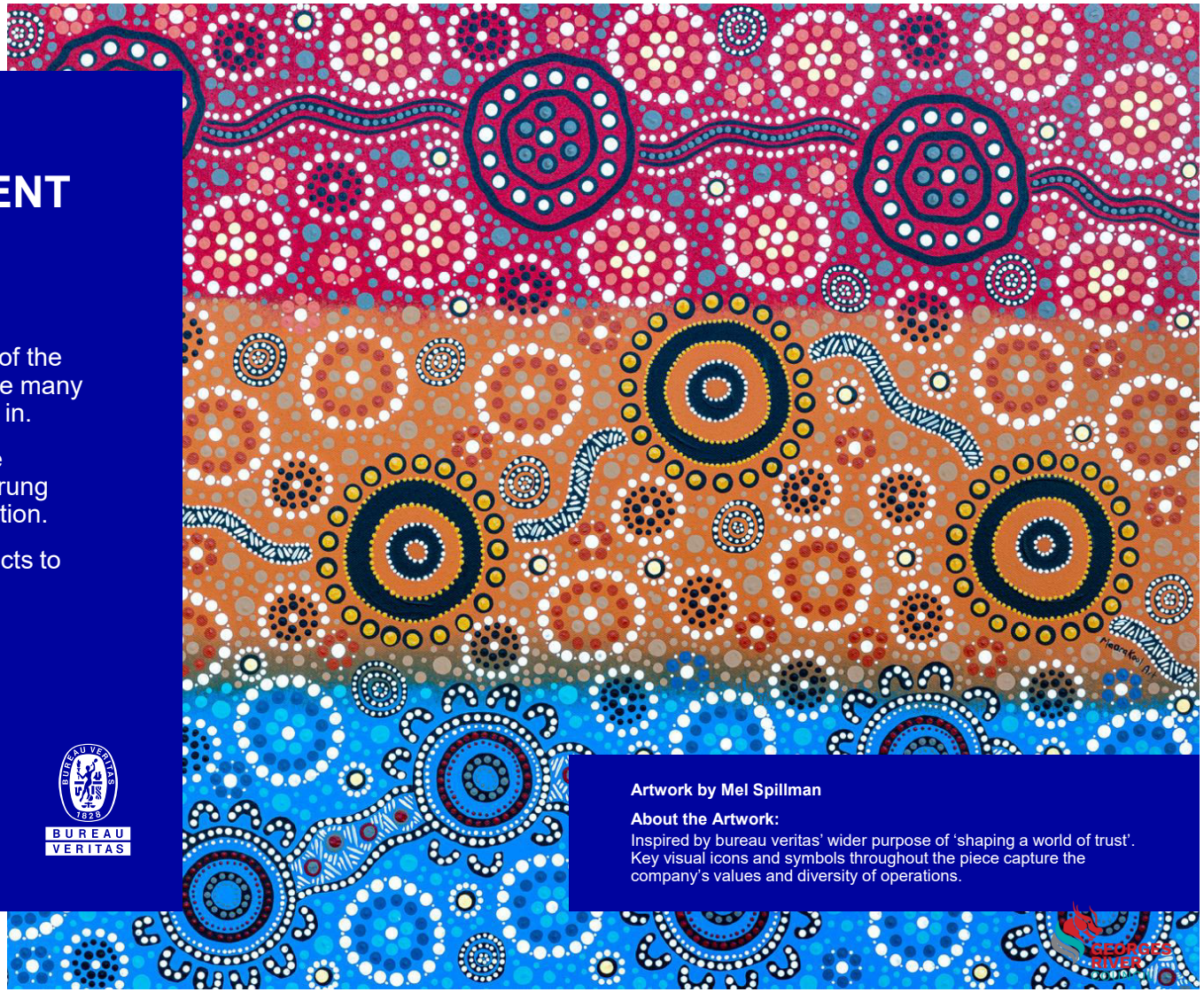
ACKNOWLEDGEMENT OF COUNTRY

Bureau Veritas acknowledges the Traditional Owners and Custodians of the lands throughout Australia across the many communities we live, visit, and work in.

Bureau Veritas' Australia head office operates on The land of the Woiwurrung (Wurundjeri) people of The Kulin Nation.

We acknowledge and pay our respects to Elders past, present, and emerging.

For more information about Bureau Veritas' commitments to reconciliation, please refer to our Reconciliation Action Plan.



Artwork by Mel Spillman

About the Artwork:
Inspired by bureau veritas' wider purpose of 'shaping a world of trust'. Key visual icons and symbols throughout the piece capture the company's values and diversity of operations.

Independent Chairperson
Andrew Wilson

About Me

- NSW Planning Manager – Bureau Veritas
- 30+ years of experience as a professional town planner
- Bachelor Degree in Urban and Regional Planning
- Registered Environmental Assessment Practitioner (REAP)



Agenda

1. **Explanation of Planning Proposal by Chairperson**
2. **Public Forum – 3 minutes for each person to make and address**



The subject site shown outlined red

The Planning Proposal

To reclassify a part (305sq.m) of Moore Park at Beverley Park from ‘community land’ to ‘operational land’ to enable the sale of the land to the adjacent St George Leagues Club



The subject site shown outlined red

Community v Operational Land

- **'Community land'** is available for use by the general public, for example, parks, reserves or sports grounds. Community land must not be sold, exchanged or otherwise disposed of by a Council. There are restrictions on granting leases and the way the land can be used.

- **'Operational land'** facilitates the functions of Council, and may not be open to the general public, for example a Council depot. There are limited restrictions on Council powers to manage, develop, dispose/sell or change the nature and use of 'Operational land'.



The subject site shown outlined red

The Process

- Lodgement with Council
- ⬇
- Review by Georges River Local Planning Panel
- ⬇
- Council meeting and resolution to proceed
- ⬇
- Gateway Determination by NSW Department of Planning Housing & Infrastructure
- ⬇
- Public Exhibition
- ⬇
- **Public Hearing**
- ⬇
- Council meeting on finalisation
- ⬇
- Finalisation and Gazettal



The subject site shown outlined red

The Subject Land

Part of Moore Park, Beverley Park

- Located at Ferry Rd and Lobb Ct in Beverley Park next to St George Leagues Club
- Local park for passive and informal active recreation with fenced off-leash dog park
- Area of 305sq.m. fenced-off and underutilised part of 5,840sq.m park
- Flat to gentle sloping topography
- Vegetation limited to small trees and grass ground cover



The subject site shown outlined red

The Subject Land

Part of Moore Park, Beverley Park

Adjacent land uses:

- Northwest: St George Leagues Club
- Northeast: R2 Low Density Residential zoned land
- Southeast: Beverley Park Golf Club and Spooner Park
- Southwest: R2 Low Density Residential zoned land



The subject site shown outlined red

The Subject Land

Part of Moore Park, Beverley Park

- RE1 Public Recreation Zone
- Community Land
- Generic Plan of Management for Parks:

Moore Park objectives:

- off-leash dog park
- community events
- natural value of the stormwater drainage corridor



The subject site shown outlined red

The Planning Proposal

Objective and Intended Outcome

- To reclassify the subject land from Community Land to Operational Land
- To enable the sale of the subject land to St Georges Leagues Club



The subject site shown outlined red

The Planning Proposal

Objective and Intended Outcome

Council resolved at its meeting on 24 June 2024 to:

- authorise the sale of the subject land to St George Leagues Club
- hold monies derived from the land sale in restricted reserve for the future embellishment or acquisition of public open space within any suburbs of the current Kogarah Bay Ward.



The subject site shown outlined red

The Planning Proposal

Amendment to Georges River LEP

- Reclassification to Operational Land by an Amendment to Georges River LEP 2021 – Schedule 4 Part 1
- No rezoning or other LEP amendment



The subject site shown outlined red

Public Forum

- 3 minutes for each person to address the Public Hearing.
- Please be respectful of others making their address.



The subject site shown outlined red

Thank you.

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GEORGES RIVER COUNCIL

Appendix B Notification Letter

georgesriver.nsw.gov.au

GEORGES RIVER COUNCIL

Contact: Andy Zhou
Phone: (02) 9330 6275
File Reference: D25/344373

17 November 2025

Name
Address
BEVERLEY PARK NSW 2217

Dear Sir/Madam

Public Exhibition of Planning Proposal to reclassification of a portion of Council's Moore Park land

I am writing to advise you that in accordance with Council's resolution at its meeting held on 22 September 2025, Council is publicly exhibiting a Planning Proposal (PP2024/0006) to amend Schedule 4, Part 2 of the *Georges River Local Environmental Plan 2021* (GRLEP).

The Planning Proposal seeks to reclassify a portion of Council's Moore Park land located at 33 Lobb Crescent (or 22A Ferry Avenue), Beverley Park, being part of Lot 160, DP 19098 (the Site), to 'operational land'.

The objective of the Planning Proposal is to enable the reclassification of the Site from 'community land' to 'operational land' under the *Local Government Act 1993*, and thereby enable the land to be purchased by the adjoining St George Leagues Club (the Club) for improved access around the Club curtilage.

The Planning Proposal and supporting information will be on public exhibition from **Wednesday, 19 November 2025 until Friday, 19 December 2025**, and can be viewed at:

- Website – https://yoursay.georgesriver.nsw.gov.au/part-of-moore-park
- Georges River Civic Centre, MacMahon Street, Hurstville, between 8.30am and 5.00pm, Monday to Friday
- Hurstville Library and Service Centre, Corner of Queens Road and Dora Street Hurstville
- Kogarah Library and Service Centre, Kogarah Town Square Belgrave Street, Kogarah

Scan the QR code to have your say

Please note Hurstville Library will temporarily close from 1 December 2025 to allow for essential fire system improvements, including a new sprinkler system. During the closure a pop-up library will be available at the Georges River Civic Centre. For more information on the closure, please view our Public Notice at: https://www.georgesriver.nsw.gov.au/Council/Public-Notices/Temporary-Closure-of-Hurstville-Library.

If you wish to comment on the Planning Proposal, please forward a written submission to the General Manager, Georges River Council:

Mail: PO Box 205, Hurstville BC 1481, or

Email: mail@georgesriver.nsw.gov.au

Submissions should quote reference **SF24/8883 - Public Submission - Part of Moore Park**. Submissions close at **5.00 pm on 19 December 2025**.

If you make a submission and have made political donations or gifts, a statement must be completed. A form is available on Council's website.

A submission by way of objection must set out the grounds for objection. Submissions are not confidential. Requests to access submissions will be considered in accordance with the *Privacy and Personal Information Protection Act 1998* and the *Government Information (Public Access) Act 2009*. For more information about Council's Privacy Management Plan, contact Council's Governance Section at 9330 6400.

A public hearing will be held into the matter in accordance with Section 29 of the *Local Government Act 1993* and the Department's *Practice Note 16-001 Classification and reclassification of public land through a local environmental plan*.

Scan the QR code to register for the public hearing. You will be notified of the date and location once they are confirmed.

If you have any questions, please do not hesitate to contact Andy Zhou, Strategic Planner / Information Management at 9330 6275.

Scan the QR code to register for the public hearing

Yours faithfully

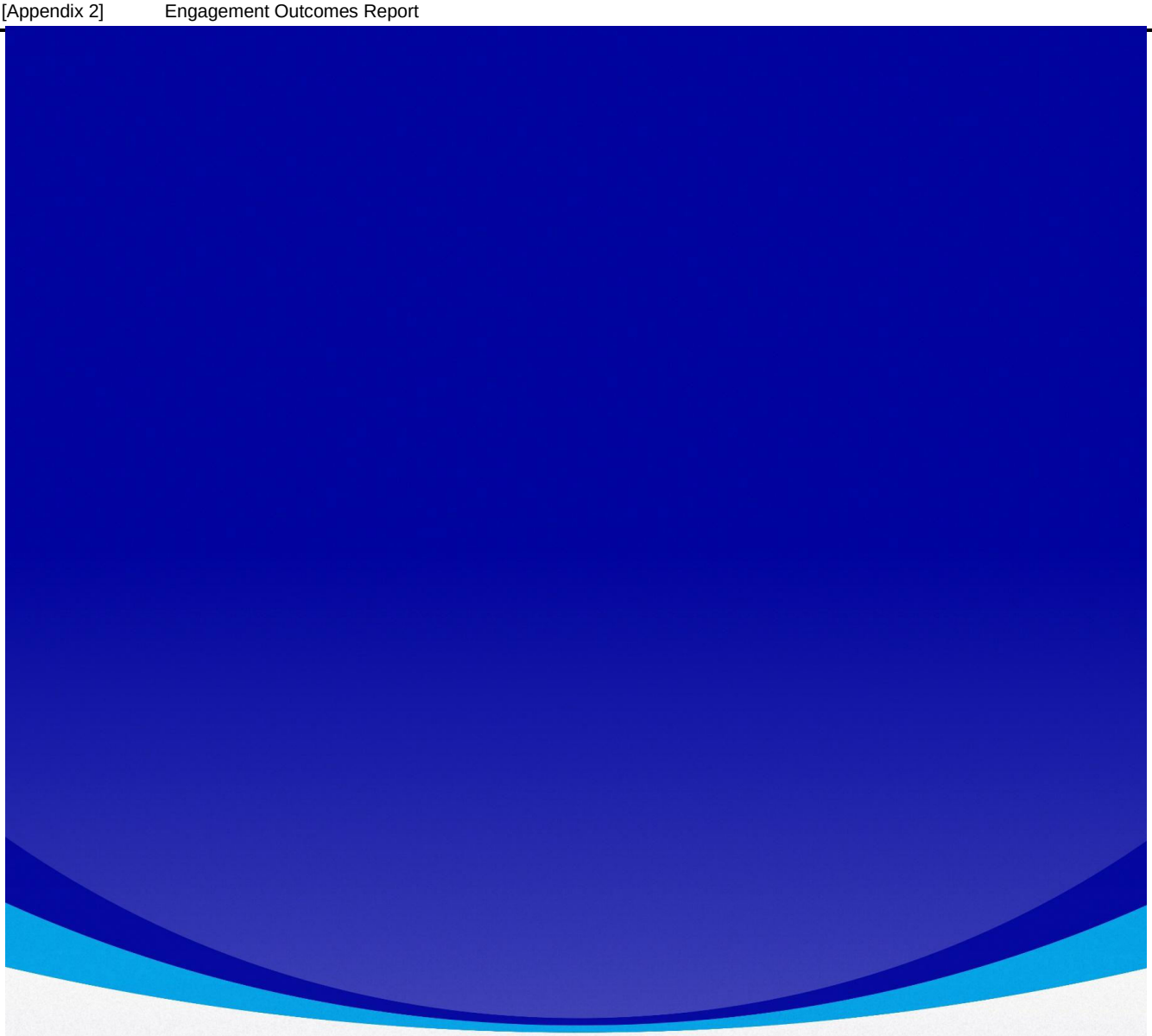


Luke Oste
A/Manager Strategic Planning

Appendix C Written Submissions

Record Number	Submission Date	Suburb	Submission details
D25/397176	21 November 2025	BEVERLEY PARK, NSW	Strongly against as it is not fair to take public land and turn it private, especially take public green space and one of the very few off leash dog parks
D25/397175	22 November 2025	CARLTON, NSW	I'm ok to change this grass area, as long as it does not encroach on the path or dog park. The lane must stay open. Maybe some money from sale can add a couple of more bench seats in the dog park
D25/397174	23 November 2025	BEVERLEY PARK, NSW	How about putting up a 6 foot + concrete wall to keep all the drunks from the Leagues Club from wandering through there at 1am, smashing bottles and taking a piss up against the front fences of houses on surrounding streets. Better still remove the bridge and keep them on the other side of the moat (canal).
D25/397173	26 November 2025	RIVERWOOD, NSW	I don't think giving them that piece of land will make any significant difference to their parking. You have not advised if the Operational land will be sold to them becoming their property or leased? Some people have pools there could be a privacy issue.
D25/397172	28 November 2025	KYLE BAY, NSW	I fully support this proposal. The triangle of grass in the dog park is rarely used, so the benefits of selling off, receiving funds & using elsewhere for the benefit of the community are clear
D25/397171	1 December 2025	BEVERLEY PARK, NSW	I do not wish the dog park to be removed. We are limited in leash free areas around Beverley Park. The one at Kogarah Park is not fenced off. Thank you.

Record Number	Submission Date	Suburb	Submission details
D25/397170	12 December 2025	CARLTON, NSW	Supported. However, it is assumed that the proposed operational area will be raised in height to align with the existing car park and a retaining wall built parallel to the public pathway. It is noted that the site has poor drainage. Please ensure there is adequate drainage from any wall away from the public pathway.
D25/398097	18 December 2025	BEVERLEY PARK, NSW	I am against the reclassification of this land to operational land and am against the selling of this land to private enterprise, especially if it is to facilitate the movement of cars. I walk along the community land multiple times every day and do not wish for the club to take it over and concrete it for the use of a carpark or driveway. It is already a very car heavy area and council should be doing more to discourage the use of cars and promote more active transport. The loss of public community land can not be recovered; it will be lost forever and will benefit the club immensely in the future. Meanwhile, us residents lose precious green space and vital tree canopy. The bottle brush trees were only established on that patch of grass about six years ago and are finally growing into something substantial. The club already demolished a mature bottle brush that provided shade and food to local birdlife, in order to install more electrical capacity, and to the best of my knowledge, they have not replaced it. Please do not sell off this land thinking it will benefit residents. The benefit to the residents is the open space and the tree canopy that should be given time to fill the air. Selling off the land only benefits the private enterprise. Please do not give in to the 'car brains'.



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Planning Proposal Report

Moomba to Sydney Ethane (MSE) Pipeline Hazard Analysis (PP2026/0002)

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1. Introduction

The Planning Proposal seeks to amend the Georges River Local Environmental Plan (GRLEP) 2021 by amending the existing Activity Hazard Risk Map and *clause 6.16 Development in areas of activity hazard risk*. The planning proposal is required to restrict sensitive use developments within 200m of the pipeline in accordance with the recommendations of the MSE Hazard Analysis Report.

It is requested that Council be given delegation for the plan making functions for this Planning Proposal.

This Planning Proposal has been prepared in accordance with Section 3.33 of the *Environmental Planning & Assessment Act 1979* (EP&A Act), its *Regulation 2021* and the *Local Environmental Plan Making Guideline* (August 2023) released by the NSW Department of Planning, Housing and Infrastructure (DPHI).

2. Background

The Local Strategic Planning Statement 2040 (LSPS) was completed in 2020 and identifies several locations where opportunities for new housing should be investigated. These areas will contribute to the provision of additional housing to meet the 10–20 year housing targets

Areas have been identified for potential additional housing and employment along the T8 (Airport and South) train line. These areas are in the northern part of the Georges River Local Government Area (LGA) and within the notification zone of the Moomba to Sydney Ethane (MSE) Pipeline. The housing and centres investigation areas are shown in **Figure 1**.

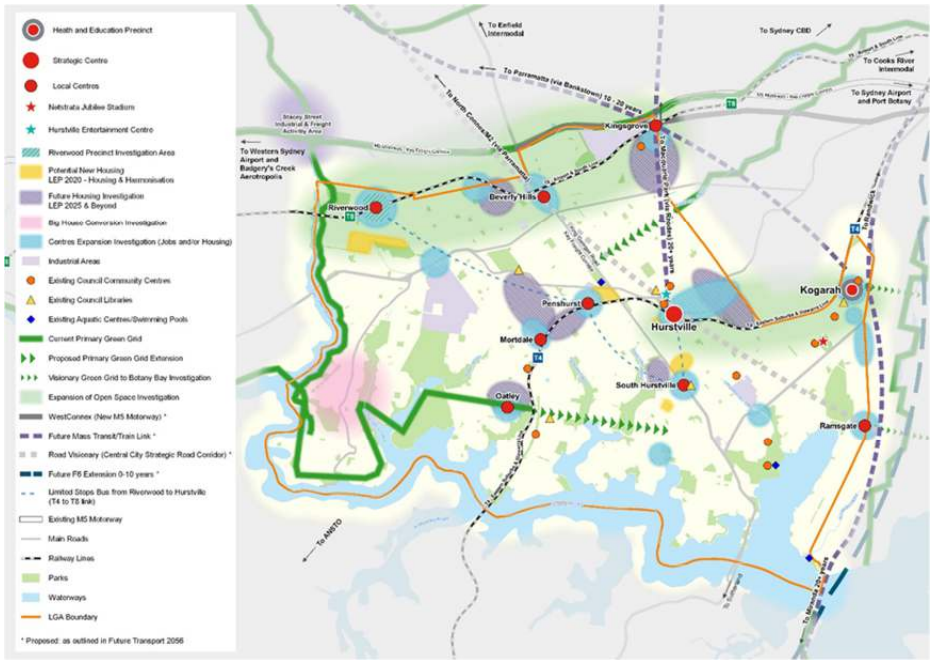


Figure 1 – LSPS 2040 Structure Plan

In 2021 the Ethane Pipeline Preliminary Hazard Analysis was completed by Arriscar for the Narwee Housing Investigation Area (HIA) to determine the implications of hazard risk on additional housing. Specifically, the analysis identified the existing hazard risk, the potential risk impacts from future proposed development, and recommended mitigation measures to address the risk impacts for an increased population.

The Risk Assessment determined that the rezoning of the HIA is compatible with risk criteria subject to the following recommendations:

a) Remove lots 407 and 432 of DP752056 (Nos. 5 and 7 Bryant Street Narwee) from the HIA planned rezoning from R2 to R3 to ensure the criteria for residential development area complied with.
b) Ensure sensitive use development such as aged care facilities, childcare centres or schools is not approved for lots 1 through to 7 of DP16824 (Nos. 1 to 13 Berrille Road Narwee).

The Planning Proposal was amended prior to public exhibition in accordance with the above recommendations. The Planning Proposal was gazetted in October 2021. The properties Nos. 1 to 13 Berrille Road are now affected by Clause 6.16 and included on the Activity Hazard Risk Map.

In 2023, Council appointed Arriscar to undertake a comprehensive risk assessment of the MSE Pipeline within the Georges River LGA. The MSE Pipeline Hazard Analysis Report assesses the extent to which population intensification can occur on land adjacent to the MSE pipeline, while remaining compliant with the DPHI risk criteria outlined in Hazardous Industry Planning Advisory Paper No. 10 (HIPAP No. 10).

This assessment was completed in August 2024 and provided a detailed assessment of the pipeline's risk profile based on its then current use for transporting Ethane. At its meeting on 24 March 2025 (ENV010-25) Council noted the MSE Pipeline Hazard Analysis Report.

In February 2025, the Minister for Planning approved the repurposing of the MSE Pipeline from Ethane to Natural Gas service.

The change in the transported substance has altered the risk profile of the pipeline, which required the modelling previously undertaken to be revised. Council reappointed Arriscar to revise the societal risk, Location Specific Individual Risk (LSIR) and injury risk based on the pipeline transporting Natural Gas.

The objectives of the MSE Hazard Analysis Report were to:

- *"Identify and assess the hazards and risks associated with the MSE pipeline with respect to the risk criteria outlined in HIPAP No. 10;*
- *Identify graphically on a map, the maximum future proposed additional dwellings the area can accommodate without exceeding the NSW DPHI's risk criteria; and*
- *Make recommendations for mitigation measures that may be required to reduce the risk on the population due to future development."*

The methodology used for the study involved the following main steps:

- *"System definition, in which information on the facility is collected and assimilated.*

- *Hazard identification, in which site events and external events are identified which may lead to potential adverse effects beyond the boundary of the site.*
- *Consequence modelling, in which all the possible consequences of each event are estimated.*
- *Frequency and likelihood estimation, in which the frequency (i.e. likelihood per year of occurrence) of each of the hazardous events is estimated, based on historical failure data.*
- *Risk estimation, in which the frequencies and consequences of each event are combined to determine levels of risk.*
- *Risk assessment, in which the calculated risks are assessed against relevant risk criteria."*

FINDINGS AND RECOMMENDATIONS

The MSE Hazard Analysis Report determined that the LSIR of fatality for the MSE Pipeline carrying Natural Gas is below the DPHI risk criteria. There is no impediment to sensitive, residential, commercial, active open space, or industrial development based on LSIR. Such developments, however, are still subject to the limitation of population to ensure societal risk criteria is satisfied.

The risks associated with injury, property damage, and accident propagation from the pipeline are all below the thresholds set by the DPHI. Societal risk remains within the "Negligible" zone under HIPAP guidelines, meaning areas within 200 metres of the pipeline are suitable for increased population. However, development is still subject to population limits to ensure societal risk criteria are met. The maximum average population density that can be safely accommodated is 65,000 persons/km²—well above current densities, such as Hurstville City Centre's 22,746 persons/km²—indicating that intensification is feasible from a risk perspective.

The following recommendations have been made by Arriscar in the MSE Hazard Analysis Report (refer **Attachment 1**):

Recommendation 1 – Sensitive Use Development

Consider restricting sensitive use developments on properties within the measurement length of 200 m from the pipeline.

Sensitive use developments are those for use by sectors of the community who may be unable to protect themselves from the consequences of a pipeline failure event, and include the following land uses:

- School
- Hospital
- Seniors housing
- Respite day care centre
- Early education and care facility
- Correctional centre

Although the DPHI's individual risk criterion for sensitive use development (0.5×10^{-6} fatalities per annum) was not exceeded, this recommendation is based upon the first of the qualitative criteria in HIPAP 10, "All 'avoidable' risks should be avoided". Placing vulnerable individuals in close proximity to the pipeline could be avoided and warrant precautionary land use controls.

Recommendation 2 – Population Intensification

Limit the future population density within the measurement length of 200 m from the pipeline to an average density of 65,000 persons/km², with the peak density not exceeding 135,000 persons/km², to ensure compliance with societal risk criteria.

Recommendation 3 – Consultation with Pipeline Operator

Following any changes to land zoning, participate in required land use change safety management studies in consultation with APA (the pipeline operator).

Recommendation 4 – Future Developments Meeting Societal Risk Criteria

Allow development applications with population densities less than those specified in Recommendation 2 to rely upon this report as evidence that the proposal complies with Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning (refer Planning Circular PS 24-005).

Recommendation 5 – Future Developments where Societal Risk is Unknown

Should a development exceed the population density limits specified in Recommendation 2, the basis of recommendation 4 will be undermined, and all future developments within 200 m of both the pipeline and the development exceeding the limit will need to independently demonstrate compliance with the risk criteria in HIPAP 4 and 10.

3. Part 1 – Objectives and Intended Outcomes

Objective

The objective of this Planning Proposal is to strengthen land use safety provisions in proximity to the MSE Pipeline by:

1) Including respite day care centres and correctional centres as land uses subject to *Clause 6.16 Development in areas of activity hazard risk.*
2) Restrict sensitive use developments within 200m of the pipeline by amending the existing Activity Hazard Risk Map.

Intended Outcome

The intended outcome of the Planning Proposal is to amend the GRLEP 2021 to implement the findings and recommendations of the MSE Pipeline Hazard Analysis Report. In doing this, the aim is to ensure the risk associated with the MSE Pipeline are appropriately considered where new sensitive use development is proposed.

4. Part 2 – Explanation of Provisions

Intended Provisions

In response to Recommendation 1, a Planning Proposal is required to restrict sensitive use developments within 200m of the pipeline by amending the existing Activity Hazard Risk Map.

Clause 6.16 will be amended, in line with Recommendation 1, to include 'Respite Day Care Centre' and 'Correctional Centre' as sensitive land uses. These uses will be added to the clause as they are permissible within the relevant land use zones and are considered as sensitive uses.

Proposed wording (in red) for the existing Clause 6.16 below:

6.16 Development in areas of activity hazard risk

(1) The objective of this clause is to minimise risk to life and property in the event of an emergency arising near a high pressure gas pipeline.

(2) This clause applies to development for one or more of the following purposes on land identified as "High Pressure Gas Pipeline Risk Area" on the Activity Hazard Risk Map—

- *a) centre-based child care facilities,*
- *b) early education and care facilities,*
- *c) educational establishments,*
- *d) health services facilities,*
- *e) seniors housing.*
- *f) Respite Day Care Centre*
- *g) Correctional Centre*

(3) The consent authority must not determine a development application for development to which this clause applies, unless, in accordance with subclause (4), the consent authority has—

- *a) consulted the Planning Secretary on the application, and*
- *b) taken into consideration the Planning Secretary's submissions, if any.*

(4) The consent authority must—

- *a) forward a copy of the application and the accompanying documents to the Planning Secretary within 7 days of receiving the application, and*
- *b) consider the Planning Secretary's submissions within 28 days of forwarding the documents.*



Figure 2 Current Activity Hazard Risk Map

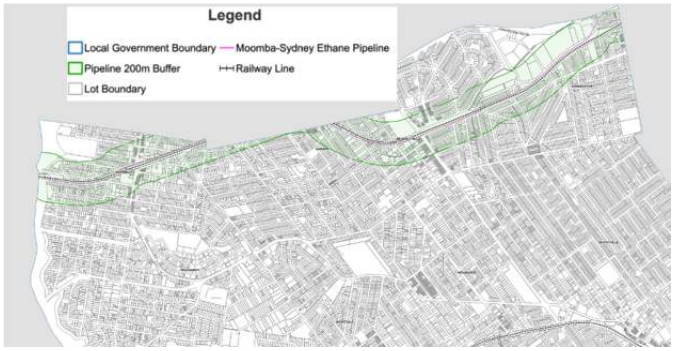


Figure 3 – 200m from the Moomba to Sydney Pipeline

The maps show the proposed amendment to the Activity Hazard Risk Map. This amendment introduces a 200-metre buffer around the Moomba to Sydney Pipeline within the Georges River LGA, identifying land where Clause 6.16 will apply. The change is intended to restrict sensitive use developments in proximity to the pipeline, consistent with the recommendations of the MSE Hazard Analysis Report.

Explanation:

Table 1 – zones affected by 200m and land uses permitted

Zones affected by the 200m buffer	Existing sensitive land uses that are permitted
R2	Centre based child care facilities, early education and care facilities, educational establishments, health services facilities, seniors housing, respite day care centre
R3	Centre based child care facilities, early education and care facilities, educational establishments, health services facilities, seniors housing, respite day care centre
R4	Centre based child care facilities, early education and care facilities, educational establishments, health services facilities, seniors housing, respite day care centre
E1	Centre based child care facilities, early education and care facilities, educational establishments, health services facilities, seniors housing, respite day care centre
E4	Nil
SP2	Respite day care centre
RE1	Respite day care centre

The table identifies the zones within 200 metres of the MSE Pipeline and the sensitive land uses currently permitted in those zones. The amendment aims to limit these sensitive uses near the pipeline in accordance with the MSE Hazard Analysis Report. Sensitive use development is not prohibited; however, proposals for sensitive uses within the buffer will require a detailed risk assessment and consultation with the Planning Secretary prior to determination.

Correctional centres are currently not permitted in any of the land use zones located within the 200m buffer. It is proposed to be included in cl6.16 to future proof against spot rezonings and SSIs.

5. Part 3 – Justification of Strategic and Site-Specific Merit

Strategic Merit

Section A – Need for the planning proposal

1. Is the planning proposal a result of an endorsed LSPS, strategic study or report?

The Planning Proposal is not directly a result of the LSPS or a strategic study. There is a need for additional housing to support population growth in the LGA and Sydney more broadly. However, consistent with the LSPS, it is essential that the growth takes into consideration natural or urban hazards. Therefore, appropriate planning controls and risk mitigation strategies are necessary to ensure that new development is managed safely and sustainably.

The Planning Proposal is a result of the MSE Hazard Analysis Report, which has outlined the risks and sets out recommendations to mitigate the risk while still supporting additional housing along the pipeline.

2. Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The Planning Proposal is the best means of amending the GRLEP 2021. It provides a stronger statutory basis for managing development in areas subject to the risks of the MSE Pipeline. Unlike a Development Control Plan (DCP), the GRLEP 2021 ensures that development consent cannot be granted unless Clause 6.16 is satisfied when development is within 200m of the pipeline, outlined in the Activity Hazard Risk Map. This approach provides greater certainty and consistency in decision-making where safety and hazard mitigation are a concern.

Section B – Relationship to the strategic planning framework

3. Will the planning proposal give effect to the objectives and actions of the applicable regional or district plan or strategy (including any exhibited draft plans or strategies)?

The Planning Proposal gives effect to the following objectives within the *Greater Sydney Region Plan – A Metropolis of Three Cities:*

> *Objective 37. Exposure to natural and urban hazards is reduced.*
>
> The properties within the 200m of the MSE Pipeline are proposed to be affected by Clause 6.16 of the GRLEP 2021. This clause applies to sensitive land uses, including centre-based child care facilities, early education and care facilities, educational establishments, health services facilities, correctional facilities, respite day care centre and seniors housing. It requires consultation with the Planning Secretary prior to approval of such developments. The objective of the clause is to minimise risk to life and property in the event of an emergency near a high-pressure gas pipeline.

The Planning Proposal gives effect to the planning priorities of the *South District Plan*:

> *Planning Priority S18. Adapting to the impacts of urban and natural hazards and climate change.*
>
> The Planning Proposal gives effect to the above objective by identifying properties within 200 metres of the MSE Pipeline on the Activity Hazard Risk Map, thereby ensuring that Clause 6.16 of the GRLEP 2021 applies to those properties. This aligns with the strategic direction outlined in the South District Plan, which emphasises the importance of avoiding and managing exposure to natural and urban hazards. Clause 6.16 provides a statutory mechanism to restrict sensitive developments in proximity of the high pressure gas pipeline, ensuring that growth does not compromise community safety or resilience.

The Planning Proposal considers the planning priorities of the *Draft Sydney Plan:*

> The Planning Proposal aligns with the Draft Sydney Plan priority of *"Aligning land use with infrastructure delivery"* by ensuring that future development within the LGA is planned with regards to the hazards and risk associated with the MSE pipeline. The Planning Proposal enables safe population growth in identified growth areas that does not compromise community safety and resilience.

4. Is the Planning Proposal consistent with a council LSPS that has been endorsed by the Planning Secretary or GCC, or another endorsed local strategy or strategic plan?

The Planning Proposal is consistent with the endorsed LSPS, specifically the following planning priority:

> *P20. Development is managed to appropriately respond to hazards and risks*
>
> The Planning Proposal gives effect to this objective by reinforcing the importance of avoiding increased sensitive land use developments in areas subject to natural and urban hazards. It also supports broader goals around public safety and sustainable growth, as outlined in the LSPS. Clause 6.16 of the GRLEP 2021 establishes a mechanism to limit sensitive land uses within these identified areas. This ensures that future development is appropriately sited and designed to reduce potential risks to people, property, and the environment.

5. Is the planning proposal consistent with any other applicable State and regional studies or strategies?

There are no other applicable State and regional studies or strategies.

6. Is the planning proposal consistent with applicable SEPPs?

This Planning Proposal has been considered against the relevant SEPPs and is determined to be consistent with the relevant provisions as set out in **Table 1** below.

Table 1 – Consistency with SEPPs

SEPP	Consistency	Comment
State Environmental Planning Policy (Biodiversity and Conservation) 2021	Yes	The Planning Proposal is not inconsistent with the SEPP.
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008	Yes	The Planning Proposal is not inconsistent with the SEPP.
State Environmental Planning Policy (Housing) 2021	Yes	The Planning Proposal is not inconsistent with the SEPP.
State Environmental Planning Policy (Industry and Employment) 2021	Yes	The Planning Proposal is not inconsistent with the SEPP.
State Environmental Planning Policy (Planning Systems) 2021	Yes	The Planning Proposal is not inconsistent with the SEPP.
State Environmental Planning Policy (Precincts—Central River City) 2021	N/A	Not applicable
State Environmental Planning Policy (Precincts—Eastern Harbour City) 2021	N/A	Not applicable
State Environmental Planning Policy (Precincts—Regional) 2021	N/A	Not applicable
State Environmental Planning Policy (Precincts—Western Parkland City) 2021	N/A	Not applicable
State Environmental Planning Policy (Primary Production) 2021	N/A	Not applicable
State Environmental Planning Policy (Resilience and Hazards) 2021	Yes	The Planning Proposal is not inconsistent with the SEPP
State Environmental Planning Policy (Resources and Energy) 2021	Yes	The Planning Proposal is not inconsistent with the SEPP.
State Environmental Planning Policy (Sustainable Buildings) 2022	Yes	The Planning Proposal is not inconsistent with the SEPP.
State Environmental Planning Policy (Transport and Infrastructure) 2021	Yes	The Planning Proposal is not inconsistent with the SEPP. The applicable high pressure dangerous goods pipeline is the MSE Pipeline managed by the APA Group. The SEPP includes requirements for development adjacent to transport and utility infrastructure, such as pipelines, to consider safety, risk, and consultation with relevant authorities.

		The planning proposal requires risk assessment and consultation with the Planning Secretary for sensitive land uses, which aligns with SEPP provisions requiring appropriate planning controls and safety measures for development near critical infrastructure. The SEPP and planning proposal aim to minimise risk to life and property and ensure land use planning supports infrastructure safety and resilience.

7. Is the planning proposal consistent with applicable Ministerial Directions (section 9.1 Directions) or key government priority?

This Planning Proposal has been considered against the relevant Ministerial Directions as set out in **Table 2** below.

Table 2 – Consistency with Ministerial Directions

Ministerial Direction	Comment
Focus area 1: Planning Systems –	
1.1 Implementation of Regional Plans	Consistent – The Planning Proposal is consistent with: • A Metropolis of Three Cities – Greater Sydney Region Plan – see previous discussion on Question 3. • South District Plan – see previous discussion on Question 3.
1.2 Development of Aboriginal Land Council land	Not applicable
1.3 Approval and Referral Requirements	Consistent – The Planning Proposal seeks additional consultation with the owner of the pipeline APA and consultation with the Planning Secretary.
1.4 Site Specific Provisions	Consistent – The Planning Proposal doesn't seek to add an Additional Permitted Use for certain land.
1.4A Exclusion of Development Standards from Variation	Not applicable
Focus area 1: Planning Systems – Place-based	Not applicable
Focus Area 2: Design and Place	This Focus Area was blank when the Directions were made.
Focus Area 3: Biodiversity and Conservation	
3.1 Conservation Zones	Consistent – The Planning Proposal does not affect land within a conservation zone or land otherwise identified for environment conservation/protection purposes in a LEP.
3.2 Heritage Conservation	Consistent – The Planning Proposal does not affect land within a heritage conservation area.
3.3 Sydney Drinking Water Catchments	Not applicable
3.4 Application of C2 and C3 Zones and Environmental Overlays in Far North Coast LEPs	Not applicable
3.5 Recreation Vehicle Areas	Not applicable
3.6 Strategic Conservation Planning	Not applicable

3.7 Public Bushland	Consistent – The Planning Proposal does not propose any changes to existing controls protecting bushland in urban areas.
3.8 Willandra Lakes Region	Not applicable
3.9 Sydney Harbour Foreshores and Waterways Area	Not applicable
3.10 Water Catchment Protection	Not applicable
Focus Area 4: Resilience and Hazards	
4.1 Flooding	Consistent – The Planning Proposal does not change any existing provisions relating to flooding.
4.2 Coastal Management	Consistent – The Planning Proposal does not change any existing provisions relating to coastal management.
4.3 Planning for Bushfire Protection	Consistent – The Planning Proposal does not change any existing provisions relating to bushfire prone land.
4.4 Remediation of Contaminated Land	Consistent – The Planning Proposal does not affect any known contaminated land.
4.5 Acid Sulfate Soils	Consistent – The Planning Proposal does not seek to introduce or change provisions relating to Acid Sulfate Soils.
4.6 Mine Subsidence and Unstable Land	Not applicable
Focus Area 5: Transport and Infrastructure	
5.1 Integrating Land Use and Transport	Not applicable
5.2 Reserving Land for Public Purposes	Not applicable
5.3 Development Near Regulated Airports and Defence Airfields	Not applicable
5.4 Shooting Ranges	Not applicable
5.5 High Pressure Dangerous Goods Pipeline	The applicable high pressure dangerous goods pipeline is the MSE Pipeline managed by the APA Group. In accordance with MSE Hazard Analysis Report, the application of Clause 6.16 in the GRLEP 2021 will be expanded to the length of the pipeline in the LGA. This existing clause restricts sensitive land uses and requires development for these land uses to consult the Planning Secretary as part of the DA process. The Planning Proposal ensures that future sensitive use developments within 200m of the pipeline are restricted, thereby achieving the objective of Direction 5.5 to reduce the risk of harm to human health and the environment. Accordingly, this Planning Proposal is consistent with the intent of this Direction.
Focus Area 6: Housing	
6.1 Residential Zones	Consistent – The Planning Proposal is consistent as it aims to minimise risk to life and property in the event of an emergency near a high-pressure gas pipeline by restricting sensitive use development.
6.2 Caravan Parks and Manufactured Home Estates	Not applicable

Focus Area 7: Industry and Employment	
7.1 Employment Zones	Consistent – The Planning Proposal is consistent as it aims to minimise risk to life and property in the event of an emergency near a high-pressure gas pipeline by restricting sensitive land uses such as child care centres, educational institutions, and correctional facilities.
7.2 Reduction in non-hosted short-term rental accommodation period	Not applicable
7.3 Commercial and Retail Development along the Pacific Highway, North Coast	Not applicable
Focus Area 8: Resources and Energy	
8.1 Mining, Petroleum Production and Extractive Industries	Not applicable
Focus Area 9: Primary Production	
9.1 Rural Zones	Not applicable
9.2 Rural Lands	Not applicable
9.3 Oyster Aquaculture	Not applicable
9.4 Farmland of State and Regional Significance on the NSW Far North Coast	Not applicable

Site-Specific Merit

Section C – Environmental, social and economic impact

8. Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected because of the proposal?

The Planning Proposal only proposes to make amendments to Clause 6.16 and the Activity Hazard Risk Map to include properties within 200m of the MSE Pipeline. The Planning Proposal will not affect critical habitat or threatened species, populations or ecological communities, or their habitats.

9. Are there any other likely environmental effects of the planning proposal and how are they proposed to be managed?

The Planning Proposal will not result in any negative environmental effects as the purpose is to minimise risk to life and property in the event of an emergency by restricting sensitive use development near the MSE Pipeline.

10. Has the Planning Proposal adequately addressed any social and economic effects?

The Planning Proposal addresses social effects by guiding how population growth is managed near the MSE Pipeline by identifying appropriate consultation requirements. This ensures that future development does not compromise public safety. The Planning Proposal identifies high risk areas so that new sensitive developments such as schools, aged care and health services are not in at risk locations.

The Planning Proposal addresses the economic effects by identifying areas where development can safely occur, encouraging investment and development that is lower risk in those locations. While developers may face additional costs to comply with safety and risk mitigation measures, these are essential for the long-term resilience of the LGA.

Overall, the Planning Proposal plays a crucial role in balancing safety with development, ensuring that social and economic growth in the LGA is sustainable and well-managed.

Section D – Infrastructure (Local, State and Commonwealth)

11. Is there adequate public infrastructure for the planning proposal?

This Planning Proposal does not create additional need for public infrastructure.

Section E – State and Commonwealth interests

12. What are the views of state and federal public authorities and government agencies consulted in order to inform the Gateway determination?

As this Planning Proposal is yet to be forwarded to the Minister for a Gateway Determination, the appropriate State and Commonwealth public authorities have not yet been consulted.

Efforts were made by Arriscar, the consultant engaged by Council to prepare the report, to consult with the pipeline operator, APA Group (a private company) during the early stages of the report's development.

Relevant State and Commonwealth public authorities will be consulted in accordance with the Gateway Determination and will be given at least 28 days to comment.

6. Part 4 – Maps

The Planning Proposal will result in an amendment to the following maps of the GRLEP 2021:

- Activity Hazard Risk Map (AHR) – Sheet AHR_001 (new maps sheet)
- Activity Hazard Risk Map (AHR) – Sheet AHR_004
- Activity Hazard Risk Map (AHR) – Sheet AHR_007 (new maps sheet)

Map sheets will be made available for finalisation.

7. Part 5 – Community Consultation

It is anticipated that this Planning Proposal will be exhibited for a minimum period of 28 days in accordance with the provisions of the *EP&A Act 1979* and the *Environmental Planning & Assessment Regulation 2000* and any requirements of the Gateway Determination.

Exhibition material, including plain English explanatory information, fact sheets, description of the objectives and intended outcomes, copy of the Planning Proposal and relevant maps will be

available for viewing during the exhibition period on Council's website and hard copies available at Council offices and libraries.

Notification of the public exhibition will be through:

- Newspaper advertisement in The Leader,
- Exhibition notice on Council's website,
- Community engagement project on Council's YourSay website,
- Notices in Council offices and libraries,
- Letters to landowners of properties affected by a proposed change in the planning controls, and
- Letters to State and Commonwealth Government agencies identified in the Gateway Determination.

8. Part 6 – Project Timeline

The anticipated project timeline for completion of this Planning Proposal is shown below:

Task	Anticipated Timeframe
Referral to LPP in accordance with S9.1 Ministerial Direction	February 2026
Reporting to Council on PP seeking endorsement to forward PP for a Gateway Determination	March 2026
Anticipated commencement date (date of Gateway Determination)	May 2026
Timeframe for government agency consultation (pre and post exhibition as required by Gateway Determination)	June – July 2026
Commencement and completion dates for public exhibition period	June – July 2026
Timeframe for consideration of submissions	July – August 2026
Report to Council on community consultation outcomes and finalisation	September 2026
Date of submission to the DPHI to finalise the LEP	October 2026

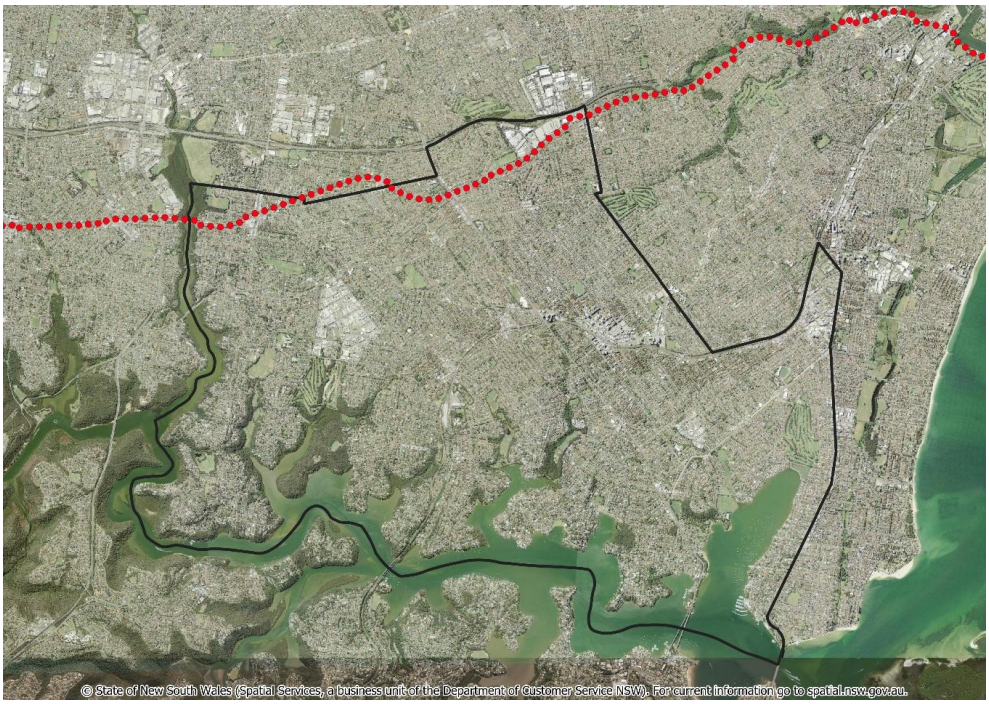
9. Appendices

- **Attachment 1 –** Moomba to Sydney Ethane Pipeline Hazard Analysis with Appendices Rev B

Repurpose of Moomba to Sydney Ethane Pipeline Hazard Analysis

For Georges River Council

21 August 2025



Doc. No.: J-000831

Revision: A

Arriscar
Risk Engineering Solutions

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

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

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

DISTRIBUTION LIST

Name	Organisation	From (Issue)	To (Issue)
Catherine McMahon	Georges River Council	A	Current
Michelle Fawcett	Georges River Council	A	Current

DOCUMENT HISTORY AND AUTHORISATION

Rev	Date	By	Description	Check	Approved
A	21-Aug-25	RF	First draft for client review.	JL	JL

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Summary

The Moomba to Sydney Ethane Pipeline (MSE) owned and operated by the APA Group (APA) runs through the northern portion of the Georges River Local Government Area (LGA) in New South Wales (NSW). The MSE pipeline runs parallel to the T8 (Airport & South) train line through the suburbs of Riverwood, Narwee, Beverly Hills and Kingsgrove. A proposal has been put forward by APA to repurpose the MSE pipeline for the transportation of natural gas, replacing its current use for ethane.

This report is a hazard analysis to determine the potential population intensification in land adjacent to the MSE pipeline that can be accommodated while satisfying the NSW Department of Planning, Housing and Infrastructure's risk criteria as described in Hazardous Industry Planning Advisory Paper No. 10 - Land Use Safety Planning (HIPAP No. 10).

Based on a comprehensive review of pipeline safety literature, a set of failure scenarios were selected for the pipeline, varying from a small hole of 10-25mm in diameter to a full-bore rupture (FBR). Potential consequences of pipeline failure are jet-fires, flash fires, and explosions, all of which have potentially fatal outcomes.

Based on generic failure rates for natural gas and other various gas pipelines in the literature, the failure rate data published by the UK Health and Safety Executive (HSE) was adopted for the study. Furthermore, based on a review relevant ignition data, the Acton & Baldwin correlation for natural gas transmission pipelines was used to estimate ignition probabilities.

DNV's Safeti 9.0 software package was used to conduct the consequence and risk modelling, and the 'long pipeline' model was selected to simulate the discharge scenarios. The resulting risk values were compared with the risk criteria in HIPAP No. 10 [1].

A societal risk area map was developed to illustrate the existing societal risk. Based on current population data and corresponding fatality estimates, the maximum permissible uniform population density across the entire GRC was determined, ensuring compliance with societal risk criteria.

Findings and Conclusions

The following findings were made from the risk analysis and assessment:

- The Location Specific Individual Risk (LSIR) of fatality risk is below the relevant NSW DPHI risk criteria.
- There is no impediment to sensitive, residential, commercial, active open space, or industrial development on the basis of LSIR. Such developments, however, are still subject to the limitation of population to ensure societal risk (SR) criteria is satisfied.
- The injury, property damage and accident propagation risks are below the relevant NSW DPHI risk criteria.
- The current maximum societal risk is within the Negligible zone of the DHPI societal risk criteria presented in HIPAP 6 and HIPAP 10.
- Based on the societal risk area map provided, any location within 200 m of the pipeline can be considered for population intensification.
- The maximum uniform population density that can be accommodated without exceeding any societal risk criteria is 135,000 persons/km^2.

Recommendations

The following recommendations are made for the consideration of Georges River Council (GRC):

Recommendation 1 – Sensitive Use Development

Consider restricting sensitive use developments on properties within the measurement length of 200 m from the pipeline.

Sensitive use developments are those for use by sectors of the community who may be unable to protect themselves from the consequences of a pipeline failure event, and include the following land uses as per Standard Instrument—Principal Local Environmental Plan (2006 EPI 155a) - NSW Legislation:

- *School*
- *Hospital*
- *Seniors housing*
- *Respite day care centre*
- *Early education and care facility*
- *Correctional centre*

Although the DPHI's individual risk criterion for sensitive use development (0.5×10^{-6} fatalities per annum) was not exceeded, this recommendation is based upon the first of the qualitative criteria in HIPAP 10, "All 'avoidable' risks should be avoided". Placing vulnerable individuals in close proximity to the pipeline could be avoided and warrant precautionary land use controls.

Recommendation 2 – Population Intensification

Limit the future population density within the measurement length of 200 m from the pipeline to an average density of 65,000 persons/km², with the peak density not exceeding 135,000 persons/km², to ensure compliance with societal risk criteria.

For example, in a development that includes an apartment complex and a large garden area, the density within the complex itself may reach up to 135,000 persons/km², while the average density across the entire development including the garden area should be below 65,000 persons/km².

Recommendation 3 – Consultation with Pipeline Operator

Following any changes to land zoning, participate in required land use change safety management studies in consultation with APA.

Recommendation 4 – Future Developments Meeting Societal Risk Criteria

Allow development applications with population densities less than those specified in Recommendation 2 to rely upon this report as evidence that the proposal complies with Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning (refer Planning Circular PS 24-005).

Recommendation 5 – Future Developments where Societal Risk is Unknown

*Should a development exceed the population density limits specified in Recommendation 2, the basis of recommendation 4 will be undermined, and **all** future developments within 200 m of both the pipeline and the development exceeding the limit will need to independently demonstrate compliance with the risk criteria in HIPAP 4 and 10.*

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Notation

Abbreviation	Description
ALARP	As Low as Reasonably Possible
Arriscar	Arriscar Pty Limited
ALARP	As Low As Reasonably Practicable
BoM	Bureau of Meteorology
GRC / Council	Georges River Council
HIPAP	Hazardous Industry Planning Advisory Paper
LGA	Local Government Area
LSIR	Location Specific Individual Risk
LUP	Land Use Planning
MSE Pipeline	Moomba to Sydney Ethane Pipeline
NSW	New South Wales
NSW DPHI	NSW Department of Planning, Housing and Infrastructure
SR	Societal Risk
Sensitive use	Land use term referred to in NSW DPHI document Hazardous Industry Advisory Papers, generally taken to mean Sensitive use developments are those for use by sectors of the community who may be unable to protect themselves from the consequences of a pipeline failure event, and include the following land uses as per Standard Instrument—Principal Local Environmental Plan (2006 EPI 155a) – NSW Legislation: • School • Hospital • Seniors housing • Respite day care centre • Early education and care facility • Correctional centre
TNO	Netherlands Organisation for Applied Scientific Research

1 INTRODUCTION

1.1 Background

The Moomba to Sydney Ethane (MSE) Pipeline owned and operated by the APA Group runs through the northern portion of the Georges River Local Government Area (LGA) in New South Wales (NSW). The MSE pipeline runs parallel to the T8 (Airport & South) train line through the suburbs of Riverwood, Narwee, Beverly Hills and Kingsgrove.

A proposal has been put forward by APA to repurpose the MSE pipeline for the transportation of natural gas, replacing its current use for ethane. Georges River Council (GRC/Council) has requested Arriscar Pty Limited (Arriscar) to revise the hazard analysis [1] which was conducted for the LGA due to the proposed repurposing of the pipeline.

1.2 Scope

The Land Use Safety Study requirements that need to be considered for the remainder of the MSE Pipeline in the northern portion of the LGA are as follows:

1) a report on the consultation outcomes with the operator (APA Group) of high-pressure dangerous goods or gas pipelines in the vicinity of the proposal with regards to Australian Standard (AS 2885) Pipelines – Gas and liquid petroleum;
2) a hazard analysis undertaken in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Hazard Analysis (HIPAP No.6) developed by the NSW Department of Planning, Housing and Infrastructure (DPHI). The hazard analysis and risk assessment must:
    a) assess the risk exposures from the existing high pressure dangerous goods or gas pipelines to determine the maximum acceptable future proposed population;
    b) assess the cumulative societal risk impact considering the existing population within the area that may be affected by the high pressure pipelines;
    c) consider the risk of escalation if the high-pressure dangerous goods or gas pipeline is sharing an easement with other dangerous goods and gas pipelines; and
    d) assess against the relevant qualitative and quantitative risk criteria detailed in Hazardous Industry Planning Advisory Paper No. 10 - Land Use Safety Planning (HIPAP No. 10) developed by the NSW DPHI; and
3) present a set of recommendations providing a range in the maximum future proposed additional dwellings the area can accommodate utilising various mitigation measures without exceeding the maximum acceptable potential risk impacts.

The geographic scope of the study included the MSE from a point at which consequences of a failure could impact the western most part of GRC, through to a point where the consequence of failure could impact the eastern most parts of GRC. Within this segment of pipeline, the MSE crosses into Canterbury-Bankstown Council (CBC). Pipeline segments within CBC were also considered.

1.3 Objectives of Study

The objectives of this study are to:

- Identify and assess the hazards and risks associated with the MSE pipeline with respect to the risk criteria outlined in HIPAP No. 10 [2];
- Identify graphically on a map, the maximum future proposed additional dwellings the area can accommodate without exceeding the NSW DPHI's risk criteria; and
- Make recommendations for mitigation measures that may be required to reduce the risk on the population due to future development.

2 RISK ASSESSMENT METHODOLOGY

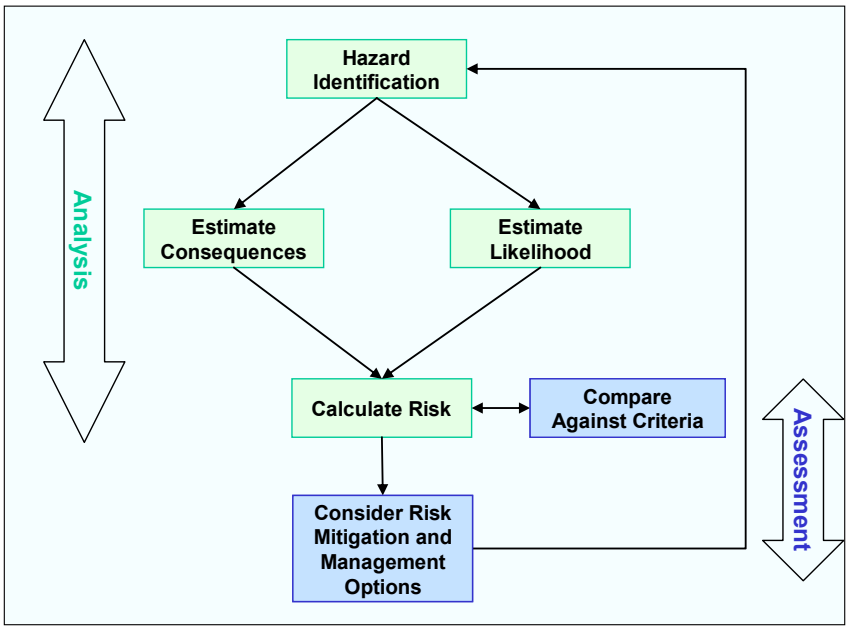
2.1 Introduction

A Quantitative Risk Assessment (QRA) involves the quantitative estimation of the consequences and likelihood of hazardous events to determine the risks generated by a facility. The risks of the facility are evaluated against risk criteria outlined regarding fatalities, injuries, and property damage, etc.

In developing the estimates for use in a QRA, it is important to ensure that any estimates fall on the side of conservatism, particularly where there is uncertainty in the underlying data and assumptions. This precautionary approach uses 'cautious best estimate' values, which, whilst conservative, are still realistic. This approach is consistent with the NSW DPHI's guidelines for undertaking this type of assessment [3].

Diagrammatically, the QRA process is as follows:

Figure 1 Overview of QRA Process [3]



2.2 Overview of Methodology

The methodology for a QRA involves the following main steps:

1. System definition, in which information on the facility is collected and assimilated.
2. Hazard identification, in which site events and external events are identified which may lead to potential adverse effects beyond the boundary of the site.
3. Consequence modelling, in which all the possible consequences of each event are estimated.
4. Frequency and likelihood estimation, in which the frequency (i.e. likelihood per year of occurrence) of each hazardous event is estimated, based on historical failure data.
5. Risk estimation, in which the frequencies and consequences of each event are combined to determine levels of risk.
6. Risk assessment, in which the calculated risks are assessed against relevant risk criteria.

2.3 Description of Facilities, Operation and Surroundings

The location of the proposed or existing facility and the surrounding areas are described to enable an appropriate consideration of the potential impacts.

2.4 Hazard Identification

A hazard is something with the potential to cause harm (e.g. thermal radiation from a fire, physical impact from a moving vehicle or dropped object, or exposure to stored energy etc.). The basis for any risk study is the identification of hazards present within a facility. Hazard identification (or HAZID) is crucial, as a hazard that is not identified will not be modelled and assessed.

There is no single definitive method for HAZID; however, it should be comprehensive and systematic to ensure critical hazards are not excluded from further analysis. A desktop review of layout drawings, engineering documentation and a literature review provide useful inputs. Examples of hazard identification techniques include simple checklists based on historical incidents and earlier analyses, more detailed “what-if” style analyses and the most detailed structured techniques such as a Hazard and Operability (HAZOP) study and Failure Modes and Effects Criticality Analysis (FMECA).

As well as identifying the hazards that exist, it is also important to identify how these hazards could lead to a hazardous scenario/event. A hazardous scenario is an event with the potential to cause off-site fatality or injury; off-site property damage; or long-term damage to the biophysical environment (i.e. any outcome for which an acceptable risk criterion has been defined by the NSW DPHI– refer to Section 2.9).

As there is usually a large number of possible initiating events leading to a hazardous scenario, it would be impractical to analyse all possibilities. Therefore, discrete initiating events are used to represent the range of possible hazardous scenarios that could occur. Generally, hazardous scenarios are represented by a limited number of leaks / hole sizes varying from small pin hole leaks to catastrophic ruptures.

When developing hazardous scenarios, the facility is first split into isolatable sections. An isolatable section is a system of equipment and/or pipelines that contain similar materials under similar

process conditions such as pressure and temperature. Preferably an isolatable section should be bounded by isolation points such as emergency shutdown valves (ESDVs) or motorised 'fail close' valves but this may not be possible for all cases.

It is necessary to capture the following information, either during the hazard identification process, or as part of the preparation for hazard consequence modelling:

- Hazardous materials and materials properties;
- Inventory of hazardous materials that could contribute to the event;
- How the material is released (e.g. hole in a pipeline);
- The condition of the material prior to release (e.g. compressed gas at a specific temperature and pressure);
- The area/s into which the material is released (e.g. inside an enclosed area, etc.);
- Ambient conditions in the area where the material is released (e.g. air temperature, wind speed and direction, atmospheric stability);
- Locations of ignition sources around the release point; and
- Duration of release before it is isolated.

2.5 Consequence Analysis

The physical consequences of a hazardous scenario are generally dependent on the:

- State of the material (liquid or gas/vapour);
- Quantity released;
- Rate of release; and
- Ignition (for fire and explosion events).

The quantity released depends on the inventory, which is estimated from the isolatable sections, size of release (viz. assumed equivalent hole diameter) and duration of release (how soon can the release be detected and isolated).

The different types of consequences typically considered for a QRA are described below.

2.5.1 Discharge

The discharge from a hole is assumed to be from a circular orifice of equivalent diameter. This is the maximum flow rate for a given hole area and is used because it can be calculated readily and will produce the maximum release rate for a given hole area. The discharge behaviour is estimated from process conditions such as the pressure, temperature, and the state of the material (liquid or vapour).

The discharge from a pipeline leak is dependent on the pressure and also location along the pipeline. Releases from the pipeline were modelled using the 'long pipeline' model in SAFETI 9.0. The long pipeline discharge model involves time-varying modelling, which models the change in storage conditions to determine the release rate at different timesteps and locations.

The average release rate over the first 30 seconds was selected to determine the effects of jet fires, flash fires (i.e. dispersion) and explosions.

However, small holes with a relative breach aperture (i.e. the area of the hole as a fraction of the total potential outflow area for the breach location) less than 0.04 were modelled utilising the steady state 'Orifice' model, which maintains a constant 'peak' release rate until the inventory is depleted. This implies a constant pressure at the release point. This is due to the time-consuming nature of time-varying discharge calculations, and the change in release rate for small holes is not significant [4].

2.5.2 Dispersion

The dispersion rate of gas/vapour depends on meteorological conditions such as the wind speed, wind direction and atmospheric stability conditions. Location-specific meteorological data is required to perform a consequence analysis. The representative wind directions, wind speeds and wind stability classes are normally determined from annual average of weather data from the local weather station available through the Bureau of Meteorology (BoM).

The gas dispersions were modelled using the Unified Dispersion Model (UDM) in SAFETI 9.0. The flammable gas dispersions were modelled to the Lower Flammable Limit (LFL). Dispersion calculations are based on the total quantity released over one hour, assuming it is released at the average flowrate over the first 30 seconds.

2.5.3 Jet Fires

Jet fires are a potential consequence related to a hazardous scenario that continuously release flammable vapour or liquid with significant momentum. Ignition will produce a turbulent diffusion flame which emits heat radiation. The physical impacts of jet fires are modelled using the surface emissivity of the flame to produce contours of heat radiation levels. Fires impinging on adjacent equipment may cause structural failures and incident escalation.

Jet fires were modelled using the 'Cone' model of the single and two-phase Jet Fire (JFSH) model in SAFETI 9.0.

2.5.4 Pool Fires

Pool fires are a potential consequence related to a hazardous scenario that release flammable liquid onto the ground which may form an evaporating pool and/or accumulate in a bund/sump. Ignition will produce a turbulent diffusion flame that burns above the whole surface of the pool and emit heat radiation. The impacts of pool fires are modelled using the surface emissivity of the flame to produce contours of heat radiation levels. Fires impinging on adjacent equipment may cause structural failures and incident escalation.

Pool fires are not a credible consequence for the gas pipeline.

2.5.5 Flash Fires and Vapour Cloud Explosions

Volatile flammable liquid releases or flammable vapour/gas releases may form a cloud and disperse in the air. Ignition of the flammable gas-air mixture may result in a flash fire or vapour cloud explosion (VCE).

A flash fire is sudden, intense fire that lasts for a very short duration in which the flame propagation speed is less than the sonic velocity. The dominant effect in a flash fire is direct engulfment by flame within the combusting cloud. To estimate the magnitude of the flammable gas cloud, the furthest distance from the release location with a concentration equal or above the lower flammability limit (LFL) is estimated using a dispersion model.

It is possible for a VCE to occur instead of a flash fire if the cloud is within an area that is sufficiently congested due to buildings, vehicles, trees, or other obstacles. Flame acceleration increases due to the turbulence caused by the congested region and produces a blast wave. It is considered to be a deflagration if the flame speed is subsonic and a detonation if the flame speed is supersonic. These events are modelled to determine the overpressures generated by the explosion.

VCEs were modelled using the Multi-Energy (ME) model. An obstructed region was defined across the entire study area, characterised by a blast strength corresponding to TNO Multi-Energy curve number 4, a Volume Blockage Ratio (VBR) of 5%, and a height of 5 m.

2.5.6 Fireballs and BLEVE

A fireball is an intense spherical fire resulting from a sudden release of pressurized liquid or gas that is immediately ignited and emits heat radiation. Boiling Liquid Expanding Vapour Explosion (BLEVE) is an explosion caused by the sudden release of superheated liquid from a vessel in which its integrity has been compromised. The boiling liquid rapidly expands due to the pressure drop resulting in an explosion producing overpressures and heat radiation. BLEVEs involving flammable material will usually have an associated fireball.

Fireballs and BLEVE's were not considered in this study.

2.5.7 Toxic Effects

If a toxic, or an asphyxiant vapour/gas is released, then the potential may exist for injury or fatality if exposed (typically via inhalation). The dispersion of flammable or toxic gas/vapour is modelled to produce a concentration profile in three dimensions (downwind, crosswind and elevation). For releases that are constant over time, this can be represented by a set of contours of constant concentration (isopleths) on a plan drawing and/or summarised in a tabular format.

Toxic effects were not considered in this study.

2.6 Vulnerability Criteria

People and property are vulnerable to heat radiation from fires, overpressures from explosions, and toxicants. The vulnerability parameters (i.e. the probability of fatalities) used in the risk analysis are presented in Appendix A.

2.6.1 Heat Radiation

The potential for injury or property damage from a fire is determined by the intensity of the heat radiation emitted by the fire and the duration of exposure. Together, the combination of time and intensity is the thermal dose.

The effects of heat radiation summarised in Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning (HIPAP No. 4) developed by the NSW DPHI are presented in Table 1.

Table 1 Effects of Heat Radiation [5]

Heat Radiation (kW/m^2)	Effect/s
1.2	• Received from the sun at noon in summer.
2.1	• Minimum to cause pain after 1 minute.
4.7	• Will cause pain in 15-20 seconds and injury after 30 seconds exposure (at least second-degree burns will occur).
12.6	• 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.
23.0	• Likely fatality for extended exposure and chance of fatality for instantaneous exposure. • Spontaneous ignition of wood after long exposure. • Unprotected steel will reach thermal stress temperatures which can cause failure. • Pressure vessel needs to be relieved or failure would occur.
35.0	• Cellulosic material will pilot ignite within one minute's exposure. • Significant chance of fatality for people exposed instantaneously.

2.6.2 Explosion Overpressure

The potential for injury or property damage from an explosion is principally determined by the explosion overpressure. However, projectiles are also a possibility in an explosion. An overpressure wave is generated when the acceleration of the flame front is increased due to the turbulence produced by obstacles in the pathway of the combusting vapour cloud.

The impact of explosion overpressure on humans takes two forms and can lead to serious injury or even fatality:

- Direct exposure could lead to organ damage (e.g. ear drum rupture or lung rupture), and/or knock a person over/into a hard object (e.g. ground or a wall).
- The person could be hit by a projectile, caused by the explosion, or from the collapse of buildings.

The effects of explosion overpressure summarised in HIPAP No. 4 developed by the NSW DPHI are presented in Table 2.

Table 2 Effects of Explosion Overpressure [5]

Overpressure (kPa)	Effect/s
3.5	• 90% glass breakage. • No fatality and very low probability of injury.
7.0	• Damage to internal partitions and joinery but can be repaired. • Probability of injury is 10%. No fatality.
14.0	• House uninhabitable and badly cracked.
21.0	• Reinforced structures distort. • Storage tanks fail. • 20% chance of fatality to a person in a building.
35.0	• House uninhabitable. • Wagons and plants items overturned. • Threshold of eardrum damage. • 50% chance of fatality for a person in a building and 15% chance of fatality for a person in the open.
70.0	• Threshold of lung damage. • 100% chance of fatality for a person in a building or in the open. • Complete demolition of houses.

2.6.3 Toxic Exposure

As there are no uniform specific criteria to cover all toxic effects, the vulnerability criteria selection for toxic exposure requires a literature review of the available toxicity data.

2.7 Frequency and Likelihood Analysis

Once the consequences of the various hazardous scenarios have been estimated, it is necessary to estimate the likelihood of each scenario. In a QRA, the likelihood must be estimated in quantitative terms (i.e. occurrences per year). Exponential notation (e.g. 5.0 x 10^{-6} per year or 5E-06 per year) is normally used because the likelihood of a hazardous scenario is usually a low number (i.e. less than 1 chance in 1000 to 10000 per year).

The likelihood of each scenario is normally estimated from historical incident and failure frequency data for which a parts count of the failure items within an isolatable section may need to be conducted. Moreover, for fire and explosion scenarios ignition probabilities are taken into consideration when determining the likelihood. This is only possible because data on such incidents and failures has been collected by various organisations over several years. Various databases and reference documents are now available that provide this data.

When using historical data to forecast the likelihood of a future event, it is important to ensure any specific conditions that existed at the time of the historical event are considered. For very low frequency events (i.e. where historical occurrences are very rare), it might not be possible to estimate the likelihood values directly from the historical data and other techniques such as fault tree analysis may be required.

2.8 Risk Analysis and Assessment

Risk analysis and assessment are separate tasks although they are often undertaken together. Risk analysis involves combining the consequence and likelihood estimates for each scenario and then summing the results across all the hazardous scenarios to generate a complete picture of the risk. The risk assessment step involves comparing the risk results against risk criteria.

Location-specific risk contours are usually used to represent off-site risk for a QRA study. These iso-risk contours are superimposed on a plan view drawing of the site. Example risk levels that are typically shown as iso-risk contours include:

- 0.5 x 10^{-6} per year (5E-07 or 0.5 in a million per year);
- 1 x 10^{-6} per year (1E-06 or 1 in a million per year);
- 5 x 10^{-6} per year (5E-06 or 5 in a million per year);
- 10 x 10^{-6} per year (1E-05 or 10 in a million per year); and
- 50 x 10^{-6} per year (5E-05 or 0.1 in a million per year).

The iso-risk contours show the estimated frequency of an event causing a specified level of harm at a specified location, regardless of whether anyone is present at that location to suffer that harm. Thus, individual iso-risk contour maps are generated by calculating individual risk at every geographic location, assuming a person will be present and unprotected at the given location 100% of the time (i.e. peak individual risk with no allowance for escape or occupancy).

In some cases, this assessment may be a simple listing of each criterion together with a statement that the criterion is met. In other, more complex cases, the risk criteria may not be met, and additional risk mitigation controls may be required to reduce the risk.

2.9 Quantitative Risk Criteria

The risk criteria adopted for this assessment are the NSW DPHI risk criteria for development in the vicinity of potentially hazardous facilities outlined in HIPAP No. 4 and 10.

2.9.1 Location Specific Individual Fatality Risk Criteria

HIPAP No. 10 presents the following risk criteria for residential and sensitive land uses:

- *the half in a million per year individual fatality risk level is an appropriate criterion above which no intensification of sensitive use development should take place;*
- *the one in a million per year individual fatality risk level is an appropriate criterion above which no intensification of residential development should take place;*
- *residential intensification may be appropriate where mitigating measures can be implemented to reduce risk exposure to less than the one in a million per year individual fatality risk level, provided the pre-mitigation residual risk levels are below the 10 in a million per year individual fatality risk level; and*
- *no residential intensification should take place where pre-mitigation residual risk levels are in excess of the 10 in a million per year individual fatality risk level.*

The maximum acceptable Location Specific Individual Risk (LSIR) of Fatality for the development of various other land uses in the vicinity of potentially hazardous facilities are presented in Table 3. These are location specific risk criteria and assumes 100% occupancy and no escape.

Table 3 Location Specific Individual Fatality Risk Criteria

Development/Land Use Type	Maximum LSIR of Fatality (per year)
Commercial developments including retail centres, offices and entertainment centres	5E-06
Sporting complexes and active open space areas	1E-05
Industrial	5E-05

2.9.2 Societal Risk Criteria

It is possible that an incident at a hazardous facility may affect more than a single individual off-site, especially in the case of a full-bore rupture of a high-pressure gas pipeline where the potential exists for multiple fatalities. The societal risk concept evolved from the concept of 'risk aversion', i.e. society is prepared to tolerate incidents that cause single fatalities at a more frequent interval (e.g. motor vehicle accidents) than for incidents causing multiple fatalities (e.g. an aircraft accident).

Two parameters are required to define societal risk:

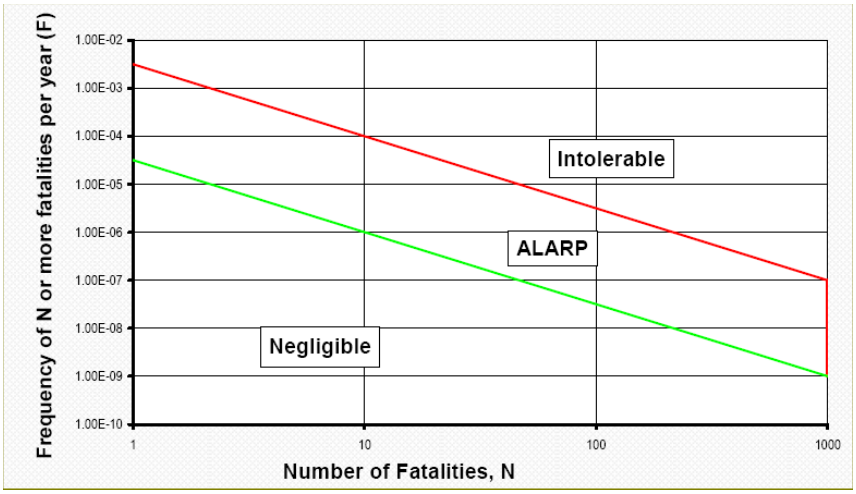
a) Number of fatalities that may result from an incident; and

b) the frequency (likelihood) of occurrence of the incident.

Societal risk is commonly represented using F-N curves, which plot the cumulative frequency (F) of accident scenarios against the number of fatalities (N). Each point on the plot indicates the frequency with which N or more fatalities are expected to occur.

The societal risk criteria incorporate an ALARP (As Low As Reasonably Possible) approach. This is reflected as three societal risk bands: Negligible, ALARP and Intolerable, as shown in Figure 2.

Figure 2 NSW DPHI Societal Risk Criteria (F-N Plot) [2]



HIPAP No. 10 [2] states the following,

- *Below the negligible line, provided other individual criteria are met, societal risk is not considered significant.*
- *Above the intolerable level, an activity is considered undesirable, even if individual risk criteria are met.*
- *Within the 'As Low As Reasonably Practicable' (ALARP) region, the emphasis is on reducing risks as far as possible towards the negligible line. Provided other quantitative and qualitative criteria of HIPAP No. 4 are met, the risks from the activity would be considered tolerable in the ALARP region.*

The F-N criterion in NSW imposes an absolute upper limit of N=1000 (i.e. an incident that could cause more than 1000 fatalities is not tolerable), regardless of how low the frequency is.

2.9.3 Injury Risk Criteria

Heat radiation of 4.7 kW/m^2 may cause pain in 20 seconds and injury after 30 seconds of exposure. The injury risk criterion for heat radiation is as follows:

- *Incident heat flux radiation at residential and sensitive use areas should not exceed 4.7 kW/m^2 at a frequency of more than 50 chances in a million per year.*

Explosion overpressure of 7 kPa has a probability of 10% to cause injury. The injury risk criterion for explosion overpressure is as follows:

- *Incident explosion overpressure at residential and sensitive use areas should not exceed 7 kPa at frequencies of more than 50 chances in a million per year.*

The injury risk criteria for toxic gas/ smoke/dust exposure are as follows:

- *Toxic concentrations in residential and sensitive use areas should not exceed a level which would be seriously injurious to sensitive members of the community following a relatively short period of exposure at a maximum frequency of 10 in a million per year.*

- *Toxic concentrations in residential and sensitive use areas should not cause irritation to eyes or throat, coughing or other acute physiological responses in sensitive members of the community over a maximum frequency of 50 in a million per year.*

2.9.4 Risk of Property Damage and Accident Propagation Criteria

Heat radiation of 23 kW/m^2 may cause unprotected steel to suffer thermal stress that may cause structural damage. The property damage risk criterion for heat radiation is as follows:

- *Incident heat flux radiation at neighbouring potentially hazardous installations or at land zoned to accommodate such installations should not exceed a risk of 50 in a million per year for the 23 kW/m^2 heat flux level.*

Explosion overpressure of 14 kPa may cause significant damage to buildings making it unhabitable. The property damage risk criterion for explosion overpressure is as follows:

- *Incident explosion overpressure at neighbouring potentially hazardous installations, at land zoned to accommodate such installations or at nearest public buildings should not exceed a risk of 50 in a million per year for the 14 kPa explosion overpressure level.*

2.10 Geographical Societal Risk

Individual fatality risk, injury risk, and property damage and accident propagation are generally illustrated using risk contours on a map, which are easily comprehended by land use planners and local authorities for Land Use Planning (LUP) purposes. However, the concept of societal risk is difficult to comprehend for LUP purposes as it is generally presented as a two-dimensional F-N plot (Refer to Figure 2).

The F-N plot does not provide any geographical insight concerning societal risk. Therefore, a method for the geographical representation of societal risk was developed by the Netherlands Organisation for Applied Scientific Research (TNO) [6]. Two kinds of societal risk maps were proposed by TNO:

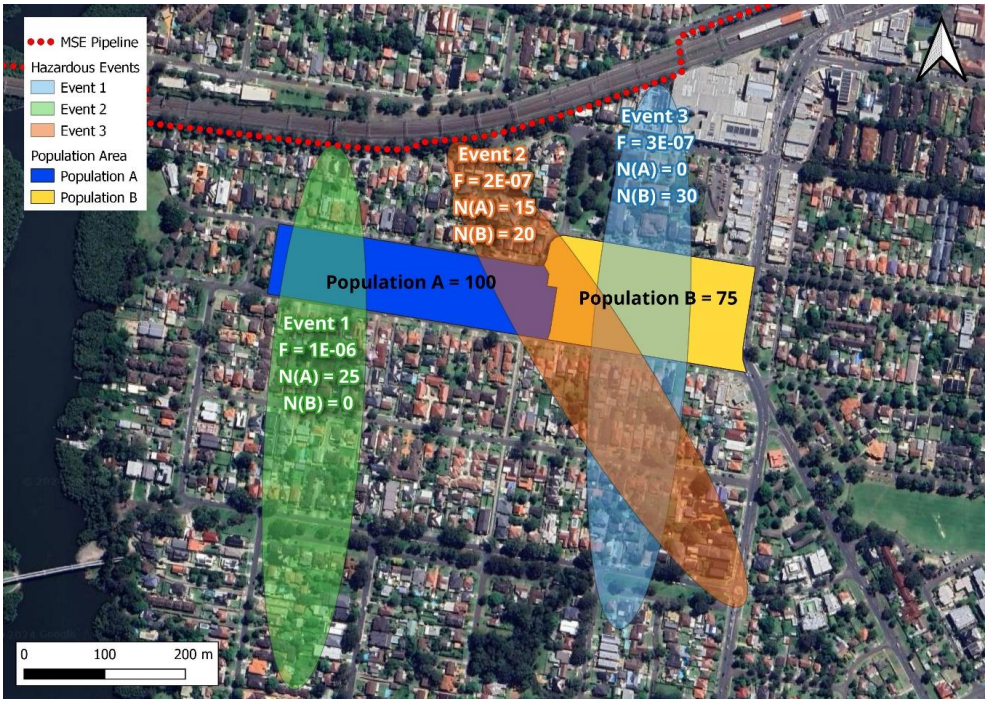
- Societal Risk Contribution Map; and
- Societal Risk Area Map.

2.10.1 Societal Risk Contribution Map

The societal risk contribution map depicts the relative contribution of a population area towards the total societal risk. It can be used to detect critical population areas with respect to societal risk, which is useful for emergency or evacuation planning, or simply understanding the reasons for a high societal risk. The societal risk contribution map uses the concept of “Expected Value” to determine the risk in each population area. However, the “Expected Value” is not suitable for evaluating the societal risk against the NSW DPHI criteria, as it only considers the population in each individual cell, and not the total population impacted by a specific event across all areas.

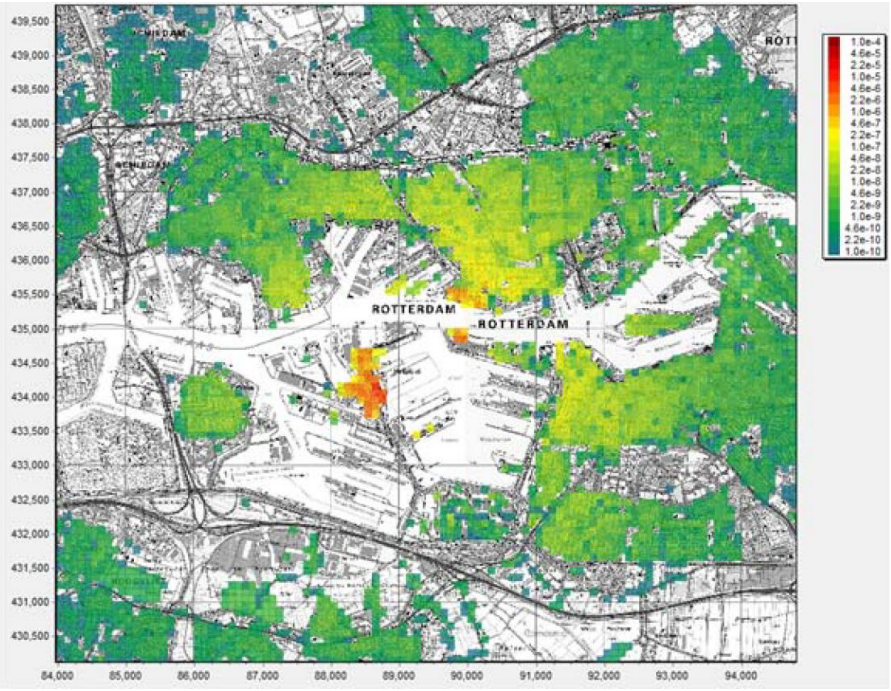
For example, considering the example shown in Figure 3, event 2 causes 15 fatalities in population A and 20 fatalities population B. The expected value for area A will only consider the 15 fatalities that occur in population A and disregard the 20 fatalities that occur in population B.

Figure 3 Example Outcomes for a Societal Risk Contribution Map



An example societal risk contribution map is shown in Figure 4.

Figure 4 Example Societal Risk Contribution Map [6]



The societal risk contribution map does not provide the required insight for LUP purposes as it does not consider the total societal risk. A large number of relatively low contribution areas (green areas in Figure 4) may still result in a very large affected group (e.g. toxic events with large effect areas) causing the total societal risk in those areas to be intolerable. Therefore, these results are not consistent and/or comparable with the societal risk criteria outlined in HIPAP No. 10 (Refer to Section 2.9.2).

In essence, the societal risk contribution map does not indicate the suitability of an area for population intensification or urban development. Therefore, to overcome this limitation, the concept of a societal risk area map was developed by TNO.

2.10.2 Societal Risk Area Map

The societal risk area map depicts the societal risk of a population area with respect to the societal risk criteria outlined in HIPAP No. 10 (Refer to Section 2.9.2). The concept of a "Norm Value" is used to represent this approach. It is quite useful for LUP purposes as it gives an indication of the areas where population intensification or urban development is suitable.

To generate a societal risk area map, the frequency of all hazardous events that affect a particular population area, and the corresponding number of fatalities across all population areas is used to produce a cumulative F-N curve for the population area under consideration, similar to the F-N curve used to describe the DPHI societal risk criteria.

Figure 5 shows three example outcomes (i.e. hazardous events that lead to fatalities) to illustrate this concept. The F-N curve for population area A consists of events 1 and 2, and the total fatalities over population areas A and B associated with each of those events. Similarly, the F-N curve for population area B consists of events 2 and 3 and their associated fatalities.

The process of developing the societal risk area map consists of:

1. Determine the frequency, f_i of each outcome *i* that could impact the population under consideration.
2. Determine the number of fatalities, N_i that occur as a result of outcome *i,* **including those that occur outside the area under consideration**
3. Sort each *f N* pair by decreasing *N*
4. Determine the cumulative frequency *F* for experiencing *N* or more fatalities, which is the equivalent of a F-N curve for the population area.

The F-N curve of each population area is translated into a "Norm Value" by identifying the tangent to the curve that is parallel to the societal risk criteria lines as illustrated in Figure 6.

Figure 5 Example Outcomes for Societal Risk Area Map

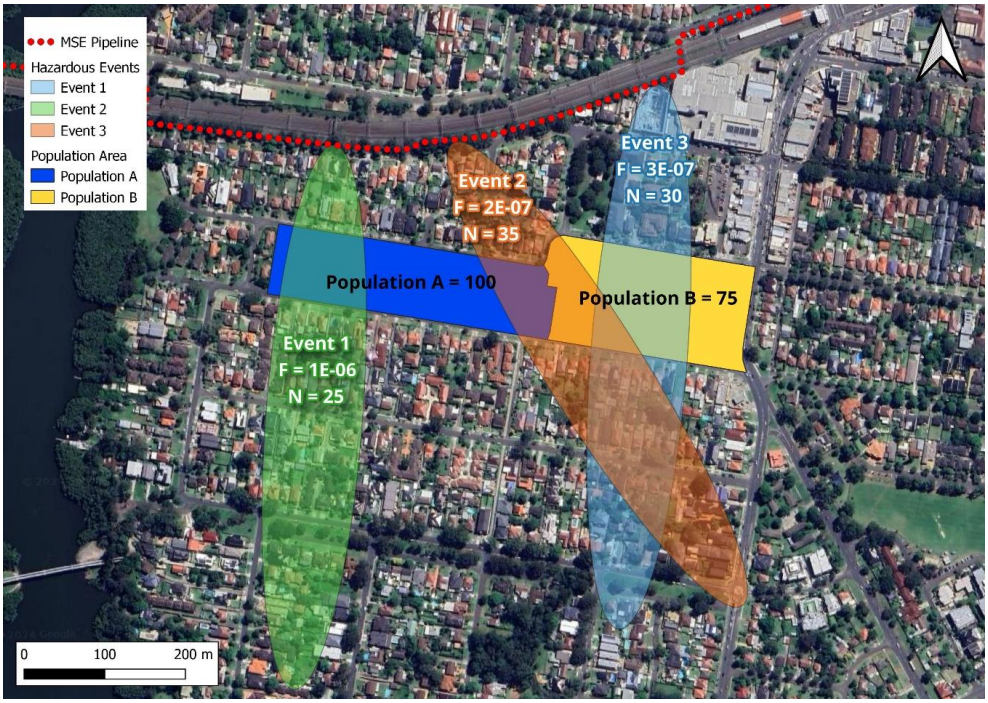
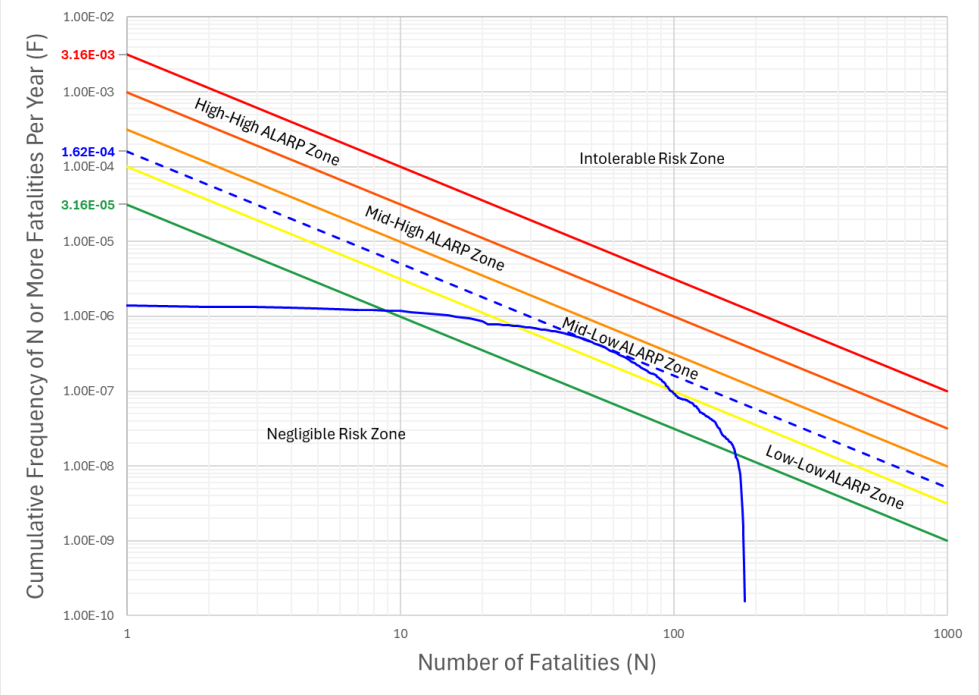


Figure 6 F-N Curve with Example Norm Values and Risk Criteria Zones



This tangent to the FN curve can be described using the following equation:

$$\text{Norm Value} = F \times N^{1.5},$$

Where the power 1.5 represents the slope of the risk criteria lines.

The norm values at the societal risk criteria lines are called the “Guide Values”. The guide values can be determined from any point along the risk criteria lines using respective F-N pairs. The norm value of the example F-N curve in Figure 6 and guide values are as follows,

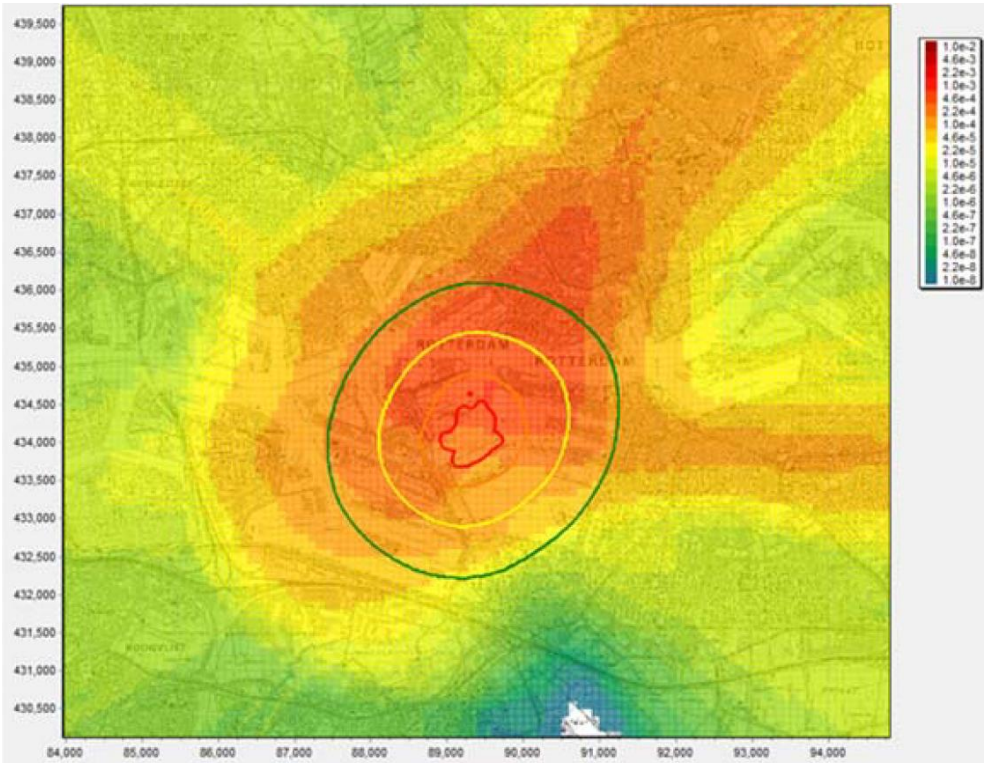
- Intolerable Guide Value = 3.16E-03
- Example Norm Value = 1.62E-04
- Negligible Guide Value = 3.16E-05

Utilizing the norm value of each population area, the relative position with respect to the guide values can be determined for each population area. In other words, the relative position of the total societal risk with respect to the societal risk criteria zones can be determined for each population area. This is presented in the societal risk area map utilizing the following colour scale:

- Red – Intolerable
- Dark Orange – High-High ALARP
- Orange – Mid-High ALARP
- Dark Yellow / Light Orange – Mid-Low ALARP
- Yellow – Low-Low ALARP
- Green – Negligible

The total societal risk in Figure 6 lies within the Mid-Low ALARP Zone, which will be illustrated using a dark yellow / light orange colour on the societal risk area map. An example societal risk area map is shown in Figure 7 (overlaid with LSIR contours).

Figure 7 Example Societal Risk Area Map [6]



Note that even the unpopulated areas (Refer to Figure 4) are now illustrated with a colour, clearly identifying the areas where population intensification or urban development is suitable. Green represents negligible risk zones, yellow and orange represent ALARP risk zones which imply that a reasonable population intensification is suitable in those areas. Provided that reasonable risk reduction measures are implemented to reduce the risk as far as possible and other quantitative and qualitative criteria are met. Red represents intolerable societal risk zones implying that population intensification is not allowed.

The contours in Figure 7 represent LSIR of fatality contours. These must be taken into consideration when identifying areas for population intensification. For example, even if the area map indicates that an area may be suitable for population intensification, population intensification is not allowed unless it satisfies the LSIR criteria.

2.11 Qualitative Risk Criteria

Irrespective of the numerical value of any risk criteria level for risk assessment purposes, it is essential that certain qualitative principles be adopted concerning the land use safety acceptability of development. Qualitative criteria are appropriate whether making zoning decisions, assessing the risk implications of a potentially hazardous development, or the locational safety suitability of a development in the vicinity of a potentially hazardous installation. HIPAP No. 10 states the following regarding qualitative risk criteria:

- *All 'avoidable' risks should be avoided.*
- *The risk from a major hazard should be reduced wherever practicable.*

- *The consequences (effects) of the more likely hazardous events (i.e. those of high probability of occurrence) should, wherever possible, be contained within the boundaries of the installation.*
- *Where there is an existing high risk from a hazardous installation, additional hazardous developments should not be allowed if they add significantly to that existing risk.*

2.12 Assumptions

It is necessary to make technical assumptions during a risk analysis. These assumptions typically relate to specific data inputs (e.g. material properties, equipment failure rates, etc.) and modelling assumptions (e.g. release orientations, vulnerability criteria, etc.).

To comply with the general principles outlined in Section 2.2 of HIPAP No. 6 [3], all steps taken in the risk analysis should be: "*traceable and the information gathered as part of the analysis should be well documented to permit an adequate technical review of the work to ensure reproducibility, understanding of the assumptions made and valid interpretation of the results*".

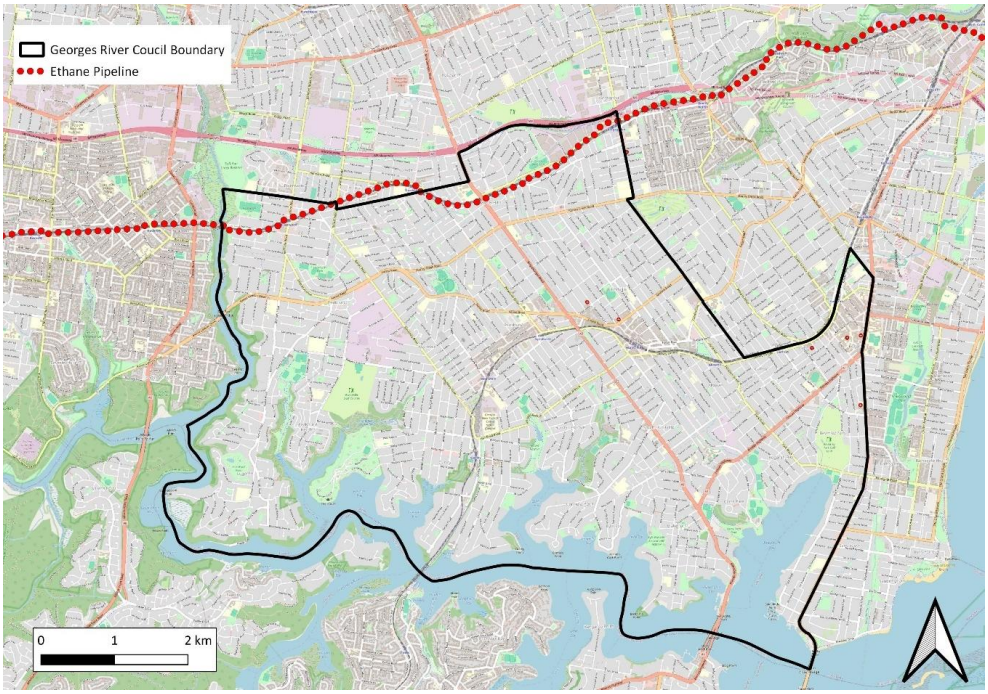
The key assumptions adopted for the QRA are listed in the Assumptions Register, Appendix A. Each assumption is numbered and detailed separately. The basis for each assumption is explained together with its potential impact on the results of the QRA and the hazardous scenarios potentially affected. Key references are also listed for each assumption, where relevant.

3 SITE DESCRIPTION

3.1 Site Location and Description

Georges River Council is a LGA located south-west of Sydney, New South Wales. The Council covers many suburbs within an area of approximately 38 km^2. The MSE pipeline runs through the northern portion of the Council parallel to the T8 (Airport & South) train line as shown in Figure 8.

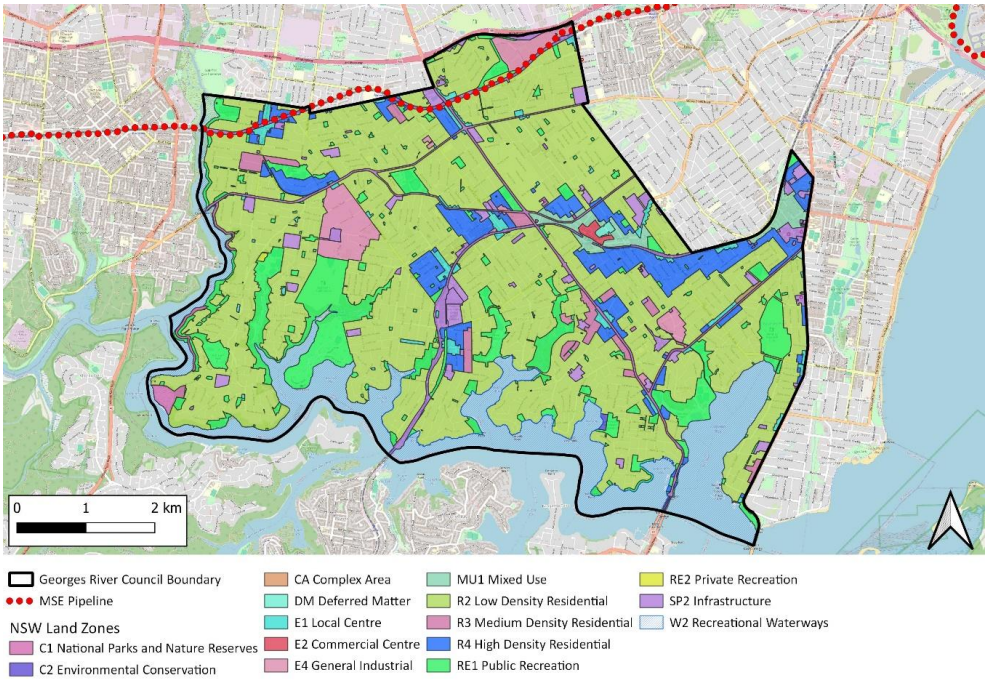
Figure 8 Site Location



3.2 Surrounding Land Uses

The LGA consists mainly of low, medium and high-density residential zones and public recreation zones with some commercial and industrial zones as shown in Figure 9.

Figure 9 Land Zones in Georges River LGA



3.3 Surrounding Population

During the preliminary consequence analysis, it was identified that the maximum consequence distance at which fatalities or injuries occur was less than 200 m. This implies that the population more than 200 m away from the pipeline are not at risk. Therefore, only the population within 200 m of the MSE pipeline were considered in this study. This aligns with the measurement length of the MSE pipeline which has been determined to be 200 m [7].

The population categories surrounding the MSE pipeline were identified to be residential, employment and school populations. The residential and employment populations adopted for this study are based on the 2021 Census of Population and Housing conducted by the ABS. The school populations (student and staff) are based on the data reported by the Australian Curriculum, Assessment and Reporting Authority (ACARA).

The residential population was extracted at the mesh block level, while the employment population was extracted at the destination zone level from the ABS as illustrated in Figure 10 and Figure 11. Mesh Blocks are the smallest geographic areas defined by the ABS which broadly identify land uses such as residential, commercial, industrial, education, parklands, transport, etc. Destination Zones are larger geographic areas containing whole mesh blocks. Co-developed with state and territory transport authorities for the analysis of Place of Work Census of Population and Housing data and commuting patterns.

Figure 10 Surrounding Mesh Blocks of Interest

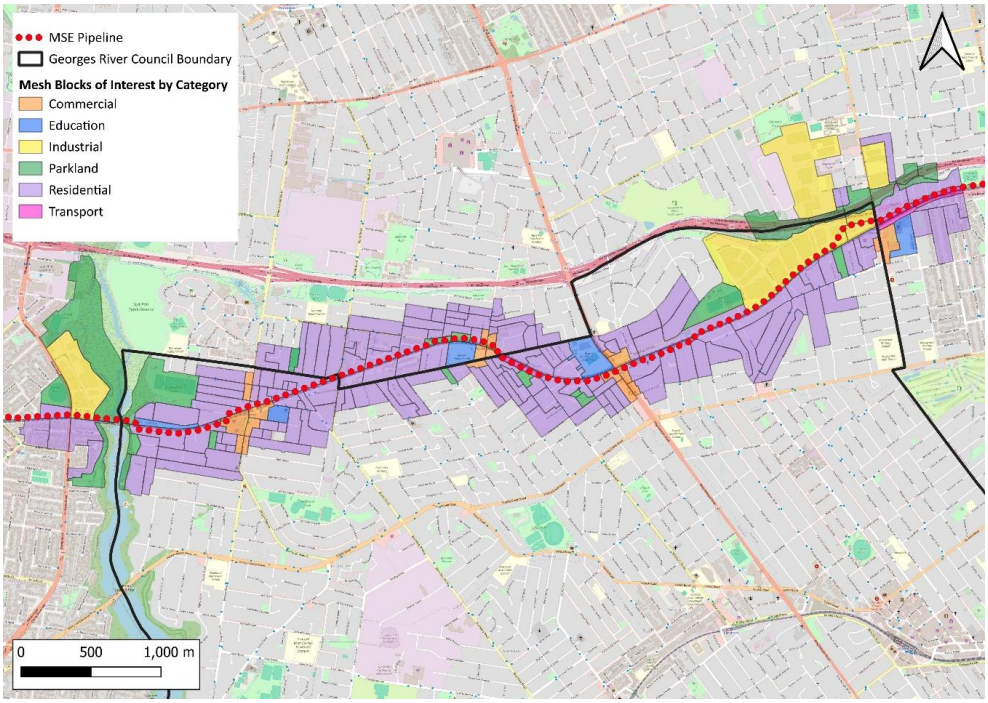
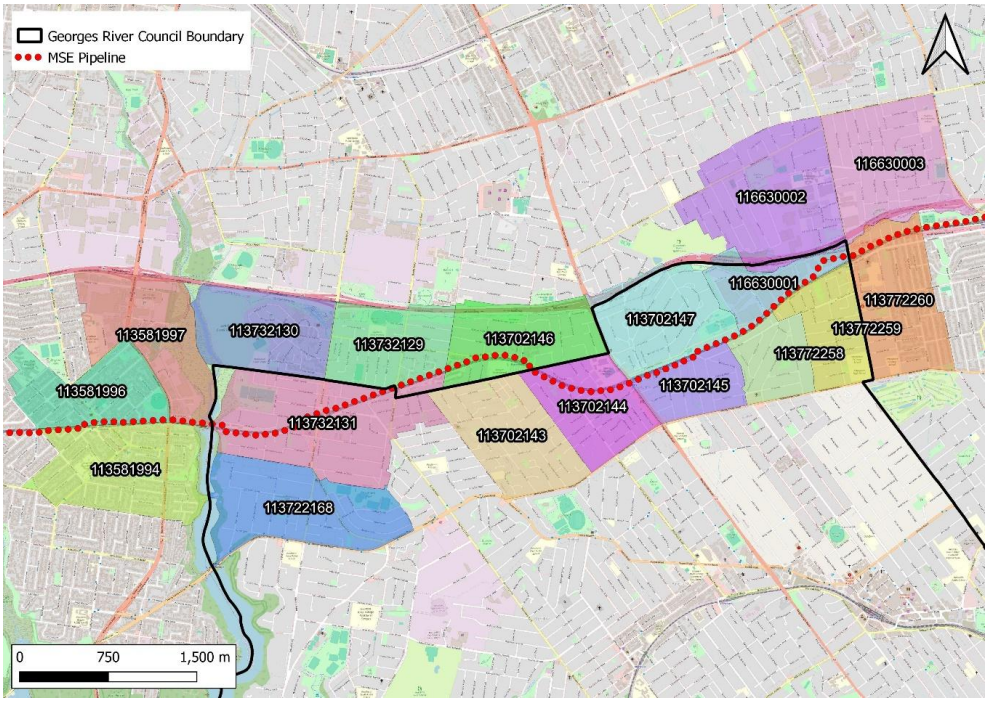


Figure 11 Surrounding Destination Zones of Interest



*The number in each destination zone represents the destination code assigned by the ABS.

Generally, these populations are carried forward to the risk analysis at their respective levels. However, for the objectives of this study, namely the geographical societal risk, a common level was required. A population analysis was conducted to distribute the employment population of a destination zone throughout appropriate mesh blocks based on the land use category. The populations were further adjusted based on the time and day as presented in Table 4. Thereafter, the mesh block populations were distributed into a 50 x 50 m grid (Refer to Appendix B).

Table 4 Population Categories Present at a Given Time and Day

Time and Day	Population Categories Present
All Night-Time (Weekdays and Weekends)	Residential
Weekday Daytime	Residential, Employment and School
Weekend Daytime	Residential and Employment

The population density maps for each time period considered are presented in Figure 12 to Figure 14. The average population density estimates within 200 m of the MSE pipeline for each time period are as follows:

- Night - 3,810 persons/km²
- Day - 2,940 persons/km²
- Weekend Day - 4,330 persons/km²

The average population density estimate within 200 m of the MSE pipeline is 3,690 persons/km².

Figure 12 Night Population Density Map

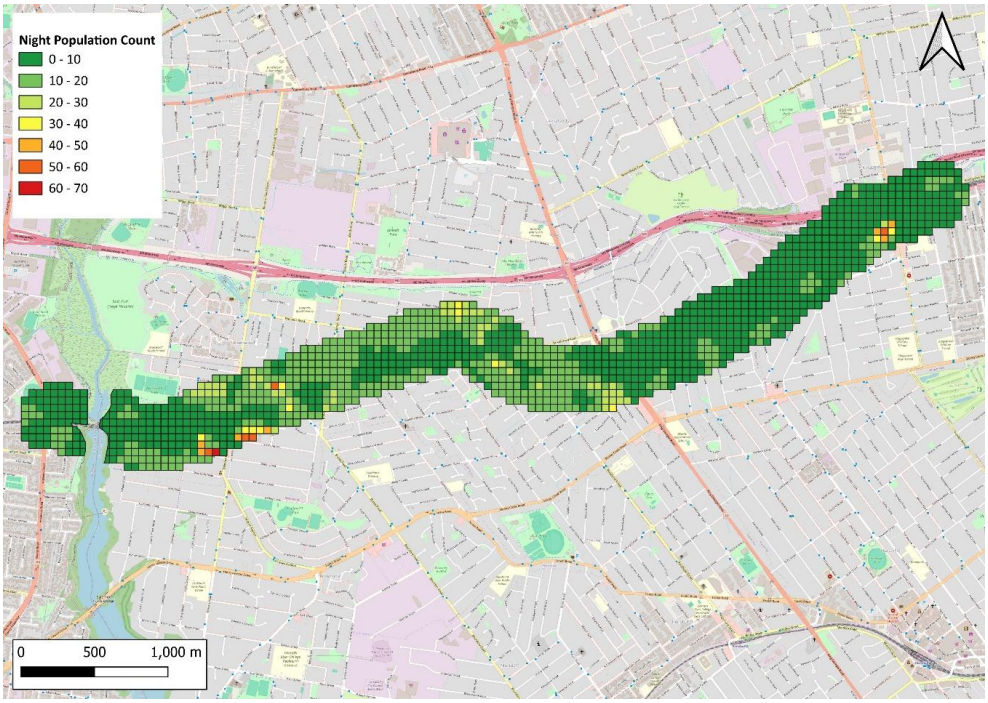


Figure 13 Day Population Density Map

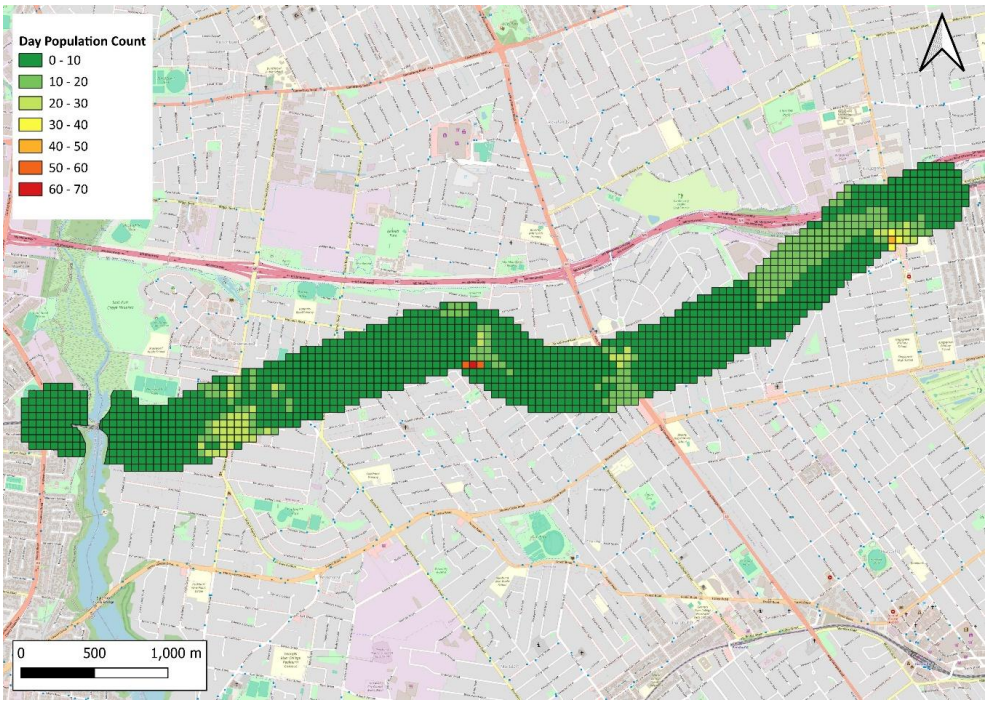
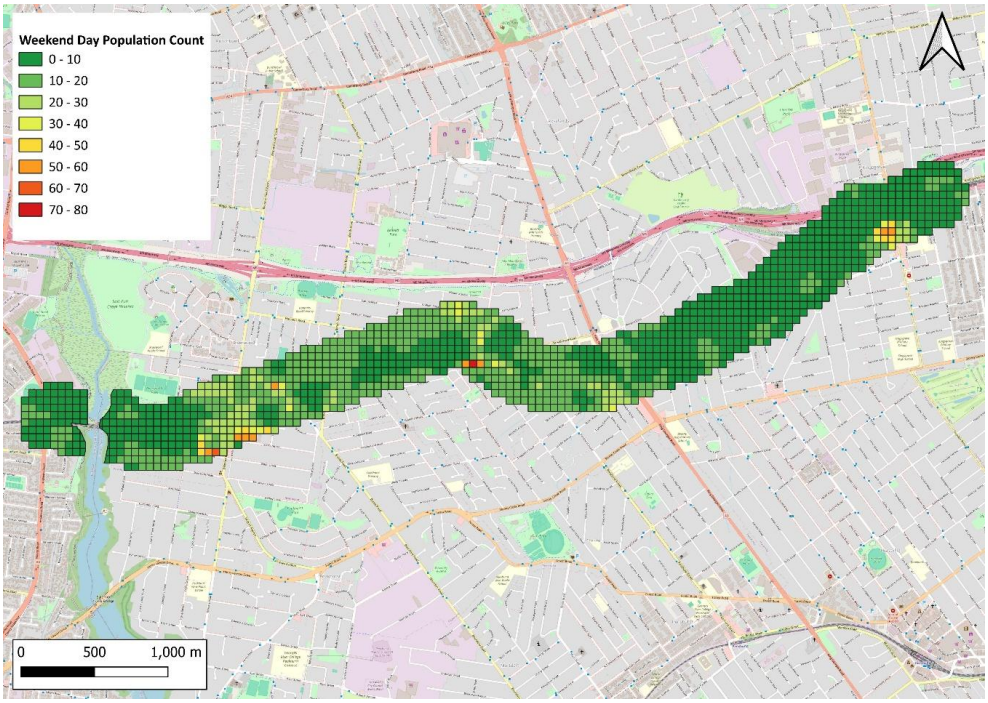


Figure 14 Weekend Day Population Density Map



3.4 Meteorology

The weather conditions such as windspeed, wind direction, stability class, temperature, solar radiation, and humidity are important in determining the extent of hazardous consequences. Meteorological data for the site is based upon 25 years of observations at the Bankstown Airport weather station (ID - 066137) operated by the Australian Bureau of Meteorology. This is the closest weather station to the LGA.

Pasquil's stability classification scheme defines six wind stability classes (A to F). Class A refers to more turbulent, unstable conditions and Class F refers to more stable (inversion) conditions. Although the probability distribution of the Pasquil stability classes is site-specific, it is generally observed that Class F conditions are more likely to occur during the night-time while Class D (neutral) conditions occur during the daytime (sunny conditions).

The weather categories and their distribution adopted for this study are presented in Table 5 - Table 8 below. Daytime weather is the period from one hour after sunrise to one hour before sunset and accounts for approximately 42% of the time, while night-time accounts for approximately 58% of the time.

Table 5 Weather Categories Used for Daytime Analysis

Weather Category	Windspeed (m/s)	Stability Class	Temperature (°C)	Relative Humidity	Solar Radiation (kW/m²)
1.9B	1.9	B	21.5	0.58	0.6
7.5D	7.5	D	21.8	0.53	0.5
4.1D	4.1	D	19.9	0.61	0.4
1.5D	1.5	D	17.0	0.76	0.3

Table 6 Weather Category Distribution for Daytime Analysis

Direction	1.9B	7.5D	4.1D	1.5D	Total
N	2.47%	0.55%	2.58%	0.76%	6.35%
NNE	1.20%	0.09%	1.08%	0.29%	2.65%
NE	1.13%	0.79%	2.01%	0.22%	4.16%
ENE	1.06%	1.98%	3.15%	0.21%	6.40%
E	1.41%	1.81%	3.82%	0.29%	7.33%
ESE	0.94%	2.89%	3.13%	0.24%	7.20%
SE	0.78%	3.81%	2.76%	0.28%	7.63%
SSE	0.62%	3.56%	2.23%	0.25%	6.67%
S	1.03%	2.74%	2.96%	0.59%	7.32%
SSW	0.81%	0.48%	1.40%	0.57%	3.27%
SW	1.06%	0.71%	2.74%	0.82%	5.33%
WSW	1.29%	1.53%	2.80%	0.89%	6.51%
W	2.28%	2.24%	3.25%	1.44%	9.21%
WNW	2.16%	1.47%	2.53%	1.48%	7.64%
NW	2.04%	0.64%	2.71%	1.37%	6.76%
NNW	1.97%	0.57%	2.20%	0.83%	5.57%
TOTAL	22.23%	25.87%	41.37%	10.53%	100.00%

Table 7 Weather Categories Used for Night-Time Analysis

Weather Category	Windspeed (m/s)	Stability Class	Temperature (°C)	Relative Humidity	Solar Radiation (kW/m²)
7.3D	7.3	D	17.5	0.65	0
4D	4	D	16.7	0.72	0
1D	1	D	13.9	0.89	0
2.6E	2.6	E	15.0	0.80	0
1F	1	F	13.4	0.89	0

Table 8 Weather Category Distribution for Night-Time Analysis

Direction	7.3D	4D	1D	2.6E	1F	Total
N	0.12%	1.61%	0.83%	0.52%	4.29%	7.36%
NNE	0.03%	0.81%	0.27%	0.31%	1.78%	3.20%
NE	0.13%	2.18%	0.24%	0.49%	2.27%	5.30%
ENE	0.05%	1.51%	0.21%	0.33%	2.21%	4.32%
E	0.08%	1.62%	0.24%	0.44%	2.45%	4.83%
ESE	0.26%	1.81%	0.20%	0.35%	1.78%	4.40%
SE	0.65%	2.08%	0.21%	0.33%	1.48%	4.75%
SSE	0.97%	2.03%	0.22%	0.26%	1.50%	4.98%
S	0.71%	2.72%	0.62%	0.56%	3.54%	8.14%
SSW	0.21%	1.37%	0.56%	0.46%	2.94%	5.55%
SW	0.21%	2.10%	0.73%	0.70%	3.93%	7.66%
WSW	0.38%	2.03%	0.72%	0.71%	4.22%	8.06%
W	0.61%	2.14%	0.86%	0.64%	5.59%	9.84%
WNW	0.32%	1.24%	0.63%	0.45%	3.66%	6.30%
NW	0.19%	1.32%	0.75%	0.50%	4.27%	7.03%
NNW	0.14%	1.75%	0.91%	0.60%	4.87%	8.28%
TOTAL	5.05%	28.33%	8.20%	7.65%	50.78%	100.00%

4 HAZARD IDENTIFICATION

4.1 Introduction

The hazard identification was based on a review of the:

- Information on the MSE pipeline provided by APA (Section 4.2);
- Properties of Natural Gas (Section 4.3);
- Pipeline failure modes (Section 4.4);
- Consequences of a Natural Gas release (Section 4.5); and
- Control measures (Section 4.6).

The representative hazardous scenarios carried forward to the consequence analysis are listed in Section 4.7.

4.2 MSE Pipeline

The MSE pipeline is owned and operated by the APA Group. Information obtained from APA about the MSE pipeline in this location is presented in Table 9.

Table 9 Data for the MSE Pipeline

Description	MSE Pipeline
Pipeline Owner	Gorodok Pty Ltd (part of APA Group)
Pipeline Name	Moomba to Sydney Ethane Pipeline
Product in Pipeline	Natural Gas (Repurposed)
Pipeline Licence (NSW)	New South Wales Licence No. 15
MAOP (Maximum Allowable Operating Pressure)	10,000 kPa
Operating Temperature	-5 °C to 65 °C
Energy Flowrate	Upto 45 TJ/day
Pipeline Material	KP1299 - KP1333: API 5L ERW X60 KP1333 - KP1375: API 5L ERW X52
Pipeline Diameter	219.1 mm (DN 200)
Pipeline Wall Thickness	11.9 mm in area of concern
Minimum depth of cover	1.8 m in area of concern
Critical defect length	332mm
Cathodic Protection	Impressed current cathodic protection applied.
External Coating on pipeline	HDPE (Yellowjacket) Joint coating is a 2-layer tape wrap system
Location of ALBVs from first ALBV upstream of HIA to first ALBV downstream of HIA	Upstream LV - Moorebank Ave KP1344 Downstream LV - Marsh Street KP1368
Pressure set points for ALBVs and approximate closure time.	4500kPa
Frequency of inspections and patrols undertaken	Ground Patrol Daily (Monday to Friday) Aerial Patrol Fortnightly

Description	MSE Pipeline
Control measures for third party activity near pipeline	11.9mm pipe wall thickness >1.2m depth of cover 25mm Concrete Coating of pipeline (Rockjacket) Either Top slabbing or top and side slabbing in all areas of concern apart from Rail Easements Marker Posts BYDA (formerly known as DBYD) Patrols Aerial patrol fortnightly. Daily ground patrol Liaison with councils, telecommunications companies, electricity companies
Pigging done for pipeline? If so, how often?	Metal loss intelligent pigging carried out on a risk basis program but is undertaken at 5 yearly presently.
Was intelligent pigging carried out to determine rate of loss of wall thickness?	Yes – no wall thickness loss has been found in this section of pipeline.
Location of nearest upstream pump / compressor station and pressure at this point.	Bulla Park
Are there non-return valves located in the pipeline downstream of and where?	Downstream NRV - Bexley Rd kp1363

4.3 Properties of Natural Gas

Natural gas is a colourless and odourless fuel gas at ambient conditions, primarily composed of methane (more than 95%). It is widely used in residential, commercial, and industrial applications, particularly for heating, power generation, and as a feedstock in chemical processing.

Due to its low molecular weight, natural gas is lighter than air and tends to disperse upward when released, which can reduce accumulation risks in open environments. It is highly flammable, forming explosive mixtures with air at concentrations between approximately 5% and 15% by volume. Although non-toxic, natural gas can displace oxygen in confined spaces, posing an asphyxiation hazard under certain conditions.

Natural gas is modelled as 100% Methane in this analysis. Physical properties of Methane are listed in Table 10.

Table 10 Physical Properties of Methane

Boiling Point (at 760 mmHg)	-162 °C
Flash Point	-188 °C
Autoignition Temperature	540 °C
Relative Density (Air =1)	0.55
Lower Flammability Limit (vol. %)	5%
Upper Flammability (vol. %)	15%

4.4 Pipeline Failure Modes

Pipelines may leak due to various causes. The four principal failure modes that may result in a leak from an underground pipeline include [8]:

- **Mechanical failures**, including material defects or design and construction faults;
- **Corrosion**, including both internal and external corrosion;
- **Ground movement and other failure modes**, including ground movement due to earthquakes, heavy rains/floods or operator error, and other natural hazards such as lightning, etc.; and
- **Third Party Activity (TPA)**, including damage from heavy plant and machinery, damage from drills/boring machines and hot tapping, etc.

The relative likelihood of each failure mode for underground pipelines in various data sources are shown in Appendix E.1.

4.4.1 Mechanical Failure

Leaks due to mechanical failures are usually caused by a construction fault, a material fault / defect or design of the pipeline.

This failure mode is credible for the MSE pipeline.

4.4.2 Corrosion

Leaks due to internal corrosion are generally a function of the material being transported, the wall thickness of the pipeline and the materials of construction.

Leaks due to external corrosion do not depend on the material being transported and are generally dependent on the soil type / conditions, pipeline coating and materials of construction, and the age of the pipeline.

This failure mode is credible for the MSE pipeline.

4.4.3 Ground Movement and Other Failure Modes

Pipeline leaks may occur due to ground movement (e.g. following a landslide or earthquake). The potential also exists for ground movement in the vicinity of water crossings (water erosion) or as a result of construction activities (new road infrastructure and buildings).

Other external events, such as lightning strikes, operational errors and erosion may also lead to a leak.

This failure mode is credible for the MSE pipeline.

4.4.4 Third Party Activity

Most leaks due to Third Party Activity (TPA) are caused by construction vehicles and equipment (drills, etc.) or by farm machinery in rural areas. The leak typically occurs immediately upon contact; however, it may be delayed (i.e. if the TPA only weakens the pipeline such that it fails at a later time). Leaks due to TPA include those caused by horizontal directional drilling (HDD), which is commonly used to install utilities and services (communication cables, etc.).

Leaks due to TPA are particularly relevant when considering development in the vicinity of existing pipelines due to the potential for significant construction activities (e.g. new road infrastructure and buildings).

This failure mode is credible for the MSE pipeline.

4.5 Consequences of a Natural Gas Release

As natural gas is flammable, ignition could result in the following which are described in Section 2.5:

- **Jet Fire** - The potential for fatality due to exposure to heat radiation from a jet fire (including direct exposure to the jet) has been included in this QRA.
- **Flash Fire** - The potential for fatality due to direct exposure to a flash fire has been included in this QRA.
- **Vapour Cloud Explosion (VCE)** - The potential for fatality due to exposure to explosion overpressures have been included in this QRA.

Other potential consequences that have been considered but were deemed unlikely to cause any adverse impact are described below.

4.5.1 Asphyxiation

Natural Gas is a simple asphyxiant with low toxicity to humans. If a release does not ignite, then the potential exists for the gas concentration to be high enough to present an asphyxiation hazard to individuals nearby.

An atmosphere with marginally less than 21% oxygen can be breathed without noticeable effects. However, at 19.5% (which is the Occupational Safety and Health Administration's (OSHA) lower limit for confined space entry in 29 CFR 1915.12 [9]) there is a rapid onset of impairment of mental activity.

An oxygen concentration of about 15% will result in impaired coordination, perception, and judgment. This may prevent a person from performing self-rescue from a confined space.

The potential for unconsciousness and fatality is only significant at less than 10% oxygen. However, to reduce the oxygen concentration to 10% requires a relatively high concentration (viz. approximately 52% v/v, which equates to 342,000 mg/m^3).

Oxygen deficiency from exposure to Natural Gas should not be a major issue because the fire hazards are usually the dominant effects in most locations (the LFL for Methane is approximately one-tenth, or 10%, of the fatal asphyxiant concentration). Therefore, the potential for fatality from asphyxiation was not carried forward to the consequence, likelihood and risk estimation steps of this QRA.

4.5.2 Toxic Smoke

Large quantities of smoke can be produced from hydrocarbon fires, especially flammable or combustible liquids such as gasoline (petrol) and diesel; however, this is rarely injurious for persons at ground level due to the buoyancy of the hot plume and its subsequent dispersion well above ground level. Methane is a relatively clean burning fuel and the potential for injury due to smoke exposure was not carried forward to the consequence, likelihood and risk estimation steps of this QRA.

4.6 Control Measures

Under the NSW Pipelines Act 1967 and Pipelines Regulation 2023, a pipeline operator must ensure the design, construction, operation, and maintenance of a licensed pipeline is in accordance with the relevant provisions of the series of Australian and New Zealand Standards AS(/NZS) 2885 for gas and liquid petroleum pipelines.

A licensee must implement a pipeline management system that relates to the pipeline operated under the licence and is in accordance with the relevant provisions of the AS(/NZS) 2885 series.

4.6.1 Prevention of Mechanical Failure and Corrosion

Operators of licensed pipelines under the NSW Pipelines Regulation 2023 are required to develop and implement systems and processes to ensure the pipeline structural integrity for the design life of the pipeline is in accordance with Section 6 of AS 2885.3:2022 [10] as part of the pipeline management system.

Continual monitoring is required while the pipeline is in operation to ensure that pipeline structural integrity is maintained, any anomalies or defects should be assessed and repaired. They shall not be operated above the maximum allowable operating pressure (MAOP).

Pipelines are generally inspected via pigging to observe any mechanical defects; and cathodic protection systems and external pipe coatings are implemented to minimise the likelihood of failure due to corrosion (Refer to Section 4.2 for details regarding the MSE pipeline).

4.6.2 Prevention of Damage due to Ground Movement and Other Failures

Normal loads (e.g. due to the internal and external pressure, weight of soil, traffic loads, etc.) and occasional loads (e.g. due to flood, earthquake, transient pressures in liquid lines and land movement due to other causes) are considered during design of a pipeline as per AS/NZS 2885.1:2018 [11].

To comply with AS/NZS 2885.1:2018 [11], additional depth of cover may also be required where the minimum depth of cover cannot be attained because of the action of nature (e.g. soil erosion, scour).

The depth of cover of pipeline in the area of concern is 1.8 m.

4.6.3 Prevention of Damage due to Third Party Activity

Operators of licensed pipelines under the NSW Pipelines Regulation 2023 are required to undertake a Safety Management Study (as per AS/NZS 2885.6:2018 [12]) to assess the risks associated with threats to the pipeline and to instigate appropriate measures to manage the identified threats.

Two key control measures are typically implemented by pipeline operators to minimise the likelihood of impact from TPA: the Before You Dig Australia (BYDA) process and daily / weekly patrols.

Statistical data indicates that the pipelines in NSW are 100% cathodically protected with effectiveness between 95 and 100%, and that over 96% of parties contacted DBYD before any excavation work [13].

The probability of leak on impact depends on the pipeline wall thickness. The depth of cover may also reduce the likelihood of impact.

4.6.4 Mitigation Control Measures

Operators of licensed pipelines under the NSW Pipelines Regulation 2023 are required to develop and implement an Emergency Response Plan (as per Section 11 of AS 2885.3:2022 [10]) as part of the pipeline management system.

The Emergency Response Plan should detail the response and recovery strategies and procedures to address all pipeline related emergency events, including: loss of containment; full-bore pipeline rupture; fires; and, natural events.

Leaks may be detected during visual inspections, incident notifications and/or by instrumented monitoring systems. If a leak is detected, then the HP pipelines can be isolated by closing automated and/or manual valves (Refer to Section 4.2 for locations of upstream and downstream isolation valves).

4.7 Hazardous Scenarios for Risk Analysis

The list of hazardous scenarios included in the risk analysis is provided in Table 11.

Table 11 List of Hazardous Scenarios

Hazardous Scenarios	Potential Consequences
Release of High-Pressure Natural Gas from MSE Pipeline	Jet Fire, Flash Fire, and/or Explosion

5 CONSEQUENCE ANALYSIS

The consequence analysis was conducted using DNV's Safeti version 9.0 software package at a height of interest of 1.5 m above ground level. The consequences of the hazardous scenarios identified were modelled to estimate the potential impacts with respect to heat radiation and overpressures. Toxic effects were not carried forward to the consequence analysis (Refer to Section 4.5.1). The consequence analysis results are presented in Appendix C.

5.1 Release of Natural Gas

5.1.1 Representative Hole Diameters

The representative hole diameters adopted for the consequence analysis are presented in Table 12. The hole diameters were selected based on a review of the available historical incident data presented in Appendix D. The selection was intended to align with the hole size categories of the leak frequency data adopted for this study (Refer to Section 6.1 and Appendix E.1). The hole size categories applicable for the MSE pipeline are as follows:

- Pinhole (≤ 25 mm);
- Small Hole (> 25 mm to ≤ 75 mm);
- Large Hole (> 75 mm to ≤ 110 mm); and
- Full-Bore Rupture (> 110 mm).

The conservative upper limit of the hole size categories was selected as the representative hole diameter for each category except for the Full-Bore Rupture (FBR) category. In the case of a FBR, flow can occur from both upstream and downstream towards the rupture. The total maximum flow area is therefore twice the cross-sectional area of the pipe. An equivalent hole diameter (D_E) for this scenario is $\sqrt{2} \times D$ as shown below:

$$Total\ Flow\ Area = 2 \times \frac{\pi D^2}{4} = 2 \times \frac{\pi \times 195.2^2}{4} = 59852.1\ mm^2$$

Where D is the internal diameter of the pipeline. Then,

$$\frac{\pi D_E^2}{4} = 59852.1\ mm^2$$

$$D_E = \sqrt{\frac{4 \times 59852.1}{\pi}} = 276.05\ mm$$

Leaks from underground pipelines in the pinhole size category tend to be larger for TPA incidents (i.e. typically c. 20 mm to 25 mm - Refer to Appendix D.1) than for the other failure modes (i.e. typically less than c. 10 mm). Therefore, two representative hole diameters were selected for the pinhole category: 25 mm for TPA only and 10 mm for all other failure modes.

Table 12 Representative Hole Diameters

Pipeline	Internal Diameter (mm)	Representative Hole Diameter (d)			
		Pinhole (≤ 25 mm)	Small Hole (25 mm < d ≤ 75 mm)	Large Hole (75 mm < d ≤ 110 mm)	FBR (> 110 mm)
MSE	195.2	10 / 25	75	110	276

5.1.2 Rate of Release

The rate of release from a pipeline leak is dependent on the pressure. A release of natural gas from the MSE pipeline was modelled at the MAOP. The average rate over the first 30 seconds was chosen as the representative release rate. The release rates for the representative hole diameters are shown in Table 13.

Table 13 Representative Release Rates

Hole Diameter (mm)	Release Rate (kg/s)
10	0.9
25	5.6
75	64.7
110	104
FBR	170

For hole sizes less than 75 mm (i.e. relative aperture ratio below of 0.04), the model maintains a constant pressure at the release point (i.e. steady state discharge model), which implies a constant release rate at the point of release.

5.1.3 Location and Direction Release

High pressure gas releases from an underground pipeline would create a crater on the ground. The direction of release from the crater is always vertical. This assumption is part of the modelling approach in Safeti and cannot be modified.

Three locations of failure were considered for all hole sizes except the FBR scenario:

- Top of the pipe (unobstructed release); or
- Middle of the pipe (on the side - obstructed release)
- Bottom of the pipe (obstructed releases)

The release frequencies were distributed between the three locations as follows:

- Top of the pipe – 63%
- Middle of the pipe – 18.5%
- Bottom of the pipe – 18.5%

5.1.4 Duration of Release

Any adverse impact due to the ignition of ethane will occur quickly; therefore, the duration of exposure is not as critical as it would be if there were a toxic material in the pipeline (i.e. where the adverse impact can significantly increase for longer exposure durations).

The isolation time and duration of release is not specified in the QRA as these will be significantly longer than the period of exposure required for an adverse effect to people and the time required for each representative release case to reach steady state.

6 FREQUENCY AND LIKELIHOOD ANALYSIS

6.1 Likelihood of Release

The likelihood of a release (i.e. leak) from the MSE pipeline was estimated based on a review of the following data sources (Refer to Appendix E.1):

- Department of Climate Change, Energy, the Environment and Water, New South Wales, Licensed Pipelines Performance Reports [14]. These reports includes data for all licensed pipelines in NSW covering a 5-year period;
- UK Health and Safety Executive (HSE), 2015, Update of Pipeline Failure Rates for Land Use Planning Assessments, Research Report (RR) 1035;
- British Standards Institute, 2013, Pipeline Systems – Part 3: Steel Pipelines on Land – Guide to the Application of Pipeline Risk Assessment to Proposed Developments in the Vicinity of Major Accident Hazard Pipelines Containing Flammables – Supplement to PD 8010-1:2004, PD 8010-3:2009+A1:2013;
- US Department of Transportation (DoT), Pipeline and Hazardous Materials Safety Administration (PHMSA), Accident Reports - Reported Data for Underground Natural Gas Steel Pipelines (January 2010 to December 2024) [15]; and
- Australia/New Zealand Pipeline Incident Database

The leak frequency data reported in RR1035 by the UK HSE was adopted for the QRA as it is most comparable to the NSW performance data and it includes the leak frequency for four hole size categories (pinhole, small hole, large hole and rupture), four failure mode categories (mechanical failure, corrosion, ground movement / other and third party activity), and in some cases for varying pipe diameters and / or wall thicknesses.

6.2 Likelihood of Representative Release Scenarios

The likelihood of each representative release scenario included in the risk analysis is presented in Table 14.

Table 14 Release Frequencies for Repurposed MSE Pipeline

Release Scenario	Release Frequency (per km per year)			Probability
	TPA	All Other Failure Modes	Total Release Frequency	
10mm (Top)		1.02E-04	1.02E-04	53.2%
10mm (Mid)		3.00E-05	3.00E-05	15.6%
10mm (Bottom)		3.00E-05	3.00E-05	15.6%
25mm (Top)	1.39E-05		1.39E-05	7.2%
25mm (Mid)	4.07E-06		4.07E-06	2.1%
25mm (Bottom)	4.07E-06		4.07E-06	2.1%
75mm (Top)	1.51E-06	1.59E-06	3.10E-06	1.6%
75mm (Mid)	4.44E-07	4.66E-07	9.10E-07	0.5%
75mm (Bottom)	4.44E-07	4.66E-07	9.10E-07	0.5%
110mm (Top)	6.30E-08	1.07E-07	1.70E-07	0.1%
110mm (Mid)	1.85E-08	3.15E-08	5.00E-08	0.0%
110mm (Bottom)	1.85E-08	3.15E-08	5.00E-08	0.0%
FBR	1.00E-07	2.52E-06	2.62E-06	1.4%

6.3 Probability of Ignition

A review of relevant ignition probability data and ignition probability correlations was conducted (Refer to Appendix E.2). The following were adopted for this study:

- The total ignition probability was based on the Acton & Baldwin correlation.
- The total ignition probability was split 50:50 between immediate ignition and delayed ignition.

The ignition probabilities calculated using the correlation are presented in Table 15.

Table 15 Ignition Probabilities

Pipeline Diameter (mm)	Operating Pressure (barg)	Equivalent Hole Diameter (mm)	pd^2	Total Ignition Probability	Probability of Immediate Ignition	Probability of Delayed Ignition
195.2	100	10	0.01	0.056	0.0278	0.0278
		25	0.06	0.056	0.0280	0.0280
		75	0.56	0.059	0.0297	0.0297
		110	1.21	0.064	0.0319	0.0319
		FBR	3.81	0.108	0.0539	0.0539

7 RISK ANALYSIS AND ASSESSMENT

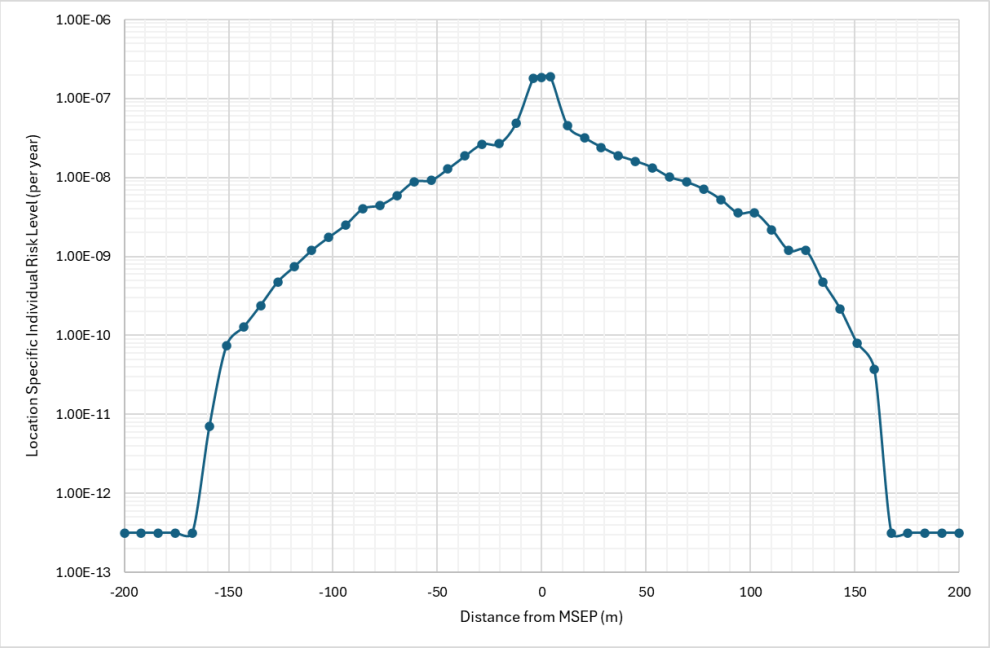
The risk analysis was conducted using DNV's Safeti version 9.0 software package. The results of the analysis are assessed with respect to the relevant criteria described in Section 2.9.

7.1 Location Specific Individual Fatality Risk

The location specific individual risk (LSIR) of fatality due to MSE pipeline was evaluated to be less than the NSW DPHI's lowest risk criteria threshold of 0.5 in a million per year (5E-07 per year) for sensitive land use development.

A risk transect extending 200 m in each direction perpendicular to the pipeline is shown in Figure 15. This figure illustrates the reduction in LSIR of fatality as the distance from the pipeline increases.

Figure 15 LSIR of Fatality Transect



7.2 Injury Risk

The injury risk due to heat radiation greater than 4.7 kW/m^2 and explosion overpressure greater than 7 kPa were evaluated to be less than the NSW DPHI's criterion of 50 in a million per year (5E-05 per year). Events with the potential to cause acute toxic injury or irritation were not identified for inclusion in the risk analysis (Refer to Section 4.5).

7.3 Risk of Property Damage and Accident Propagation

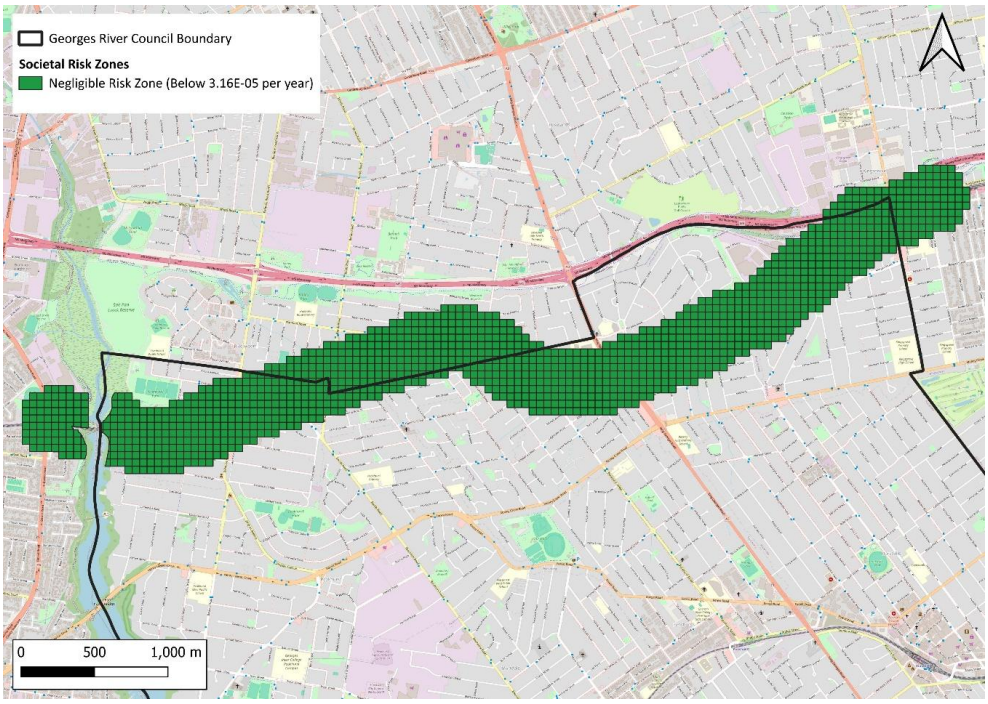
The property damage and accident propagation risk due to heat radiation greater than 23 kW/m^2 and explosion overpressure greater than 14 kPa were evaluated to be less than the NSW DPHI's criterion of 50 in million per year (5E-05 per year).

7.4 Geographical Societal Risk

7.4.1 Current Population

The societal risk area map of the Georges River LGA for the current population is presented Figure 16. The societal risk due to the MSE pipeline in natural gas service is in the Negligible Zone (Refer to Figure 6). Thus, implying that a reasonable population intensification can be achieved in any location within 200 m of the pipeline without exceeding the societal risk criteria.

Figure 16 Societal Risk Area Map of Georges River LGA for the Current Population



The maximum number of fatalities within each grid cell based on the current population is presented in Figure 17, and the FN curve based on the current population for the entire GRC study area is presened in Figure 18.

It should be noted that the measurement length is only 200 m, and this FN curve is based on the entire pipeline length through GRC. The frequency at which N or more fatalities occur is overestimated in this approach as individuals located beyond the measurement length from the release point would not be affected.

Figure 17 Maximum Number of Fatalities

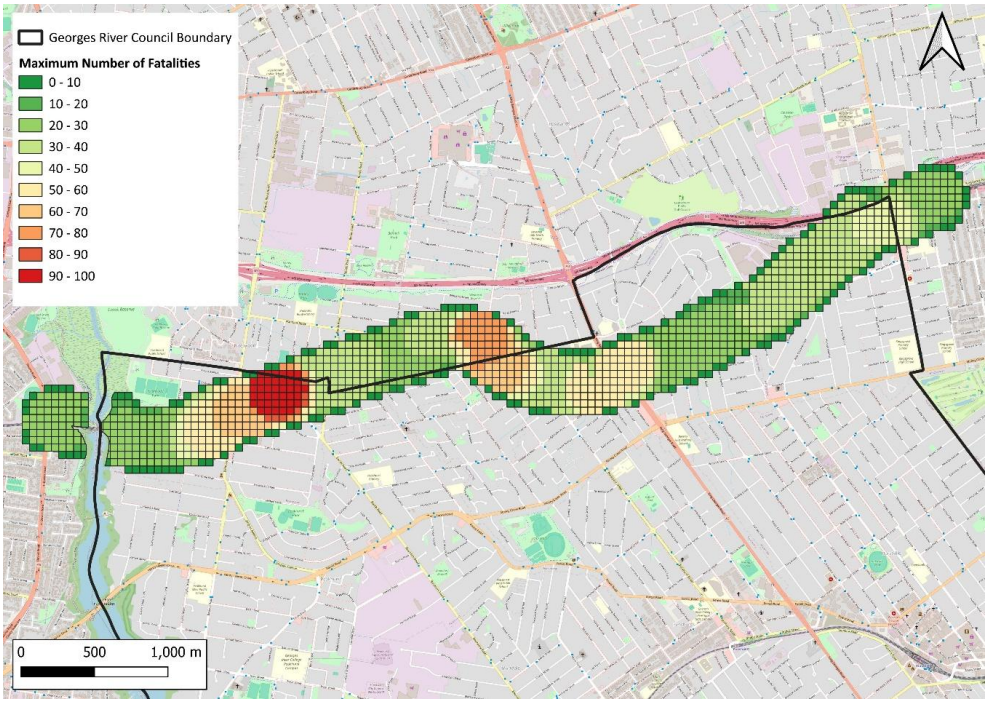
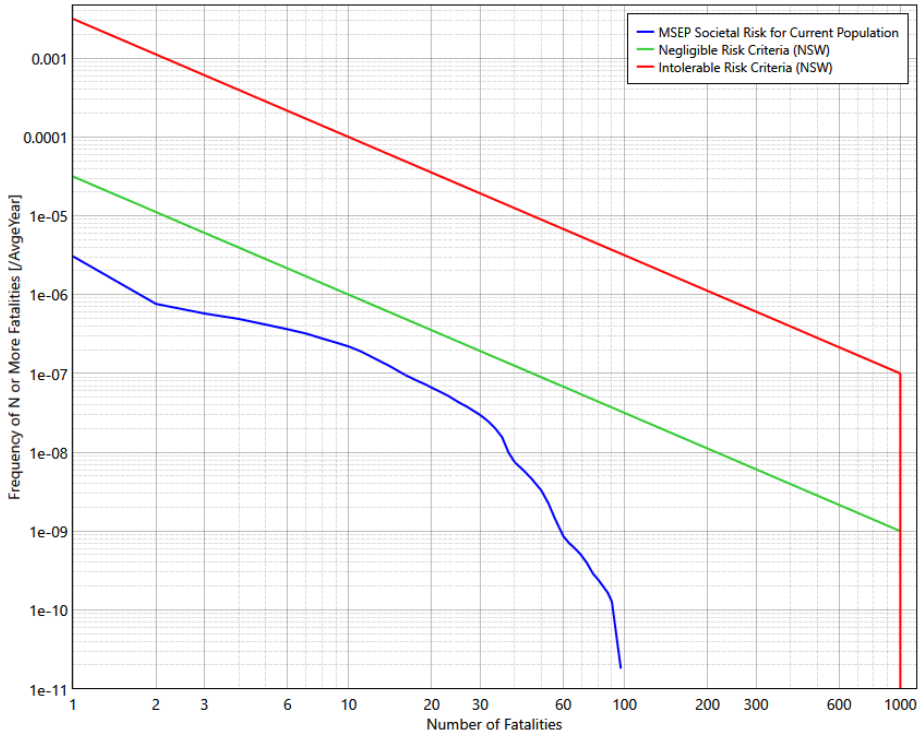


Figure 18 FN Curve for Entire Georges River Council

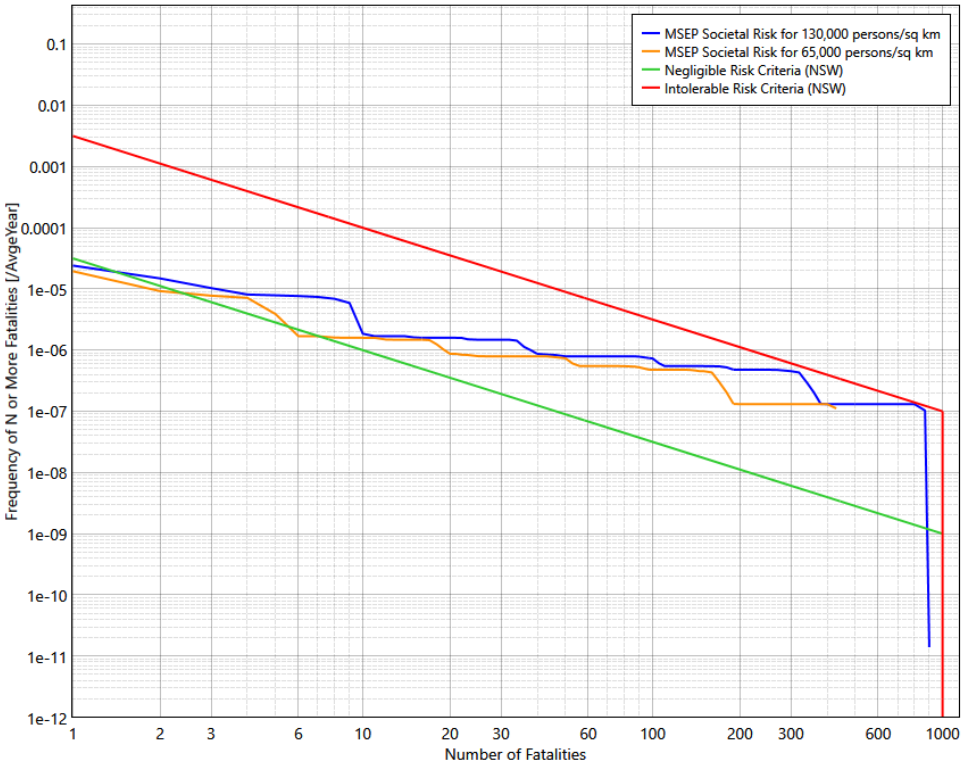


7.4.2 Population Intensification

An analysis was conducted to estimate the maximum permissible population density ensuring compliance with the societal risk criteria. This involved evaluating both the current population distribution and associated fatality data to arrive at a population density that could be uniformly applied across the entire GRC.

The maximum allowable population density was determined to be 130,000 persons persons/km². This value represents the upper limit beyond which societal risk criteria would be exceeded. Additionally, a more cautious density of 65,000 persons/km² (i.e. 50% of the maximum allowable density) was considered. The FN curves for both uniform population densities are presented in Figure 19.

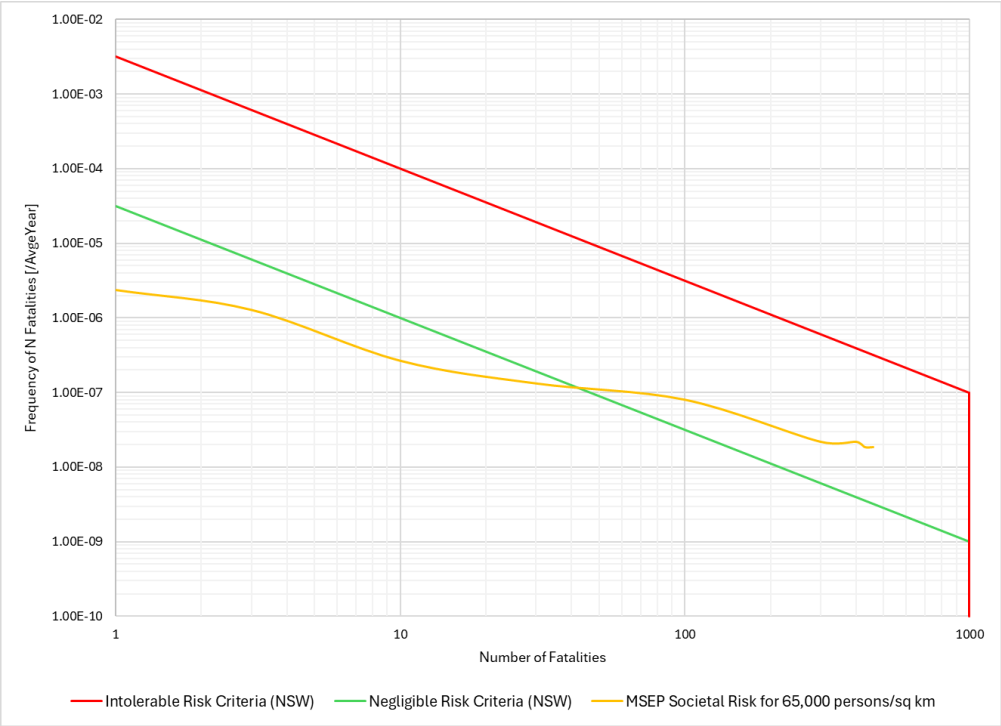
Figure 19 FN Curves for Entire GRC at 130,000 and 65,000 persons/km²



The societal risk is within the ALARP region, and the maximum number of fatalities is lower than 1000. It should be noted that the measurement length is only 200 m, and this FN curve is based on the entire pipeline length through GRC. The frequency at which N or more fatalities occur is overestimated in this approach as individuals located beyond the measurement length from the release point would not be affected.

The FN curve per km for a uniform density of 65,000 persons/km² is presented in Figure 20. This figure illustrates the reduction in the frequency at which N or more fatalities occur due to the analysis being limited to a 1 km segment. A shorter segment such as 400 m would further reduce the frequencies.

Figure 20 FN Curve per km for 65,000 persons/km²



7.5 Qualitative Risk

- *All 'avoidable' risks should be avoided* — The pipeline is an existing facility and cannot be relocated to avoid risk exposure. While intensification of residential dwellings could be avoided, there are significant adverse societal effects from avoiding such redevelopment such as loss of business income, increased costs of home ownership and further societal costs involved in accommodating population growth in areas where public infrastructure does not already exist.
- *The risk from a major hazard should be reduced wherever practicable* — Population intensification should be focused as far as practicable from the MSE pipeline.
- *The consequences (effects) of the more likely hazardous events (i.e. those of high probability of occurrence) should, wherever possible, be contained within the boundaries of the installation* — This is not applicable for a pipeline as there is no boundary.
- *Where there is an existing high risk from a hazardous installation, additional hazardous developments should not be allowed if they add significantly to that existing risk* — This study has not considered the potential for additional hazardous industries in the vicinity of the MSE. Should GRC receive a development application for a potentially hazardous development based upon the criteria contained within "Applying SEPP 33" [16], GRC should request the proponent include cumulative risk of the development and the MSE.

8 CONSULTATION WITH OPERATOR

The operator of the pipeline, APA Group, were contacted for information. To date, no response has been received.

The nature of this report is to inform GRC on proposed land use changes to achieve desired population increases and revitalisation of town centres. This may require changes to land use zones surrounding the MSE, and as such, may require a land use change Safety Management Study (SMS) as detailed in *AS/NZS 2885.6 : 2018 Pipelines – Gas and liquid petroleum Part 6: Pipeline safety management* [12]. Such a study presents another opportunity for consultation with the operator.

The objectives of a land use change SMS include:

- Informing stakeholders, including local government, planning authorities and development proponents of the requirements of the AS(/NZS) 2885 series.
- Reviewing proposed development plans and proposing changes to minimize impacts on the pipeline.
- Managing construction activities in the vicinity of the pipeline to minimize risk.
- Identifying any protective measures that might be required so that risk remains as low as reasonably practicable despite changed surroundings.

The following information is specifically required for a land use change SMS, in addition to general information requirements listed in clause 5.2.1 of AS 2885.6 [12]:

- Revised location classification of the pipeline. Primary and secondary location classes are defined in AS/NZS 2885.6 based upon the surrounding land use, and reflect threats to pipeline integrity, and risks to people, property and the environment. The location class of the pipeline may change with as land use changes. Given the proximity of the pipeline to several schools in both the GRC and CBC, as well as the existing residential densities, it is expected the location classification of the pipeline is already the highest possible.
- Details of any construction activities close to the pipeline that are associated with the land use change. These details are not available as yet.
- Any other threats introduced by the land use change. The proposed land use changes are not significantly different from existing land use. Therefore, it is not expected any new threats will be introduced, as there may be expected if mining was proposed in a rural area.

9 FINDINGS AND RECOMMENDATIONS

9.1 Findings

The following finding were made from the risk analysis and assessment:

- The LSIR of fatality risk is below the relevant NSW DPHI risk criteria.
- There is no impediment to sensitive, residential, commercial, active open space, or industrial development on the basis of LSIR. Such developments, however, are still subject to the limitation of population to ensure societal risk criteria is satisfied.
- The injury, property damage and accident propagation risks are below the relevant NSW DPHI risk criteria.
- The current maximum societal risk is within the Negligible zone of the DHPI societal risk criteria presented in HIPAP 6 and HIPAP 10.
- Based on the societal risk area map provided, any location within 200 m of the pipeline can be considered for population intensification.
- The maximum uniform population density that can be accommodated without exceeding any societal risk criteria is 135,000 persons/km^2.

9.2 Recommendations

The following recommendations are made for the consideration of GRC:

9.2.1 Recommendation 1 – Sensitive Use Development

Consider restricting sensitive use developments on properties within the measurement length of 200 m from the pipeline.

Sensitive use developments are those for use by sectors of the community who may be unable to protect themselves from the consequences of a pipeline failure event, and include the following land uses as per Standard Instrument—Principal Local Environmental Plan (2006 EPI 155a) - NSW Legislation:

- *School*
- *Hospital*
- *Seniors housing*
- *Respite day care centre*
- *Early education and care facility*
- *Correctional centre*

Although the DPHI's individual risk criterion for sensitive use development (0.5×10^{-6} fatalities per annum) was not exceeded, this recommendation is based upon the first of the qualitative criteria in HIPAP 10, "All 'avoidable' risks should be avoided". Placing vulnerable individuals in close proximity to the pipeline could be avoided and warrant precautionary land use controls.

9.2.2 Recommendation 2 – Population Intensification

Limit the future population density within the measurement length of 200 m from the pipeline to an average density of 65,000 persons/km², with the peak density not exceeding 135,000 persons/km², to ensure compliance with societal risk criteria.

For example, in a development that includes an apartment complex and a large garden area, the density within the complex itself may reach up to 135,000 persons/km², while the average density across the entire development including the garden area should be limited to 65,000 persons/km².

9.2.3 Recommendation 3 – Consultation with Pipeline Operator

Following any changes to land zoning, participate in required land use change safety management studies in consultation with APA.

9.2.4 Recommendation 4 – Future Developments Meeting Societal Risk Criteria

Allow development applications with population densities less than those specified in Recommendation 2 to rely upon this report as evidence that the proposal complies with Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning (refer Planning Circular PS 24-005).

9.2.5 Recommendation 5 – Future Developments where Societal Risk is Unknown

*Should a development exceed the population density limits specified in Recommendation 2, the basis of recommendation 4 will be undermined, and **all** future developments within 200 m of both the pipeline and the development exceeding the limit will need to independently demonstrate compliance with the risk criteria in HIPAP 4 and 10.*

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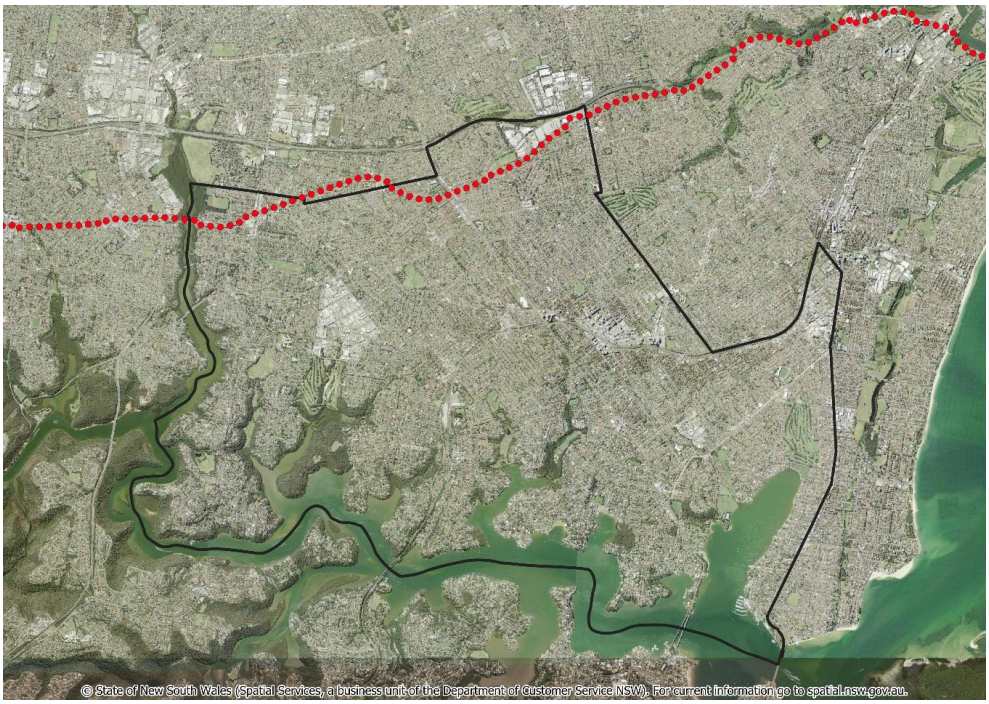
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Appendices

Repurpose of Moomba to Sydney Ethane Pipeline
Hazard Analysis
Appendices

For Georges River Council

21 August 2025



Doc. No.: J-000831-APPX

Revision: A

Arriscar Risk Engineering Solutions

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

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

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

DISTRIBUTION LIST

Name	Organisation	From (Issue)	To (Issue)
Catherine McMahon	Georges River Council	A	Current
Michelle Fawcett	Georges River Council	A	Current

DOCUMENT HISTORY AND AUTHORISATION

Rev	Date	By	Description	Check	Approved
A	21-Aug-25	RF	First draft for client review.	JL	JL

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Notation

Abbreviation	Description
ABS	Australian Bureau of Statistics
AGL	Above Ground Level
APD	Australian Pipeline Database
APGA	Australian Pipeline and Gas Association
Arriscar	Arriscar Pty Limited
BoM	Bureau of Meteorology
CIA	Chemical Industries Association
CONCAWE	Conservation of Clean Air and Water in Europe
GRC / Council	Georges River Council
EGIG	European Gas pipeline Incident Group
HIPAP	Hazardous Industry Planning Advisory Paper
IOGP	International Association of Oil & Gas Producers
LFL	Lower Flammable Limit
LGA	Local Government Area
LPG	Liquified Petroleum Gas
LUP	Land Use Planning
MAHPs	Major Accident Hazard Pipelines
MSE Pipeline	Moomba to Sydney Ethane Pipeline
NSW DPHI	New South Wales Department of Planning, Housing and Infrastructure
QRA	Quantitative Risk Assessment
RR	Research Report
TNO	Netherlands Organisation for Applied Scientific Research
TPA	Third Party Activity
UFL	Upper Flammable Limit
UK HSE	United Kingdom Health and Safety Executive
UKOPA	United Kingdom Onshore Pipeline Operators' Association
US DoT	United States Department of Transport
VBR	Volume Blockage Ratio
VCE	Vapour Cloud Explosion

Appendix A Assumptions

It is necessary to make technical assumptions during a risk analysis. These assumptions typically relate to specific data inputs (e.g. material properties, equipment failure rates, etc.) and modelling assumptions (e.g. release orientations, vulnerability criteria, etc.).

To comply with the general principles outlined in Section 2.2 of Hazardous Industry Planning Advisory Paper (HIPAP) No. 6, all steps taken in the risk analysis should be: "*traceable and the information gathered as part of the analysis should be well documented to permit an adequate technical review of the work to ensure reproducibility, understanding of the assumptions made and valid interpretation of the results*". Therefore, details of the key assumptions adopted for the risk analysis are provided in this Appendix.

Each assumption is numbered and detailed separately. The basis for each assumption is explained together with its potential impact on the risk results and the hazardous scenarios affected by the assumption. Key references are also listed for each assumption.

The analysis was conducted in Safeti 9.0 software package. Where relevant, the implementation of an assumption in Safeti is also described.

It is important that the assumptions be supported by:

- experimental data in the literature, where available;
- actual operating experience, where available;
- similar assumptions made by experts in the field and a general consensus among risk analysts; and
- engineering judgement of the analyst.

The main objectives are to minimise uncertainty in the risk estimate as far as is possible, and to ensure that the assumptions result in a 'conservative best estimate' of the risk. Such an approach is consistent with the following extract from Section 5 of HIPAP No. 6: "*In the consequence analysis and throughout the hazard analysis, the analyst must be conscious of the uncertainties associated with the assumptions made. Assumptions should usually be made on a 'conservative best estimate' basis. That is, wherever possible the assumptions should closely reflect reality. However, where there is a substantial degree of uncertainty, assumptions should be made which err on the side of conservatism.*"

Operational Data

A.1 Assumption No. 1: Pipeline Operating Conditions at the Time of Release

- **Assumptions:**
  - The operating pressure and temperature of the pipeline were assumed to be 10 MPag (MAOP) and -5 °C respectively.
  - The mass flowrate of Natural Gas through the pipeline was assumed to be 10.4 kg/s based on an energy flowrate of 45 TJ/day and a heat of combustion of 50 MJ/kg.
- **Justification and Impact of Assumptions:**
  - All operational data for the pipeline was provided by the pipeline owner (APA Group).
  - The pressure used to model the release rates was based on the pipeline pressure near Georges River Council (GRC), as advised by the pipeline owner (APA Group).
  - Operating conditions (particularly operating pressure) are required to undertake the consequence modelling.
  - Providing a flow will slow the rate of pressure reduction calculated by the 'Long Pipeline' model.
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - Temperature and pressure fields in the material tab of the long pipeline polyline equipment item.
- **References:**
  - Sherpa Consulting Pty Ltd, "Pipeline Hazard Analysis: Moomba to Sydney Ethane Pipeline Repurposing Modification, 2024.

A.2 Assumption No. 2: Pipeline Utilisation

- **Assumptions:**
  - The pipeline is utilised 100% of the time.
- **Justification and Impact of Assumptions:**
  - Utilisation data is required to estimate the likelihood of hazardous events (i.e. leak frequency).
  - Natural Gas is always present in the pipeline, except during rare periods of major maintenance.
  - The Natural Gas will be supplied to the East Coast Gas Grid which nominally operates 24 hours a day, 7 days a week.
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - Failure frequency field in the risk tab of the long pipeline polyline equipment item.

- The utilisation is incorporated during the estimation of the failure frequency of the pipeline.

- **References:**
  - APA Group, “Modification Report: Moomba to Sydney Ethane Pipeline Repurposing (IS505100),” 2024

Locational Data

A.3 Assumption No. 3: Representative Meteorological Conditions

- **Assumptions:**
  - Representative meteorological data is based upon 25 years of observations at Bankstown Airport weather station (ID - 066137) operated by the Australian Bureau of Meteorology (BoM).
  - The average ambient conditions (temperature, solar radiation and relative humidity), and the probabilistic distribution of wind speed and wind direction for the representative stability classes were determined using BoM data.
  - The data was split into daytime and night-time conditions.
  - Night-time is considered the period from 1 hour before sunset, to one hour after sunrise. This approximates to 10 hours daytime and 14 hours night-time.
- **Justification and Impact of Assumptions:**
  - Meteorological data is required to undertake the dispersion and consequence analysis.
  - Meteorological data (mean cloud cover, temperature, wind speeds, etc.) is collected by the BoM. Bankstown Airport is approximately 9 km from GRC and it is one of the two closest BoM weather stations, the other being Sydney Airport (ID 066037) at approximately 8 km from the Council.
  - Sydney Airport is located much closer to the coast. Therefore, Bankstown Airport is considered the more representative location.
  - Raw data from Bankstown Airport observations have been rationalised into a set of wind speed and weather stability classes for dispersion calculations.
  - Wind will cause flames to tilt downwind. The higher the wind speed, the greater the tilt. The net effect of the tilt is to increase the heat radiation in the downwind direction. This is much more pronounced for pool fires than jet fires because jet fires have much greater momentum. An allowance for flame tilt is included in the Safeti models for pool fires and vertical jet fires. The Safeti model assumes horizontal jet fires are directed in the same direction as the wind.
  - The downwind gas concentrations, and hence the hazard ranges for dispersion of flammable gas or vapour, vary with wind speed and weather stability class. Therefore, multiple representative wind speed and stability class categories are included in accordance with standard practice for undertaking a quantitative risk assessment (QRA).
  - The day/night split of the weather data is required to allow for the fact that residential, commercial, and industrial occupancies change over a 24-hour period.
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - Weather folder/tab.
- **References:**
  - BoM meteorological data for Bankstown weather station (ID – 066137).

A.4 Assumption No. 4: Surface Roughness Length

- **Assumptions:**
  - A conservative roughness length of 1 m is applicable for GRC.
- **Justification and Impact of Assumptions:**
  - The surface roughness affects the dispersion analysis. As the surface roughness increases, a release of gas or vapour will disperse faster with increasing distance from the source. Therefore, it is necessary in Safeti to select a surface roughness length that is representative of the types of terrain and obstacles near the source of release.
  - The roughness length for different surface types, as listed in the Safeti user manual, is shown in Table 1. GRC is predominantly a suburban area, it is most associated with the terminology of "regular large obstacle coverage (suburb, forest)"

Table 1 Surface Roughness Lengths

Description	Roughness Length (m)
Open water, at least 5 km	0.0002
Mud flats, snow, no vegetation, no obstacles	0.005
Open flat terrain, grass, few isolated objects	0.03
Low crops; occasional large obstacles, x/h > 20	0.1
High crops, scattered large obstacles, 15<x/h<20	0.25
Parkland, bushes, numerous obstacles, x/h<15	0.5
Regular large obstacle coverage (suburb, forest)	1
City centre with high- and low-rise buildings	3

  - It is not possible to define different surface roughness lengths for different locations within a single Safeti model. Only a single representative value can be defined for the entire area.
- **Hazardous Scenarios Affected:**
  - Dispersion modelling for all relevant hazardous scenarios.
- **Implementation in Safeti:**
  - Surface roughness length field in the dispersing surface tab of the surface parameters.
- **References:**
  - Safeti software documentation.

A.5 Assumption No. 5: Location of the High-Pressure Gas Pipeline

- **Assumptions:**
  - The location of the pipeline is sourced from the Australian Pipeline and Gas Association's (APGA) Australian Pipeline Database (APD).
- **Justification and Impact of Assumptions:**
  - The APD is made available to users to raise awareness of the location of high-pressure hydrocarbon pipelines and facilitate discussions between pipeline operators and stakeholders regarding the potential for planning and development decisions to trigger requirements in the series of Australian and New Zealand Standards AS(/NZS) 2885 for gas and liquid petroleum pipelines.
  - Use of the APD is conditional on several factors that are consistent with the objectives of this study, including:
    - The APD is to be used solely for the purpose of facilitating discussion regarding planning activity and decisions in the vicinity of pipelines. **This is consistent with the objectives of this study.**
    - The APD is not to be used for proving and construction activities. Dial Before You Dig enquiries must be made for these activities and any condition complied with. **It is not the intent of this study to provide detailed construction information.**
  - When overlayed onto aerial photos, the APGA Pipeline database accuracy appears no less accurate than the accuracy expected of the consequence models and frequency estimates.
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - Eastings and Northings of pipeline vertices recorded in the geometry tab of the pipeline polyline equipment item. Vertices are obtained by manipulating geometry exported from APD.
- **References:**
  - APGA Australian Pipeline Database.

A.6 Assumption No. 6: Total Surrounding Population (Day and Night)

- **Assumptions:**
  - The residential and employment populations are based upon the 2021 Census of Population and Housing conducted by the Australian Bureau of Statistics (ABS).
  - Residential populations were extracted at the mesh block level, while the employment populations were extracted at the destination zone level.
  - A population analysis was conducted to distribute the employment population throughout the mesh blocks for the purposes of this study. This analysis and the assumptions made are presented in Appendix B.
- **Justification and Impact of Assumptions:**
  - The total population, population density, and the % of the total population present during the day and night are required for estimation of the societal risk.

- The 2021 Census data is the most recent population data available.
- NSW DPHI population projections are not available at the mesh block level which is the level of granularity required for the objectives of this study.

- **Hazardous Scenarios Affected:**
  - All societal risk calculations. Population density, along with the consequence distances, determines the F-N points of the societal risk.
  - Locational specific risk is not impacted by these assumptions.
- **Implementation in Safeti:**
  - Population field in the population tab of the population polygons.
- **References:**
  - Census of Population and Housing, 2021, TableBuilder.

A.7 Assumption No. 7: Locational Distribution of People

- **Assumptions:**
  - The percentage of people located indoors and outdoors during the day and night is presented in Table 2:

Table 2 Assumed Proportion of Population Indoor and Outdoor During Day and Night

Location	Daytime	Night-Time
Indoor	90%	99%
Outdoor	10%	1%

  - All populations are located at ground level.
- **Justification and Impact of Assumptions:**
  - The proportion of people located indoors and outdoors will affect the societal risk analysis, as the vulnerability to fires, explosion, etc. depends on the location.
  - The default values recommended by the Netherlands Organization for Applied Scientific Research (TNO) in the 'Purple Book' for residential and industrial areas are tabulated in Table 3.

Table 3 Proportion of Population Indoor and Outdoor During Day and Night (TNO)

Location	Daytime	Night-Time
Indoor	93%	99%
Outdoor	7%	1%

  - The % of the total population located indoors and outdoors was estimated from similar risk analyses (Including some data provided by NSW DPHI). It is reported in these analyses that the % of people indoors and outdoors is 90% indoors and 10% outdoors during the day, which differs slightly from the TNO data, but is typically justified as being more applicable for Australian environmental conditions. Similarly, it is reported in these analyses that the % of people indoors and outdoors is 95 to 99% indoors and 1 to 5% outdoors during the night.
- **Hazardous Scenarios Affected:**
  - All societal risk calculations.
- **Implementation in Safeti:**

- Fraction of population indoors for societal risk field in the general risk tab of the population polygons.

- **References:**
  - RIVM, Guidelines for Quantitative Risk Assessment (Purple Book), CPR 18E, 3rd edition, VROM, 2005

Consequence Analysis

A.8 Assumption No. 8: Representative Materials

- **Assumptions:**
  - Natural gas is modelled as 100% Methane.
- **Justification and Impact of Assumptions:**
  - The composition and materials used affect the magnitude of the consequences.
  - Materials containing multiple components are simplified for modelling purposes by choosing a representative component to best approximate the variable composition.
  - Natural gas is 97% Methane. Modelling a representative material rather than a multi-component material reduces complexity, limits the potential for inconsistencies and ultimately has a minimal effect on the results.
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - Material field in the material tab of the long pipeline polyline equipment item.
- **References:**
  - Data provided by APA group.

A.9 Assumption No. 9: Representative Release Rates

- **Assumptions:**
  - Release events are modelled using the 'Long Pipeline' model in Safeti at the MAOP of 10 MPag. The model calculates the reduction in release rate over time (i.e. it is a time-varying discharge model).
  - The average rate over the first 30 seconds was chosen as the representative release rate for each event and subsequent consequences.
  - For hole sizes with a relative aperture ratio below of 0.04, the model maintains a constant pressure at the release point (i.e. steady state discharge model), which implies a constant release rate at the point of release.
- **Justification and Impact of Assumptions:**
  - All operational data for the pipeline was provided by the pipeline owner (APA Group).
  - The release rate is highly sensitive to pipeline pressure.
  - The long pipeline model assumes the input pressure is reduced by frictional losses along the pipeline length until the breach point. This results in a lower pressure at the release point leading to a lower release rate.
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - Pressure field in the material tab of the long pipeline polyline equipment item.

- Pumped inflow field in the scenario tab of the long pipeline polyline equipment item.
- The following fields in the time varying releases tab of the long pipeline polyline the equipment item:
  - Duration of interest;
  - Method for calculating average rate; and
  - Expected number of average rates.
- Relative size for "small breach" – liquid field in the long pipe tab of the discharge parameters or long pipeline polyline equipment item.

- **References:**
  - Data provided by APA Group.
  - Safeti software documentation.

A.10 Assumption No. 10: Representative Hole Diameters

- **Assumptions:**
  - The consequence analysis was based on the representative hole diameters shown in Table 4:

Table 4 Representative Hole Diameters

Pipeline	Internal Diameter (mm)	Representative Hole Diameter (d)			
		Pinhole (≤ 25 mm)	Small Hole (25 mm < d ≤ 75 mm)	Large Hole (75 mm < d ≤ 110 mm)	FBR (> 110 mm)
MSE	195.2	10 or 25	75	110	276

- **Justification and Impact of Assumptions:**
  - The representative hole diameters were selected based on a review of the available historical incident data (Refer to Appendix D), and the leak frequency data (Refer to Appendix E) adopted for this study which included four hole size categories:
    - Pinhole (≤ 25 mm);
    - Small Hole (> 25 mm to ≤ 75 mm);
    - Large Hole (> 75 mm to ≤ 110 mm); and
    - Rupture (> 110 mm).
  - Leaks from underground pipelines in the pinhole size category tend to be larger for TPA incidents (i.e. typically 20 mm to 25 mm – Refer to Appendix D.1) than for the other failure modes (i.e. typically less than 10 mm). Therefore, two representative hole diameters were selected in this category: 25 mm for TPA and 10 mm for all other failure modes.
    - This is also consistent with the predicted hole sizes in this size category reported in Table E5 of AS/NZS 2885.1:2018, which are based on excavator weight and tooth dimensions (i.e. 15 mm for 5 tonne excavators, 20 mm for 10-15 tonne excavators and 25 mm for 20-25 tonne excavators).

- **Hazardous Scenarios Affected:**
  - All.

- **Implementation in Safeti:**
  - Hole diameter field in the scenario tab of each release scenario of the long pipeline polyline equipment item.
- **References:**
  - Refer to Appendix D and Appendix E.

A.11 Assumption No. 11: Location of Release from Pipeline

- **Assumptions:**
  - High pressure gas releases from an underground pipeline would create a crater on the ground. The direction of release from the crater is always vertical. This assumption is part of the modelling approach in Safeti and cannot be modified.
  - The location of failure on the pipe can be taken as:
    - Top of the pipe (unobstructed release)
    - Middle of the pipe (on the side - obstructed release)
    - Bottom of the pipe (obstructed releases)
  - The release frequency is distributed between the three locations:
    - Top of the pipe – 63%
    - Middle of the pipe – 18.5%
    - Bottom of the pipe – 18.5%
- **Justification and Impact of Assumptions:**
  - The crater size depends on the location of the hole on the pipe and hence all three locations (top, middle and bottom) may be modelled.
  - Top releases are taken as non-obstructed releases; middle and bottom releases are taken as obstructed releases.
  - Impingement reduces the momentum of the release, and the dispersion modelling is dominated by the representative wind conditions.
  - The UK HSE (RR 1034) reports that some data from UKOPA includes the 'hole circumferential position' for releases from underground pipelines. Based on the 71 recorded incidents (All pipelines and materials) and average crater dimensions, an unobstructed release (c. ±71° from vertical) was estimated to occur for 63% of the releases and an obstructed release was estimated to occur for the balance 37% of releases. The distribution is not reported for different failure modes.
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - Accident type for buried sections field in the scenario tab of each release scenario of the long pipeline polyline equipment item.
- **References:**
  - Safeti software documentation.
  - UK HSE, Review of the Event Tree Structure and Ignition Probabilities used in HSE's Pipeline Risk Assessment Code MISHAP, Research Report (RR) 1034, 2015.

A.12 Assumption No. 12: Maximum Extent of Flash Fires

- **Assumptions:**
  - The maximum extent of a flash fire is defined by the downwind and crosswind distances from the release location to a concentration equal to 100% of the lower flammability limit (LFL).
  - The concentration is calculated using an averaging time of 18.75s.
- **Justification and Impact of Assumptions:**
  - Justification is provided in (Benintendi, 20171031, p. 341):
    - For passive dispersion models, the shorter the averaging time, the higher the centreline concentration, and there is concern that flammable concentrations may exist beyond the 100% LFL contour determined for a specific averaging time.
    - To take into account the different averaging times, the following empirical formula is recommended for converting concentrations from a 10-minute averaging time to another (Hanna et al., 1993):
      - $\frac{C_t}{C_{600}} = \left(\frac{600}{t}\right)^{0.2}$ …(1)

      where time is in seconds. Ct denotes time averaged concentration at the new averaging time of t seconds.
    - Hanna claims that experimentally:
      - $C_{max} = 2 \times C_{600}$ …(2)

      where Cmax is the maximum peak concentration in the plume.
    - Substituting C_{max} from (2) with $C_{600}\left(\frac{600}{t}\right)^{0.2}$ from (1) and solving for t, it yields,
      - *t = 18.75 s.*
  - This time should be adopted to carry out worst case predictions for the extent of 100% LFL. It is the core averaging time for flammable dispersion in Safeti.
  - For the materials under consideration, flash fires are not expected to be a major contributor because the gases involved are either buoyant, or have a neutral buoyancy, and should ignition occur, effects from jet fires are expected to dominate.
- **Hazardous Scenarios Affected:**
  - All hazardous scenarios with a flash fire as a potential outcome.
- **Implementation in Safeti:**
  - Flammable averaging time and LFL fraction to finish fields in the flammables tab of the flammable parameters.
- **References:**
  - Safeti software documentation.
  - Benintendi, R. (20171031). Process Safety Calculations. [VitalSource Bookshelf version]. Retrieved from vbk://9780081012291.
  - Hanna, S.R., Strimaitus, D.G., Chang, J., 1993. Hazard Response Modeling Uncertainty (A Quantitative Method) Vol 11 - Evaluation of Commonly Used

Hazardous Gas Dispersion Models, Environics Division Air Force Engineering & Services Center, Engineering & Services Laboratory.

A.13 Assumption No. 13: Isolation Time and Duration of Release

- **Assumptions:**
  - Isolation time and duration of release is not specified as these will be significantly longer than the time taken for the release to reach steady state and the period of exposure required for an adverse effect on people.
- **Justification and Impact of Assumptions:**
  - Natural gas is flammable, and any adverse impact will occur quickly (fire or explosion); therefore, the duration of exposure is not as critical as it would be if there were toxic materials in the pipeline (i.e. where the adverse impact can significantly increase for longer exposure durations).
  - The consequence calculations of the Long Pipeline Model, uses the average releases rate over the first 30 seconds and an exposure time of 30 seconds (user specified), compared to isolation valve closure times which typically vary from minutes (full bore rupture case) to hours (small to medium leaks).
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - Not implemented in Safeti.
- **References:**
  - Safeti software documentation.

A.14 Assumption No. 14: Shielding by Intervening Structures

- **Assumptions:**
  - The presence of intervening structures (e.g. buildings) does not shield other receptors from heat radiation.
- **Justification and Impact of Assumptions:**
  - In the Safeti software, it is not possible to take account of the potential protection provided by intervening structures.
  - People located indoors are typically less vulnerable to fire, which is a relevant consideration for the societal risk assessment (Refer to Assumption No. 20).
- **Hazardous Scenarios Affected:**
  - All hazardous scenarios with a pool fire or jet fire as a potential outcome.
- **Implementation in Safeti:**
  - Not implemented in Safeti.
- **References:**
  - Safeti software documentation.

A.15 Assumption No. 15: 3D Explosion Method and Model Parameters

- **Assumptions:**
  - The peak side-on overpressure resulting from an explosion is estimated using the 3D Obstructed Region Explosion Modelling option in the Safeti software.
  - The maximum explosive mass in a flammable gas or vapour cloud is the maximum mass between the LFL and UFL concentration for that section of the cloud that overlaps a congested area.
  - An obstructed region with a blast strength of 4, Volume Blockage Ratio (VBR) of 5%, and a height of 5 m Above Ground Level (AGL) was utilized to model the severity of explosions.
  - Explosions in unobstructed regions were modelled with a blast strength of 2 and an explosion efficiency of 100%.
  - Only overpressure effects are included. Projectiles and whole-body displacement are not included.
- **Justification and Impact of Assumptions:**
  - The explosive mass and blast strength are key parameters for modelling the overpressures from a VCE. The blast strength determines the peak overpressure generated by the explosion. The VBR determines the mass involved in the explosion.
  - There are no significantly congested locations in the study area; however, a confined explosion could occur if gas or vapour enters a building.
  - The blast strength is estimated based on the obstructed volume (%) and potential obstructions in each congested area. The following congested areas are present:
    - Buildings – A medium obstructed volume (60% for a residential building) and a moderate level of congestion are assumed to simulate the entry of gas or vapour into the building, followed by a confined explosion. This corresponds to curve number 4 of the TNO Multi-Energy Model.
    - The open spaces between the buildings are not strictly congested areas; however, the presence of vehicles, trees etc. at ground level may contribute to flame acceleration and the formation of an overpressure if ignition occurs.
- **Hazardous Scenarios Affected:**
  - All hazardous scenarios with a VCE as a potential outcome.
- **Implementation in Safeti:**
  - Explosion method in settings tab.
  - Uniform confined explosion method in the explosion parameters tab of the equipment item.
  - Uniform confined explosion strength and uniform confined method explosion efficiency fields in the multi-energy tab of the explosion parameters.
  - Unconfined explosion strength and explosion efficiency fields in the ME (3D options) tab of the explosion parameters.
- **References:**

- Centre for Chemical Process Safety, Estimating the flammable mass of vapour clouds", American Institute of Chemical Engineers, 1999.
- TNO, Methods for the Calculation of Physical Effects, 'Yellow Book', CPR 14E, 3rd Edition, VROM PGS 2, 2005.
- Safeti software documentation

Likelihood Analysis

A.16 Assumption No. 16: Likelihood of Release (Loss of Containment)

- **Assumptions:**
  - The UK HSE pipeline failure rate data is the most appropriate data to be used for the hazard analysis.
- **Justification and Impact of Assumptions:**
  - The estimated likelihood of release (or loss of containment) is a critical and significant input for the analysis. The risk results are directly proportional to this input.
  - Generic failure rate data for cross-country pipelines from Australia, UK, USA and Europe were reviewed. The failure rate from the UK HSE pipeline failure rate data is the closest large international database with hole size distribution to the overall failure rate from the NSW Pipeline Performance reports. Further details are presented in Appendix E.1.
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - Failure frequency field in the risk tab of the equipment item.
  - The likelihood is incorporated during the estimation of the failure frequency of the pipeline.
- **References:**
  - Refer to Appendix E.1.

A.17 Assumption No. 17: Ignition Probability

- **Assumptions:**
  - The probability of ignition is based on the correlation of Acton and Baldwin as represented in the IOGP Risk Assessment Data Directory 434-06 “Ignition Probabilities”, being

    $$P_{(ign)} = Min(0.0137 \times pd^2 + 0.0555, 1),$$

    where p is the pipeline operating pressure (bar, gauge pressure) and d is the pipeline diameter (m).
  - For puncture releases (all causes), the same ignition probability relationship may be applied, with d equal to the release hole diameter and with the coefficient of the pd^2 value halved.

    $$P_{(ign)} = Min(0.00654 \times pd^2 + 0.0555, 1)$$
- **Justification and Impact of Assumptions:**
  - The estimated probability of ignition is a critical and significant input for the risk analysis. For the purposes of this analysis, ignition is required for a hazardous scenario causing injury to people.
  - Relevant ignition data for cross-country pipelines were reviewed. Further details are presented in Appendix E.2.

- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - The following fields in the risk tab of the long pipeline polyline equipment item:
    - Probability of immediate ignition;
    - Specify minimum probability of delayed ignition;
- **References:**
  - Refer to Appendix E.2.

A.18 Assumption No. 18: Probability of VCE or Flash Fire given Delayed Ignition

- **Assumptions:**
  - The conditional probability of a flash fire only given delayed ignition is 0.6 and the conditional probability of a VCE with a flash fire is 0.4.
- **Justification and Impact of Assumptions:**
  - Ignition of a free gas/vapour cloud may demonstrate characteristics of a flash fire and/or a VCE. Safeti uses the delayed ignition probability resulting in either of the events.
- **Hazardous Scenarios Affected:**
  - All hazardous scenarios with a flash fire and/or VCE as a potential outcome.
- **Implementation in Safeti:**
  - The following tabs and fields of the event tree parameters:
    - Continuous / Instantaneous – no rainout
      - Flash fire; and
      - Explosion with flash fire.
- **References:**
  - Safeti software documentation.
  - RIVM, Guidelines for Quantitative Risk Assessment, 'Purple Book', CPR 18E, 3rd Edition, VROM PGS 3, 2005.

Risk Analysis

A.19 Assumption No. 19: Event Spacing for Releases from Pipelines

- **Assumptions:**
  - Representative release events are modelled using the 'Long Pipeline' model in Safeti, which distributes these events along the pipeline at set intervals.
- **Justification and Impact of Assumptions:**
  - The 'Long Pipeline' model in Safeti is used to estimate the time-dependent release from a long pipeline. The 'Long Pipeline' model includes inputs for use in the risk calculations, such as pipeline burial depth, leak frequency, etc.
  - The interval at which representative incidents are distributed along the pipeline is selected automatically by the 'Long Pipeline' model based on the incident consequence.
- **Hazardous Scenarios Affected:**
  - All.
- **Implementation in Safeti:**
  - The pipeline polyline equipment item utilises the 'Long Pipeline' model.
- **References:**
  - Safeti software documentation.

Vulnerability Parameters

A.20 Assumption No. 20: Vulnerability to Heat Radiation from a Fire (Indoor or Outdoor)

- **Assumptions:**
  - For the calculation of location-specific individual risk, the probability of fatality is based on the following probit equation (RIVM 'Purple Book'):

$$Y = -36.38 + 2.56 \ln\left(I^{1.333} t\right)$$

  - Where Y is the probit value, I is the heat radiation intensity (W/m2) and t is the exposure duration (seconds).
  - A maximum exposure duration of 30 seconds is applicable for individuals located outdoors in an urban setting. It is assumed after 30 seconds the persons will have found shelter from heat radiation.
  - A jet fire averaging time of 30 seconds has been adopted to align with the maximum exposure duration.
  - The probability of fatality for an individual located outdoors (30 seconds exposure), as calculated using the above probit equation, is shown in Table 5:

Table 5 Probability of Fatality for Exposure to Heat Radiation (Outdoor)

Heat Radiation Intensity (kW/m^2)	Probit	Probability of Fatality
4.7	1.19	0
12.6	4.55	0.32
15.9	5.35	0.63
23.0	6.61	0.94
35.0*	8.04	1.0

*Safeti assumes fatal injuries are incurred at 35 kW/m2 and above, regardless of the exposure duration.

  - For the calculation of societal risk:
    - The probability of fatality for individuals located outdoors is factored by 0.14 (Safeti default) to allow for the protection provided by clothing and the possibility of seeking shelter behind obstacles.
    - The probability of fatality for an individual located indoors is 0 at less than 35 kW/m2, and 1 at 35 kW/m2 or greater.

- **Justification and Impact of Assumptions:**
  - The probit equation adopted for the risk analysis is generally consistent with the following data from HIPAP No. 4 shown in Table 6:

Table 6 Effects of Heat Radiation

Heat Radiation Intensity (kW/m^2)	Effect/s
1.2	Received from sun in summer at noon.
1.6	Minimum necessary to be felt as pain.
4.7	Pain in 15 to 20 seconds, 1st degree burns in 30 seconds. Injury (second degree burns) to person who cannot escape or seek shelter after 30 seconds exposure.
12.6	High chance of injury. 30% chance of fatality for extended exposure. Melting of plastics (cable insulation). 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.
23.0	Fatality on continuous exposure. 10% chance of fatality on instantaneous exposure. Spontaneous ignition of wood after long exposure. Unprotected steel will reach thermal stress temperatures, which can cause failure. Pressure vessel needs to be relieved, or failure would occur.
35.0	25% chance of fatality on instantaneous exposure.
60.0	Fatality on instantaneous exposure.

  - It is reported in the RIVM 'Purple Book' that people indoors are assumed to be protected from heat radiation until the building catches fire. The threshold for the ignition of buildings in the RIVM 'Purple Book' is set at 35 kW/m2 and if the building is set on fire, all the people inside the building are assumed to die (i.e. The probability of fatality indoors is 1 if the heat radiation exceeds 35 kW/m2 and it is 0 if the heat radiation is less than 35 kW/m2).
- **Hazardous Scenarios Affected:**
  - All hazardous scenarios with a pool fire or jet fire as a potential outcome.
- **Implementation in Safeti:**
  - The following fields in the radiation tab of the flammable parameters:
    - Probit N value;
    - Probit A value; and
    - Probit B value.
  - Jet fire averaging time field in the jet fire reference data tab of the jet fire parameters.

- Jet fire maximum exposure duration field in the jet fire tab of the jet fire parameters.
- Critical radiation intensity field in the flammable risk tab of the flammable parameters.
- All fields relevant to jet fires in the radiation probit method tab of the indoor and outdoor vulnerabilities.

- **References:**
  - TNO, Methods for the Determination of Possible Damage, 'Green Book', CPR 16E, 1st Edition, VROM, 1992.
  - RIVM, Guidelines for Quantitative Risk Assessment, 'Purple Book', CPR 18E, 3rd Edition, VROM PGS 3, 2005.

A.21 Assumption No. 21: Vulnerability to Flash Fire (Indoor or Outdoor)

- **Assumptions:**
  - For the calculation of location-specific individual risk, the probability for fatality = 1 for any individual located within the flammable cloud (distance to LFL concentration).
  - For the calculation of societal risk, the probability for fatality for any individual located within the flammable cloud (distance to LFL concentration) is 1 (outdoor) or 0.1 (indoor).
- **Justification and Impact of Assumptions:**
  - The assumed probabilities differ from the guidance in the RIVM 'Purple Book' and the default values in the Safeti software. In both cases, the probability of fatality is set at 1 for all individuals (outdoor or indoor). This was considered too conservative. The probability of fatality indoors was set at 0.1 to take account of the possibility of open doors / windows and/or failure to evacuate.
- **Hazardous Scenarios Affected:**
  - All hazardous scenarios with a flash fire as a potential outcome.
- **Implementation in Safeti:**
  - Flash fire vulnerability field in the options tab of the indoor and outdoor vulnerabilities.
- **References:**
  - Safeti software documentation.
  - RIVM, Guidelines for Quantitative Risk Assessment, 'Purple Book', CPR 18E, 3rd Edition, VROM PGS 3, 2005.

A.22 Assumption No. 22: Vulnerability to Explosion Overpressure (Indoor or Outdoor)

- **Assumptions:**
  - For the calculation of location-specific individual risk, the probability for fatality is as shown in Table 7.
  - For the calculation of societal risk, the probability for fatality is as shown in both Table 7 and Table 8.

Table 7 Probability of Fatality from Exposure to Peak Side On - Overpressure (Outdoor)

Overpressure (kPa)	Probability of Fatality	Source
35	0.15	HIPAP No. 4
70	1	HIPAP No. 4

Table 8 Probability of Fatality from Exposure to Peak Side On - Overpressure (Indoor)

Overpressure (kPa)	Probability of Fatality	Source
21	0.2	HIPAP No. 4
35	0.5	HIPAP No. 4
70	1	HIPAP No. 4

- **Justification and Impact of Assumptions:**
  - The description of explosion overpressure effects from HIPAP No. 4 are:

Table 9 Effects of Explosion Overpressure

Overpressure (kPa)	Effect/s
0.3	Loud noise.
1.0	Threshold for breakage of glass.
4.0	Minimal effect in the open. Minor injury from window breakage in building.
7.0	Glass fragments fly with enough force to cause injury. Probability of injury is 10%. No fatality. Damage to internal partitions and joinery of conventional buildings but can be repaired.
14.0	1% chance of ear drum rupture. House uninhabitable and badly cracked.
21.0	10% chance of ear drum rupture. 20% chance of fatality for a person within a conventional building. Reinforced structures distort. Storage tanks fail.
35.0	50% chance of fatality for a person within a conventional building and 15% chance of fatality for a person in the open. House uninhabitable. Heavy machinery damaged. Significant damage to plant.
70.0	100% chance of fatality for a person within a building or in the open. 100% loss of plant.

- The probability of fatality is higher for an individual located in a conventional building than when outdoors due to the higher chance of harm from collapse of the structure.

- **Hazardous Scenarios Affected:**
  - All hazardous scenarios with a VCE as a potential outcome.
- **Implementation in Safeti:**
  - The lethality and overpressure fields of the first table in the obstructed explosion tab of the indoor and outdoor vulnerabilities.
- **References:**
  - Safeti software documentation.
  - NSW Department of Planning and Infrastructure, Hazardous Industry Planning Advisory Paper (HIPAP) No. 4, Risk Criteria for Land Use Safety Planning, January 2011.
  - International Association of Oil & Gas Producers (IOGP), Risk Assessment Data Directory, Report No. 434-14, Vulnerability of humans, July 2023.
  - Chemical Industries Association (CIA), Guidance for the location and design of occupied buildings on chemical manufacturing sites, 2nd Edition, 2003.

Appendix B Population Analysis

Generally, residential and school populations at the mesh block level, and employment populations at the destination zone level are carried forward to the risk analysis. However, for the objectives of this study, namely the geographical representation of societal risk, a common level was required.

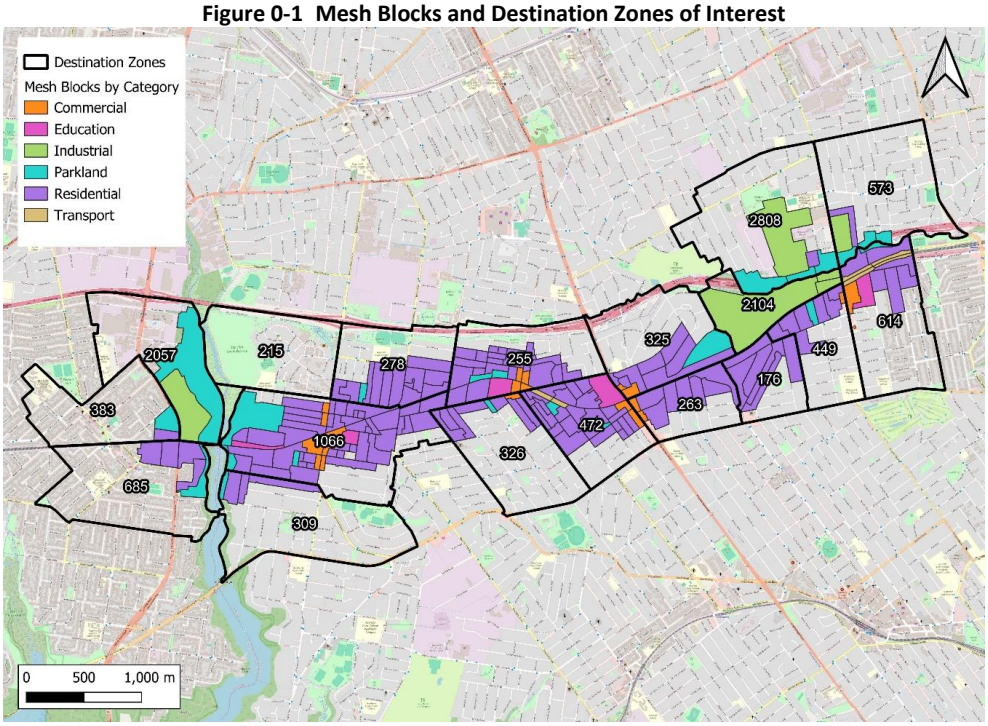
The following Appendix details the methods and assumptions of a population analysis, in which the employment population of a destination zone was distributed throughout appropriate mesh blocks based on the land use category. The populations were further adjusted based on the time and day as presented in Table 10.

Table 10 Population Categories Present at a Given Time and Day

Time and Day	Population Categories Present
All Night-Time (Weekdays and Weekends)	Residential
Weekday Daytime	Residential, Employment and School
Weekend Daytime	Residential and Employment

The mesh blocks within each destination zone categorised based on the land use type and the respective employment population are presented in Figure 0-1. Note that only the populations within 200 of the MSE pipeline were considered in this study as there are no adverse impacts beyond this point.

Figure 0-1 Mesh Blocks and Destination Zones of Interest



B.1 Night-Time Population

The mesh block populations extracted from the ABS corresponds to the residential population of a mesh block. These values were adopted as the night-time population present in each mesh block, on the basis that each person would be at home at night-time. The school and employment populations were not included in the night-time population on the basis that most employees generally work during the daytime, and school is only in session during the daytime.

Note that certain non-residential mesh blocks contain a residential population; these mesh blocks predominantly consist of non-residential land with a few dwellings. Nevertheless, the residential population was distributed throughout the entire non-residential mesh block.

B.2 Weekday Daytime Population

The residential population present within a mesh block during the daytime of a weekday was assumed to be 40% of the night-time residential population, on the basis that a larger fraction of the residential population will travel out of the mesh block for work. The education mesh blocks were allocated the population of the school/s within that mesh block, which include both students and staff.

It was observed through Google Earth that the majority of businesses within a destination zone were in the commercial and/or industrial mesh blocks. Therefore, the majority of the employment population was deemed to be concentrated in the commercial and/or industrial mesh blocks of a destination zone. The remaining employment population represents the people working from home in the residential mesh blocks and the school staff population in the education mesh blocks. Refer to Figure 0-2 for example, distributing the total employment population throughout each mesh block would have underestimated the population density in commercial or industrial zones adjacent to the MSE pipeline.

Figure 0-2 Destination Zone Code - 113732131



The total employement population in residential mesh blocks of a certain destination zone was assumed to be 40% of the total employment population. This assumption was based on material compiled and presented by .id (informed decisions, https://id.com.au) [1]. The material is a derivative of ABS Data that can be accessed from the website of the Australian Bureau of Statistics at www.abs.gov.au, and which data can be licensed on terms published on the ABS website. The employment population in each residential mesh block was then estimated based on the relative area of each mesh block.

The school populations (student and staff) are based on the data reported by the Australian Curriculum, Assessment and Reporting Authority (ACARA). The employment populations in the commercial and/or industrial mesh blocks were determined by subtracting the 'residential-employment' and school staff populations from the total employment population and then distributed based on the relative area of each mesh block.

B.3 Weekend Daytime Population

The residential population present in a mesh block during the daytime of a weekend was assumed to be 100% of the night-time residential population, based on the assumption that individuals are likely to be at home during weekends. School populations were excluded, as schools are not in session during weekends.

Employment figures from both commercial and industrial mesh blocks were included by filtering the population data by industries likely to operate on weekends—such as retail, hospitality, and healthcare etc., utilizing ABS TableBuilder Service.

B.4 Populations Carried Forward to the Risk Analysis

The mesh block populations carried forward to the risk analysis for each time period are presented in Table 11.

Table 11 Mesh Block Populations Included in Risk Analysis

Destination Zone Code	Mesh Block Code	Mesh Block Category	Night-Time Population	Weekday Daytime Population	Weekend Daytime Population
113581994	10049270000	Residential	99	49	99
	10049280000	Residential	160	77	160
	10049740000	Residential	103	54	103
	10049750000	Residential	97	51	97
	10987050000	Parkland	1	2	5
113581996	10046880000	Parkland	1	0	0
	10046890000	Residential	149	66	149
113581997	10048101000	Industrial	7	498	116
	10048110000	Parkland	1	0	0
113702143	10390010000	Residential	80	35	80
	10390020000	Residential	111	49	111
	10390030000	Residential	95	42	95
	10390410000	Parkland	1	0	0
	10390420000	Residential	115	50	115
	10390621000	Commercial	31	187	192
	10390630000	Residential	82	36	82
	10390640000	Residential	76	35	76
	11205501000	Residential	112	47	112
113702144	10388980000	Residential	112	51	112
	10390680000	Parkland	1	0	0
	10390690000	Residential	51	24	51
	10390700000	Residential	123	53	123
	10390710000	Residential	53	25	53
	10390720000	Residential	53	26	53
	10390730000	Residential	87	40	87
	10390740000	Residential	70	31	70
	10390760000	Education	0	111	0
	10390770000	Residential	74	35	74
	10390780000	Residential	94	44	94
	10390800000	Residential	126	59	126
	10391051000	Commercial	7	51	35
	10391052000	Commercial	0	41	23
	10391100000	Residential	163	78	163
	10391130000	Parkland	1	0	0
	10391140000	Residential	142	67	142
	10391150000	Residential	103	46	103
	10391160000	Residential	64	29	64
	10391170000	Residential	84	40	84

Destination Zone Code	Mesh Block Code	Mesh Block Category	Night-Time Population	Weekday Daytime Population	Weekend Daytime Population
	10391180000	Residential	120	52	120
	10391200000	Residential	125	54	125
	11004400000	Transport	1	0	0
	11004410000	Transport	1	0	0
	11004440000	Parkland	1	0	0
	11204458300	Residential	70	32	70
	11204473200	Residential	63	30	63
	11204680200	Residential	110	50	110
	11204710400	Residential	49	22	49
	11204710500	Residential	90	38	90
	11205080700	Residential	92	41	92
113702145	10391061000	Commercial	0	27	23
	10391062000	Commercial	0	44	36
	10391270000	Residential	116	55	116
	10391310000	Residential	159	74	159
	10391350000	Residential	99	47	99
	10391370000	Residential	85	43	85
	10391380000	Residential	85	42	85
	10391390000	Residential	131	63	131
	10391400000	Residential	169	82	169
113702146	10182180000	Residential	68	31	68
	10182900000	Parkland	1	0	0
	10182910000	Parkland	1	0	0
	10192990000	Residential	64	28	64
	10193000000	Residential	104	46	104
	10193020000	Residential	119	51	119
	10193040000	Residential	81	35	81
	10193060000	Residential	89	40	89
	10193072000	Residential	41	19	41
	10193080000	Residential	136	61	136
	10193090000	Residential	96	44	96
	10193100000	Residential	123	57	123
	10193110000	Residential	112	48	112
	10193120000	Residential	45	19	45
	10193170000	Residential	29	14	29
	10193190000	Residential	40	17	40
	10193200000	Residential	152	69	152
	10194551000	Commercial	21	53	51
	10194552000	Commercial	0	37	25
	10194553000	Commercial	64	59	87
	10194554000	Commercial	0	30	21
	10194560000	Education	0	19	0
	11204859500	Residential	44	19	44

Destination Zone Code	Mesh Block Code	Mesh Block Category	Night-Time Population	Weekday Daytime Population	Weekend Daytime Population
	11204865400	Residential	95	41	95
	11204883800	Residential	88	38	88
	11204883900	Residential	46	21	46
	11205129700	Residential	68	29	68
	11205499700	Residential	107	47	107
	11205501100	Residential	59	26	59
113702147	10388560000	Residential	131	60	131
	10388570000	Residential	153	70	153
	10389030000	Parkland	1	0	0
	10391040000	Residential	44	20	44
	10391361000	Commercial	20	146	94
	10391362000	Residential	33	16	33
	10391365000	Commercial	4	33	21
	10391420000	Residential	156	77	156
	10391430000	Residential	130	57	130
	11204699200	Residential	100	46	100
113722168	10389720000	Residential	178	86	178
	10390070000	Residential	93	49	93
	10397430000	Residential	56	29	56
	11004500000	Parkland	1	0	0
113732129	10182200000	Residential	155	83	155
	10182210000	Residential	153	79	153
	10192740000	Residential	168	89	168
	10192770000	Parkland	1	0	0
	10192780000	Residential	60	36	60
	10192790000	Residential	110	57	110
	10192810000	Residential	172	87	172
	10192820000	Residential	95	48	95
	10192830000	Residential	125	63	125
	10192850000	Residential	116	62	116
	10192860000	Residential	70	40	70
	11205077700	Residential	23	12	23
	11205198800	Residential	151	76	151
113732131	10387990000	Residential	151	78	151
	10389340000	Residential	79	34	79
	10389490000	Parkland	1	0	0
	10389510000	Residential	65	31	65
	10389530000	Education	0	7	0
	10389540000	Residential	107	53	107
	10389550000	Residential	132	67	132
	10389560000	Residential	158	76	158
	10389570000	Residential	172	77	172
	10389580000	Residential	173	78	173

Destination Zone Code	Mesh Block Code	Mesh Block Category	Night-Time Population	Weekday Daytime Population	Weekend Daytime Population
	10389602000	Residential	39	19	39
	10389603000	Residential	13	9	13
	10389604000	Commercial	10	55	61
	10389606000	Commercial	17	50	60
	10389640000	Residential	142	62	142
	10389650000	Education	4	36	4
	10389661000	Commercial	12	60	67
	10389662000	Commercial	0	219	220
	10389663000	Commercial	19	53	65
	10389664000	Commercial	15	134	144
	10389665000	Commercial	20	85	98
	10389670000	Parkland	1	0	0
	10389680000	Residential	81	35	81
	10389690000	Residential	54	26	54
	10389700000	Residential	81	35	81
	10389710000	Residential	92	39	92
	10389730000	Parkland	1	0	0
	10389740000	Residential	100	49	100
	10389750000	Residential	151	77	151
	10389760000	Residential	158	77	158
	10389770000	Residential	139	69	139
	10389850000	Residential	108	56	108
	10389870000	Residential	128	55	128
	10389880000	Residential	132	57	132
	10389900000	Residential	101	54	101
	10389910000	Residential	126	64	126
	10389920000	Residential	145	71	145
	10389930000	Residential	103	52	103
	10389970000	Residential	82	37	82
	10389980000	Residential	64	31	64
	10390210000	Residential	59	27	59
	10397450000	Residential	142	73	142
	10987150000	Parkland	1	0	0
	11204970100	Residential	58	30	58
	11204974400	Residential	136	68	136
	11205056600	Residential	143	71	143
	11205056700	Residential	55	23	55
	11205087200	Residential	51	23	51
	11205098100	Residential	69	35	69
	11205117300	Residential	94	40	94
	11205523200	Residential	95	43	95
	11205727900	Residential	84	36	84
	11205743400	Residential	94	50	94

Destination Zone Code	Mesh Block Code	Mesh Block Category	Night-Time Population	Weekday Daytime Population	Weekend Daytime Population
	11205860300	Residential	47	24	47
113772258	10388650000	Residential	167	76	167
	10388950000	Residential	144	67	144
	10391530000	Residential	183	83	183
	10391540000	Residential	125	57	125
	10391550000	Residential	142	64	142
	10391560000	Residential	77	39	77
113772259	10388960000	Residential	146	70	146
	10391570000	Residential	99	47	99
	10391580000	Residential	90	44	90
	10391590000	Parkland	1	0	0
	10391600000	Residential	91	45	91
	10391610000	Residential	84	42	84
	10391620000	Residential	84	40	84
	10397404000	Residential	278	117	278
	10397405000	Commercial	14	99	91
113772260	10658650000	Residential	165	78	165
	10659600000	Parkland	1	0	0
	10659950000	Education	24	145	24
	10659960000	Commercial	57	237	219
	10663480000	Transport	1	0	0
	10663490000	Transport	1	0	0
	10664260000	Residential	68	35	68
	10666340000	Residential	104	49	104
	10666350000	Residential	157	70	157
	10670160000	Residential	176	81	176
	10670170000	Residential	115	55	115
	10994560000	Transport	1	0	0
	10994700000	Transport	1	0	0
116630001	10397401000	Industrial	0	79	20
	10397402000	Industrial	0	101	25
	10397551000	Industrial	0	1713	425
116630002	10194700000	Industrial	21	1022	716
	10194721000	Residential	67	49	67
	11000820000	Parkland	1	0	0
	11000840000	Parkland	1	0	0
	11000850000	Parkland	1	0	0
116630003	10183090000	Residential	118	56	118
	10194730000	Parkland	1	0	0
	10194752000	Industrial	8	324	107
	11000390000	Parkland	1	0	0
	11000880000	Parkland	1	0	0
Total			**15807**	**13038**	**18477**

B.5 Population Grid

The mesh block populations were distributed into a 50 x 50 m grid based on the relative area of the mesh block that falls within a particular grid cell. A single grid cell may only intersect part of a single mesh block or overlap portions of several different mesh blocks. Figure 0-3 illustrates a grid cell that overlaps four mesh blocks, for which the grid cell population is calculated as follows,

$$Grid\ Cell\ Population = \frac{P_1 \times a_1}{A_1} + \frac{P_2 \times a_2}{A_2} + \frac{P_3 \times a_3}{A_3} + \frac{P_4 \times a_4}{A_4}$$

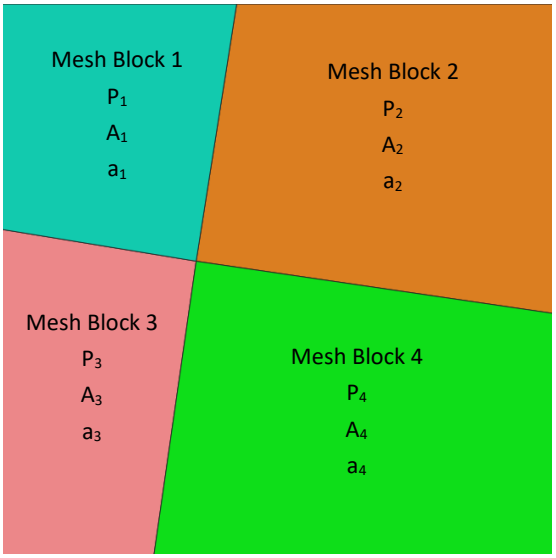
Where,

P – Mesh Block Population

A – Area of Mesh Block

a – Area of Intersect

Figure 0-3 Grid Cell Intersected by Mesh Block Boundaries



Appendix C Consequence Analysis Results for Representative Release Scenarios

C.1 Discharge Results

The discharge results for each representative release scenario are presented in Table 12.

Table 12 Discharge Results

Scenario	Mass Flowrate (kg/s)	Temperature (°C)	Velocity (m/s)	Release Time (s)
10 mm (Top/Mid/ Bottom)	0.9	-138	42.2	3600
25 mm (Top/Mid/Bottom)	5.6	-138	55.3	3600
75 mm (Top/Mid/Bottom)	64.7	-124	233	3600
110 mm (Top/Mid/Bottom)	104	-117	294	3600
FBR	170	-94.8	47.1	3600

C.2 Jet Fire Consequence Analysis Results

The downwind distances to the radiated heat fluxes from jet fires for each representative release scenario are presented in Table 13.

Table 13 Downwind Distances to the Radiated Heat Fluxes from Jet Fires

Scenario	Weather	Flame Length (m)	Distance to 3 kW/m2 (m)	Distance to 4.7 kW/m2 (m)	Distance to 12.6 kW/m2 (m)	Distance to 23 kW/m2 (m)	Distance to 35 kW/m2 (m)
10mm (Top)	1.9B (Day)	15.4	19.6	15.8	6.8	3.1	2.1
	7.5D (Day)	10.9	23.0	19.8	14.5	11.6	10.8
	4.1D (Day)	12.4	21.8	18.0	12.5	9.2	5.4
	1.5D (Day)	16.2	18.8	14.4	5.0	2.3	1.9
	7.3D (Night)	10.9	22.9	19.7	14.4	11.6	10.7

Scenario	Weather	Flame Length (m)	Distance to 3 kW/m2 (m)	Distance to 4.7 kW/m2 (m)	Distance to 12.6 kW/m2 (m)	Distance to 23 kW/m2 (m)	Distance to 35 kW/m2 (m)
	4.0D (Night)	12.5	21.7	17.9	12.4	9.0	5.2
	1D (Night)	17.4	16.9	11.8	2.5	0.9	Not reached at height of interest
	2.6E (Night)	14.1	20.2	16.9	9.9	4.5	2.7
	1F (Night)	17.4	16.9	11.8	2.5	0.9	Not reached at height of interest
10mm (Mid)	1.9B (Day)	15.4	19.6	15.8	6.8	3.1	2.1
	7.5D (Day)	10.9	23.0	19.8	14.5	11.6	10.8
	4.1D (Day)	12.4	21.8	18.0	12.5	9.2	5.4
	1.5D (Day)	16.2	18.8	14.4	5.0	2.3	1.9
	7.3D (Night)	10.9	22.9	19.7	14.4	11.6	10.7
	4.0D (Night)	12.5	21.7	17.9	12.4	9.0	5.2
	1D (Night)	17.4	16.9	11.8	2.5	0.9	Not reached at height of interest
	2.6E (Night)	14.1	20.2	16.9	9.9	4.5	2.7
	1F (Night)	17.4	16.9	11.8	2.5	0.9	Not reached at height of interest
10mm (Bottom)	1.9B (Day)	15.4	19.6	15.8	6.8	3.1	2.1
	7.5D (Day)	10.9	23.0	19.8	14.5	11.6	10.8

Scenario	Weather	Flame Length (m)	Distance to 3 kW/m2 (m)	Distance to 4.7 kW/m2 (m)	Distance to 12.6 kW/m2 (m)	Distance to 23 kW/m2 (m)	Distance to 35 kW/m2 (m)
	4.1D (Day)	12.4	21.8	18.0	12.5	9.2	5.4
	1.5D (Day)	16.2	18.8	14.4	5.0	2.3	1.9
	7.3D (Night)	10.9	22.9	19.7	14.4	11.6	10.7
	4.0D (Night)	12.5	21.7	17.9	12.4	9.0	5.2
	1D (Night)	17.4	16.9	11.8	2.5	0.9	Not reached at height of interest
	2.6E (Night)	14.1	20.2	16.9	9.9	4.5	2.7
	1F (Night)	17.4	16.9	11.8	2.5	0.9	Not reached at height of interest
25mm (Top)	1.9B (Day)	32.4	44.0	34.3	13.0	3.9	1.4
	7.5D (Day)	22.9	51.3	43.1	28.4	23.5	19.9
	4.1D (Day)	26.1	47.6	38.8	25.7	16.2	7.8
	1.5D (Day)	34.0	42.2	31.6	8.4	2.6	Not reached at height of interest
	7.3D (Night)	22.9	51.2	42.9	28.2	23.4	19.7
	4.0D (Night)	26.2	47.4	38.7	25.5	15.9	7.6
	1D (Night)	36.6	38.7	26.8	6.1	Not reached at height of interest	Not reached at height of interest
	2.6E (Night)	29.5	45.6	37.3	19.7	8.8	4.4

Scenario	Weather	Flame Length (m)	Distance to 3 kW/m2 (m)	Distance to 4.7 kW/m2 (m)	Distance to 12.6 kW/m2 (m)	Distance to 23 kW/m2 (m)	Distance to 35 kW/m2 (m)
	1F (Night)	36.6	38.8	26.9	6.1	Not reached at height of interest	Not reached at height of interest
25mm (Mid)	1.9B (Day)	33.2	45.6	36.1	15.0	5.6	2.6
	7.5D (Day)	23.5	52.2	43.9	29.2	24.2	20.7
	4.1D (Day)	26.8	48.8	39.7	26.6	17.2	8.7
	1.5D (Day)	34.9	43.8	33.3	10.7	3.6	1.1
	7.3D (Night)	23.5	52.1	43.8	29.0	24.0	20.4
	4.0D (Night)	26.9	48.7	39.6	26.5	16.9	8.4
	1D (Night)	37.5	40.1	28.2	6.7	Not reached at height of interest	Not reached at height of interest
	2.6E (Night)	30.3	46.6	38.5	21.1	9.2	4.9
	1F (Night)	37.5	40.1	28.2	6.7	Not reached at height of interest	Not reached at height of interest
25mm (Bottom)	1.9B (Day)	33.2	45.5	36.0	14.9	5.5	2.6
	7.5D (Day)	23.5	52.1	43.9	29.2	24.2	20.6
	4.1D (Day)	26.8	48.8	39.6	26.6	17.2	8.6
	1.5D (Day)	34.9	43.7	33.2	10.6	3.6	1.1
	7.3D (Night)	23.4	52.0	43.8	28.9	24.0	20.4

Scenario	Weather	Flame Length (m)	Distance to 3 kW/m2 (m)	Distance to 4.7 kW/m2 (m)	Distance to 12.6 kW/m2 (m)	Distance to 23 kW/m2 (m)	Distance to 35 kW/m2 (m)
	4.0D (Night)	26.8	48.6	39.6	26.4	16.8	8.3
	1D (Night)	37.5	40.0	28.1	6.6	Not reached at height of interest	Not reached at height of interest
	2.6E (Night)	30.3	46.6	38.5	21.1	9.2	4.8
	1F (Night)	37.5	40.1	28.2	6.7	Not reached at height of interest	Not reached at height of interest
75mm (Top)	1.9B (Day)	77.2	110.0	82.0	26.2	Not reached at height of interest	Not reached at height of interest
	7.5D (Day)	54.6	123.0	100.0	63.9	43.9	27.7
	4.1D (Day)	62.3	120.0	95.7	50.7	20.9	9.2
	1.5D (Day)	81.1	107.0	77.1	21.3	Not reached at height of interest	Not reached at height of interest
	7.3D (Night)	54.5	123.0	100.0	63.7	43.5	27.3
	4.0D (Night)	62.4	120.0	95.6	50.3	20.2	8.9
	1D (Night)	87.2	101.0	69.7	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
	2.6E (Night)	70.4	115.0	89.0	34.5	10.8	Not reached at height of interest
	1F (Night)	87.1	101.0	70.0	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
75mm (Mid)	1.9B (Day)	88.4	134.0	104.0	42.1	15.8	2.9

Scenario	Weather	Flame Length (m)	Distance to 3 kW/m2 (m)	Distance to 4.7 kW/m2 (m)	Distance to 12.6 kW/m2 (m)	Distance to 23 kW/m2 (m)	Distance to 35 kW/m2 (m)
	7.5D (Day)	62.6	151.0	124.0	80.5	63.5	49.5
	4.1D (Day)	71.3	141.0	116.0	73.4	46.5	26.0
	1.5D (Day)	92.8	130.0	98.4	32.6	11.0	Not reached at height of interest
	7.3D (Night)	62.4	151.0	124.0	80.3	63.2	49.1
	4.0D (Night)	71.5	141.0	116.0	73.1	45.9	25.7
	1D (Night)	99.8	122.0	88.0	26.4	Not reached at height of interest	Not reached at height of interest
	2.6E (Night)	80.6	139.0	112.0	58.4	25.4	11.4
	1F (Night)	99.8	123.0	88.2	26.5	Not reached at height of interest	Not reached at height of interest
75mm (Bottom)	1.9B (Day)	80.7	118.0	88.9	30.1	Not reached at height of interest	Not reached at height of interest
	7.5D (Day)	57.1	134.0	108.0	70.4	51.7	36.4
	4.1D (Day)	65.1	127.0	103.0	57.5	29.1	11.9
	1.5D (Day)	84.7	114.0	83.8	24.3	Not reached at height of interest	Not reached at height of interest
	7.3D (Night)	57.0	133.0	108.0	70.2	51.2	35.8
	4.0D (Night)	65.2	127.0	103.0	57.0	28.3	11.8

Scenario	Weather	Flame Length (m)	Distance to 3 kW/m2 (m)	Distance to 4.7 kW/m2 (m)	Distance to 12.6 kW/m2 (m)	Distance to 23 kW/m2 (m)	Distance to 35 kW/m2 (m)
	1D (Night)	91.1	108.0	75.3	15.6	Not reached at height of interest	Not reached at height of interest
	2.6E (Night)	73.5	123.0	96.2	41.3	15.0	Not reached at height of interest
	1F (Night)	91.1	108.0	75.5	16.0	Not reached at height of interest	Not reached at height of interest
110mm (Top)	1.9B (Day)	91.7	131.0	97.0	30.9	Not reached at height of interest	Not reached at height of interest
	7.5D (Day)	64.9	145.0	119.0	73.8	48.3	27.9
	4.1D (Day)	73.9	142.0	113.0	58.0	23.9	8.7
	1.5D (Day)	96.2	127.0	91.5	24.6	Not reached at height of interest	Not reached at height of interest
	7.3D (Night)	64.7	146.0	119.0	73.5	47.9	27.4
	4.0D (Night)	74.1	142.0	113.0	57.6	23.7	7.4
	1D (Night)	103.0	120.0	83.6	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
	2.6E (Night)	83.5	137.0	105.0	41.0	Not reached at height of interest	Not reached at height of interest
	1F (Night)	103.0	121.0	83.9	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
110mm (Mid)	1.9B (Day)	105.0	162.0	125.0	48.5	18.8	Not reached at height of interest

Scenario	Weather	Flame Length (m)	Distance to 3 kW/m2 (m)	Distance to 4.7 kW/m2 (m)	Distance to 12.6 kW/m2 (m)	Distance to 23 kW/m2 (m)	Distance to 35 kW/m2 (m)
	7.5D (Day)	74.5	182.0	149.0	96.7	74.9	57.1
	4.1D (Day)	84.9	172.0	141.0	86.4	53.5	30.0
	1.5D (Day)	111.0	157.0	119.0	41.1	Not reached at height of interest	Not reached at height of interest
	7.3D (Night)	74.3	182.0	149.0	96.6	74.5	56.5
	4.0D (Night)	85.1	172.0	141.0	85.8	52.6	29.4
	1D (Night)	119.0	149.0	107.0	32.8	Not reached at height of interest	Not reached at height of interest
	2.6E (Night)	96.0	168.0	134.0	67.6	25.3	13.4
	1F (Night)	119.0	149.0	108.0	33.0	Not reached at height of interest	Not reached at height of interest
110mm (Bottom)	1.9B (Day)	95.5	140.0	105.0	35.9	Not reached at height of interest	Not reached at height of interest
	7.5D (Day)	67.6	156.0	127.0	81.1	56.4	36.8
	4.1D (Day)	77.0	151.0	121.0	65.4	29.4	13.4
	1.5D (Day)	100.0	136.0	99.3	29.8	Not reached at height of interest	Not reached at height of interest
	7.3D (Night)	67.4	156.0	127.0	80.8	55.9	36.8
	4.0D (Night)	77.2	151.0	121.0	64.9	28.6	13.3

Scenario	Weather	Flame Length (m)	Distance to 3 kW/m2 (m)	Distance to 4.7 kW/m2 (m)	Distance to 12.6 kW/m2 (m)	Distance to 23 kW/m2 (m)	Distance to 35 kW/m2 (m)
	1D (Night)	108.0	129.0	90.5	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
	2.6E (Night)	87.0	146.0	113.0	46.6	16.5	Not reached at height of interest
	1F (Night)	108.0	129.0	90.8	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
FBR	1.9B (Day)	136.0	220.0	174.0	82.5	31.4	18.6
	7.5D (Day)	96.3	240.0	197.0	128.0	100.0	79.2
	4.1D (Day)	110.0	226.0	186.0	119.0	78.8	47.0
	1.5D (Day)	143.0	213.0	165.0	66.1	28.3	9.2
	7.3D (Night)	96.1	240.0	197.0	128.0	100.0	78.7
	4.0D (Night)	110.0	226.0	186.0	119.0	78.0	46.3
	1D (Night)	154.0	202.0	150.0	52.1	12.8	Not reached at height of interest
	2.6E (Night)	124.0	225.0	183.0	103.0	55.3	28.6
	1F (Night)	154.0	203.0	150.0	52.3	13.9	Not reached at height of interest

C.3 Flash Fire Consequence Analysis Results

The extent of the flammable cloud for each representative release scenario are presented in Table 14.

Table 14 Flammable Cloud Dimensions for Release Scenarios

Scenario	Weather	Maximum Distance to UFL at Height of Interest (m)	Maximum Distance to LFL at Height of Interest (m)	Maximum Distance to LFL at any Height (m)	Height of Maximum Distance to LFL at any Height (m)
10mm (Top)	1.9B (Day)	0.3	0.5	1.3	4.2
	7.5D (Day)	0.4	1.2	1.5	2.2
	4.1D (Day)	0.4	0.6	1.5	3.2
	1.5D (Day)	0.3	0.4	1.4	5.5
	7.3D (Night)	0.4	1.2	1.5	2.2
	4.0D (Night)	0.4	0.6	1.5	3.2
	1D (Night)	0.3	0.4	1.3	6.7
	2.6E (Night)	0.3	0.5	1.4	4.2
	1F (Night)	0.3	0.4	1.2	7.1
10mm (Mid)	1.9B (Day)	0.3	0.5	1.3	4.2
	7.5D (Day)	0.4	1.2	1.5	2.2
	4.1D (Day)	0.4	0.6	1.5	3.2
	1.5D (Day)	0.3	0.4	1.4	5.5
	7.3D (Night)	0.4	1.2	1.5	2.2
	4.0D (Night)	0.4	0.6	1.5	3.2

Scenario	Weather	Maximum Distance to UFL at Height of Interest (m)	Maximum Distance to LFL at Height of Interest (m)	Maximum Distance to LFL at any Height (m)	Height of Maximum Distance to LFL at any Height (m)
	1D (Night)	0.3	0.4	1.3	6.7
	2.6E (Night)	0.3	0.5	1.4	4.2
	1F (Night)	0.3	0.4	1.2	7.1
10mm (Bottom)	1.9B (Day)	0.3	0.5	1.3	4.2
	7.5D (Day)	0.4	1.2	1.5	2.2
	4.1D (Day)	0.4	0.6	1.5	3.2
	1.5D (Day)	0.3	0.4	1.4	5.5
	7.3D (Night)	0.4	1.2	1.5	2.2
	4.0D (Night)	0.4	0.6	1.5	3.2
	1D (Night)	0.3	0.4	1.3	6.7
	2.6E (Night)	0.3	0.5	1.4	4.2
	1F (Night)	0.3	0.4	1.2	7.1
25mm (Top)	1.9B (Day)	0.4	0.6	2.9	10.0
	7.5D (Day)	0.5	0.8	3.6	5.4
	4.1D (Day)	0.5	0.7	3.4	7.6
	1.5D (Day)	0.4	0.6	3.1	12.6
	7.3D (Night)	0.5	0.7	3.5	5.4

Scenario	Weather	Maximum Distance to UFL at Height of Interest (m)	Maximum Distance to LFL at Height of Interest (m)	Maximum Distance to LFL at any Height (m)	Height of Maximum Distance to LFL at any Height (m)
	4.0D (Night)	0.5	0.7	3.4	7.6
	1D (Night)	0.4	0.6	2.9	15.1
	2.6E (Night)	0.4	0.6	3.2	9.7
	1F (Night)	0.4	0.6	2.4	14.2
25mm (Mid)	1.9B (Day)	0.5	0.7	3.4	9.8
	7.5D (Day)	0.6	0.9	4.2	5.2
	4.1D (Day)	0.5	0.7	4.1	7.4
	1.5D (Day)	0.5	0.7	3.7	12.8
	7.3D (Night)	0.6	0.9	4.1	5.1
	4.0D (Night)	0.5	0.7	4.0	7.5
	1D (Night)	0.5	0.7	3.5	15.5
	2.6E (Night)	0.5	0.7	3.8	9.0
	1F (Night)	0.5	0.6	2.9	14.8
25mm (Bottom)	1.9B (Day)	0.5	0.7	3.4	9.8
	7.5D (Day)	0.6	0.9	4.2	5.2
	4.1D (Day)	0.5	0.7	4.1	7.4
	1.5D (Day)	0.5	0.7	3.7	12.8

Scenario	Weather	Maximum Distance to UFL at Height of Interest (m)	Maximum Distance to LFL at Height of Interest (m)	Maximum Distance to LFL at any Height (m)	Height of Maximum Distance to LFL at any Height (m)
	7.3D (Night)	0.6	0.9	4.1	5.1
	4.0D (Night)	0.5	0.7	4.0	7.5
	1D (Night)	0.5	0.7	3.5	15.5
	2.6E (Night)	0.5	0.7	3.7	9.1
	1F (Night)	0.5	0.6	2.9	14.8
75mm (Top)	1.9B (Day)	0.6	0.8	5.7	33.4
	7.5D (Day)	0.6	0.8	7.9	19.4
	4.1D (Day)	0.6	0.8	7.3	25.7
	1.5D (Day)	0.6	0.8	6.2	36.6
	7.3D (Night)	0.6	0.8	7.8	19.5
	4.0D (Night)	0.6	0.8	7.2	25.8
	1D (Night)	0.6	0.7	5.7	43.6
	2.6E (Night)	0.6	0.7	6.5	30.7
	1F (Night)	0.6	1.1	4.9	38.5
75mm (Mid)	1.9B (Day)	1.1	1.5	8.9	23.6
	7.5D (Day)	1.1	1.5	13.1	15.5
	4.1D (Day)	1.1	1.5	12.0	18.7

Scenario	Weather	Maximum Distance to UFL at Height of Interest (m)	Maximum Distance to LFL at Height of Interest (m)	Maximum Distance to LFL at any Height (m)	Height of Maximum Distance to LFL at any Height (m)
	1.5D (Day)	1.1	1.4	10.1	38.7
	7.3D (Night)	1.1	1.5	12.9	15.6
	4.0D (Night)	1.1	1.5	11.8	18.8
	1D (Night)	1.1	1.4	9.3	46.1
	2.6E (Night)	1.1	1.4	10.6	27.8
	1F (Night)	1.1	1.5	8.2	40.3
75mm (Bottom)	1.9B (Day)	0.7	0.9	6.5	33.0
	7.5D (Day)	0.7	0.9	9.2	18.9
	4.1D (Day)	0.7	0.9	8.4	25.5
	1.5D (Day)	0.7	0.9	7.1	33.9
	7.3D (Night)	0.7	0.9	9.0	19.1
	4.0D (Night)	0.7	0.9	8.3	25.6
	1D (Night)	0.7	0.9	6.6	45.0
	2.6E (Night)	0.7	0.8	7.5	29.7
	1F (Night)	0.6	1.2	5.7	34.0
110mm (Top)	1.9B (Day)	0.6	0.8	6.7	40.3
	7.5D (Day)	0.6	0.8	9.3	23.9

Scenario	Weather	Maximum Distance to UFL at Height of Interest (m)	Maximum Distance to LFL at Height of Interest (m)	Maximum Distance to LFL at any Height (m)	Height of Maximum Distance to LFL at any Height (m)
	4.1D (Day)	0.6	0.8	8.6	31.6
	1.5D (Day)	0.6	0.8	7.2	49.2
	7.3D (Night)	0.6	0.8	9.2	24.5
	4.0D (Night)	0.6	0.8	8.5	32.4
	1D (Night)	0.6	0.8	6.7	53.0
	2.6E (Night)	0.6	0.8	7.6	37.1
	1F (Night)	0.6	0.7	5.8	42.3
110mm (Mid)	1.9B (Day)	1.1	1.6	10.2	39.1
	7.5D (Day)	1.2	1.6	15.5	22.2
	4.1D (Day)	1.2	1.5	13.9	30.6
	1.5D (Day)	1.1	1.5	11.6	48.5
	7.3D (Night)	1.2	1.6	15.3	22.3
	4.0D (Night)	1.1	1.5	13.7	30.7
	1D (Night)	1.1	1.5	10.6	57.7
	2.6E (Night)	1.1	1.5	12.3	25.7
	1F (Night)	1.2	1.6	9.5	48.9
110mm (Bottom)	1.9B (Day)	0.7	1.0	7.4	40.4

Scenario	Weather	Maximum Distance to UFL at Height of Interest (m)	Maximum Distance to LFL at Height of Interest (m)	Maximum Distance to LFL at any Height (m)	Height of Maximum Distance to LFL at any Height (m)
	7.5D (Day)	0.7	1.1	10.6	23.1
	4.1D (Day)	0.7	1.0	9.7	29.1
	1.5D (Day)	0.7	0.9	8.2	49.7
	7.3D (Night)	0.7	1.1	10.5	23.2
	4.0D (Night)	0.7	1.0	9.5	32.3
	1D (Night)	0.7	0.9	7.5	41.4
	2.6E (Night)	0.7	0.9	8.6	37.2
	1F (Night)	0.7	0.9	6.6	39.5
FBR	1.9B (Day)	1.9	2.8	17.8	22.9
	7.5D (Day)	2.0	2.8	30.1	25.2
	4.1D (Day)	1.9	2.7	27.8	19.6
	1.5D (Day)	1.9	2.6	21.7	24.7
	7.3D (Night)	2.0	2.8	29.7	25.5
	4.0D (Night)	1.9	2.7	27.3	19.8
	1D (Night)	1.9	2.6	19.4	72.4
	2.6E (Night)	1.8	2.6	23.9	43.5
	1F (Night)	1.8	2.6	18.6	59.4

C.4 Explosion Consequence Analysis Results

The downwind distances to overpressure levels from an explosion along with the corresponding exploded mass and peak overpressure for each representative release scenario are presented in Table 15.

Table 15 Downwind Distances to Overpressures from VCEs

Scenario	Weather	Exploded Mass (kg)	Peak Overpressure (kPa)	Distance to 7 kPa (m)	Distance to 10 kPa (m)
10mm (Top)	Day	0.2	10.1	5.3	3.5
10mm (Mid)		0.2	10.1	5.3	3.5
10mm (Bottom)		0.2	10.1	5.3	3.5
10mm (Top)	Night	0.2	10.1	5.1	3.4
10mm (Mid)		0.2	10.1	5.1	3.4
10mm (Bottom)		0.2	10.1	5.1	3.4
25mm (Top)	Day	0.9	10.1	9.2	6.0
25mm (Mid)		1.1	10.1	10.1	6.7
25mm (Bottom)		1.1	10.1	10.0	6.7
25mm (Top)	Night	0.8	10.1	9.1	6.0
25mm (Mid)		1.1	10.1	10.0	6.7
25mm (Bottom)		1.1	10.1	10.0	6.6
75mm (Top)	Day	2.4	10.1	12.1	7.7
75mm (Mid)		4.1	10.1	14.3	9.1
75mm (Bottom)		2.8	10.1	12.7	8.1
75mm (Top)	Night	2.6	10.1	12.4	8.0
75mm (Mid)		4.8	10.1	15.2	9.7
75mm (Bottom)		2.9	10.1	12.9	8.3
110mm (Top)	Day	3.3	10.1	13.5	8.6
110mm (Mid)		5.6	10.1	15.8	10.1
110mm (Bottom)		3.7	10.1	14.0	9.0
110mm (Top)	Night	3.6	10.1	13.9	9.0
110mm (Mid)		6.5	10.1	16.8	10.8

Scenario	Weather	Exploded Mass (kg)	Peak Overpressure (kPa)	Distance to 7 kPa (m)	Distance to 10 kPa (m)
110mm (Bottom)		4.1	10.1	14.5	9.3
FBR	Day	12.3	10.1	21.0	13.5
FBR	Night	15.3	10.1	22.3	14.2

Appendix D Historical Accident Data

D.1 Aboveground or Underground Cross-Country Pipelines – Various Materials

United Kingdom Onshore Pipeline Operators' Association (UKOPA), Major Accident Hazard Pipelines (1962-2014)

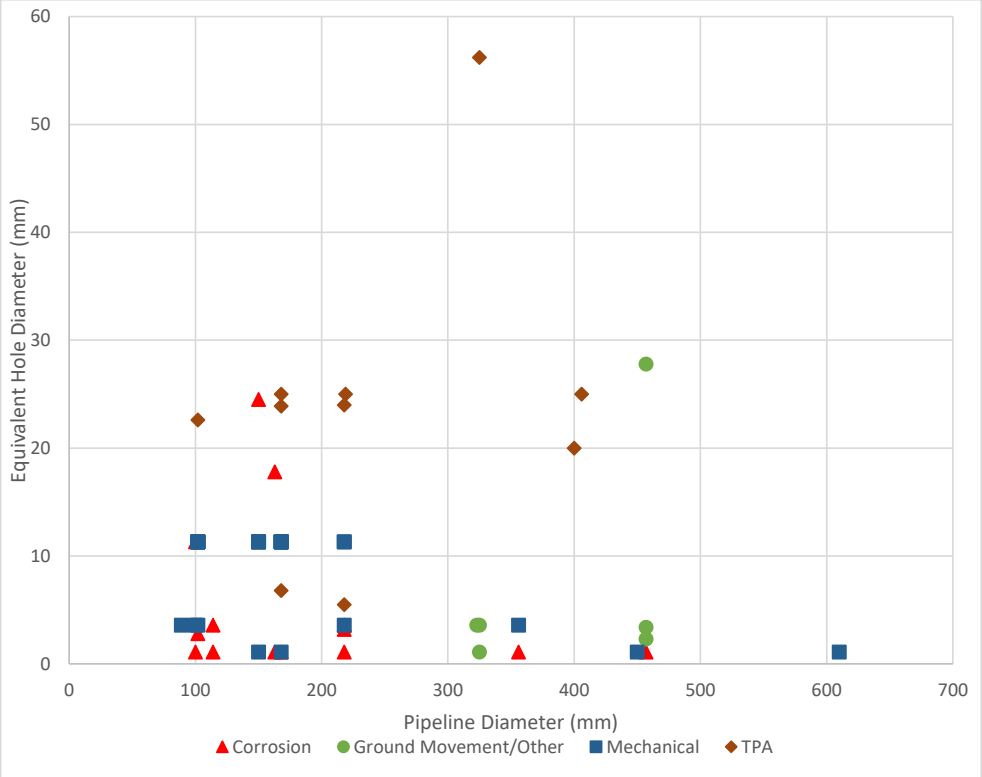
Failure reports in the UKOPA database include details such as the length and width of each failure. Table 16 presents incidents where the hole size was reported, as cited by the UK HSE in RR1035 [2]. This dataset is almost entirely composed of Natural Gas (NG) leaks, with only one incident involving another material (propylene).

Table 16 Dimensions of Leaks for Aboveground or Underground Cross-Country Pipelines (UKOPA - Reported Values Only)

Fault ID	Discovery Date	Product	Wall Thickness (mm)	Diameter (in)	Diameter (mm)	Equivalent Hole Diameter (mm)	Cause
1950	1998	NG	4.4	3.9	100	1.1	Corrosion
1948	1997	NG	4.4	3.9	100	11.3	Corrosion
400	1998	NG	Not Recorded	4	102	2.8	Corrosion
3112	2010	NG	4.4	4.5	114	1.1	Corrosion
1424	1990	NG	4.5	4.5	114	3.6	Corrosion
1998	2001	NG	4.8	5.9	150	24.5	Corrosion
2569	2005	NG	4.7	6.4	163	1.1	Corrosion
2979	2009	NG	4.3	6.4	163	17.8	Corrosion
728	1990	NG	6	6.6	168	1.1	Corrosion
425	2000	NG	6.6	8.6	218	1.1	Corrosion
417	1998	NG	5.2	8.6	218	3.2	Corrosion
402	1999	NG	5.2	8.6	218	3.6	Corrosion
422	1999	NG	6.6	8.6	218	3.6	Corrosion
1934	1993	NG	6.4	14	356	1.1	Corrosion
730	1994	NG	6.4	18	457	1.1	Corrosion
1460	2001	NG	6.35	12.7	323	3.6	Ground movement/Other
1490	1989	NG	6.4	12.8	325	1.1	Ground movement/Other
1489	1989	NG	6.4	12.8	325	3.6	Ground movement/Other
1388	1998	NG	8	18	457	2.3	Ground movement/Other
2923	2008	NG	9.52	18	457	3.4	Ground movement/Other
2872	2000	NG	9.52	18	457	27.8	Ground movement/Other
1972	1990	NG	4.5	3.5	89	3.6	Mechanical
1949	1997	NG	4.4	3.9	100	3.6	Mechanical
1947	1990	NG	4.4	4	102	3.6	Mechanical
1909	1989	NG	4.4	4	102	11.3	Mechanical
1913	1990	NG	4.4	4	102	11.3	Mechanical
1914	1990	NG	4.4	4	102	11.3	Mechanical
1916	1990	NG	4.4	4	102	11.3	Mechanical
1917	1990	NG	4.4	4	102	11.3	Mechanical
1919	1990	NG	4.4	4	102	11.3	Mechanical
363	1997	NG	Not recorded	5.9	150	1.1	Mechanical
1928	1990	NG	4.5	5.9	150	11.3	Mechanical
1973	1990	NG	4.5	5.9	150	11.3	Mechanical
2028	1990	NG	4.8	5.9	150	11.3	Mechanical

Fault ID	Discovery Date	Product	Wall Thickness (mm)	Diameter (in)	Diameter (mm)	Equivalent Hole Diameter (mm)	Cause
2078	1989	NG	5.6	5.9	150	11.3	Mechanical
1996	1993	NG	4.8	6.6	168	1.1	Mechanical
1875	1989	NG	5.2	6.6	168	11.3	Mechanical
1886	1990	NG	4.4	6.6	168	11.3	Mechanical
1887	1990	NG	4.4	6.6	168	11.3	Mechanical
1925	1989	NG	4.4	6.6	168	11.3	Mechanical
1926	1989	NG	4.4	6.6	168	11.3	Mechanical
1940	1990	NG	4.4	6.6	168	11.3	Mechanical
2069	1990	NG	6.4	8.6	218	3.6	Mechanical
1876	1989	NG	6.4	8.6	218	11.3	Mechanical
2055	1989	NG	6.4	8.6	218	11.3	Mechanical
1710	1989	NG	7.9	14	356	3.6	Mechanical
1842	1992	NG	9.5	17.7	450	1.1	Mechanical
1361	1994	NG	9.5	24	610	1.1	Mechanical
1117	1993	NG	12.7	36	914	160.1	Mechanical
1918	1990	NG	4.4	4	102	22.6	TPA
1987	1990	NG	4.8	6.6	168	23.9	TPA
2980	2009	NG	5.56	6.6	168	25	TPA
1645	1992	NG	7.1	8.6	218	5.5	TPA
366	1991	NG	4.8	8.6	218	24	TPA
2783	2006	NG	4.5	8.6	219	25	TPA
1560	1989	NG	6.4	12.8	325	56.2	TPA
1185	1998	NG	10.4	15.7	400	20	TPA
1193	1990	NG	9.5	16	406	25	TPA
3109	2009	Propylene	7.1	6.6	168	6.8	TPA

Figure 0-4 Equivalent Hole Diameter for Leaks from Above Ground or Underground Cross-Country Pipelines (UKOPA - Reported Values Only)



D.2 Underground Cross-Country Pipelines – Natural Gas

US Department of Transportation (DoT), Pipeline and Hazardous Materials Safety Administration (PHMSA), Accident Reports - Reported Data for Underground Natural Gas Steel Pipelines (January 2010 to December 2024)

Hole dimensions are not consistently reported in the US DoT database. The following tables include all recorded incidents where hole size information was available. For these cases, the reported length and width were used to calculate the equivalent diameter of a circular opening with the same cross-sectional area.

Table 17 Dimensions of Rupture Events for Underground Natural Gas Steel Pipelines (US DoT - Reported Values Only)

Failure Mode	Pipeline Diameter (mm)	Wall Thickness (mm)	Rupture Length (m)	Rupture Width (m)	Approx. Rupture Area (m^2)	Equiv. Hole Diameter (mm)
Corrosion	114.3	3.2	0.61	0.10	0.05	161.6
Corrosion	219.075	4.8	0.20	0.81	0.13	309.8
Corrosion	219.075	4.8	0.20	0.20	0.03	203.2
Corrosion	762	10.3	30.81	2.39	57.78	1077.6
Corrosion	508	7.9	10.97	1.60	13.75	718.4
Ground Movement / Other	304.8	6.4	0.84	0.03	0.02	145.9
Ground Movement / Other	508	9.5	2.44	4.57	8.76	718.4
Ground Movement / Other	609.6	8.7	0.61	0.61	0.29	609.6
Ground Movement / Other	914.4	13.1	2.87	0.91	2.06	1293.2
Ground Movement / Other	304.8	7.9	0.30	0.09	0.02	166.9
Ground Movement / Other	254	9.3	0.25	0.25	0.05	254.0
Mechanical Failure	323.85	6.4	0.76	0.32	0.19	458.0
Mechanical Failure	323.85	5.6	5.94	0.91	4.27	458.0
Mechanical Failure	1066.8	12.3	3.09	0.04	0.09	343.3
Mechanical Failure	508	10.3	3.68	1.60	4.61	718.4
Mechanical Failure	762	8.3	3.05	1.52	3.65	1077.6

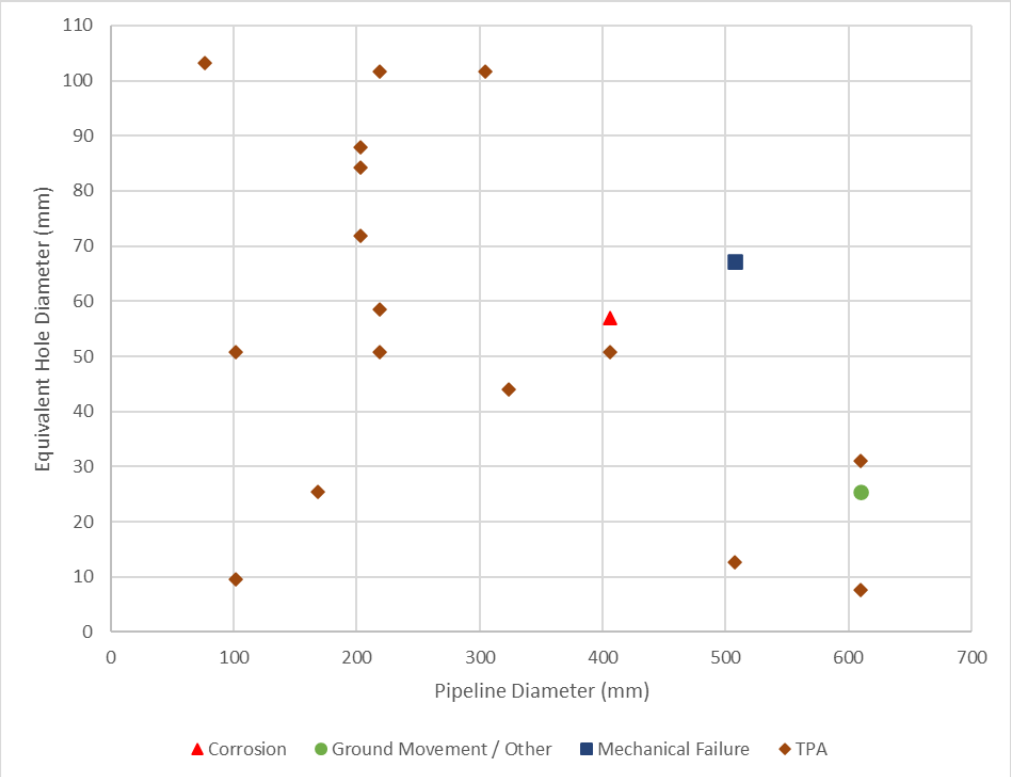
Failure Mode	Pipeline Diameter (mm)	Wall Thickness (mm)	Rupture Length (m)	Rupture Width (m)	Approx. Rupture Area (m^2)	Equiv. Hole Diameter (mm)
Mechanical Failure	762	7.1	14.33	2.39	26.86	1077.6
Mechanical Failure	762	9.5	2.39	0.05	0.10	348.6
TPA	406.4	5.6	1.28	0.91	0.92	574.7
TPA	152.4	4.8	0.1	0.2	0.01	125.1
TPA	304.8	5.6	0.91	0.30	0.22	431.1
TPA	508	6.8	3.05	0.38	0.91	718.4
TPA	114.3	4.8	0.2	0.1	0.01	124.4
TPA	323.85	5.2	0.30	0.91	0.22	458.0
TPA	406.4	7.1	3.23	0.41	1.03	574.7

Table 18 Dimensions of Puncture Events for Underground Natural Gas Steel Pipelines (US DoT - Reported Values Only)

Failure Mode	Pipeline Diameter (mm)	Wall Thickness (mm)	Puncture Length (mm)	Puncture Width (mm)	Approx. Puncture Area (mm^2)	Equiv. Hole Diameter (mm)
Corrosion	406.4	6.4	1277.6	2.5	2548.7	57.0
Ground Movement / Other	609.6	12.3	25.4	25.4	506.7	25.4
Mechanical Failure	508.0	6.5	355.6	12.7	3547.0	67.2
TPA	219.1	4.8	50.8	203.2	8107.3	101.6
TPA	219.1	4.8	50.8	50.8	2026.8	50.8
TPA	304.8	5.2	50.8	203.2	8107.3	101.6
TPA	508.0	6.0	12.7	12.7	126.7	12.7
TPA	323.9	5.6	25.4	76.2	1520.1	44.0
TPA	609.6	6.8	38.1	25.4	760.1	31.1
TPA	76.2	4.0	38.1	279.4	8360.7	103.2
TPA	609.6	7.1	7.6	7.6	45.6	7.6
TPA	203.2	6.4	152.4	50.8	6080.5	88.0

Failure Mode	Pipeline Diameter (mm)	Wall Thickness (mm)	Puncture Length (mm)	Puncture Width (mm)	Approx. Puncture Area (mm²)	Equiv. Hole Diameter (mm)
TPA	203.2	4.8	50.8	101.6	4053.7	71.8
TPA	219.1	6.4	58.4	58.4	2680.5	58.4
TPA	406.4	5.6	50.8	50.8	2026.8	50.8
TPA	101.6	8.6	50.8	50.8	2026.8	50.8
TPA	101.6	4.0	5.1	17.8	70.9	9.5
TPA	203.2	4.8	279.4	25.4	5573.8	84.2
TPA	168.3	6.4	25.4	25.4	506.7	25.4

Figure 0-5 Equivalent Hole Diameter for Leaks from Underground Natural Gas Steel Pipelines (US DoT - Reported Values Only)



Appendix E Likelihood Analysis

E.1 Likelihood of Release from Underground Pipelines

The likelihood of a release (i.e. leak) from each underground pipeline was estimated based on a review of relevant data sources. The primary data sources included:

- Department of Climate Change, Energy, the Environment and Water, New South Wales, Licensed Pipelines Performance Reports [3]. These reports includes data for all licensed pipelines in NSW covering a 5-year period;
- UK Health and Safety Executive (HSE), Update of Pipeline Failure Rates for Land Use Planning Assessments, Research Report (RR) 1035, 2015;
- British Standards Institute, 2013, Pipeline Systems – Part 3: Steel Pipelines on Land – Guide to the Application of Pipeline Risk Assessment to Proposed Developments in the Vicinity of Major Accident Hazard Pipelines Containing Flammables – Supplement to PD 8010-1:2004, PD 8010-3:2009+A1:2013;
- US Department of Transportation (DoT), Pipeline and Hazardous Materials Safety Administration (PHMSA), Accident Reports - Reported Data for Underground Natural Gas Steel Pipelines (January 2010 to December 2024) [4]; and
- Australia/New Zealand Pipeline Incident Database

A comparison of failure frequency databases was conducted by determining the total generic failure frequencies from each source, with the NSW Pipeline Performance Report serving as the baseline. However, it was not possible to calculate the generic failure frequency from the data reported in PD 8010 due to the absence of exposure data. A summary of the generic failure frequencies is provided in Table 19 below.

Table 19 Generic Pipeline Failure Frequencies

Database	Failure Rate (per km per yr)					% Difference
	Pinhole (≤ 25 mm)	Small Hole (> 25 mm to ≤ 75 mm)	Large Hole (> 75 mm to ≤ 110 mm)	Rupture (> 110 mm)	Total Failure Frequency	
NSW	-	-	-	-	1.4E-04	Baseline
UK HSE	1.2E-04	4.9E-06	2.7E-07	2.6E-06	1.3E-04	-4%
US DoT	6.9E-06	1.5E-06	7.0E-07	3.9E-06	1.3E-05	-91%
PD 8010	4.3E-05	2.6E-05	2.6E-05	1.3E-04	2.3E-04	+64%
AS/NZ Pipeline Incident Database	-	-	-	-	3.0E-05	-78%

The leak frequency data reported in RR1035 (refer to Appendix E.1.2) was adopted for this analysis, as it is the most comparable to the NSW pipeline performance data. RR1035 includes leak frequencies categorized by four-hole sizes (pinhole, small hole, large hole, and rupture), four failure modes (mechanical failure, corrosion, ground movement/other, and third-party activity), and in some cases, by pipe diameter and/or wall thickness.

In contrast, the NSW performance data presents incident frequencies without categorizing them by failure mechanism, pipeline diameter, or wall thickness, which limits the potential for detailed analysis.

The leak frequency data from British Standards Institute PD 8010-3:2009+A1:2013 (refer to Appendix E.1.3) was not used, as the failure frequencies are not clearly defined for all failure modes. In the absence of historical failure data, the UK HSE adopts a probabilistic approach to estimate incident frequency, whereas PD 8010 does not provide any guidance on such an approach. Additionally, the rupture frequency due to third-party activity (TPA), estimated using the methodology in Annex B of PD 8010-3:2009+A1:2013, is inconsistent with data from the UK HSE and US DoT.

The leak frequency data derived from the US DoT data (Refer to Appendix E.1.4) was not used since the total leak frequency is lower than reported in RR1035 and the NSW performance data.

The leak frequency data reported in RR1035 has been based on:

- An analysis of pipeline failure data from multiple organisations, including:
  - CONCAWE (CONservation of Clean Air and Water in Europe);
  - UKOPA (United Kingdom Onshore Pipeline Operators' Association); and
  - EGIG (European Gas pipeline Incident Group).
- A conservative, yet realistic, analysis of the available data. For example:
  - For failure mode categories where zero failures have occurred, assumptions have been made to estimate the chance of a failure, even if not seen historically (over the observation period).
  - Only the most recent 22 years of historical incident data was analysed to ensure a consistent pipeline population and to remove the older incident data, which may not be as representative of current practice.
  - Incident data for pipelines carrying products at elevated temperatures was excluded from the analysis.
  - Although the location of failures (e.g. rural or urban) may be recorded in the various databases, it is recognised that there is insufficient data to estimate the leak frequency for different locations.
  - The recommended failure rates for specific materials have been derived from the most appropriate dataset (e.g. for a specific substance the failure rates for corrosion may derived from the CONCAWE products dataset, whilst the mechanical failure rates may be derived from the UKOPA dataset).

E.1.1 NSW Performance Reports

The average leak frequency from the NSW Performance Reports for all licensed pipelines in NSW for the 12-year period from 2011-12 to 2022-23 is **1.4E-04 per km per year**. The loss of containment data presented in these reports are tabulated in Table 20.

Table 20 NSW Licenced Pipelines LOC Data

Year	LOC Events per 1,000 km
2011/12	0
2012/13	0.41
2013/14	0
2015/16	0
2016/17	0
2017/18	0.41
2018/19	0
2019/20	0.21
2020/21	0
2021/22	0
2022/23	0.62
Average	0.14

E.1.2 UK HSE (RR1035)

The leak frequency data reported in Section 7.1 of RR1035 for underground natural gas pipelines are presented in Table 21. Pipeline exposure data based on pipeline diameter and wall thickness obtained from RR1035 are presented in Table 22 and Table 23 respectively.

Utilizing the pipeline exposure data, the total generic pipeline failure frequency was determined to be **1.3E-04 per km per year** as presented in Table 24.

Table 21 Leak Frequencies for Underground Natural Gas Pipelines Reported in RR1035

Failure Mode	Pipeline Diameter (mm)	Wall Thickness (mm)	Leak Frequency (per km per yr)				
			Pinhole (≤ 25 mm)	Small Hole (> 25 mm to ≤ 75 mm)	Large Hole (> 75 mm to ≤ 110 mm)	Rupture (> 110 mm)	Total Leak Frequency
Mechanical Failure	< 115	All	4.5E-04	1.0E-08	1.0E-08	1.0E-08	4.5E-04
	127 to < 273		1.5E-04	1.0E-08	1.0E-08	1.0E-08	1.5E-04
	≥ 305		8.7E-06	1.0E-08	1.0E-08	1.0E-08	8.7E-06
Corrosion	All	< 5	3.1E-04	1.0E-08	1.0E-08	1.0E-08	3.1E-04
		5 to < 10	3.3E-05	1.0E-08	1.0E-08	1.0E-08	3.3E-05
		≥ 10	1.0E-07	1.0E-08	1.0E-08	1.0E-08	1.3E-07
Ground Movement / Other	All	All	1.2E-05	2.5E-06	1.5E-07	2.5E-06	1.7E-05
TPA	All	All	2.2E-05	2.4E-06	1.0E-07	1.0E-07	2.5E-05

Table 22 Pipeline Exposure by Diameter

Pipeline Diameter	Exposure (km.yr)
<115	19798
127 to 273	93913
>305	342909

Table 23 Pipeline Exposure by Wall Thickness

Wall Thickness	Exposure (km.yr)
< 5	25681
5 to 10	213527
>= 10	217413

Table 24 Generic Leak Frequencies for Underground Natural Gas Pipelines

Failure Mode	Leak Frequency (per km per yr)				
	Pinhole (≤ 25 mm)	Small Hole (> 25 mm to ≤ 75 mm)	Large Hole (> 75 mm to ≤ 110 mm)	Rupture (> 110 mm)	Total Leak Frequency
Mechanical Failure	5.7E-05	1.0E-08	1.0E-08	1.0E-08	5.7E-05
Corrosion	3.3E-05	1.0E-08	1.0E-08	1.0E-08	3.3E-05
Ground Movement / Other	1.2E-05	2.5E-06	1.5E-07	2.5E-06	1.7E-05
TPA	2.2E-05	2.4E-06	1.0E-07	1.0E-07	2.5E-05
Total Leak Frequency	1.2E-04	4.9E-06	2.7E-07	2.6E-06	**1.3E-04**
%	94.1%	3.7%	0.2%	2.0%	100%

E.1.3 British Standards Institute (PD 8010-3:2009+A1:2013)

The data and approach included in Annex B of PD 8010-3:2009+A1:2013 was used to estimate the leak frequencies for the pipelines (Refer to Table 25). It was not possible to estimate a generic average failure frequency in the absence of pipeline exposure data. This data is applicable for a pipeline with a wall thickness of 11.9 mm.

The rupture frequency due to 'TPA' was derived from the generic pipeline failure frequency. For leaks (other than ruptures) due to 'Ground Movement / Other' or 'TPA', the estimated leak frequency was assumed to be distributed evenly across the other hole sizes (Note: There is no guidance in PD 8010-3:2009+A1:2013 on how to distribute the non-rupture events).

Table 25 Leak Frequencies for MSE Pipeline based on PD 8010

Failure Mode	Approx. Leak Frequency (per km per yr)					Comments (Refer to Annex B of PD 8010-3:2009+A1:2013)
	Pinhole (≤ 25 mm)	Small Hole (> 25 mm to ≤ 75 mm)	Large Hole (> 75 mm to ≤ 110 mm)	Rupture (> 110 mm)	Total Leak Frequency	
Mechanical Failure	1.7E-05	0.0E+00	0.0E+00	0.0E+00	1.7E-05	Only the pinhole leak frequency was reported.
Corrosion	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	No data reported for external or internal corrosion.
Ground Movement / Other	1.1E-06	1.1E-06	1.1E-06	3.5E-07	3.7E-06	Based on average incident rate (0.02 per 1000 km.yr) and survival values of 0.018 (Rupture) and 0.17 (Leaks).
TPA	2.5E-05	2.5E-05	2.5E-05	1.3E-04	2.1E-04	Proportion of ruptures = 0.63
Total Leak Freq. =	4.3E-05	2.6E-05	2.6E-05	1.3E-04	**2.3E-04**	
% =	19%	12%	12%	57%	100%	

E.1.4 US Department of Transportation (DoT)

The Pipeline and Hazardous Materials Safety Administration (PHMSA) Accident Reports contain data on incidents involving various pipelines. To enable comparison with UK data, the subset of incidents involving underground natural gas transmission pipelines was analysed. Leaks were categorised using the same failure modes and representative hole sizes as defined in UK sources (i.e., RR1035 and PD8010).

Incidents involving pipes or valves manufactured prior to 1970 were excluded from the analysis. Pipeline safety has improved significantly since the 1970 and inclusion of these events lead to incorrect conclusions regarding the failure frequency. All leaks with no reported hole size were allocated to the 'Pinhole' category. These are typically described as cracks or pinholes and may include leaks from smaller fittings. The results are summarised in Table 26.

Period of Recorded Incident Data =	15	yrs	(Jan 2010 to Dec 2024)
Total Length of Natural Gas Pipelines =	7127667	km.yrs	(Jan 2010 to Dec 2024)

Table 26 Leak Frequencies for Underground Natural Gas Transmission Pipelines

Failure Mode	Approx. Leak Frequency (per km per yr)				
	Pinhole (≤ 25 mm)	Small Hole (> 25 mm to ≤ 75 mm)	Large Hole (> 75 mm to ≤ 110 mm)	Rupture (> 110 mm)	Total Leak Frequency
Mechanical Failure	2.5E-06	1.4E-07	0.0E+00	1.1E-06	3.8E-06
Corrosion	1.3E-06	1.4E-07	0.0E+00	7.0E-07	2.1E-06
Ground Movement / Other	1.8E-06	1.4E-07	0.0E+00	9.8E-07	2.9E-06
TPA	1.3E-06	1.1E-06	7.0E-07	1.1E-06	4.2E-06
Total Leak Frequency	6.9E-06	1.5E-06	7.0E-07	3.9E-06	**1.3E-05**
%	52.7%	11.8%	5.4%	30.1%	100%

E.1.5 Australia/New Zealand Pipeline Incident Database

A comparison with limited Australian data between 2000 and 2018 extracted from the report "Experience with the Australian/New Zealand Pipeline Incident Database" has been undertaken. The report does not provide explicit rates for loss of containment from pipelines but provides data from which some conclusions may be drawn. These are:

- Total km of pipelines within a given interval (Refer to Table 27), and
- Total number of leaks and ruptures in the period 2000 to 2018. A total of 17 are reported in the database.

Table 27 Australian Pipeline Population by Half Decade

Period			km of Pipeline			Pipeline Population (km.year)
Start	End	Interval (year)	Start of period	End of period	Average during period	
2000	2005	5	26000	29000	27500	137,500
2005	2010	5	29000	32000	30500	152,500
2010	2015	5	32000	36000	34000	170,000
2015	2018	3	36000	36000	36000	108,000
					Total	**568,000**

From Table 27 and the total of 17 release incidents, the expected total release frequency is:

$$f = \frac{N}{km.y} = \frac{17}{568{,}000} = 3 \times 10^{-5}\ \mathrm{km^{-1}y^{-1}}$$

E.2 Ignition Probability

A review of relevant ignition probability data and ignition probability correlations was conducted using the following sources:

- United Kingdom Pipeline Operators Association (UKOPA), UKOPA Pipeline Product Loss Incidents and Faults Report (1962-2014), 2015;
- UK Health and Safety Executive (HSE), Review of the Event Tree Structure and Ignition Probabilities used in HSE's Pipeline Risk Assessment Code MISHAP, Research Report (RR) 1034, 2015;
- European Gas Pipeline Incident Data Group, Gas Pipeline Incidents, 9th Report of the European Gas Pipeline Incident Data Group (Period 1970 – 2013), 2015;
- International Association of Oil & Gas Producers, Ignition Probabilities (Report 434-06), 2019; and
- Acton, M.R., Acton, O.J. and Robinson. C., A Review of Natural Gas Transmission Pipeline Incidents to Derive Ignition Probabilities for Risk Assessment, Hazards 26.

For this analysis:

- The total ignition probability was based on the Acton & Baldwin correlation (Refer to Table 29).
    - The Acton & Baldwin correlation is recommended by the IOGP.
    - The data in UK HSE's RR 1034 are not reported for varying hole sizes or operating pressures (i.e. are not release rate dependent) and appear to be only applicable for larger release events (i.e. ruptures).
    - The total ignition probability for rupture scenarios reported in the UKOPA database is lower compared to the correlation.
    - The correlation probabilities are comparable to the EGIG data.
- The total ignition probability was split 50:50 for immediate ignition and delayed ignition.

Ignition data is usually reported by hole size rather than failure mode and inconsistent reporting of immediate ignition due to TPA (which is sometimes reported to be the highest immediate ignition probability and sometimes not) means it was not possible to estimate the immediate ignition probability based on failure mode.

E.2.1 Ignition Probability Data for Above Ground or Underground Cross-Country Pipelines – Various Materials

United Kingdom Pipeline Operators Association (UKOPA), UKOPA Pipeline Product Loss Incidents and Faults Report (1962-2014), 2015)

The definition of a Major Accident Hazard Pipeline (MAHP) from the Pipelines Safety Regulations 1996 (PSR 96) includes various materials (e.g. including natural gas at >8 bar, flammable liquids, etc.). The pipeline may be above or below ground. Hence, this data is not exclusive to underground natural gas pipelines.

The number of Incidents reported in the UKOPA database are presented in Table 28. There were 9 out of 192 (4.7%) product loss incidents that resulted in ignition.

Table 28 Ignition Probability - UKOPA

Hole Size Class	Total Number of Incidents	Number of Incidents with Ignition	Total Ignition Probability	Total Ignition Probability
Full Bore and Above	7	1	0.14	0.09
110mm – Full Bore	4	0	0.0	
40mm – 110mm	7	1	0.14	0.03
20mm – 40mm	23	0	0.0	
6mm – 20mm	31	3	0.10	0.05
0 – 6mm	118	4	0.03	
Unknown	2	0	0.0	0.0
Total =	192	9	0.047	0.047

International Association of Oil & Gas Producers, Ignition Probabilities (Report 434-06), 2019 - Scenario 3: Gas or LPG Release from Onshore Pipeline in an Industrial or Urban Area)

The ignition data presented for Scenario 3 in the IOGP directory is applicable for releases of flammable gases (other than buried natural gas pipelines), vapours or liquids significantly above their normal (Normal Atmospheric Pressure (NAP)) boiling point from onshore cross-country pipelines running through industrial or urban areas.

For buried natural gas pipelines, IOGP recommends using the Acton & Baldwin correlation described in Appendix E.2.2.

E.2.2 Ignition Probability Data for Underground Cross-Country Pipelines – Natural Gas

Acton, M.R., Acton, O.J. and Robinson. C., A Review of Natural Gas Transmission Pipeline Incidents to Derive Ignition Probabilities for Risk Assessment, Hazards 26

An analysis of historical data for rupture incidents shows the ignition probability increases linearly with pd^2. The correlation derived for rupture releases takes the form:

$$P_{ign} = 0.0555 + 0.0137pd^2, 0 \leq pd^2 \leq 69$$

$$P_{ign} = 1\,, pd^2 > 69$$

P_{ign} = probability of ignition

p = pipeline operating pressure (bar)

d = pipeline diameter for ruptures (m)

The probability of ignition P_{ign}, calculated as detailed above, is then generally apportioned as 0.5 for immediate ignition and 0.5 for delayed ignition, where delayed ignition occurs after 30 seconds.

This correlation is for ignition by all causes and is applicable to underground cross-country pipelines carrying high pressure natural gas. It does not take the location of the pipeline (e.g. rural or urban) or the cause of failure (e.g. external) into consideration. The following data was combined to derive the correlation:

- Transmission pipeline incident data recorded between 1970 and 2004; and
- US Office of Pipeline Safety Office (OPS) data between 2002 and 2007.

The authors state that the total ignition probability for releases caused by external interference, such as excavating machinery, is much lower than releases caused by other means (viz. 0.11 vs. 0.34 for pipeline ruptures from 1970 to 2004).

For puncture releases (all causes), the same ignition probability relationship may be applied, with d equal to the release hole diameter and with the coefficient of the pd^2 value halved. This reflects the difference between the two sources contributing to the gas release following a rupture and the single source contributing to a puncture release.

Table 29 Ignition Probability – Acton & Baldwin

Pipeline Diameter (mm)	Operating Pressure (bar)	Equivalent Hole Diameter (mm)	pd^2	Total Ignition Probability	Probability of Immediate Ignition	Probability of Delayed Ignition
195.2	100	10	0.01	0.056	0.0278	0.0278
		25	0.06	0.056	0.0280	0.0280
		75	0.56	0.059	0.0297	0.0297
		110	1.21	0.064	0.0319	0.0319
		FBR	3.81	0.108	0.0539	0.0539

European Gas Pipeline Incident Data Group, Gas Pipeline Incidents, 9th Report of the European Gas Pipeline Incident Data Group (Period 1970 – 2013), 2015

Although the pipeline definition does not exclude above ground pipelines, the data is predominantly for underground natural gas transmission pipelines with a maximum operating pressure > 15 bar.

In the period 1970 - 2013, only 5% of the gas releases recorded as incidents in the EGIG database ignited.

Table 30 Ignition Probability – EGIG

Hole Size Class		Total Ignition Probability
Rupture (FB and Above)	All diameters	0.139
	<= 16 inches	0.103
	> 16 inches	0.32
Hole (>20 mm to FB)		0.023
Pinhole / Crack (Up to 20 mm)		0.044

UK Health and Safety Executive (HSE), Review of the Event Tree Structure and Ignition Probabilities used in HSE's Pipeline Risk Assessment Code MISHAP, Research Report (RR) 1034, 2015 - Typical Event Tree Probabilities for Natural Gas

The following data is proposed in RR 1034 for the UK HSE's computer program MISHAP. This program is used by the UK HSE to calculate the level of risk around Major Accident Hazard Pipelines (MAHPs), particularly in land use planning (LUP) assessments.

A MAHP may be above or below ground; however, the MISHAP model appears to be primarily for underground pipelines. The probabilities are not reported for varying hole sizes or operating pressures (i.e. are not release rate dependent) and appear to be only applicable for larger release events (i.e. ruptures).

For example, the literature cited in RR 1034 indicates an overall ignition probability between 0.2 and 0.5 for larger releases of natural gas, depending on the degree of confinement. On this basis, the total ignition probability proposed in RR 1034 for natural gas is 0.44.

It is reported in RR 1034 that the risk associated with VCE events is negligible because the development of MISHAP (and its predecessors) was based on areas with low congestion and confinement (e.g. rural pipelines), which are not conducive for creating the large flammable clouds required for a VCE. It is acknowledged in RR 1034 that this may require further review.

The proposed conditional probability value for delayed remote ignition is zero. It is reported in RR 1034 that this is "to take into account the reasoning that natural gas is unlikely to form a significant vapour cloud due to its buoyant nature".

Table 31 Ignition Probability – UK HSE (RR 1034)

Outcome	Probability of Outcome
Immediate ignition, fireball and jet fire	0.250
Delayed ignition and jet fire	0.188
Delayed ignition, flash fire and jet fire	0.000
No ignition	0.563

Note: Some of the sources cited in RR 1034 with an overall ignition probability between 0.2 and 0.5 are relatively old (c. mid 1980s - See below). This data would also appear to confirm that the total ignition probability proposed for natural gas in MISHAP is for a worst-case rupture event on a larger transmission pipeline.

Table 32 Ignition Probability – Data Cited by UK HSE (RR 1034)

Data source	Ignition Probability	
World-wide, Townsend & Fearnehough (1986)	Leaks	0.1
	Ruptures	0.5
US Gas, Jones (1986)	Ruptures	0.26
	All sizes	0.16
European Gas, European Gas Pipeline Incident Data Group (1988)	Pinholes / cracks	0.02
	Holes	0.03
	Ruptures < 16”	0.05
	Ruptures ≥ 16”	0.35
	All sizes	0.03

E.2.3 Ignition Probability Data for Underground Cross-Country Pipelines – Gases Other Than Natural Gas

UK Health and Safety Executive (HSE), Review of the Event Tree Structure and Ignition Probabilities used in HSE's Pipeline Risk Assessment Code MISHAP, Research Report (RR) 1034, 2015 - Typical Event Tree Probabilities for Flammable Gas other than Natural Gas

The following data is proposed in RR 1034 for the UK HSE's computer program MISHAP to calculate the level of risk around Major Accident Hazard Pipelines (MAHPs), particularly in land use planning (LUP) assessments (Refer to Table 33). A MAHP may be above or below ground; however, the MISHAP model appears to be primarily for underground pipelines. The probabilities are not reported for varying hole sizes and appear to be only applicable for larger release events.

For MISHAP, the risk associated with VCE events is negligible because the development of MISHAP (and its predecessors) was based on areas with low congestion and confinement (e.g. rural pipelines), which are not conducive for creating the large flammable clouds required by VCE. It is acknowledged in RR 1034 that this may require further review.

Table 33 Ignition Probability – UK HSE (RR 1034)

Outcome	Probability of Outcome		
	R12 Materials with a MIE < 0.2 mJ (1)	R12 Materials with a MIE ≥ 0.2 mJ (2)	R11 and Low Reactive Materials (3)
Immediate ignition, fireball and jet fire	0.350	0.300	0.250
Delayed ignition and jet fire	0.325	0.210	0.188
Delayed ignition, flash fire and jet fire	0.096	0.145	0.167
No ignition	0.229	0.345	0.396

(1) For example: ethylene

(2) For example: butane, ethane and propane

(3) For example: ammonia, carbon monoxide

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Draft Asbestos Management Policy

March 2026

Policy Administration

Dates	Policy approved 03/2026 This Policy is effective upon its approval Policy is due for review (up to 3 years) 03/2029
Approved by	Council Meeting on 23/03/2026
Policy Type	☒ Council Policy ☐ Executive Policy
Exhibition Period	3 September 2025 to 3 November 2025
Policy Owner	Environment, Health and Regulatory Services, Environment and Planning Directorate
Related Documents	Appendix F – Asbestos-related legislation, policies, and standards
Appendices	Appendix A – General information and guidance Appendix B – Further information Appendix C – Acronyms Appendix D – Relevant contacts Appendix E – Waste management facilities that accept asbestos Appendix F – Asbestos-related legislation, policies and standards Appendix G – Agencies roles and responsibilities Appendix H – Scenarios illustrating agencies lead response in NSW Appendix I – Asbestos containing materials Appendix J – Asbestos licences Appendix K – Naturally Occurring Asbestos Map
References & Legislation	See Appendix F
Document Identifier	Policy #: Doc No. D25/192694
Breaches of Policy	Breaches of any policy will be dealt with and responded to in accordance with adopted codes and/or relevant legislation
Record Keeping	All documents and information obtained in relation to the implementation of this policy will be kept in accordance with the NSW State Records Act 1998, Georges River Council's Corporate Records Policy and adopted internal procedures.

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Background

This Policy was formulated to be consistent with Council's legislative obligations and within the scope of Council's powers. This policy should be read in conjunction with relevant legislation, guidelines and codes of practice. In the case of any discrepancies, the most recent legislation should prevail.

This Policy is based upon the revised Model Asbestos Policy for NSW Councils (released 2015) which was developed and released by the Local Government and Shires Associations of NSW (LGSA) together with the Heads of Asbestos Coordination Authorities (HACA) in November 2012 to promote a consistent Local Government approach to asbestos management across NSW.

The 2012 'Model Asbestos Policy for NSW Councils' policy was reviewed and revised by HACA and issued in November 2015.

- This Policy does not constitute legal advice. Legal advice should be sought in relation to particular circumstances and liability will not be accepted for losses incurred as a result of reliance on this policy.

Introduction

Georges River Council acknowledges the serious health hazard of exposure to asbestos.

In Australia, asbestos was gradually phased out of building materials in the 1980s and the supply and installation of asbestos containing goods has been prohibited since 31 December 2003. Yet asbestos legacy materials still exist in many homes, buildings and other assets and infrastructure. It is estimated that one in three Australian homes contains asbestos. Several homes, sheds, structures and buildings throughout the Georges River Local Government Area (LGA) may contain asbestos.

Where material containing asbestos is in a non-friable form (that is, cannot be crushed by hand into a powder), undisturbed and painted or otherwise sealed, it may remain safely in place. However, where asbestos containing material is broken, damaged, disturbed or mishandled, fibres can become loose and airborne posing a risk to health. Breathing in dust containing asbestos fibres can cause asbestosis, lung cancer and mesothelioma.

It is often difficult to identify the presence of asbestos by sight. Where a material cannot be identified or is suspected to be asbestos, it is best to assume that the material is asbestos and take appropriate precautions. Further information about asbestos and the health impacts of asbestos can be found in Appendix A and website links to additional information are provided in Appendix B.

Council has an important dual role in minimising exposure to asbestos, as far as is reasonably practicable, for both:

- residents and the public within the Local Government Area (LGA)
- workers (employees and other persons) in council workplaces.

Council's legislative functions for minimising the risks from asbestos apply in various scenarios including:

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- as a Person Conducting a Business or Undertaking (PCBU) in NSW
- contaminated land management
- council land, building and asset management
- emergency response
- land use planning (including development approvals and demolition)
- management of naturally occurring asbestos
- regulation of activities (non-work sites)
- waste management and regulation.

Purpose

This Policy aims to outline:

- the role of Council and other organisations in managing asbestos;
- Council's relevant regulatory powers;
- Council's approach to dealing with naturally occurring asbestos, sites contaminated by asbestos and emergencies or incidents
- general advice for residents on renovating homes that may contain asbestos;
- Council's development approval process for developments that may involve asbestos and conditions of consent;
- waste management and regulation procedures for asbestos waste in the LGA;
- Council's approach to managing asbestos containing materials in Council workplaces; and
- sources of further information.

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Scope

This Policy applies to all of the Georges River LGA within Council's jurisdiction.

The Policy provides information for Council workers, the local community and wider public.

Part 1 of the policy includes the sections that are likely to be of most interest to the local community and wider public.

Part 2 is information that applies to workers associated with Council including employees, contractors, consultants, and volunteers (as defined by the current NSW *Work Health and Safety Regulation)*. Definitions for key terms used in the policy are provided in Definition of Terms and acronyms are listed in Appendix C.

The policy applies to friable and non-friable (bonded) asbestos within the LGA.

The policy outlines Council's commitment and responsibilities in relation to safely managing asbestos and contains general advice. For specific advice, individuals are encouraged to contact Council or the appropriate organisation (contact details are listed in Appendix D).

The policy does not provide detail on specific procedures. Practical guidance on how to manage risks associated with asbestos and asbestos containing material can be found in the:

- Code of practice on how to manage and control asbestos in the workplace (catalogue no. WC03560) published by SafeWork NSW.
- Code of practice on how to safely remove asbestos published by SafeWork NSW (catalogue no. WC03561) published by SafeWork NSW.
- Additional guidance material listed in Appendix B.
- Detailed information on Council's procedures and plans may be found in other documents, which are referenced in part 2 under section 16.1.

Definition of Terms

The terms used in the policy are defined as below, consistent with the definitions in the:

- Code of practice on how to manage and control asbestos in the workplace (catalogue no. WC03560) published by SafeWork NSW
- *Code of practice on how to safely remove asbestos* (catalogue no. WC03561) published by SafeWork NSW
- Contaminated Land Management Act 1997
- Environmental Planning and Assessment Act 1979
- Emergency Pollution and Orphan Waste Clean-Up Program Guidelines 2013
- Protection of the Environment Operations Act 1997
- Waste classification guidelines part 1 classifying waste 2008
- NSW Work Health and Safety Act 2011
- NSW Work Health and Safety Regulation 2011.

Term	Meaning
Accredited certifier	In relation to matters of a particular kind, means the holder of a certificate of accreditation as an accredited certifier under the *Building Professionals Act 2005* in relation to those matters.
Airborne asbestos	Any fibres of asbestos small enough to be made airborne. For the purposes of monitoring airborne asbestos fibres, only respirable fibres are counted.
Asbestos	The asbestiform varieties of mineral silicates belonging to the serpentine or amphibole groups of rock forming minerals including the following: • actinolite asbestos • grunerite (or amosite) asbestos (brown) • anthophyllite asbestos • chrysotile asbestos (white) • crocidolite asbestos (blue) • tremolite asbestos

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Term	Meaning
	• a mixture that contains 1 or more of the minerals referred to in paragraphs (a) to (f).
Asbestos containing material (ACM)	Any material or thing that, as part of its design, contains asbestos.
Asbestos-contaminated dust or debris (ACD)	Dust or debris that has settled within a workplace and is, or is assumed to be, contaminated with asbestos.
Asbestos-related work	Work involving asbestos that is permitted under the *Work Health and Safety Regulation 2011*, other than asbestos removal work.
Asbestos removal licence	Class A asbestos removal licence or a Class B asbestos removal licence. asbestos removal work means: (a) work involving the removal of asbestos or asbestos containing material, or (b) Class A asbestos removal work or Class B asbestos removal work.
Asbestos removalist	A person conducting a business or undertaking who carries out asbestos removal work.
Asbestos waste	Any waste that contains asbestos. This includes asbestos or asbestos containing material removed and disposable items used during asbestos removal work including plastic sheeting and disposable tools.
Certifying authority	A person who is authorised by or under section 85A of the *Environmental Planning and Assessment Act 1979* to issue complying development certificates or is authorised by or under section 109D of the *Environmental Planning and Assessment Act 1979* to issue part 4A certificates.
Class A asbestos removal licence	A licence that authorises the carrying out of Class A asbestos removal work and Class B asbestos removal work by or on behalf of the licence holder.
Class A asbestos removal work	The removal of friable asbestos which must be licensed under clause 485 of the *Work Health and Safety Regulation 2011*. This does not include: the removal of ACD that is associated with the removal of non-friable asbestos, or ACD that is not associated with the removal of friable or non-friable asbestos and is only a minor contamination.
Class B asbestos removal licence	A licence that authorises the carrying out of Class B asbestos removal work by or on behalf of the licence holder.

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Term	Meaning
Class B asbestos removal work	The removal of more than 10 square metres of non-friable asbestos or asbestos containing material work that is required to be licensed under clause 487 but does not include Class A asbestos removal work.
Competent person	A person who has acquired through training or experience the knowledge and skills of relevant asbestos removal industry practice and holds: (a) a certification in relation to the specified VET course for asbestos assessor work, or (b) a tertiary qualification in occupational health and safety, occupational hygiene, science, building, construction or environmental health.
Complying development	A fast track, 10-day approval process where a building meets all of the predetermined standards established in either a state or local council planning document. A complying development certificate can be issued by either a local council or an accredited certifier.
Contaminant	Any substance that may be harmful to health or safety.
Contamination of land	The presence in, on or under the land of a substance at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment.
Control measure	In relation to a risk to health and safety, a measure to eliminate or minimise the risk.
Demolition work	Work to demolish or dismantle a structure, or part of a structure that is loadbearing or otherwise related to the physical integrity of the structure, but does not include: (a) the dismantling of formwork, falsework, or other structures designed or used to provide support, access or containment during construction work, or (a) the removal of power, light or telecommunication poles. development means: (b) the use of land (c) the subdivision of land (d) the erection of a building (e) the carrying out of a work (f) the demolition of a building or work (g) any other act, matter or thing referred to in section 26 of the *Environmental Planning and Assessment Act 1979* that is controlled by an environmental planning instrument.

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Term	Meaning
Development application	An application for consent under part 4 of the *Environmental Planning and Assessment Act 1979* to carry out development but does not include an application for a complying development certificate.
Emergency service organisation	Includes any of the following: (a) the Ambulance Service of NSW (b) Fire and Rescue NSW (c) the NSW Rural Fire Service (d) the NSW Police Force (e) the State Emergency Service (f) the NSW Volunteer Rescue Association Inc (g) the NSW Mines Rescue Brigade established under the Coal Industry Act 2001 (h) an accredited rescue unit within the meaning of the State Emergency and Rescue Management Act 1989.
Exempt development	Minor development that does not require any planning or construction approval because it is exempt from planning approval.
Exposure standard for asbestos	A respirable fibre level of 0.1 fibres/ml of air measured in a person's breathing zone and expressed as a time weighted average fibre concentration calculated over an eight-hour working day and measured over a minimum period of four hours in accordance with the Membrane Filter Method or a method determined by the relevant regulator.
Friable asbestos	Material that: (a) is in a powder form or that can be crumbled, pulverised or reduced to a powder by hand pressure when dry (b) contains asbestos.
Health	Physical and psychological health.
Health monitoring	Of a person, monitoring the person to identify changes in the person's health status because of exposure to certain substances.
Independent	In relation to clearance inspections and air monitoring: (a) not involved in the removal of the asbestos (b) not involved in a business or undertaking involved in the removal of the asbestos, in relation to which the inspection or monitoring is conducted.
In situ asbestos	Asbestos or asbestos containing material fixed or installed in a structure, equipment or plant, but does not include naturally occurring asbestos.

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Term	Meaning
Licence holder	In the case of an asbestos assessor licence – the person who is licensed: (a) to carry out air monitoring during Class A asbestos removal work (b) to carry out clearance inspections of Class A asbestos removal work • to issue clearance certificates in relation to Class A asbestos removal work, or • in the case of an asbestos removal licence – the person conducting the business or undertaking to whom the licence is granted, or • in the case of a major hazard facility licence – the operator of the major hazard facility to whom the licence is granted or transferred.
Licensed asbestos assessor	A person who holds an asbestos assessor licence.
Licensed asbestos removalist	A person conducting a business or undertaking who is licensed under the *Work Health and Safety Regulation 2011* to carry out Class A asbestos removal work or Class B asbestos removal work.
Licensed asbestos removal work	Asbestos removal work for which a Class A asbestos removal licence or Class B asbestos removal licence is required.
NATA	The National Association of Testing Authorities, Australia.
NATA-accredited laboratory	A testing laboratory accredited by NATA or recognised by NATA either solely or with someone else.
Naturally occurring asbestos	The natural geological occurrence of asbestos minerals found in association with geological deposits including rock, sediment or soil.
Non-friable asbestos	Material containing asbestos that is not friable asbestos, including material containing asbestos fibres reinforced with a bonding compound. Note**.** Non-friable asbestos may become friable asbestos through deterioration (see definition of friable asbestos).
Occupational hygienist	A person with relevant qualifications and experience in asbestos management who is a full member of the Australian Institute of Occupational Hygienists (AIOH).
Occupier	Includes a tenant or other lawful occupant of premises, not being the owner.
Officer	An officer as defined in the NSW *Work Health and Safety Act 2011.*
Orphan waste	Materials that have been placed or disposed of on a premises unlawfully that may have the potential to pose a risk to the environment or public health.

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Term	Meaning
Person conducting a business or undertaking	A 'person' is defined in laws dealing with interpretation of legislation to include a body corporate (company), unincorporated body or association and a partnership.
Personal protective equipment	Anything used or worn by a person to minimise risk to the person's health and safety, including air supplied respiratory equipment.
Respirable asbestos fibre	An asbestos fibre that: (a) is less than three micrometres wide (b) more than five micrometres long (c) has a length to width ratio of more than 3:1. specified VET course means: • in relation to Class A asbestos removal work – the following VET courses: • remove non-friable asbestos • remove friable asbestos, or • in relation to Class B asbestos removal work – the VET course Remove non-friable asbestos, or • in relation to the supervision of asbestos removal work – the VET course Supervise asbestos removal, or • in relation to asbestos assessor work – the VET course Conduct asbestos assessment associated with removal.
Structure	Anything that is constructed, whether fixed or moveable, temporary or permanent, and includes: (a) buildings, masts, towers, framework, pipelines, transport infrastructure and underground works (shafts or tunnels) (b) any component of a structure (c) part of a structure (d) volunteer means a person who is acting on a voluntary basis (irrespective of whether the person receives out-of-pocket expenses).
Waste	Includes: • any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment, or • any discarded, rejected, unwanted, surplus or abandoned substance, or • any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance, or • any process, recycled, re-used or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations, or • any substance prescribed by the regulations made under the Protection of the Environment Operations Act 1997 to be waste.

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Term	Meaning
Waste facility	Any premises used for the storage, treatment, processing, sorting or disposal of waste (except as provided by the regulations).
Worker	A person is a worker if the person carries out work in any capacity for a person conducting a business or undertaking, including work as: (a) an employee, or (b) a contractor or subcontractor, or (c) an employee of a contractor or subcontractor, or (d) an employee of a labour hire company who has been assigned to work in the person's business or undertaking, or (e) an outworker, or (f) an apprentice or trainee, or (g) a student gaining work experience, or (h) a volunteer, or (i) a person of a prescribed class.
Workplace	A workplace is a place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work. Place includes: a vehicle, vessel, aircraft or other mobile structure, and any waters and any installation on land, on the bed of any waters or floating on any waters.

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Policy Statement

1. Roles and Responsibilities of Council

1.1 Educating residents

Council shall assist residents to access appropriate information and advice on the:

- prohibition on the use and re-use of asbestos containing materials
- requirements in relation to development, land management and waste management
- risks of exposure to asbestos
- safe management of asbestos containing materials
- safe removal and disposal of minor quantities of asbestos containing materials.

Educational information and website links for educational materials can be found in Appendices A and B.

The responsibility for actioning these roles is with the Environment and Planning Directorate and specifically the Development and Building Section and Environmental Health, Parking and Rangers and Environmental Sustainability and Waste Units of the Environment, Health and Regulatory Services Section.

1.2 Managing Public Land

- Council is responsible for managing public land and land contaminated with asbestos as outlined in section 4.
- The responsibility for actioning this role is with the Assets and Infrastructure Directorate and specifically the City Operational Services and City Technical Services Sections.

1.3 Managing Waste

- Where Council is the appropriate regulatory authority, Council is responsible for:
- Issuing clean up notices to address illegal storage or disposal of asbestos waste or after an emergency or incident (under the *Protection of the Environment Operations Act 1997).*
- Issuing prevention or clean up notices where asbestos waste has been handled (including stored, transported or disposed of) in an unsatisfactory manner (under the *Protection of the Environment Operations Act 1997).*
- Issuing fines for improper transport of asbestos (under the *Protection of the Environment Operations Act 1997).*
- Applying planning controls to proposals to dispose of asbestos waste on-site, seeking advice from the NSW Environment Protection Authority (EPA) on this matter and making notation on planning certificates (section 10.7 certificates) where on-site disposal is permitted.
- Contracting a private business that operates a licensed landfill facility/facilities that accepts asbestos waste.

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- Waste facilities that may be licensed to accept asbestos waste are listed in Appendix E.
- The responsibility for actioning these roles is with the Environment and Planning Directorate and specifically the Development and Building Section and Environmental Health, Parking and Rangers and Environmental Sustainability and Waste Units of the Environment, Health and Regulatory Services Section.

1.4 Regulatory Responsibilities

Council has regulatory responsibilities under the following legislation, policies and standards in situations where council is the appropriate regulatory authority or planning authority:

- *Contaminated Land Management Act 1997 (NSW)*
- *Environmental Planning and Assessment Act 1979 (NSW)*
- Environmental Planning and Assessment Regulation 2021 (NSW)
- *Local Government Act 1993 (NSW)*
- *Protection of the Environment Operations Act 1997 (NSW)*
- Protection of the Environment Operations (General) Regulation 2022 (NSW)
- Protection of the Environment Operations (Waste) Regulation 2014 (NSW)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008
- State Environmental Planning Policy (Resilience and Hazards) 2021
- Demolition work code of practice 2015 (catalogue no. WC03841).

Additional legislation, policies and standards relating to the safe management of asbestos are listed in Appendix F.

The responsibility for actioning these roles is with the Environment and Planning Directorate and specifically the Development and Building Section and Environmental Health, Parking and Rangers, Development Compliance and Environmental Sustainability and Waste Units of the Environment, Health and Regulatory Services Section.

The situations in which council has a regulatory role in the safe management of asbestos are listed in Table 1.

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Table 1: Situations in which council has a regulatory role in managing asbestos

Issue	Council's role and Business Unit responsible	Section of policy
Contaminated land	Record known asbestos site contamination on section 10.7 certificates where practicable, (Strategic Planning Section) and for council workplaces, record on council's asbestos register (City Operational Services Section). Notify stakeholders of land use planning policy requirements relating to contamination. (Development and Building Section - Development Assessment Unit and Advisory and Specialist Assessment Unit) Manage residential asbestos contaminated land that is not declared 'significantly contaminated' under the *Contaminated Land Management Act 1997* (excluding oversight of removal or remediation work which is the role of SafeWork NSW). (Environment, Health and Regulatory Services Section – Environmental Health Unit)	Section 4
Development assessment	Assess development applications for approval under the *Environmental Planning and Assessment Act 1979*. (Development and Building Section - Development Assessment Unit and Advisory and Specialist Assessment Unit) Set conditions of consent for renovations, alterations, additions, demolitions or other developments requiring consent and which may involve disturbance of asbestos containing materials. (Development and Building Section - Development Assessment Unit and Advisory and Specialist Assessment Unit) Ensure compliance with development conditions. (Environment, Health and Regulatory Services Section – Compliance Unit) Apply conditions relating to development involving friable and non-friable asbestos material under the relevant legislation and planning codes and as outlined in section 9. (Development and Building Section - Development Assessment Unit and Advisory and Specialist Assessment Unit)	Section 7
Demolition	Approve demolition under the Environmental Planning and Assessment Act 1979. (Development and Building Section - Development Assessment Unit and Advisory and Specialist Assessment Unit) Council certifiers approve development as complying development under the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008. (Development and Building Section – Building Certification Unit)	Section 7
Emergencies and incidents	Regulate the clean-up of asbestos waste following emergencies where sites are handed over to the council or a local resident by an emergency service organisation (excluding oversight of licensed removal or remediation work which is the role of SafeWork NSW). (Environment, Health and Regulatory Services Section – Environmental Health Unit) Council may consider the need to issue a clean-up notice, prevention notice or cost compliance notice under the *Protection of the Environment Operations Act 1997*.	Section 5
Naturally occurring asbestos	Verify compliance with environmental planning and assessment legislation for development applications that could disturb naturally occurring asbestos. Prepare an asbestos management plan for council workplaces or road works which occur on land containing naturally occurring asbestos.	Section 3

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Issue	Council's role and Business Unit responsible	Section of policy
	Note – No responsibility has been assigned as there is no know locations within the LGA where naturally occurring asbestos if present.	
Residential premises	Respond to any public health risks (risks to council workers and wider public) relating to the removal of asbestos containing materials or asbestos work at residential properties that does not involve a business or undertaking. (Council workers – People and Culture Section – Work Health and Safety Unit, Public - Environment, Health and Regulatory Services Section – Environmental Health Unit) Respond to complaints about unsafe work at a residential property that is undertaken by a resident (not a worker, which is the role of SafeWork NSW). (Environment, Health and Regulatory Services Section – Environmental Health Unit) Respond to public health risks posed by derelict properties or asbestos materials in residential settings. (Environment, Health and Regulatory Services Section – Environmental Health Unit)	Section 7
Waste	Regulate in cooperation with the NSW EPA any non-complying transport of asbestos containing materials. (Environment, Health and Regulatory Services Section – Environmental Sustainability and Waste Unit) Investigate reports and collect/remove instances of illegally dumped asbestos on public land throughout the LGA (Environment, Health and Regulatory Services Section – Parking and Rangers Unit)	Section 8

1.5 Responsibilities to Workers

Council is committed to fulfilling its responsibilities to workers under the NSW *Work Health and Safety Act 2011* and NSW *Work Health and Safety Regulation 2017* and maintaining a safe work environment through council's:

- The elimination and mitigation of risk so far as is reasonably practicable
- general responsibilities
- education, training and information for workers
- health monitoring for workers
- Instructions for identifying and managing asbestos containing materials in council premises are outlined in Part 2 of this document under section 10.

2. Other Stakeholders involved in Managing Asbestos

Council is committed to working collaboratively with other government agencies and where appropriate, other stakeholders as needed to respond to asbestos issues.

Appendix D notes useful contacts and Appendix G notes agencies involved in managing asbestos. Various asbestos scenarios requiring stakeholders to work together are outlined in Appendix H.

Part 1 – Asbestos in the Local Government Area: Information for the community

3. Naturally Occurring Asbestos

There is no natural occurring asbestos (NOA) within the Georges River Council LGA as confirmed by NSW Government Mapping of naturally occurring asbestos in NSW and supported by Appendix K – Naturally Occurring Asbestos Map.

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Council is not aware of any naturally occurring asbestos in the LGA and will continue monitoring materials dumped in the LGA to ensure they do not contain NOA. When NOA is identified it will be removed in line with section 12.2 of this policy.

3.1 Responsibilities for naturally occurring asbestos

For naturally occurring asbestos that will remain undisturbed by any work practice, council is the lead regulator.

Where development applications propose activities that may disturb areas of naturally occurring asbestos (such as excavation), any consent or approval may contain conditions requiring testing to determine if asbestos is present, and the development of an asbestos management plan if the testing reveals naturally occurring asbestos is present. Council will verify compliance with environmental planning and assessment legislation and together with the EPA and SafeWork NSW and may coordinate enforcement where non-compliance is suspected.

Where naturally occurring asbestos will be disturbed due to a work process, including roadwork, excavation and remediation work, SafeWork NSW is the lead regulator. Requirements for workplaces are summarised in the naturally occurring asbestos fact sheet (catalogue no. WC03728) published by SafeWork NSW. Where naturally occurring, asbestos is part of a mineral extraction process, the NSW Department of Industry is the lead regulator.

3.2 Managing naturally occurring asbestos

Where naturally occurring, asbestos is encountered or suspected, the risk from disturbance of the naturally occurring asbestos should be assessed by an occupational hygienist.

The management of naturally occurring asbestos that stays in its natural state is not prohibited if managed in accordance with an asbestos management plan. Requirements for risk management, asbestos management plans and provisions for workers are outlined in the Naturally occurring asbestos fact sheet (catalogue no. WC03728) published by SafeWork NSW. The SafeWork NSW website provides further information on naturally occurring asbestos and supporting documents on what people can do to avoid contact with naturally occurring asbestos.

3.2.1 Management of naturally occurring asbestos by council

Council will aim to prevent the exposure of workers and the public to any naturally occurring asbestos that is known or discovered in the council workplace.

If naturally occurring asbestos is discovered in the LGA, council will develop risk controls, an asbestos management plan in relation to the naturally occurring asbestos in the council workplace and provide guidance materials where necessary.

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4. Contamination of Land with Asbestos

Background information on contamination of land with asbestos and potential disturbance of asbestos contaminated sites can be found in Appendix A under Definition of Terms and Responsibilities. The nature of asbestos contamination of land can vary significantly and there can be a number of different mechanisms available to address this contamination depending upon its source and extent.

4.1 Responsibilities for Contaminated Land

Responsibility for cleaning up contaminated land lies with the person responsible for contaminating the land or the relevant landowner.

Council may issue a clean-up notice to the occupier of premises at or from which council reasonably suspects that a pollution incident has occurred, or is occurring, requiring asbestos waste to be removed (under part 4.2 of the *Protection of the Environment Operations Act 1997*).

Council may also issue prevention notices (under part 4.3 of the Protection of the Environment Operations Act 1997) to ensure good environmental practice. If a person does not comply with a prevention notice given to the person, council employees, agents or contractors may take action to cause compliance with the notice.

Any reasonable costs incurred by council in monitoring or enforcing clean up and prevention notices may be recovered through a compliance cost notice (under part 4.5 of the Protection of the Environment Operations Act 1997). Council shall keep records of: tasks undertaken; the hours council employees have spent undertaking those tasks; and expenses incurred.

During site redevelopment council will consider contamination with asbestos containing materials in the same way as other forms of contamination as stipulated by the *Environmental Planning and Assessment Act 1979*. That is, council will apply the general requirements of *State Environmental Planning Policy (Resilience and Hazards) 2021 and the Managing Land Contamination: Planning Guidelines SEPP (Resilience and Hazards) 2021*.

Council provides information about known land contamination on planning certificates (issued under section 10.7 of the *Environmental Planning and Assessment Act 1979*) as outlined in section 4.2.

For sites that are ‘significantly contaminated’ and require a major remediation program independent of any rezoning or development applications, the EPA and SafeWork NSW are the lead regulatory authorities as outlined in Appendix A.

The management of council workplaces contaminated with asbestos is outlined in section 12.4.

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4.2 Finding out if land is contaminated

A person may request from council a planning certificate containing advice on matters including whether council has a policy to restrict the use of land due to risks from contamination. Certificates are issued under section 10.7(2) of the *Environmental Planning and Assessment Act 1979*.

Factual information relating to past land use and other matters relevant to contamination may also be provided, even when land use is not restricted. When council receives a request for a certificate under section 10.7(2), it may also inform applicants of any further information available under section 10.7(5). Council may also use section 10.7(5) certificates to record other information, particularly anything else of a factual nature about contamination which council deems appropriate (such as details of land history, assessment, testing and remediation).

Council records can only indicate known contaminated sites. Any site may potentially be contaminated.

4.3 Duty to report Contaminated Land

A person whose activities have contaminated land or a landowner whose land has been contaminated is required to notify the EPA when they become aware of the contamination (under section 60 of the *Contaminated Land Management Act 1997*). Situations where this is required are explained in the document: *Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997*.

The EPA will inform council of contaminated land matters relating to the LGA as required under section 59 of the *Contaminated Land Management Act 1997*.

4.4 Derelict Buildings

Concerns regarding potential health risks from derelict properties may be directed to council. Derelict properties include abandoned buildings, fire damaged buildings and otherwise dilapidated buildings. Where derelict properties contain friable asbestos and asbestos is exposed, either from human activities or weathering, this poses a potential risk to public health.

Council may manage derelict properties that pose a demonstrable public health risk using a range of regulatory tools according to the particular circumstances.

Council may issue a clean-up notice or prevention notice and compliance cost notice as noted in section 4.1.

Council may also order a person to demolish or remove a building if the building is so dilapidated as to present harm to its occupants or to persons or property in the neighbourhood (under Schedule 5, Part 1, Order 3) of the *Environmental Planning and Assessment Act 1979*).

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An Order may require immediate compliance with its terms in circumstances which the person who gives the order believes constitute a serious risk to health or safety or an emergency Schedule 5, Part 4, clause 27 (2) of the *Environmental Planning and Assessment Act 1979*).

If a person fails to comply with the terms of an order, council may act under Schedule 5, Part 4, clause 33 of the *Environmental Planning and Assessment Act 1979* to give effect to the terms of the order, including the carrying out of any work required by the order.

If the derelict building is on a site that is a workplace, then SafeWork NSW is the lead agency responsible for ensuring that asbestos is removed by appropriately licensed removalists.

5. Responding to Emergencies and Incidents

Emergencies and incidents such as major collapses, cyclones, explosions, fires, storms, or vandalism can cause damage to buildings or land that contain asbestos. This may include working with state agencies in accordance with the NSW Asbestos Emergency Plan and the Disaster Assistance Guidelines. This can create site contamination issues and potentially expose emergency service workers and the wider public to asbestos. Emergencies or incidents can arise from natural hazards, or from accidental or deliberate human activities including criminal activity.

5.1 Responsibilities in the clean up after an emergency or incident

Council may play a role in ensuring that asbestos containing materials are cleaned up after an emergency or incident. If the emergency or incident occurs at a workplace, SafeWork NSW is the lead agency.

Council may issue a clean-up, prevention, cost compliance or penalty infringement notice as outlined in section 1.3 and section 4.1.

Alternatively, council may act under the *Environmental Planning and Assessment Act 1979* as outlined in section 4.4 of this policy.

Council will determine an appropriate response depending on the nature of the situation.

This may include to:

- Seek advice from an occupational hygienist on the likely level of risk and appropriate controls required.
- Liaise with or consult the appropriate agencies.
- Inform emergency personnel of any hazards known to council as soon as practicable.
- Follow the Code of practice on how to safely remove asbestos (catalogue no. WC03561) published by SafeWork NSW.
- Ensure that any council workers attending the site have appropriate training and are wearing appropriate personal protective equipment.

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- Council workers required to remove small quantities of bonded asbestos are trained and do not remove more than 10 square meters. They are prohibited from removing friable asbestos.
- Exclude the public from the site.
- Inform the public of the potential sources of exposure to asbestos, health risks and emergency management response.
- Minimise the risks posed by any remaining structures (see section 4.4).
- or issuing a clean-up or prevention notice (as outlined in section 4.4) to ensure asbestos containing materials are removed for disposal.
- Ensure that the site is kept damp, at all times or sprayed with PVA glue, particularly where friable asbestos is present, if considered appropriate (noting that in some instances this may not be appropriate, for example if there are live electrical conductors or if major electrical equipment could be permanently damaged or made dangerous by contact with water).
- Ensure that asbestos containing materials are disposed of at a facility licensed to accept asbestos waste and sight proof of appropriate disposal through weighbridge dockets or similar documentation.

5.2 Advice to the public regarding clean up after an emergency or incident

During a clean up after an emergency or incident, the possibility of neighbours being exposed to asbestos fibres may be very low if precautions are taken to minimise the release and inhalation of asbestos dust and fibres.

As a precautionary measure, where council is involved in a clean-up, council may consider advising those in neighbouring properties to:

- avoid unnecessary outdoor activity and do not put any laundry outside during the clean-up.
- close all external doors and windows and stay indoors during the clean-up.
- consider avoiding using air conditioners that introduce air from outside into the home during the clean-up.
- dispose of any laundry that may have been contaminated with asbestos as asbestos waste after the clean-up (advice on disposing of asbestos waste is provided in section 8).
- use a low-pressure hose on a spray configuration to remove visible dust from pathways after the clean-up.
- wipe dusty surfaces with a damp cloth and bag and dispose of the cloth as asbestos waste after the clean-up (advice on disposing of asbestos waste is provided in section 8).
- any other measures recommended by an occupational hygienist following assessment of the situation.

6. Council's Process for Changing Land Use

Council recognises the need to exercise care when changing zoning for land uses, approving development or excavating land due to the potential to uncover known or unknown asbestos material from previous land uses (for example, where a site has previously been used as a landfill or for on-site burial of asbestos waste).

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State Environmental Planning Policy (Resilience and Hazards) 2021 states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed.

Managing sites contaminated with asbestos material is addressed in section 4.

7. Council's Process for Assessing Development

This section applies to development applications assessed under the *Environmental Planning and Assessment Act 1979* and complying development applications assessed under the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* or council's complying codes (see section 7.5.2). This includes alterations and additions to residential development, which may include internal work as well as extensions to the existing main structure, or changes to outbuildings, sheds or garages.

This section also covers renovations that do not require development consent or a complying development certificate. Development consent is not required to maintain an existing structure. For example, the replacement of windows, doors and ceilings may involve the removal of asbestos but is categorised as exempt development under the *Environmental Planning and Assessment Act 1979* and does not require development consent. In these instances, council has an educative role in providing owners and occupiers with advice and information about the identification and safe management of asbestos.

7.1 Responsibilities for approving development

Council is the consent authority for the majority of development applications in the LGA. The Sydney South Planning Panel (SSPP) which is the current authority for the Georges River Council (GRC) Local Government Area, is also consent authority for certain local or regional development. Council may have representation on the SSPP.

Council or the SSPP may impose conditions of consent and a waste disposal policy to a development consent to ensure the safe removal of asbestos, where asbestos has been identified or may be reasonably assumed to be present.

Either council or a private certifier may assess a complying development certificate. Where a private certifier is engaged to assess a complying development certificate, the private certifier is responsible for ensuring that the proposed development activities include adequate plans for the safe removal and disposal of asbestos.

This also applies to the demolition of buildings. Certifiers are able to issue a complying development certificate under the Demolition Code of the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*. Further information on demolition is provided in section 7.4.

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When a private certifier issues a complying development certificate and is appointed as the Principal Certifying Authority for the development it is the certifier's responsibility to follow up to ensure that works including asbestos handling, removal and disposal if present, are carried out appropriately in accordance with the *Environmental Planning and Assessment Regulation 2021* (clause 152). Compliance is covered in section 7.7.

7.2 Providing advice to home owners, renovators and developers

Council is committed to providing information to minimise the risks from asbestos in the LGA. Information is provided below and in Appendix A. Appendix B lists additional sources of information on how to deal safely with the risks of asbestos and Appendix I lists asbestos containing products that may be found around the home.

The key points are:

- Before any renovation, maintenance or demolition work is carried out, any asbestos or asbestos containing materials should be identified (refer to section 7.3).
- Where a material cannot be identified or it is suspected to be asbestos, it is best to assume that the material is asbestos and take appropriate precautions.
- If asbestos containing materials can be maintained in good condition it is recommended that they be safely contained, left alone and periodically checked to monitor their condition, until demolition or redevelopment.
- If asbestos materials cannot be safely contained, they should be removed as outlined in section 7.4.
- For demolition or redevelopment, any asbestos containing materials should be safely removed and disposed of prior to the work commencing.

Anyone who is undertaking renovations themself without a contractor is encouraged to refer to Appendices A and B for more information and contact council where they require further advice or clarification. Anyone engaging an asbestos removal contractor may contact SafeWork NSW with any queries as SafeWork NSW regulates asbestos removal by workers (as explained in section 7.4). Contact details for council and SafeWork NSW are provided in Appendix D.

7.3 Identifying Asbestos

Information on common places where asbestos is likely to be found in residential, commercial and industrial premises with materials from prior to 2004 on the premises is provided in Appendix A.

A person may apply to council for a planning certificate (called a section 10.7 certificate) for the relevant land. Council may provide information on a planning certificate including whether council has a policy to restrict the use of land due to risks from asbestos contamination, as outlined in section 4.2.

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Council aims to ensure that records are, as far as possible, accurate. In some instances, council may not have up-to-date information about asbestos for a property. A general guide to the likelihood of asbestos presence based on building age is provided in Appendix A.

The most accurate way to find out if a building or structure contains asbestos is to obtain an asbestos inspection by a person competent in the identification and assessment of asbestos, such as an occupational hygienist (a competent person is defined by the NSW *Work Health and Safety Regulation 2017*).

This is highly advisable before undertaking major renovations to buildings constructed or containing materials from prior to 2004.

Property owners and agents are encouraged to inform any tenants or occupiers of the presence of asbestos and to address any potential asbestos hazards where appropriate.

Property owners who let their properties out are required to identify any asbestos within those properties before any work is carried out (this includes residential properties).

The *Work Health and Safety Regulation 2017* states that the person conducting a business or undertaking in any building constructed before 31 December 2003 must identify if there is any asbestos in the building.

All commercial properties that contain asbestos must have and maintain a current asbestos register and asbestos management plan.

7.4 Removing Asbestos, Refurbishments and Demolitions

7.4.1 Removing asbestos at domestic premises

If development is undertaken by contractors, as is the case with a lot of home renovations, then the work is considered to be at a workplace and is regulated by SafeWork NSW under the *NSW Work Health and Safety Regulation 2017*. This requires that a person conducting a business or undertaking who is to carry out refurbishment or demolition of residential premises must ensure that all asbestos that is likely to be disturbed by the refurbishment or demolition is identified and, so far as reasonably practicable, is removed before the refurbishment or demolition is commenced.

Depending on the nature and quantity of asbestos to be removed, a licence may be required to remove the asbestos. The requirements for licenses are outlined below and summarised in the table in Appendix J. SafeWork NSW is responsible for issuing asbestos licences.

Friable asbestos must only be removed by a licensed removalist with a friable (Class A) asbestos removal licence. Except in the case of the removal of:

- asbestos containing dust associated with the removal of non-friable asbestos, or

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- asbestos containing dust that is not associated with the removal of friable or non-friable asbestos and is only a minor contamination (which is when the asbestos contamination is incidental and can be cleaned up in less than one hour).

The removal of more than 10 square metres of non-friable asbestos or asbestos containing material must be carried out by a licensed non-friable (Class B) or a friable (Class A) asbestos removalist.

The removal of asbestos containing dust associated with the removal of more than 10 square metres of non-friable asbestos or asbestos containing material requires a non-friable (Class B) asbestos removal licence or a friable (Class A) asbestos removal licence.

Removal of 10 square metres or less of non-friable asbestos may be undertaken without a licence. However, given the risks involved, council encourages residents to consider engaging a licensed asbestos removal contractor.

All asbestos removal should be undertaken in accordance with the *Code of practice on how to safely remove asbestos* (catalogue no. WC03561).

If a residential premise is a workplace, the licensed asbestos removalist must inform the following persons before licensed asbestos removal work is carried out:

- the person who commissioned the work.
- a person conducting a business or undertaking at the workplace.
- the owner and occupier of the residential premises.
- anyone occupying premises in the immediate vicinity of the workplace (as stated in section 467 of the NSW *Work Health and Safety Regulation 2017*).

In certain circumstances, a premise may be used for both residential and commercial purposes and is therefore classified as a workplace.

All licensed asbestos removal must be:

- supervised by a supervisor named to SafeWork NSW.
- notified to SafeWork NSW at least five days prior to the work commencing.

Requirements for the transport and disposal of asbestos waste are covered in section 8.

7.4.2 Removing Asbestos at Workplaces

The NSW *Work Health and Safety Regulation 2017* specifies requirements for demolition and refurbishment at a workplace with structures or plants constructed or installed before 31 December 2003. SafeWork NSW is the lead agency for regulating the safe management of asbestos at workplaces.

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7.4.3 Obtaining approval for demolition

Demolition work is classified as high-risk construction work in the NSW *Work Health and Safety Regulation 2017* and demolition licenses are required for some demolition work. The *Demolition work code of practice 2015* provides practical guidance on how to manage the risks associated with the demolition of buildings and structures. In most circumstances demolition of a structure requires development consent or a complying development certificate. Applicants may enquire to council as to whether and what type of approval is required. Where a development application is required council's standard conditions need to be applied to ensure that asbestos is safely managed. Council's conditions for development consent are referred to in section 7.6.

A wide range of development, including residential, industrial and commercial development, can be approved for demolition as complying development under the Demolition Code of the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* and the *Environmental Planning and Assessment Regulation 2021* provides mandatory conditions for complying development certificate applications.

Demolition of development that would be exempt development under the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* is also exempt development and does not require consent. This includes minor structures such as carports, fences, sheds and the like.

The *Demolition work code of practice 2015* (catalogue no. WC03841) provides practical guidance to persons conducting a business or undertaking on how to manage the health and safety risks associated with the demolition work. The *Demolition work code of practice 2015* applies to all types of demolition work.

7.5 Exempt or Complying Development

7.5.1 Exempt Development

Exempt development does not require any planning or construction approval if it meets the requirements of the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.

This means that there is no ability for council or a private certifier to impose safeguards for the handling of asbestos through conditions of development consent. However, council advises that all asbestos removal work should be carried out in accordance with the *Code of practice on how to safely remove asbestos* (catalogue no. WC03561).

7.5.2 Complying Development

The *Environmental Planning and Assessment Regulation 2021* (clause 152) outlines conditions under which a complying development certificate can be issued for development that involves building work or demolition work and friable or non-friable asbestos.

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Where more than 10 square metres of non-friable asbestos is to be removed, a contract evidencing the engagement of a licensed asbestos removal contractor is to be provided to the principal certifying authority. The contract must specify the landfill site lawfully able to accept asbestos to which the removed asbestos will be delivered.

If the contract indicates that asbestos will be removed to a specified landfill site, the person having the benefit of the complying development certificate must give the principal certifying authority a copy of a receipt from the operator of the landfill site stating that all the asbestos material referred to in the contract has been received by the operator.

If the work involves less than 10 square metres of non-friable asbestos and is not undertaken by a licensed contractor, it should still be undertaken in a manner that minimises risks as detailed in the *Code of practice on how to safely remove asbestos* (catalogue no. WC03561). In instances where asbestos removal is less than 10 square metres of non-friable asbestos and not from a place of work, then SafeWork NSW would not be the agency responsible for regulating this activity. Concerns or complaints may be directed to council as outlined in section 9.

The *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* outlines the requirements for the applicant to notify their neighbours that works may include asbestos removal.

Further requirements to inform other persons of licensed asbestos removal are described in section 467 of the NSW *Work Health and Safety Regulation 2011* as noted in section 7.4.1 of this policy.

7.6 Development applications

If a proposed building does not meet the requirements of exempt or Complying Development then the alternative planning approval pathway is a development application (DA). A DA can only be approved by a local council, the SSPP or, for very large, State-significant development proposals, the State Government. A development application needs to be prepared, and it will be assessed in accordance with the requirements of relevant environmental planning instruments and the development standards established by council. Council may undertake a site inspection as part of the DA assessment.

7.6.1 Pre-Development Application advice regarding asbestos

Council's pre-DA service enables proponents to discuss asbestos-related issues with council prior to lodging a DA. Council may inform applicants of this policy, fact sheets or websites. Generally, this may be most relevant to structures erected or modified before the 1980s and any other structure that could be reasonably suspected to contain asbestos including those with building materials from prior to 2004.

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7.6.2 Conditions of consent

Conditions will be imposed on development consents where there are known issues relating to asbestos. The conditions may require the removal of the asbestos and validation of the removal by an Occupational Hygienist.

Council's standard conditions are subject to change, however as a guide the following may be applied on development consents:

- Work involving bonded asbestos removal work (of an area of more than 10 square metres) or friable asbestos removal work must be undertaken by a person who carries on a business of such removal work in accordance with a licence under clause 458 of the Work Health and Safety Regulation 2017.
  a) the person having the benefit of the Development Consent and Construction Certificate must provide the principal certifying authority with a copy of a signed contract with such a person before any development pursuant to the Development Consent commences,
  b) any such contract must indicate whether any bonded asbestos material or friable asbestos material will be removed, and if so, must specify the landfill site (that may lawfully receive asbestos) to which the bonded asbestos material or friable asbestos material is to be delivered,
  c) if the contract indicates that bonded asbestos material or friable asbestos material will be removed to a specified landfill site, the person having the benefit of the Development Consent must give the principal certifying authority a copy of a receipt from the operator of the landfill site stating that all the asbestos material referred to in the contract has been received by the operator.
- Development Assessment – Demolition & Asbestos

  The demolition work shall comply with the provisions of Australian Standard AS2601:2001 – Demolition of Structures, *NSW Work Health & Safety Act 2011* and the *NSW Work Health & Safety Regulation 2017*. The work plans required by AS2601:2001 shall be accompanied by a written statement by a suitably qualified person that the proposals contained in the work plan comply with the safety requirements of the Standard. The work plans and the safety statement shall be submitted to the Principal Certifying Authority prior to the commencement of works.

  For demolition work which involves the removal of asbestos, the asbestos removal work must be carried out by a licensed asbestos removalist who is licensed to carry out the work in accordance with the *NSW Work Health & Safety Act 2011* and the *NSW Work Health & Safety Regulation 2017* unless specified in the Act and/or Regulation that a license is not required.

  The asbestos removal work shall also be undertaken in accordance with the *Code of practice on how to safely remove asbestos* published by SafeWork NSW (catalogue no. WC03561). Copies of the Act, Regulation and Code of Practice can be downloaded free of charge from the Safe Work NSW website: http://www.safework.nsw.gov.au

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- Development Assessment – Demolition Notification Requirements

  a) The developer/builder must notify adjoining residents five (5) working days prior to demolition. Such notification is to be a clearly written note giving the date demolition will commence, contact details of the developer/builder, licensed asbestos demolisher and the appropriate regulatory authority. Notification is to be placed in the letterbox of every premises (including every residential flat or unit, if any) either side and immediately at the rear of the demolition site.

  b) Five (5) working days prior to demolition, the developer/builder is to provide written notification to Georges River Council advising of the demolition date, details of the Safe Work NSW licensed asbestos demolisher, and the list of residents advised of the demolition.

- On demolition sites where buildings to be demolished contain asbestos, a standard commercially manufactured sign containing the words **"DANGER ASBESTOS REMOVAL IN PROGRESS"** measuring not less than 400mm x 300mm is to be erected in a prominent visible position (from street frontage) on the site. The sign is to be erected prior to demolition work commencing and is to remain in place until such time as all asbestos material has been removed from the site to an approved waste facility.

7.7 Compliance and Enforcement

7.7.1 Responsibilities for Compliance and Enforcement

The controls rely on information being provided and checked by the principal certifying authority which may be either the local council or a private certifier. A private certifier has powers under the *Environmental Planning and Assessment Act 1979* to issue construction certificates, compliance certificates, complying development certificates, occupation certificates and to carry out mandatory inspections. Councils will not always be the principal certifying authority. When a council is not nominated as the principal certifying authority for a complying development certificate or development application, the council may not have any knowledge of the asbestos matter. Accordingly, coordination of compliance and/or enforcement actions between the council and the private certifier will be required.

Council may take action on any development for which council has issued the development consent, even when not appointed as the principal certifying authority to ensure enforcement. Where council receives a complaint about a development for which council is not the principal certifying authority, council should consider whether council is the appropriate authority to resolve the matter. Complaints that warrant action by councils because of their greater enforcement powers include:

- urgent matters, for example, a danger to the public or a significant breach of the development consent or legislation
- matters that are not preconditions to the issue of the occupation/subdivision certificate.

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7.7.2 Compliance Strategies

Illegal works include:

- works that are undertaken without a required development consent or complying development certificate.
- works that are undertaken that do not comply with the conditions of the development consent or complying development certificate.

Where council becomes aware of illegal work involving asbestos or asbestos containing materials, council will notify SafeWork NSW if the site is a workplace.

The *Environmental Planning and Assessment Act 1979* empowers council to issue orders to direct specific work be undertaken to comply with a development consent.

Council may also issue a clean-up notice or prevention notice under the *Protection of the Environment Operations Act 1997* as outlined in section 4.1 of this policy.

Council may audit asbestos-related demolition works which council has recently approved by using a legal notice under section 192 of the *Protection of the Environment Operations Act 1997* to require developers to provide information and records regarding disposal of their asbestos waste.

Any enforcement commenced by Council will be in accordance with Council's adopted Enforcement Policy.

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8. Managing Asbestos as a Waste

It is illegal to dispose of asbestos waste in domestic garbage bins or to recycle, reuse, bury or illegally dump asbestos waste. Asbestos must not be placed in general waste skip bins, domestic, commercial or public litter bins, or the Council-provided bulky waste collection service. Members of the public need to be aware of this hazard and may need to secure their skip bins to prevent a third party from illegally disposing of asbestos in the skip bin.

Asbestos waste (in any form) must only be disposed of at a landfill site that may lawfully receive asbestos waste.

8.1 Responsibilities for asbestos waste management

Council's responsibilities for asbestos waste management are outlined in section 1.3.

The handling and, where appropriate, temporary storage of asbestos waste at worksites is regulated by SafeWork NSW.

The EPA regulates premises that have or require an environment protection licence in accordance with the *Protection of the Environment Operations Act 1997*. A licence is required where more than 5 tonnes of asbestos waste, brought from off-site, is stored at any time. All other sites where asbestos waste is stored, typically those that are non-work sites, are regulated by local councils.

8.2 Handling Asbestos Waste for Disposal

The *Code of practice on how to safely remove asbestos* (catalogue no. WC03561) provides details on waste containment and disposal and controls applicable to all types of asbestos removal (in section 4.8 of the Code).

8.3 Transporting Asbestos Waste

The following requirements apply to the transport of asbestos waste and non-compliance with these requirements is an offence under clause 78 of the Protection of the Environment Operations (Waste) Regulation 2014:

a) any part of any vehicle in which the person transports the waste is covered, and leak-proof, during the transportation, and
b) if the waste consists of bonded asbestos material, it is securely packaged during the transportation, and
c) if the waste consists of friable asbestos material it is kept in a sealed container during transportation, and
d) if the waste consists of asbestos-contaminated soils it is wetted down.

An environment protection licence issued by the EPA is required to transport asbestos waste interstate where any load contains more than 200 kilograms of asbestos waste.

It is an offence to transport waste to a place that cannot lawfully receive that waste, or cause or permit waste to be so transported (under section 143 of the Protection of the Environment Operations Act 1997).

8.4 Disposing of Asbestos Waste at Waste Facilities

The disposal of asbestos through the kerbside clean-up services is strictly not permitted. Council does not operate any waste facilities.

NOTE It will be necessary to contact the Facility prior to taking any asbestos or asbestos related material to the facility as special arrangements need to be made in relation to its disposal.

Fees are applicable in relation to the disposal of this material and information relating to these fees is available by contacting the above telephone number.

Persons delivering waste to a landfill site must comply with the following requirements:

- A person delivering waste that contains asbestos to a landfill site must inform the landfill occupier of the presence of asbestos when delivering the waste.

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- When unloading and disposing of asbestos waste at a landfill site, the waste must be unloaded and disposed of in such a manner as to prevent the generation of dust or the stirring up of dust.

Non-compliance with these requirements is an offence under the *Protection of the Environment Operations (Waste) Regulation 2014* and these offences attract strong penalties.

8.4.1 Situations in which asbestos waste may be rejected from waste facilities

Asbestos waste may be rejected from a waste facility if the waste is:

- not correctly packaged for delivery and disposal (as per sections 8.2 and 8.3)
- not disclosed by the transporter as being asbestos or asbestos containing materials, or
- taken to a waste facility that does not accept asbestos waste.

Where waste is rejected, the waste facility must inform the transporter of the waste of a waste facility to which the waste may be transported, that is, a waste facility at which the waste can be legally accepted (as required by the Protection of the Environment Operations (Waste) Regulation 2014).

Individuals may be fined $15,000 and corporations may be fined $30,000 under the Protection of the Environment Operations Act 1997 and Protection of the Environment Operations (Waste) Regulation 2014 for transporting asbestos waste to a facility that cannot lawfully receive asbestos waste.

8.5 Illegal Dumping of Asbestos Waste

Illegal dumping is the unlawful deposit of waste onto land. That is waste materials dumped, tipped or otherwise deposited onto private or public land where no licence or approval exists to accept such waste. Illegal landfilling, which is waste used as fill material, with or without the consent of the owner or occupier of the land and without the necessary council or EPA approvals, is also considered to be illegal dumping and pollution of land.

Illegal dumping of asbestos waste in public places such as parks, streets or nature strips can attract regulatory action including:

- on the spot fines
- prosecution for pollution of land (under section 142A of the *Protection of the Environment Operations Act 1997*), or
- fines, imprisonment, or both for an individual (under section 119 of the *Protection of the Environment Operations Act 1997*).

The responsibility for cleaning up illegally dumped waste lies with the person or company that deposited the waste. If they cannot be identified the relevant occupier or landowner becomes the responsible party.

Local councils are the appropriate regulatory authority for illegal dumping on public land within the LGA of the Council's jurisdiction unless:

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- the activity was part of the carrying on of an activity listed in Schedule 1 of the *Protection of the Environment Operations Act 1997*
- the activity was carried out by a public authority or the state, or
- the site is regulated by a different authority such as the Minister for Planning.

9. Complaints and Investigations

Complaints and inquiries relating to asbestos may be directed to council about incidents in public places and private properties. Complaints and inquiries regarding a workplace should be directed to SafeWork NSW. Complaints and inquiries regarding licensed premises under the *Protection of the Environment Operations Act 1997* should be directed to the EPA.

Complaints about council in relation to its management of asbestos may be directed to the NSW Ombudsman.

PART 2 – Management of Asbestos Risks within Council

10. Rights and Responsibilities of Workers at the Council Workplace

10.1 Duties of Council Workers at the Council Workplace

10.1.1 The General Manager

The General Manager has a duty to exercise due diligence to ensure that council complies with the NSW Work Health and Safety Act 2011 and the NSW Work Health and Safety Regulation 2017. This includes taking reasonable steps to ensure that council has and uses appropriate resources and processes to eliminate or minimise risks associated with asbestos.

10.1.2 Workers (Contractors, Labour Hire, Volunteers and Work Experience)

Workers have a duty to take reasonable care for their own health and safety and that they do not adversely affect the health and safety of other persons. Accordingly, workers:

- must comply with this policy and any reasonable instruction or procedure relating to health and safety at the workplace
- must use any personal protective equipment provided, in accordance with information, training and reasonable instruction provided so far as the worker is reasonably able
- may cease, or refuse to carry out, work if the worker has a reasonable concern that to carry out the work would expose them, or other persons, to a serious health or safety risk, emanating from an immediate or imminent exposure to a hazard
- should ensure they are using the latest version of all relevant procedures, plans, guidelines and legislation (refer to Appendix F).

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10.1.3 Managers / Coordinators

Managers / Coordinators / People Leaders are responsible for ensuring workers who report to them have access to this policy and appropriate information, documentation, training and equipment.

10.2 Responsibilities of Council to Council Workers

10.2.1 Council's general responsibilities

Council has general responsibilities under the NSW *Work Health and Safety Act 2011* and the NSW *Work Health and Safety Regulation 2017*. Accordingly, council will:

- not use any asbestos containing materials (unless in accordance with part 8.1 (419) of the NSW Work Health and Safety Regulation 2017) and will not cause or permit asbestos waste in any form to be reused or recycled
- ensure that exposure of a person at the workplace to airborne asbestos is eliminated so far as is reasonably practicable
- ensure that the exposure standard for asbestos (defined in Definition of Terms) is not exceeded in the workplace.
- notify SafeWork NSW immediately if persons are likely to be affected by asbestos fibers or if an air monitoring process records respirable asbestos fiber levels above 0.02 fibers/ml of air.
- ensure that any contractors engaged to undertake the removal of asbestos for council are appropriately licensed and comply with the relevant statutory requirements, standards, codes and guidelines including but not limited to:
  - Environmentally Hazardous Chemicals Act 1985 (NSW)
  - Waste Avoidance and Resource Recovery Act 2001 (NSW)
  - Protection of the Environment Operations Act 1997
  - Protection of the Environment Operations (Waste) Regulation 2014
  - SafeWork NSW requirements
  - SafeWork NSW Code of Practice – How to manage and control asbestos in the workplace
  - SafeWork NSW Code of Practice – How to safely remove asbestos
  - Consult with workers as required by the *Work Health and Safety Act 2011*

10.2.2 Education, training and information for workers

As required by the NSW Work Health and Safety Act 2011 and NSW Work Health and Safety Regulation 2017, council will:

- Provide any information, training, instruction or supervision that is necessary to protect all persons at the workplace from risks to their health and safety arising from work carried out as part of the conduct of council business.

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- Ensure workers who council reasonably believes may be involved in asbestos removal work or the carrying out of asbestos-related work in the workplace are trained in the identification, safe handling and suitable control measures for asbestos and asbestos containing material.

Any workers who are involved in any activity listed in Appendix A under section 1 on behalf of, or for, Council shall be provided with access to a copy of this policy and information and training suitable to their role and the activity.

Council may also provide information and training to Council employees who may need to respond to asbestos issues related to renovations and developments as outlined in section 7.

Topics training may cover are outlined in the *Code of practice on how to safely remove asbestos* (catalogue no. WC03561).

Education and training will only be provided by appropriately Accredited Individuals.

A record of asbestos training undertaken by each worker will be kept until five years after the day the worker ceases to work for Council.

A list of workers who have received the appropriate training to respond to asbestos hazards, in particular asbestos awareness training or licenses, is maintained in Council's electronic record keeping system.

10.2.3 Health Monitoring for Workers

Council employees may be required to take samples for testing or remove dumped asbestos and if there is a risk to the health of the employee as a result of that exposure, they are covered by the NSW *Work Health and Safety Regulation 2017* (clauses 435-444). Council will ensure these employees are kept on the health monitoring program.

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11. Identifying and Recording Asbestos Hazards in the Council Workplace

This section outlines how council will identify and record asbestos hazards in the workplace. This section does not cover naturally occurring asbestos which is addressed in section 3 or illegal dumping which is addressed in section 8.5.

11.1 Identifying Asbestos

Council will ensure, so far as is reasonably practicable, that all asbestos or asbestos containing material at the workplace is identified by a competent person (as defined by the NSW Work Health and Safety Regulation 2017). If a material cannot be identified or accessed, it will be assumed to be asbestos. This does not apply if council has reasonable grounds to believe that asbestos or asbestos containing material is not present.

11.2 Material Sampling

Council may choose to identify asbestos or asbestos containing material by arranging for a sample to be analysed. Where council arranges sampling of asbestos containing material, this will be undertaken by an appropriately trained and competent contractor. Analysis of the sample must only be carried out by a National Association of Testing Authorities (NATA) accredited laboratory () or a laboratory approved or operated by the regulator.

11.3 Indicating the Presence and Location of Asbestos

Council will clearly indicate the presence and location of any asbestos or asbestos containing material identified or assumed at the workplace. Where it is reasonably practicable to do so, council will indicate the presence and location of the asbestos or asbestos containing material as identified in Appendix B of the Code of Practice for Managing and Controlling Asbestos in the Workplace at https://www.safeworkaustralia.gov.au/system/files/documents/1705/mcop-how-to-manage-and-control-asbestos-in-the-workplace-v2.pdf.

Asbestos register

Council has an online Asbestos Register with Arosafety.

Council's Asbestos Register will be maintained to ensure the register lists all identified (or assumed) asbestos in the workplace and Council owned facilities. Information in the Register is to be kept up to date. The asbestos register will be accessible, reviewed, revised and otherwise managed as mandated by the *NSW Work Health and Safety Regulation 2017* (clauses 425 – 428).

The GRC Asbestos Register is maintained by Council's Coordinator City Maintenance.

Council will ensure that any worker carrying out or intending to carry out work at a council workplace that involves a risk of exposure to airborne asbestos, is given a copy of the Asbestos Register.

11.4 Suspected Asbestos

Should a worker suspect there is asbestos in a council workplace then Council's Asbestos Register must be checked immediately to see if it is safe to work around. If the location of the potential asbestos is not on Council's Asbestos Register the worker (with the assistance of their people leader or WHS Team member) must:

- Immediately cordon off the area and prevent access to all persons.
- Label the area with a "Danger Asbestos Sign – Do Not Enter"
- Report the location to your People Leader, WHS Team member and the Coordinator City Maintenance immediately for inspection, testing and a safety review by a licensed asbestos assessor.

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12. Managing asbestos-related risks in the council workplace

12.1 Asbestos Management Plan

Council will develop and maintain an Asbestos Management Plan, based on the findings of the Asbestos Register. GRC will engage a contractor with recognised authority to complete an asbestos management plan for identified workplaces and Council owned assets within the Georges River LGA. The asbestos management plan will be stored and made available in Council's electronic records management system.

The asbestos management plan will be accessible and reviewed, at least every five years or when requested by a health and safety representative (HSR) or when asbestos is removed, disturbed, sealed or enclosed, or when changes to a control measure are made or when the plan is no longer adequate in accordance with NSW *Work Health and Safety Regulation 2011* clause 429.

12.2 Asbestos Management Plan for Naturally Occurring Asbestos

Council is not aware of any naturally occurring asbestos in the workplace. If naturally occurring asbestos is discovered, Council will engage a contractor with recognised authority to prepare an asbestos management plan in relation to the naturally occurring asbestos in accordance with the NSW Work Health and Safety Regulation 2017 part 8.4 (Management of naturally occurring asbestos).

12.3 Management Options for Asbestos-Related Risks in the Council Workplace

On engaging a Contractor to develop an asbestos management plan, Council will ensure that the management plan includes decisions and reasons for decisions about the management of asbestos at the workplace.

The GRC asbestos management plan, may include in addition to WHS legislative requirements:

- Reference and link to the asbestos register.
- GRC appropriate signage and labelling.
- Safe work procedures and control measures.
- Incident and emergency procedures.

The asbestos management plan may include options for managing asbestos related risks including but not limited to:

- Removal of asbestos or asbestos containing materials (preferred wherever reasonably practicable).
- Interim control measures: enclosure (only for non-friable asbestos), encapsulation (when the original asbestos bond is still intact) or sealing (where the sealed material is unlikely to be subject to mechanical damage) asbestos containing material, to be implemented along with regular inspections by a competent person.

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- Leaving asbestos containing material in good condition insitu (deferring action).

Council may undertake an asbestos risk assessment, in consultation with workers and/or their representatives, in order to inform decision-making. Only competent persons will perform risk assessments or any subsequent reviews or revisions of risk assessments.

For all asbestos work or asbestos-related work, safe work practices will be in place and suitable personal protective equipment will be used.

12.4 Sites Contaminated with Asbestos that are Council Workplaces

Where asbestos is identified as contaminating a workplace, the site will be included in Council's Asbestos Register and Asbestos Management Plan.

Council may need to ensure that an exposure assessment is undertaken and that appropriate risk management options are determined and implemented.

For asbestos in soil or aggregate, a suitably qualified occupational hygienist must carry out an assessment if the material in the soil and aggregate is unknown or classified as friable.

Council should engage specialists, who may include asbestos removalists, for all cases except in the case of minor, non-friable contaminations of less than 10 square meters.

12.5 Demolition or Refurbishment of Council Buildings and Assets

Council will ensure that before any demolition or refurbishment of a council structure or plant constructed or installed before 31 December 2003 is undertaken, the Asbestos Register is reviewed, and a copy provided to the business undertaking the demolition or refurbishment. Council will ensure that any asbestos that is likely to be disturbed is identified and so far, as is reasonably practicable removed. Asbestos removed during works shall be removed from the Asbestos Register and the Asbestos Management Plan updated.

12.6 Removal of Asbestos in the Council Workplace

Removal of asbestos or asbestos containing materials in the council workplace will be undertaken by Council workers if it is deemed reasonable and is less than 10 square metres of bonded asbestos. Asbestos shall be handled in line with WHS Management System WHSI022c – Asbestos removal worker instruction.

All other asbestos shall be removed by a suitably licensed asbestos contractor.

An asbestos removalist must meet the requirements of the NSW Work Health and Safety Regulation 2017 including the requirements to:

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- Notify SafeWork NSW at least five days prior to the asbestos removal work commencing. However, in the case of emergency work, such as burst pipes, fires and illegally dumped asbestos, council may request to SafeWork NSW that this five-day period be waived.
- Prepare, supply and keep an asbestos removal control plan.
- Obtain a copy of the Asbestos Register for the workplace before carrying out asbestos removal work at the workplace (this does not apply if the asbestos removal work is to be carried out at residential premises, for example cleaning up asbestos that has been illegally dumped at a residential premises).
- Inform the person with management or control of the workplace that the licensed asbestos removal work is to be carried out at the workplace.
- Erect signs and barricades.
- Limit access to the asbestos removal area.
- Properly dispose of asbestos waste and dispose of, or treat, contaminated personal protective equipment.
- arrange a clearance inspection and clearance certificate.

Where council is informed that asbestos removal work is to be carried out at the workplace, council will inform workers and those in the immediate vicinity of the workplace and limit access to the asbestos removal area as per the *NSW Work Health and Safety Regulation 2017*.

12.6.1 Verification of Licensed Asbestos Removalist Contractors

Where council requires the services of asbestos removalists, council will require the licence details of asbestos removalists prior to engaging their services and will verify the licence details with SafeWork NSW's Certification Unit prior to entering a contract or agreement with the licensed asbestos removalists.

Council is required to ensure that the work is carried out by a competent person who has been trained in the identification and safe handling of, and suitable control measures for, asbestos and asbestos containing material. Council will therefore require a statement in a written contract or agreement with the licensed asbestos removalist that the licensed asbestos removalist who will undertake the work has been adequately trained and is provided with appropriate health monitoring by their employer.

The licensed asbestos removalist is to provide the following documentation prior to carrying out asbestos removal work:

- Asbestos Removal Control Plan.
- Public Liability Certificate of Currency.
- Workers' Compensation Certificate of Currency.

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- SafeWork NSW confirmation details to carry out the removal work.

Council will provide a copy of the Asbestos Register to the licensed asbestos removalist.

Where council becomes aware of any breaches by licensed asbestos removalists, council will report this to SafeWork NSW.

12.6.2 Clearance Inspections and Certificates

Where council commissions any licensed asbestos removal work, council will ensure that once the licensed asbestos removal work has been completed, a clearance inspection is carried out and a clearance certificate is issued by an independent licensed asbestos assessor (for Class A asbestos removal work) or an independent competent person (in any other case) before the asbestos removal area is re-occupied.

The friable asbestos clearance certificate will require visual inspection as well as air monitoring of the asbestos removal site. Air monitoring is mandatory for all friable asbestos removal. The air monitoring must be conducted before and during Class A asbestos removal work by an independent licensed asbestos assessor.

The friable asbestos clearance certificate is to state that there was no visible asbestos residue in the area or vicinity of the area where the work was carried out and that the airborne asbestos fibre level was less than 0.01 asbestos fibres/ml.

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13. Accidental Disturbance of Asbestos by Workers

In situations where asbestos is accidentally disturbed by council work and has, or could, become airborne, council will act to minimise exposure of workers and the wider public to airborne asbestos.

Council will:

- Stop works in the vicinity of the asbestos immediately.
- Inform the site supervisor immediately, inform necessary workers and record the incident.
- Evacuate the area.
- Restrict access to the area, label the area with a “Danger Asbestos Sign – Do Not Enter”.
- Ensure only appropriately trained and equipped contractors attend the site.
- Exclude the public from the site and provide information to the public if in a public area.
- Update the asbestos register and notify workers of any newly identified asbestos locations.

Council’s trained workers or licensed Asbestos Contractors will manage the accidental disturbance as per the requirements set out by current legislation and as per the license requirements.

14. Council's Role in the Disposal of Asbestos Waste

14.1 Responding to Illegal Dumping

Where Council commissions the removal of illegally dumped asbestos material or suspected asbestos material, Council will ensure this is undertaken in accordance with section 12.

Where Council becomes aware of illegally dumped asbestos material outside of Council's jurisdiction, Council will promptly notify the relevant authority.

14.2 Transporting and Disposing of Asbestos Waste

Council engages Contractors to transport and dispose of asbestos waste. This will be in accordance with the legislation and as outlined in section 8.

As Council utilises authorised contractors to carry out this function, proof of receipt for asbestos waste received at a licensed landfill facility will be required. The receipt provided may note the time, date and location of disposal, weight of asbestos containing material disposed, method of disposal (note on handling) and a receipt number. This information must be recorded by the facility, regardless of whether a receipt is issued.

Where asbestos waste is illegally dumped, management options for Council include:

- To undertake surveillance via video cameras to issue fines to deter dumping.
- To provide targeted education to neighbouring landholders to ensure they do not access the waste.

14.3 Re-excavation of landfill sites

The re-excavation of a council landfill site where significant quantities of asbestos waste are deposited is not encouraged and should only be considered with reference to any available records on the nature, distribution and quantities of asbestos waste required under the relevant legislation, and consultation with the EPA (as the appropriate regulatory authority under the *Protection of the Environment Operations Act 1997*).

15. Advice to tenants and prospective buyers of council owned property

Council may provide advisory notes to tenants and prospective buyers of council owned property that is likely to contain asbestos.

Council may request that tenants in council property:

- Advise council of any hazards relating to asbestos.
- Minimise damage to asbestos containing material.
- Co-operate with council in facilitating any risk management work arranged by council.
- Act on advice from council to minimise risks from asbestos.

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16. Implementing Council's Asbestos Policy

16.1 Supporting Documents

The implementation of this policy is supported by:

- Council's conditions of consent.
- Guidelines for dealing with household asbestos
- Guidelines for business and industry – dealing with asbestos
- SafeWork NSW – Code of Practice – How to Manage and Control Asbestos
- Council also has several internal documents that support this Policy.
- Site or building specific asbestos management plan (designed by authorised contractor).
- Online Asbestos Register (refer to 13.3).
- WHSI022c – Asbestos removal worker instruction.
- Complaints handling procedures – Pol-016.003 (Customer feedback and Complaints Management Policy)
- Council's online hazard and WHS incident reporting system - ic.GRC
- maintenance and inspection schedules for Council owned assets.
- Training registers/records (relevant to identifying, handling and removing of asbestos materials).
- Safe Work Method Statement for asbestos removal

Council intends to update its website to provide residents with accurate and up to date information on asbestos management.

16.2 Communicating the policy

This is a publicly available Policy. The policy is to be made available via:

- Council's Customer Services Centre, Civic Centre, 16 MacMahon Street, Hurstville.
- Council's website Asbestos Management Policy
- Council's Work Health Safety Management System on the Safety Intranet Page.
- All employees shall receive information on the location of the policy at induction.

Any workers (including employees, contractors, consultants and, where relevant, volunteers and members of the public) who are involved in any activity or activities listed in Appendix A under section 1 on behalf of, or for, council shall be provided with access to a copy of this policy and relevant supporting documents. This includes any workers involved in commencing, arranging, undertaking, regulating, inspecting or supervising a potentially hazardous activity or activities.

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Managers / Coordinators / People Leaders are responsible for ensuring workers who report to them have access to the policy and appropriate information, documentation and training in asbestos awareness (as per the *NSW Work Health and Safety Regulation 2017*) prior to planning the activity or activities. Further information about training is noted in section 10.2.2 of this policy.

Council shall incorporate a statement regarding compliance with this policy in all relevant contracts and agreements with workers (including employees, contractors, consultants and, where relevant, volunteers and members of the public).

16.3 Non-Compliance with the Policy

Failure by workers to adhere to the Policy and failure by managers to adequately inform relevant workers of this policy shall be considered non-compliance with this policy.

The appropriate supervisor, manager, director, or the General Manager, shall respond to non-compliance with the policy by providing education and training, and take action consistent with Council's discipline procedures or altering the worker's duties, or in the case of serious breaches, terminating the worker's services. Each case shall be assessed on its merits with the aim of achieving a satisfactory outcome for all parties.

Workers should approach their supervisor or manager if they are experiencing difficulties in understanding or implementing the policy or if they are concerned that other workers are not complying with the policy.

17. Variations to this policy

Council reserves the right to review, vary or revoke this policy. The General Manager may allow variations to the policy for minor issues in individual cases.

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Responsibilities

Position	Responsibility
Executive Team	The Executive Team is responsible for supporting and participating in the requirements of this Policy
Council Management	Council management is responsible for executing the requirements of this Policy.
Council Workers	It is the responsibility of all Council workers to adhere to this policy. Council's regulatory and operational role in regard to asbestos management are outlined in Table 1 of this Policy which details the specific business units responsible for key asbestos management functions. Further responsibilities for Council workers are outlined in PART 2 – Management of asbestos risks within Council.

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Version Control and Change History

Version	Amendment Details	Procedure Owner	Period Active
1.0	Kogarah City Council – Policy – Asbestos Management	Planning & Environmental Services	28/10/13 to 2018
1.0	Hurstville City Council – Asbestos Management Policy	Director Service Delivery	17/12/2014 - 2018
2.0	New Georges River Council Policy	WHS Team	2018 – 2025
3.0	Georges River Council Asbestos Management Policy Summary of Amendments: • Removed reference to WHS in title. • Policy owner changed from Work Health and Safety, Business and Corporate Services Directorate to Environment, Health and Regulatory Services, Environment and Planning Directorate. • Updated legislative references. • Moved Related Documents to Appendix G. • Formatted into new corporate Policy Template. • Moved definitions from within the Policy and in Appendix E to Definition of Terms table within the Policy. • Allocating Business Unit responsibilities to Section 1 – Roles and Responsibilities of Council.	Manager Environment, Health and Regulatory Services	2025 - 2029

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Version	Amendment Details	Procedure Owner	Period Active
	• General formatting, editing and updating of content to reflect current legislation and standards.		

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Appendix A – General Information and Guidance

What is Asbestos?

Asbestos is the generic term for a number of naturally occurring, fibrous silicate materials. If asbestos is disturbed it can release dangerous fine particles of dust containing asbestos fibres. Breathing in dust containing elevated levels of asbestos fibres can cause asbestosis, lung cancer and mesothelioma.

There are two major groups of asbestos:

- the serpentine group contains chrysotile, commonly known as white asbestos
- the amphibole group contains amosite (brown asbestos) and crocidolite (blue asbestos) as well as some other less common types (such as tremolite, actinolite and anthophyllite).

Further information about the different types of asbestos can be found in: Environmental Health Standing Committee (enHealth), Asbestos: A guide for householders and the general public, Australian Health Protection Principal Committee, Canberra, 2013.

In Australia, in the past asbestos was mined and widely used in the manufacture of a variety of materials. Asbestos was gradually phased out of building materials in the 1980s and the supply and installation *of* asbestos containing goods has been prohibited in Australia since 31 December 2003.

Asbestos legacy materials still exist in many homes, buildings and other assets. It is estimated that 1 in 3 Australian homes contains building materials with asbestos. Where the material containing asbestos is in a non-friable form (or bonded), undisturbed, and painted or otherwise sealed, it may remain safely in place. However, where the asbestos containing material is broken, damaged or mishandled, fibres can become loose and airborne posing a risk to health. Disturbing or removing asbestos unsafely can create a health hazard.

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It is often difficult to identify the presence of asbestos by sight. If you are in doubt, it is best to assume that you are dealing with asbestos and take every precaution. The most accurate way to find out whether a material contains asbestos is to obtain an asbestos inspection by a person competent in the identification and assessment of asbestos such as an occupational hygienist. It can be unsafe for an unqualified person to take a sample of asbestos. Licensed asbestos removalists can be found by using the telephone directory. Council encourages residents to ask the contractor for a copy of their licence prior to engaging them. Residents can then check with SafeWork NSW (phone 13 10 50) to confirm the contractor has the appropriate class of licence for the asbestos removal job.

Where is Asbestos Found?

Asbestos can be found where it occurs naturally and in a variety of materials (from prior to 2004) in residential, commercial and industrial premises and on public and private land.

Naturally Occurring Asbestos

Naturally occurring asbestos refers to the natural geological occurrence of asbestos minerals found in association with geological deposits including rock, sediment or soil.

Asbestos is found as a naturally occurring mineral in many areas of NSW. Asbestos may occur in veins within rock formations. The map provided in Appendix K gives an indication of areas in NSW known to have naturally occurring asbestos.

There is no known naturally occurring asbestos within the Local Government Area.

Work processes that have the potential to inadvertently release naturally occurring asbestos into the air include:

- agriculture
- forestry
- landscaping
- mining
- other excavation or construction activities
- pipe works and telecommunications works
- road construction and road works.

Further information can be found in this policy under section 3 and in the *Naturally occurring asbestos fact sheet* (catalogue no. WC03728) published by SafeWork NSW, which provides a photograph of naturally occurring asbestos. The SafeWork NSW website provides further information on naturally occurring asbestos and supporting documents on what people can do to avoid contact with naturally occurring asbestos.

Residential Premises

As a general rule, a house built:

- Before the mid-1980s – is highly likely to contain asbestos containing products.
- Between the mid-1980s and 1990 – is likely to contain asbestos containing products.
- After 1990 – is unlikely to contain asbestos containing products. However, some houses built in the 1990s and early 2000s may have still used asbestos cement materials until the total ban on any activity involving asbestos products became effective from December 2003.

Pipelines installed prior to 1992, particularly black surface coated and grey surface pipes, may contain asbestos.

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It is important to note, the most accurate way to find out whether a material contains asbestos is by engaging a licensed asbestos removalist or occupational hygienist to inspect and arrange testing where necessary.

Fibre cement sheeting, commonly known as ‘fibro’, ‘asbestos sheeting’ or ‘AC sheeting’ (asbestos containing sheeting) is the most commonly found legacy asbestos material in residential premises. Other asbestos containing materials were used in ‘fibro’ houses but also found in brick and timber housing stock from that period. Asbestos materials were sold under a range of commercial names. Some asbestos containing materials found in New South Wales domestic settings are listed in Appendix I.

Common places where asbestos is likely to be found in and around homes include:

Outside

- backyard garden sheds, carports, garages and dog kennels

- electrical meter boards
- imitation brick cladding
- lining under eaves
- wall and roof materials (flat, patterned or corrugated asbestos sheeting).

Inside

- insulation materials in heaters and stoves
- interior walls and sheeting
- sheet materials in wet areas (bathroom, toilet and laundry walls, ceilings and floors)
- vinyl floor tiles, the backing to cushion vinyl flooring and underlay sheeting for ceramic tiles including kitchen splashback.

Asbestos can also be found in:

- angle mouldings (internal and external)
- board around windows and fireplaces
- brake pads and clutch pads to vehicles
- buried and dumped waste materials
- carpet underlay
- ceilings (ceiling tiles or sprayed coatings or loose in the ceiling cavity and may have moved to wall cavities, cornices and sub-floor areas)
- cement flooring
- external toilets
- fencing
- guttering, downpipes and vent pipes
- inside appliances e.g. irons, whitegoods
- gable ends
- outbuildings
- ridge capping
- swimming pools – reinforcing marble swimming pools
- ventilators – internal and external.

Other places asbestos can be found are listed in Appendix I.

Commercial and Industrial Premises

In commercial and industrial premises, asbestos may be found in the abovementioned places and also:

- asbestos rope or fabric in expansion joints (for example exhaust flues) and insulation
- bituminous waterproof membrane on flat roofs
- brake disc pads and brake linings
- cloth, tapes, ropes and gaskets for packing
- electrical switchboards and duct heater units
- fillers and filters
- fire doors
- lagging on pipes such as heater flues
- lift motor rooms

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- pipes, casing for water and electrical/ telecommunication services
- rubber, plastics, thermosetting resins, adhesives, paints, coatings, caulking compounds and sealants for thermal, electrical and insulation applications
- structural beams of buildings
- yarns and textiles e.g. fire blankets.

Other places asbestos can be found are listed in Appendix I.

Sites Contaminated with Asbestos

Contamination of soils from asbestos or asbestos containing materials can present a risk in urban and rural environments if the asbestos can give rise to elevated levels of airborne fibres that people can breathe. Whilst buried material may not give rise to airborne asbestos fibres if securely contained, inappropriate disturbance of this waste could give rise to harmful levels of asbestos fibres in air. Activities such as those listed in section 3 of this Appendix have the potential to encounter and disturb asbestos waste or contamination, particularly where the contamination is not known to be present at the site or has not been appropriately considered.

Situations Where Asbestos Contamination may Occur

Situations where asbestos contamination may occur include:

- industrial land, e.g., asbestos-cement manufacturing facilities, former power stations, and rail and shipyards, especially workshops and depots
- waste disposal or dumping sites, including sites of illegal dumping e.g., building waste
- sites with infill or burial of asbestos waste from former asbestos mining or manufacture processes
- buildings or structures damaged by fire or storm (particularly likely for those with pre-1980s building materials but also possible for those with materials from prior to 2004)
- land with fill or foundation material of unknown composition
- sites where buildings or structures have been constructed from asbestos containing material or where asbestos may have been used as insulation material, e.g., asbestos roofing, sheds, garages, reservoir roofs, water tanks, boilers and demolition waste has been buried onsite
- sites where buildings or structures have been improperly demolished or renovated, or where relevant documentation is lacking (particularly likely for those with pre-1980s building materials but also those with materials from prior to 2004)
- disused services with asbestos containing piping such as water pipes (including sewage systems, water services and irrigation systems), underground electrical and telephone wires and telecommunications trenches or pits (usually within 1 metre of the surface).

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Significantly Contaminated Land

For sites that are significantly contaminated, the EPA and SafeWork NSW are the lead regulatory authorities. The *Contaminated Land Management Act 1997* applies to significantly contaminated land. In general, significant contamination is usually associated with former asbestos processing facilities or where large quantities of buried friable asbestos waste has been uncovered and is giving rise to measurable levels of asbestos fibres in air.

Such sites require regulatory intervention to protect community health where the source of the contamination is not being addressed by the responsible person. The EPA has details of sites that have been nominated as significantly contaminated on its Public Register found on the EPA website.

If land is contaminated but not determined to be 'significant enough to warrant regulation' then the *Contaminated Land Management Act 1997* does not apply. In such cases the provisions within the planning legislation and/or the *Protection of the Environment Operations Act 1997* may be the appropriate mechanism for management of such contamination.

Guidance on assessing land can be found in the document: Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997.

Potentially Hazardous Activities

A number of activities could cause asbestos to be inadvertently disturbed and consequently create a health risk.

Before undertaking any of the activities listed below, it should be considered whether asbestos containing materials may be present. If asbestos is present, these activities may be illegal or certain precautions may be required, or an appropriately licensed person may be required to undertake the activity.

Members of the public could inadvertently disturb asbestos through activities including:

- renovations, refurbishments or repairs particularly those involving power tools, boring, breaking, cutting, drilling, grinding, sanding or smashing asbestos containing materials
- sealing, painting, brushing and cleaning asbestos cement products
- demolitions of homes or other structures (dismantling or destruction)
- relocating a house, building or structure
- using compressed air on asbestos containing materials
- water blasting asbestos containing materials
- cleaning gutters on asbestos cement roofs
- handling asbestos cement conduits or boxes
- maintenance work such as plumbing and electrical work on or adjacent to asbestos containing materials such as working on electrical mounting boards
- maintenance or servicing of materials from vehicles, plant or equipment
- checking, removing or replacing ceiling insulation which contains asbestos.

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Council could inadvertently disturb asbestos through activities such as:

- abovementioned activities
- asset and building maintenance
- certifying
- inspections of sites and premises
- transport and disposal of illegally dumped materials
- collection, transport and disposal of incorrectly disposed of materials.

Naturally occurring asbestos and contaminated sites could be inadvertently disturbed during:

- road building
- site and construction work
- other excavation activities
- vehicle movements.

Natural processes can create a risk of exposure to asbestos including:

- extensive fire or storm damage to asbestos cement roofs or building materials
- extensive weathering and etching of unsealed asbestos cement roofs.

In addition, work that intentionally disturbs asbestos, such as sampling or removal, should be conducted by a competent person and in accordance with the relevant codes of practice and legislation.

Health Hazards

Asbestos fibres can pose a risk to health if airborne, as inhalation is the main way that asbestos enters the body. The World Health Organisation has stated that concentrations of asbestos in drinking water from asbestos cement pipes do not present a hazard to human health.

Breathing in asbestos fibres can cause asbestosis, lung cancer and mesothelioma. The risk of contracting these diseases increases with the number of fibres inhaled and the risk of lung cancer from inhaling asbestos fibres is greatly increased if you smoke. Small fibres are the most dangerous and they are invisible to the naked eye. People who are at most risk are those who have been exposed to high levels of asbestos for a long time. The symptoms of these diseases do not usually appear for some time (about 20 to 30 years) after the first exposure to asbestos.

Asbestosis is the irreversible scarring of lung tissue that can result from the inhalation of substantial amounts of asbestos over a period of years. It results in breathlessness that may lead to disability and, in some case, death.

Lung cancer can be caused by asbestos. Lung cancer is related to the amount of fibre that is breathed in, and the risk of lung cancer is greatly increased in those who also smoke tobacco.

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Mesothelioma is a cancer of the pleura (outer lung lining) or the peritoneum (the lining of the abdominal cavity). Mesothelioma rarely occurs less than 15 years from first exposure, and most cases occur over 30 years after first exposure. Accordingly, the rates of malignant mesothelioma (an incurable cancer) are expected to rise from the year 2012 to 2020 and are expected to peak in this time.

If asbestos fibres are in a stable material, for example bonded in asbestos-cement sheeting (such as fibro), and these materials are in good condition they pose little health risk. However, where fibro or other non-friable asbestos sheeting is broken, damaged or mishandled, fibres can become loose and airborne posing a risk to health. Disturbing or removing asbestos containing materials unsafely can create a hazard.

The occupational standard for asbestos is 0.1fibre/ml of air and the environmental standard is 0.01fibre/ml in air.

When someone has potentially been exposed to asbestos or receives or expects they may receive a diagnosis of an asbestos-related disease, they may experience psychological distress, including anxiety and may be in need of support. Their family and those around them may also be vulnerable to psychological distress.

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Appendix B – Further Information

Aboriginal Communities

Illegal dumping prevention and clean-up. Handbook for Aboriginal communities, 2008 (EPA) can be found on the EPA website.

Asbestos Contractors

Choosing an asbestos consultant fact sheet (catalogue no. WC04547) can be found on Safework's website. http://www.safework.nsw.gov.au/

For a listing of asbestos removal contractors in your area, refer to your local telephone directory or the Yellow Pages www.yellowpages.com.au or by contacting the Asbestos Removal Contractors Association NSW (ARCA) www.arcansw.asn.au or by emailing: email@arcansw.asn.au An asbestos removal contractor's licence can be verified by contacting the SafeWork NSW's Certification Unit on **13 10 50**.

Asbestos Waste

Advice about safely disposing of household asbestos waste can be found on the EPA website. https://www.epa.nsw.gov.au/

Asbestos waste disposal facility search function on the Asbestos Safety and Eradication Agency website.

Management of asbestos in recycled construction and demolition waste, 2010 (SafeWork NSW) http://www.safework.nsw.gov.au/

Contaminated Land

Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997, 2015 (EPA). https://www.epa.nsw.gov.au/

Managing land contamination: Planning guidelines SEPP 55 – Remediation of land, 1998 (Department of Planning and Environment and EPA) https://www.epa.nsw.gov.au/

Emergency Management

Guidance Material: Asbestos and Fire-damaged Buildings, 2015 (EPA) https://www.epa.nsw.gov.au/

NSW Asbestos Emergency Plan: The NSW Asbestos Emergency sub plan details the specific arrangements for the coordinated funding and management of asbestos debris during and following a larger scale emergency, being an event that requires a significant and coordinated response, where the presence of asbestos containing material in the community poses a significant risk to public health and safety. www.emergency.nsw.gov.au

Environmental Risk Assessment

Environmental health risk assessment: Guidelines for assessing human health risks from environmental hazards, 2002 (Commonwealth of Australia)

Available via email by contacting the enHealth Secretariat:

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enHealth.Secretariat@health.gov.au

Health

Asbestos and health risks fact sheet, 2007 (NSW Health)

www.health.nsw.gov.au

Further advice concerning the health risks of asbestos can be obtained from your local public health unit.

Renovation and Development

Asbestos: A guide for householders and the general public, Environmental Health Standing Committee (enHealth), Australian Health Protection Principal Committee, Canberra, 2013 (available at:

www.health.gov.au

Asbestos Awareness Website (Asbestos Education Committee)

www.asbestosawareness.com.au

Choosing and working with a principal certifying authority: A guide for anyone planning to build or subdivide, 2011 (Building Professionals Board)

www.bpb.nsw.gov.au

Practical Guidance

Code of practice on how to manage and control asbestos in the workplace (catalogue no. WC03560) published by SafeWork NSW

Code of practice on how to safely remove asbestos (catalogue no. WC03561) published by SafeWork NSW http://www.safework.nsw.gov.au/

Tenants

Tenants' rights Fact sheet 26 Asbestos and lead, 2010 (Tenants NSW)

www.tenants.org.au

Tenants – Housing NSW Tenants

Asbestos fact sheet, 2010 (Housing NSW)

www.housing.nsw.gov.au/NR/rdonlyres/F4E1131F-2764-4CB1-BC07-98EB6C594085/0/Asbestos.pdf

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Appendix C – Acronyms

ACD Asbestos Containing Dust (an acronym used in the legislation)

ACM Asbestos Containing Material (an acronym used in the legislation)

ARA Appropriate Regulatory Authority (an acronym used in the legislation)

DA Development Application

EPA NSW Environment Protection Authority

JRPP Joint Regional Planning Panel

LGA Local Government Area

NATA National Association of Testing Authorities

NOA Naturally occurring asbestos

NSW New South Wales

SEPP State Environmental Planning Policy

VET Vocational Education and Training

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Appendix D – Relevant Contacts

Georges River Council Customer Service Centre

Location: Corner MacMahon and Dora Streets, Hurstville

Open: 8:30am – 5:00pm, Monday to Friday

Phone: 9330 6400

Email: mail@georgesriver.nsw.gov.au

Website: www.georgesriver.nsw.gov.au

Asbestos-related Disease Organisations (non-exhaustive)

Asbestos Diseases Foundation Australia Inc

Phone: (02) 9637 8759
Helpline: 1800 006 196
Email: info@adfa.org.au
Website: www.adfa.org.au

Asbestos Diseases Research Institute

Phone: (02) 9767 9800
Email: info@adri.org.au
Website: www.adri.org.au

Australian Institute of Occupational Hygienists Inc.

Phone: (03) 9338 1635
Email: admin@aioh.org.au
Website: www.aioh.org.au

Dust Diseases Authority

Phone: (02) 8223 6600
Toll Free: 1800 550 027
Email: DDAenquiries@icare.nsw.gov.au
Website: www.icare.nsw.gov.au

NSW Environment Protection Authority (EPA)

Phone: (02) 9995 5000
Environment line: 13 15 55
Email: info@epa.nsw.gov.au
Website: www.epa.nsw.gov.au/epa

Licensed Asbestos Contractors

For a listing of asbestos removal contractors in your area, refer to your local telephone directory or the Yellow Pages website: www.yellowpages.com.au or contact:

Asbestos Removal Contractors Association NSW

PO Box Q1882
Queen Victoria Building
NSW 1230

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Email: email@arcansw.asn.au
Website: www.arcansw.asn.au

Verification of an asbestos removal contractor's licence can be checked by contacting SafeWork NSW's Certification Unit Phone: **13 10 50**

Civil Contractors Federation (CCF)

Phone: (02) 9009 4000
Email: ccfnsw@ccfnsw.com
Website: www.ccfnsw.com/

Local Government NSW

Phone: (02) 9242 4000
Email: lgnsw@lgnsw.org.au
Website: www.lgnsw.org.au

NSW Ombudsman

Phone: (02) 9286 1000
Toll free (outside Sydney metro): 1800 451 524
Email: nswombo@ombo.nsw.gov.au
Website: www.ombo.nsw.gov.au

Training providers (non-exhaustive)

TAFE NSW

Phone: 131 601
Website: www.tafensw.edu.au

Housing Industry Association (HIA)

Phone: (02) 9978 3333
Website: www.hia.com.au/

Local Government Training Institute

Phone: (02) 4922 2333
Website: www.lgti.com.au

Comet Training

Phone: (02) 9649 5000
Website: www.comet-training.com.au/site

Master Builders Association (MBA)

Phone: (02) 8586 3521
Website: www.masterbuilders.com.au

SafeWork NSW

SafeWork NSW Information Centre Phone: 13 10 50
SafeWork NSW – Asbestos/Demolition Hotline Phone: (02) 8260 5885
Website: www.safework.nsw.gov.au

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Appendix E – Waste Management Facilities that Accept Asbestos Wastes

Waste management facilities that can accept asbestos waste may be operated by council, the State Government or private enterprise. The fees charged by the facility operators for waste received are determined by the facility.

Not all waste management centres accept asbestos waste from the public. Management of asbestos waste requires special precautions such as a separate disposal location away from other general waste and controls to prevent the liberation of asbestos fibres, such as the immediate covering of such waste.

Waste management facilities in other areas that accept asbestos wastes.

A list of licensed landfills that may accept asbestos waste from the public is available on the EPA website at: www.epa.nsw.gov.au/managewaste/house-asbestos-land.htm

Some of the landfills may accept non-friable asbestos waste but not friable asbestos waste. Some landfills may not accept large quantities of asbestos waste.

Always contact the landfill before taking asbestos waste to a landfill to find out whether asbestos is accepted and any requirements for delivering asbestos to the landfill. EPA does not endorse any of the landfills listed on the website or guarantee that they will accept asbestos under all circumstances.

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Appendix F – Asbestos-related Legislation, Policies and Standards

- *Contaminated Land Management Act 1997*
- Code of practice on how to manage and control asbestos in the workplace (catalogue no. WC03560) published by SafeWork NSW
- *Code of practice on how to safely remove asbestos* (catalogue no. WC03561) published by SafeWork NSW
- Demolition work code of Practice 2015
- *Environmental Planning and Assessment Act 1979*
- *Environmental Planning and Assessment Regulation 2021*
- *Local Government Act 1993*
- *Local Government (General) Regulation 2005*
- *Protection of the Environment Operations (General) Regulation 2022*
- *Protection of the Environment Operations (Waste) Regulation 2014*
- *Protection of the Environment Operations Act 1997*
- State Environmental Planning Policy (Resilience and Hazards) 2021
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008
- *NSW Work Health and Safety Act 2011*
- NSW Work Health and Safety Regulation 2017
- Workers' Compensation (Dust Diseases) Act 1942.

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Appendix G – Agencies Roles and Responsibilities

NSW Organisations:

Department of Planning and Environment (DPE)

DPE's primary role in the management of asbestos relates to administration of State Environmental Planning Policies, and the *Environmental Planning and Assessment Act 1979* (and associated Regulation).

Whilst DPE does not have an operational role in the management of asbestos, it has a regulatory function and provides policy support relating to asbestos and development. In assessing proposals for development under the *Environmental Planning and Assessment Act 1979*, consent authorities are required to consider the suitability of the subject land for the proposed development. This includes consideration of the presence of asbestos and its environmental impact.

Where asbestos represents contamination of the land (i.e. it is present in excess of naturally occurring levels*), State Environmental Planning Policy (Resilience and Hazards) 2021* imposes obligations on developers and consent authorities in relation to remediation of the land and the assessment and monitoring of its effectiveness.

The *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* enables exempt and complying development across the state. While this includes demolition and the removal of asbestos, the *Environmental Planning and Assessment Regulation 2000* specifies particular conditions that must be contained in a complying development certificate in relation to the handling and lawful disposal of both friable and non-friable asbestos material under the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.*

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Dust Diseases Authority (DDA)

The Dust Diseases Authority provides a system of no-fault compensation to people who have developed a dust disease from occupational exposure to dust as a worker in New South Wales and to their dependants. The DDA's statutory function is to administer the *Workers' Compensation (Dust Diseases) Act 1942*. Services include:

- payment of compensation benefits to eligible workers and dependents
- co-ordination and payment of medical and related health care expenses of affected
- medical examination of workers exposed to dust in the workplace
- information and education.

NSW Environment Protection Authority (EPA)

EPA's role is to regulate the classification, storage, transport and disposal of waste in NSW, including asbestos waste. The waste regulatory framework includes the *Protection of the Environment Operations Act 1997* and the *Protection of the Environment Operations (Waste) Regulation 2014*. Clauses 77 through to 81 of the *Protection of the Environment Operations (Waste) Regulation 2014* set out the special requirements relating to the transportation and disposal of asbestos waste.

EPA is the appropriate regulatory authority for activities that require an environment protection licence or are carried out by public authorities such as local councils, the Roads and Maritime Services and Sydney Water. Local councils are the appropriate regulatory authority for activities that are not regulated by the EPA, which typically include building demolition, construction sites, residential properties, commercial sites and small to medium sized industrial facilities.

EPA is responsible for assisting councils in fulfilling their regulatory responsibilities. EPA has developed resources to assist Local Government to regulate asbestos waste incidents and prevent illegal dumping. Website links to these resources are provided in Appendix B.

The EPA maintains the regulatory framework for the remediation of contaminated land (the *Contaminated Land Management Act 1997*) and actively regulates land that is declared to be 'significantly contaminated' under the *Contaminated Land Management Act 1997*.

Heads of Asbestos Coordination Authorities (HACA)

The HACA is chaired by SafeWork NSW with senior officials from:

- Department of Industry
- Department of Planning and Environment
- Dust Diseases Authority
- Environment Protection Authority
- Local Government NSW
- Ministry of Health
- Office of Emergency Management
- Office of Local Government.

The HACA group will improve the management, monitoring and response to asbestos issues in NSW by developing coordinated prevention programs. These programs include a comprehensive public awareness campaign to promote the safe handling of asbestos and help prevent the risk of exposure to asbestos-related diseases in the NSW community. Further information about the HACA can be found on the SafeWork NSW website: www.safework.nsw.gov.au.

Local Government NSW (LGNSW)

Local Government NSW (LGNSW) is the peak body for councils in NSW. LGNSW represents all NSW general-purpose councils, the special-purpose county councils and the NSW Aboriginal Land Council.

LGNSW is a credible, professional organisation facilitating the development of an effective community-based system of Local Government in NSW. LGNSW represents the views of councils to NSW and Australian Governments; provides industrial relations and specialist services to councils; and promotes NSW councils to the community.

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In 2012, LGNSW commenced a project funded by SafeWork NSW to assist councils to adopt and implement a model asbestos policy. The project is outlined at: www.lgnsw.org.au

NSW Department of Industry

The NSW Department of Industry, Skills and Regional Development (known as the NSW Department of Industry) leads the state government's contribution to making NSW:

- a fertile place to invest and to produce goods and services, and thereby
- create jobs and opportunities for our citizens

The NSW Department of Industry also has responsibilities for:

- skill formation and development to match industry demand
- partnering with stakeholders in stewardship and sustainable use of the state's natural resources; and
- supporting economic growth in the regions.

Within the Division of Resources & Energy in the Department, the Geological Survey of NSW teams of field geologists, geophysicists, mineral geoscientists and palaeontologists and geospatial specialists produce a range of maps. Geological mapping records the distribution of rock types and location of structures at or near the Earth's surface. The maps have applications to land use assessment, engineering construction, environmental management and natural hazard risk assessment.

The Geological Survey of NSW prepared the state-wide mapping of naturally occurring asbestos (NOA) in NSW for the Heads of Asbestos Coordination Authorities.

NSW Ministry of Health

The NSW Ministry of Health does not have express statutory responsibilities for managing asbestos-related risks and incidents in NSW. The Ministry provides an expert advisory service to other governmental agencies on public health issues. This service may include technical information or assistance to prepare public health information bulletins.

NSW Ombudsman

The NSW Ombudsman is an independent and impartial watchdog body. The NSW Ombudsman is responsible for ensuring that public and private sector agencies and employees within its jurisdiction fulfil their functions appropriately. The NSW Ombudsman assists those agencies and their employees to be aware of their responsibilities to the public, to act reasonably and to comply with the law and best administrative practice.

Office of Fair Trading and the Building Professionals Board (BPB)

NSW Fair Trading safeguards the rights of all consumers and advises business and traders on fair and ethical practice. NSW Fair Trading provides services directly to individuals and businesses to create a fair, safe and equitable marketplace.

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NSW Fair Trading is establishing a Loose-Fill Asbestos Implementation Taskforce responsible for overseeing and implementing the NSW Government Voluntary Purchase and Demolition Program for properties containing loose-fill asbestos insulation. The Loose-Fill Asbestos Implementation Taskforce will be in place until work is completed on the purchase and demolition of all properties that choose to participate in the Program.

The Building Professionals Board (BPB) is now part of Fair Trading and oversees building and subdivision certification. The BPB's role involves providing practice advice and educational programs to assist certifying authorities (private and council) in carrying out their role. The BPB certifies and audits both private and council certifiers. Further information about the BPB may be found at: www.bpb.nsw.gov.au

Office of Local Government

The Office of Local Government is responsible for local government across NSW. The Office's organisational purpose is to 'Strengthen Local Government' and its organisational outcome is 'Fit for the future councils leading strong communities'.

The Office has a policy, legislative, investigative and program focus on matters ranging from Local Government finance, infrastructure, governance, performance, collaboration and community engagement. The Office strives to work collaboratively with the Local Government sector and is the key adviser to the NSW Government on local government matters.

SafeWork NSW

SafeWork NSW is responsible for the issuing and control of licences that are issued to all asbestos removal and demolition contractors. SafeWork NSW works with the employers, workers and community of NSW to achieve safer and more productive workplaces, and effective recovery, return to work and security for injured workers.

SafeWork NSW administers work health and safety, injury management, return to work and workers compensation laws, and manage the workers compensation system. SafeWork NSW's activities include, health and safety, injuries and claims, licensing for some types of plant operators, registration of some types of plant and factories, training and assessment, medical and healthcare, law and policy.

National Organisations

Asbestos Safety and Eradication Agency

The Asbestos Safety and Eradication Agency was established in 2013 to provide a national focus on asbestos issues which go beyond workplace safety to encompass environmental and public health issues. The agency's objective is to eliminate asbestos-related disease in Australia.

The agency has broad functions under its legislation, including:

- Reporting on the implementation of the National Strategic Plan on Asbestos Awareness and Management (NSP); reviewing and amending the NSP as required and promoting the NSP.
- Providing advice to the Minister about asbestos safety.

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- Liaising with all levels of government, agencies or bodies about the implementation of the NSP; as well as asbestos safety in general.
- Commissioning, monitoring and promoting research about asbestos safety.

The agency administers the National Asbestos Exposure Register which was created to record the details of members of the community who may have been exposed to asbestos. Registration forms are online at https://www.asbestossafety.gov.au/national-asbestos-exposure-register

The agency also maintains a national database for asbestos disposal facilities, which members of the public can search to identify their nearest facility that accepts asbestos waste, available online at https://www.asbestossafety.gov.au/search-disposal-facilities

Councils interested in finding out more about the agency, updating information listed on the disposal database, or receiving information, flyers or brochures for distribution within the LGA should contact the agency at enquiries@asbestossafety.gov.au.

National Association of Testing Authorities (NATA)

This body has the role of providing accreditation to firms licensed to remove asbestos.

NSW (Head Office) and ACT
Phone: (02) 9736 8222
National Toll Free: 1800 621 666
Website: www.nata.asn.au

Environmental Health Committee (enHealth)

The Environmental Health Committee (enHealth) is a subcommittee of the Australian Health Protection Committee (AHPC). enHealth provides health policy advice, implementation of the National Environmental Health Strategy 2007-2012, consultation with key players, and the development and coordination of research, information and practical resources on environmental health matters at a national level.

Website: www.health.gov.au/internet/main/publishing.nsf/content/ohp-environ-enhealth-committee.htm

Safe Work Australia

Safe Work Australia is an Australian Government statutory agency established in 2009, with the primary responsibility of improving work health and safety and workers' compensation arrangements across Australia.

Phone: (02) 6121 5317
Email: info@swa.gov.au
Website: www.safeworkaustralia.gov.au

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Appendix H – Scenarios illustrating which Agencies lead a response in NSW

The tables show which agencies are responsible for regulating the following scenarios in NSW:

- emergency management
- naturally occurring asbestos
- residential settings
- site contamination
- waste
- workplaces.

Emergency Management

Scenario	Lead organisation	Other regulators
Emergency response	Emergency services	Fire and Rescue (Hazmat) SafeWork NSW
Handover to Local council, owner of property or NSW Police – crime scene following a minor incident	Local council NSW Police	
Handover to State Emergency Recovery Controller	State Emergency Recovery Controller	Recovery Committee Local council EPA SafeWork NSW
Handover to Recovery Committee following a significant incident	Recovery Committee (formed by State Emergency Recovery Controller)	Local council EPA SafeWork NSW
Remediation not requiring a licensed removalist	Local council	Principal Certifying Authority SafeWork NSW (workers)
Remediation requiring licensed removal work	SafeWork NSW	Local council Principal Certifying Authority
Clearance Certificate issued by an Asbestos Assessor	SafeWork NSW	Principal Certifying Authority

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Naturally Occurring Asbestos

Scenario	Lead organisation	Other regulators
Naturally occurring but will be disturbed due to a work process including remediation work	SafeWork NSW	Local council EPA (*Protection of the Environment Operations Act 1997* Scheduled Activities Public Authorities)
Naturally occurring asbestos part of a mineral extraction process	NSW Department of Industry	Local council EPA (*Protection of the Environment Operations Act 1997* Scheduled Activities Public Authorities)
Naturally occurring but will remain undisturbed by any work practice	Local council	EPA (*Protection of the Environment Operations Act 1997* Scheduled Activities Public Authorities) SafeWork NSW (workers)
Soil contaminated with asbestos waste and going to be disturbed by a work practice	SafeWork NSW	EPA (*Protection of the Environment Operations Act 1997* Scheduled Activities Public Authorities, declared contaminated land sites)
Soil contaminated with asbestos waste but will remain undisturbed by any work practice	Local council	EPA (*Protection of the Environment Operations Act 1997* Scheduled Activities Public Authorities, declared contaminated land sites) SafeWork NSW (workers on site)
Potential for exposure on public land	EPA (Protection of the Environment Operations Act 1997 Scheduled Activities Public Authorities	Local council SafeWork NSW (workers on site)
Soil contaminated with asbestos waste but at a mine site	NSW Department of Industry EPA (*Protection of the Environment Operations Act 1997* Scheduled Activities Public Authorities)	Local council

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Residential Settings

Scenario	Lead organisation	Other regulators
Safe Management of asbestos including: • identification • in situ management • removal requirements • disposal requirements.	Local council Private Certifiers	SafeWork NSW EPA
Site contaminated due to past uses	Local council	SafeWork NSW EPA
Licensed removal work required	SafeWork NSW	Local council Private Certifiers
Removal does not require a licensed removalist	Local council Private Certifiers	SafeWork NSW (workers)
Transport or waste disposal issues	Local council	EPA
Derelict property with fibro debris	Local council or Multi-agency	Multi-agency

Site Contamination

Scenario	Lead organisation	Other regulators
Asbestos illegally dumped	Local council	EPA SafeWork NSW
Site contamination at commercial premises	See Workplaces	
Site contamination at residential premises	See Residential settings	

Waste

Scenario	Lead organisation	Other regulators
Waste temporarily stored on-site	SafeWork NSW (worksites) EPA and Local council (non-worksites)	
Waste transported by vehicle	EPA	SafeWork NSW
Waste disposed of onsite	Council or EPA as illegal dumping or pollution of land if no valid council development consent	Local council (consent required to dispose onsite) (section 149 property certificate and development assessment process)
Waste going to landfill site	EPA (advice)	Local council (if managing licensed landfill)

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Scenario	Lead organisation	Other regulators
Waste to be transported interstate	EPA	
Waste for export	Department of Immigration and Border Protection	SafeWork NSW Department of Employment

Workplaces

Scenario	Lead organisation	Other regulators
Asbestos installed/supplied after 2003 (illegally)	SafeWork NSW	
Risks to the health of workers	SafeWork NSW	
Asbestos management and asbestos going to be removed	SafeWork NSW NSW Department of Industry (mine sites)	
Risks to the health of the public from worksites	SafeWork NSW (Risks to workers) Local council (Risks to the wider public) Department of Planning and Infrastructure (part 3A approvals) EPA (*Protection of the Environment Operations Act 1997* licensed sites)	
Waste stored temporarily on-site at worksites	SafeWork NSW	
Transport or waste disposal issues	EPA	SafeWork NSW Local council
Asbestos contaminated clothing going to a laundry	SafeWork NSW	EPA Local council
Contaminated land not declared under the *Contaminated Land Management Act 1997*	Local council	EPA
'Significantly contaminated' land declared under the *Contaminated Land Management Act 1997*	EPA	Local council

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Appendix I – Asbestos Containing Materials

Some asbestos containing materials found in New South Wales domestic settings (non-exhaustive list):

Asbestos containing materials	Approximate supply dates
Cement sheets	Imported goods supplied from 1903 locally made 'fribrolite' from 1917
Cement roofing / lining slates	Imported goods supplied from 1903 locally made 'fribrolite' from 1917
Mouldings and cover strips	Available by 1920s and 1930s
Super-six (corrugated) roofing	Available by 1920s and 1930s – 1985
'Tilex' decorative wall panels	Available by 1920s and 1930s
Pipes and conduit piping	Available by 1920s and 1930s
Motor vehicle brake linings	Available by 1920s and 1930s
Striated sheeting	Available from 1957
'Asbestolux' insulation boards	Available from 1957
'Shadowline' asbestos sheeting for external walls, gable ends and fences	Available from 1958 – 1985
Vinyl floor tiles impregnated with asbestos	Available up until 1960s
Asbestos containing paper backing for linoleum	Available up until 1960s
'Durasbestos' asbestos cement products	Available up until 1960s
'Tilex' marbletone decorative wall panels	Available from early 1960s
'Tilex' weave pattern decorative wall panels	Available from early 1960s
'Hardiflex' sheeting	Available from 1960s – 1981
'Versilux' building board	Available from 1960s – 1982
'Hardiplank' and 'Hardigrain' woodgrain sheeting	Available from mid 1970s – 1981
Loose-fill, fluffy asbestos ceiling insulation	During the 1960s and 1970s, pure loose-fill asbestos was sold as ceiling insulation for residential and commercial premises. A Canberra based company known as 'Mr Fluffy' installed insulation in at least 1,000 homes in the ACT and

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Asbestos containing materials	Approximate supply dates
	is also understood to have installed insulation into homes in NSW.
Asbestos rope gaskets for wood heaters. Heater and stove insulation	Dates of supply availability unknown but prior to 31 December 2003
Compressed fibro-cement sheets	Available from 1960s – 1984
Villaboard	Available until 1981
Harditherm	Available until 1984
Highline	Available until 1985
Coverline	Available until 1985
Roofing accessories	Available until 1985
Pressure pipe	Available until 1987

Sources:

NSW Government, 2011, Asbestos Blueprint: A guide to roles and responsibilities for operational staff of state and local government.

NSW Taskforce Report: Loose-Fill Asbestos Insulation in NSW Homes (2015) www.fairtrading.nsw.gov.au/biz_res/ftweb/pdfs/Tenants_and_home_owners/Loose_Fill_Asbestos_Taskforce_Report.pdf (accessed October, 2015).

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Asbestos containing materials that may be found in various settings (non-exhaustive list)

A

Air conditioning duct, in the exterior or interior acoustic and thermal insulation
Arc shields in lift motor rooms or large electrical cabinets
Asbestos-based plastics products as electrical insulates and acid-resistant compositions or aircraft seats
Asbestos ceiling tiles
Asbestos cement conduit
Asbestos cement electrical fuse boards
Asbestos cement external roofs and walls
Asbestos cement in the use of form work for pouring concrete
Asbestos cement internal flues and downpipes
Asbestos cement moulded products such as gutters, ridge capping, gas meter covers, cable troughs and covers
Asbestos cement pieces for packing spaces between floor joists and piers
Asbestos cement (underground) pit as used for traffic control wiring, telecommunications cabling etc
Asbestos cement render, plaster, mortar and coursework
Asbestos cement sheet
Asbestos cement sheet behind ceramic tiles
Asbestos cement sheet over exhaust canopies such as ovens and fume cupboards
Asbestos cement sheet internal walls and ceilings
Asbestos cement sheet underlay for vinyl
Asbestos cement storm drainpipes
Asbestos cement water pipes (usually underground)
Asbestos containing laminates, (such as Formica) used where heat resistance is required
Asbestos containing pegboard
Asbestos felts
Asbestos marine board, e.g. marinate
Asbestos mattresses used for covering hot equipment in power stations
Asbestos paper used variously for insulation, filtering and production of fire-resistant laminates
Asbestos roof tiles
Asbestos textiles
Asbestos textile gussets in air conditioning ducting systems
Asbestos yarn
Autoclave/steriliser insulation

B

Bitumen-based waterproofing such as malthoid (roofs and floors, also in brickwork)
Bituminous adhesives and sealants
Boiler gaskets
Boiler insulation, slabs and wet mix

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Brake disc pads
Brake linings

C

Cable penetration insulation bags (typically Telecom)
Calorifier insulation
Car body filters (uncommon)
Caulking compounds, sealant and adhesives
Ceiling insulation (which may have moved into wall cavities, cornices and sub-floor areas)
Cement render
Chrysotile wicks in kerosene heaters
Clutch faces
Compressed asbestos cement panels for flooring, typically verandas, bathrooms and steps for demountable buildings
Compressed asbestos fibres (CAF) used in brakes and gaskets for plant and automobiles

D

Door seals on ovens

E

Electric heat banks – block insulation
Electric hot water services (normally no asbestos, but some millboard could be present)
Electric light fittings, high wattage, insulation around fitting (and bituminised)
Electrical switchboards see Pitch-based
Exhausts on vehicles

F

Filler in acetylene gas cylinders
Filters: beverage wine filtration
Fire blankets
Fire curtains
Fire door insulation
Fire-rated wall rendering containing asbestos with mortar
Fire-resistant plaster board, typically on ships
Fire-retardant material on steel work supporting reactors on columns in refineries in the chemical industry
Flexible hoses
Floor vinyl sheets
Floor vinyl tiles
Fuse blankets and ceramic fuses in switchboards

G

Galbestos™ roofing materials (decorative coating on metal roof for sound proofing)
Gaskets: chemicals, refineries
Gaskets: general
Gauze mats in laboratories/chemical refineries
Gloves: asbestos

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H

Hairdryers: insulation around heating elements
Header (manifold) insulation

I

Insulation blocks
Insulation in ceilings, which may have spread to wall cavities, cornices and sub-floor areas
Insulation in electric reheat units for air conditioner systems

L

Laboratory bench tops
Laboratory fume cupboard panels
Laboratory ovens: wall insulation
Lagged exhaust pipes on emergency power generators
Lagging in penetrations in fireproof walls
Lift shafts: asbestos cement panels lining the shaft at the opening of each floor and asbestos packing around penetrations
Limpet asbestos spray insulation
Locomotives: steam, lagging on boilers, steam lines, steam dome and gaskets

M

Mastik
Millboard between heating unit and wall
Millboard lining of switchboxes
Mortar

P

Packing materials for gauges, valves, etc can be square packing, rope or loose fibre
Packing material on window anchorage points in high-rise buildings
Paint, typically industrial epoxy paints
Penetrations through concrete slabs in high rise buildings
Pipe insulation including moulded sections, water-mix type, rope braid and sheet
Plaster and plaster cornice adhesives
Pipe insulation: moulded sections, water-mix type, rope braid and sheet
Pitch-based (zelemite, ausbestos, lebah) electrical switchboard

R

Refractory linings
Refractory tiles
Rubber articles: extent of usage unknown

S

Sealant between floor slab and wall, usually in boiler rooms, risers or lift shafts
Sealant or mastik on windows
Sealants and mastik in air conditioning ducting joints
Spackle or plasterboard wall jointing compounds
Sprayed insulation: acoustic wall and ceiling

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Sprayed insulation: beams and ceiling slabs
Sprayed insulation: fire retardant sprayed on nut internally, for bolts holding external building wall panels
Stoves: old domestic type, wall insulation

T

Tape and rope: lagging and jointing
Tapered ends of pipe lagging, where lagging is not necessarily asbestos
Tilux sheeting in place of ceramic tiles in bathrooms
Trailing cable under lift cabins
Trains: country – guards vans – millboard between heater and wall
Trains – Harris cars – sprayed asbestos between steel shell and laminex

V

Valve and pump insulation

W

Welding rods
Woven asbestos cable sheath

Sources:

Environmental health notes number 2 guidelines for local government on asbestos, 2005 (Victorian Department of Human Services).
www.health.vic.gov.au/environment/downloads/hs523_notes2_web.pdf

NSW Taskforce Report: Loose-Fill Asbestos Insulation in NSW Homes (2015)
www.fairtrading.nsw.gov.au/biz_res/ftweb/pdfs/Tenants_and_home_owners/Loose_Fill_Asbestos_Taskforce_Report.pdf (accessed October, 2015).

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Appendix J – Asbestos Licences

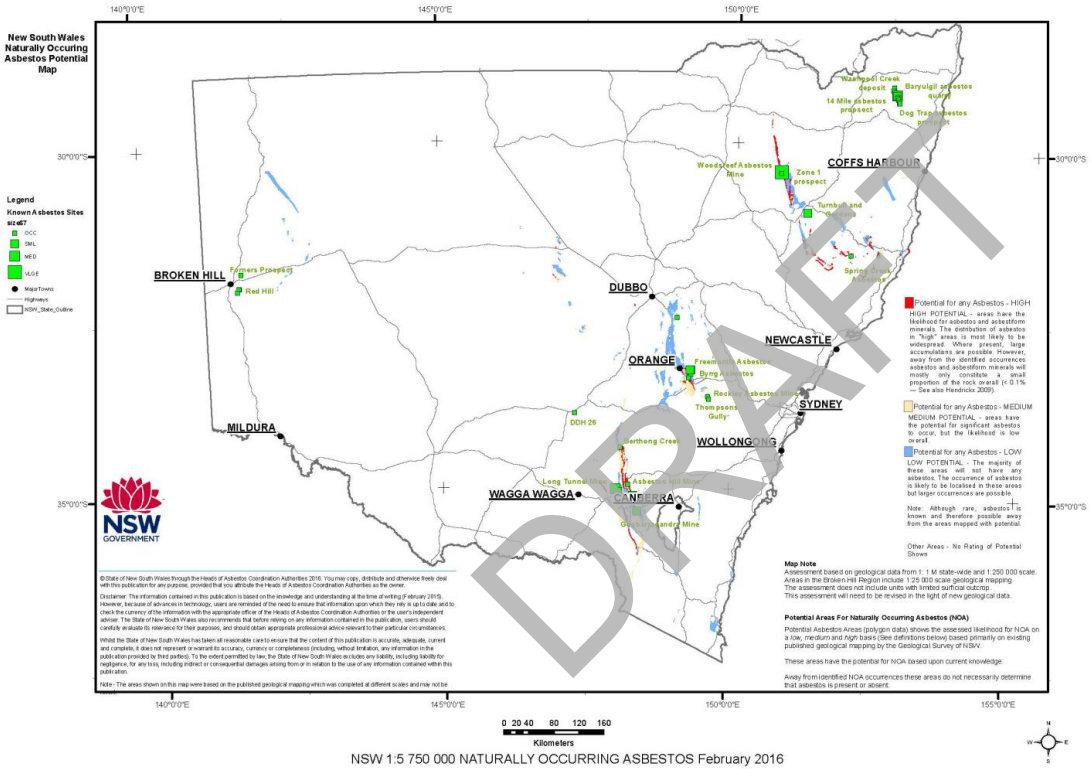
Type of licence	What asbestos can be removed?
Class A	Can remove any amount or quantity of asbestos or asbestos containing material, including: • any amount of friable asbestos or asbestos containing material • any amount of asbestos containing dust • any amount of non-friable asbestos or asbestos containing material.
Class B	Can remove: • any amount of non-friable asbestos or asbestos containing material **Note**: A Class B licence is required for removal of more than 10 m² of non-friable asbestos or asbestos containing material but the licence holder can also remove up to 10 m² of non-friable asbestos or asbestos containing material. • asbestos containing dust associated with the removal of non-friable asbestos or asbestos containing material. **Note**: A Class B licence is required for removal of asbestos containing dust associated with the removal of more than 10 m² of non-friable asbestos or asbestos containing material but the licence holder can also remove asbestos containing dust associated with removal of up to 10m² of non-friable asbestos or asbestos containing material.

Trained Council workers	Can remove:
	• up to 10 m² of non-friable asbestos or asbestos containing material
	• asbestos containing dust that is:
	  ○ associated with the removal of less than 10 m² of non-friable asbestos or asbestos containing material
	  ○ not associated with the removal of friable or non-friable asbestos and is only a minor contamination.

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An asbestos removal contractor's licence can be verified by contacting SafeWork NSW's Certification Unit on 13 10 50.

Appendix K – Map



NSW 1:5 750 000 NATURALLY OCCURRING ASBESTOS February 2016

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Draft Georges River Council Wildlife Protection Area Policy

March 2026

Policy Administration

Dates	Policy approved 02/08/2022 This Policy is effective upon its approval. Policy is due for review 08/2025
Approved by	Council Meeting 02/08/2022 Council Resolution CCL059-22 (ENV019-22)
Policy Type	☐ Executive Policy ☒ Council Policy
Exhibition Period	24 September to 24 November 2025
Policy Owner	Manager Environment, Health and Regulatory Services, Environment and Planning Directorate
Related Documents	• Georges River Council Enforcement Policy 2024 Enforcement Policy.PDF • Georges River Council Biodiversity Study 2021 (Volumes 1 & 2) - 2021 Biodiversity Study - Volume 1 and 2021 Biodiversity Study - Volume 2 • Oatley Flying-fox Camp Management Plan 2021 - Oatley Flying-fox Camp Management Plan 2021 • Georges River Council Keeping of Animals Policy 2024 - Georges River Council Keeping of Animals Policy • Georges River Council Management of Feral and Infant Companion Animals Policy 2024 - Management of Feral and Infant Companion Animals Policy • Hurstville City Council Neverfail Bay and Oatley Point Reserve Fauna Study 2010 • SSROC Connected Corridors for Biodiversity 2018 • Georges River Council Community Strategic Plan 2025-2035 - Georges River Council Community Strategic Plan 2025-2035
Appendices	Appendix A – Map of Category 2 Wildlife Protection Areas
References & Legislation	• Environment Protection and Biodiversity Conservation Act 1999 • Companion Animals Act (NSW) 1998 • Local Government Act (NSW) 1993 • Biodiversity Conservation Act (NSW) 2016 • Biodiversity Conservation Regulation (NSW) 2017 • National Parks and Wildlife Act (NSW) 1974 • Prevention of Cruelty to Animals Act (NSW) 1979 • Threat Abatement Plan for Predation by Feral Cats 2024

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Document Identifier	Policy #: Pol- Doc #: D26/46573
Breaches of Policy	Breaches of any policy will be dealt with and responded to in accordance with adopted codes and/or relevant legislation.
Record Keeping	All documents and information obtained in relation to the implementation of this policy will be kept in accordance with the NSW State Records Act 1998, Georges River Council's Corporate Records Policy and adopted internal procedures.

Purpose

This Policy aims to protect local biodiversity and the local environment through the declaration of Wildlife Protection Areas (WPA).

The Policy grants Council the ability to control and manage roaming cats and off-leash dogs in designated WPAs outlined within this Policy for the protection of native fauna.

Scope

This Policy applies to public land declared as a WPA as identified in Appendix A - Map of Category 2 Wildlife Protection Areas and any future declared Wildlife Protection Areas.

This Policy applies to owners of companion animals in the local government area (LGA), particularly those who live within 1km of a declared WPA.

This Policy identifies parks and reserves as a WPA and provides criteria for the creation of additional WPAs.

Strategic Context

Councils Community Strategic Plan 2025-2035, Pillar 2: Our Green Environment, outlines the strategies to achieve our goal that includes:

- Adopt and promote measures to increase the tree canopy, bushland and reinstate our biodiversity including endemic flora and fauna.

Under the *Companion Animals Act 1998* (the Act), local authorities can prohibit cats and dogs in areas through the declaration of WPAs, meaning any public place or any part of a public place set apart by the local authority for the protection of wildlife and where notices to the effect that cats or dogs are prohibited in or on that public place.

WPAs can be declared as one of two categories under the Act:

- Category 1 lands prohibit both cats and dogs as per section 30(1)(b) and section 14(1)(h). Section 14(1)(h) does not apply to a police dog, a dog that is an assistance animal being used bona fide by a person with a disability to assist the person or a corrective services dog.

- Category 2 lands prohibit cats as per section 30(1)(b). Dogs that are on a leash will be permitted on formed tracks, pathways or roads.

The Georges River Council Biodiversity Study 2021 (the Study) provided recommendations for the perpetual conservation of areas containing biodiversity value in the LGA, through the declaration of sites as category 2 WPAs.

Council already has the ability to regulate the presence of off-leash dogs in public places under the *Companion Animals Act 1998,* requiring that all dogs be kept on leashes unless in designated off-leash dog parks, which are listed on Council's website. As such, this Policy will only impose declarations of Category 2 Wildlife Protection Areas at the sites contained in Appendix A - Map of Category 2 Wildlife Protection Areas.

Council's current Keeping of Animals Policy contains regulations for cat owners to abide by to prevent cats roaming if they are proven to be causing a nuisance. The Keeping of Animals Policy however does not allow enforcement orders to be issued to owners of cats found roaming in public areas. Due to limitations in the Companion Animals Act 1998, local authorities can only prohibit cats being in WPAs as per section 30(1)(b).

Several declared WPAs border bushlands that is part of Georges River National Park. The NSW Government Pets in Parks Policy 2021, associated with the *NSW National Parks and Wildlife Act 1974*, outlines that:

- A pet cannot be brought into a national park or other land reserved or acquired under the National Parks and Wildlife Act 1974 (NPW Act). You can walk a dog on a leash in regional parks within designated dog walking areas. The plan of management for the regional park will determine if and where pets are permitted, and if any conditions apply.

This WPA Policy is consistent with the NSW National Parks and Wildlife Act 1974 where Council managed land which borders areas of the Georges River National Park that are declared as WPAs will prohibit cats.

Definition of Terms

Term	Meaning
Biodiversity Values	Defined in the Georges River Biodiversity Study 2021 as the natural variety and variability of all living organisms, and the ecological and environmental complexes in which they occur. It incorporates multiple levels of complexity including diversity of genetics, species and ecological communities as well as the ecological services provided by the biodiversity (i.e. pollination, regulation of climate, nutrient cycling). Biodiversity values also include social, economic, ethical and aesthetic

Term	Meaning
	features of the environment and are interconnected with human health and wellbeing.
Companion Animal	As defined in the *NSW Companion Animals Act 1998* as a dog, a cat, or any other animal that is prescribed by the Act's regulations as a companion animal or is registered on the Companion Animals Register. Note: All dogs are treated as companion animals, even working dogs on rural properties, guard dogs, police dogs and corrective services dogs.
Feral Animal	As defined in the Management of Feral and Infant Companion Animals Policy, a Wild Companion Animal that has escaped domestication. It is born outside human society and has had no or minimal contact with people.
Feral Cat	As defined in the Commonwealth Threat Abatement Plan for Feral Cats, feral cats are those that are not formally owned by people. Typically, they survive by hunting or scavenging for themselves and live in diverse habitats. Most feral cats live in natural environments and have no or few interactions with people.
LGA	Local Government Area, defined in the Local Government Act 1993 as an administrative division of a country that a local government is responsible for.
Off-leash Dog	A dog, as outlined within the Companion Animal definition, that is roaming unrestricted by a leash or other means preventing its free movement.
Resident	A person permanently residing in the Georges River Local Government Area.
Roaming Cat	Any unattended cat, whether identified or not.
Visitor	A person not residing in the Georges River Local Government Area.
Wildlife Protection Area (WPA)	Areas declared by local authorities through the *Companion Animals Act 1998* for the purpose of protecting local wildlife by prohibiting companion animal(s).

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Policy Statement

1. Council's Commitment

1.1. Council is committed to maintaining healthy and biodiverse bushland and open space areas, available to all residents and visitors with equal and unprohibited access within the Georges River Council LGA. This is achieved by:

- Maintaining bushland and open space areas free from roaming cats and off- leash dogs.
- Facilitating the relocation or removal of roaming cats and off-leash dogs from Category 2 WPAs in Appendix A of this Policy.

2. Policy Principles

2.1 This Policy aims to enable additional regulatory provisions to assist in improving the welfare of native animals in the LGA. The declaration of WPAs will permit authorised Council Officers to issue penalty notices and/or seize roaming cats and off-leash dogs found in WPAs.

3. Identifying Wildlife Protection Areas

3.1 Areas of Council managed land declared as Category 2 Wildlife Protection Areas are listed in Appendix A - Map of Category 2 Wildlife Protection Areas, and as follows:

- Bald Face Point Reserve
- Carss Bush Park
- Cedar Street Reserve (including Cedar Street Reserve South) and Moons Avenue Reserve
- Clarendon Road Reserve and Ogilvy Street Reserve (North and South)
- Gannons Park and Heinrick Reserve
- H.V. Evatt Park, Evatt Park Foreshore and Banksia Place Reserve
- Kyle Williams Reserve
- Moore Reserve
- Myles Dunphy Reserve and Meyer Reserve
- Neverfail Bay Reserve
- Oatley Park, Lime Kiln Bay Reserve and Oatley Heights Park
- Oatley Pleasure Grounds
- Oatley Point Reserve
- Peakhurst Foreshore Reserve, Jinna Road Reserve and Hurstville Golf Course (southern vegetated portion only)
- Poulton Park, Redin Place Reserve and Hurstville Quarry Reserve (North and South)
- Ray Street Reserve
- Riverwood Park, Lillian Road Reserve and Basil Street Reserve
- Shipwrights Bay Reserve
- Yarran Road Reserve.

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3.2 Selection of these areas has been based on the conservation classification of the site, the presence of threatened flora and fauna, the recorded presence of roaming cats or off-leash dogs as recorded in the Georges River Biodiversity Study 2021 and whether Council manages the area.

3.3 The identification of additional Wildlife Protection Area sites will only be considered if the following four criteria have been met:

i. Three (3) separate verified reports of roaming cats are recorded at the subject site on three (3) separate dates by Council staff and/or community members; and;
ii. The subject site can appropriately be signposted at all public access points; and;
iii. The land is managed by Council; and
iv. The site has been identified as containing biodiversity values.

3.4 Once the above criteria have been met, and if the presence of roaming cats or off- leash dogs is confirmed, the Manager Environment Health and Regulatory Services will propose the site be declared a Wildlife Protection Area by Council.

3.5 The proposal will be submitted to Council via Council's Environment and Planning Committee and will include:

- A map identifying the proposed area; and
- Information on how the proposal meets the criteria listed in 3.2.

4. Declaring Wildlife Protection Areas

4.1 Under the *Companion Animals Act 1998*, local authorities can prohibit cats and dogs from public lands for the purpose of wildlife protection.

4.2 Once a Wildlife Protection Area has been formally declared by Council through this Policy and its supporting documents, it will come into effect 30 days after declaration by Council.

4.3 Following formal declaration Council will:

- Install permanent signage notifying the community of Wildlife Protection Areas at all achievable public access points at each of the designated Wildlife Protection Areas; and
- Advise residents within a 1km radius of the new Wildlife Protection Area site by letter; and
- Update Councils Wildlife Protection Area webpage and public mapping system.

5. Managing Wildlife Protection Areas

5.1 Sections 14 and 30 of the *Companion Animals Act 1998* give Council the authority to impose fines on non-compliant owners of companion animals found in declared Wildlife Protection Areas.

5.2 Council operational staff can monitor declared Wildlife Protection Areas for the presence of roaming cats or off-leash dogs.

5.3 The trapping of animals is governed under the *Prevention of Cruelty to Animals Act (NSW) 1979*. Council (or contractors on behalf of Council) will only seize roaming cats and off-leash dogs in accordance with the Act using humane and approved methods.

5.4 Where roaming cats or off-leash dogs can be caught, impounded and the owner identified, the owner will be sent a notice of seizure advising them that they will need to claim their animal from Council's designated impound facility.

5.5 Penalty notices may be issued to owners of roaming cats or off-leash dogs found in Wildlife Protection Areas.

5.6 Where roaming cats or off-leash dogs cannot be caught by Council staff, Council may engage an animal management contractor to seize the animal in accordance with the *Prevention of Cruelty to Animals Act (NSW) 1979.*

5.7 If no microchip or other identification can be found and the roaming cat or off-leash dog is not claimed, it will be offered to a rehoming organisation or may be euthanised after the required holding period.

5.8 Additionally, if a roaming cat or off-leash dog is in a poor state of health it may be euthanised in accordance with section 26AA of the NSW *Prevention of Cruelty to Animals Act 1979.*

6. Compliance with Wildlife Protection Areas

6.1 Residents living within one kilometre of a declared Wildlife Protection Area are recommended to:

i. Keep cats contained on private property to minimise the negative impact on native wildlife or nuisance to neighbouring residents. This can be done by keeping cats indoors/in an enclosure (house, enclosure, shed or garage), and removing any cat-flaps on doors, or by any means that prevents the animal from leaving the premises on which it is ordinarily kept.

ii. Keep dogs contained on their premises and whilst in a public area keep the dog on an appropriate chain, cord or leash under the effective control of a person over the age of 16.

iii. Carefully read and adhere to any Council signposted instructions positioned at entrances to declared Wildlife Protection Areas.

6.2 All residents and visitors to a site that is a declared Wildlife Protection Area are encouraged to be aware of roaming cats or off leash dogs and report any sightings to Council on Council's website or to Council's Customer Experience Team.

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7. Impounding of Roaming Cats or Off-Leash Dogs Found in Wildlife Protection Areas

7.1 Cats found unattended in Wildlife Protection Areas may be seized and impounded in accordance with section 30(1)(b) and 32(1) of the *Companion Animal Act 1998*. Off-leash dogs can be impounded under section 13 and 14 of the Act.

7.2 Any person identified to have abandoned a companion animal in a Wildlife Protection Area may be referred to the appropriate regulatory authority for prosecution in accordance with section 11 of the *Prevention of Cruelty to Animals Act 1979.*

7.3 Any person identified to have liberated an animal covered by this policy from seizing may be referred to the appropriate regulatory authority for prosecution in accordance with section 2.6 of the *Biodiversity Conservation Act 2016.*

8. Review of the Policy

8.1 This policy will be subject to review and amendments by the policy owner after three years following the date of adoption, or at such time that any sites are declared or undeclared as Wildlife Protection Areas and are added or removed from the list contained in Appendix A – Map of Category 2 Wildlife Protection Areas.

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Responsibilities.

Position	Responsibility
Manager Environment, Health & Regulatory Services	• To oversee ownership of the Policy. • To actively encourage Policy implementation amongst staff. • To respond to reported concerns or barriers to policy implementation. • To ensure Policy procedure and objectives remain consistent with leading Council strategic objectives and goals. • To coordinate and participate in Policy review.
Manager City Operational Services	• To communicate awareness of Policy to staff. • Enable installation of signage at Wildlife Protection Areas as outlined within this Policy.
Coordinator Parking & Rangers	• To effectively train, guide and monitor staff in Policy implementation. • To communicate with partner organisations and businesses relating to policy implementation, specifically relating to impoundment and euthanasia of trapped animals. • To consistently monitor the presence of companion animals in Council public reserves so that Policy amendments can be explored.
Coordinator Environmental, Sustainability & Waste	• To lead engagement of independent consultants to monitor subject sites for presence of companion animals should a site meet the criteria in section 3.2.
Senior Rangers	• To effectively train, guide and monitor staff in policy implementation. • To consistently monitor the presence of companion animals in Council public reserves so that policy amendments can be explored.
Rangers	• To read and become aware of policy objectives and procedure. • To adhere to and carry out policy procedure. • To Report any barriers or concerns relating to policy implementation to the relevant Coordinator.
Senior Environment Officer	• To consider interaction between this policy and Council's routine Feral Animal Control Program.
Operational Staff working declared wildlife protection areas	• To report sightings of companion animals in declared wildlife protection areas to Environment, Health and Regulatory Services Staff.

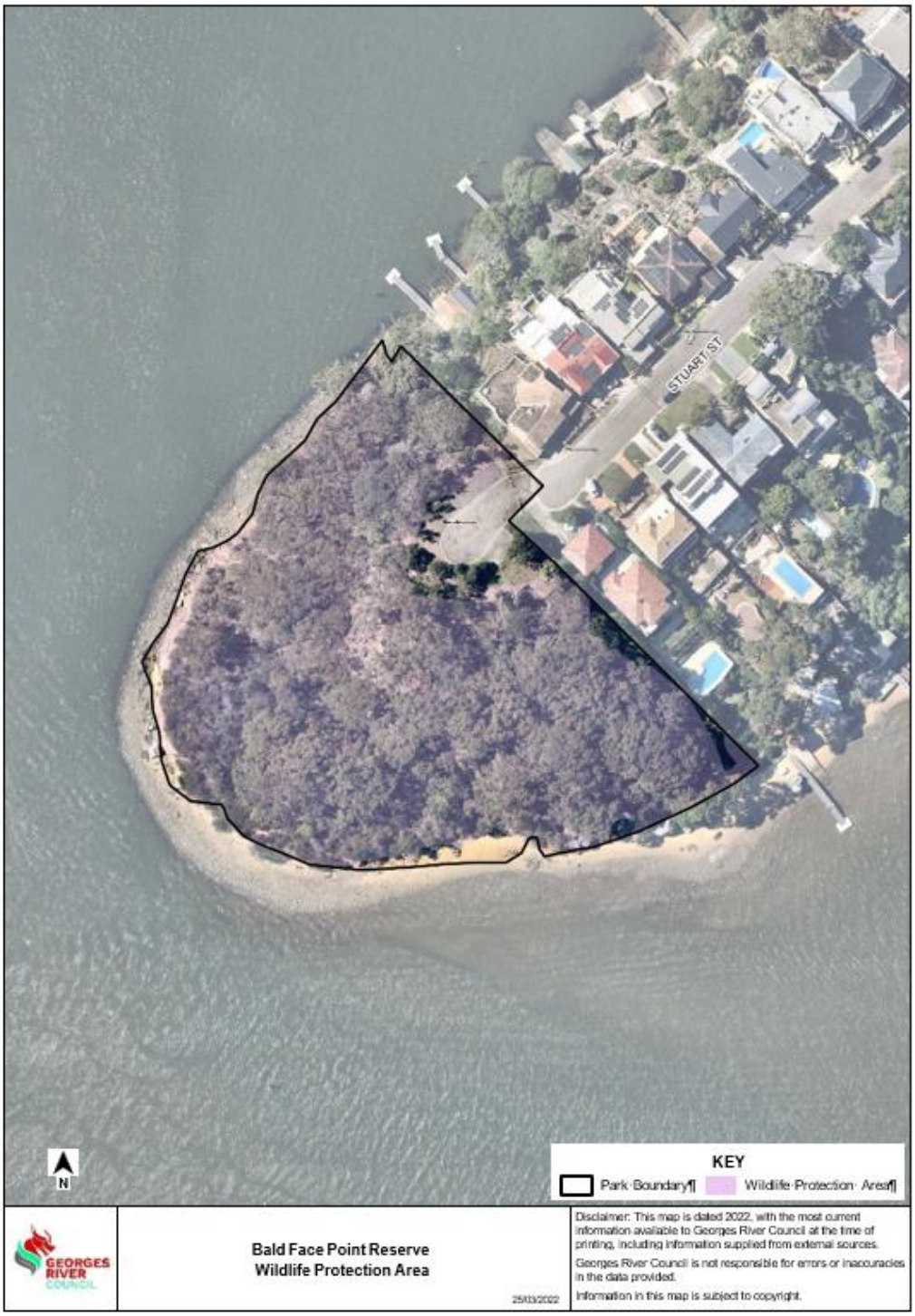
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Version Control and Change History

Version	Amendment Details	Policy Owner	Period Active
1.0	New Georges River Council Wildlife Protection Area Policy. Adopted by Council 02/08/2022 (Council Resolution CCL059-22 & ENV019-22)	Manager Environment, Health & Regulatory Services	02/08/2022 - Ongoing
2.0	Amendments to policy administration, including related documents, references and legislation. Amendments to Definition of Terms with removal of stray cat and domestic companion animal definitions. Amendments to criterion in identification of additional Wildlife Protection Area sites. Amendments to Council actions for declaring Wildlife Protection Areas.	Manager Environment, Health & Regulatory Services	08/2025
3.0	Minor formatting to policy - 3.3 became 3.2.	Manager Environment, Health & Regulatory Services	03/2026 – 03/2029

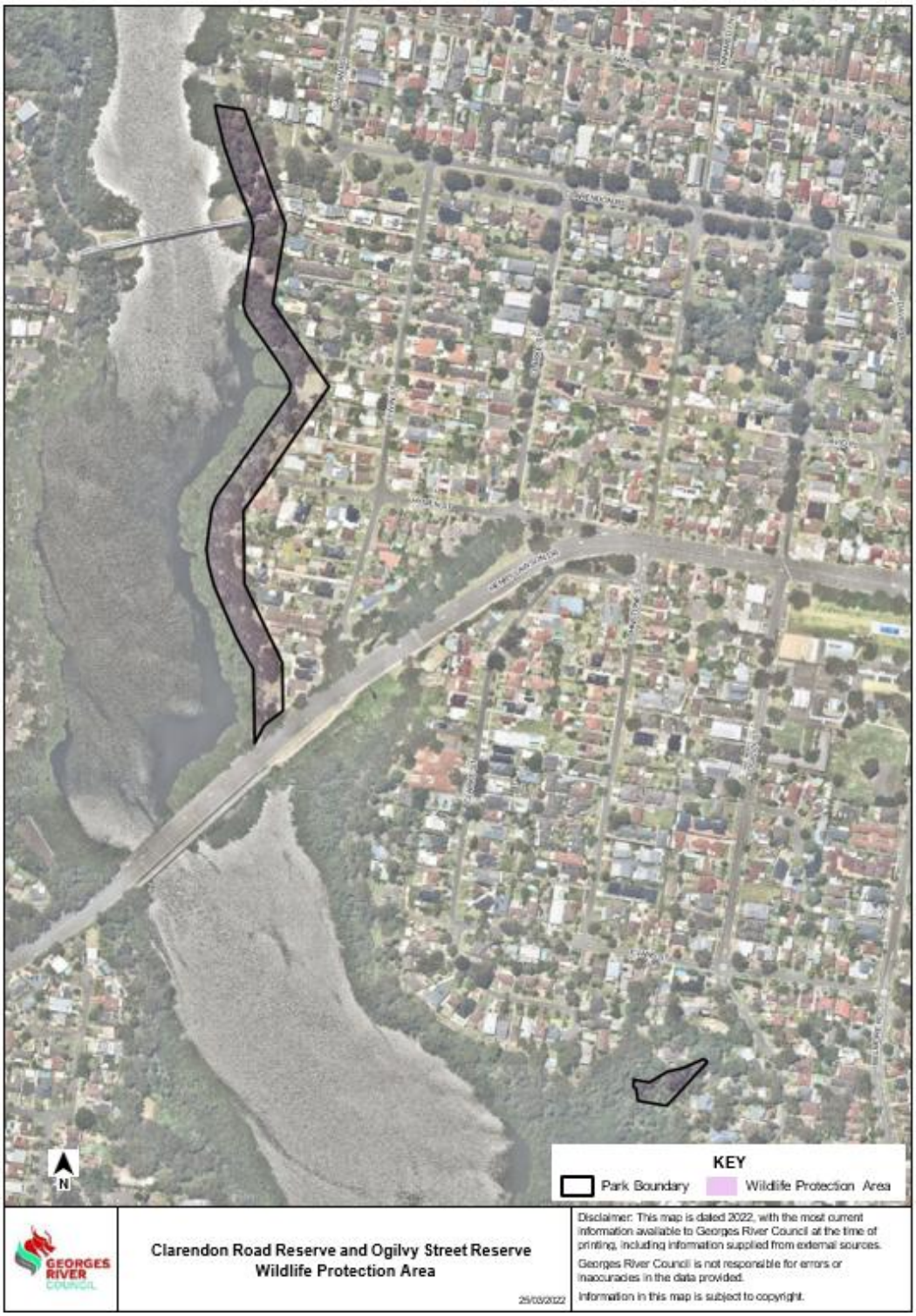
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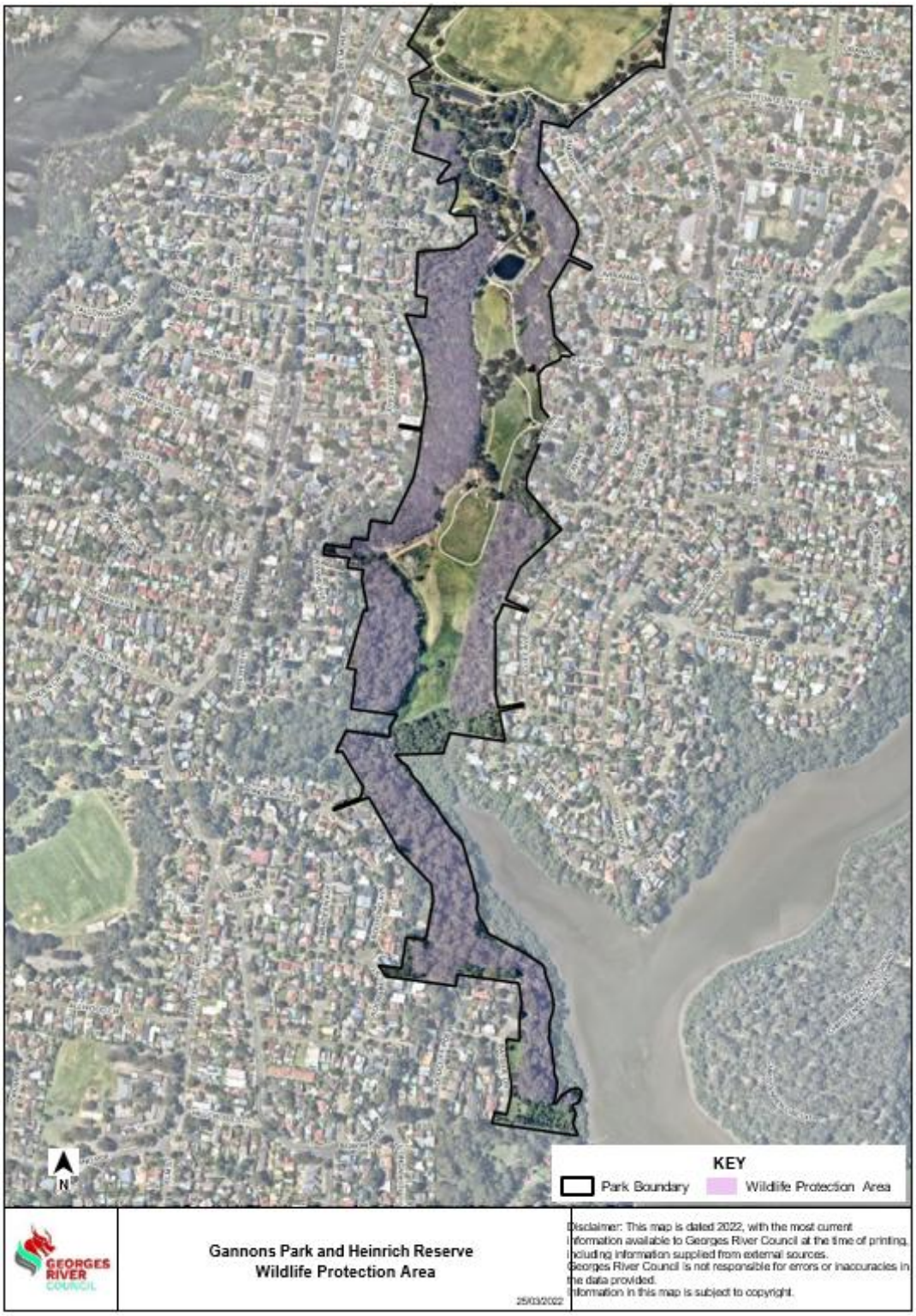
Appendix A Map of Category 2 Wildlife Protection Areas




BORGAN ST
DEWRANG ST
BENWERRIN AVE
BUNYALA ST
MIOWERA AVE
GNARIO AVE
ALLAWAH AVE
CARWAR AVE
PRINCES HWY
BROCKWELL PL
TORRENS ST
BEACH ST
N
KEY
Park Boundary
Wildlife Protection Area
GEORGES RIVER COUNCIL
Carss Bush Park
Wildlife Protection Area
25/03/2022
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MOONS AVE
CEDAR ST
MAPLE ST
LUGARNO PDE
LUGARNO PDE
N
KEY
Park Boundary
Wildlife Protection Area
GEORGES RIVER COUNCIL
Cedar Street Reserve and Moons Avenue Reserve
Wildlife Protection Area
25/03/2022
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KEY
Park Boundary
Wildlife Protection Area
N
GEORGES RIVER COUNCIL
Clarendon Road Reserve and Ogilvy Street Reserve
Wildlife Protection Area
25/03/2022
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KEY
Park Boundary
Wildlife Protection Area
N
GEORGES RIVER COUNCIL
Gannons Park and Heinrich Reserve
Wildlife Protection Area
25/03/2022
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KEY
Park Boundary
Wildlife Protection Area
N
GEORGES RIVER COUNCIL
H.V. Evatt Park
Wildlife Protection Area
25/03/2022
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WARATAH ST
EMPIRE AVE
AVELING ST
PARK VIEW GR
STUART ST
PLEASANT WY
THE KNOLL
COMO ST
N
KEY
Park Boundary
Wildlife Protection Area
GEORGES RIVER COUNCIL
Kyle Williams Reserve
Wildlife Protection Area
25/03/2022
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KEY
Park Boundary
Wildlife Protection Area
N
GEORGES RIVER COUNCIL
Moore Reserve
Wildlife Protection Area
25/03/2022
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KEY
Park Boundary
Wildlife Protection Area
N
GEORGES RIVER COUNCIL
Myles Dunphy Reserve
Wildlife Protection Area
25/03/2022
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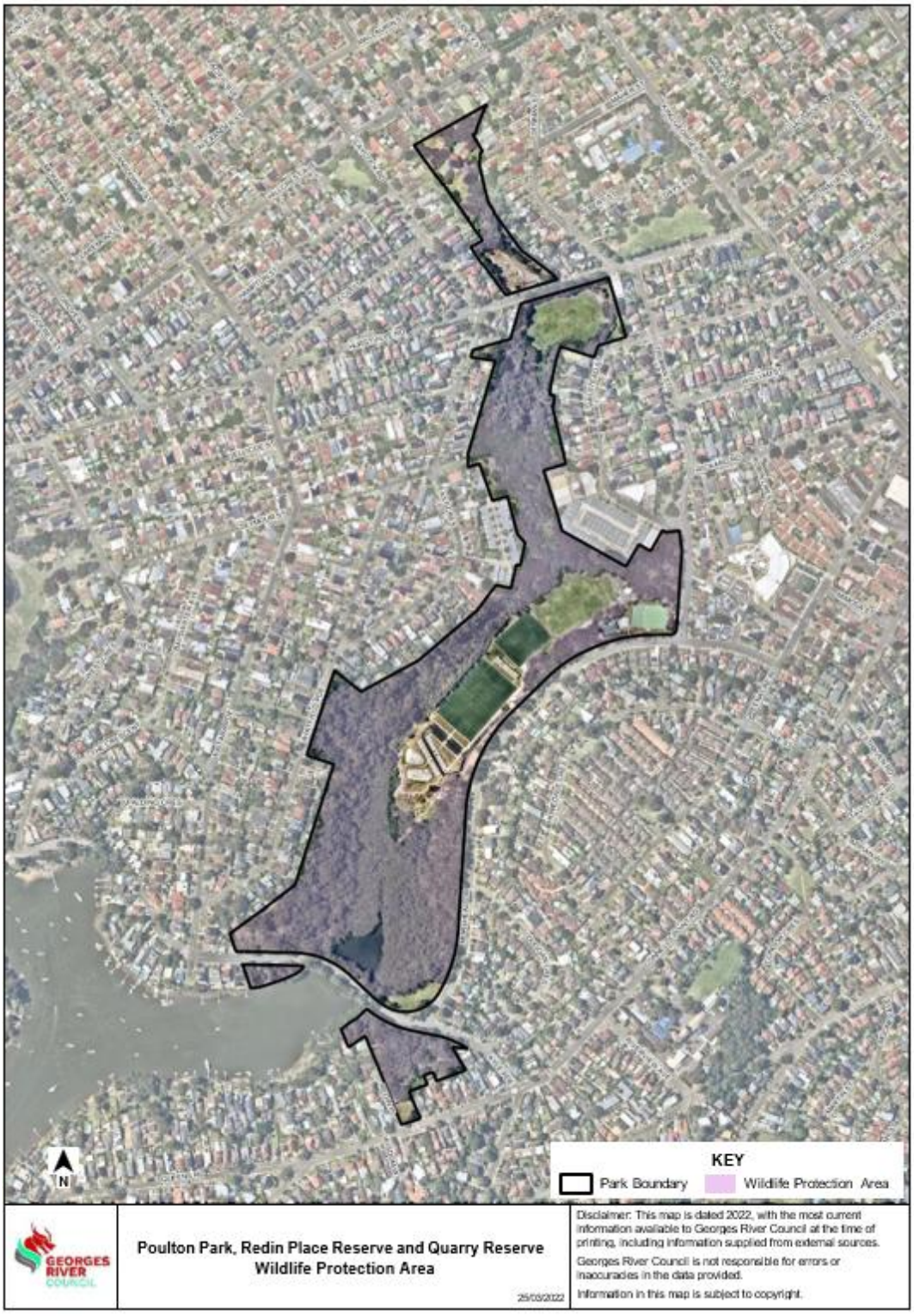

YARRAN RD
NEVERFAIL PL
WYONG ST
N
KEY
Park Boundary
Wildlife Protection Area
GEORGES RIVER COUNCIL
Neverfail Bay Reserve
Wildlife Protection Area
25/03/2022
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KEY
Park Boundary
Wildlife Protection Area
N
GEORGES RIVER COUNCIL
Oatley Park and Lime Kiln Bay Reserve
Wildlife Protection Area
25/03/2022
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NEVILLE ST
ROSA ST
RUSSELL ST
ANNETTE ST
N
KEY
Park Boundary
Wildlife Protection Area
GEORGES RIVER COUNCIL
Oatley Pleasure Grounds
Wildlife Protection Area
25/03/2022
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HERBERT ST
PHILIPPS ST
ALGERNON ST
N
KEY
Park Boundary
Wildlife Protection Area
GEORGES RIVER COUNCIL
Oatley Point Reserve
Wildlife Protection Area
25/03/2022
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KEY
Park Boundary
Wildlife Protection Area
N
GEORGES RIVER COUNCIL
Peakhurst Foreshore Reserve and Jinna Road Reserve
Wildlife Protection Area
25/03/2022
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KEY
Park Boundary
Wildlife Protection Area
N
GEORGES RIVER COUNCIL
Poulton Park, Redin Place Reserve and Quarry Reserve
Wildlife Protection Area
25/03/2022
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STUART CRES
STUART ST
N
KEY
Park Boundary
Wildlife Protection Area
GEORGES RIVER COUNCIL
Ray Street Reserve
Wildlife Protection Area
25/03/2022
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KEY
Park Boundary
Wildlife Protection Area
N
GEORGES RIVER COUNCIL
Riverwood Park, Lillian Road Reserve and Basil Street Reserve
Wildlife Protection Area
25/03/2022
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COOGARAH ST
RIVER ST
MARIE DODD CRES
CASTLE ST
GOLD ST
WOODLANDS AVE
FLETCHER AVE
N
KEY
Park Boundary
Wildlife Protection Area
GEORGES RIVER COUNCIL
Shipwrights Bay Reserve
Wildlife Protection Area
25/03/2022
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SOUTHERN ST
YARRAN RD
N
KEY
Park Boundary
Wildlife Protection Area
GEORGES RIVER COUNCIL
Yarran Road Reserve
Wildlife Protection Area
25/03/2022
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