PYMBLE LADIES' COLLEGE

PRELIMINARY HAZARD ANALYSIS FOR THE DEVELOPMENT FOR THE SECONDARY INNOVATION PRECINCT FOLLOWING STATE ENVIRONMENTAL PLANNING POLICY (RESILIENCE AND HAZARDS) 2021 GUIDELINES

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1. INTRODUCTION

CETEC has been commissioned by Pymble Ladies' College (the College) to prepare a Preliminary Hazard Analysis report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs) and in support of the preparation of an Environmental Impact Statement (EIS) and State Significant Development Application (SSD- 79146716) to the Department of Planning, Housing and Infrastructure (DPHI).

This report has been prepared with reference to architectural plans prepared by 3XN and dated March 2025.

SEARS TABLE RESPONSE:

Project SEAR SSD 79146716	**Section of report**
15. Hazards and Risks	
Where there are dangerous goods and hazardous materials associated with the development provide a preliminary risk screening in accordance with Chapter 3 of SEPP (Resilience and Hazards) 2021.	5
Where required by SEPP (Resilience and Hazards) 2021, provide a Preliminary Hazard Analysis prepared in accordance with *Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis* and *Multi-Level Risk Assessment*.	7
If the development is adjacent to or on land in a pipeline corridor, report on consultation outcomes with the operator of the pipeline and prepare a hazard analysis.	N/A

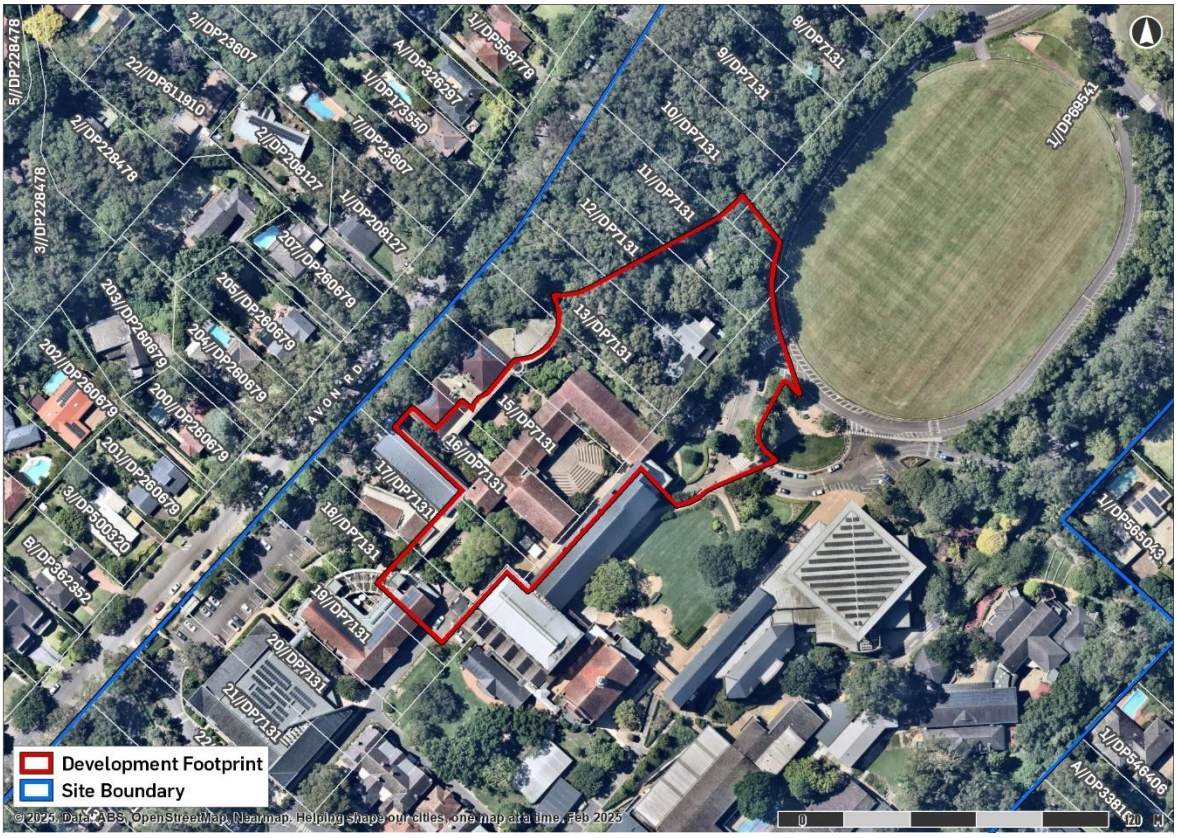
1.1. THE SITE AND LOCALITY

The site is located at 20 Avon Road, Pymble, within the Ku-Ring-Gai Local Government Area (LGA). The site comprises multiple parcels of land and is legally described as:

- Lot 1 Deposited Plan 69541
- Lots 11- 17 Deposited Plan 7131

The site and proposed work areas are identified in the figures below.

Source: Urbis



Source: Urbis

Key features of the site are as follows:

- The site accommodates the existing Pymble Ladies' College which accommodates Kindergarten to Year 12 students.
- Vehicular access to the College is provided via separate ingress and egress driveways on the northern and western sections of Avon Road.
- Pedestrian access is provided through multiple gates along Avon Road.
- The project area that is subject to this SSDA is located at the entrance to the College west of the oval.
- The project area slopes down from south to north with a fall from RL 124.50 at the southern corner to RL 116 at the north west corner.

Key features of the locality:

The development context surrounding the site is a leafy suburban environment, predominantly made up of detached residential properties set within expansive gardens and along avenues lined with mature trees. Recent developments of moderate-scale residential apartment buildings occur closer to the railway corridor. Two storey commercial establishments are located near to Pymble train station, specifically along the Pacific Highway and on the northern flank of the railway line.

- The site is located approximately 19km north west of the Sydney Central Business District.
- The College is situated approximately 200m from Pymble train station, situated on Pacific Highway and Pymble town centre.

The immediately surrounding locality is described as follows:

- **North:** Avon Road and Pacific Highway (approximately 400m).
- **East:** Residential uses, accommodating a mixture of dwelling houses and residential flat buildings.
- **South:** Avondale Golf Course.
- **West:** Avon Road, beyond which is a residential area characterised by detached dwelling houses.

2. STATE ENVIRONMENTAL PLANNING POLICY (RESILIENCE AND HAZARDS) 2021

2.1. BACKGROUND

The State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) consolidates and repeals the provisions of the following 3 SEPPs:

1. SEPP (Coastal Management) 2018 (Coastal Management SEPP).
2. SEPP 33 – Hazardous and Offensive Development (SEPP 33).
3. SEPP 55 – Remediation of Land (SEPP 55).

These changes are part of a broader administrative consolidation of SEPPs. No policy changes have been made to this consolidation. The SEPP consolidation does not change the legal effect of the existing SEPPs, with section 30A of the Interpretation Act 1987 applying to the transferred provisions. The SEPP consolidation is administrative in nature. It has been undertaken in accordance with section 3.22 of the Environmental Planning and Assessment Act 1979. The Resilience and Hazards SEPP:

- Transfers most existing provisions from the 3 SEPPs (as shown above) being consolidated into chapters 2, 3 and 4. Chapter 1 contains the preliminary information and commencement details.
- Repeals the 3 SEPPs being consolidated.

The Resilience and Hazards SEPP incorporates provisions from the SEPPs being consolidated as follows:

- 'Chapter 2 - Coastal Management' contains planning provisions from the Coastal Management SEPP for land use planning within the coastal zone consistent with the Coastal Management Act 2016.
- 'Chapter 3 – Hazardous and Offensive Development' contains planning provisions from SEPP 33 to manage hazardous and offensive development.
- 'Chapter 4 – Remediation of land' contains planning provisions from SEPP 55, which provides a state-wide planning framework for the remediation of contaminated land and to minimise the risk of harm.

Therefore, this report will form part the Environmental Assessment and details the Preliminary Hazard Analysis undertaken for the proposed building following the guidelines and methodology as detailed within NSW Planning & Environment document titled '*Hazardous and Offensive Development - Application Guidelines, Applying SEPP 33*'.[1]

1 https://www.planning.nsw.gov.au/sites/default/files/2023-03/hazardous-and-offensive-development-application-guidelines-applying-sepp-33.pdf and https://legislation.nsw.gov.au/view/html/inforce/current/epi-2021-0730#statusinformation

2.2. Purpose of This Policy

The State Environmental Planning Policy (Resilience and Hazards) 2021 guidelines have been prepared to provide advice on interpreting and implementing the policy. They have been written principally for councils who must act as consent authorities for developments affected by this policy. The guidelines are also useful for industry, consultants and other government agencies to determine and assist in identifying developments which should be considered under the State Environmental Planning Policy (Resilience and Hazards) 2021 guidelines, and on the broad assessment requirements of the policy.

2.3. Applying State Environmental Planning Policy (Resilience and Hazards) 2021 Guidelines to Determine if it is Applicable

2.3.1. Chapter 2 - Coastal Management

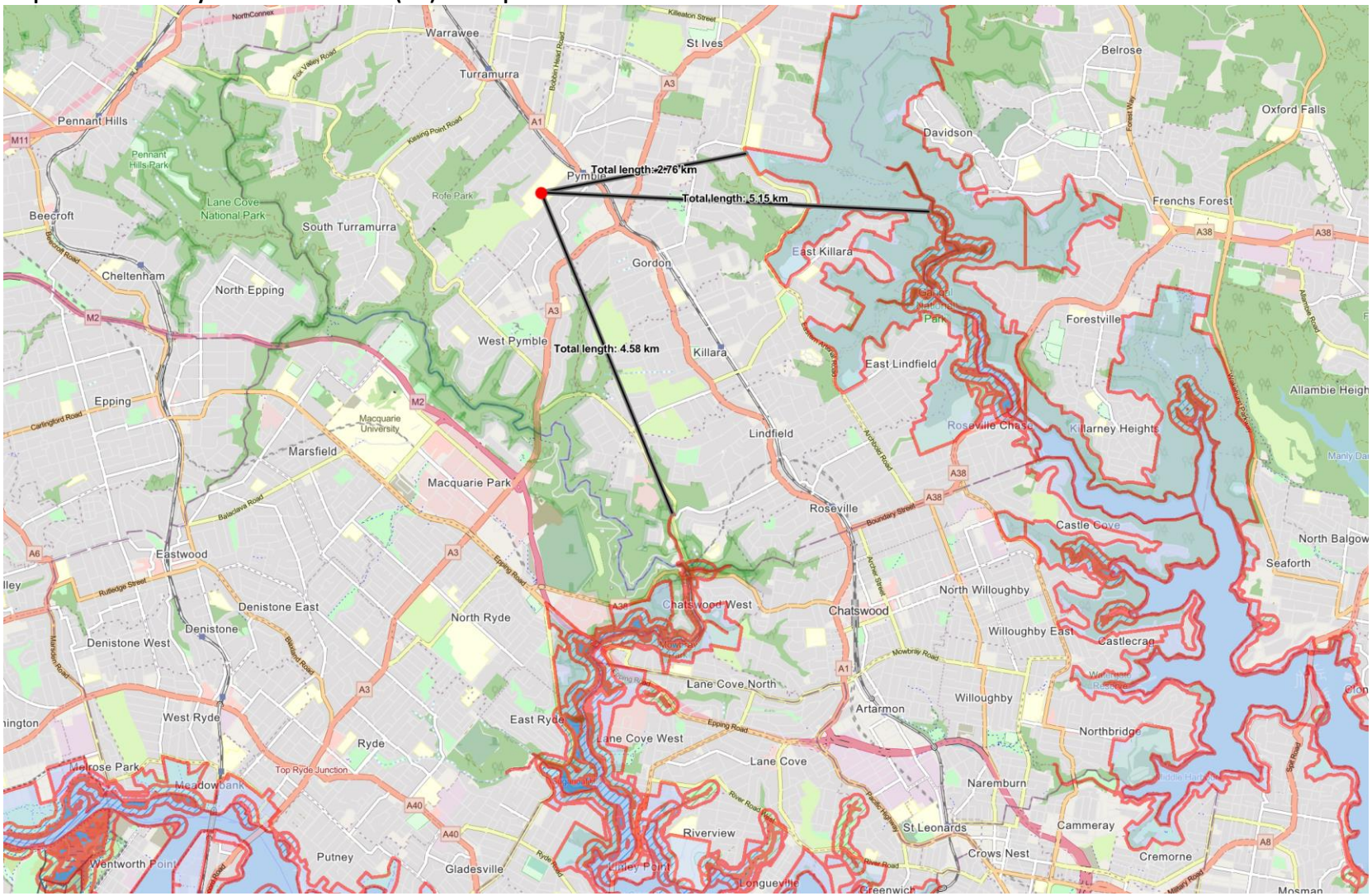
Under the State Environmental Planning Policy (Resilience and Hazards) 2021, aims from Chapter 2 is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016, including the management objectives for each coastal management area, by:

- Managing development in the coastal zone and protecting the environmental assets of the coast.
- Establishing a framework for land use planning to guide decision-making in the coastal zone.
- Mapping the 4 coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the Coastal Management Act 2016.

Currently in this instance and as per the State Environmental Planning Policy (Coastal Management) 2018-maps[2] (refer to Map 1), the SIP development is more than 2.5 Km from the closest Coastal Wetlands and therefore, the proposed development falls outside the Coastal Environmental Areas and as such, Chapter 2 - Coastal Management of the State Environmental Planning Policy (Resilience and Hazards) 2021 guidelines is not applicable.

2 https://datasets.seed.nsw.gov.au/dataset/state-environmental-planning-policy-resilience-and-hazards-2021

Map 1: The Secondary Innovation Precinct (SIP) development from Wetlands



2.3.2. CHAPTER 3 - HAZARDOUS AND OFFENSIVE DEVELOPMENT

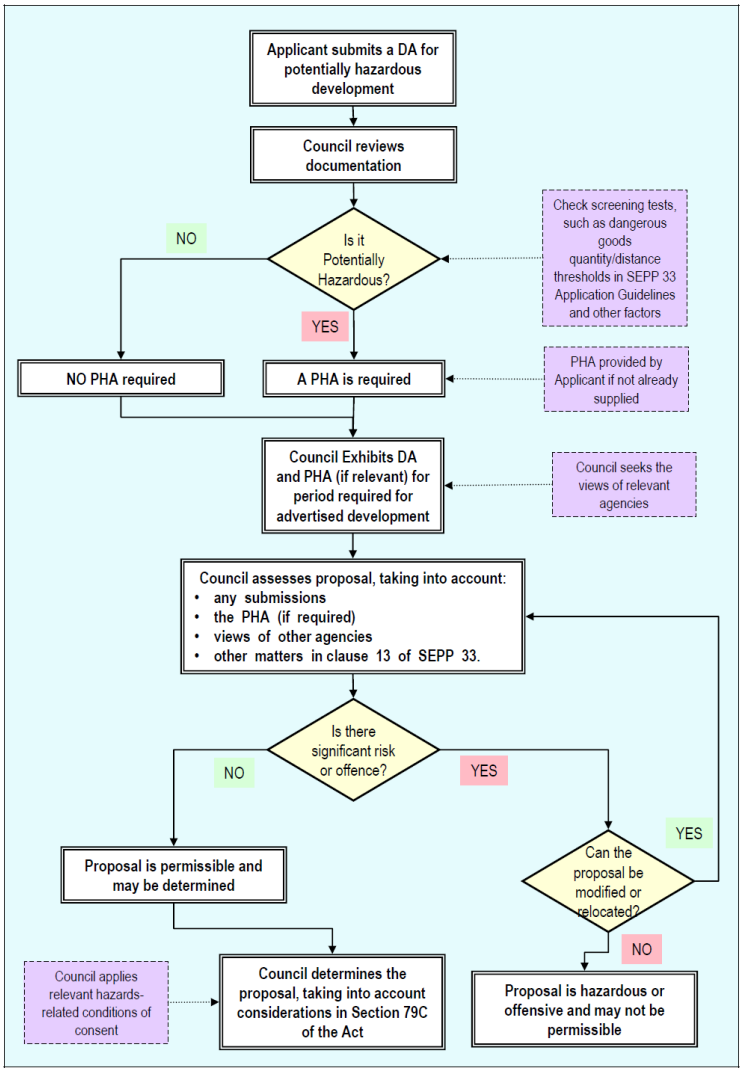
This Chapter aims to:

- Amend the definitions of hazardous and offensive industries where used in environmental planning instruments.
- Render ineffective a provision of any environmental planning instrument that prohibits development for the purpose of a storage facility on the ground that the facility is hazardous or offensive if it is not a hazardous or offensive storage establishment as defined in this Chapter.
- Require development consent for hazardous or offensive development proposed to be carried out in the Western Division.
- Ensure that in determining whether a development is a hazardous or offensive industry, any measures proposed to be employed to reduce the impact of the development are taken into account.
- Ensure that in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact.
- Require the advertising of applications to carry out any such development.

Therefore, Chapter 3 of the State Environmental Planning Policy (Resilience and Hazards) 2021 will apply if a proposal for an 'industrial development' requires consent, and it is either a potentially hazardous industry, potentially an offensive industry, or in some instances both. Figure 1 indicates the procedure for determining if Chapter 3 (Hazardous and Offensive Development) – State Environmental Planning Policy (Resilience and Hazards) 2021 applies to a development application.

In this instance, as the precinct will be using hazardous chemicals, it could be defined as a hazardous and offensive development, therefore this assessment will be further discussed in subsequent sections of this report.

Figure 1: Chapter 3 (Hazardous and Offensive Development) – State Environmental Planning Policy (Resilience and Hazards) 2021 Process Taken from SEPP 33 Document[1]



2.3.3. CHAPTER 4 – REMEDIATION OF LAND

The purpose of this Chapter is to provide for a Statewide planning approach to the remediation of contaminated land. In particular, this Chapter aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment:

- By specifying when consent is required, and when it is not required, for a remediation work.
- By specifying certain considerations that are relevant in rezoning land and in determining development applications in general and development applications for consent to carry out a remediation work in particular.
- By requiring that a remediation work meet certain standards and notification requirements.

In reviewing the NSW EPA website on registered Contaminated Land Record of Notices[3], Pymble Ladies' College

3 https://app.epa.nsw.gov.au/prclmapp/searchregister.aspx

falls within the Ku-ring-gai Council LGA and an audit of the register reveals that there are no known contaminated land notices for the site. Refer to Table 1 for Notices of the surrounding area.

Table 1: Contaminated Land Record of Notices - LGA: KU-RING-GAI COUNCIL

Your search for: LGA: KU-RING-GAI COUNCIL
Notice Type: Declaration of Significantly Contaminated Land
Date from: 01 Jan 1990
Date to: 30 Jan 2025

Matched 38 notices relating to 5 sites.

Search Again | Refine Search

Suburb	Address	Site Name	Notices related to this site
KILLARA	496 Pacific HIGHWAY	7-Eleven Service Station (Former Mobil)	5 former
KILLARA	692B-694 Pacific HIGHWAY	Former Caltex Service Station	1 former
KILLARA	684-684a, 690, 692 and 696 Pacific HIGHWAY	Land Adjacent to Former Service Station Site	22 former
LINDFIELD	478 Pacific HIGHWAY	Former BP Service Station Lindfield	3 current and 3 former
ST IVES	179-181 Mona Vale ROAD	Shell Service Station	4 former

However, it is understood that there is a separate report assessing the proposed development against Chapter 4 of the SEPP (Resilience and Hazards) 2021. Please refer to it for further discussion.

3. CHAPTER 3 - HAZARDOUS AND OFFENSIVE DEVELOPMENT

3.1. SCOPE AND AIM OF STUDY

The objective of this assessment is to present the hazards and risks associated with the proposed development through the evaluation of the likelihood and consequences of an event through the identified hazards, the risks to the immediate community with the proposed refurbishment and compared to the NSW Department of Planning risk criteria. These criteria are detailed in the SEPP 33 document "Hazardous and Offensive Development Application Guidelines: Applying SEPP 33" (NSW Department of Planning, 2011) under the "Multi-Level Risk Assessment Approach". Any hazard analysis will be conducted according to the Department of Planning's HIPAP No. 6 document entitled "Hazard Analysis".

The scope of this report includes the following:

- Systematic identification and documentation of conceivable hazards based on information supplied and relevant experience from similar projects.
- Establishment of the consequence of each identified hazard and determination of any offsite effects. Note: this process is quantitative based on current and proposed future expectations, actual impacts can be finalised following design finalisation, plume modelling and/or calculations as appropriate.
- Where offsite effects are identified, the frequency of occurrence is determined based on historical data for the site.
- Proposed risk reduction measures as deemed necessary will also be recommended and applied to the analysis.

3.2. HOW TO IDENTIFY A POTENTIALLY HAZARDOUS INDUSTRY

The following points and Figure 1 demonstrate how to determine if a proposed facility is hazardous using the risk screening method (Appendix 4 of the SEPP 33 document[1]). The information required to determine this is highlighted below:

- A list of all the hazardous materials used in the proposed development and the quantity of each present. Note: if the proposed development is an addition or modification to an existing building, all hazardous materials on the site which are in proximity to the new development are to also to be included in the assessment.
- Dangerous goods classification for each material, including subsidiary class(es) are to be determined and documented.
- The mode of storage used (bulk or packages/containers) and the maximum quantity stored or held on site.
- The distance of the stored material to the site boundary for any of the materials in dangerous goods Classes 1.1 (explosives with mass explosion hazard), 2.1 (flammable gases) and 3 (flammable liquids).
- The average number of annual and weekly road movements of hazardous material to and from the

site, including the typical quantity in each load.

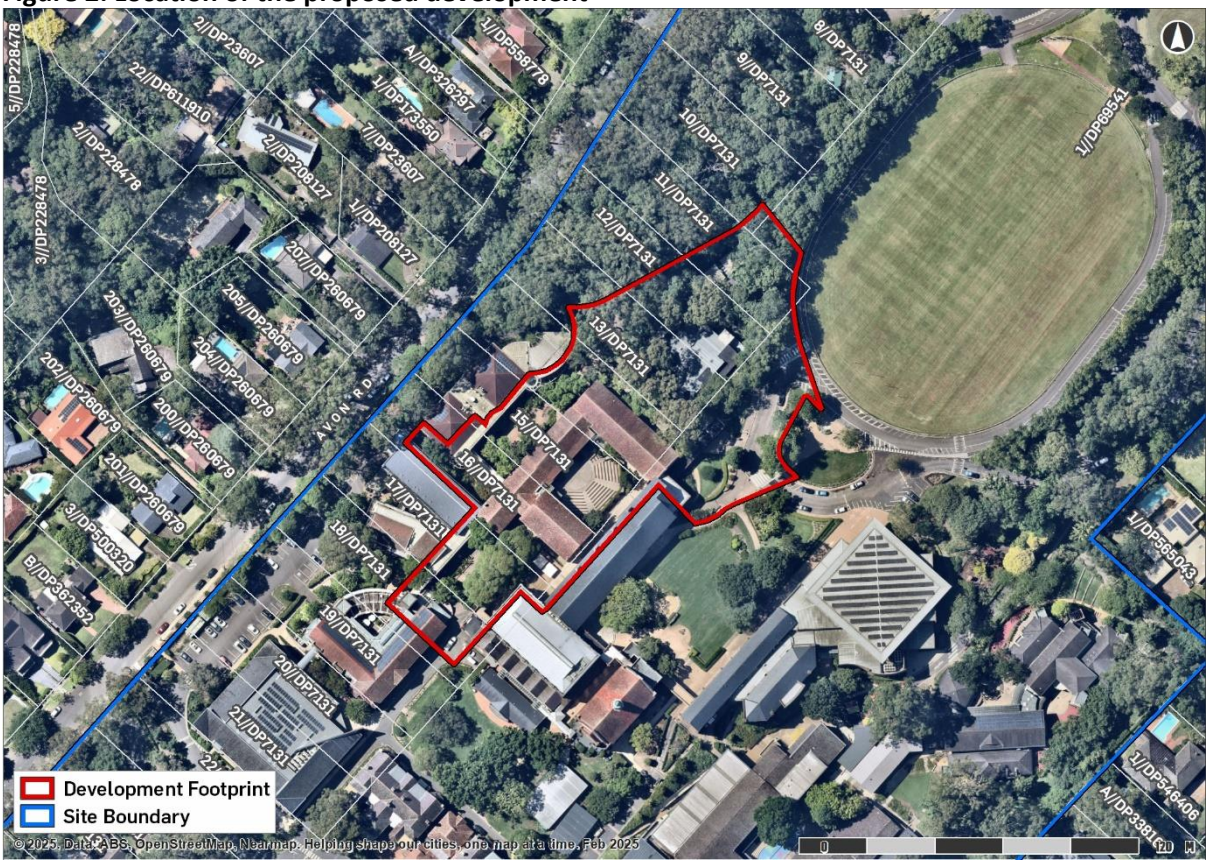
From the above collated information, it is then possible to determine if the site will be considered a hazardous or offensive site under SEPP 33[1] methodology.

4. Site and Spatial Requirements

4.1. Site Location and Surrounding Areas

The proposed site (i.e. the Secondary Innovation Precinct) is located adjacent to the Flagpole lawn within Pymble Ladies' College. The site is located between Gate 2 from Avon road to the left, Main oval / Flagpole lawn to the right, James Kelso Pavilion and Field to the front and the Middle school to the rear of the site, refer to Figure 2. In the immediate surrounding area are located, existing buildings that are part of the Pymble Ladies' College. Residential areas are located outside of the site boundary, which is approximately 80 metres from the proposed building, as well as the Avondale golf club approximately 430 meters from the SIP development, refer to Figure 2.

Figure 2: Location of the proposed development



4.2. Current Quantities of Dangerous Goods Stored Onsite

Information as received indicates that currently onsite users hold the following volumes of chemicals within the various buildings that will be part of the Secondary Innovation Precinct in the future, refer to Table 2.

Table 2: Collated Volumes of Chemicals Being Stored Currently

Dangerous Goods Class	Current Maximum Storage Volume (L or Kg)
1.1	Not Used Onsite
1.2-1.3	Not Used Onsite
2.1 (pressurised, excluding LPG)	8.88 Kg
2.1 (liquefied pressure, excluding LPG)	0.45 Kg
2.2	Not Used Onsite
2.2, 5.1	Not Used Onsite
LPG (above ground)	Not Used Onsite
LPG (underground)	Not Used Onsite
2.3	Not Used Onsite
3 (PG I)	Not Used Onsite
3 (PG II)	14.77 L
3 (PG III)	1.5 L
4	Not Used Onsite
5	Not Used Onsite
6	Not Used Onsite
7	Not Used Onsite
8 (PG I)	Not Used Onsite
8 (PG II)	10 L
8 (PG III)	Not Used Onsite
9	3 L

5. REVIEWING CHAPTER 3 OF SEPP (RESILIENCE AND HAZARDS) 2021 TO DETERMINE APPLICABILITY

Since the 1980s, the New South Wales Department of Planning has promoted and implemented an integrated approach to the assessment and control of potentially hazardous development. The approach has been designed to ensure that safety issues are thoroughly assessed during the planning and design phases of a facility and that controls are put in place to give assurance that it can be operated safely throughout its life.

Applying SEPP 33[1] included a screening method, based on the quantities of Dangerous Goods on a site, to assist in determining if a development is likely to be a potentially hazardous industry. However, the screening method was not intended to be applied in isolation.

5.1. SCOPE AND APPLICATION

Chapter 3 SEPP (Resilience and Hazards) 2021 applies to any proposals which fall under the policy's definition of '*potentially hazardous industry*' or '*potentially offensive industry*'. Certain activities may involve handling, storing or processing a range of substances which in the absence of locational, technical or operational controls may create an off-site risk or offence to people, property or the environment. Such activities would be defined as potentially hazardous or potentially offensive. These guidelines are to assist councils and proponents to establish whether a development proposal would fit into such definitions and hence, come under the provisions of the policy.

For development proposals classified as 'potentially hazardous industry' the policy establishes a comprehensive test by way of a Preliminary Hazard Analysis (PHA) to determine the risk to people, property and the environment at the proposed location and in the presence of controls. Should such risk exceed the criteria of acceptability, the development is classified as 'hazardous industry' and may not be permissible within most industrial zonings in NSW.

5.2. DOES CHAPTER 3 APPLY?

Firstly, consideration whether the proposed use falls within the definition of 'industry' as adopted by the planning instrument applies to this proposal or whether it is a 'storage establishment'. To determine whether this proposal falls within the definition of 'industry' or 'storage establishment', collation of site chemical storage and usage data is collated and compared to the following tables. If the collated data agrees with any of the tabulated limits, then the proposal is considered to be a Hazardous and/or Offensive Development.

5.2.1. SCREENING METHOD

Table 3 below and within a series of graphs and tables, (refer to Figure 4, Table 4 and Table 5), provide the required information to which the facility/development is assessed against. Quantities below those identified in the tables and graphs can be assumed to give an unlikely significant off-site risk and therefore will not make the proposed site/development a Hazardous and/or Offensive Development.

Further to this, Table 4 offers another consideration which is required to be assessed to determine if the site could be considered a Hazardous and/or an Offensive Development. This assessment is conducted by the assessment of the expected number of Dangerous Goods deliveries to the site over the year, week or load volumes.

Currently Figure 4 graphs the minimum acceptable distance the proposed development can be to the neighbouring properties for the development to not be considered a Hazardous and/or Offensive Development.

Note that, residential properties would be considered a '*sensitive*' dwelling, further to this, CETEC has also included educational buildings into this definition.

Refer to Section 5.3 of this report where CETEC has assessed the current quantities of dangerous goods on-site (i.e. Table 2 of this report) against the minimum threshold quantities in the SEPP 33 document[1] (i.e. refer to Table 3 and Table 5 of this report), for every type of dangerous goods stored on-site.

Table 3: Screen clip taken from SEPP 33[1] – Table 1

Table 1: Screening Method to be Used

Class	Method to Use/Minimum Quantity
1.1	Use graph at Figure 5 if greater than 100 kg
1.2-1.3	Table 3
2.1 — pressurised (excluding LPG)	Figure 6 graph if greater than 100 kg
2.1 — liquefied (pressure) (excluding LPG)	Figure 7 graph if greater than 500 kg
LPG (above ground)	table 3
LPG (underground)	table 3
2.3	table 3
3PGI	Figure 8 graph if greater than 2 tonne
3PGII	Figure 9 graph if greater than 5 tonne
3PGIII	Figure 9 graph if greater than 5 tonne
4	table 3
5	table 3
6	table 3
7	table 3
8	table 3

Note: *Classes 1.4, 1.5, 1.6, 2.2, 7 and 9 are excluded from the risk screening. Classes used are those referred to in the Dangerous Goods Code and are explained in appendix 6.*

Table 4: Screen clip taken from SEPP 33[1] – Table 2

Table 2: Transportation Screening Thresholds

	Vehicle Movements		Minimum quantity* per load (tonne)	
	Cumulative Annual	Peak Weekly		
Class	*or*		Bulk	Packages
1	see note	see note	see note	
2.1	>500	>30	2	5
2.3	>100	>6	1	2
3PGI	>500	>30	1	1
3PGII	>750	>45	3	10
3PGIII	>1000	>60	10	no limit
4.1	>200	>12	1	2
4.2	>100	>3	2	5
4.3	>200	>12	5	10
5	>500	>30	2	5
6.1	all	all	1	3
6.2	see note	see note	see note	
7	see note	see note	see note	
8	>500	>30	2	5
9	>1000	>60	no limit	

Note: *Where proposals include materials of class 1, 6.2 or 7, the Department of Planning should be contacted for advice. Classes used are those referred to in the Dangerous Goods Code and are explained in Appendix 7.*

** If quantities are below this level, the potential risk is unlikely to be significant unless the number of traffic movements is high.*

Figure 3: Screen clip taken from SEPP 33[1] – Figure 5

Figure 5: Class 1.1 Explosives

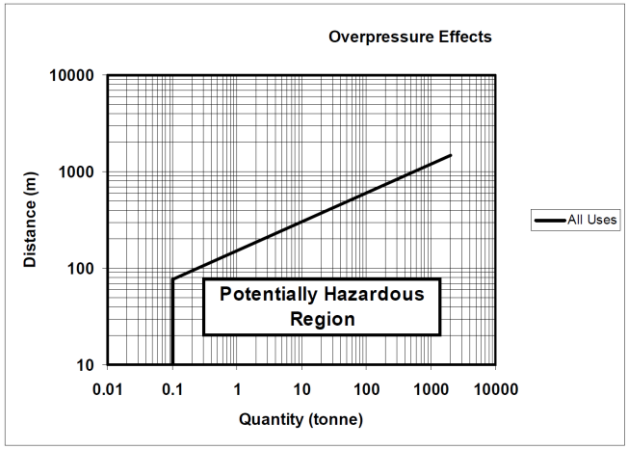


Figure 4: Screen clip taken from SEPP 33[1] – Figure 6

Figure 6: Class 2.1 Flammable Gases Pressurised (Excluding LPG)

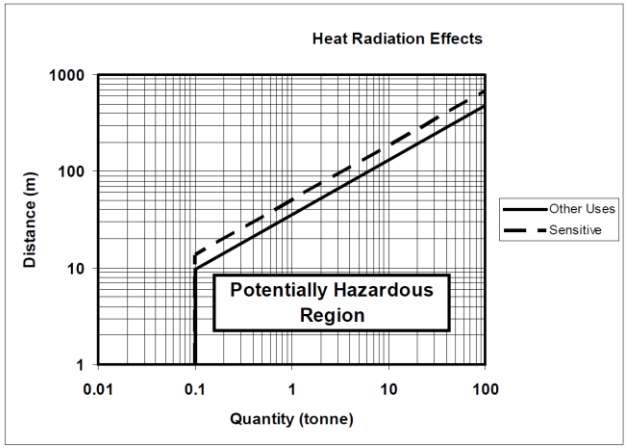


Figure 5: Screen clip taken from SEPP 33[1] – Figure 7

Figure 7: Class 2.1 Flammable Gases Liquefied Under Pressure (Excluding LPG)

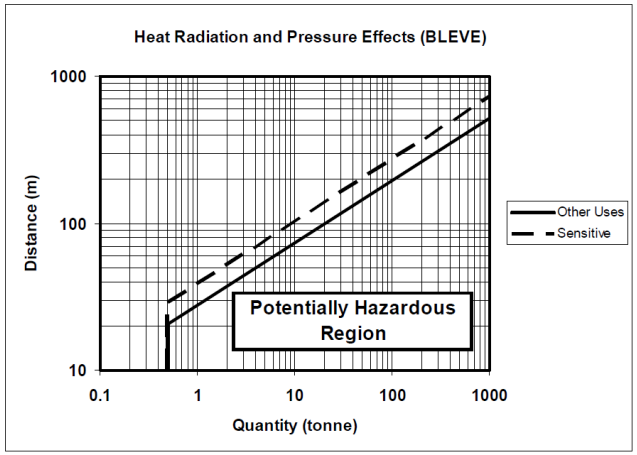


Figure 6: Screen clip taken from SEPP 33[1] – Figure 8

Figure 8: Class 3PGI Flammable Liquids

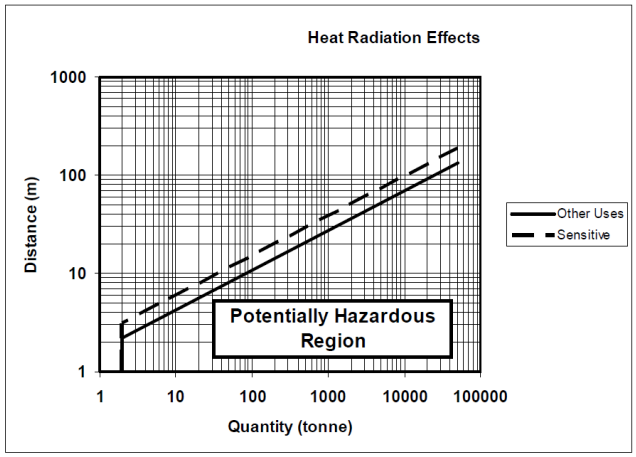


Figure 7: Screen clip taken from SEPP 33[1] – Figure 9

Figure 9: Class 3PGII and 3PGIII Flammable Liquids

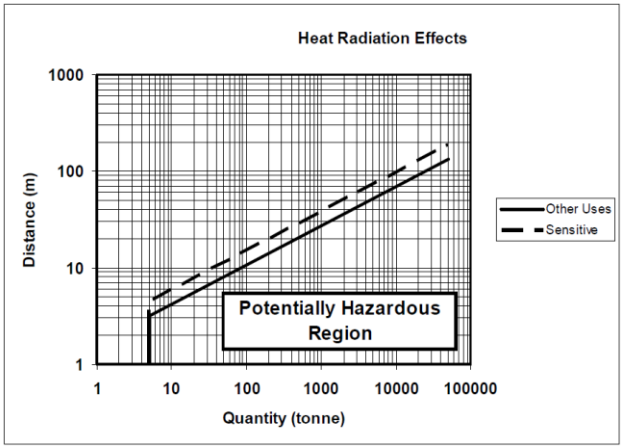


Table 5: Screen clip taken from SEPP 33[1] – Table 3

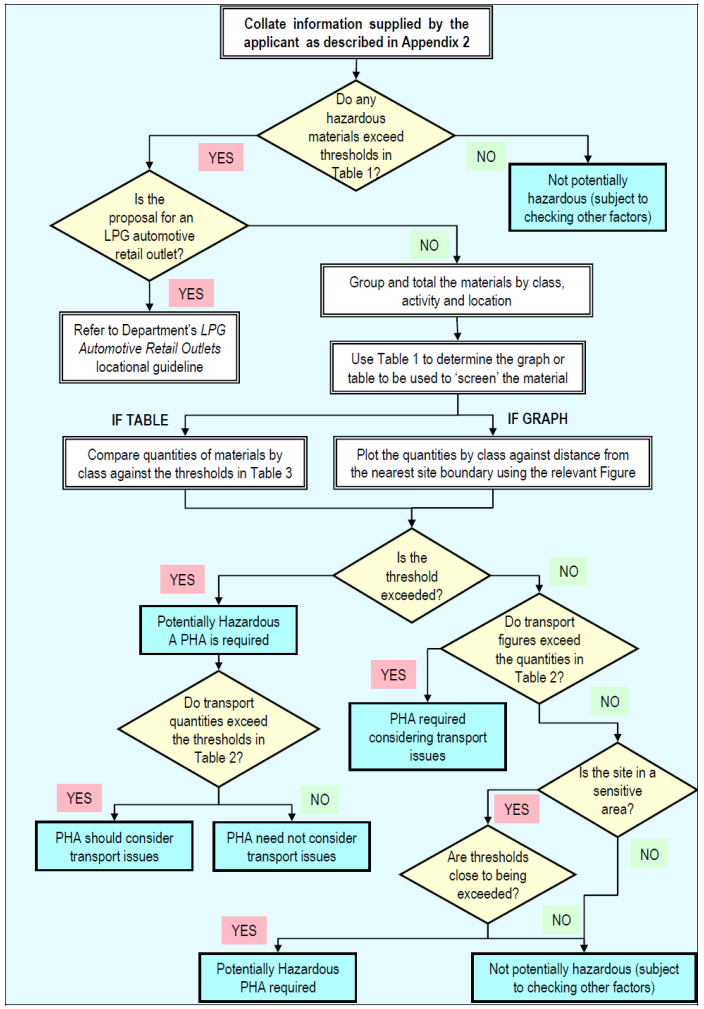
Table 3: General Screening Threshold Quantities

Class	Screening Threshold	Description
1.2	5 tonne	or are located within 100 m of a residential area
1.3	10 tonne	or are located within 100 m of a residential area
2.1	(LPG only — not including automotive retail outlets')	
	10 tonne or16 m^3	if stored above ground
	40 tonne or 64 m^3	if stored underground or mounded
2.3	5 tonne	anhydrous ammonia, kept in the same manner as for liquefied flammable gases and not kept for sale
	1 tonne	chlorine and sulfur dioxide stored as liquefied gas in containers <100 kg
	2.5 tonne	chlorine and sulphur dioxide stored as liquefied gas in containers >100 kg
	100 kg	liquefied gas kept in or on premises
	100 kg	other poisonous gases
4.1	5 tonne	
4.2	1 tonne	
4.3	1 tonne	
5.1	25 tonne	ammonium nitrate — high density fertiliser grade, kept on land zoned rural where rural industry is carried out, if the depot is at least 50 metres from the site boundary
	5 tonne	ammonium nitrate — elsewhere
	2.5 tonne	dry pool chlorine — if at a dedicated
		pool supply shop, in containers <30 kg
	1 tonne	dry pool chlorine — if at a dedicated pool supply shop, in containers >30 kg
	5 tonne	any other class 5.1
5.2	10 tonne	
6.1	0.5 tonne	packing group I
	2.5 tonne	packing groups II and III
6.2	0.5 tonne	includes clinical waste
7	all	should demonstrate compliance with Australian codes
8	5 tonne	packing group I
	25 tonne	packing group II
	50 tonne	packing group III

Note: *The classes used are those referred to in the Australian Dangerous Goods Code and are explained in Appendix 7.*

Figure 8: Screen Clip taken from SEPP 33 Document[1] – Figure 4.

Figure 4: Risk Screening Procedure



5.3. IDENTIFY POTENTIALLY HAZARDOUS INDUSTRY

To identify a *Potentially Hazardous Industry*, a preliminary risk screen is conducted, and the procedure is outlined in '*Figure 4*' of the SEPP 33 document[1], refer to Figure 8. Based on this the following information is collated:

- A chemical manifest/list of all hazardous materials used in the proposed development and the quantity of each present.
- Dangerous goods classification for each material, including subsidiary class(es).
- The mode of storage used (e.g. bulk or packages/containers) and the maximum quantity stored or held on site.
- The distance of the stored material from the site boundary for any of the materials in dangerous goods classes 1.1, 2.1 and 3.
- The average number of annual and weekly road movements of hazardous material to and from the facility, and the typical quantity in each load.

5.3.1. SCREENING METHOD

Below CETEC has conducted a preliminary assessment in Table format to determine if Chapter 3 (Hazardous and Offensive Development) – State Environmental Planning Policy (Resilience and Hazards) 2021 applies to this development and if it could be considered a Hazardous and/or an Offensive Development.

5.3.2. ASSESSMENT – CHEMICALS IN BULK STORAGE

Class	Referencing Source	Minimum Quantity (Kg)[4]	Proposed Storage (L / Kg)	Exceeded?	Finding
1.1	Table 2, Table 3 and Figure 3	100 Kg	-	-	Class 1.1 chemicals/explosive not used onsite.
1.2	Table 2, Table 3 and Table 4	5 tonnes, or are located within 100 m of a residential area	-	-	Class 1.2 chemicals/explosive not used onsite.
1.3	Table 2, Table 3 and Table 4	10 tonnes, or are located within 100 m of a residential area	-	-	Class 1.3 chemicals/explosive not used onsite.
2.1 (pressurised)	Table 2, Table 3 and Figure 4	100 Kg	8.88	No	Not considered *Potentially Hazardous*.
2.1 (liquefied)	Table 2, Table 3	500 Kg	0.45	No	Not considered *Potentially Hazardous*.
LPG (above ground)	Table 2, Table 3 and Table 4	10 tonne or 16 m^3	-	-	Above ground LPG tanks not used onsite.
LPG (below ground)	Table 2, Table 3 and Table 4	40 tonne or 64 m^3	-	-	Underground LPG tanks not used onsite.
2.3	Table 2, Table 3 and Table 4	5 tonnes, anhydrous ammonia	-	-	Class 2.3 gases not used onsite.
2.3	Table 2, Table 3 and Table 4	1 tonne, chlorine and sulphur dioxide stored as liquefied gas in containers <100 kg	-	-	Class 2.3 gases not used onsite.
2.3	Table 2, Table 3 and Table 4	2.5 tonnes, chlorine and sulphur dioxide stored as liquefied gas in containers >100 kg	-	-	Class 2.3 gases not used onsite.

4 Unless specified, an average solvent density of 1 Kg/L was taken to calculate the mass.

Class	Referencing Source	Minimum Quantity (Kg)[4]	Proposed Storage (L / Kg)	Exceeded?	Finding
2.3	Table 2, Table 3 and Table 4	100 (liquefied gas kept in or on premises)	-	-	Class 2.3 gases not used onsite.
2.3	Table 2, Table 3 and Table 4	100 (other poisonous gases)	-	-	Class 2.3 gases not used onsite.
3 (PGI)	Table 2, Table 3 and Figure 6	2,000	-	-	Class 3 Packing Group I chemicals not used onsite.
3 (PGII)	Table 2, Table 3 and Figure 7	5,000	14.77	No	Not considered *Potentially Hazardous*.
3 (PGIII)	Table 2, Table 3 and Figure 7	5,000	1.5	No	Not considered *Potentially Hazardous*.
4.1	Table 2, Table 3 and Table 4	5,000	-	-	Class 4.1 chemicals not used onsite.
4.2	Table 2, Table 3 and Table 4	1,000	-	-	Class 4.2 chemicals not used onsite.
4.3	Table 2, Table 3 and Table 4	1,000	-	-	Class 4.3 chemicals not used onsite.
5.1	Table 2, Table 3 and Table 4	25,000 (ammonium nitrate, high density fertiliser grade kept on land zoned rural where rural industry is carried out)	-	-	Not used onsite, not considered *Potentially Hazardous*.
5.1	Table 2, Table 3 and Table 4	5,000 (ammonium nitrate — elsewhere)	-	-	Not used onsite, not considered *Potentially Hazardous*.
5.1	Table 2, Table 3 and Table 4	2,500 (dry pool chlorine, if at a dedicated pool supply shop in containers <30 kg)	-	-	Not used onsite, not considered *Potentially Hazardous*.
5.1	Table 2, Table 3	1,000 (dry pool chlorine, if at a dedicated pool	-	-	Not used onsite, not considered

Class	Referencing Source	Minimum Quantity (Kg)[4]	Proposed Storage (L / Kg)	Exceeded?	Finding
	and Table 4	supply shop in containers >30 kg)			*Potentially Hazardous*.
5.1	Table 2, Table 3 and Table 4	5,000 (any other class 5.1)	-	-	Not used onsite, not considered *Potentially Hazardous*.
5.2	Table 2, Table 3 and Table 4	10,000	-	-	Not used onsite, not considered *Potentially Hazardous*.
6.1	Table 2, Table 3 and Table 4	6.1 (PGI) – 500	-	-	Not used onsite, not considered *Potentially Hazardous*.
6.1	Table 2, Table 3 and Table 4	6.1 (PGII & PGIII) – 2,500	-	-	Not used onsite, not considered *Potentially Hazardous*.
6.2	Table 2, Table 3 and Table 4	6.2 – 500	-	-	Not used onsite, not considered *Potentially Hazardous*.
7	Table 2, Table 3 and Table 4	All	-	-	Not used onsite, not considered *Potentially Hazardous*.
8	Table 2, Table 3 and Table 4	PGI – 5,000	-	-	Not used onsite, not considered *Potentially Hazardous*.
8	Table 2, Table 3 and Table 4	PGII – 25,000	10	No	Not considered *Potentially Hazardous*.
8	Table 2, Table 3 and Table 4	PGIII – 50,000	-	-	Not used onsite, not considered *Potentially Hazardous*.

5.3.3. ASSESSMENT – TRANSPORTATION CONSIDERATIONS

In conducting this assessment, the expected number of vehicles movements that occur onsite for deliveries and removals of waste also needs to be assessed. Based on this and the information as provided by the client, (see Appendix A), the aggregate annual volume of deliveries, which usually occur on a monthly basis depending on the items being delivered or picked up is summarised below. The data also aggregate package volume and estimated by CETEC container volumes based on site observations. Therefore, CETEC has estimated the following information as detailed below.

Based on a normal delivery scenario, CETEC has estimated the following deliveries to occur;

- Chemical waste pick-up every year, includes solid chemical waste, aqueous waste, organic waste and hydrocarbons (approx. 60 L). It is to be noted that the waste from the Secondary Innovation Precinct will temporarily be stored in the Science building, until collection.
- Bulk chemical deliveries are not anticipated however, approx. 5 L/kg per month of chemicals is estimated for the SIP building.
- Gas cylinders are not required for the building as only electric usage has been proposed.

	Number of Vehicle Movements,[5] (i.e. deliveries and pickups)				Minimum Quantity per Load (tonnes)			
Class	**Cumulative Annual**	**Expected to be Exceeded**	**Peak Weekly**	**Expected to be Exceeded**	**Bulk**	**Expected to be Exceeded**	**Package**	**Expected to be Exceeded**
1	All	N/A	All	N/A	All	N/A	-	N/A
2.1	> 500	No	> 30	No	2	No	5	No
2.3	> 100	N/A	> 6	N/A	1	N/A	2	N/A
3 - PGI	> 500	N/A	> 30	N/A	1	N/A	1	N/A
3 - PGII	> 750	No	> 45	No	3	No	10	No
3 - PGIII	> 1,000	No	> 60	No	10	No	No Limit	No
4.1	> 200	N/A	> 12	N/A	1	N/A	2	N/A
4.2	> 100	N/A	> 3	N/A	2	N/A	5	N/A
4.3	> 200	N/A	> 12	N/A	5	N/A	10	N/A
5	> 500	N/A	> 30	N/A	2	N/A	5	N/A
6.1	All	N/A	All	N/A	1	N/A	3	N/A
6.2	See Note	See Note	See Note	See Note	See Note	See Note	N/A	See Note
8	> 500	No	> 60	No	2	No	5	No
9	> 1000	No	> 60	No	No Limit	No	-	No

NOTE: As indicated in the SEPP 33 document[1], “Where proposals include materials of Class 6.2, the Department of Planning should be contacted for advice.”

5 Very small quantities of chemicals are used in the SIP building which is estimated to be up to 5 L deliveries per month and the chemical waste is collected once a year, estimated to be 60 L, which is stored in the Science building, until collection.

5.3.4. FINAL EVALUATION

Therefore based on the preliminary assessment within Sections 5.3.2 and 5.3.3, the limits have not been exceeded for any chemical classes or vehicles movements.

Currently, there is no indication for increase in chemical usage per year. However, CETEC has estimated the expected volume of chemicals onsite may increase 2 to 3-fold. Which would mean that the building's expected chemical volumes would potentially increase to the volumes as shown below.

Dangerous Goods Class	Expected Future Storage Volume (L or Kg)	SEPP 33[1] Minimum Quantity (Kg)
1.1	N/A	100
1.2-1.3	N/A	5 tonnes (1.2), 10 tonnes (1.3)
2.1 (pressurised, excluding LPG)	26.64	100
2.1 (liquefied pressure, excluding LPG)	1.35	500
LPG (above ground)	N/A	10 tonnes
LPG (underground)	N/A	40 tonnes
2.3	N/A	100 (other poisonous gases)
3 (PG I)	N/A	2000
3 (PG II)	44.34	5000
3 (PG III)	4.5	5000
4	N/A	5000 (4.1), 1000 (4.2), 1000 (4.3)
5	N/A	5000 (any other class 5.1), 10000 (5.2)
6	N/A	500 (PGI), 2500 (PGII & PGIII)
7	N/A	All
8 (PG I)	N/A	5000
8 (PG II)	30	25000
8 (PG III)	N/A	50000

However, when referencing Section 5.3.2, a 2 to 3-fold increase of chemicals onsite means that the volume onsite will still remain significantly below the threshold limits. This assessment is based on CETEC's assumption of a linear growth of required chemical usage based on a possibility of increased staff / student numbers. Therefore, the future facility operators will need to keep a live chemical manifest and ensure that chemical volumes remain within the required limits.

Therefore, based on the above and assuming linear growth, CETEC is of the opinion that the Chapter 3 (Hazardous and Offensive Development) – State Environmental Planning Policy (Resilience and Hazards) 2021 does not apply for this facility, however, with any facility which uses dangerous goods, there is always a risk of incidents which the facility needs to address as part of their Safe Working Procedures for chemical handling onsite. This as a minimum, will require yearly chemical audits to ensure volumes remain below the threshold limits.

6. STUDY METHODOLOGY – RISK ASSESSMENT

Based on the chemical volumes information supplied to CETEC and as summarised above, the facility would not be expected to be considered a "Hazardous and Offensive Development", although CETEC has provided a qualitative risk assessment below to demonstrate potential risk mitigation strategies to aid in the further development of the design for the SIP.

6.1. INTRODUCTION TO METHODOLOGY

The methodology for the PHA is well established and documented in Australia utilising the criteria as detailed in the Department of Planning's HIPAP No 6 (Guidelines for Hazard Analysis) and HIPAP No 4 (Risk Criteria for Land Use Planning, Ref 2). These documents describe the methodology and criteria to be used in PHAs, as required by the NSW Department of Planning for major 'potentially hazardous' developments.

As per HIPAP No 6, there are five (5) stages in the risk assessment, which are;

Stage 1: **Hazard Identification** – The review of potential hazards associated with all hazardous goods to be stored and used onsite, including their transportation to and from the site.

The hazard identification also includes identification of potential incidents and their impact on neighbouring areas, including public spaces and buildings and private buildings. Once identified, possible mitigating strategies to minimise the likelihood of the incident and/or decrease the impact on the public are then considered.

Stage 2: **Consequence and Effect Analysis** – The consequences of identified hazards are assessed using current risk assessment techniques with consideration of known exposure standards and known correlations between exposure and health effects. In addition, potential impacts on neighbouring properties and to the local environment are considered.

Stage 3: **Frequency Analysis** – In consideration of potential incidents for which significant effects have been identified, whether to people, property or the neighbouring external environment, the frequency of occurrence is estimated or evaluated based on historical data.

Stage 4: **Quantitative Risk Analysis** – The combination of a potential consequence (such as death or injury) combined with the estimated frequency of an event results in the risk from the event,

i.e. *Risk = Consequence x Frequency*

The risk is therefore obtained by adding together the results from the risk calculations for each incident and the results from the risk analysis are presented in three forms;

- Individual fatality risk.
- Injury or irritation risk.
- Societal risk.

The risk results are then assessed against the guidelines adopted by the NSW Department of Planning.

Stage 5: **Risk Reduction** – Where possible, risk reduction measures are identified throughout the course of the study in the form of recommendations. If adopted, future risk assessment calculations can be modified accordingly.

6.2. RISK CRITERIA

Having determined the risks from a proposed development, it must then be compared to acceptable criteria in order to assess whether or not the risk level is acceptable. If not acceptable, then specific risk mitigating measures must be developed and incorporated to reduce the risk to an acceptable level. Where no measures are found, then the development is not compatible with the surrounding environment and land uses.

7. HAZARD ANALYSIS

7.1. HAZARD IDENTIFICATION – SUMMARY OF HAZARDOUS GOODS ONSITE

For the nature of the building, the foreseeable dangerous goods that could be supplied, stored and used onsite are listed in Table 6. The list is comprehensive, as it's envisaged that several departments in the building especially the laboratories will use flammable liquids for disinfecting benches and the amenities will use corrosive liquids for disinfecting the floors. The laboratory areas may also conduct analytical activities, possibly resulting in a wider range of hazardous substances being stored and used on site.

It should be noted that the Australian Standards cited in Table 6 are still current, and generally the current edition of the standard would be followed. The standards should not be considered in isolation from the current legislation in NSW. In any case, incompatibilities with the legislation are rare. The NSW Work Health and Safety Regulation (2017), hereafter referred to as the 'WHS Regulation', requires businesses or organisations to assess risk and to minimise risk accordingly. It includes specific provisions for chemicals, including "scheduled" chemicals, chemicals containing lead and specifically listed carcinogenic substances. The use of any of these substances' triggers specific requirements in the legislation. Australian Standards are not part of the legislation, but their implementation represents best practice and would be expected to be looked on favourably in a court of law.

Table 6: Substances which may be stored and used within the SIP.

Building activity	Associated chemical and/or hazard class	Comments on requirements and storage restrictions
Flammable liquids: supply, storage & handling	Class 3 liquids	Storage and handling on site will be dictated by the requirements of AS 2243.2 and AS 1940.
Toxic substances: supply, storage & handling	Class 6.1 substances	Storage and handling on site will be dictated by the requirements of AS 2243.2 and AS 4452, and with various state and federal regulations.
Corrosive substances: supply, storage & handling	Class 8 substances	Storage and handling on site will be dictated by the requirements of AS 2243.2 and AS 3780.
Miscellaneous dangerous goods: supply, storage & handling	Class 9 substances	Storage and handling on site will be dictated by the requirements of AS 2243.2 and AS 4681.

7.2. SUMMARY OF RISK DUE TO IDENTIFIED HAZARDS

Although there is a large number of identified hazards onsite, overall these hazards can be grouped into the following main categories assuming any incident occurs within the confines of the building;

- Gases (Classes 2.1 and 2.2) – Depending on where the gas usage is occurring or where the gas is being stored, fire, explosion, asphyxiation may result.
- Class 3 substances (i.e. flammable liquids) – Depending on where storage or usage is occurring, fire, explosion or varying levels of toxicity to people may result. There are containment issues to be considered in the event of a flammable liquids fire, and
- Class 8 (corrosive) substances – Depending on where storage or usage is occurring, varying levels of danger to personnel may result, depending on the degree of corrosiveness towards human tissue and on the toxicity of the substance. Final outcomes will depend on the types of corrosive agents being used. Class 8 substances are subject to a wide range of incompatibilities both with other corrosive substances and with other dangerous goods classes.
- Class 9 substances – these are described as miscellaneous dangerous goods and include a high proportion of substances that are environmentally hazardous, of which a high proportion of those are aquatic or marine pollutants and would constitute an environmental hazard in the event of a major loss of containment.
- Rooms with chemical usage, chemical store exhausts – Depending on the location from which the exhausted air is being drawn, the fugitive emissions from these sources may lead to varying levels of toxicity towards people; normally the emissions would be released to the environment at roof level.

7.3. HAZARD IDENTIFICATION AND MITIGATION

Table 7 below provides a summary of the hazardous incidents identified onsite and potential initial mitigating features which may be implemented to reduce their overall risk outcome.

Table 7: Risk Assessment of Foreseeable Scenarios

Event	Cause/Comment	**Category of consequence (bold);** Description of hazards(s)	Likelihood of Event
Chemical Storage and Laboratory Areas/ Usage (Classes 3 to 9, excluding 6.2 & 7, including sub. classes)			
Class 3: Accidental spillage or breakage of containers	Human error, shelving failure.	**Consequence: Catastrophic** Spillage results in generation of flammable vapours: FIRE OR EXPLOSION, resulting in injury or death.	**Likelihood: Rare** Human error and/or user inexperience may result in a human induced event. Likelihood is "Rare" based on assumption that mitigation would include use of mechanical ventilation within store, and hazardous zone assignments within store would further reduce probability of ignition.
All classes, but particularly Class 8: Accidental breakages resulting in spillage and mixing of 2 or more incompatible chemicals within chemical storage area.	Human error, shelving failure.	**Consequence: Major** Spillage results in incompatible chemicals reacting, with generation of toxic and corrosive fumes; MINOR to SERIOUS INJURIES	**Likelihood: Rare** Human error and/or user inexperience may result in a human induced event; this would require incompatible chemicals to be spilt together, "Rare" assumes that mechanical ventilation would greatly reduce the probability that resulting vapours would reach highly toxic or hazardous levels. The change of mixing of chemicals would be further reduced by storing incompatible chemicals within dedicated chemical cabinets or different stores.
As above, but with consequences outside of building	Delivery vehicle accident, accidental dropping of containers within loading dock area.	**Consequence: Moderate** Spillage results in complaints from personnel in neighbouring surrounding building	**Likelihood: Rare** Complaints would be likely only in the event that the reaction products generate strong odours
Class 8: Accidental spillage or breakage of containers	Human error, shelving failure.	**Consequence: Moderate** The corrosiveness and/or toxicity of the spilt liquid and any vapours produced lead to toxic health effects and damage to human tissue; INJURIES REQUIRING HOSPITALISATION	**Likelihood: Unlikely** Mixing of chemicals resulting in undue risk would be low because chemicals would be stored within dedicated chemical cabinets or stores.
Class 8: Accidental breakage of glass container within rooms, with injury to person and contact with substance that's corrosive to skin,	Human error, shelving failure.	**Consequence: Moderate** Person ruptures skin while trying to clean up spillage, neglecting to use appropriate PPE due to inexperience; INJURY REQUIRING HOSPITALISATION	**Likelihood: Rare** Human error and/or user inexperience may result in a human induced event.
Multiple classes: Two chemicals are deliberately mixed, leading to unintended and violent reaction	Human error, shelving failure.	**Consequence: Moderate** The sudden nature and violence of the reaction lead to injury and property damage. INJURIES REQUIRING HOSPITALISATION, PROPERTY DAMAGE	**Likelihood: Unlikely** Human error and/or user inexperience may result in a human induced event.
As above, but with consequences outside of building	Delivery vehicle accident, accidental dropping of containers within loading dock area.	**Consequence: Moderate** Unintentionally violent chemical reaction results in complaints from personnel in neighbouring surrounding building	**Likelihood: Rare** Complaints would be likely only in the event that the reaction products generate strong odours
Transportation of Dangerous Goods to and from the building			
Accident onsite while goods are being delivered to site	Human error.	**Consequence: Major** Breakage of glass containers holding chemicals. Release of toxic, or flammable gases into the surrounding area.	**Likelihood: Unlikely** The dangerous goods transport company would follow their procedures and protocols which would be in compliance to the ADG Code.

7.4. CALCULATION OF RISK

Risk is the likelihood of any defined adverse outcome due to a hazardous event. Risk can be defined for any of the final outcomes of an event as detailed in Table 7 by the effect of the consequences coupled with the associated likelihood. As the adverse outcome can take many forms, particularly in the case of effects on the biophysical environment, risks can be expressed in a number of different ways. Within this report, the Risk has been documented in Table 9 using the risk assessment table in Table 8.

Based on the risk assessment results as detailed in Table 9, result greater than 'LOW' will require further risk mitigating hardware to mitigate any potential adverse event or reduce its impact. This section of the assessment now only applies to the proposed development.

Table 8: Risk Assessment Table

Likelihood	Consequences					
		Insignificant Minor problem, easily handled by normal day to day process.	**Minor** Some disruption possible. Injuries may result, hospitalisation generally not required, can be treated with first aid onsite.	**Moderate** Significant time & resources required. Moderate injuries, may require hospitalisation.	**Major** Operations severely damaged. Severe injuries.	**Catastrophic** Business survival at risk. Death.
	Almost Certain (>90%)	**High**	**High**	**Extreme**	**Extreme**	**Extreme**
	Likely (50 - 90%)	**Moderate**	**High**	**High**	**Extreme**	**Extreme**
	Moderate (10 - 50%)	**Low**	**Moderate**	**High**	**Extreme**	**Extreme**
	Unlikely (3 - 10%)	**Low**	**Low**	**Moderate**	**High**	**Extreme**
	Rare (<3%)	**Low**	**Low**	**Moderate**	**High**	**High**

Table 9: Risk Assessment Outcome

Event	Consequence Rating	Likelihood Rating	Overall Risk	Required Mitigating Strategies	Updated Likelihood Rating	Final Risk
Chemical Storage and Laboratory Areas/ Usage (Classes 3 to 9, excluding 6.2 & 7, including sub. Classes)						
Class 3: Accidental spillage or breakage of containers, resulting in fire or explosion. SERIOUS INJURIES	**Moderate**	**Rare**	**Moderate**	• Design chemical storage areas as per the requirements of AS 2243.2, incorporating further requirements from AS 1940, i.e. fire separation, ventilation requirements, etc. • Incorporate minimum firefighting requirements as per AS 1940. • Ensure flammable liquids store has containment area that's designed as per the requirements of AS 1940, thus supplying minimum bunding requirements so that all foreseeable spills are contained • For areas where flammable vapours may result, ensure hazard zoning as per the requirements of AS/NZS IEC 60079.10.1 are incorporated clearly documenting ZONE type, Gas Group, Temperature Class. • Ensure that all flammable liquids are suitably stored, even those which are only subsidiary Class 3	**Rare**	**Moderate**
All classes, but particularly Class 8: Accidental breakages resulting in spillage and mixing of 2 or more incompatible chemicals within chemical storage area. SERIOUS INJURIES	**Moderate**	**Rare**	**Moderate**	• Design chemical storage areas incorporating segregation and separation to minimise unwanted chemical mixing, i.e. Class 3 chemicals to be separated from Class 8 chemicals. • Ensure that all potential incompatibilities are checked when assigning storage locations, including acids/alkalis, acids/cyanides, hypochlorites/acids etc.	**Rare**	**Moderate**
As above, but with consequences outside of building COMPLAINTS FROM PERSONNEL IN SURROUNDING BUILDINGS	**Moderate**	**Rare**	**Moderate**	As above, but additionally: • Ensure exhaust from chemical storage areas exhaust at an appropriate location, ideal locations may require investigation. However, as a minimum it should comply with AS 1940 and AS/NZS 1668 requirements.	**Rare**	**Moderate**
Class 8: Accidental spillage or breakage of containers, leads to INJURIES REQUIRING HOSPITALISATION	**Moderate**	**Unlikely**	**Moderate**	• Careful assessment of each course of action and use of appropriate PPE to minimise probability of a spillage of toxic and corrosive chemicals	**Rare**	**Moderate**
Class 8: Accidental breakage of glass container within rooms, with injury to person and contact with substance that's corrosive to skin.	**Moderate**	**Rare**	**Moderate**	• Careful assessment of each course of action and use of appropriate PPE to minimise probability of the breakage of a glass vessel containing of toxic, oxidising or corrosive chemicals	**Rare**	**Moderate**
Multiple classes: Two chemicals are deliberately mixed, leading to unintended and violent reaction, resulting in INJURY REQUIRING HOSPITALISATION & PROPERTY DAMAGE	**Moderate**	**Unlikely**	**Moderate**	• Careful assessment of risk of uncontrolled reaction prior to mixing chemicals; of appropriate PPE to minimise probability of injury	**Rare**	**Moderate**
As above, but with consequences outside of building COMPLAINTS FROM PERSONNEL IN SURROUNDING BUILDINGS	**Moderate**	**Rare**	**Moderate**	As above, but additionally: • Ensure exhaust from chemical storage areas exhaust at an appropriate location, ideal locations may require investigation through AERMOD, AUSPLUME or physical modelling of wind and building infrastructure	**Rare**	**Moderate**
Transportation of Dangerous Goods to and from the building						
Loss of containment of dangerous goods onsite while goods are being delivered to site	**Moderate**	**Unlikely**	**Moderate**	• Ensure that all deliveries to site are conducted by approved suppliers which hold all relevant licensing as per the Australian Dangerous Goods Code, Dangerous Goods (Road and Rail Transport) Act 2008 and Dangerous Goods (Road and Rail Transport) Regulation 2022. • Ensure appropriate spill kits are available and that all facility staff who may be in attendance are trained in their use, and in how to react to a loss of containment • Ensure the design of the loading dock provides ample space for ease of truck movements. • Ensure that spilt material is not allowed to enter waterways and that it's not somehow flushed or moved into a public place where members of the public may be exposed to it. • Ensure that the company delivering the dangerous goods has a safety management system that includes procedures for clean-ups and incident management; where spills occur on facility premises, the facility staff should be in control of the clean-up process.	**Rare**	**Moderate**
Transportation of Dangerous Goods within the building						
Transportation of dangerous goods / hazardous chemicals between building levels resulting contents spillage.	**Moderate**	**Unlikely**	**Moderate**	• Prevent personnel from occupying lifts while they are being used to transport dry ice between floors • Implement lift controls for unattended lift usage. • Transport goods on purpose-designed trolleys to minimise the possibility of spillage of dangerous goods.	**Rare**	**Moderate**

8. POTENTIAL HAZARDOUS INCIDENTS AND THEIR CONTROLS

As detailed in the risk assessment above (Table 9), safety management systems have been recommended to reduce the risk from potentially hazardous installations, these mitigating strategies will employ design requirements as detailed in various Australian Standards and a combination of engineered solutions including, hardware and software packages. It is essential to ensure that hardware systems and software procedures used are reliable and of the highest quality in order to ensure safe operation of the facility under all circumstances.

8.1. GENERAL HARDWARE SAFEGUARDS

Hardware safeguards include factors such as the building design, layout of equipment and instrumentation, and compliance with relevant codes, technical standards and industry best practice.

All systems handling dangerous goods will comply with the following Acts, Regulations and Codes and Australian Standards in their latest editions. Below are listed some of the most relevant for design and construction:

- NSW Work Health and Safety Act (2011) and NSW Work Health and Safety Regulation (2017)
- NSW Dangerous Goods (Road and Rail Transport) Act 2008 and NSW Dangerous Goods (Road and Rail Transport) Regulation 2022
- AS 1940 The storage and handling of flammable and combustible liquids
- AS/NZS 2982 Laboratory design and construction.
- AS 2243.2 Safety in laboratories - Part 2 Chemical Aspects and Storage.
- AS/NZS IEC 60079.10.1 Explosive atmospheres - Classification of areas - Explosive gas atmospheres.
- AS/NZS 60079.17 Explosive atmospheres - Electrical installations inspection and maintenance.
- AS/NZS 60079.14 Explosive atmospheres - Electrical installations design selection and erection.

8.2. SPECIFIC HARDWARE SAFEGUARDS

8.2.1. CHEMICAL STORAGE, USE, SPILLS OR FIRES

The appropriate Australian Standards include the AS 2243 series (several of which are already listed in Section 8.1) as well as various storage and handling standards and other appropriate standards listed below:

- AS/NZS 1940 The storage and handling of flammable and combustible liquids.
- AS 3780 The storage and handling of corrosive substances.
- AS/NZS 4681The storage and handling of Class 9 (miscellaneous) dangerous goods and articles.
- AS/NZS 1216 Class labels for dangerous goods.
- AS 1668.2 The use of ventilation and air-conditioning in buildings. Part 2: Mechanical ventilation in buildings

The above standards set out storage requirements for dangerous goods; including constructions requirements for chemical stores, ventilation requirements, maximum allowable volumes in storage and in use, recommended procedures to mitigate spills and minimum firefighting requirements.

The proposed safeguards for these storage and usage areas are detailed below when considering potential hazardous events associated with the type of storage or use.

- Human error, spills and vapour generation – For volatile chemicals which are accidently spilt due to human error (e.g. accidental dropping of containers) the resulting spilt liquids can generate vapours which may be toxic or flammable in nature. The vapour pressure of many liquids (ethanol for instance) will lie within the explosive range of that vapour and in the absence of effective ventilation the spillage can create a hazardous atmosphere above the liquid. A means to mitigate the risk to occupants is to ventilate the area to maintain an environment which is suitable for personnel to implement corrective actions to either clean up the spill or alert others to the incident. As detailed in the standards above, safety devices that are implemented in the chemical storage design include:
    - Emergency buttons to alert security or safety officers.
    - Gas or vapour sensors, which when triggered, alert security or safety officers.
    - Emergency ventilation.
    - Spill kits to aid in clean-up.
- Flammable vapour generation – For areas where flammable liquids are used, spills of these chemicals can generate flammable vapours which can cause flash fires or explosions. However, when considering the ‘fire triangle’, the three items that are required to cause a fire or explosion are oxygen, fuel and an ignition source. The two items above which can be controlled through engineering mitigating devices are flammable vapour generation and ignition sources. Therefore, these areas will be ventilated as per AS 1940 and AS 1668.2 and all ignition sources will be assessed following the requirements of AS 60079.10.1. That is all areas where flammable liquids are used will be mapped in terms of their flammable areas (known as hazardous zones, as defined in AS 60079.10.1) and all electrical items which

fall within the defined hazard zones will be engineered to meet the requirements of the applicable standards of the AS 60079 series.

- Fires from spills – All areas where chemicals are being used may possess a small potential for fires. This risk is mitigated through the installation of various firefighting devices as per relevant codes and Australian Standards, these firefighting devices will include:
    - Fire sprinklers.
    - Fire hose reels.
    - Fire extinguishers.
    - Fire blankets.

  Therefore, although a risk of fire is always present there will be a number of mitigating strategies which will be applied to meet BCA requirements such as fire compartmentation, firefighting devices, etc.

- Containment of flammable liquid spills – areas where flammable liquids are stored will require appropriate containment of any flammable liquid spill and will need to be constructed to the requirements of AS 1940. Areas where these chemicals are used will need to comply with the requirements of AS 2243.2.
- Containment of corrosive liquid spills – areas where flammable liquids are stored will require appropriate containment of any flammable liquid spill and will need to be constructed to the requirements of AS 3780. Areas where these chemicals are used will need to comply with the requirements of AS 2243.2.

8.2.2. Chemical Vapour Release from the Building

As the building may generate various vapours which can be toxic or harmful to users, the AS 2243 series of standards sets out minimum design and construction requirements for laboratory type of areas and how to expel their emissions to minimise the impact and risk to the public. Currently AS 2982 and AS 1668.2 define how ventilation exhaust is to be discharged into the atmosphere to minimise the impact on the general public and neighbouring building.

The proposed safeguards for safe exhaust discharge are:

- Design exhaust stacks to meet the requirements of AS 1668.2 meeting minimum separation distances from building fresh air intakes and other openings within the same building or neighbouring buildings.
- Conduct plume modelling for stack emissions to confirm that all contaminants discharged from stacks are diluted to acceptable levels before reaching locations where people are likely to be present for significant periods. “Acceptable” would be defined in terms of potential odours and in terms of levels that have the potential to cause health effects from regular exposure. Such discharge locations will be modified if required to minimise the risk of neighbouring complaints.

9. CONCLUSION

In reviewing the proposal and the conditions as detailed within the State Environmental Planning Policy (Resilience and Hazards) 2021 guidelines where 'Chapter 2 - Coastal Management', 'Chapter 3 – Hazardous and Offensive Development' and 'Chapter 4 – Remediation of land' form part of the assessment, it was determined that only Chapter 3 would be applicable to this assessment. Therefore, a "Hazardous and Offensive Development" assessment was conducted and based on the assessment and as detailed in Sections 5.3.2 and 5.3.4, no limits of chemical storages currently have been exceeded. Projecting into the future with expected facility occupant growth and assuming similar linear growth in chemical usage for educational purposes, CETEC is of the opinion that the facility/development will not be considered to be a Hazardous and Offensive Development.

i.e. **The development is not a Hazardous and Offensive Development.**

For vehicle movements for all chemical waste from the SIP building, CETEC has estimated that on average approx. 60 Kg/L of hazardous chemical waste is collected annually. As the facility already has direct communication with an authorised waste collector, and the waste quantities are significantly low, the number of vehicle movements for all chemical classes will not evoke the Hazardous and Offensive Development requirement.

The main hazard associated with the proposed project is associated with the storage and handling of Dangerous Goods of Classes 3, 8 and 9. As documented in Table 9, the *Risk Assessment Outcomes*, there are a number of risk scenarios which have been found to be Moderate in this assessment (assuming no engineering controls are implemented), however, practically it would be expected that the impact to the external environment, i.e. the neighbouring environment, would be small given that chemical volumes onsite would be relatively small. Further impacts to the local environment, building occupants and building structure can be further reduced by the implementation of appropriate design requirements as detailed in Table 9. However, the major social impact from an incident onsite would be through the injury of students / staff within the laboratory rooms. This risk and impact on the surrounding community will need to be addressed and mitigated based on the following recommendations.

9.1. RECOMMENDATIONS POST-DEVELOPMENT CONSENT

This report documents a number of risks and hazards associated with the identified chemicals which will be used within the building and broadly identifies potential risk mitigating strategies which can be applied to decrease the risk. This report doesn't risk assess user requirements, chemical usage within laboratory rooms or any other engineering risk mitigating controls that may be required to mitigate the hazards associated with the nature of the work to be conducted within the building.

Therefore, following the development consent and as imposed by the SEPP 33 guidelines document[1], a risk assessment will be required in the future to determine the most appropriate mitigation available and generally speaking would include the following reviews and audits, as detailed below, by a suitably qualified Dangerous Goods and Laboratory Design expert;

- Conduct an assessment to determine laboratory areas and/or chemical storage areas for the laboratory design are in compliance against *AS/NZS 2982:2010 – Laboratory design and construction* and any other storage Australian Standard, e.g. AS 1940, AS 4332, AS 1894, etc.

  NOTE: This assessment may be undertaken in the future if required.

- Review areas of chemical odours/vapour generation and determine appropriate sensors / ventilation controls to be used for the hazards which are identified.

  NOTE: This assessment may be undertaken in the future.

- Undertake yearly audits of all chemicals onsite to ensure chemicals volumes by Chemical Class and Packing group remain below threshold limits.

APPENDIX A – DOCUMENTS PROVIDED BY THE CLIENT

Appendix B - Architect Design Brief

Pymble Ladies' College Secondary Innovation Precinct Architectural Services Architect Design Brief_112023

3XN Combined 20250108 -compresse

3XN Pymble Ladies' College Secondary Innovation Precinct Schematic Design_15112024

Industry Specific SEARs Schools467512

Planning Secretary's Environmental Assessment Requirements Pymble Ladies' College Senior Innovation Precinct_16012025

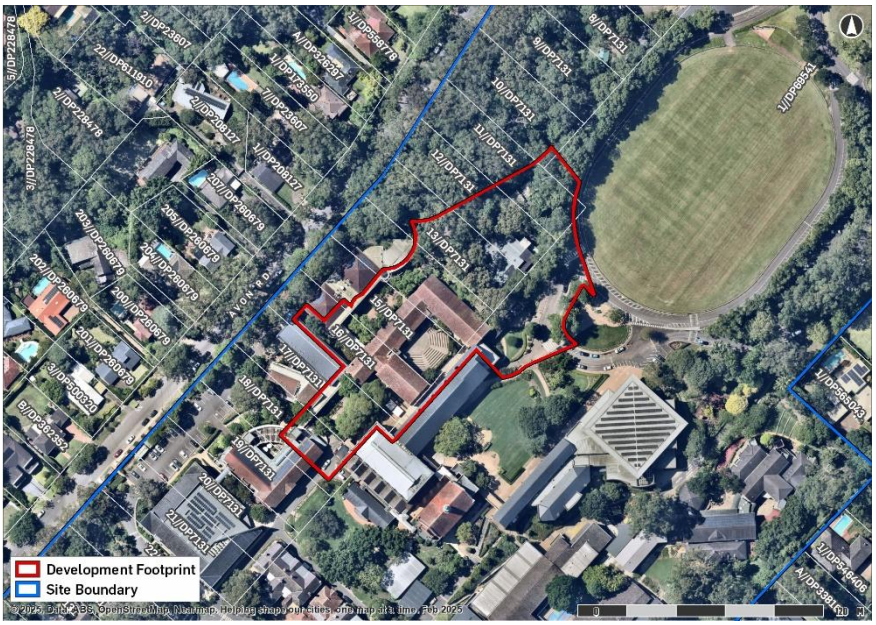
Materials_ListPDF_2025_January_20.pdf

Pymble Ladies' College 2024 Manifest_20012025

College Map_2025 (002).pdf

Pymble Ladies' College Map 2025_2602025

Pymble Ladies' College Site Aerial_2602025



Pymble Ladies' College Development Aerial Close_26022025

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