

# **NARRABRI SPECIAL ACTIVATION PRECINCT**

## **PACKAGE E: LAND USE SAFETY**

### **TECHNICAL REPORT**

#### **DEPARTMENT OF PLANNING AND ENVIRONMENT**

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### **Acknowledgement of Country**

We acknowledge country and pay respects to the Gomeroi/Gamilaroi/Gamilaraay/Kamilaroi people as the Traditional Owners and Custodians of the land and waters on which the Narrabri Special Activation Precinct is located.

We recognise their continued connection to Country and that this connection can be seen through stories of place and cultural practices such as art, songs, dances, storytelling and caring for the natural and cultural landscape of the area.

We also recognise the continuing living culture of Aboriginal people, and the significance of Narrabri in that living culture. We recognise the contemporary stories of displacement and the cultural significance of Narrabri in the continued journey of self-determination in Australia.

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## GLOSSARY

Term	Definition
Residential land use	Residential, hotels, motels, tourist resorts. In this study it excludes land zoned rural/residential or individual residences that are permitted in zones that are not zoned residential.
Sensitive land use	Hospitals, schools, child-care facilities, aged care housing.
Separation distances	Separation distances are used in this study to manage societal risk. Societal risk is the consideration of rare events that may be acceptable if they effect a small number of people but are unacceptable if they effect many people. Separation distances are used in this report to assess the distance between a development and residential areas. Meeting a separation distance demonstrates land use safety conflict can be avoided.
Buffer zones	<p>Buffer zones are used in this study to assess individual risk and the potential for escalation between developments. They are areas surrounding a development that are generally:</p> <ul style="list-style-type: none"> <li>• not suitable for sensitive, residential, or commercial developments</li> <li>• areas in which additional large populations (e.g. administration offices) should be avoided</li> <li>• not suitable for potentially hazardous developments (as defined by the State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience SEPP) due to the risk of escalation/knock-on effects between industrial developments.</li> </ul>
The HIPAP 10 performance objective to 'protect residential amenity and health'	In the context of risk to people, amenity is concerned with nuisance type issues such as noise and odour. Amenity is not assessed in this study and 'health' is taken to mean safety due to acute effects of incidents for potentially hazardous developments. Amenity, in terms of air quality, noise and odour is discussed in specific SAP Technical reports.
SEPP 33	<p>State Environmental Planning Policy (SEPP) 33 Hazardous and Offensive developments was withdrawn and incorporated as section 3 of the Resilience and Hazards SEPP 2021.</p> <p>Clause 3.12 (a) of the Resilience and Hazards SEPP 2021 requires consideration of circulars and guidelines published by the Department of Planning relating to hazardous developments, Hence, current guidance documents and inventory thresholds published to support the superseded SEPP 33 are still applicable.</p>
Narrabri SAP investigation area	The Narrabri SAP investigation formed the basis for the initial development of the SAP structure plan. It covers an area approximately 10km from Narrabri town centre.
Structure Plan	The structure plan identifies areas within the SAP investigation area that are proposed for different types of development. The structure plan was developed following two Enquiry by Design (EbD) workshops.

Term	Definition
Narrabri SAP	<p>The Narrabri SAP is a feature within the structure plan. It is a contiguous area bounded by Yarrie Lake Road to the south and Culgoora Road to the north. To the east the boundary is the eastern edge of the existing waste management and recycling area. The western boundary is approximately 5km west of Bohena Creek.</p> <p>The planning framework for the SAP falls under the State Environmental Planning Policy (Precincts- Regional) 2021.</p>
Development area	<p>The structure plan identifies geographical areas for different types of development. For example, 'Transport and Logistics'. The term development area is used in this report to refer to an area identified by a development type in the structure plan.</p>

## ABBREVIATIONS

AS	Australian Standard
CSG	Coal Seam Gas
DG	Dangerous Goods
DPE	Department of Planning and Environment
EbD	Enquiry by Design
EIS	Environmental Impact Statement
EP&A	Environmental Planning and Assessment
ERPG	Emergency Response Planning Guide
FHA	Final Hazard Assessment
HIPAP	Hazardous Industry Planning Advisory Paper
LGA	Local Government Area
LPG	Liquefied Petroleum Gas
MHF	Major Hazard Facility
NSW	New South Wales
PHA	Preliminary Hazard Assessment
PV	Photovoltaic
RGDC	Regional Growth NSW Development Corporation
SAP	Special Activation Precinct
SEPP	State Environmental Planning Policy
WHS	Work Health and Safety



## 1. EXECUTIVE SUMMARY

This document is the land use safety technical report for the Narrabri structure plan. The structure plan includes the Narrabri Special Activation Precinct (SAP) and associated, complementary, development in the Narrabri area. Options to eliminate or mitigate land use safety conflict to an acceptable level were considered throughout the development of the structure plan. This included dedicated sessions on land use safety at two Enquiry by Design (EbD) workshops with options and scenarios developed, assessed and informed by land use safety considerations including buffers and separation distances in a baseline study and a scenario testing study.

The land use safety benefit achieved by locating higher hazard and energy intensive industry in the west of the SAP was identified in the scenario testing study and carried forward in the structure plan.

The high-level objective of this study was to analyse the Narrabri SAP structure plan and assess if land use safety conflict is eliminated or, where this is not possible, can be managed to acceptable levels. Other technical studies have been completed that may identify constraints that are more onerous than this study.

The objective was achieved by identifying the location and types of development enabled by the structure plan, with the potential to lead to land use safety conflict. The study assessed their impact on residential and sensitive land uses and neighbouring developments. Given uncertainty in the nature and scale of future development the assessment was based on representative industries and types of activities.

The technical assessment concludes that the structure plan largely eliminates the potential for land use safety conflict between industrial developments and residential areas by maximising separation distances. Beneficial uses such as lower hazard developments, light industry and environmental buffers are included in the structure plan to minimise sterilisation of land.

Where land use safety conflict is not eliminated the technical assessment concludes that the risk-based approach to land use safety established in the NSW Resilience and Hazards SEPP (2021) [1] (Resilience SEPP) is an appropriate framework to manage any residual risk.

The combination of separation distances set in the structure plan and a risk-based approach for any residual land use safety conflict will manage safety at residential and sensitive land uses without the unnecessary sterilisation of land and allow for development specific factors to be taken into consideration to maximise utilisation of land in the SAP.

The assessment did not identify any requirements to change the structure plan, but it does identify specific recommendations for consideration in planning controls. The two key recommendations are:

- The land use safety planning framework established in the Resilience SEPP should be adopted to avoid inadvertently approving a development or unnecessarily sterilising land.
- Specific plans should be developed to manage land use safety conflict at dwellings located in the structure plan development areas as the plan is being implemented. The plan should account for staging of developments and cumulative risk at a receptor from multiple developments.

## **2. INTRODUCTION**

### **2.1. SAP overview**

The New South Wales (NSW) Government, through its introduction of Special Activation Precincts (SAPs) has identified six distinctive areas throughout regional NSW to bring together planning and investment to stimulate economic growth across a range of industries including freight and logistics, manufacturing, waste management and recycling, energy generation and agricultural and food processing activities. The planning and creation of these areas is partially facilitated and funded through the \$4.2 billion Snowy Hydro Legacy Fund.

The establishment of SAPs is a joint NSW Government Agency initiative by the Department of Regional Growth NSW, Department of Planning and Environment (DPE) and the Regional Growth NSW Development Corporation (RGDC) as part of the 20-Year Economic Vision for Regional NSW. DPE is responsible for preparing the planning framework whereas the Department of Regional NSW manages each precinct.

In November 2020, Narrabri was declared the sixth and final SAP investigation area, enabled by its strong reputation and location within Australia's highest productive grain region as well as its strong transportation linkages including existing road and rail connections and the future Inland Rail. To facilitate the planning within this precinct DPE has engaged Sherpa Consulting Pty Ltd (Sherpa) to prepare a series of technical studies regarding land use safety within Narrabri SAP investigation area.

As part of the master planning process and to inform this technical study two Enquiry by Design (EbD) workshops were organised. A preliminary EbD was held on the 29<sup>th</sup> and 30<sup>th</sup> of March 2022 to develop three initial land use scenarios. Following an interdisciplinary assessment of the three scenarios, a final EbD workshop was held between 5<sup>th</sup> and 8<sup>th</sup> of September 2022 to study the interdisciplinary constraints of the three scenarios and identify and develop a preferred land use structure plan. This report assesses the land use structure plan from the final EbD workshop from a land use safety perspective.

### **2.2. Narrabri overview**

Narrabri township is located within the Narrabri Shire Local Government Area (LGA), approximately 530km northwest of Sydney. As of 2021 census, the population of Narrabri township was 6,898 persons with 16% identifying as Aboriginal and/or Torres Strait Island Peoples.

The township lies at the junction of the Newell and Kamilaroi highways and has direct rail connection to the Port of Newcastle via the Walgett branch of the Main North line. Once completed, Narrabri will also have a direct connection to the new Inland Rail route which will connect Melbourne to Brisbane via a new and upgraded track.

### 2.3. Land use safety design integration

Land use safety was studied at all stages of the SAP design process, with the findings of the studies incorporated into the final structure plan.

In conjunction with the SAP team, a baseline study assessed the types of development that that would fit the character of the SAP and may be attracted to the region. The baseline study broadly established how the types of development could be integrated into the SAP and any constraints. The baseline study results were used as an input to the preliminary EbD and informed 3 scenarios.

The scenario assessment study then analysed the 3 scenarios. Whilst all 3 scenarios had the potential to successfully manage land use safety conflict, the final structure plan adopted the inherently safer approach of locating high hazard and energy intensive industry in the west of the SAP to maximise the separation distance to residential areas and associated sensitive receptors such as aged care and schools.

### 2.4. Study objectives

The high-level objective of this study is to analyse the Narrabri SAP structure plan and assess if land use safety conflict can be eliminated or, where this is not possible, managed to acceptable levels. The study considers land use safety conflict within the SAP investigation area as a result of existing and proposed developments in the structure plan.

The high-level object is met by:

1. Defining an assessment framework based on NSW land use safety planning principals and processes.
2. Identifying existing and proposed developments with the potential to introduce land use safety conflict (sources of risk) and risk receptors.
3. Assessing sources of risk against risk receptors in the context of land use safety planning.
4. Draw conclusions on the suitability of the structure plan to eliminate land use safety conflict and/or manage residual risk to acceptable levels.
5. Provide recommendations that can be incorporated in planning controls.

### 2.5. Potentially hazardous activities

The Narrabri structure plan can accommodate a wide range of developments including those that may be determined as *potentially hazardous activities* that have the potential to result in unacceptable risk levels at neighbouring developments.

Under the Resilience and Hazards SEPP (Resilience SEPP), Ref [1], activities are determined to be potentially hazardous if:

- the quantities of Dangerous Goods (DGs) and their location exceed defined screening thresholds; or
- they are industries that may be potentially hazardous as listed in Appendix 3 of *Applying SEPP33* (Department of Planning, 2011) [2].

A land use safety conflict occurs where the risk from a development may impact upon neighbouring developments. Application of the Resilience SEPP framework to assess and manage potentially hazardous activities is appropriate when assessing land use safety conflict.

Regardless of any assessment in this study, to avoid inadvertently prohibiting or allowing a development, the land use safety planning framework relating to potentially hazardous activities detailed in the Resilience SEPP should be applied.

It is necessary to apply the Resilience SEPP as:

- There is no relationship between the land use zones defined in planning controls and the nature and scale of land use safety conflicts arising from developments that may be permissible under the structure plan.
- Analysis in this technical report is representative only and cannot take account of the specific hazards and controls for a proposed development. The Resilience SEPP accounts for the unique nature of hazards and controls associated with developments.
- The Resilience SEPP triggers a process of assessment and approval against defined risk criteria with a mechanism for regulatory oversight.

### 3. STRUCTURE PLAN

Areas identified for development in the structure plan issued after the Final EbD (Figure 3.1), cover approximately 3,096 ha and include:

- 1,783 ha of employment land within the SAP boundary
- 936 ha of land for rail connection, employment and residential development outside the SAP boundary.

Broadly the structure plan includes an area proposed as the Narrabri SAP and complementary developments outside of the SAP for light industry and a residential area with associated amenities such as a school, recreation and health facilities.

The Narrabri SAP is located to the west of the existing township and incorporates two areas separated by an environmental buffer zone. The final SAP boundary may change throughout the master planning process.

The structure plan highlights:

- two large SAP enterprise zones separated by the Bohena Creek environmental buffer
- one light industrial zones located outside of the SAP
- a residential growth area to the south of the town centre
- green spaces and interconnecting green loops.

The overall layout provides the opportunity to stage development with:

- an eastern area leveraged off Inland Rail opportunities
- a western area leveraged of Coal Seam Gas (CSG) and power generation opportunities
- a western extension area allocated for a grain storage and handling facility.

Further detail is provided in Figure 3.1 which shows the preferred locations for developments across the SAP investigation area.

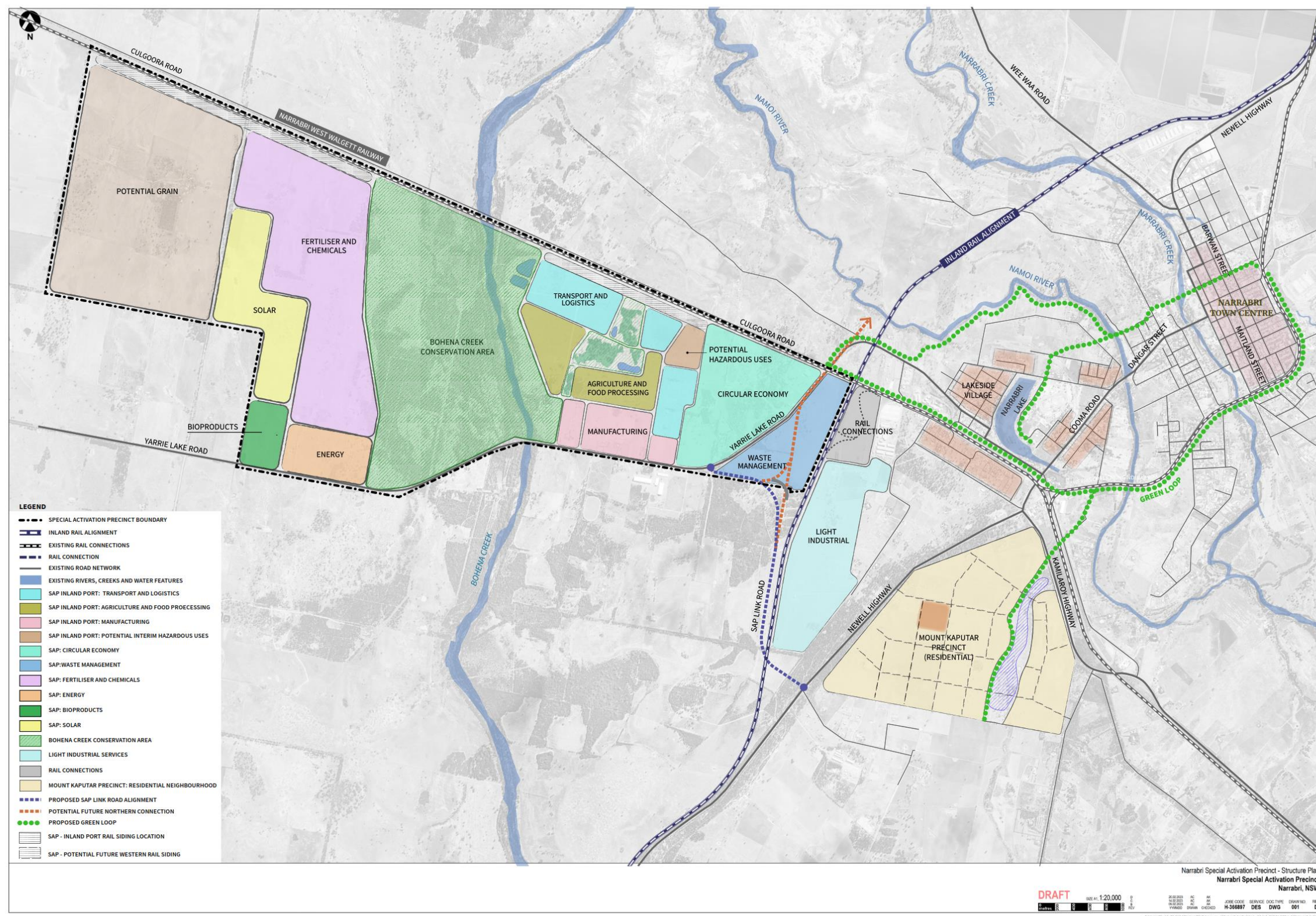
The proposed structure plan development areas and their envisaged character are summarised in Table 3.1.

**Table 3.1: Proposed structure plan elements and character**

<b>Development Area</b>	<b>Character</b>
Transport and logistics	Warehouses for storage and distribution, container storage, areas for transfer between road and rail. Includes rail loading/unloading area.
Interim potentially hazardous uses	Warehouses that store or handle DGs/hazardous chemicals. Manufacturing and/or storage of DGs/hazardous chemicals.
Agriculture and food processing area	Production, processing, handling, formulating, packaging and storage of agricultural products and food.
Circular economy	Handling, storage, sorting and processing of waste to support a circular economy.
Waste management and recycling	Comprises the existing Narrabri waste management area. Will complement the proposed circular economy area
Manufacturing area	Support development of a range of manufacturing activities. This may include potentially hazardous activities.
Potential grain area	Provision for a future grain handling area that leverages off the rail frontage with access to the inland rail.
Fertiliser and chemical	Development of higher hazard industries such as fertiliser and chemical manufacturing, handling and storage. Area located away from the town centre with separation from the eastern SAP to minimise knock on effects.
Solar area	An area has been identified for solar arrays and supporting infrastructure. Low manning levels associated with solar development presents an opportunity for development in buffer areas around higher hazard facilities.
Energy	Energy generation, possibly gas fired (CSG), peak generator (used to fill shortfall in supply).
Bioproducts	Complementary to energy generation, area for bio-gas, liquid or solid fuel production, storage and use.
Rail connection	Area for rail infrastructure.
Light industrial	Light industrial area, typically limited storage or handling of DGs/hazardous chemicals. Not potentially hazardous activities.
Residential zone	Area identified for housing, health precinct, neighbourhood centre and school. Broad range of non-industrial activities.



Figure 3.1: Narrabri structure plan





## 4. METHODOLOGY

### 4.1. Scope

The scope of this technical report is identification and assessment of potential land use safety conflict introduced by the Narrabri structure plan (refer to section 2.1 for details).

Other technical studies may identify constraints that are more onerous than this study.

### 4.2. Context

To manage land use safety to acceptable levels without unnecessarily prohibiting development or sterilising land, NSW has adopted a risk-based approach to land use safety planning.

The framework is established and guided by the documents in Table 4.1.

**Table 4.1: NSW land use planning documents**

Ref	Document	Level	Use in study
[1]	Resilience and Hazards SEPP (Resilience SEPP) <sup>1</sup>	Primary	Establishes the framework for identifying potentially hazardous activities,
[2]	Hazardous and Offensive Development Application Guidelines, Applying SEPP33	Primary	Established the threshold for potentially hazardous facilities
[3]	Assessment Guideline – Multi-level Risk Assessment	Primary	Establishes a process for risk assessment
[4]	DPE HIPAP <sup>2</sup> 4 – Risk Criteria for Land Use Planning	Supporting	Provides land use safety criteria
[5]	DPE HIPAP 6 – Hazard Analysis	Supporting	Provides assessment guidance
[6]	DPE HIPAP 10 – Land Use Safety Planning	Primary	Established the principles, framework and criteria for the assessment
[7]	DPE HIPAP 12 – Hazards Related Conditions of Consent	Supporting	Provides guidance on conditions of consent based on risk level
[8]	NSW Work Health and Safety Act (and supporting regulation)	Supporting	Supported guidance on threshold quantities for a Major Hazard Facility (MHF)
[9]	Australian Emergency Response Guide Book 2021	Supporting	Provides extent of evacuation and distances requiring protection.

<sup>1</sup> SEPP33 has been consolidated into a new SEPP (March 2022). Supporting guidelines that refer to SEPP33 remain valid. See [Fact sheet - Resilience and Hazards SEPP \(nsw.gov.au\)](https://www.nsw.gov.au/fact-sheet-resilience-and-hazards-sepp).

<sup>2</sup> Hazardous Industry Planning Advisory Paper (HIPAP)

### **4.3. Assessment frame**

#### **4.3.1. Resilience SEPP**

Potentially hazardous activities have the potential to result in unacceptable risk levels at neighbouring developments. The Resilience SEPP provides a framework for assessing and determining if the risk is acceptable.

As land use safety conflict occurs where the safety risks from a development impact on neighbouring developments at an unacceptable level, application of the Resilience SEPP framework to assess and manage potentially hazardous activities is appropriate when assessing land use safety conflict.

The Resilience SEPP provides a mechanism to determine if a development is potentially hazardous. The determination is based on thresholds for quantities of DGs and other considerations detailed in the Applying SEPP33 guideline.

If a development is determined to not be potentially hazardous it can be developed with no specific land use safety consideration.

If a development is determined to be potentially hazardous, there is a requirement to undertake a Preliminary Hazard Analysis (PHA) to determine if the risk associated with the development can be managed to an acceptable level. The process recognises that not all hazards and controls may be known at the development application stage. Prior to commencing activities, the PHA is updated to a Final Hazard Assessment (FHA) to reflect the hazards and adopted controls.

A series of documents support the application and requirements of the Resilience SEPP, specifically:

- Hazardous and Offensive Development Application Guidelines, Applying SEPP33 defines the criteria for determining if a development is potentially hazardous.
- Assessment Guideline – Multi-level Risk Assessment defines levels of risk assessment starting with initial screening for consequences to full quantitative risk assessment.
- HIPAP 6 details the requirements of a PHA and FHA.
- HIPAP 4 details the criteria to determine if the risk associated with a development is managed to an acceptable level.
- HIPAP 10 provides guidance on land use safety issues that should be addressed by both proponents of developments and local planning authorities.
- HIPAP 12 sets out a framework for setting conditions of consent.

#### **4.3.2. NSW WHS Act and Regulation**

The NSW Work Health and Safety (WHS) Act and supporting regulation define the most hazardous facilities that may be developed as MHFs. MHFs are licensed and operate

under a regime that ensure risks are managed to an acceptable level. There are approximately 50 MHFs operating in NSW.

MHFs are determined based on the quantity of DGs stored or handled on site and other factors including the proximity to offsite receptors. MHFs are required to notify to the regulator if they exceed 10% of the MHF threshold. The regulator may determine a facility that exceeds 10% of the MHF threshold as an MHF.

This assessment limited developments at 10% of the MHF threshold. Developments above this level would require detailed assessment to confirm suitable siting and buffers.

#### **4.3.3. Conclusion**

This assessment uses the Resilience SEPP framework to determine if a development is potentially hazardous and hence requires assessment for land use safety conflict with a limit on the assessment set at 10% of MHF notification values.

#### **4.4. Criteria**

##### **4.4.1. Overview**

The assessment of land use safety conflict requires a set of criteria against which decisions can be measured and judged. HIPAP 10: Land Use Safety Planning (2011) provides guidance on the principles of strategic land use safety planning, performance objectives and selecting criteria for land use safety studies. As the SAP structure plan is concerned with strategic planning the approach and criteria in HIPAP 10 are appropriate for this assessment.

##### **4.4.2. Strategic factors**

Table 4.2 summarises how HIPAP 10 strategic land use planning factors are taken into consideration in this study and summarises how the factors are used to determine land use safety conflicts and assess the SAP structure plan.

The HIPAP 10 performance objective to 'protect residential amenity and health' was used to frame the assessment of impact at residential and sensitive land uses. In the context of risk to people, amenity is concerned with nuisance type issues such as noise and odour. Amenity is not assessed in this study and 'health' is taken to mean safety due to acute effects of incidents from potentially hazardous facilities.

**Table 4.2: HIPAP 10 strategic land use planning factors**

<b>Factor</b>	<b>HIPAP 10 consideration</b>	<b>Implementation in the study</b>
Permissibility of land use	Determine which types of development are permissible in an area.	The structure plan defines areas for certain types of development. The structure plan is used as the basis for the assessment.
Avoid environmentally sensitive areas	Lists examples of environmentally sensitive areas which includes areas close to sensitive land uses such as schools, nursing homes and hospitals.	The study assesses the potential impact on residential areas, schools, nursing homes and hospitals.
Compatibility with land uses	Provision of buffer zones including the identification of beneficial land uses which can form a buffer between potentially hazardous industries and sensitive land uses such as residential areas.	The study assesses the need for and extent of buffer zones to sensitive land uses including beneficial use of land in buffer zones.
Initial site investigation	The purpose of the initial site investigation is to provide an early indication of the suitability of a proposed site.	This study provides an indication of the ability of the structure plan to eliminate land use safety conflict, or where this is not possible, demonstrate that land use safety can be managed to an acceptable level.

**Table 4.3: HIPAP 10 performance objective in the context of land use safety**

Land Use	Performance Objective	Factor for determining appropriate separation distances in HIPAP 10	Adopted
Residential areas, hospitals or schools	Protect residential safety	What is the likelihood of the performance objective being achieved by the mitigation measures alone?	Assessment initially based on the quantity of DGs on site with no consideration of mitigation controls.
		What is the likelihood of the mitigation measure failing?	
		What is the likelihood of an incident which will result in a failure to meet the performance objectives?	
		What back up mitigation measures are available?	
		What is the likely geographic extent of the impacts if mitigation measures fail or an incident occurs?	Yes
		What separation distances are required to achieve the performance objective: <ul style="list-style-type: none"> <li>Under normal operational and mitigation performance conditions</li> <li>If mitigation measures fail or an incident occurs.</li> </ul>	Yes

#### 4.4.3. Individual and societal risk criteria

Individual and societal risk criteria are presented in HIPAP 10.

Given the uncertainty in the nature, scale and controls and the number of proposed developments, individual risk and societal risk were not assessed quantitatively. Developments were qualitatively assessed for their potential to result in individual risk or impact on populated areas with the potential to result in land use safety conflict.

#### 4.4.4. Consequence criteria

The consequences of incidents from potentially hazardous facilities were assessed against the criteria in Table 4.4. Given the uncertainty in developments that may occur under the structure plan the assessment was primarily based on a qualitative assessment. Where quantitative data was available for similar developments, the results were used to inform the assessment.

**Table 4.4: Consequence criteria**

Impact	Qualitative criteria	Quantitative criteria
Heat radiation	Heat radiation reaches target	Incident heat flux radiation <ul style="list-style-type: none"> <li>- at a residential and sensitive use areas does not exceed 4.7kW/m<sup>2</sup>,</li> <li>- at neighbouring hazardous installation does not exceed 23kW/m<sup>2</sup> (escalation potential).</li> </ul>
Explosion overpressure	Explosion overpressure of concern reaches target	Incident explosion overpressure at a residential and sensitive use areas should not exceed 7kPa. Incident explosion overpressure at 21kPa at industrial facility to cause escalation.
Toxic exposure	Emergency response guideline distances met	Toxic concentrations in residential and sensitive areas should not exceed a level which would be seriously injurious to sensitive members of the community following a relatively short period of exposure [Emergency Response Planning Guide (ERPG 2) or 1% fatality level].

#### 4.4.5. Summary of criteria

Based on the above criteria the SAP structure plan was assessed against the following:

1. Potential for consequences from events at industrial developments to result in:
  - a. fatality, injury or irritation at residential areas.
  - b. fatalities, injury, irritation or knock on effects at neighbouring developments.
2. Where consequences may result in fatality, injury, irritation or knock on effects at residential areas or neighbouring facilities the assessment consider the magnitude of the effect, its likelihood and any requirements for planning controls.

#### 4.5. Identification

To inform the risk assessment the following were identified:

1. Representative developments (risk sources) that may be permissible under the structure plan.
2. Existing risk receptors (e.g. schools, hospitals, aged care, residential, recreational, commercial and industrial areas).
3. Existing risk sources (e.g. industrial activities).
4. New risk receptors proposed in the SAP structure plan.

Existing and new receptors and industries were identified based on information gathered during the SAP planning process and presented at the two EbD workshops.

#### 4.6. Assessment

The Multi-level risk assessment guide sets out three levels of assessment:

- Level 1 is an essentially qualitative approach based on comprehensive hazard identification to demonstrate that the activity does not pose a significant off-site risk.
- Level 2 supplements the qualitative analysis by sufficiently quantifying the main risk contributors to show that risk criteria will not be exceeded.
- Level 3 is a full quantitative analysis.

Given the uncertainty in the nature and scale of developments that may be proposed in the SAP this assessment has adopted a screening approach. The assessment is essentially a Level 1 assessment with consequences estimated from typical developments.

The assessment was undertaken as follows:

- Identification of sources of risk with an estimate of credible consequences
- Identification of risk receptors
- Development of scenarios for assessment based on the sources of risk and the receptors
- For each potential land use safety conflict the assessment considered credible consequences. The magnitude of the consequence was estimated based on development applications for similar developments or an estimate using consequence modelling software.
- The credible consequences were assessed to determine if they could impact on identified risk receptors

- Where a credible consequence could impact an identified receptor, the scenario was further assessed to determine the likelihood of land use safety conflict and proposed planning controls.



## **5. ASSESSMENT**

### **5.1. Sources of risk**

Sources of risk and credible consequences were identified for examples of industries that may be developed in an area. The results are provided in Table 5.1.

For each area two distances are proposed to manage land use safety conflict:

- buffer distance
- separation distance.

#### **5.1.1. Buffer distances**

Buffer distances are used in this study to assess individual risk and the potential for escalation between developments. They are areas surrounding a development that are generally:

- not suitable for sensitive, residential, or commercial developments
- areas in which additional large populations (e.g. administration offices) should be avoided
- not suitable for potentially hazardous developments (as defined by the Resilience SEPP) due to the risk of escalation/knock-on effects between industrial developments.

It is used to test the structure plan against HIPAP 10 strategic planning factors (Table 4.2).

#### **5.1.2. Separation distances**

Separation distances are used in this study to manage societal risk. Societal risk is the consideration of rare events that may be acceptable if they effect a small number of people but are unacceptable if they effect many people. Separation distances are used in this report to assess the distance between a development and residential or sensitive land uses. Meeting a separation distance demonstrates land use safety conflict can be avoided between a development and a residential or sensitive land use.

It is used to test the HIPAP 10 derived performance objective of protecting residential safety (Table 4.3).

**Table 5.1: Sources of risk**

Industry	Buffer distance to avoid land use safety conflict between industries	Separation distance to avoid land use safety conflict between industries and residential or sensitive receptors	Notes
Agriculture and food processing	50-100m <sup>(Note 1)</sup>	Up to 3-4km <sup>(Note 2)</sup>	<ol style="list-style-type: none"> <li>Assumes facility has Liquefied Petroleum Gas (LPG) or domestic gas supply and/or typical DGs warehouse storing flammable or toxic material below 10% MHF threshold.</li> <li>Assumes ammonia refrigeration circuit or similar inventory of toxic gas stored under pressure with distances to irritation levels. 3km applied to residential area, 4km applied to sensitive receptors.</li> </ol>
Energy	350m <sup>(Note 3)</sup>	No additional requirement	<ol style="list-style-type: none"> <li>Assume high pressure gas supply (transmission pipeline or connection from Narrabri gas project).</li> </ol>
Bioproducts	50-100m <sup>(Note 4)</sup> 350m <sup>(Note 5)</sup>	No additional requirement	<ol style="list-style-type: none"> <li>Assumes bioproducts are limited to combustible solids stored in stockpiles or flammable liquid in tanks.</li> <li>Based on EbD discussions, bioproducts are bioenergy and biofuels from agricultural waste and biomass and bioplastic production. Buffer based assumes a high-pressure gas supply or high pressure gas is produced for export.</li> </ol>
Transport and logistics	No requirement	No additional requirements	<ol style="list-style-type: none"> <li>The preferred location for potentially hazardous developments will be in the 'interim potentially hazardous uses area'. Developments in this area not potentially hazardous.</li> </ol>
Fertiliser and chemicals	50-100m <sup>(Note 7)</sup>	800m	<ol style="list-style-type: none"> <li>Assumes DGs that may exceed SEPP 33 screening including toxic gases.</li> </ol>
	500m <sup>(Note 8)</sup>	4km	<ol style="list-style-type: none"> <li>Assumes storage up to 10% of MHF threshold of ammonia (20 tonnes) or ammonium nitrate (500 tonnes) (fertiliser).</li> </ol>
Waste management and recycling	50-100m <sup>(Note 9)</sup>	No additional requirements	<ol style="list-style-type: none"> <li>Assumes typical stockpile fire scenarios or lower pressure biogas.</li> </ol>
Circular economy	50-100m <sup>(Note 10)</sup>	No additional requirements	<ol style="list-style-type: none"> <li>Assumes typical stockpile fire scenarios or bulk storage of flammable liquids.</li> </ol>

Industry	Buffer distance to avoid land use safety conflict between industries	Separation distance to avoid land use safety conflict between industries and residential or sensitive receptors	Notes
Light industrial <sup>(Note 11)</sup>	No requirement	No additional requirements	11. Light industrial assumed to have no generic land use safety buffer requirements. Developments will be below the potentially hazardous screening threshold or managed by applying the Resilience SEPP PHA process.
Manufacturing <sup>(Note 12)</sup>	50-100m	800m <sup>(Note 13)</sup>	12. Assumes industry permitted to store or handle DGs in excess of the potentially hazardous screening levels and up to 10% of MHF threshold including toxics. 13. Applies if toxic gas present in single iso-tainers. Distance is for emergency response evacuation level effects. If no toxics, then buffer distances apply.
Potentially hazardous users <sup>(Note 14)</sup>	50-100m	800m <sup>(Note 15)</sup>	14. Assumes warehouse or industry permitted to store DGs in excess of the potentially hazardous screening levels and up to 10% of MHF threshold including toxics. 15. Applies if toxic gas present in single iso-tainers. Distance is for emergency response evacuation level effects. If no toxics, then buffer distances apply.
Grain store	25m (dust explosion) 800m <sup>(Note 16)</sup>	800m <sup>(Note 16)</sup>	16. If fumigant (toxic gas) is used.
Solar area (PV arrays, transformers and batteries)	50-100m <sup>(Note 17)</sup>	50-100m	17. Typical separation distances for battery or transformer fires to offsite receptors.

## 5.2. Receptors

The closest risk receptors to the SAP are detailed in Table 5.2, Table 5.3 and Table 5.4. The location of current and proposed areas zoned residential, individual dwellings in rural/residential areas and sensitive receptors are shown on Figure 5.1.

**Table 5.2: Schools and childcare facilities**

HIPAP Land Use	Term used in study	Name	Location
Hospitals, schools, child-care facilities, old age housing	Sensitive	Kogil Street Preschool	10 Kogil Street, Narrabri
		Narrabri West Public School	274 Old Turrawan Road, Narrabri
		Narrabri High School	2 Gibbons Road, Narrabri
		Narrabri Public School	90 Barwan Street, Narrabri
		St Francis Xavier's Primary School	32 Nandewar Street, Narrabri
		Gumnut Cottage Child Care and Preschool	11 Fitzroy Street, Narrabri
		Nurruby Childrens Services	72 Gibbons Road, Narrabri
		Nurruby OOSH Care	11 Bridge Street, Narrabri
		Jungle Kids Early Learning	99 Barwan Street, Narrabri
		Community Kids Early Learning	41 Nandewar Street, Narrabri

**Table 5.3: Hospitals and aged care facilities**

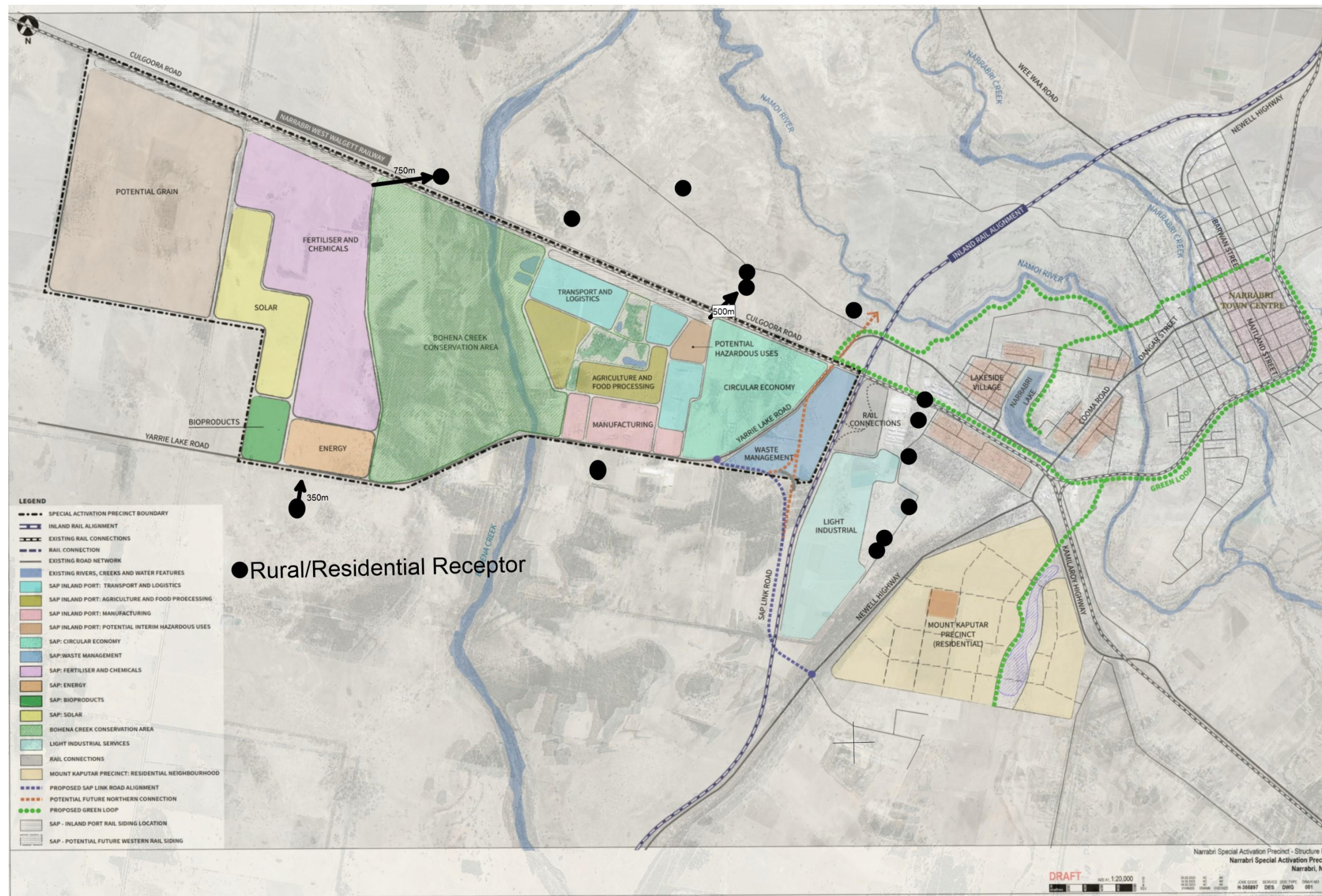
HIPAP Land Use	Term used in study	Name	Location
Hospitals, schools, child-care facilities, old age housing	Sensitive	Narrabri District Health Service Hospital	66 Gibbons St, Narrabri
		Whiddon Narrabri Nursing Home	84 Gibbons St, Narrabri
		Whiddon Narrabri (Robert Young)	52 Gibbons Street, Narrabri

**Table 5.4: Sport and recreation facilities**

HIPAP Land Use	Term used in study	Name	Location
Sporting complexes and active open space	Active	Cooma Oval	Green space bounded by Cooma Road, Ugoa Street and Narrabri Lake.
		Dangar Park	
		Gately Field	
		Net ball courts	



Figure 5.1: Receptors





### 5.3. Scenarios for assessment

The sources of risk and risk receptors were reviewed to identify the scenarios for assessment. The scenarios were developed on the following basis:

- The risk to dwellings within designated areas in the SAP structure plan will require management of land use safety conflict during the transition to SAP structure plan uses. Specific management plans that reflect the staging of proposed developments will be required to manage the transition.
- Existing industrial developments impacting on existing residential or sensitive land uses has not been assessed as developments will have been through a planning process and any risks accepted.
- Risk associated with any CSG development will be assessed in a separate planning process to demonstrate risk levels can be managed to an acceptable level.

Based on the above points the scenarios in Table 5.5 were carried forward for assessment.

**Table 5.5: Scenarios for assessment**

No.	Source	Receptors
1	Structure plan industries	Existing rural/residential Existing residential/sensitive zoning Structure plan residential/sensitive zones
2	Structure plan industries	Structure plan industries Existing industries
3	Existing industries	Structure plan residential/sensitive zones

### 5.4. Scenario 1

This section assesses the potential for industries introduced by the SAP structure plan to result in land use safety conflict with:

- existing rural/residential dwellings
- existing residential/sensitive zones; and
- residential/sensitive zones introduced by the structure plan.

The assessment is summarised in Table 5.6.

In all cases existing residential zones and sensitive land uses are closer to the source of the risk than the structure plan proposed residential area. Hence, this assessment focuses on existing residential and sensitive uses.

Distances to rural/residential receptors are illustrated in Figure 5.1.

**Table 5.6: Assessment of SAP structure plan on non-industrial receptors**

Area	Development	Types of development	Basis of assessment	Target separation distance to non-industrial receptor	Approximate distance to			Consequence at receptors	Opportunities and constraints	Further assessment in this report
					SAP boundary	Rural/residential dwelling	Residential zoning/sensitive land use			
Industries in SAP	Transport and logistics, including intermodal activities	Warehouses Outdoor storage areas Distribution centres Transfer of goods between road and rail.	Limited inventory of DGs, alternative area is defined for preferred area for DGs	No specific requirements	300m	600m	More than 2.5km	Not credible for developments below potentially hazardous screening criteria.	Developments that are not potentially hazardous can be developed with no specific land use safety controls. Developments above the potentially hazardous threshold require assessment under the Resilience SEPP. Likely that Level 1 assessment can demonstrate risk levels are acceptable as no close receptors.	No
Industries in SAP	Interim potentially hazardous uses including intermodal activities	Warehouses that store or handle DGs/hazardous chemicals. Manufacturing and/or storage of DGs/hazardous chemicals.	Preferred developments in this area will be potentially hazardous.	50-100m (flammable liquids) 800m (if toxic substances stored)	200m	500m	More than 3km	Impacts limited to effects of large release of toxic gas to rural/residential areas.	Issues are likely to be limited to injury/irritation risk associated with the storage of toxic gases. Potentially hazardous developments require assessment under the Resilience SEPP.	Yes – toxic injury/irritation
Industries in SAP	Agriculture and food processing area	Production, handling, formulating, packaging and storage of agricultural products and food.	Developments may include refrigeration circuits containing ammonia above the potentially hazardous screening criteria.	50-100m (flammable liquids) 3-4km (if ammonia in a refrigeration circuit is used)	700m	850m	Residential 3km Sensitive 4km	Impacts limited to effects of large release of toxic gas to rural/residential areas.	Issues are likely to be limited to injury/irritation risk associated with the storage of toxic gases. Potentially hazardous developments require assessment under the Resilience SEPP.	Yes – toxic injury/irritation
Industries in SAP	Circular economy	Handling, storage, sorting and processing of waste to support a circular economy.	Developments may include stockpiles of combustible material or flammable liquids stored in bulk	50-100m	On SAP boundary	500m	1.2km	Impacts limited to 50-100m from storage tank or stockpile. No impact at receptors.	Developments above the potentially hazardous threshold require assessment under the Resilience SEPP. Likely that Level 1 assessment can demonstrate risk levels are acceptable as no close receptors.	No
Industries in SAP	Waste management and recycling	Comprises the existing Narrabri waste management area. Will complement the proposed circular economy area	May contain stockpiles of combustible material	50-100m	On SAP boundary	500m	1km	Impacts likely limited to 50m from stockpiles.	Developments above the potentially hazardous threshold require assessment under the Resilience SEPP. Likely that Level 1 assessment can demonstrate risk levels are acceptable as no close receptors.	No
Industries in SAP	Manufacturing area	Support development of a range of manufacturing activities. This may include potentially hazardous developments.	Developments may store or handle DGs/hazardous chemicals	50-100m (flammable liquids) 800m (if toxic substances stored)	On SAP boundary	100m	3km	Impacts limited to effects of large release of toxic gas to rural; residential areas.	Issues are likely to be limited to injury/irritation risk associated with the storage of toxic gases to individual dwellings. Potentially hazardous developments require assessment under the Resilience SEPP. Level 1 assessment likely to be adequate for developments with no toxic material.	Yes – toxic injury/irritation

Area	Development	Types of development	Basis of assessment	Target separation distance to non-industrial receptor	Approximate distance to			Consequence at receptors	Opportunities and constraints	Further assessment in this report
					SAP boundary	Rural/residential dwelling	Residential zoning/sensitive land use			
Industries in SAP	Potential grain area	Provision for a future grain handling area that leverages off the rail frontage with access to the inland rail.	Grain storage with potential for fumigation with toxic gases.	800m (if fumigant used)	On SAP boundary	800m	3km	Impacts limited to effects of large release of toxic gas to rural; residential areas.	Issues are likely to be limited to injury/irritation risk associated with the storage of toxic gases to individual dwellings. Potentially hazardous developments require assessment under the Resilience SEPP. Level 1 assessment likely to be adequate for developments with no toxic material.	Yes – toxic injury/irritation
Industries in SAP	Fertiliser and chemical	Development of higher hazard industries such as fertiliser and chemical manufacturing, handling and storage. Area located away from the town centre with separation from the eastern SAP to minimise knock on effects.	Potential to store ammonia or ammonium nitrate above potentially hazardous screening threshold.	500m (fertiliser explosion) 3-4km (if ammonia is used in a pressurised circuit)	On SAP boundary	750m	More than 6.5km	Impacts limited to effects of large release of toxic gas to rural; residential areas.	Issues are likely to be limited to injury/irritation risk associated with the storage of toxic gases to individual dwellings. Potentially hazardous developments require assessment under the Resilience SEPP. Full quantitative PHA will be required for this type of development.	No
Industries in SAP	Solar area	An area has been identified for solar arrays and supporting infrastructure. Low manning levels associated with solar development presents an opportunity for development in buffer areas around higher hazard facilities.	Photo-voltaic solar panels, transforms and grid connections. Possible battery storage system	50-100m (battery or transformer)	900m	>1km	More than 7.5km	No credible offsite impact.	Likely that Level 1 assessment can demonstrate risk levels are acceptable as no close receptors.	No
Industries in SAP	Energy	Energy generation, possibly gas fired (CSG), peak generator (used to fill shortfall in supply).	Gas fired generator fed by CSG.	350m (from high pressure gas supply)	On SAP boundary	350m	More than 6.5km	Effects of fire from high pressure gas supply may reach rural/residential dwelling	There is scope to manage the layout to ensure receptors are outside the consequence zones. Level 1 PHA assessment with some quantification of consequences likely to be sufficient.	Yes – fire from high pressure gas supply
Industries in SAP	Bioproducts	Complementary to energy generation, area for bio-gas, liquid or solid fuel production, storage and use.	Flammable gas stored under pressure, flammable liquid or combustible solids.	350m (from high pressure gas supply)	On SAP boundary	400m	More than 6.5km	No credible impacts	No credible impact to non-industrial receptors.	No
SAP investigation area	Rail connection	Area for rail infrastructure.	Physical assets associated with rail connections	No requirements	n/a	n/a	300m	No credible impacts	No credible impact to non-industrial receptors.	No



Area	Development	Types of development	Basis of assessment	Target separation distance to non-industrial receptor	Approximate distance to			Consequence at receptors	Opportunities and constraints	Further assessment in this report
					SAP boundary	Rural/residential dwelling	Residential zoning/sensitive land use			
SAP investigation area	Light industrial	Light industrial area, typically limited to not potentially hazardous.	Industries with DGs below potentially hazardous screening quantities.	No requirements	n/a	n/a	Adjoins residential areas	Not credible for developments below potentially hazardous screening criteria.	Developments that are not potentially hazardous can be developed with no specific land use safety controls.	No

The assessment demonstrates that for most cases the separation distance from the source of risk introduced by the structure plan to receptors is sufficient to prevent land use safety conflict. Acceptable risk at individual dwellings in rural/residential areas or neighbouring developments is likely to be demonstrated by a level 1 PHA (qualitative) supplemented with modelling of the worst-case credible scenario specific to the development, to demonstrate land use safety conflict is eliminated for all developments, except a fertiliser or chemical facility. The higher hazard potential and unique nature of controls for a fertiliser or chemical plant are likely to require a fully quantitative PHA.

Two scenarios are further assessed below:

- injury and irritation risk from a release of toxic gas impacting an individual rural/residential dwelling
- a fire from the high-pressure gas supply to the power generation facility impacting an individual rural/residential area.

The implications for land use safety conflict are discussed in the following sections.

#### **5.4.1. Toxic gas release**

Individual dwellings in rural/residential areas may be affected by a release of toxic gas.

If toxic gases are stored or handled at developments in the manufacturing area then the closest dwellings are south of Yarrie Road, approximately 100m from the boundary of the manufacturing area. This is well within typical evacuation and emergency response zones for chemical releases (600-800m).

It is recommended that storage and handling of toxic gases above the potentially hazardous screening quantities are preferentially located in the northern part of the manufacturing area to maximise separation to rural/residential dwellings.

#### **5.4.2. Power generation**

Rural/residential dwellings to the south of Yarrie Road may be within 350m of the high-pressure gas supply pipeline to the power generation facility. There is the potential for the dwelling to be in the injury zone for a full bore failure and fire from the pipeline.

It is recommended that the risk associated with the gas supply to a power generator is assessed including the supply pipe line to ensure land use safety conflict is managed during the planning phase.

### **5.5. Scenario 2**

This section assesses the potential for industries introduced by the structure plan to result in land use safety conflict with:

- other industries introduced by the structure plan
- existing industries.

The assessment is summarised in Table 5.7.

Industries are typically clustered by activity with the direct risk of injury or fatality managed to acceptable levels through standard design process, layout and emergency response. The main residual risk is knock on effects or escalation between facilities where a small event can propagate to a large event.

In general, risk of injury or fatality due to the immediate effects of an event should be managed through the Resilience SEPP potentially hazardous activities assessment process.

The residual risk of escalation is assessed in this section.

**Table 5.7: Assessment of SAP structure plan industrial developments**

Area	Development	Types of development	Basis of assessment	Buffer distance	Development within buffer zone in		Impact	Opportunities and constraints	Further assessment in this report
					Structure Plan	Current			
Industries in SAP	Transport and logistics	Warehouses Outdoor storage areas Distribution centres Transfer of goods between road and rail.	Limited inventory of DGs, alternative area is defined for preferred area for DGs	No requirement	None	None	Not credible for developments below potentially hazardous screening criteria.	Developments that are not potentially hazardous can be developed with no specific land use safety controls. Developments above the potentially hazardous threshold require assessment under the Resilience SEPP.	No
Industries in SAP	Interim potentially hazardous uses	Warehouses that store or handle DGs/hazardous chemicals. Manufacturing and/or storage of DGs/hazardous chemicals.	Preferred developments in this area will be potentially hazardous.	50-100m from storage area to prevent escalation	Transport and logistics Agricultural and food processing Circular economy	None	Warehouse fires may escalate to the Agricultural and food processing area (ammonia refrigeration inventory) or the circular economy (stockpiles or bulk storage of recovered combustible/flammable material). Potential for escalation between potentially hazardous activities.	Fires may escalate to adjoining warehouses, stockpiles or food processing facilities. Potentially hazardous developments require assessment under the Resilience SEPP.	Yes – fire escalation to potentially hazardous facilities.
Industries in SAP	Agriculture and food processing area	Production, handling, formulating, packaging and storage of agricultural products and food.	Developments may include refrigeration circuits containing ammonia above the potentially hazardous screening criteria.	50-100m from storage area to prevent escalation	Transport and logistics Manufacturing Interim potentially hazardous users	None	Fires from storage of flammable or combustible material may escalate to the Transport and logistics warehouses, manufacturing facilities or interim potentially hazardous users. Potential for escalation between potentially hazardous activities.	Fires may escalate to adjoining warehouses, stockpiles or food processing facilities. Potentially hazardous developments require assessment under the Resilience SEPP.	Yes – fire escalation to potentially hazardous facilities.
Industries in SAP	Circular economy	Handling, storage, sorting and processing of waste to support a circular economy.	Developments may include stockpiles of combustible material or flammable liquids stored in bulk	50-100m from storage area to prevent escalation	Transport and logistics Manufacturing Interim potentially hazardous users	None	Fires from storage of flammable or combustible material may escalate to the Transport and logistics warehouses, manufacturing facilities or interim potentially hazardous users. Potential for escalation between potentially hazardous activities.	Fires may escalate to adjoining warehouses, stockpiles or food processing facilities. Potentially hazardous developments require assessment under the Resilience SEPP.	Yes – fire escalation to potentially hazardous facilities.
Industries in SAP	Waste management and recycling	Comprises the existing Narrabri waste management area. Will complement the proposed circular economy area	May contain stockpiles of combustible material	50-100m from storage area to prevent escalation	Circular economy	Rail connection Light industries	Stockpile fires may escalate to stockpiles in the circular economy. Limited potential to escalate to rail connection or light industry due to limited additional flammable or combustible material.	Fires may escalate to adjoining warehouses, stockpiles or food processing facilities. Potentially hazardous new developments require assessment under the Resilience SEPP.	Yes – fire escalation to adjacent stockpiles.
Industries in SAP	Manufacturing Area	Support development of a range of manufacturing activities. This may include potentially hazardous developments.	Developments may store or handle DGs/hazardous chemicals	50-100m from storage area to prevent escalation	Agricultural and food processing Circular economy	None	Fires from storage of flammable or combustible material may escalate to the Agricultural and food processing area or the circular economy.	Fires may escalate to adjoining warehouses, stockpiles or food processing facilities. Potentially hazardous new developments require assessment under the Resilience SEPP.	Yes – fire escalation to potentially hazardous facilities.

Area	Development	Types of development	Basis of assessment	Buffer distance	Development within buffer zone in		Impact	Opportunities and constraints	Further assessment in this report
					Structure Plan	Current			
Industries in SAP	Potential grain area	Provision for a future grain handling area that leverages off the rail frontage with access to the inland rail.	Grain storage with potential for fumigation with toxic gases.	25m dust explosion from silo or conveyor	Fertiliser and chemicals area Solar	None	Dust explosion may escalate to fertiliser and chemical area. Limited escalation potential to solar area	Dust explosion may escalate to fertiliser and chemical area. Given the small buffer it is possible to eliminate the land use safety conflict with a 25m buffer to the Fertiliser and Chemicals area.	Yes – dust explosion
Industries in SAP	Fertiliser and chemical	Development of higher hazard industries such as fertiliser and chemical manufacturing, handling and storage. Area located away from the town centre with separation from the eastern SAP to minimise knock on effects.	Potential to store ammonia or ammonium nitrate above potentially hazardous screening threshold.	500m (AN explosion)	Grain storage Solar	None	Explosion may escalate to dust explosion in grain area Limited escalation potential to solar area.	Development of a fertiliser or chemical plant will require a PHA. Based on the complexity and potential consequences it is likely a Level 3 (fully quantitative) PHA will be required.	Yes – AN explosion
Industries in SAP	Solar area	An area has been identified for solar arrays and supporting infrastructure. Low manning levels associated with solar development presents an opportunity for development in buffer areas around higher hazard facilities.	Photo-voltaic solar panels, transforms and grid connections. Possible battery storage system	100m battery fire	Grain storage Fertiliser and chemicals Bioproducts	None	Battery fire may escalate to fertiliser and chemical area or bio-products area. Limited potential for a fire to escalate to the grain area.	Battery fire may escalate to fertiliser and chemical area or bio-products area. Given the small buffer and size of the solar area it is possible to eliminate the land use safety conflict with a 100m buffer within the site boundary.	Yes – battery fire
Industries in SAP	Energy	Energy generation, possibly gas fired (CSG), peak generator (used to fill shortfall in supply).	Gas fired generator fed by CSG.	350m HP gas supply fire	Bioproducts Fertiliser and chemical area	None	A fire from the HP gas feed to a gas generator may escalate to the fertiliser and chemical area or the bio-products area.	HP gas fire may escalate to fertiliser and chemical or bio-products area. Given there is the space available in the area it is possible to eliminate land use safety conflict with a 350m buffer from the HP gas system to industrial neighbours.	Yes – HP gas fire
Industries in SAP	Bioproducts	Complementary to energy generation, area for bio-gas, liquid or solid fuel production, storage and use.	Flammable gas stored under pressure, flammable liquid or combustible solids.	350m HP gas supply fire	Solar Fertiliser and chemical area Energy	None	A fire from the HP gas feed may escalate to the energy, fertiliser and chemical area or the solar area. Limited potential to escalate to solar area.	HP gas fire may escalate to fertiliser and chemical or bio-products area. Given there is the space available in the area it is possible to eliminate land use safety conflict with a 350m buffer from the HP gas system to industrial neighbours.	HP gas system fire.
SAP investigation area	Rail connection	Area for rail infrastructure	Physical assets associated with rail connections	None	None	None	None	None	
SAP investigation area	Light industrial	Light industrial area, typically limited storage or handling of DGs/ hazardous chemicals.	Industries with DGs below potentially hazardous screening quantities.	None	None	None	None	None	

The assessment demonstrates that the proposed developments in the structure plan have sufficient buffers to existing industrial development to avoid land use safety conflict.

Residual land use safety conflict will require management for the following scenarios:

- General escalation and risk imposed between adjacent potentially hazardous development
- Escalation of an explosion from the fertiliser and chemical area
- Escalation of a fire from a high-pressure gas supply.

The implications for land use safety conflict are discussed in the following sections.

#### **5.5.1. General escalation and risk**

The general risk of escalation between potentially hazardous developments and can be managed through the application of codes and standards in design supported by a PHA. Required buffers are typically 50-100m between locations which do not handle toxic gases or AN. Such buffers have the potential to be accommodated within site boundaries.

There is the potential for early movers to the SAP to sterilise, or impact on the ability to develop on surrounding land if not appropriately assessed.

It is recommended that the Resilience SEPP requirements are followed to ensure specific hazards and controls are taken into consideration to avoid land use safety conflict, whilst avoiding unnecessary sterilisation of land. This should include determining if consequences can be kept onsite before applying a risk-based approach. This is in line with the general principle of avoiding avoidable risk.

#### **5.5.2. Fertiliser or chemical plant explosion**

An explosion involving 500 tonnes<sup>3</sup> of AN (representative of fertiliser) was modelled to inform the distances to overpressure of concern. Modelling reports a distance of 350m for escalation to plant and equipment and 500m to injury.

The size of the area allocated for the fertiliser and chemicals plant combined with the solar area to the west and the environmental buffer zone to the east provides the opportunity to prevent escalation and to limit the potential for any offsite injury.

It is recommended that the risk associated with a fertiliser or chemical plant is assessed with the layout designed to maximise the separation distance of stores of DGs to the site boundary in a level 3 PHA.

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<sup>3</sup> 500 tonnes is 10% of the MHF inventory of AN. 10% of the inventory requires notification as a potential MHF.

### **5.5.3. High pressure gas supply fire**

The energy and bio-product facilities are premised based on a supply of CSG. CSG is typically transported at high pressures in cross country pipelines with consequences extending up to 300m in the event of a full bore rupture and fire.

There is the potential for a high pressure gas pipeline fire to escalate between the energy and bio product sites or to the Fertiliser and Chemicals area.

As any pipeline is likely to enter the SAP from the south (CSG area) it is recommended that pressure reduction and pipework routing is designed to minimise the potential for a fire to escalate between sites with a balance between escalation potential to the fertiliser and chemical storage area and impact outside the southern SAP boundary.

## **5.6. Scenario 3**

This section details the assessment of the potential for existing industries to result in land use safety conflict with residential and sensitive land uses introduced by the structure plan.

The assessment is summarised in Table 5.8 and shows there is no potential land use safety conflict between identified existing industries and the structure plan residential and sensitive land use area.

**Table 5.8: Current industries to structure plan residential area assessment**

Development	Types of development	Basis of assessment	Typical separation distance	Distance to structure plan residential area	Impact	Summary	Further Assessment
Grain handling	Grain silo, Old Turrawan Road (near to level crossing)	Grain storage with potential for fumigation with toxic gases.	800m (if fumigant used)	750-800m	Any impact will be minimal, fumigation is not a frequent activity.	May fall under evacuation area but unlikely to result in land use safety conflict.	No
Fuel terminal	Woodham Petroleum fuel depot	Above ground storage of flammable and combustible liquid fuel.	50-100m	250m	No impact	No impact	No



## 6. FINDINGS

### 6.1. HIPAP 10 goals and objectives

The goals and objectives developed from HIPAP 10 (Table 4.2 and Table 4.3) were reviewed against the output of the assessment.

The review found that the structure plan meets the goal of *protecting residential safety* by providing sufficient separation distance from potentially hazardous development to:

- areas zoned residential/sensitive use, to eliminate land use safety conflict for the scenarios assessed in this study.
- individual dwellings in areas zoned for rural/residential living, to eliminate land use safety conflict or provide the opportunity to manage to acceptable levels scenarios identified in the assessment.

Assessment against the strategic land use planning factors is summarised in Table 6.1.

**Table 6.1: Assessment against land use safety factors**

Factor	HIPAP 10 consideration	Assessment
Permissibility of land use	Determine which types of development are permissible in an area.	Structure plan proposes types of development in defined area and the assessment concludes that land uses are appropriate in the context of land use safety conflict with residential areas and can be managed acceptable levels between developments. Permissibility will be established in a future legislative framework.
Avoid environmentally sensitive areas	Lists examples of environmentally sensitive areas which includes areas close to sensitive land uses such as schools, nursing homes and hospitals.	The study has taken sensitive land uses into consideration. The structure plan has built in separation distances and buffers.
Compatibility with land uses	Provision of buffer zones including the identification of beneficial land uses which can form a buffer between potentially hazardous industries and sensitive land uses such as residential areas.	Buffers and separation distances have been identified and beneficial uses allocated as appropriate (e.g. solar farm, light industrial and green areas).
Initial site investigation	The purpose of the initial site investigation is to provide an early indication of the suitability of a proposed site.	This study is an initial site investigation and has indicated the suitability of the proposed structure plan.

### 6.2. Managing residual risk

The technical report assessment is based on typical developments that may be proposed under the structure plan and concludes that land use safety conflict can be eliminated to residential and sensitive land uses based on separation distances.

Broadly the assessment found that the structure plan balances eliminating land use safety conflict with residential and sensitive land uses, whilst avoiding unnecessary sterilisation of land.

There is a residual potential for land use safety conflict between:

- developments and individual rural/residential dwellings, particularly if developments store or handle toxic gases.
- neighbouring industrial development with the potential for offsite risk and escalation potential between sites.

This study finds that the existing risk-based land use safety planning framework established in the Resilience SEPP is an appropriate basis of managing residual land use safety conflict.

## 7. RECOMMENDATIONS

The following general recommendations are made in this study:

- The land use safety planning framework established in the Resilience SEPP should be adopted to avoid inadvertently approving a development or unnecessarily sterilising land.
- Specific plans should be developed to manage land use safety conflict at dwellings located in the structure plan development areas as the plan is being implemented. The plan should account for staging of developments and cumulative risk at a receptor from multiple developments.

In addition to the general recommendation to adopt the Resilience SEPP, the following specific recommendations are made for consideration in planning controls:

- It is recommended that storage and handling of toxic gases above the potentially hazardous screening quantities are preferentially located in the northern part of the manufacturing area to maximise separation to rural/residential dwellings.
- It is recommended that the Resilience SEPP requirements are followed to ensure specific hazards and controls are taken into consideration to avoid land use safety conflict, whilst avoiding unnecessary sterilisation of land. This should include determining if consequences can be kept onsite before applying a risk-based approach. This is in line with the general principle of avoiding avoidable risk.
- For any proposed development in the SAP, it is recommended that screening against the criteria in *Applying SEPP 33* [2] be undertaken. .
- It is recommended that the risk associated with a fertiliser or chemical plant is assessed with the layout designed to maximise the separation distance of stores of DGs to the site boundary in a Level 3 PHA.
- As any high pressure gas pipeline is likely to enter the SAP from the south (CSG area), it is recommended that pressure reduction and pipework routing is designed to minimise the potential for a fire to escalate between sites, with a balance between escalation potential to the fertiliser and chemical storage area and impact outside the southern SAP boundary.

## 8. CONCLUSIONS

Eliminating or, where this was not possible, managing land use safety conflict to an acceptable level was considered throughout the development of the structure plan. This included a baseline study, scenarios testing study and dedicated sessions on land use safety at both EbD workshops with options assessed and informed by buffers and separation distances.

Where separation distances and buffers were identified to manage land use safety conflict the potential for beneficial uses was explored to avoid unnecessary sterilisation of land.

This technical report shows that the process has resulted in a structure plan which largely eliminates the potential for land use safety conflict between industrial developments and residential areas by maximising separation distances. Beneficial uses such as lower hazard developments, light industry and environmental buffers are included in the structure plan to minimise sterilisation of land.

Where land use safety conflict is not eliminated, the risk-based approach to land use safety established in the Resilience SEPP is an appropriate framework to manage any residual risk.

## APPENDIX A. REFERENCES

- [1] NSW Department of Planning, “Resilience and Hazards SEPP,” 2021.
- [2] NSW Department of Planning, “Hazardous and Offensive Development Application Guidelines - Applying SEPP 33,” 2011.
- [3] NSW Department of Planning and Infrastructure, “Assessment Guideline, Multi Level Risk Assessment,” 2011.
- [4] NSW Department of Planning, “Hazardous Industry Planning Advisory Paper No 4 - Risk Criteria for Land Use Safety Planning,” 2011.
- [5] NSW Department of Planning, “Hazardous Industry Planning Advisory Paper No. 6 - Hazard Analysis,” 2011.
- [6] NSW Department of Planning, “Hazardous Industry Planning Advisory Paper No 10 - Land Use Safety Planning,” 2011.
- [7] NSW Department of Planning, “Hazardous Industry Planning Advisory Paper No.12: Hazards Related Conditions of Consent,” 2011.
- [8] NSW Government, Work Health and Safety Regulation 2017, 2017.
- [9] Competent Authorities Panel (CAP), “Australian Emergency Response Guide Book,” 2021.