



# 2017

COUNCIL BUSINESS PAPERS

Ordinary Meeting WEDNESDAY 15 MARCH 2017

SEPARATELY ATTACHED ATTACHMENTS

# ATTACHMENTS

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*Good  
Government*

COMMUNITY  
ENGAGEMENT  
SUMMARY OF  
FINDINGS

MID-WESTERN REGIONAL COUNCIL  
INTEGRATED PLANNING AND REPORTING

■ ■ ■ ■ ■ TOWARDS 2030



## IMMUNITY ENGAGEMENT SUMMARY OF FINDINGS

THIS DOCUMENT HAS BEEN PREPARED BY ALINA AZAR, MANAGER ECONOMIC DEVELOPMENT FOR MID-WESTERN REGIONAL COUNCIL.

ANY QUESTIONS IN RELATION TO THE CONTENT OF THIS DOCUMENT SHOULD BE DIRECTED TO:  
COUNCIL@MIDWESTERN.NSW.GOV.AU OR (02) 6378 2850

DATE OF PUBLICATION: FEBRUARY 2017

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## COMMUNITY ENGAGEMENT SUMMARY OF FINDINGS

## 1. Purpose

Under the NSW Government's Integrated Planning Reporting Framework, Council is required to review its Community Strategic Plan every four years. In order to meet this requirement and ensure the *Towards 2030: Mid-Western Region Community Plan* remains relevant and is updated appropriately, a Community Engagement Strategy was prepared and adopted by Council in November 2016.

The Community Engagement Strategy was designed to engage a broad range of Mid-Western region residents and stakeholders. A variety of activities were undertaken to seek feedback and engagement, and to ensure the community was provided a range of opportunities to contribute to the Community Strategic Plan.

This document provides a summary of the community engagement process that was undertaken in reviewing and contributing towards an update of the Community Strategic Plan in accordance with the requirements of the Integrated Planning and Reporting Framework.

## 2. Key Messages

The Community Engagement Strategy included activities which educated the community about the review process, and requested feedback from the community which reflects its main priorities.

This dual-objective approach helped to ensure that the information collected is both valuable and relevant in informing the review of the Community Strategic Plan.

### Objective: EDUCATION

#### Key Messages:

- This is *Towards 2030: Mid-Western Region Community Plan*
- These are the current themes, goals and strategies that Council is working to achieve

### Objective: ENGAGEMENT

#### Key Messages:

- What are the community's priorities?
- What is missing from *Towards 2030: Mid-Western Region Community Plan*?
- What special projects would the community like to see?

## COMMUNITY ENGAGEMENT SUMMARY OF FINDINGS

## 3. Community Engagement Process

### 3.1 Summary of Engagement Tools and Timing

The following table provides a summary of the community engagement process and identifies the tools that were used to inform the review of the Community Strategic Plan and associated Integrated Planning and Reporting documents by 30 June 2017.

Phase	Tools	Proposed Timing
Preliminary Engagement	Community Wide Survey Stakeholder Workshops	May - Jul 2016
Community Engagement for Newly Elected Council	Community Roadshow Permanent Displays Direct Mail out Online Engagement Postcard activities in schools	Dec - Feb 2017
Analysis of Community Engagement	Post Engagement Report to Council	March 2017
Public Feedback on Draft IP&R Documents	Public Exhibition for 28 Days Post Exhibition Report to Council	April - May 2017
Adopt Revised IP&R Documents	Report to Council	Jun-17

### 3.2 Description of Community Engagement Tools

Provided below is a brief description of the engagement tools implemented as part of community engagement between May 2016 and February 2017. Over 2,500 community members have participated in this process and provided feedback.

#### COMMUNITY WIDE SURVEY

As part of the preliminary engagement phase, a community wide telephone survey was conducted by Micromex Research Consultants on behalf of Council in May 2016.

The survey sought to examine community attitudes and perceptions towards current and future services and facilities provided by Council. The survey was designed to engage all sectors of the community and capture data which provides a statistically significant representation of the community's attitudes and perceptions. 400 residents participated in the telephone survey.

#### STAKEHOLDER WORKSHOPS

Also as part of the preliminary engagement phase, feedback was sought from key stakeholders with a series of workshops focused around the 5 key themes in the Community Strategic Plan. Stakeholders were asked to provide feedback in relation to the levels of importance and satisfaction with the underlying strategies for each of the key themes.



### COMMUNITY ROADSHOW

A Community Roadshow was held across the region during the month of December 2016. The Community Roadshow involved a portable display being assembled in each of the main towns of Mudgee, Gulgong, Kandos and Rylstone in prominent positions to capture pedestrian traffic. The portable display acted to inform and engage the community increasing general awareness of the Community Strategic Plan whilst providing information and feedback to Council. There was a range of participatory activities which the community was able to use to reveal their key priorities and engage with Council staff.

The mobile library service was also used to provide access to the Community Roadshow for residents in the villages.

613 face-to-face discussions took place during the Community Roadshow period.

### PERMANENT DISPLAYS

Each of Council's Administration Centres/Libraries hosted a permanent display between December 2016 and February 2017. These displays included signage and interactive activities for the community to complete whilst visiting Council's offices and buildings.

### DIRECT MAILOUT

A direct mail-out to residents (through Community News) provided another outlet by which residents could participate in the community engagement process and have their say. Community News is distributed to every household in the region, (approximately 10,160 households). In addition, a letter was sent to over 172 community groups asking for their feedback on the Community Strategic Plan.

### SCHOOLS ACTIVITIES AND POSTCARDS

Postcards were distributed to all schools across the region and students were invited to provide their feedback on their local community. 385 school aged children across the region responded to the activity. Postcards were also available in conjunction with the mobile library service to reach residents in small villages.

### ONLINE ENGAGEMENT

A number of activities were available through Council's website including surveys and polls. These activities were closely aligned to the Community Roadshow activities, and helped to ensure that the community engagement process reached a broad cross-section of the community. 1,083 responses to online surveys were received during the engagement process.

### PUBLIC EXHIBITION

All of the draft IP&R documents (which includes the Community Strategic Plan and 2018 – 2021 Delivery Program) will be placed on public exhibition for a period of 28 days prior to being formally adopted by Council. The public exhibition period will allow residents to review the draft documents and make public submissions so that these documents can be adopted by the 30 June 2017 deadline.

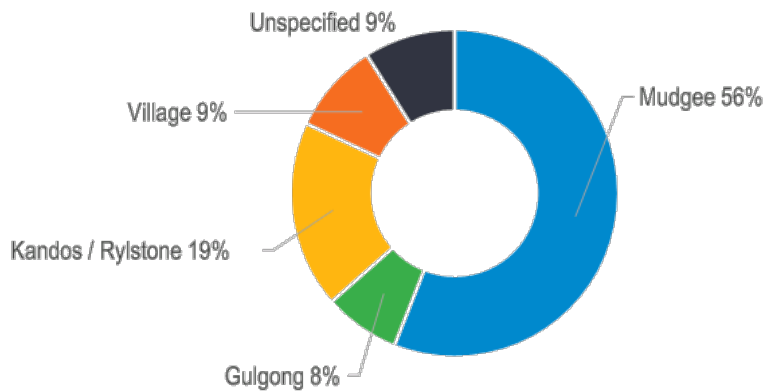
COMMUNITY ENGAGEMENT SUMMARY OF FINDINGS

## 4. Stakeholders

The Office of Local Government’s Integrated Planning and Reporting Manual requires Council to identify relevant stakeholder groups and the method that will be used to engage each group. The following table lists the range of stakeholder groups and identifies the activities that were used to engage each group.

	Workshops	Phone Surveys	Community Roadshow	Permanent Displays	Mail out	Online Surveys	Postcard Exercise
Sporting Groups	√				√	√	
Community Groups	√				√	√	
Media	√				√	√	
Youth	√	√	√	√	√	√	√
Seniors		√	√	√	√	√	√
Schools	√				√	√	√
State Govt. Agencies	√				√	√	
Industry Groups	√				√	√	
Chambers of Commerce	√				√	√	
Committees of Council					√	√	
Councillors	√				√	√	
Staff	√				√	√	
Individual Residents		√	√	√	√	√	√

Community Engagement participation by Location.







## 5.2 Top 5 Projects for the Future

A key focus of community engagement was to identify the community's key priorities and projects. Three exercises were implemented to capture projects the community would like Council to consider in future planning. Opportunities to provide feedback were designed to engage a broad range of community members, utilising different techniques to draw relevant and usable data.

These activities included:

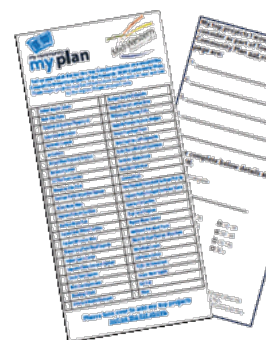
- Face to Face Interactive Boards

During the Community Roadshow, the community was asked to choose from over 50 project ideas (or add their own). They were asked to select their Top 5 cards and pin these to a pin-board to be photographed and captured for feedback. This technique gave community members the opportunity to discuss many options and explain their thought process to Council Staff.



- DL Flyers at Roadshows and in Council Administration Centres

Residents who preferred to provide their feedback more privately, were given a Top 5 Project card that could be completed and placed in a ballot box for staff to data enter. This included both a list of possible projects, as well as the opportunity to add projects that were not already captured.



- Online Survey through Council Website and Social Media

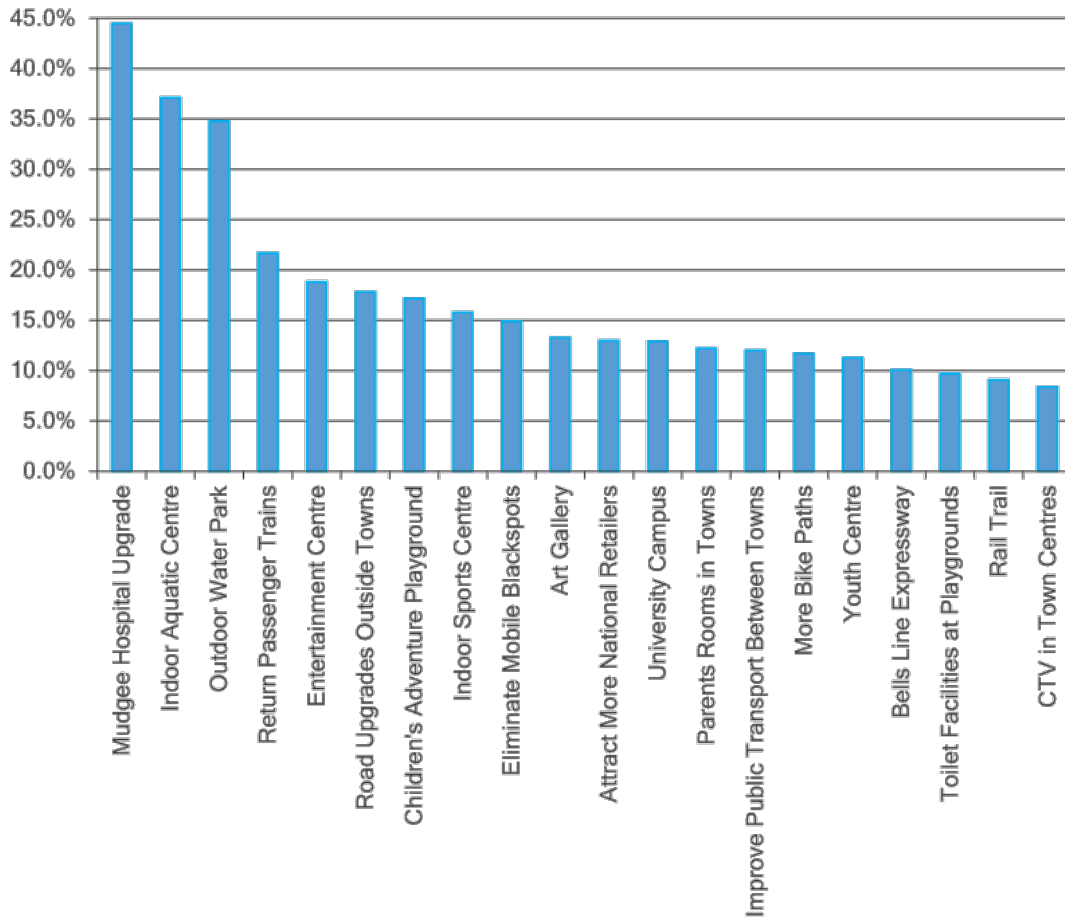
An online survey was created and distributed through Council's Website, Social Media Channels and shared through community group channels including media outlets, business and interest groups. This provided those that had not participated in the Community Roadshow to have their say on projects they would like Council to focus on or to investigate.



COMMUNITY ENGAGEMENT SUMMARY OF FINDINGS

Over 1,200 residents participated in the one of the three exercises above. The following graph summarises the 20 most mentioned projects.

*Tell us your wish list for the top 5 major projects you would like council to consider as part of the Towards 2030 Community Plan. These major projects may be infrastructure investments or new services to the region. Please choose 5 exactly.*



The graph shows that the Mudgee Hospital Upgrade was the project that featured most frequently in the community's Top 5 projects. An Indoor Aquatic Centre, Outdoor Waterpark, Return Passenger Trains and an Entertainment Centre made up the overall Top 5.

The data collected was also analysed by age and town to provide further insights into the community's priorities and preferences.

Mudgee Hospital Upgrade, Indoor Aquatic Centre and Return Passenger Trains were consistently listed amongst the Top 5 projects across all ages.

An Indoor Sports Centre and Entertainment Centre were common projects for all ages under 50 years. An Art Gallery featured in the priority list for those older than 40 years. A University Campus

COMMUNITY ENGAGEMENT SUMMARY OF FINDINGS

was highly rated amongst those under 20 (university age), those 30 – 39 years (those with young children) and 50 – 59 years (traditionally parents of university-aged children).

Appendix 2 provides further details of preferences by age and Appendix 3 highlights preferences by gender.

It is interesting to note the inclusion of both Return Passenger Trains and Rail Trail in the top project responses. Whilst a larger proportion supported Return Passenger Trains, Rail Trails also had strong support. Council would need to consider if and how these projects could be achieved simultaneously.

Data was also compared by location to identify any similarities and differences across the region. The results are summarised below.

Project	Mudgee	Gulgong	Kandos / Rylstone	Villages
Mudgee Hospital	√	√	√	√
Indoor Aquatic Centre	√	√		√
Outdoor Water Park	√	√		√
Road Upgrades Outside Towns			√	√
Return Passenger Trains	√	√	√	√
Indoor Sports Centre	√	√		
Eliminate Mobile Blackspots			√	√
Children's Adventure Playground	√	√		
University Campus	√	√	√	
More Bike Paths	√			
Entertainment Centre	√			√
Improve Public Transport Between Towns		√	√	
Bells Line Expressway			√	
Attract More National Retailers				√
Youth Centre				√
Rural Bin Collection				√
Parents Rooms in Towns		√		
Art Gallery	√		√	
Road Upgrades Inside Towns			√	
Shop Local Program			√	
Upgrade Henry Lawson Drive		√		

**COMMUNITY ENGAGEMENT SUMMARY OF FINDINGS**

Similar to the age-based results, the Mudgee Hospital Upgrade and Return Passenger Trains were seen as a top priority across all towns.

The Indoor Aquatic Centre and Outdoor Water Park were highlighted by residents in Mudgee, Gulgong and Villages. Whilst a University Campus was identified in each town but not the villages.

Improving Public Transport Between Towns was highlighted as a priority for Gulgong, Kandos and Rylstone residents.

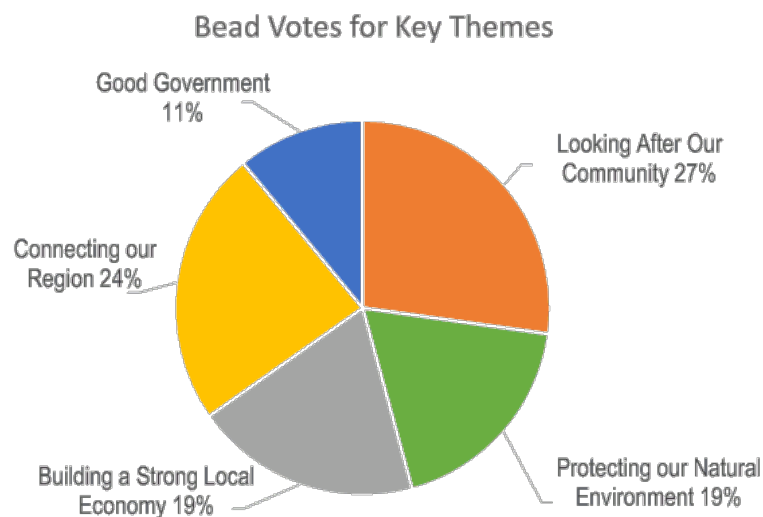


### 5.3 Bead Exercise – Resource Allocation by Key Themes

This exercise involved the community utilising a handful of coloured beads and allocating them between different themes as reflected in the Community Plan (as represented by 5 glass jars). Beads represented Council funds and participants were asked to allocate the beads in the way they would like Council to allocate funds across the key themes of the Community Plan.



The results of this exercise are presented in the following graph.



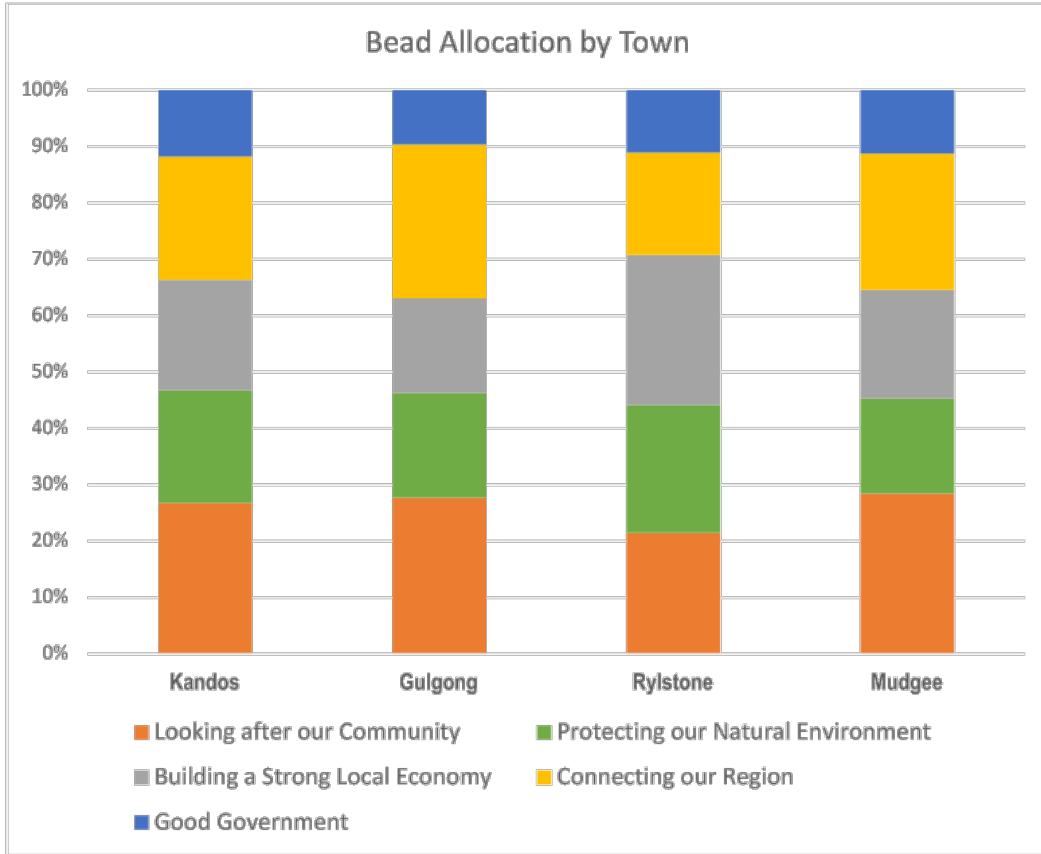
The graph shows that on average, the community would allocate 27% of resources to Looking After Our Community, 19% of resources to Protecting Our Natural Environment, 19% of resources to Building A Strong Local Economy, 24% of resources to Connecting Our Region and 11% of resources to Good Government.

In the 2017/18 financial year, the resource allocation for operational expenses is estimated as:

- Looking After Our Community – 28%
- Protecting Our Natural Environment – 37%
- Building A Strong Local Economy – 4%
- Connecting Our Region – 19%
- Good Government – 12%

COMMUNITY ENGAGEMENT SUMMARY OF FINDINGS

The following graph demonstrates the results of the bead exercise by town.



The graph shows the results were similar across each of the towns in the region. The main difference was in Rylstone where a relative higher proportion of beads were allocated to Building A Strong Local Economy and Protecting Our Natural Environment, than in other towns.

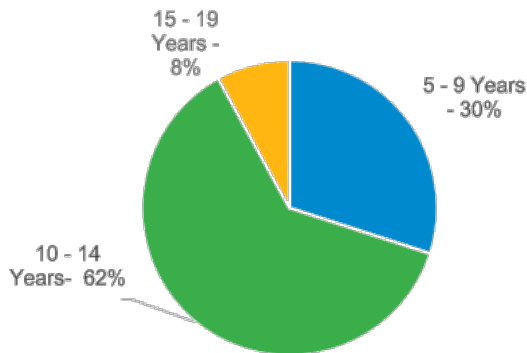
## 6. Appendices

### 6.1 APPENDIX 1 – DEMOGRAPHIC BREAKDOWN FOR POSTCARD EXERCISE

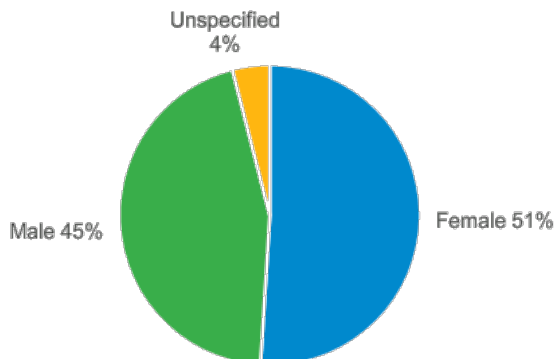
Town or Village of Postcard Exercise Respondents

Home Town or Village	% Respondents
Mudgee	62%
Gulgong	8%
Kandos	15%
Rylstone	10%
Illford	1%
Lue	3%
Charbon	1%

Age Breakdown of Postcard Exercise Respondents



Gender Breakdown of Postcard Exercise Respondents

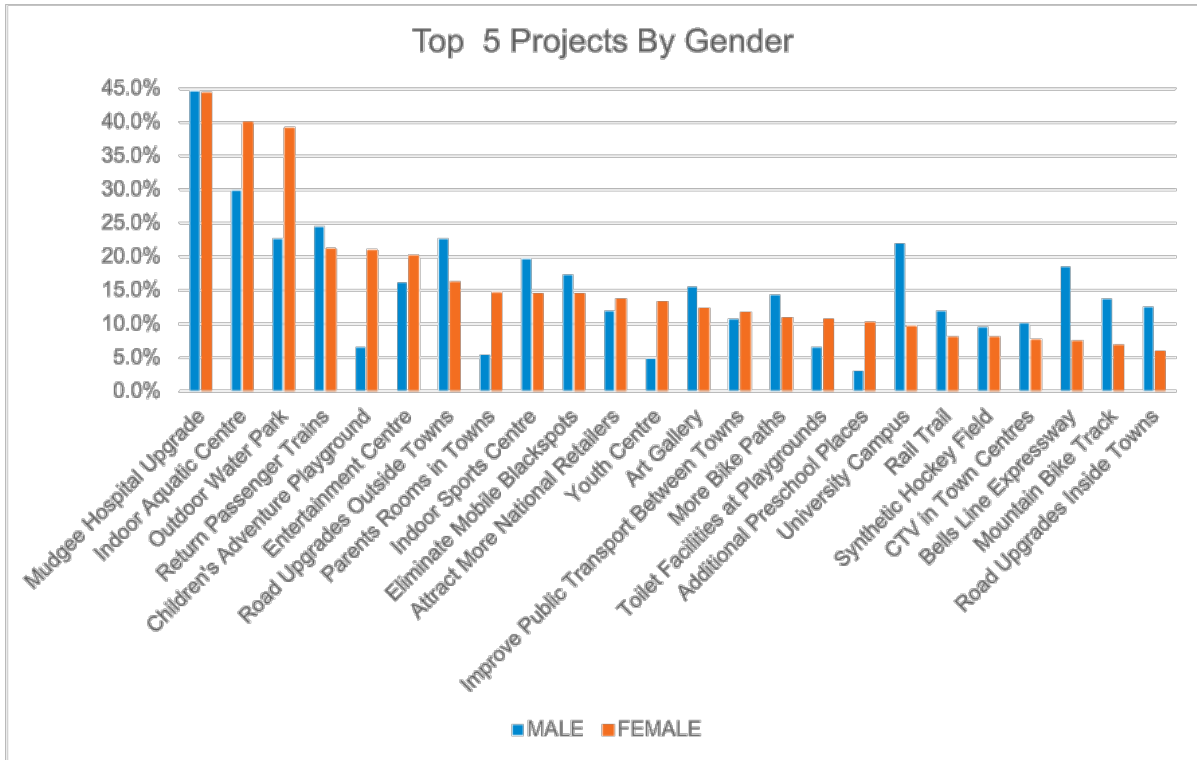


## COMMUNITY ENGAGEMENT SUMMARY OF FINDINGS

## 6.2 APPENDIX 2 – TOP 5 PROJECTS BY AGE

Project	<20 Years	20-29 Years	30-39 Years	40-49 Years	50-59 Years	60+ Years
Mudgee Hospital	√	√	√	√	√	√
Indoor Aquatic Centre	√	√	√	√	√	√
Outdoor Water Park	√	√	√	√		
Road Upgrades Outside Towns			√	√	√	
Return Passenger Trains	√	√	√	√	√	√
Indoor Sports Centre	√	√	√	√		
Eliminate Mobile Blackspots		√		√		√
Children's Adventure Playground		√	√			
University Campus	√		√		√	
Create Town Squares	√					
Entertainment Centre	√	√	√	√		
Improve Public Transport Between Towns					√	√
Attract More National Retailers		√			√	√
Youth Centre	√			√		
More Major Events	√					
Parents Rooms in Towns		√				
Art Gallery				√	√	√
Aged Care Services					√	√
More Bike Paths			√			
More Public Toilets in Towns					√	
Rail Trail						√
Public Art Investment						√

### 6.3 APPENDIX 3 – TOP 5 PROJECTS BY GENDER



**COMMUNITY ENGAGEMENT SUMMARY OF FINDINGS**



## **Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos & Rylstone**

Mid-Western Regional Council

Final Report  
February 2017



**JACOBS**

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



## Floodplain Risk Management Study and Plan

Project no: IA004400  
 Document title: Floodplain Risk Management Study  
 Document No.: IA004400  
 Revision: Final  
 Date: February 2017  
 Client name: Mid-Western Regional Council  
 Client no:  
 Project manager: Akhter Hossain  
 Author: Michael Reeves, Akhter Hossain  
 File name: I:\ENVR\Projects\EN03015\Deliverables\Reports\FRMS\IA004400\_FRMS\_Final.docx

Jacobs Group (Australia) Pty Limited

Level 7, 177 Pacific Highway  
 North Sydney NSW 2060 Australia  
 PO Box 632 North Sydney NSW 2059 Australia  
 T +61 2 9928 2100  
 F +61 2 9928 2500  
 www.jacobs.com

### Document history and status

Revision	Date	Description	By	Review	Approved
01	29/6/2015	Draft Report	MR, AH	A Hossain	A Hossain
02	22/7/2016	Draft Final Report	MR, AH	A Hossain	A Hossain
03	12/12/2016	Draft Final	MR	A Hossain	A Hossain
04	17/2/2017	Final	AH	A Hossain	A Hossain

Cover photo: Bridge over the Cudgegong River entering Rylstone, taken during the December 2010 flood

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**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



**Foreword**

The primary objective of the New South Wales Government's Flood Prone Land Policy is to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods, wherever possible. Under the Policy, the management of flood prone land remains the responsibility of local government.

The policy provides for a floodplain management system comprising the following five sequential stages:

Data Collection	Involves compilation of existing data and collection of additional data
Flood Study	Determines the nature and extent of the flood problem
Floodplain Risk Management Study	Evaluates management options in consideration of social, ecological and economic factors relating to flood risk with respect to both existing and future development
Floodplain Risk Management Plan	Involves formal adoption by Council of a plan of management for the floodplain
Implementation of the Plan	Implementation of flood, response and property modification measures (including mitigation works, planning controls, flood warnings, flood preparedness, environmental rehabilitation, ongoing data collection and monitoring by Council)

Mid-Western Regional Council proposes to develop a floodplain risk management plan for Kandos and Rylstone to address the existing, future and continuing flood problems, in accordance with the NSW Floodplain Development Manual (2005).

A report entitled "Flood Study for Kandos and Rylstone" was prepared by Sinclair Knight Merz (currently Jacobs Group Australia Pty Ltd) in November 2013 to address outcomes from the first and second stages of the floodplain risk management process. This report represents the third stage of the management process and has been prepared for Council by Jacobs. The report identifies social and economic impacts of flooding within Kandos and Rylstone. The report identifies both structural and non-structural measures for floodplain management. A set of floodplain management measures is recommended for consideration by Council and other stakeholders.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



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**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



## Executive Summary

Mid-Western Regional Council is responsible for local planning and land management in the towns of Kandos and Rylstone. Council has no formal floodplain risk management strategies in place to provide an appropriate level of protection for the Kandos and Rylstone communities. Further, Council needs to update its emergency management strategies to effectively manage the continuing flood problems for the two towns.

Sinclair Knight Merz (currently Jacobs Group Australia Pty Ltd) was engaged by Council in June 2011 to undertake a Floodplain Risk Management Study and to prepare a Floodplain Risk Management Plan for Kandos and Rylstone. The Study and Plan were jointly funded by Council, and the Commonwealth and NSW Governments through the NSW Office of Environment and Heritage.

The Floodplain Risk Management Study seeks to identify, assess and optimise measures aimed at reducing the impact of flooding for existing and further development, to make recommendations to Council for the future management of lands within the study area and inform the development of the Floodplain Risk Management Plan for Kandos and Rylstone.

A flood study for Kandos and Rylstone was prepared by Sinclair Knight Merz in November 2013 which involved data collection and review, community consultation, hydrologic and hydraulic modelling and flood mapping. Additional investigations were undertaken as part of this study to update outcomes from the 2013 Flood Study.

Both formal and informal consultations were undertaken with the community and the stakeholders during the preparation of this study. A community questionnaire was distributed to residents to gauge their experience of flooding and their opinions on flood-related issues. In total six (6) responses on the questionnaire were received. Details on the outcome from the community consultation are provided in **Section 3** of this report.

Four (4) residential properties in Kandos and one (1) residential property in Rylstone are subject to above floor flooding in the 20% AEP event and the same number of properties is also subject to above floor flooding in the 0.5% AEP event due to local catchment overland flooding. In the PMF event, 38 and 193 properties are subject to above floor flooding in Kandos and Rylstone respectively.

Flood damages have been calculated for a range of flood events to provide a tool to assess the effectiveness of management measures by considering the percentage reduction in damages from the existing case. The average annual damages for Kandos and Rylstone under the existing conditions are estimated at \$207,000 and \$122,700 respectively.

Protection of private properties from flooding and drainage improvements for the study area was highlighted as being key issues during discussions with Council and information provided by the community through their responses on the questionnaire.

A number of floodplain risk management measures were reviewed and assessed to address the key flooding issues. Three types of measures were considered; flood modification measures, property modification measures and response modification measures. The recommended measures for Kandos and Rylstone are presented in **Table 1-1** and **Table 1-2** respectively.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



**Table 1-1 : Recommended Measures for Kandos**

Measures considered	Required Funding	Features of the Measure	Consultant's Recommended Priority Rankings
1. Prepare a Local Flood Plan for Kandos.	SES costs	SES to prepare a Local Flood Plan for Kandos utilising information in this study and the Flood Study for Kandos and Rylstone (SKM 2013)	<b>Priority 1:</b> this measure has a high priority for inclusion in the FRMP. It does not require Government funding.
2. Implement controls over future residential development/ re-development in flood prone areas in Kandos.	Council costs	<p>Floor levels of new residential developments be located 0.5m above the adopted 1% AEP flood levels</p> <p>All new residential buildings on flood prone land be constructed using flood compatible materials to withstand hydrostatic pressures and debris load</p> <p>Council to formulate a porous fencing policy to minimise impact on local overland flood behaviour</p> <p>Evaluation of development proposals to use data presented in the Flood Study for Kandos and Rylstone (SKM 2013) and in this FRMS, 2015.</p>	<b>Priority 1:</b> this measure has a high priority for inclusion in the FRMP. It does not require additional Government funding.
3. Provide flood signage and flood depth indicators at roads crossing significant overland flow paths to enhance flood education and preparedness.	\$15,000	Provide flood signage and flood depth indicators at all roads crossing significant overland flow paths within the study area (approximately 30 signs)	<b>Priority 1:</b> this measure would improve flood education and flood preparedness for residents and tourists and has a high priority in terms of managing flood risk to people.
4. Protect four (4) residential buildings from flooding in the 1% AEP event resulting from local catchment flooding	\$400,000+	<p>Initial investigation to determine cost-effective measures acceptable to owners of 4 properties to protect their dwellings from flooding up to 1% AEP event. Measures to be considered to protect each house would include voluntary house raising, voluntary house purchase and construction of a ring levee around the house.</p> <p>Capital costs of implementing the preferred option to protect 4 houses from flooding up to 1% AEP event.</p>	<b>Priority 2:</b> this measure would ensure that no residential buildings are damaged in the 1% AEP event. A high priority is to be given to the initial investigation so that the preference of property owners are known and the cost of protecting the residential building can be finalized.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



**Table 1-2 : Recommended Measures for Rylstone**

Measures considered	Required Funding	Features of the Measure	Consultant's Recommended Priority Rankings
1. Prepare a Local Flood Plan for Rylstone.	SES costs	SES to prepare a Local Flood Plan for Rylstone utilising information in this study and the Flood Study for Kandos and Rylstone (SKM 2013)	<b>Priority 1:</b> this measure has a high priority for inclusion in the FRMP. It does not require Government funding.
2. Update the Dam Safety Emergency Plan for Rylstone Dam	Council costs	Council to engage a consultant to update the Dam Safety Emergency Plan for Rylstone Dam utilising information in this study and the Flood Study for Kandos and Rylstone (SKM 2013)	<b>Priority 1:</b> this measure has a high priority for protecting residents due to potential failure of Rylstone Dam. It does not require Government funding
3. Implement controls over future residential development/ re-development in flood prone areas in Rylstone.	Council costs	<p>Floor levels of new residential developments be located 0.5m above the adopted 1% AEP flood levels</p> <p>All new residential buildings on flood prone land be constructed using flood compatible materials to withstand hydrostatic pressures and debris load</p> <p>Council to formulate a porous fencing policy to minimise impact on local overland flood behaviour</p> <p>Evaluation of development/ re-development proposals to use data presented in Flood Study for Kandos and Rylstone (SKM 2013) and in this FRMS, 2015.</p>	<b>Priority 1:</b> this measure has a high priority for inclusion in the FRMP. It does not require additional Government funding.
4. Provide flood signage and flood depth indicators at roads crossing significant overland flow paths to enhance flood education and preparedness.	\$10,000	Provide flood signage and flood depth indicators at all roads crossing significant overland flow paths within the study area (approximately 20 signs)	<b>Priority 1:</b> this measure would improve flood education and flood preparedness for residents and tourists and has a high priority in terms of managing flood risk to people.
5. Protect one (1) residential buildings from flooding in the 1% AEP event resulting from local catchment flooding	\$100,000+	Initial investigation to determine cost-effective measures acceptable to owner of one property to protect the dwelling from flooding up to 1% AEP event. Measures to be considered to protect the house would include voluntary house raising, voluntary house purchase and construction of a ring	<b>Priority 2:</b> this measure would ensure that no residential buildings are damaged in the 1% AEP event. A high priority is to be given to the initial investigation so that the

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



Measures considered	Required Funding	Features of the Measure	Consultant's Recommended Priority Rankings
		levee around the house.  Capital costs of implementing the preferred option to protect one house from flooding up to 1% AEP event.	preference of the property owner is known and the cost of protecting the residential building can be finalised.



**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



**Important note about this report**

The sole purpose of this report and the associated services performed by Jacobs is to document the development of a Draft Floodplain Risk Management Plan for Kandos and Rylstone for consideration by Mid-Western Regional Council in accordance with the scope of services set out in the contract between Jacobs and the Client. That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, Jacobs's Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

## 1. Introduction

### 1.1 Background

Mid-Western Regional Council (Council) is responsible for local planning and land management in the towns of Kandos and Rylstone. Council has no formal floodplain risk management strategies in place to provide an appropriate level of protection for the Kandos and Rylstone communities. Further, Council needs to update emergency management strategies to effectively manage the continuing flood problems for the two towns. Hence, Council proposes to develop a floodplain risk management plan for both Kandos and Rylstone in phases, in accordance with the NSW Government's (2005) Floodplain Development Manual. Initial investigations (including data collection and review of all relevant data) and a flood study, are included in the first phase (Phase 1). For both towns, a Floodplain Risk Management Study (the Study) and Plan (the Plan) will be developed in the second phase (Phase 2), with the Plan being implemented in the third phase (Phase 3).

Sinclair Knight Merz (currently Jacobs Group Australia Pty Ltd) was engaged by Council in June 2011 to develop a Floodplain Risk Management Plan for Kandos and Rylstone encompassing all activities in Phase 1 and Phase 2. A report entitled "Flood Study for Kandos and Rylstone, Final, November 2013" was produced by as the outcome for Phase 1 of the project. This report details outcomes from Phase 2 of the project.

### 1.2 Study Areas

#### 1.2.1 Kandos

The study area for Kandos is shown in **Figure 1-1**. Kandos (population approximately 1,440) is located in the Central Tablelands of NSW. The town is located on the headwaters of Cumber Melon Creek, which is a tributary of the Cudgegong River. Kandos has a history of overland flooding and in recent times, Kandos experienced minor overland flooding in 2010 and 2012. Minor development has modified overland flow paths to some extent and future development has the potential to aggravate overland flooding further. Council updated its Local Environmental Plan (LEP) and also prepared a Development Control Plan (DCP), in order to guide the expansion of the township, and Council needs to assess the impact of future urbanisation on the catchment.

#### 1.2.2 Rylstone

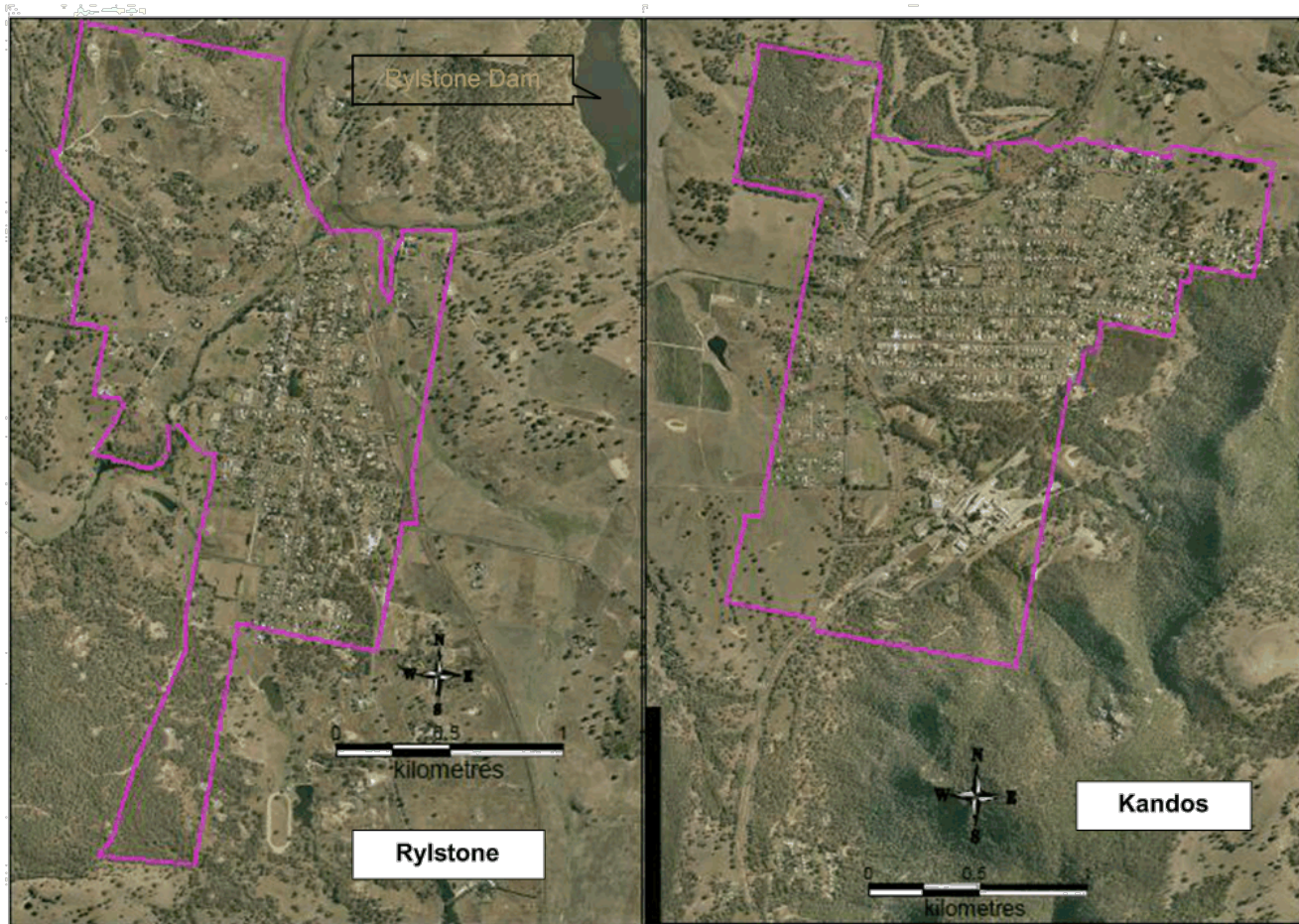
The study area for Rylstone is shown in **Figure 1-1**. Rylstone (population approximately 730) is located in the upper Cudgegong River catchment and has a history of both overland flooding and, to a much lesser extent, riverine flooding from the Cudgegong River. The town experienced several major floods in the 1950s due to flooding in the Cudgegong River and in recent times significant overland flooding problems were experienced in some parts of the town in 2010 and 2012.

Rylstone Dam, which provides water supply for Rylstone and Kandos, is located on the Cudgegong River approximately 1 km upstream of Rylstone. Failure of Rylstone Dam (catchment area 535 km<sup>2</sup> and a storage capacity of 3,038 ML) has the potential to impact on flooding in Rylstone.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



**Figure 1-1 : Study Areas**



**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



### 1.3 Overall Objectives

Council needs to develop a Floodplain Risk Management Plan (FRMP) for Kandos and Rylstone, to address the existing, future and continuing flood problems, in accordance with the NSW Floodplain Development Manual (2005). To meet the requirements of the Manual, Council needs a FRMP in order to:

- Reduce the flood hazard and risk to people and property in the existing community;
- Provide valuable flood intelligence to assist State Emergency Service (SES) in updating Local Flood Plans for the townships;
- Protect, maintain and, where possible, enhance the river and floodplain environment, and
- Ensure flood management decisions integrate the social, economic and environmental considerations.

The study was undertaken in three phases. Major activities undertaken in each phase are provided in the following sections.

#### 1.3.1 Phase 1

- Initial Investigations
  - A site inspection;
  - Data collection and review of all relevant documents, data and reports;
  - Consultation with the community and stakeholders; and
  - Identification of additional data needs to undertake the study.
- Flood Study
  - Review of existing hydrologic and hydraulic models for the Cudgegong River catchment at Rylstone and defining flood behaviour for 0.5%, 1%, 2%, 5%, 10%, 20% annual exceedance probability (AEP) events and the Probable Maximum Flood (PMF) event;
  - Investigations of overland flooding for both Kandos and Rylstone under the existing catchment and floodplain conditions for the full range of flood events including 0.5%, 1%, 2%, 5%, 10%, 20% AEP events and the PMF event;
  - Identification of flooding issues within the catchments and an assessment of the existing stormwater drainage network in both Kandos and Rylstone; and
  - Preparation of provisional flood mapping for both Kandos and Rylstone for the PMF, 1% AEP, 1% AEP +0.5m and 20% AEP events.

It is to be noted that an assessment on the potential impacts of climate change on flood behaviour was outside the scope of this study.

#### 1.3.2 Phase 2 Floodplain Risk Management Study and Draft Plan

The following activities were included in Phase 2 of the study

- An assessment of potential flood management and mitigation measures in order to achieve improvements necessary to meet the required level of protection. Such measures may include improved drainage works within both Kandos and Rylstone, levees, bypass floodways, culvert amplification, house floor raising, construction of flood retarding basins, flood warning and public education, zoning and development control, voluntary purchase etc.;
- Estimation of flood damages and annual average damages and their net present worth;
- An economic assessment of the floodplain management measures based on life cycle cost and benefits;
- Prioritisation of improved drainage measures and estimate the cost thereof; and
- Final flood mapping.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



**1.3.3 Phase 3 Floodplain Risk Management Plan Implementation**

Council is responsible for implementation of the Floodplain Risk Management Plan.

**1.4 Report Structure**

The outcome of the Floodplain Risk Management Study and draft Plan (Phase 2) as described in Section 1.3.2 of this report and the outcome from the Phase 1 was produced in the SKM 2013 report.

The report has been divided into the following sections:

- Executive Summary
- Section 1: introduces the study
- Section 2: provides background information on catchment characteristics and land use for the study area
- Section 3: details community consultation process and outcomes from the consultation
- Section 4: provides a review on the relevant legislation and planning
- Section 5: details flood behaviour
- Section 6: assesses flood damages
- Section 7: provides an overview on floodplain risk management measures
- Section 8: provides details on the identified floodplain risk management measures for Kandos
- Section 9: provides details on the identified floodplain risk management measures for Rylstone
- Section 10: provide details on the Draft Floodplain Risk Management Plan for endorsement by Council
- Section 11: acknowledges input provided by others in completing the study
- Section 12: provides details on references cited in this report
- Section 13: provides the glossary of terms
- Appendix A: contains the Newsletter and Questionnaire sent to residents
- Appendix B: provides details on options assessment for floodplain risk management

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

## 2. Background

### 2.1 Catchment Characteristics

#### 2.1.1 Kandos

Kandos is a small industrial town located in the upper catchment area of Cumber Melon Creek, a tributary of the Cudgegong River. The township is located on the lower western slopes of Coomber Melon Mountain. Overland flow paths run through the town towards west and north-west generally and cross Wallerawang-Gwabegar railway line to join the main stem of Cumber Melon Creek approximately 1.5 to 2.5 kilometres downstream. The residential development to the east of the town is located 200m below the mountain peak and approximately 500m to the north west of it. The developed areas of the town are located on mild slopes.

#### 2.1.2 Rylstone

Cudgegong River drains a catchment area of approximately 590 square kilometres at the southern boundary of Rylstone, near the sewage treatment works (STW). Rylstone Dam (catchment area 535 square kilometres) is located on Cudgegong River approximately 1.5 kilometres north-east of Rylstone. The dam (15m high, a crest length of 143m and a storage capacity of 3,320 ML at FSL) comprises of a concrete arch section with earth fill embankments at both ends.

Cudgegong River flows in a westerly direction through a well-defined valley for approximately 1 kilometre downstream of Rylstone Dam. An unnamed creek joins the River from the south beside the water treatment plant (WTP). Tongbong Creek joins the River from the north approximately 200 metres downstream of the WTP. The Wallerawang-Gwabegar Railway line crosses Cudgegong River downstream of its junction with Tongbong Creek. Bylong Valley Way crosses the River downstream of the Railway crossing. The River then flows along the western edge of the township into open undulating country before flowing into Windamere Dam reservoir located 15 kilometres downstream.

### 2.2 Land Use

#### 2.2.1 Kandos

The town was established in 1913, when the New South Wales Cement Lime and Coal Company was set up to take advantage of local supplies of limestone. The town is centred upon the Wallerawang-Gwabegar railway line which runs along the western edge of the main town centre. Most of the residential development is located to the east of the railway line. Residential development is bound to the east and south-east by Coomber Melon Mountain. The main non-agricultural industry was the production of cement, however, the cement manufacturing facility and associated limestone quarry (both operated by Cement Australia) was closed in September 2011. Centennial Coal was another major production (coal) in the Kandos region until 2015.

#### 2.2.2 Rylstone

Except for the urban area of the township, the dominant land use within the catchment is forest and there are significant rural areas within the catchment. Urban development in Rylstone extends to the edge of the narrow floodplain of the Cudgegong River with the only developments on the floodplain being playing fields and associated buildings.

### 2.3 Availability of Data

Details on the availability of data for this study are described in the Flood Study Report for Kandos and Rylstone (SKM 2013). A preliminary assessment was undertaken utilising the LiDAR data to identify properties which would be subject to above floor flooding in the 1% AEP event and since completion of the flood study, habitable floor levels for 15 dwellings in Kandos and 1 dwelling in Rylstone were connected to AHD by de Witt Consulting in May 2015. The surveyed floor levels are more reliable than that estimated using the LiDAR data.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



### 3. Community Consultation

The local community have a key role to play in the development and ongoing implementation of a Floodplain Risk Management Plan. Engaging the community early in the project provides people with the opportunity to actively contribute to the flood risk management process. This is important for Kandos as several residents experienced flooding in recent years and have local knowledge of the area, which can be useful when understanding the flood behaviour.

#### 3.1 Consultation Process

The Community consultation process involved the following steps:

- At the start of the study, an Inception Meeting was held with the floodplain management committee (FMC), government agencies and Jacobs. This meeting was used to establish the project, agree to the study program and obtain relevant data for the project;
- Consultation letters were sent to key stakeholders;
- A community questionnaire was distributed to residents to gauge their experience of flooding and their opinions on flood-related issues. A copy of the questionnaire is included in **Appendix A**.
- An information session was held in Rylstone with the community on 6 May 2015 to present outcomes on the flood mitigation option assessment for both Kandos and Rylstone.

#### 3.2 Community Questionnaire

A community consultation process was initiated to obtain flood information for past events. This involved sending a newsletter and a questionnaire (included in **Appendix A**) to residents and landowners within the study areas in Kandos and Rylstone. The newsletter introduced the floodplain management process to the residents of the areas, described the purpose of the questionnaire and provided the residents with contacts for their responses. The questionnaire was prepared in consultation with Council to help identify flood and drainage issues in the study areas and to provide reliable flood information to assist in the validation of the hydrologic and hydraulic computer models. An electronic copy of the newsletter and questionnaire was provided to Council and Council distributed printed copies of the newsletter and questionnaire within the community in July 2011.

The flood information that was requested included:

General information such as:

- Residents from the Study Area
- Ownership of the residence
- How long residents lived at the property

Specific flood information such as:

- Experience on flooding in residence and/or at work
- Location and depth of flood water in the worst flood experienced
- Duration of flooding
- Flood damages to residence and business
- Disruption to vehicular access to residence during flooding
- Identify information (eg. flood photographs, newspaper clippings, flood marks etc.) that can be provided to Consultants

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

- Flooding to residence made worse by works on other properties or by construction of roads or other structures
- Any comments on any other issues associated with this study.

The responses to the community survey were thoroughly reviewed for information of major flooding effects that could be useful for validation of the hydrologic and hydraulic computer models.

### 3.3 Summary of Responses to Questionnaire

In total six (6) responses were received from the community to the questionnaire. Three (3) respondents are residents of Rylstone; one respondent is a resident of Kandos; one respondent lives in Clandulla (which is located outside the study area) who identified a flooding problem area in Rylstone, which is also located outside the study area; and one respondent intends to live in Rylstone and identified benefits of flooding on the re-vegetation of the riparian area of the Cudgegong River through Rylstone. A summary of information provided by respondents is provided below.

#### Kandos

The owner has been living in the dwelling on 15 George Street, Kandos for the last 30 years. A storm event in 2010 resulted in a 0.4m depth of flooding in the garage and washed out the driveway. Photographs (refer to **Figure 3-1** to **Figure 3-3**) provided by the owner indicate that stormwater from Darton Park (located at the corner of George and Mason Street) runs along both George Street and Mason Street, which is obstructed by the culvert under the driveway of the property on 15 George Street. The obstruction at the driveway culvert caused stormwater to run along the driveway in a northerly direction.



**Figure 3-1 Stormwater from Darton Park moving along George Street**



**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



**Figure 3-2 Stormwater impeded by culvert under the Driveway of 15 George Street**



**Figure 3-3 Stormwater running along the Driveway of 15 George Street**

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone****Rylstone**

Information provided by respondents relating to flooding issues in Rylstone is discussed below:

Blockage of pipe culvert under driveway of 42 Carwell Street, Rylstone - A pipe culvert (approximately 900mm diameter) under the driveway is approximately 75% blocked with silt, gravel and rocks. Stormwater from the adjoining Council yard and Piper Street is drained through the pipe culvert under the driveway, and hence, clearing this culvert is desirable.

Flooding on 2571 Bylong Valley Way, Rylstone - Two respondents identified flooding on this property. Following further discussion with the owner of the property it is understood that the backyard was flooded during a storm event about ten (10) years ago.

Re-vegetation and Rylstone Weir - The respondent (who lives outside the study area) highlighted the importance of re-vegetation along the Cudgegong River in mitigating bank erosion. The respondent was involved in re-vegetation of a 450m reach along the Cudgegong River upstream of Rylstone. The respondent believes that removal of the weir will have a positive impact on flooding in Rylstone and movement of fish and platypus.

Access to Rylstone Cemetery cut-off - The respondent (who lives outside the study area) identified flooded sections of Glen Alice Road, Brown Lane and Narrango Road, which cut off access to the cemetery. In 2010, Narrango Road was impassable for a week due to one storm event. However, Council clarified that access to the cemetery was restricted for a day due to flooding on the causeway on Fitzgerald Street and an alternative access to the cemetery via Glen Alice Road was open. Council further clarified that Narrango Road was not impassable for a week.

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## 4. Legislation and Planning

### 4.1 Background

This section provides an overview on the NSW flood risk management framework and existing policies and planning controls applicable to Kandos and Rylstone and recommends the way forward to develop a Floodplain Risk Management Plan.

### 4.2 NSW Flood Risk Management Framework

#### 4.2.1 Objectives and Approach

The primary objective of NSW Flood Risk Management (FRM), as expressed within the NSW Flood Prone Lands Policy (Floodplain Development Manual 2005, page 1) is as follows:

*“To reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible.”*

Within the scope of this report, the relevance of the above objective is primarily to ensure that the Floodplain Risk Management Plan for Kandos and Rylstone does not lead to increased flood risk to property and persons and that the planning controls and emergency management planning provisions proposed to achieve this outcome form part of a consistent and coordinated strategy to reduce flood risks.

#### 4.2.2 NSW FRM Policy and Guidelines

The NSW Flood Prone Land Policy is produced within Section 1.1 of the Floodplain Development Manual (FDM 2005). This policy is consistent with that first introduced in 1984, which places the primary responsibility for implementation on local councils. This provides the opportunity for FRM to be integrated within council’s normal planning processes. The NSW Government provides financial and technical assistance, and indemnity is provided in Section 733 of the Local Government Act 1993, subject to acting in “good faith” - being performance in accordance with the principles and guidelines of the FDM unless proven otherwise.

The FDM requires a merit approach to be adopted for the purposes of formulating a FRMP that provides a basis for decision making in the floodplain, considering both mainstream and overland flooding sources. This is in recognition that flood prone land is a valuable resource which should not be unnecessarily sterilised by the rigid application of prescriptive criteria, and to equally avoid the approval of inappropriate proposals. The merit approach is defined as follows:

*“The merit approach weighs socio-economic, ecological and cultural impacts of land use options for different flood prone land areas together with flood damage, hazard and behaviour implications, and environmental protection and wellbeing of the State’s rivers and floodplains.”*

The NSW Flood Prone Land Policy and the FDM provide a platform for the management of floodplains in a manner that follows a risk management approach. Consistent with this approach the FDM defines the floodplain for the purposes of establishing the broadest area potentially at risk from flooding for the preparation of studies and ultimately the FRMP, as follows:

*“Floodplain means: Area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is, flood prone land.”*

*“Flood prone land means: Land susceptible to flooding by the PMF event. Flood prone land is synonymous with flood liable land.”*

*“Probable maximum flood means: The PMF is the largest flood that could conceivably occur at a particular location; usually estimated from probable maximum precipitation, where applicable, snow melt, coupled with the*

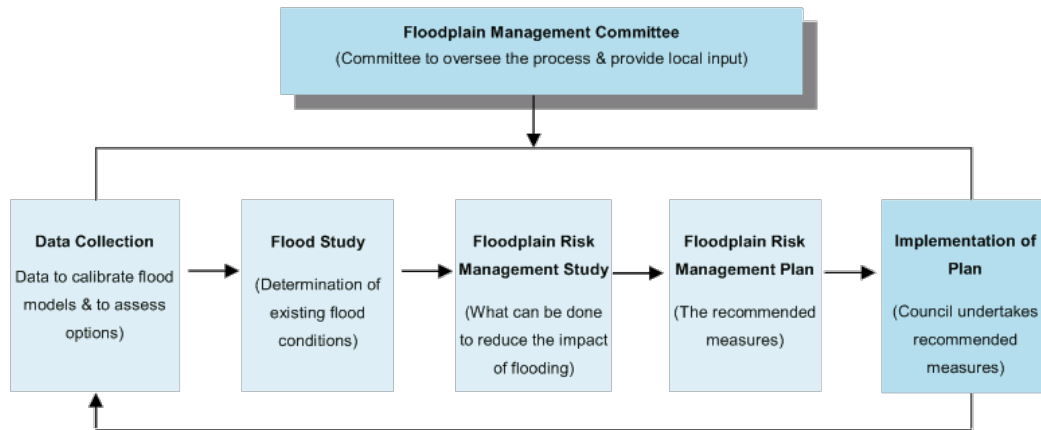
**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land that is the floodplain. The extent, nature and potential consequences of flooding associated with a range of events rarer than the flood used for designing mitigation works and controlling development, up to and including the PMF event should be addressed in a floodplain risk management study.”

The FDM is a manual which provides guidance with regard to how to implement the NSW Flood Prone Land Policy. The FDM requires the level of flood risk acceptable to the community is to be determined through a process overseen by a committee comprised of local elected representatives, community members and state and local Government officials (including the SES). This process is shown in **Figure 4-1**.

The ultimate outcome is the preparation of a Floodplain Risk Management Plan (FRMP), which is a plan formally adopted by a local council in accordance with the NSW Flood Prone Land Policy. FRMPs should have an integrated mix of management measures that address existing, future and continuing risk.



■ **Figure 4-1 NSW FRM Process (Adapted from FDM 2005)**

**4.2.3 2007 Flood Planning Guideline**

On January 31, 2007 the NSW Planning Minister announced a new guideline for development control on floodplains (the "Flood Planning Guideline"). An overview of the new Guideline and associated changes to the Environmental Planning and Assessment Act, 1979 (EPA Act) and Environmental Planning and Assessment Regulation 2000 (Regulation) was issued by the Department of Planning in a Circular dated January 31, 2007 (Reference PS 07-003). The Flood Planning Guideline issued by the Minister in effect relates to a package of directions and changes to the EPA Act, Regulation and FDM.

This Flood Planning Guideline provides an amendment to the Manual. The Guideline confirms that unless there are "exceptional circumstances", Councils are to adopt the 100 year ARI flood for determining the flood planning level (FPL) for residential development, with the exception of some sensitive forms of residential development such as seniors living housing. THE FPL is the planning flood (100 year ARI) plus a typical allowance for freeboard. The Guideline does provide that controls on residential development above the 100 year flood may be imposed subject to an "exceptional circumstance" justification being agreed to by the Department of Natural Resources (now the Office of Environment and Heritage -OEH) and the Department of Planning (now the Department of Planning and Environment - DPE) prior to the exhibition of a Draft LEP or Draft DCP.

The Flood Planning Guideline provides various potentially ambiguous statements in regard to what is the Residential FPL for the purposes of applying the directions in the Guideline. The DPE has advised that the reference to the FPL is a reference to both the 100 year flood plus freeboard (typically 0.5 metres). The Guideline only applies to the introduction of "new" controls and does not rescind pre-existing controls.

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As discussed below, Council's existing FRM Policy (and consequently DCP which triggers the application of the Policy) provides controls on residential development above the 100 year (plus freeboard) extent.

#### **4.2.4 Relationship with EPA Legislation**

The plan-making processes under the EPA Act, such as for a Local Environmental Plan (LEP) and a Development Control Plan (DCP) operate independently of the preparation of FRMPs under the FDM. While these two processes could be overlapped, it has been the usual practice to undertake the processes separately. Ultimately the planning recommendations of the FRMP will need to be reflected in planning instruments and policies brought into force in accordance with the EPA Act.

Ultimately the planning recommendations of the FRMP will need to be reflected in planning instruments and policies brought into force in accordance with the EPA Act. Accordingly the FRMP can provide appropriate input to the EPA Act planning processes in three ways:

- Providing direction at a local (and state) strategic planning level in addressing FRM (e.g. where urban growth should occur and the distribution of land uses therein);
- Recommending development controls to be incorporated in appropriate planning instruments (e.g. LEPs and DCPs) to mitigate the risk to development where permitted in the floodplain; and
- Ensuring that the planning controls and associated documents (e.g. S149 Planning Certificates) contribute to ensuring the community is appropriately informed about the flood risk.

To understand how these FRMP outcomes may be best achieved, the existing EPA Act framework and guidelines that relate to FRM are discussed later in this section.

### **4.3 Existing Policies & Planning Controls**

The imposition of planning controls can be an effective means of managing flood risks associated with future development (including redevelopment). Such controls might vary from prohibiting certain land uses to specifying development controls such as minimum floor levels and building materials.

In principle, the degree of restriction that is imposed on development due to flooding relates to the level of risk that the community is prepared to accept after balancing economic, environmental and social considerations. In practice, the planning controls that may ultimately be imposed are influenced by a complex array of considerations including state imposed planning policy and directions, existing local planning strategies and policies and ultimately the acceptability of conditions that could be imposed through the development application process.

The following provides an outline of policy that is potentially relevant because it either directs the FRM planning controls that could be adopted or affects the way flood risk is identified in the planning controls.

#### **4.3.1 State Environmental Planning Policies**

A State Environmental Planning Policy (SEPP) is a planning document prepared in accordance with the EPA Act and eventually approved by the Minister, which deals with matters of significance for environmental planning for the State. Clause 1.19 of the Codes SEPP has been amended so that land identified as 'flood control lot' is no longer excluded from the application of the General Housing Code. Instead, specified development and development standards have been added to the General Housing Code for development on low hazard flood control lots. The development standards have been designed to ensure that complying development is not allowed on high hazard or high risk flood control lots including floodways, flood storage areas, a flowpath or areas identified in local flood plans as high hazard or high risk.

#### **4.3.2 Climate Change Policies**

Climate change is expected to have adverse impacts upon sea levels and rainfall intensities, both of which may have a significant influence on flood behaviour at specific locations. Rainfall intensities will have a wide

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influence on flooding while the sea level rise will have a diminished effect as the distance from the tidal influences of coastal waters increases. Being located inland, flooding in both Kandos and Rylstone is insensitive to sea level rise.

Scientific data regarding the effect of climate change on rainfall intensities is not sufficiently advanced to provide specific guidance for the assessment of flood risk. No relevant planning benchmarks have been adopted by Government related to rainfall intensity changes. However, NSW Government guidelines recommend the undertaking of a sensitivity analysis, which assumes nominal increases in rainfall intensities of 10%, 20% and 30%.

A preliminary assessment indicates that a 10% increase in rainfall intensity for the 2% AEP event would be similar to the 1% AEP intensity and a 30% increase in rainfall intensity for the 5% AEP event would be similar to the 1% AEP intensity. A detailed assessment of the impact of climate change was outside the scope of this study.

#### **4.3.3 Section 117 Directions**

Ministerial directions pursuant to Section 117(2) of the EPA Act specify matters which local councils must take into consideration in the preparation of LEPs. Direction 4.3, as currently applies, deals specifically with flood [liable] prone land and has the following two objectives:

*“(a) To ensure that the development of flood prone land is consistent with the NSW Government’s Flood Prone Land Policy and the principles of the Floodplain Development Manual, 2005.*

*“(b) To ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land”.*

The Direction applies to all councils that contain flood prone land when an LEP proposes to “create, remove or alter a zone or provision that affects flood prone land.” In such cases, the Direction requires draft LEPs to ensure the following:

- (4) *A planning proposal must include provisions that give effect to and are consistent with the NSW Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005 (including the Guideline on Development Controls on Low Flood Risk Areas).*
- (5) *A planning proposal must not rezone land within the flood planning areas from Special Use, Special Purpose, Recreation, Rural or Environmental Protection Zones to a Residential, Business, Industrial, Special Use or Special Purpose Zone.*
- (6) *A planning proposal must not contain provisions that apply to the flood planning areas which:*
  - a. *permit development in floodway areas,*
  - b. *permit development that will result in significant flood impacts to other properties,*
  - c. *permit a significant increase in the development of that land,*
  - d. *are likely to result in a substantially increased requirement for government spending on flood mitigation measures, infrastructure or services, or*
  - e. *permit development to be carried out without development consent except for the purposes of agriculture (not including dams, drainage canals, levees, buildings or structures in floodways or high hazard areas), roads or exempt development.*
- (7) *A planning proposal must not impose flood related development controls above the residential flood planning level for residential development on land, unless a relevant planning authority provides*

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*adequate justification for those controls to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).*

- (8) *For the purposes of a planning proposal, a relevant planning authority must not determine a flood planning level that is inconsistent with the Floodplain Development Manual 2005 (including the Guideline on Development Controls on Low Flood Risk Areas) unless a relevant planning authority provides adequate justification for the proposed departure from that Manual to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).*

**4.3.4 Local Environmental Plan (LEP)**

Mid-Western Council Local Environmental Plan 2012 applies to both Kandos and Rylstone. The study area for Kandos contains land within a number of standard zones such as IN1 General Industrial and RU5 Village. These zones are shown in **Figure 4-2**. The study area for Rylstone contains land within a number of standard zones such as R2 Low Density Residential, RU5 Village and IN1 General Industrial. These zones are shown in **Figure 4-3**.

Clause 6.2 of the LEP deals with flood planning and has the following objectives:

- (a) to minimise the flood risk to life and property associated with the use of land,*
- (b) to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,*
- (c) to avoid significant adverse impacts on flood behaviour and the environment.*

Clause 6.2 applies to:

- (a) land identified as "Flood planning area" on the Flood Planning Map, and*
- (b) other land at or below the flood planning level.*

Development consent must not be granted to development on land to which Clause 6.2 applies unless the consent authority is satisfied that the development:

- (a) is compatible with the flood hazard of the land, and*
- (b) is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and*
- (c) incorporates appropriate measures to manage risk to life from flood, and*
- (d) is not likely to significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and*
- (e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding.*

A word or expression used above clause has the same meaning as it has in the FDM 2005, unless it is otherwise defined in Clause 6.2. In Clause 6.2:

**flood planning area** means the land shown as "Flood planning area" on the Flood Planning Map.

**flood planning level** means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard.

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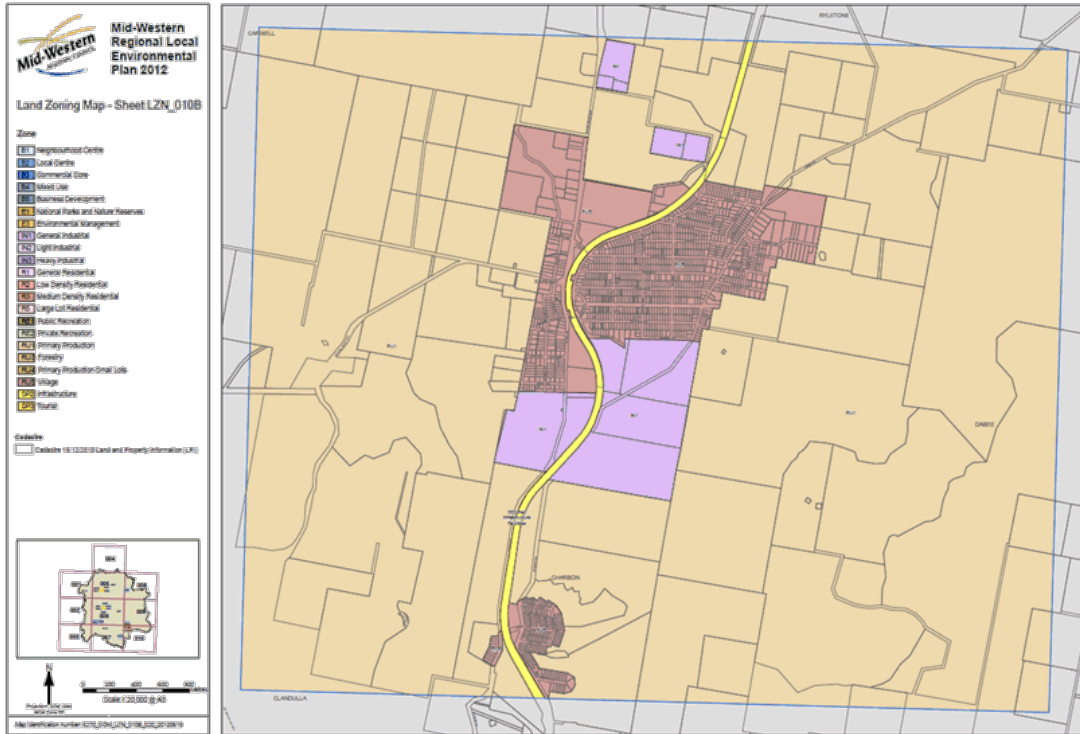


Figure 4-2 Kandos LEP 2012 Zoning Map

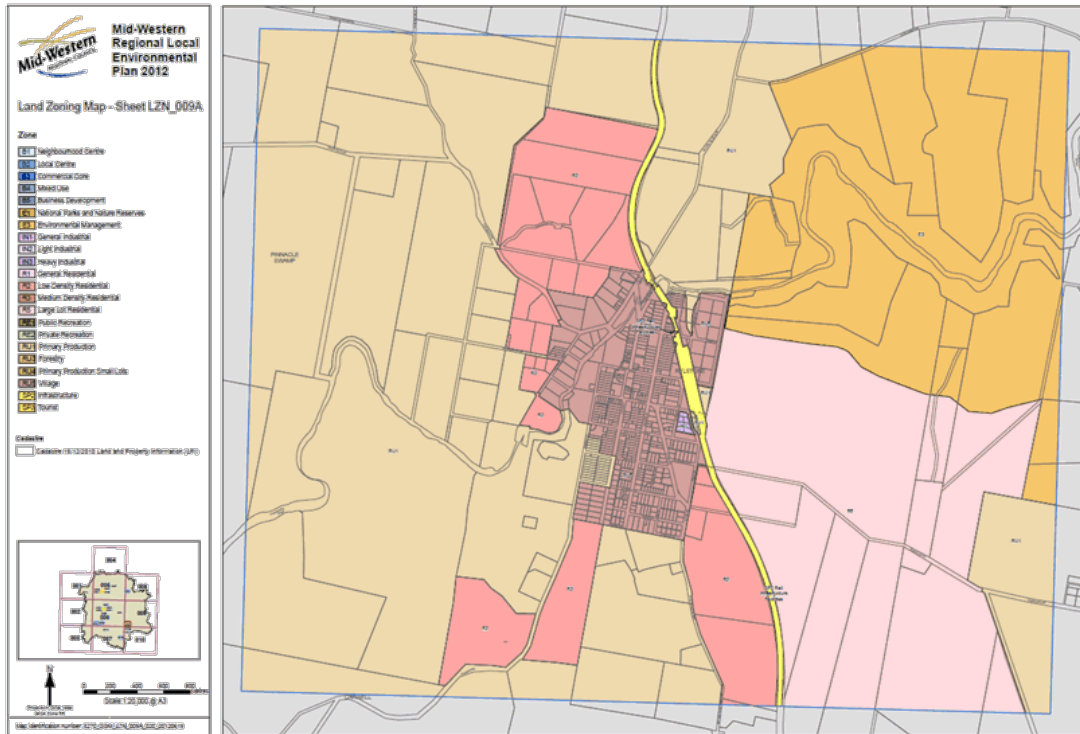


Figure 4-3 Rylstone LEP 2012 Zoning Map



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#### 4.3.5 Development Control Plan (DCP)

*Mid-Western Regional Council Development Control Plan 2013* (DCP 2013) applies to both Kandos and Rylstone. Clause 5.2 *Flooding* provides design standards to be adopted for different types of development. Flood planning matrices of flood related controls for both urban and rural floodplains are defined in the DCP to recognise that different controls are applicable to different land uses for Low, Medium and High Flood Risk Precincts (FRPs). The DCP requires that *all proposals are to have regard to the appropriate planning matrix.*

The DCP applies flood related development controls up to the PMF (being the extent of flood liable land as defined by the FDM) but there are limited controls on most development in the Low flood risk precinct (FRP). The DCP defines the criteria for determining and mapping FRPs which are outlined below.

- **High Flood Risk:** *Land that is below the 100 year ARI flood that is subject to high hydraulic hazard (i.e. provisional high hazard in accordance with the Floodplain Management Manual) or areas that are isolated in a 100 year ARI flood due to evacuation difficulties.*
- **Medium Flood Risk:** *Land below the 100 year ARI flood level that is not subject to high hydraulic hazard and where there are no significant evacuation difficulties.*
- **Low Flood Risk:** *All other land within the floodplain (ie. within the PMF extent) but not identified as either in a high flood risk or medium flood risk precinct.*

DCP 2013 provides prescriptive controls complemented with performance controls to allow individual development proposals the flexibility to demonstrate the achievement of the intended outcome of the prescriptive controls in alternate ways. Performance Criteria includes the following:

- (a) The proposed development should not result in any increased risk to human life.*
- (b) The additional economic and social costs which may arise from damage to property from flooding should not be greater than that which can reasonably be managed by the property owner and general community.*
- (c) The proposal should only be permitted where effective warning time and reliable access is available for the evacuation of an area potentially affected by floods, where likely to be required.*
- (d) Development should not detrimentally increase the potential flood affectation on other development or properties.*

#### 4.4 Other Environmental Legislation

##### 4.4.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of the Environment, Water, Heritage and the Arts and aims to ensure that actions likely to have a significant impact on matters of national environmental significance are subject to a rigorous assessment and approval process. Matters of national significance that may be impacted by flood control works include Ramsar wetlands, nationally threatened species and ecological communities, and migratory species. An assessment of the potential impacts on matters of national environmental significance, as defined and listed under the EPBC Act, would need to be undertaken before any flood control works are implemented.

##### 4.4.2 Fisheries Management Act 1994 (NSW)

The *Fisheries Management Act 1994* (FM Act) is administered by the Fisheries division of the NSW Department of Primary Industries. The broad objectives of the FM Act are to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. Floodplains provide important spawning, nursery and feeding habitat for a number of native freshwater fish species. The Act makes provision for the conservation of key fish habitats (including floodplains) through habitat protection plans, and for the conservation of threatened species, populations and ecological communities of fish.

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Most fish species undertake local or large-scale migration, with some species such as golden perch and silver perch migrating onto the floodplain to spawn. The Act requires that NSW Fisheries be notified whenever any barrier to fish passage is constructed, altered or modified. The Act also requires a permit from NSW Fisheries for dredging and reclamation works on wetlands and floodplains. These works may include the construction of levees, drains, storages and other works.

### 4.4.3 National Parks and Wildlife Act 1974 (NSW)

The NSW National Parks and Wildlife Service (NPWS), a division of the Department of Environment and Climate Change (DECC – Now OEH), is responsible for the protection and care of Aboriginal relics, the protection and care of native fauna, and the protection of native plants under the *National Parks and Wildlife Act 1974* (NPW Act). The NPW Act also allows for the establishment, preservation and management of areas of cultural, environmental and archaeological significance.

Of particular relevance to flood control works, it is an offence to knowingly destroy or disturb any Aboriginal site or relic in NSW. Aboriginal sites that may be relevant to the outcomes of the Floodplain Risk Management Plan would include any carved or scarred trees that may rely on flooding for their longevity and any sites of spiritual significance that are sustained by periodic flooding. An Aboriginal archaeological and cultural heritage assessment, to identify the presence of and potential impacts on Aboriginal objects and sites of Aboriginal cultural significance within the floodplain, would need to be undertaken before any flood control works are implemented.

### 4.4.4 Threatened Species Conservation Act 1995 (NSW)

The *Threatened Species Conservation Act 1995* (TSC Act) is administered by the DECC (Now OEH) and provides for the protection of threatened species, populations, ecological communities, and their habitats (with the exception of fish and marine plants). The Act ensures that threatened species are taken into consideration during the development planning process and in decision making by authorities. Threatened species whose ecology may depend on flood inundation will be an important consideration when identifying environmentally important areas and determining outcomes in the FRMP.

In relation to development assessment, the provisions of the TSC Act are linked to the EP&A Act. Specifically, Section 5A of the EP&A Act identifies the factors that must be taken into account in determining whether there is likely to be a significant impact on threatened species, populations or ecological communities, or their habitats (the 'Seven Part Test'). An assessment of the potential impacts on threatened species, populations and ecological communities would need to be undertaken before any flood control works are implemented.

### 4.4.5 Dams Safety Act 1978 (NSW)

The Dams Safety Act 1978 is administered by the NSW Dams Safety Committee (DSC). The DSC interprets its statutory role as being to ensure the safety of dams and their storage reservoirs in order to adequately protect the interests of the community. It is the responsibility of the DSC to define its requirements for the safety of dams and their storages and to ensure compliance by owners with those requirements. The DSC will prescribe those dams with the potential for a failure which could have a significant adverse effect on community interests.

Rylstone Dam, owned by Mid-Western Regional Council, is a prescribed Dam. A Dam Safety Emergency Plan (DSEP) for Rylstone Dam was prepared in 2010 and the DSEP is to be updated to incorporate findings from the 2013 Flood Study Report (SKM 2013).

## 4.5 Current Gaps or Limitations of Planning Instruments

Through the review of current planning instruments and policies, it was considered necessary to review the definition of FPL for Kandos on the basis of the following considerations:

- Flooding results from short duration intense storm events resulting from stormwater drainage overflows due to inadequate provisions for land drainage; and

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- The 1% AEP flood levels with 0.5m freeboard were generally higher than flood levels resulting from the PMF event implying that the FPL if based on 1% AEP plus 0.5m freeboard would include lands located above PMF levels.

The DCP does not include a fencing policy. A fencing policy is considered essential in managing risk due to overland flooding. In particular, the fencing policy would recommend porous fencing across significant overland flow paths to minimise flood impacts to neighbouring properties resulting from backwater and cascade failures of fencing.

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## 5. Flood Behaviour

### 5.1 Kandos

#### 5.1.1 Existing Condition

The existing flooding conditions were investigated and reported in the “Flood Study for Kandos and Rylstone” report (SKM 2013). A DRAINS hydrologic model was developed for the study area to estimate catchment runoff for the full range of storm events between 20% AEP and the PMF. DRAINS model results were analysed to estimate stormwater capacities and overflows simulated by the DRAINS model were utilised in HEC-RAS hydraulic models to estimate peak water levels and velocities along the major overland flow paths. HEC-RAS model results were used to develop the flood maps.

The local overland flood extents for Kandos are shown in **Figure 5-1**. The existing flooding behaviour for Kandos consists of several overland flow paths that generally flow from the higher ground to the south-east and cut across the town towards the north-west. These are wide and shallow paths which results in significant flooding even for the 20% AEP event. Overflows associated with the main stormwater system crossing the Railway at the corner of Davies Road and McLachlan Street result in flooding of adjoining properties located along its overland flow paths. Properties along the overland flow path for the stormwater system crossing George Street are impacted by overflows in the 20% AEP event. An overland flow path runs east to west between Lloyd Avenue and Anzac Avenue, which impacts on a number of properties in the 20% AEP event. The flood extent for the 1% AEP event is slightly more extensive than the 20% AEP flood extent. In some areas, the PMF is less than 0.5m higher than the 1% AEP event.

#### 5.1.2 Pit inlet capacity and blockage assessment

During the Floodplain Risk Management Study phase, additional flood modelling was undertaken to assess the sensitivity of pit capacities and blockages. DRAINS modelling in the Flood Study phase assumed that the stormwater system in Kandos was limited by pipe capacities; hence no pit inlet capacities were included. The updated DRAINS modelling included two additional scenarios where pit capacities were introduced and blockages were applied. Pit inlet capacities were taken from the ‘Hornsby Council’ database within DRAINS where on-grade and sag pits with lintels could be modelled.

Data from the survey undertaken of the Kandos stormwater network was used to assign an appropriate pit inlet capacity. The flow in pipes reduced by up to 0.74m<sup>3</sup>/s with an average reduction of 0.15m<sup>3</sup>/s across the storm events. Hence the stormwater network capacity is reduced when inlet capacities are taken into account. A scenario with inlet blockages was also tested. The recommended blockages of 20% for on-grade pits and 50% for sag pits (Australian Rainfall and Runoff 2013) were adopted. The flow in pipes was further reduced by up to 0.26m<sup>3</sup>/s when blockage factors were implemented. The average reduction, however, was just 0.02m<sup>3</sup>/s.

The overland discharges were then applied to the HEC-RAS models for both scenarios. The results indicated that the change in flood level when pit capacities were modelled was a maximum increase of only 0.03m for the 1% AEP event. The majority of cross sections, however, showed no discernible change in modelled peak water levels. The maximum increase in the peak water level for the 1% AEP event incorporating blockages was a further 0.02m, but again, there was no discernible change in peak water level at most cross sections.

This sensitivity analysis showed that the flows in the Kandos stormwater system were sensitive to the pit capacities and blockage factors used. Flows in pipes would be reduced as much as 90% under these scenarios. The additional overland flow, however, did not significantly contribute to raising the peak water level during a flood. The peak flood level and overall flood extent showed no substantial change when pit inlet capacities and blockages were modelled. The flows conveyed by the stormwater system were minor compared to the overland flows experienced in Kandos during flood events. Accordingly, there was no change made to the flood maps generated for the Flood Study (presented in **Figure 5-1**).



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### 5.1.3 Hydraulic Categorisation

During the flood study phase, it was not considered appropriate to develop hydraulic categories for the small overland flow paths through Kandos; however, these have been delineated for the current study for the 1% AEP flood event. The three flood hydraulic categories identified in the *Floodplain Development Manual* (NSW Government, 2005) are:

- Floodway, where the main body of flow occurs and blockage could cause redirection of flows. Generally characterised by relatively high flow rates; depths and velocities;
- Flood storage, characterised by deep areas of floodwater and low flow velocities. Floodplain filling of these areas can cause adverse impacts to flood levels in adjacent areas; and
- Flood fringe, areas of the floodplain characterised by shallow flows at low velocity.

There is no firm guidance on hydraulic parameter values for defining these hydraulic categories, and appropriate parameter values may differ from catchment to catchment. For example, the minimum threshold flows and depths which might define a floodway in an urban overland flow catchment may be markedly lower than those for a large lowland river due to the different scale of flooding.

For Kandos, the criteria outlined in **Table 5-1** was employed.

**Table 5-1 Hydraulic Categories Criteria**

Hydraulic Category	Criteria
Floodway	Area within the 1% AEP flood extent where 80% of the flow is conveyed <sup>1</sup> . This was calculated for each cross section and then joined to form a continuous floodway.  Using the defined floodway, an encroachment analysis was undertaken and the increase in the 1% AEP flood level was confirmed to be no more than 0.1m.
Flood Storage	Area within the 1% AEP flood extent, outside the Floodway, where depth > 0.5m.
Flood Fringe	Area within the 1% AEP flood extent outside the Floodway and Flood Storage areas.

<sup>1</sup> A combination of peak velocity (V), peak depth (D) and velocity-depth product (VD) was also used to verify the floodway, however, the hydraulic modelling for Kandos, being a 1D steady state model was not appropriate for using this criteria. The peak depth and peak velocity was used to define the VD criteria (instead of the peak VD). The following thresholds were used to define the floodway:

- $[VD > 0.25 \text{ and } V > 0.25] \text{ or } [V > 1]$
- $[VD > 0.5 \text{ and } V > 0.5] \text{ or } [V > 1]$

The results produced show a heavy reliance on the velocity component rather than the depth component, due to the generally wide and shallow nature of the overland flow paths. The velocity used was the cross-sectional average velocity and the criteria produced whole sections of floodway along the length of the flow path, rather than a proportion of each cross section. Hence, these results were not used to define the floodway.

The hydraulic categories mapping is presented in **Figure 5-2**.

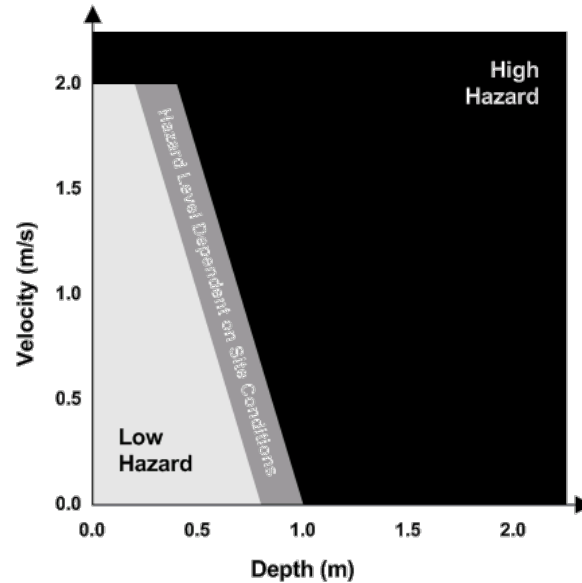


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### 5.1.4 Hazard Categorisation

During the flood study phase, provisional flood hazard categories were determined. These were generated in accordance with the NSW Government's Floodplain Development Manual (2005), using the criteria outlined in **Figure 5-4**. A 'provisional' flood hazard map was prepared for the 1% AEP flood event based on the peak flood depths and velocities for the 1% AEP event.



**Figure 5-3 : Hydraulic Hazard Category Diagram**  
(adapted from the *NSW Floodplain Development Manual*)

The flood hazard map has been revised for the Floodplain Risk Management Study to determine the 'true' hazard. The flood hazard for the 1% AEP event has been determined based on the peak depth and peak velocity (as defined in **Figure 5-3**). Other factors, such as isolation, effective warning time, flood readiness, etc. have been considered in determining the 'true' hazard for the 1% AEP flood event. The flood hazards for the 1% AEP event for Kandos are generally low for the majority of the flooded areas. Significant high flood hazard areas are present on overland flow paths between Fleming Street and Dunn Street; on the sports field between Mason Street and Bent Street, on the northern half of White Crescent; south of Jamison Road and crossing Ilford Road between Clifford Street and Lloyd Avenue; and near the intersection of Cairo Street and Anzac Avenue.

The flood hazard map for Kandos is shown in **Figure 5-4**.

### 5.1.5 Flood Risk Precincts

The Mid-Western Regional Council Development Control Plan (DCP) 2013 refers to Flood Risk Precincts (FRP's) to define areas of flood prone land where certain development constraints apply. The FRP categories are defined in Section 4.3.5.

The Flood Risk Precinct map for Kandos is shown in **Figure 5-5**. The areas of high flood risk are the same as those with a high flood hazard. The remaining area within the 1% AEP flood extent is medium risk and low risk is present to the PMF extent.







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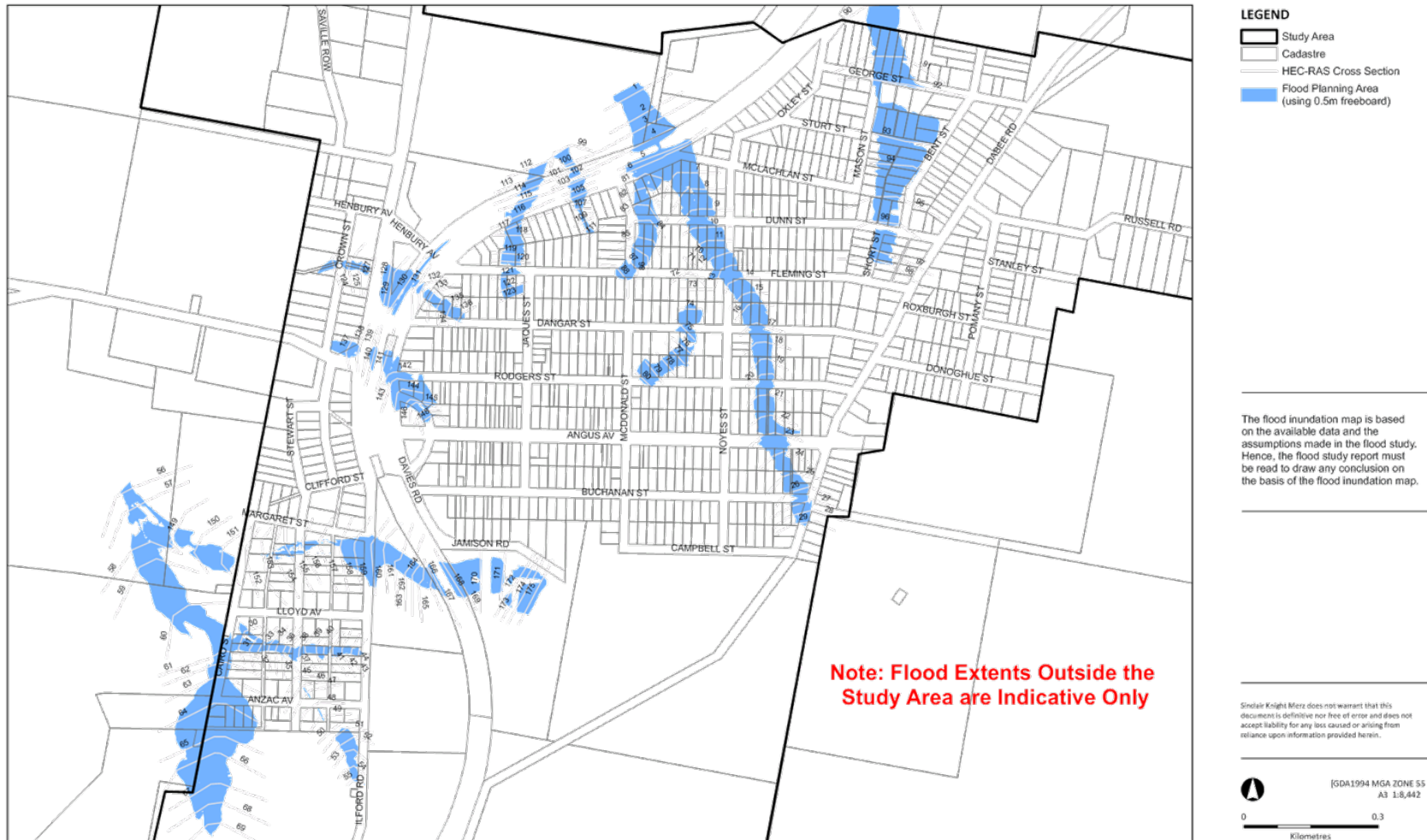


**5.1.6 Flood Planning Area**

The flood planning area (FPA) is defined by the extent of the area below the flood planning level (usually the 1% AEP flood plus freeboard) and delineates the area and properties where flood planning controls are proposed, for example, minimum floor levels to ensure that there is sufficient freeboard of building habitable floor levels above the 1% AEP flood. Other controls may be considered, such as policies on fence construction or rezoning.

A freeboard of 0.5m is often selected for defining the flood planning level on mainstream floodplains, while a reduced freeboard of 0.3m may be more appropriate in some areas affected by overland flows. However, in the case of Kandos, the difference in flood planning areas with a 0.5m freeboard and 0.3m freeboard is minimal and hence a freeboard of 0.5m has been adopted. This remains consistent with the Mid-Western Council Local Environmental Plan (2012). The flood planning area map for Kandos is shown in **Figure 5-6**.

Figure 5-6 Flood Planning Area for Kandos due to Rainfall Runoff Generated from Local Catchments



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### 5.1.7 Flood Emergency Response

Flood emergency response is an important outcome of the Floodplain Risk Management Process. The State Emergency Service (SES) will use the information contained in the studies to update the Mid-Western Regional Council Local Flood Plan for Kandos.

Areas within the catchment have been classified based on the floodplain risk management guideline *Flood Emergency Response Planning – Classification of Communities* (DECC, 2007). The classification indicates the relative vulnerability of different areas of the catchment and considers the ability to evacuate certain parts of the community. It is considered preliminary and subject to update in the subsequent Floodplain Risk Management Study. The classification has been undertaken for the 20% AEP, 1% AEP and PMF events, with mapping provided in **Figure 5-7**, **Figure 5-8** and **Figure 5-9** respectively.

The categories identified included:

- Indirectly Affected: Areas which are not flood affected and whose access is not cut-off, but may be affected by flood impacts to services and infrastructure in the area.
- Rising Road Access: Areas that become inundated by flooding which can be evacuated by vehicles on roads with continuously rising grade to high ground.
- Overland Escape Route: Areas where vehicular access is cut-off but can be evacuated on foot to high ground.
- High Trapped Perimeter: Areas which are partially or wholly above the peak flood level but whose evacuation routes are cut-off. These areas are not surrounded by flood waters but there may be a physical barrier preventing evacuation overland.
- Low Trapped Perimeter: Areas which are above the peak flood level during early stages of the flood, and which become submerged as the flood peaks, cutting off evacuation routes and there may be a physical barrier preventing evacuation overland.
- High Trapped Island: Areas which are above the peak flood level but surrounded by flood waters and whose evacuation routes are cut-off.
- Low Trapped Island: Areas which are surrounded by flood waters during early stages of the flood, and which become submerged as the flood peaks.

The guideline is largely geared towards classification of communities in mainstream floodplains with longer flooding response times. Hence some assumptions were made to suit the shorter-duration overland flooding that occurs in Kandos:

- For overland escape routes, the maximum depth considered safe for humans is 0.5m (for children) and a maximum velocity of 3m/s (AR&R 2016).
- For vehicle evacuation to be possible it was considered that a depth of approximately 0.2m was the limit of stability for small passenger cars, subject to the velocity of flows (AR&R 2016).
- Some properties are located on overland flow paths and their dwellings become surrounded by flooding. While there may be a rising road or overland evacuation routes available, due to the rapid rise in flood level, there may be insufficient warning time before the dwelling is surrounded by deep floodwaters and subsequently inundated. These areas were treated as 'low flood islands' since there was no information available on habitable floor levels of these dwellings.
- It was considered that all residential properties have fences that are barriers to overland escape routes as they may be too high for some members of the community to climb. For example if a property has flooding in the front yard and it cuts off street access then an overland escape route would not be possible through the sides or rear of the property and hence it would be a 'high trapped perimeter' classification.



Figure 5-8 Classification of Communities for Kandos for the 1% AEP Flood Event due to Rainfall Runoff Generated from Local Catchments

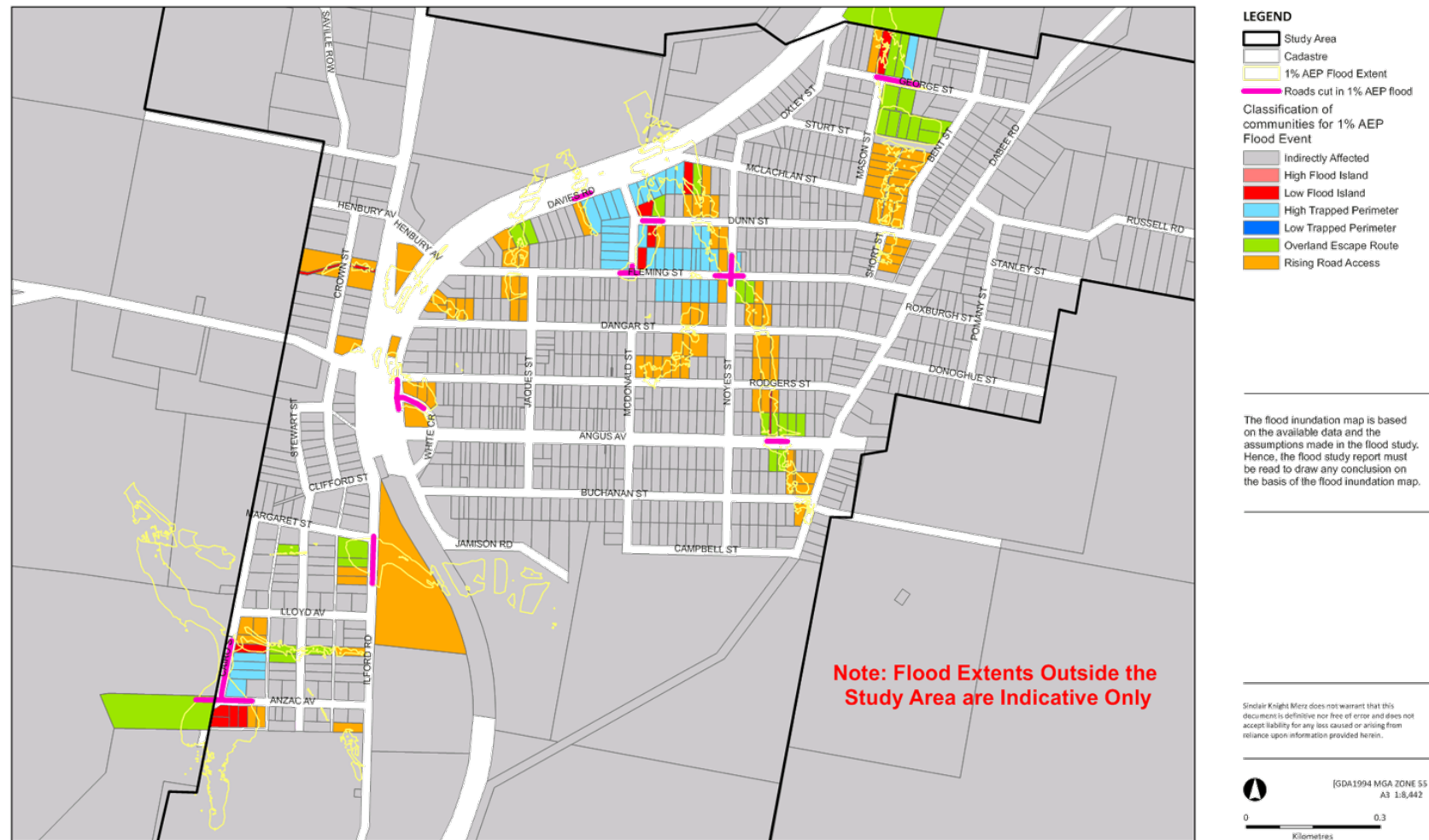


Figure 5-9 Classification of Communities for Kandos for the PMF Event due to Rainfall Runoff Generated from Local Catchments





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- Areas of trapped high ground (High Trapped Perimeter or High Trapped Island) are not a serious concern for Kandos, since the duration of flooding is expected to be relatively short. These areas do not require evacuation.
- Properties with full vehicular access to the street that were not affected by flooding have been classed as 'indirectly affected' since there may be impacts to them such as damaged road infrastructure, loss of normal transport links, electricity supply, water supply, sewage or telecommunication services.

There are four roads that lead in to/out of Kandos – three on the western side of the railway line (Ilford Road to the north and south, and an unnamed road to the west) and one on the eastern side of the railway (Dabee Road to the north). These roads are important for regional evacuation out of the town. The two connecting bridges across the railway line (Angus Avenue and Henbury Avenue) remain accessible in all flood events up to the PMF. While Ilford Road to the south is cut off in the 20% AEP to PMF events, regional access to Kandos remains open to the north and south up to the PMF event.

Since Kandos is subject to short-duration overland flooding, it is considered more important that flood affected properties are able to access higher ground to avoid floodwaters. It is unlikely that Kandos would experience significant flooding for more than a few hours. Properties classes as 'high trapped perimeter' or high flood island' do not pose a significant problem since the residents would have access to higher ground in the event of a flood and will not be displaced for long due to the short duration of flooding expected in Kandos. Properties with 'rising road access' provide the best method of evacuation for those who are required to evacuate. Details on roads that are cut due to floodwater are also provided in the classification of communities maps (**Figure 5-7** to **Figure 5-9**). Overland escape routes provide the next best option, where evacuation can occur on foot. 'Low flood island' and 'low trapped perimeter' properties are those of most concern, as if they do not evacuate when flooding starts to occur, they may be trapped in their dwelling.

**5.1.8 Flooding with Future Development**

Potential future development for Kandos is outlined in **Figure 5-10**. For the flood study (SKM 2013), a general land use layer was used to estimate the fraction impervious of each catchment identified in the DRAINS model. **Table 5-2** shows the land use categories and associated fraction impervious.

**Table 5-2 Land use layer categories and estimated fraction impervious**

Land use category	Fraction impervious
Open space	0.05
Commercial	0.50
Railway	0.20
Road	0.70
Rural / Rural Residential	0.10
Urban / Residential	0.30
Quarry	0.80

Many of the identified vacant lots, which have potential for short to long term development, are already included in the 'residential' land use layer (refer to **Figure 4-2**). There are three areas located outside the identified urban / residential area that have the potential to be developed in the future – one to the north of the town on the

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

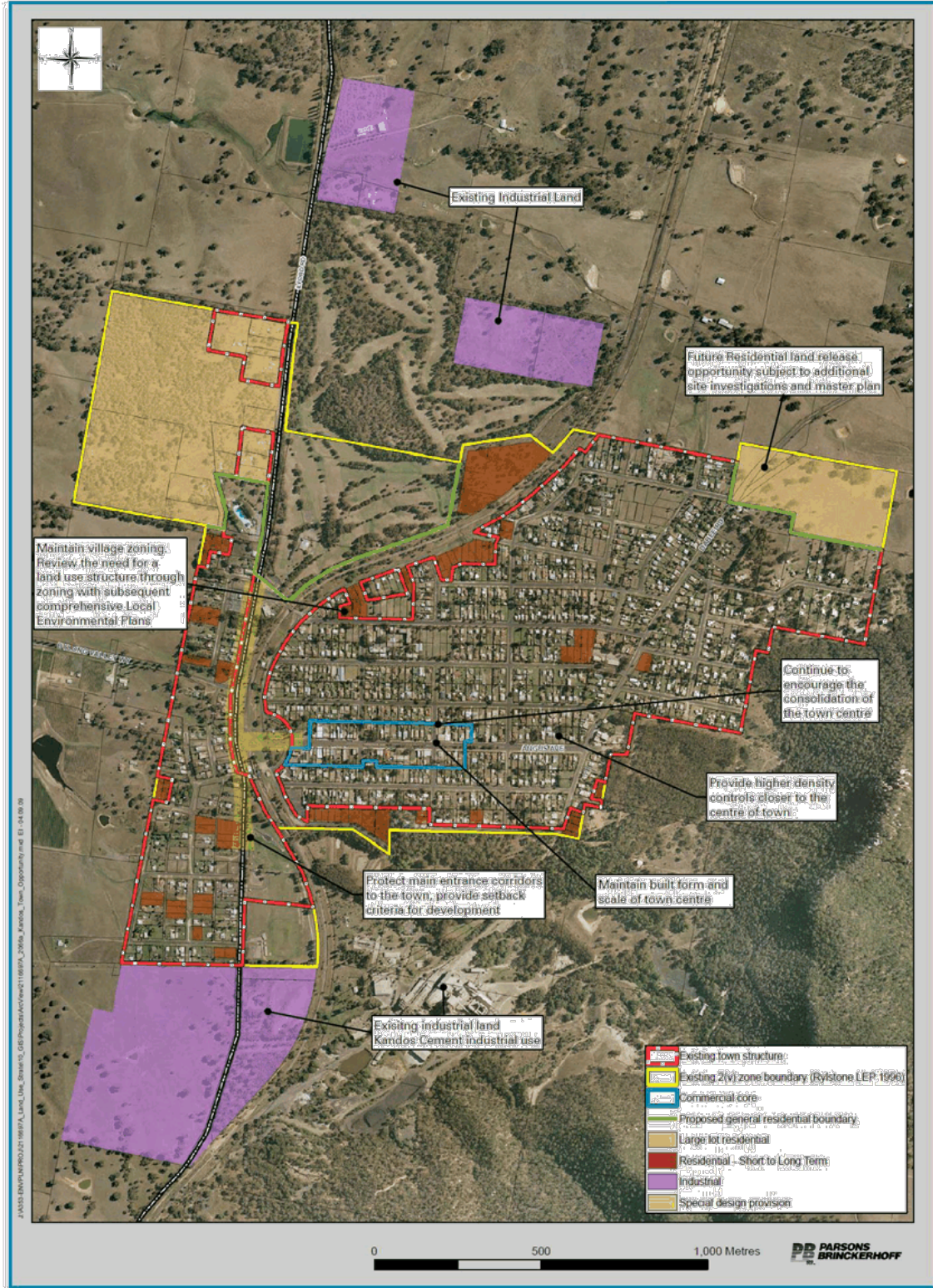
northern side of the railway corridor, one is a row of vacant blocks along Jamison Street on the southern side of the town and the other is four lots at the southern end of Dabee Road (refer to **Figure 5-10**). The area to the north is located at the end of the main flow path through Kandos. Additional runoff from development in this area will flow into this flow path and continue out of the town area and hence will have no impact on flooding within the town. The area to the south will increase impervious runoff at the upstream end of a flow path running west through a 'rural residential' area. These properties, however, are located within a much larger catchment (local catchment is approximately 150ha in area, with a total catchment area of approximately 280ha draining to this flow path) and the increase in impervious area will have an indiscernible impact on discharge. Similarly, the properties located at the upper end of the main flow path through Kandos will have a minimal impact on discharge. While the catchment is approximately 4ha in area, the properties only occupy 10% of this. The impervious fraction of this area will increase from 0.05 to 0.30. Sensitivity testing showed that the 1% AEP peak flows from this catchment increase from 1.15m<sup>3</sup>/s to 1.16m<sup>3</sup>/s with this increase in impervious area, which was considered negligible.

It is recommended that if any areas are to be rezoned that a detailed flood study be undertaken to investigate any flooding issues that will occur as a result of any new development.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



Figure 5-10 : Comprehensive Land Use Strategy for Kandos (source: Council )



**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

## 5.2 Rylstone

### 5.2.1 Existing Flooding

The Rylstone Township is located on the southern side of the Cudgegong River, downstream of Rylstone Dam. The existing flooding conditions for Rylstone were investigated and reported in the "Flood Study for Kandos and Rylstone" report (SKM 2013). There are two mechanisms of flooding for Rylstone – the first is riverine flooding from the Cudgegong River, and the second is flooding from local overland flow paths.

The riverine flooding, from the Cudgegong River, was modelled in the SKM 2013 study using an XP-RAFTS hydrological model and a MIKE-11 hydraulic model. The MIKE-11 model was updated at part of this study to remove any potential glass wall effect for the PMF event. MIKE-11 cross sections were extended to cover the entire flood extent for the PMF event. The available LiDAR data and 0.5m contour data were used to extend MIKE-11 cross sections. The updated MIKE-11 model was run for the PMF event and no significant changes in flood behaviour were identified. This was due to the fact that the adopted inflow hydrograph for the PMF event for the catchment area of Rylstone Dam was based on the 2003 PMF Study for Rylstone Dam, which estimated the peak inflow to be 14,700 m<sup>3</sup>/s. The adopted peak inflow for the PMF event is 32 times larger than the 1% AEP peak inflow into Rylstone Dam. An independent check undertaken using CRC for Catchment Hydrology (1996) provides a peak flow of 6,200 m<sup>3</sup>/s for the PMF event for Rylstone Dam. A review of the consequence category for Rylstone Dam is under consideration by Council.

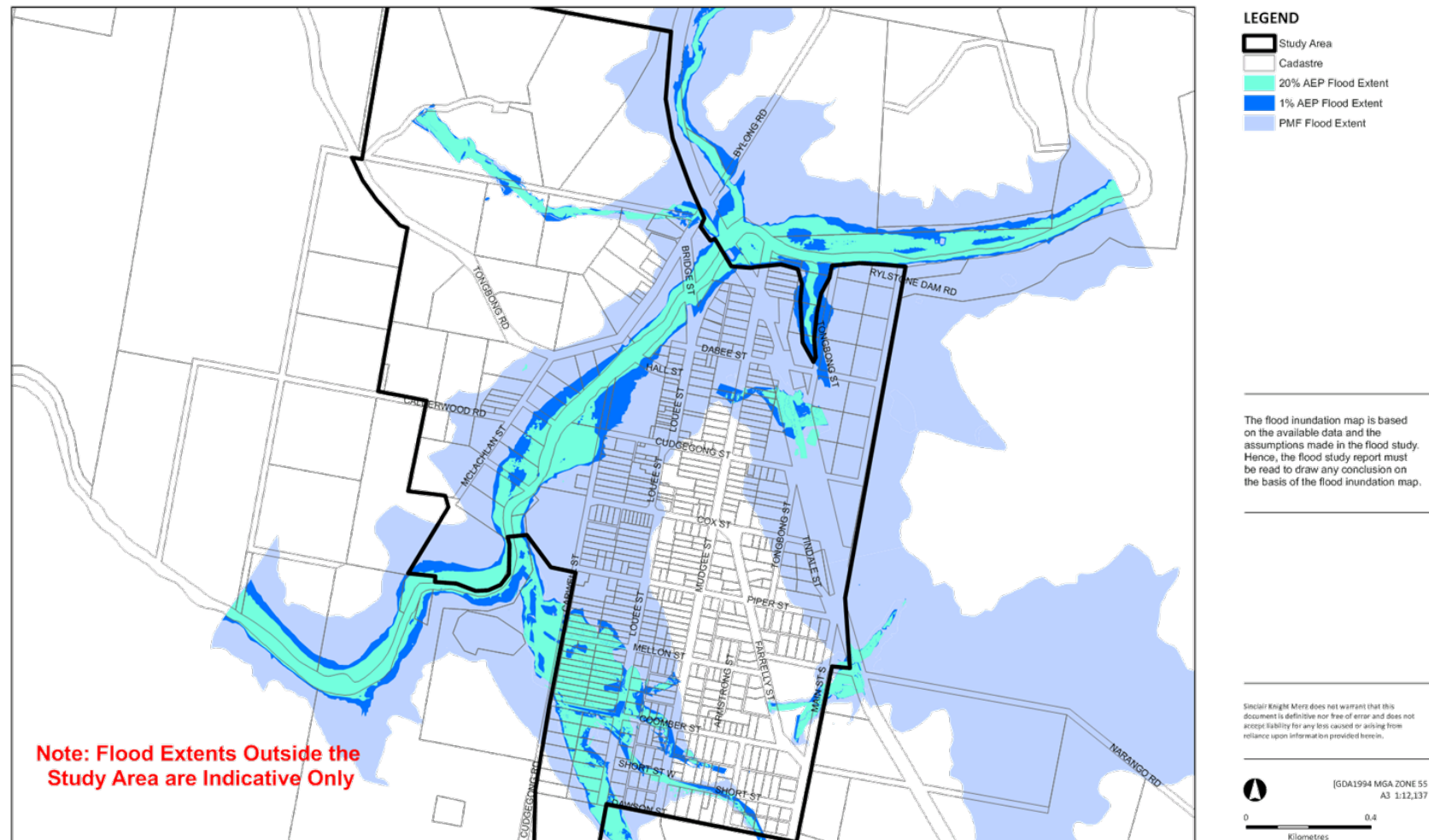
Local overland flooding was modelled using a DRAINS hydrological model for catchment flows and the Rylstone stormwater network. Discharges surcharging or not captured by the stormwater piped system were then used as inflows into a HEC-RAS model representing the overland flow paths through Rylstone.

The combined riverine and local overland flood extents are shown in **Figure 5-11**.

The flood extent for the 20% AEP riverine flood extent is limited within the banks of the Cudgegong River and the 1% AEP event does not have a significant impact on properties in Rylstone. The PMF, however, being at least 10m above the 0.5% AEP flood level, causes extensive inundation in Rylstone and the majority of areas within the township are affected by the PMF event.

Rylstone has several overland flow paths that impact on the town. Rylstone is located on a ridge, which Farrelly Street runs along. Water sheds either side of this ridge. The primary area affected by overland flows is across the south-west portion of the town, where several overland flow paths run in a north-westerly direction and converge on the Cudgegong River. There are also some smaller flow paths that flow from the ridgeline to the east. On the northern side of the Cudgegong River one overland flow path discharges into the river, in between the crossings of the railway line and Bylong Valley Way. A number of properties are impacted by local overland flooding in a 20% AEP event. These properties are located on the southern end of Louee Street between Dawson Street and Melon Street, on Cudgegong Road/Carwell Street between Dawson Street and Piper Road; and along Dawson Street, Short Street and Coomber Street. The extent of inundation in a 1% AEP event is slightly more extensive than in the 20% AEP event. The FPL covers more area than the overland PMF, indicating that the FPL is higher than PMF levels in some areas.

Figure 5-11 Combined Overland and Riverine Flood Extents for Rylstone under Existing Conditions



**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone****5.2.2 Additional Flood Assessment**

During the Floodplain Risk Management Study phase, additional flood modelling was undertaken to assess the sensitivity of pit capacities and blockages as unlimited pit inlet capacity was assumed in the DRAINS model developed in the Flood Study phase. The updated DRAINS modelling included two additional scenarios where pit capacities were introduced and blockages were applied. Pit inlet capacities were taken from the 'Hornsby Council' database within DRAINS where on-grade and sag pits with lintels could be modelled.

Data from the survey undertaken of the Rylstone stormwater network was used to assign an appropriate pit inlet capacity. The flow in pipes reduced by up to  $0.59\text{m}^3/\text{s}$  with an average reduction of  $0.12\text{m}^3/\text{s}$  in the 1% AEP event. Hence the stormwater network capacity was reduced when inlet capacities were taken into account. A scenario with inlet blockages was also tested. The recommended blockages of 20% for on-grade pits and 50% for sag pits were adopted based on Australian Rainfall and Runoff (2013). The flow in pipes was further reduced by up to  $0.06\text{m}^3/\text{s}$  in the 1% AEP event when blockage factors were implemented. The average reduction, however, was just  $0.02\text{m}^3/\text{s}$ .

The overland discharges were then applied to the HEC-RAS model for both scenarios. The results indicated that the change in flood level when pit capacities were modelled was a maximum increase of 0.24m for the 1% AEP event. The majority of cross sections, however, had peak water levels within 0.05m. When blockages were incorporated, there was no discernible change in peak water level for the 1% AEP event over the pit inlet capacity scenario.

This sensitivity analysis showed that the flows in the Rylstone stormwater system were sensitive to the pit capacities and blockage factors used. Flows in pipes were reduced as much as 90% under these scenarios. The additional overland flow, however, generally did not significantly contribute to raising the peak water level during a flood. While the peak water level at some cross sections showed a notable increase, generally the increase was small and the overall flood extent did not show a substantial change when pit inlet capacities and blockages were modelled. The flows conveyed by the stormwater system were minor compared to the overland flows experienced in Rylstone during flood events.

**5.2.3 Hydraulic Categorisation**

During the flood study phase, hydraulic categories were only developed for riverine flooding in Rylstone. The delineation of hydraulic categories is important with the adoption of merit based flood policy. This is because the NSW Government's Floodplain Development Manual (2005) recognises three hydraulic categories of flood prone land (floodway, flood storage and flood fringe). Definition of floodways, flood storage and flood fringe, as given in the Manual, are presented below:

- Floodways are those areas where a significant volume of water flows during floods and are often aligned with obvious natural channels. They are areas that, even if only partially blocked, would cause a significant increase in flood levels and/or a significant redistribution of flood flow, which may in turn adversely affect other areas. They are often, but not necessarily, areas with deeper flows or areas where higher velocities occur.
- Flood Storage areas are those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood.
- Flood Fringe is the remaining area of land affected by flooding, after floodway and flood storage areas have been defined. Development in flood fringe areas would not have any significant effect on the pattern of flood flows and/or flood levels.

After reviewing the nature of riverine flooding in Rylstone and considering the fact that the low flow channel of the Cudgegong River was poorly represented in the ALS data, the flood extent for the 20% AEP event was classified as floodway (the Cudgegong River channel) and the remaining areas were classified as flood fringe. These areas can be seen in **Figure 5-12**.



**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone****5.2.4 Hazard Categorisation**

Flood hazard categories were determined for both riverine and overland flooding in Rylstone. These were generated in accordance with the NSW Government's Floodplain Development Manual (2005), using the criteria outlined in **Figure 5-3**. The flood hazard map for Rylstone is shown in **Figure 5-13**. The Cudgegong River itself is classified as high hazard, with two smaller tributaries entering near Tongbong Street and Bylong Valley Way also having a large high hazard area. For the overland flows, much of the area is low hazard, with some isolated areas being high hazard.

**5.2.5 Flood Risk Precincts**

The Mid-Western Regional Council Development Control Plan (DCP) 2013 refers to Flood Risk Precincts (FRP's) to define areas of flood prone land where certain development constraints apply. The FRP categories are defined in Section 4.3.5.

The Flood Risk Precinct map for Rylstone is shown in **Figure 5-14**. The areas of high flood risk are the same as those with a high flood hazard. The remaining area within the 1% AEP flood extent is medium risk and low risk is present to the PMF extent.

**5.2.6 Flood Planning Area**

The flood planning area (FPA) is defined by the extent of the area below the flood planning level (usually the 1% AEP flood plus a freeboard) and delineates the area and properties where flood planning controls are proposed, for example, minimum floor levels to ensure that there is sufficient freeboard of building habitable floor levels above the 1% AEP flood. Other controls may be considered, such as policies on fence construction or rezoning.

A freeboard of 0.5m is often selected for defining the flood planning level on mainstream floodplains, while a reduced freeboard of 0.3m may be more appropriate in some areas affected by overland flows. However, in the case of Rylstone, the difference in flood planning areas affected by overland flows with a 0.5m freeboard and 0.3m freeboard is minimal and hence a freeboard of 0.5m has been adopted both for mainstream and overland flooding. This remains consistent with the Mid-Western Council Local Environmental Plan (2012). The flood planning area map for Rylstone is shown in **Figure 5-15**.



Figure 5-13 Combined Overland and Riverine Flood Hazard Categorisation for Rylstone for the 1% AEP event

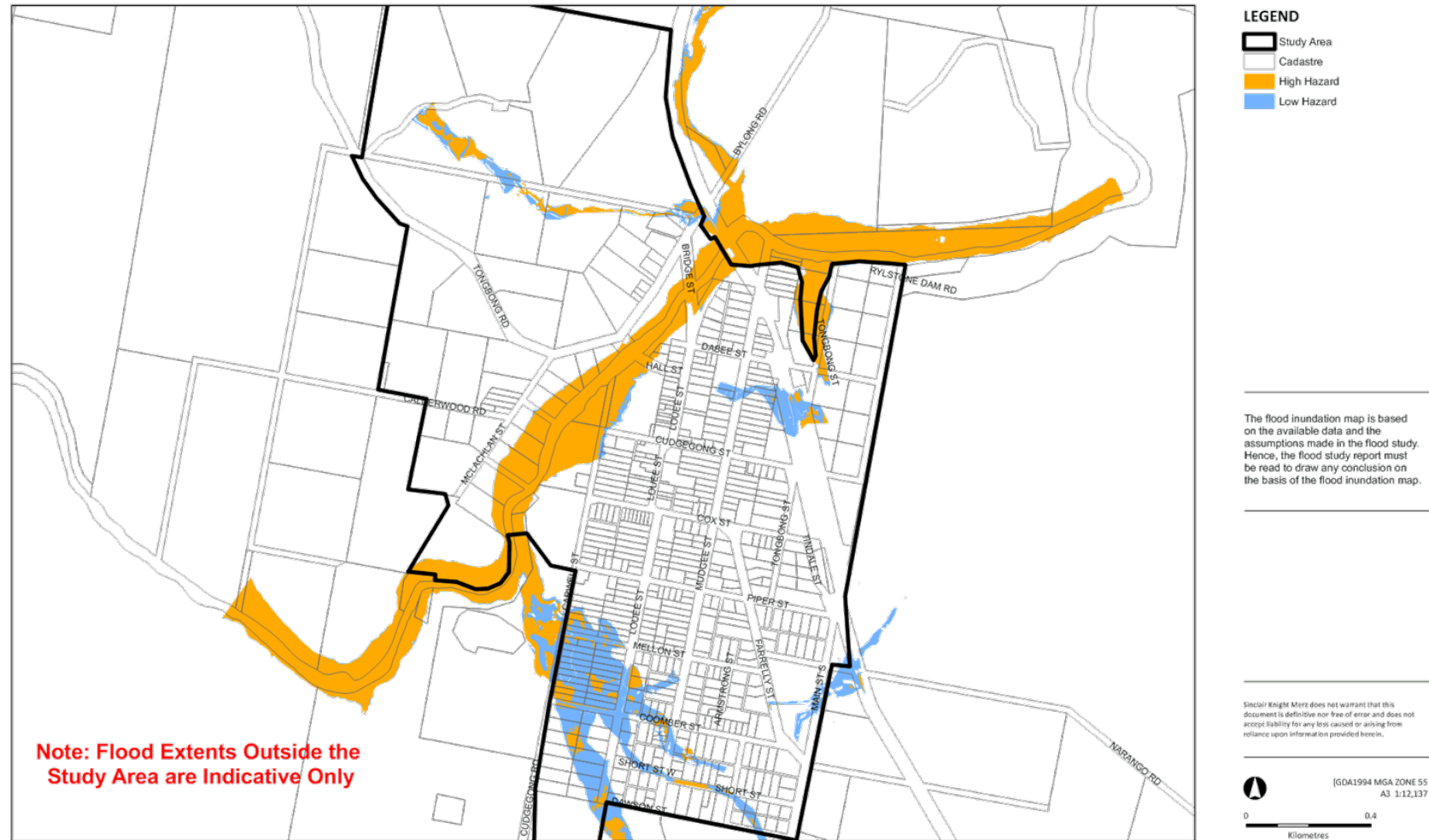


Figure 5-14 Combined Overland and Riverine Flood Risk Precincts for Rylstone

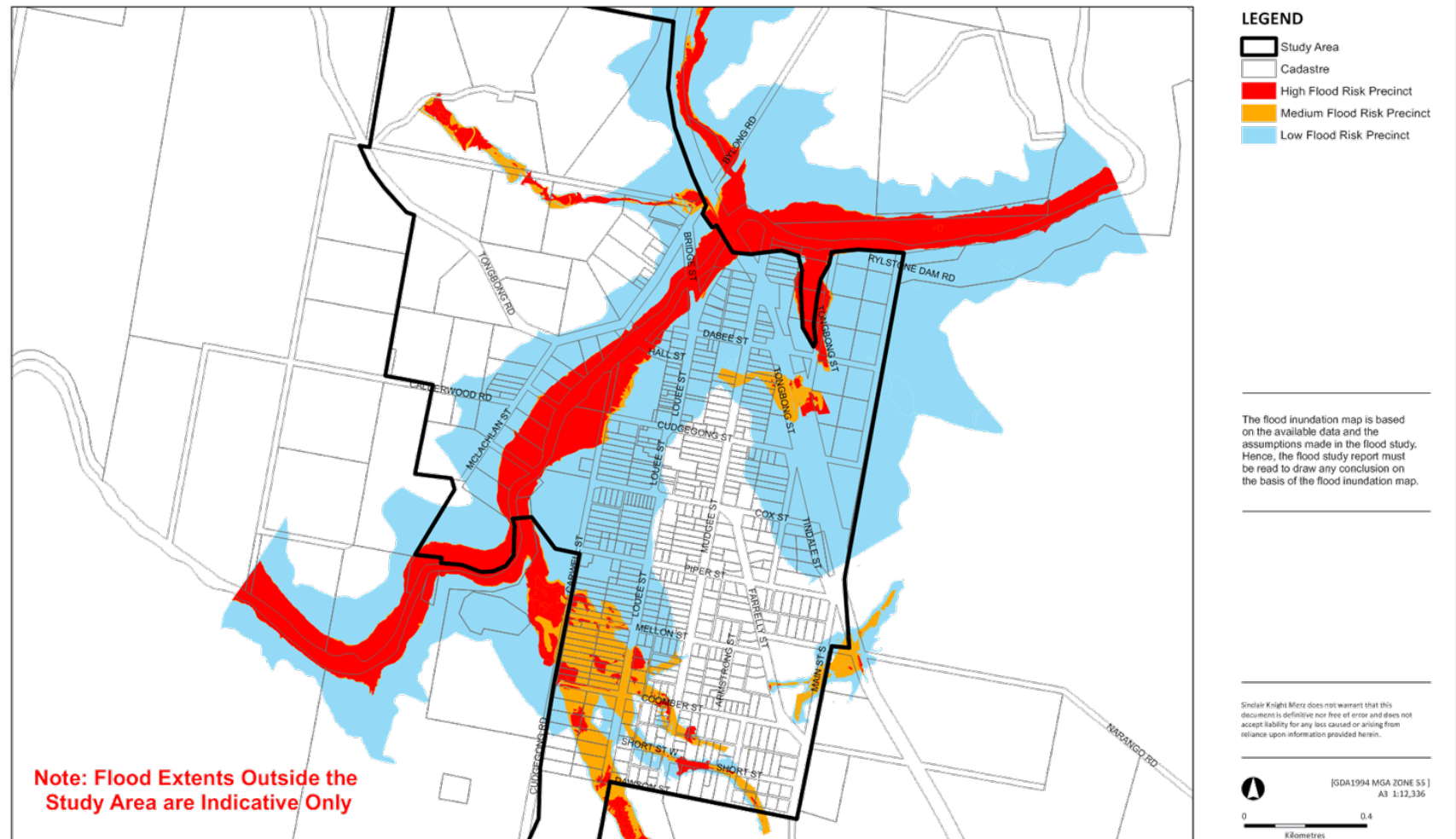
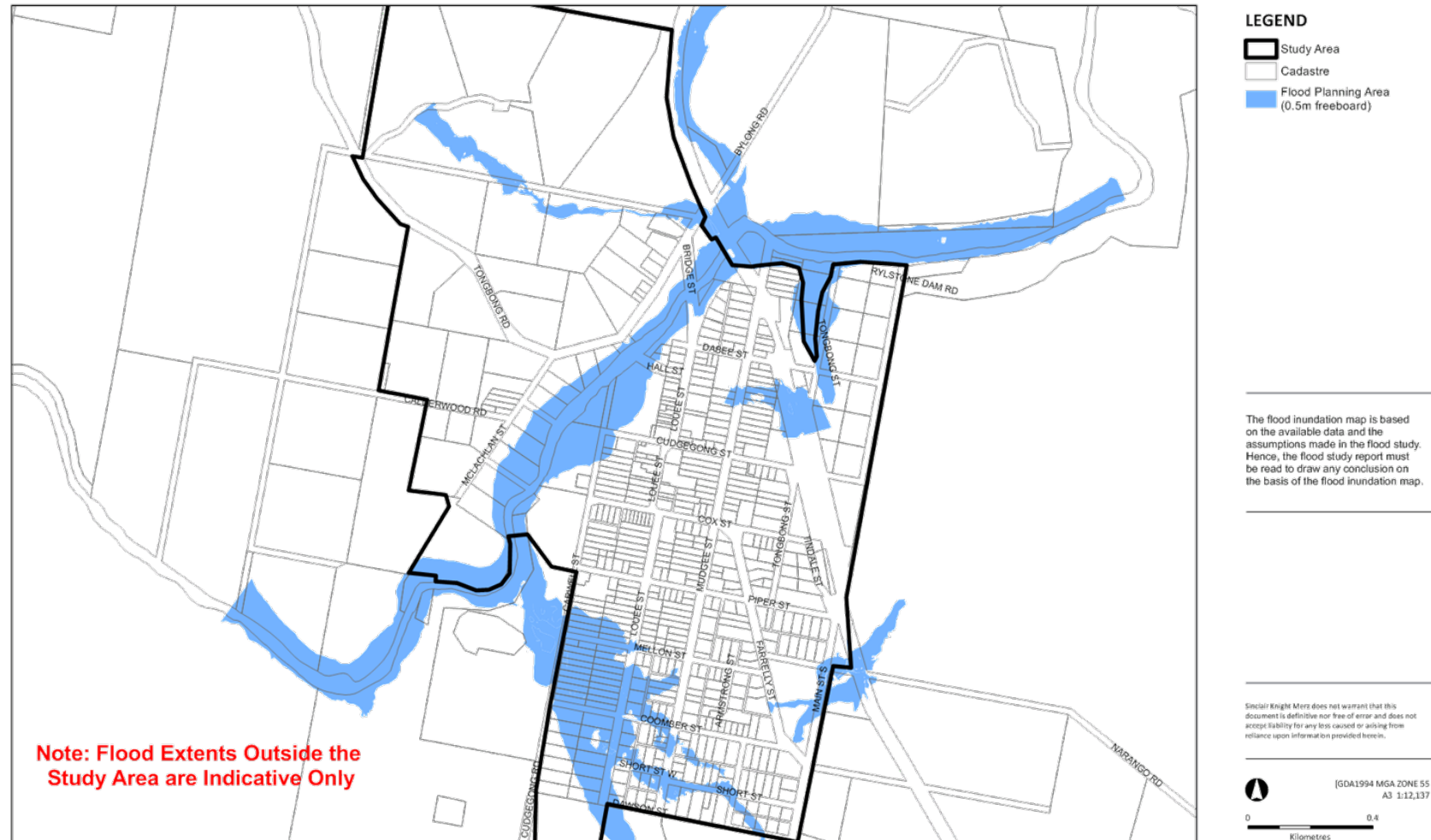


Figure 5-15 Combined Overland and Riverine Flood Planning Area for Rylstone



## Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone



### 5.2.7 Flood Emergency Response

Flood emergency response is an important outcome of the Floodplain Risk Management Process. The State Emergency Service (SES) will use the information contained in the studies to update the Mid-Western Regional Council Local Flood Plan for Rylstone.

Areas within the catchment have been classified based on the floodplain risk management guideline *Flood Emergency Response Planning – Classification of Communities* (DECC, 2007). The classification indicates the relative vulnerability of different areas of the catchment and considers the ability to evacuate certain parts of the community. It is considered preliminary and subject to update in the subsequent Floodplain Risk Management Study. The classification has been undertaken for the 1% AEP and PMF events, with mapping provided in **Figure 5-16** and **Figure 5-17** respectively. Details on the roads that have access cut off are also shown in the maps.

The categories identified included:

- Indirectly Affected: Areas which are not flood affected and whose access is not cut-off, but may be affected by flood impacts to services and infrastructure in the area.
- Rising Road Access: Areas that become inundated by flooding which can be evacuated by vehicles on roads with continuously rising grade to high ground.
- Overland Escape Route: Areas where vehicular access is cut-off but can be evacuated on foot to high ground.
- High Trapped Perimeter: Areas which are partially or wholly above the peak flood level but whose evacuation routes are cut-off. These areas are not surrounded by flood waters but there may be a physical barrier preventing evacuation overland.
- Low Trapped Perimeter: Areas which are above the peak flood level during early stages of the flood, and which become submerged as the flood peaks, cutting off evacuation routes and there may be a physical barrier preventing evacuation overland.
- High Trapped Island: Areas which are above the peak flood level but surrounded by flood waters and whose evacuation routes are cut-off.
- Low Trapped Island: Areas which are surrounded by flood waters during early stages of the flood, and which become submerged as the flood peaks.

The guideline is largely geared towards classification of communities in mainstream floodplains with longer flooding response times, hence some assumptions were made to suit the combined mainstream flooding and shorter-duration overland flooding that occurs in Rylstone:

- For overland escape routes, the maximum depth considered safe for humans is 0.5m (for children) and a maximum velocity of 3m/s (AR&R 2016)
- For vehicle evacuation to be possible it was considered that a depth of approximately 0.2m was the limit of stability for small passenger cars, subject to the velocity of flows (AR&R 2016).
- Some properties are located on overland flow paths and their dwellings become surrounded by flooding. While there may be a rising road or overland evacuation routes available, due to the rapid rise in flood level, there may be insufficient warning time before the dwelling is surrounded by deep floodwaters and subsequently inundated. These areas were treated as 'low flood islands' since there was no information available on habitable floor levels of these dwellings.
- It was considered that all residential properties have fences that are barriers to overland escape routes as they may be too high for some members of the community to climb. For example if a property has flooding in the front yard and it cuts off street access then an overland escape route would not be possible through the sides or rear of the property and hence it would be a 'high trapped perimeter' classification.
- Properties with full vehicular access to the street that were not affected by flooding have been classed as 'indirectly affected' since there may be impacts to them such as damaged road infrastructure, loss of normal transport links, electricity supply, water supply, sewage or telecommunication services.

Figure 5-16 Combined Overland and Riverine Classification of Communities for Rylstone for the 1% AEP event

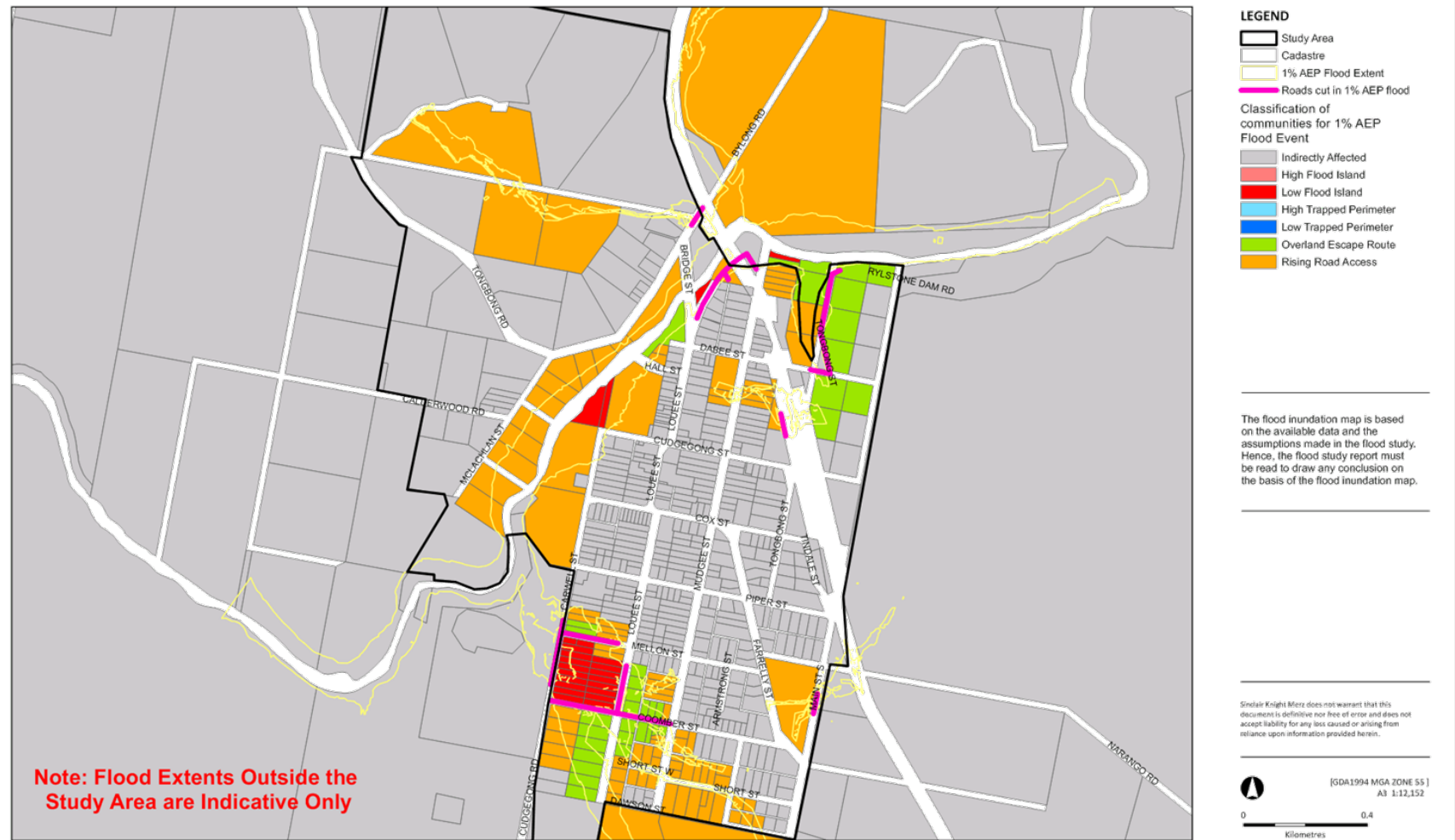
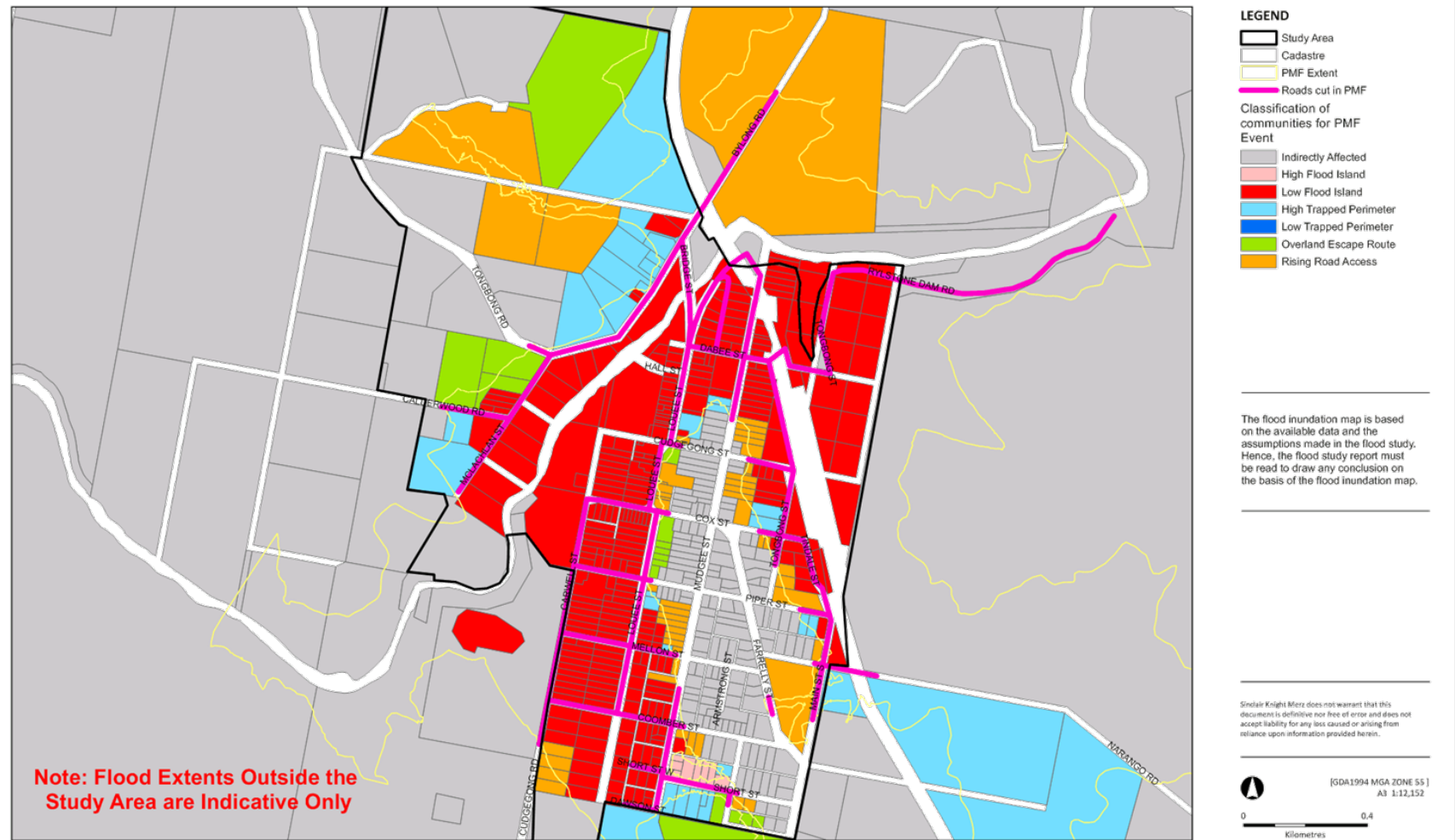


Figure 5-17 Combined Overland and Riverine Classification of Communities for Rylstone for the PMF event



**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



There are five roads that lead in to/out of Rylstone – three on the southern side of the Cudgegong River (Narango Road to the east, Ilford Road to the south and Cudgegong Road to the south west) and two on the northern side of the Cudgegong River (Bylong Road to the north and Tongbong Road to the north west). These roads are important for regional evacuation out of the town. The Bridge Street bridge crossing the Cudgegong River and connecting the two areas of Rylstone is only overtopped in the PMF event. Ilford Road / Farrelly Street is located on a ridge line and remains trafficable in the 1% AEP event. In the PMF event there is a local drainage flow path that crosses a sag point in Farrelly Street near Rylstone Hospital. Flood water is expected to be less than 0.5m deep across the road and only for a very short period of time (since it is subject to overland flooding rather than mainstream flooding, and is located at the upstream end of the drainage catchment). For the classification of communities, it has been assumed that this road will be open to traffic for a large proportion of the time during the PMF event (where most properties that would utilise this road for evacuation are impacted by riverine flooding), and hence the town south of the Cudgegong River is not completely cut off in the PMF event. North of the Cudgegong River, Bylong Road is cut off in the 1% AEP event from overland flooding only, and Tongbong Road remains a viable evacuation route. In the PMF event, riverine flooding cuts all these access roads north of the Cudgegong River.

The Rylstone township is located on a ridge line the grades down to the Cudgegong River to the north. In the 1% AEP the town is mainly affected by overland flooding, with the primary area of concern the south western corner of the town where several small overland flow paths combine. This cuts off access along Cudgegong Road and cause flooding problems. Some other peripheral roads are also cut. The flooding, however, is expected to be of a short duration and not a significant issue with most residents having a viable evacuation route or high ground to move to. In the PMF event, riverine flooding of the Cudgegong River is the primary issue. The floodwater surrounds the main ridge line and inundates a significant portion of the town. Residents, given enough warning time, will be able to evacuate south along Ilford Road. For properties north of the Cudgegong River early evacuation is also necessary, since the evacuation routes become inaccessible.

Properties with 'rising road access' provide the best method of evacuation for those who are required to evacuate. Overland escape routes provide the next best option, where evacuation can occur on foot. 'High flood island' and 'high trapped perimeter' properties may be adequately safe if affected by overland flooding, but may require resupply or evacuation by boat or air if impacted by long duration riverine flooding. 'Low flood island' and 'low trapped perimeter' properties are those of most concern, as if they do not evacuate when flooding starts to occur, they may be trapped in their dwelling.

### 5.2.8 Flooding with Future Development

Potential future development for Rylstone is outlined in **Figure 5-18** which indicates that the township (including all residential and commercial/retail land uses) is currently zoned with the existing 2(v) village zone boundary, and areas outside the boundary are zoned as 1(c) Rural Small Holdings – Rural Residential, 1(c1) Rural Small Holdings – Rural Retreat, 1(a) General Rural, 7(c) Water Catchment and 4(a) Industrial.

For the flood study (SKM 2013), a general land use layer was used to estimate the fraction impervious of each catchment identified in the DRAINS model. **Table 5-2** shows the land use categories and associated fraction impervious. Currently there are 31 vacant lots which can supply residential growth for the next 5-10 years. These lots, being identified as short-term residential (refer to **Figure 5-18**), were adopted as 'open space' for calculating runoff in the SKM 2013 study. There are two distinct areas – one in the south eastern corner of the town and the other in the north eastern corner. The area in the south east is located at the upper end of two of the main overland flow paths through Rylstone. The catchment that drains to the flow path that runs along Coomber Street has an increase in impervious area of approximately 17% (estimated 0.63ha of additional impervious area in the 3.65ha catchment).

The future development results in an increase in peak flows at the upper end of the flow path. The 1% AEP peak flow increases from 1.71m<sup>3</sup>/s to 1.81m<sup>3</sup>/s. This increase of 0.1m<sup>3</sup>/s will have a negligible impact on peak flood levels, especially taking into account the additional catchment area which enters downstream. For the catchment that drains to the flow path which runs along Short Street, the increase in impervious area is approximately 6% (estimated 0.3ha of additional impervious area in the 4.92ha catchment). This results in an increase in peak flows at the upper end of the flow path. The 1% AEP peak flow increases from 1.49m<sup>3</sup>/s to 1.54m<sup>3</sup>/s. This increase of 0.05m<sup>3</sup>/s will also have a negligible impact on peak flood levels, as it is very small in

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

comparison to the total flows along that flow path. The other area marked for short term residential development on the north eastern corner of the town is located on the downstream end of a local flow path. Any new development in this area will need to be compatible with the flood hazard present along the flow path. The change in impervious area will not affect the existing urban development, since it is located upstream of this area.

Long term residential development has also been identified for two areas (refer to **Figure 5-18**) – one on the north eastern edge of the town, to the west of the unnamed tributary of the Cudgegong River, and the other on the western side of the Cudgegong River, along Tongbong Road. Runoff from the area on the north eastern side of Rylstone will enter directly into the tributary of the Cudgegong River and will not impact on existing development. The area on the western side of the Cudgegong River will primarily drain directly to the Cudgegong River and will not impact on existing development. A small portion of land which is already classified as 'rural residential' (impervious fraction of 0.1) may impact on a flow path which is directly north of the area. The land category will change to 'urban residential' (impervious fraction of 0.3) and this increase in impervious area will be negligible considering the large catchment area which the flow path drains.

There are also areas identified for short term rural residential development and long term rural residential development. These areas exist on the western side of the Cudgegong River and many will drain directly to the Cudgegong River. The increase in impervious area (approximately 5%) is considered minimal and will have a negligible impact on peak flood levels.

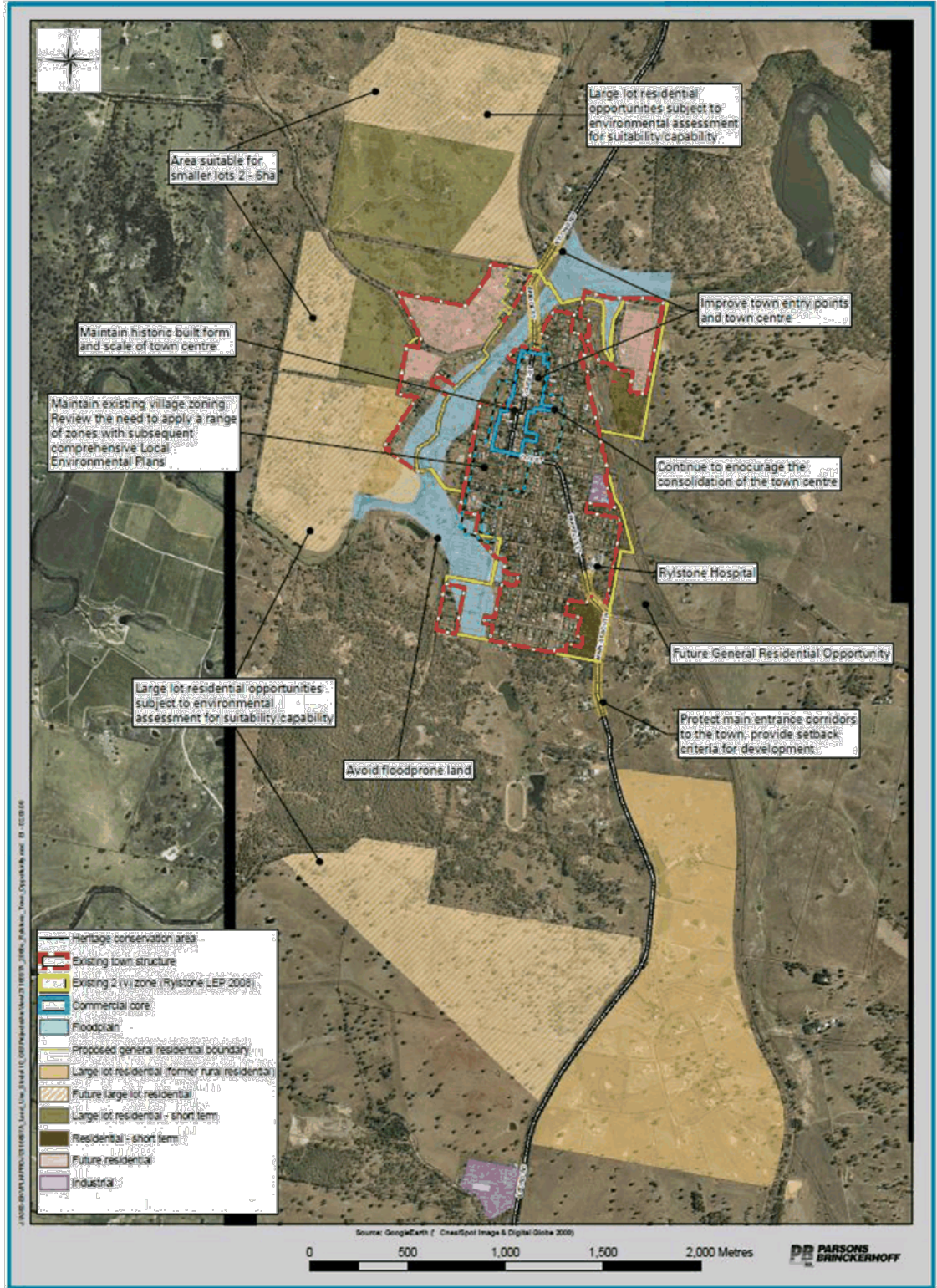
It is recommended that if any areas are to be rezoned that a detailed flood study be undertaken to investigate any flooding issues that will occur as a result of any new development.



**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



Figure 5-18 : Comprehensive Land Use Strategy for Rylstone (source:Council )



**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

## 6. Flood Damages

### 6.1 Introduction

The quantification of flood damages is an important part of the floodplain risk management process. By quantifying flood damages for a range of design events, appropriate management measures can be evaluated in terms of their benefits (reduction in flood damage) versus the cost of implementation.

The cost of flood damage and disruption to a community depend on a number of factors which include:

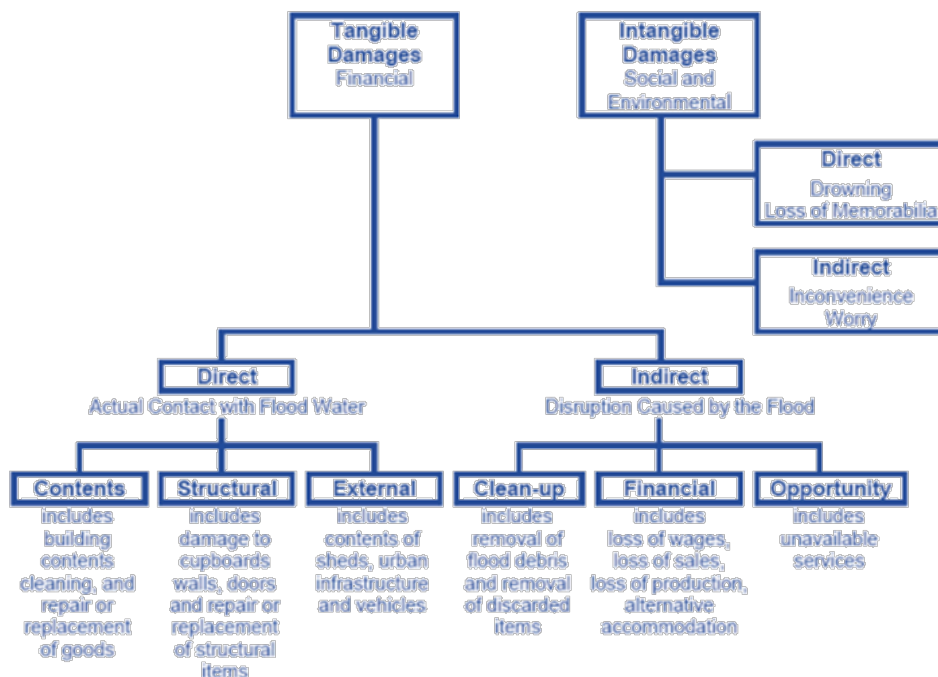
- Flood magnitude (depth, velocity and duration)
- Type of structures at risk and their susceptibility to damage
- Nature of the development at risk (residential, commercial, industrial)
- Awareness and readiness of the community to flooding
- Effective warning times
- Availability of Evacuation Plans

The potential damage associated with a particular sized flood can be divided into a number of components, which are grouped into two major categories;

- Tangible damages – financial costs of flooding quantified in monetary terms
- Intangible damages – social costs of flooding reflected in increased levels of mental stress, physical illness, inconvenience to people, etc.

Intangible damages are difficult to measure and impossible to meaningfully quantify in dollar terms. For this reason, intangible damages have not been assessed for Kandos and Rylstone and the following damage assessment focuses on tangible damages only. Tangible damages can be further sub-divided into two categories, direct and indirect damages, as illustrated in **Figure 6-1**.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



**Figure 6-1 : Types of flood damages** (Source: NSW Floodplain Development Manual, 2005)

Flood damage estimation procedures have been formulated using data collected following real flood events. Information collected includes identification of properties flooded, the extent of flooding, depth of flooding experienced, flooding mechanism etc. This information can then be used to guide and calibrate models used to calculate flood damages for a particular area. One of the most thoroughly studied flood damage assessments was that undertaken at Nyngan, following the flood in 1990.

The most common approach to present flood damage data is in the form of flood-damage curves for a range of property types, i.e. residential, commercial, public property, public utilities etc. These relate flood damage to depth of flooding above a threshold level (usually floor level).

## 6.2 Approach

Estimation of flood damage has focussed on residential and commercial properties in the Study area using guidelines issued by DECC (October 2007) and recognised damage assessment methodologies. The estimation of damage is based upon flood depth above 'protection level', where protection level relates to the floor level minus 0.5m. It is recommended by DECC (October, 2007) that the freeboard allowance is removed to ensure calculation of damage is not under-estimated.

### 6.2.1 Property Database

A property database has been assembled using available survey and contour data. The database includes the following information for each property identified within the PMF extent in both Kandos and Rylstone; address, floor level, ground level, modelled flood levels for each event and data source. A total of 15 properties in Kandos and one property in Rylstone had floor levels surveyed. These were the properties estimated to be potentially impacted up to the 1% AEP event. For the PMF event, a large number of properties will be impacted. Ground levels for these buildings were estimated based on ALS data. Floor levels for each affected property were estimated by undertaking a 'windscreen survey' using Google Street View. Flood levels were assigned to each property based on the modelled flood surface based on HEC-RAS results. The database was used to determine the number and extent of properties inundated above protection level for a range of flood events. This method was implemented using the overland flooding results for all flood events in Kandos and overland

## Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone



flood events up to the 0.5% event in Rylstone. For the PMF for Rylstone, widespread flooding occurs due to riverine flooding from the Cudgegong River. To assess the flood damages for this event, the PMF extent was taken and all properties within the extent were assigned an indicative flood depth based on their location. Most properties identified are inundated well above their floor level in the PMF event.

### 6.2.2 Residential Damage

Flood damage of residential buildings was calculated using a residential damage spreadsheet developed by the NSW Department of Environment, Climate Change and Water (DECCW, now NSW Office of Environment and Heritage) in 2007. This includes a representative stage-damage curve derived for a typical house on a floodplain to estimate structural, contents and external damage. The amount of damage is based on the flood inundation depth, for a suite of annual exceedance probability events. These values are then summed to provide a total damage for each flood event analysed. The AEP of the Probable Maximum Flood has been estimated using the chart from Book VI of AR&R 2003. The AEP of the PMF event for Kandos was estimated to be 1 in  $10^7$  and the AEP of the PMF event for Rylstone was conservatively estimated to be 1 in  $10^6$ .

A number of input parameters are required to determine which stage-damage curved will be adopted. The key parameters used in this assessment are shown in **Table 6-1**.

**Table 6-1 Parameters adopted in residential damages assessment**

Parameter	Kandos Value	Rylstone Value	Comment
Building Damage Repair Limitation Factor	0.85	0.85	Suggested range of 0.85 to 1.00 (short to long duration events). Typical overland flood duration in Kandos and Rylstone is 'short'. <sup>1</sup>
Contents Damage Repair Limitation Factor	0.75	0.75	Suggested range of 0.75 to 0.90 (short to long duration events). Typical overland flood duration in Kandos and Rylstone is 'short'. <sup>1</sup>
Effective Warning Time (hrs)	0	0	While there may be some warning of a flood, it has been conservatively assumed as 0 hours for both Kandos and Rylstone.
Level of flood awareness	Low	Low	Guidelines suggest 'low' is adopted unless 'high' can be justified. While some flooding was experienced in 2010, significant flooding has not been seen since the 1950's.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



Parameter	Kandos Value	Rylstone Value	Comment
House type and size	Single Storey, 240m <sup>2</sup>	Single Storey, 240m <sup>2</sup>	The houses in both Kandos and Rylstone are typically single storey detached dwellings (supported by evidence gathered during site visits and Google Street View). House size was taken to be the recommended average size.

<sup>1</sup> Short duration overland flooding from local catchments causes the most damage in most cases. The only long duration flood event relevant to the flood damage assessment is the PMF event for Rylstone, where riverine flooding dominates the flood damages.

The DECCW stage-damage curves within the spreadsheet are derived for late 2001, and have been updated using an Average Weekly Earnings (AWE) factor to August 2007. AWE is used to update residential flood damage curves rather than the inflation rate measured by the Consumer Price Index (CPI). The most recent AWE value from the Australian Bureau of Statistics (ABS, 2015) at the time of the assessment was November 2014, and a factor of 1.67 was applied to all ordinates in the stage-damage residential stage-damage curves based on the increase from August 2007. Similarly, the spreadsheet was developed for the Sydney urban area. A regional cost variation factor of 1.12 was applied based on the value of Mudgee, the closest town recorded in the Australian Construction Handbook (Rawlinsons, 2015) for both Kandos and Rylstone.

**6.2.3 Non-residential Building Damage**

While the majority of development at risk from flooding in Kandos and Rylstone is residential, there are a small number of commercial developments impacted by flooding. In both towns the proportion of buildings impacted that are non-residential is minimal and a separate detailed assessment has not been undertaken. Instead, to remain consistent with the residential damages calculations, an equivalent number of residential houses has been estimated for these buildings. In Kandos there is one service station affected in major floods (greater than 1% AEP). The service station, located on Davies Road has been included in the flood damages assessment as being the equivalent of two residential houses. The properties impacted by flooding in Rylstone up to the 0.5% AEP event are all residential. During the PMF event, however, flooding from the Cudgegong River impacts on a number of commercial buildings along Louee St, as well as St Malachy’s Catholic Church, Rylstone Shire Hall, Sporting Clubs, Rylstone Caravan Park and the Rylstone Sewage Treatment Works. For these buildings, an equivalent number of houses were assumed, according to **Table 6-2**.

**Table 6-2 Equivalent number of residential houses used for non-residential buildings in the flood damages assessment**

Building	Equivalent number of residential houses
Rylstone Sewage Treatment Works	4
Service station	2
Commercial building	2
Church building	2
School building	2
Community hall	1
Sports club	1
Caravan park permanent buildings	1

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### 6.2.4 Vehicle Damage

An estimation of vehicle damage has been excluded from this assessment. Significant damage can be attributed to vehicles but these can be readily moved from the path of flood waters and have not been included in the flood damages calculations.

## 6.3 Estimated Tangible Flood Damages

### 6.3.1 Kandos

An estimation of the number of properties impacted, number of properties with above floor flooding and total damage costs for each modelled flood event for the Kandos township was undertaken. The assessment was performed with the recommended protection level of 0.5m. When floodwaters are within 0.5m of the floor level, damages start accumulating. Damages for properties experiencing above floor flooding only was also considered. The results are provided in **Table 6-3**.

**Table 6-3 : Estimated Tangible Flood Damage for Kandos**

Flood Event AEP	Number of properties impacted <sup>1</sup>	Number of properties affected by above floor flooding	Estimated Flood Damage for properties with above floor flooding <sup>2</sup>	Total Estimated Flood Damage for Kandos <sup>3</sup>
20%	47	4	\$326,400	\$1,038,400
10%	47	4	\$326,400	\$1,040,700
5%	48	4	\$403,700	\$1,060,100
2%	48	4	\$404,500	\$1,105,100
1%	49	4	\$404,500	\$1,116,300
0.5%	51	4	\$415,200	\$1,248,900
PMF	56	38	\$2,536,100	\$3,084,300

1 Floodwaters above the protection level (within 0.5m of floor level)

2 Rounded to the nearest \$100, based on a protection level of 0m

3 Rounded to the nearest \$100, based on a protection level of 0.5m

The most convenient way to express flood damage for a range of flood events is by calculating the Annual Average Damage (AAD). The AAD value is determined by multiplying the damages that can occur in a given flood by the probability of that flood actually occurring in a given year, and then summing across a range of floods. This method allows smaller floods, which occur more frequently to be given a greater weighting than the larger catastrophic floods. The AAD for the existing case then provides a benchmark by which to assess the merit of flood management options. Average Annual Damage for the existing situation for Kandos (to the nearest \$100) is **\$632,200** based on a protection level of 0.5m. However, the Average Annual Damage for Kandos is **\$207,000** based on a protection level of 0m.

### 6.3.2 Rylstone

An estimation of the total damage costs for each modelled flood event for the Rylstone township is provided in **Table 6-4**. Due to the rounding of damages and the limited range in flood levels, the 10% to 1% AEP events have the same flood damages estimate. With the PMF event being significantly larger than the other flood events modelled for Rylstone, there are substantially larger flood damages for the PMF event (\$31.5 million).

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**Table 6-4 : Estimated Tangible Flood Damage for Rylstone**

Flood Event AEP	Number of properties impacted <sup>1</sup>	Number of properties affected by above floor flooding	Estimated Flood Damage for properties with above floor flooding <sup>2</sup>	Total Estimated Flood Damage for Rylstone <sup>3</sup>
20%	6	1	\$73,500	\$129,500
10%	7	1	\$73,500	\$140,600
5%	7	1	\$73,500	\$140,600
2%	7	1	\$73,500	\$140,600
1%	7	1	\$73,500	\$140,600
0.5%	8	1	\$73,500	\$151,800
PMF	193	193	\$31,499,000	\$31,499,000

- 1 Floodwaters above the protection level (within 0.5m of floor level)
- 2 Rounded to the nearest \$100, based on a protection level of 0m
- 3 Rounded to the nearest \$100, based on a protection level of 0.5m

Average Annual Damage for the existing situation for Rylstone (to the nearest \$100) is **\$157,800** based on a protection level of 0.5m. However, the Average Annual Damage for Rylstone is **\$122,700** based on a protection level of 0m.

## 6.4 Summary

### 6.4.1 Kandos

For floods up to and including the 1% AEP flood, damage in Kandos is attributed to residential dwellings that are located on overland flow paths. These overland flow paths carry a significant flow including the runoff from the catchments bounded by the mountains to the south and east of Kandos. The change in flood level from the smaller events to the larger events is minimal, indicating wide and open flow paths. The buildings located along these flow paths are likely to experience flooding even for small events. There are 4 properties that are estimated to experience above floor flooding for events up to the 0.5% AEP, as tabulated in **Table 6-5**. In the PMF event, there are 38 properties estimated to experience above floor flooding. The number of properties impacted by flooding above the protection level (0.5m below the floor level) ranges from 47 in the 20% AEP event to 56 properties in the PMF event.

**Table 6-5 Kandos properties experiencing above floor flooding or are impacted in the 1% AEP event**

Flow path	Number of properties impacted <sup>1</sup>	Number of properties with above floor flooding
Trib-1	18	0
Trib-2	7	0
Trib-3	2	0
Trib-4	9	0
Trib-5	0	0
Trib-6	1	0

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Flow path	Number of properties impacted <sup>1</sup>	Number of properties with above floor flooding
Trib-7	3	0
Trib-8	4	2
Trib-9	0	0
Trib-10	0	0
Trib-11	0	0
Trib-12	5	2

<sup>1</sup> Floodwaters are within 0.5m of floor level (i.e. the protection level)

Although this damage assessment is based upon tangible damages only, it is worthy to note that intangible damages could be insignificant for Kandos. This is due to the short duration of flooding and lack of warning of an event occurring. While flood damage estimates for Kandos are indicative only, they are useful in the evaluation of flood management options, aimed at reducing flood damage estimates while being economically viable to implement.

Considering the fact that flooding in Kandos results from local catchment overland flooding where flood depths are shallow and flood extents are wide, it is recommended that the Average Annual Damage for Kandos based on 0m level of protection (i.e. **\$207,000**) be adopted.

#### 6.4.2 Rylstone

For floods up to and including the 0.5% AEP flood, damage in Rylstone is attributed to residential dwellings that are located on overland flow paths. The primary area of concern is the catchment runoff that drains through the southern portion of the town into the Cudgegong River. Similar to Kandos, these flow paths tend to be wide and open, and the change in flood level of a small event to a large event is minimal. The buildings located along these flow paths are likely to experience flooding even for small events. There is one building that is estimated to experience above floor flooding for events up to the 0.5% AEP due to overland flow. The number of properties impacted by flooding above the protection level (0.5m below the floor level) ranges from 6 to 8 properties for the 20% to 0.5% AEP events. The PMF extent is attributed primarily to the riverine flooding of the Cudgegong, and it is estimated that 193 properties in the Rylstone township would be impacted, including a number of commercial buildings.

Although this damage assessment is based upon tangible damages only, it is worthy to note that intangible damages could be insignificant for Rylstone also. This is due to the short duration of flooding and lack of warning of an event occurring. While flood damage estimates are indicative only, again they are useful in the evaluation of flood management options for Rylstone, aimed at reducing flood damage estimates while being economically viable to implement.

Considering the fact that results from local catchment overland flooding where flood depths are shallow and flood extents are wide, it is recommended that the Average Annual Damage for Rylstone based on 0m level of protection (i.e. **\$122,700**) be adopted.



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## 7. Review of Potential Floodplain Risk Management Measures

### 7.1 Overview

This section provides a review of available measures for flood management in Kandos and Rylstone. From the management measures reviewed, a number were selected for based on feedback from the community. A detailed assessment of these is included in **Sections 8 and 9**.

### 7.2 Floodplain Risk Management Options

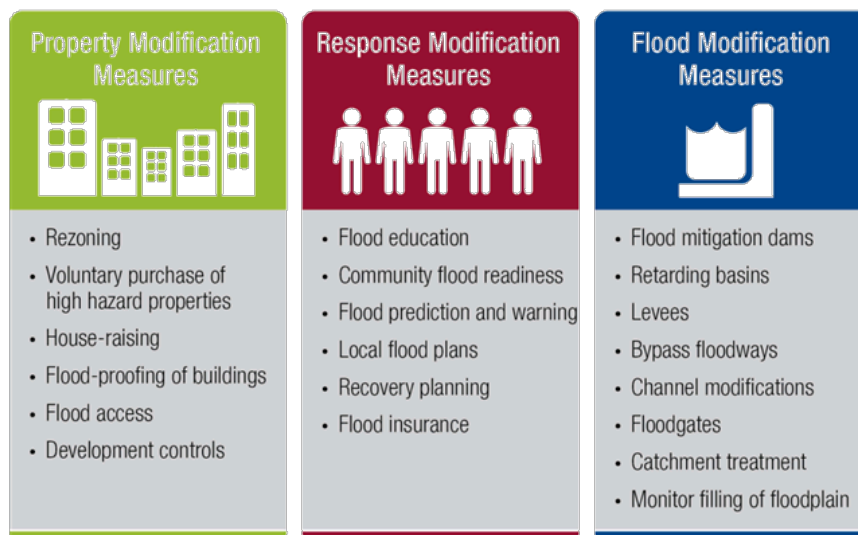
One of the objectives of this Floodplain Risk Management Study is to identify and compare various floodplain risk management options to deal with existing flood risk in the study area, considering and assessing their social, economic, ecological and cultural impacts and their ability to mitigate flood impacts. A Floodplain Risk Management Option can be formulated by a combination of Floodplain Risk Management Measures for the study area.

The *Floodplain Development Manual* (NSW Government, 2005) describes floodplain risk management measures in three broad categories:

- **Property modification measures** involve modifying existing properties (for example, house-raising) and/or imposing controls on new property and infrastructure development (for example, floor height restrictions)
- **Response modification measures** involve modifying the response of the population at risk to better cope with a flood event (for example improving community flood readiness)
- **Flood modification measures** involve modifying the behaviour of the flood itself (for example, construction of a levee to exclude floodwaters from an area)

A summary of the potential floodplain risk management measures is provided in **Figure 7-1**.

## Flood Management Measures



**Figure 7-1 : Floodplain risk management measures**

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## 8. Floodplain Risk Management Measures for Kandos

### 8.1 Flood Modification measures

#### 8.1.1 Detention basin

An option of detaining water in a basin was considered for Kandos through a review of the topographic data and the existing nature of the residential development. In total eight (8) potential detention basin sites (refer to **Appendix B**) were identified. These basins would be located upstream of the urban area and provide a storage of floodwaters which would be released at a much lower rate.

Using the catchments created for the DRAINS hydrologic model, the proportion of each catchment intercepted by the basin was estimated and that proportion of flows was removed from the DRAINS model. This is a conservative approach, assuming that all flows from areas upstream of the basin are captured. This preliminary assessment was done to assess the effect on flooding of properties.

Basins 1 to 6 would reduce flow entering the main overland flow path (Trib-1) that crosses the railway at the corner of Davies Road and McLachlan Street and the flow path that crosses George Street (Trib-4). There are currently no buildings with above floor flooding along these flow paths in the 1% AEP, but a large number of impacted properties. The basins would not have a significant impact on the number of properties flooded along these flow paths. The catchments running down from the hills to the south east of Kandos are generally long and thin. The proposed basin locations, therefore, generally only intercept flows from a thin strip of land and flows from surrounding land areas and adjacent urban runoff still contributes to significant overland flow. Basins 7 and 8 also did not reduce the number of buildings that were subject to above-floor flooding along Trib-12. A summary of the maximum reduction in flows and flood levels attributed to each basin for the 1% AEP flood is shown in **Table 8-1**.

**Table 8-1 Summary of the reduction in flows and flood levels for the 1% AEP for each proposed basin**

Basin Number	Flow path affected	Maximum reduction in flow <sup>1</sup> (m <sup>3</sup> /s)	Maximum reduction in flood level <sup>2</sup> (m)
1	Trib-4	0.62	0.02
2	Trib-4	0.78	0.03
3	Trib-1	0.75	0.13
4	Trib-1	2.15	0.30
5	Trib-1	1.74	0.25
6	Trib-1	1.04	0.15
7	Trib-12	6.91	0.22
8	Trib-12	4.81	0.15

1 Reduction in peak flow if the basin were to detain all catchment flows upstream runoff

2 Maximum reduction in peak water level at any one cross section. These can be localised changes in flood behaviour and may not represent the change along the entire flow path or at impacted properties.

Additional complications arise with implementation of detention basins such as land acquisition and environmental approvals. The land where these basins are proposed are either private land or in environmentally sensitive areas (such as the woodland area to the south-east of Kandos). There is also a large cost involved in planning, designing and constructing basins that also needs to be accounted for. Considering these costs and complications involved in implementing detention basins, along with the result that it will not make any additional building flood-free for the 1% AEP, the option of basins is not considered practical and has not been investigated further.

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**8.1.2 Stormwater upgrade**

Much of the overland flooding in Kandos is a result of the underground stormwater system being at capacity and surcharging. Upgrading of the stormwater system is another flood modification measure that may help to reduce the number of properties impacted by flood waters. In order to assess the effectiveness of upgrading the stormwater system, pipe capacities were doubled in this preliminary study. Many of the pipes in the Kandos network are 450 or 600mm in diameter. For this assessment, it was generally assumed that these pipe sizes would be upgraded to provide twice the capacity (i.e. the pipe was duplicated in the DRAINS model). For some flow paths, new stormwater infrastructure was designed for better connectivity of the existing network. These stormwater upgrades are shown in **Appendix B** and the results can be seen in **Table 8-2**.

**Table 8-2 Summary of the reduction in flows and flood levels for the 1% AEP for each stormwater upgrade scenario**

Scenario	Description	Flow path affected	Number of pipes upgraded	Maximum reduction in flow <sup>1</sup> (m <sup>3</sup> /s)	Maximum reduction in flood level <sup>2</sup> (m)
S1	Double capacity of all pipes along flow path	Trib-1	33	1.30	0.03
S2	New stormwater pits on Rodgers St and Dangar Street with 600 dia pipes	Trib-2	2 new	1.35	0.21
S3a	Double capacity of all pipes along flow path	Trib-3	10	0.51	0.05
S3b	Connect existing stormwater system to downstream system with 450 dia pipe	Trib-3	1 new	0.10	0.01
S4a	Connect existing system along easement with 450 dia pipe and continue down Bent St, discharge flows at the corner of Mason and George St out beyond properties with 450 dia pipe.	Trib-4	4 new	0.88	0.04
S4b	S4a plus double capacity of all existing pipes along flow path	Trib-4	27	1.34	0.06
S6	Double capacity of all pipes along flow path	Trib-6	7	0.13	0.04
S7	New pit on Dangar St with 600 dia pipe taking flows around into Davies Rd culverts	Trib-7	2 new	0.57	0.08
S8	Double capacity of all pipes along flow path	Trib-8	10	0.62	0.07

1 Maximum reduction in peak flows along affected flow path for the 1% AEP event

2 Maximum reduction in peak water level at any one cross section along the affected flow path. These can be localised changes in flood behaviour and may not represent the change along the entire flow path or at impacted properties.

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The results indicate that for each scenario tested, there can be a reduction in peak flows of up to  $1.30\text{m}^3/\text{s}$  by upgrading the existing network, and up to  $1.35\text{m}^3/\text{s}$  reduction for new infrastructure. The Trib-8 flow path is the only flow path where above floor flooding occurs in the 1% AEP and there is an existing stormwater network present. Upgrading the pipe system in this area only reduces flood levels by up to 0.07m and does not decrease the number of buildings with above floor flooding. In most cases the change in flood level is less than 0.1m. Scenario S2, however, has a significant improvement in flooding, with a maximum reduction of 0.21m along the Trib-2 flow path. However, there are only 7 impacted properties along this flow path, none with above floor flooding in the 1% AEP. The reduction in flood levels is likely to improve flooding issues for these properties. These works, however, involve the installation of pits and pipes into the existing kerb and gutter infrastructure along Rodger Street (270m) and Dangar Street (160m). This option is not considered viable given that there are no properties with above floor flooding.

### 8.1.3 Culvert upgrade

Floodwater generally flows from the high ground to the south east of Kandos and flows across the town towards the north east. Along the western and north western edge of the main town centre, these flow paths are intercepted by Davies Road, then the railway line and then Ilford Road on the Western side. There are culverts under the road and/or railway line that convey flows out of the town. These culverts act as hydraulic controls in the 1% AEP flood event. A preliminary study was undertaken to assess if the upgrading of these culverts would reduce flood levels upstream and improve flooding at properties in the town. The location of the culvert upgrades is shown in **Appendix B** and the results are presented in **Table 8-3**.

**Table 8-3 Summary of the reduction in flood levels for the 1% AEP for each culvert upgrade scenario**

Scenario	Location	Existing culvert no x W x H (mm) no x dia (mm)	Proposed culvert no x W x H (mm) no x dia (mm)	Flow path	Reduction in afflux <sup>1</sup> (m)
C1	Railway	2 x 1800 x 1100	4 x 1800 x 1100	Trib-1	1.81
C6	Davies Road	1 x 900	3 x 900	Trib-6	0.29
C7	Ilford Road	1 x 450	4 x 450	Trib-7	2.25
C8	Railway Ilford Road	1 x 900 1 x 900	2 x 900 2 x 900	Trib-8	1.32

<sup>1</sup> Reduction in water level upstream of the culvert crossing for the 1% AEP event

In each of the existing cases, the culverts identified are controlling upstream water levels since the water level rises above the obvert level of the culvert in the 1% AEP flood condition. In each of the scenarios, culverts were added until water was conveyed through the culverts, with the peak water level being below the obvert of the culvert. In each case, the reduction in upstream water level (afflux caused by the culvert crossing) is significantly reduced. In scenario C6 water no longer overtops Davies Road and in C7 and C8, water no longer overtops Ilford Road in the 1% AEP event. Despite these improvements in performance, the reduction in water level does not translate far enough upstream in any scenario to provide an improvement to any properties impacted by flooding in the 1% AEP event. Therefore, the option to upgrade road and rail culverts was not investigated further.

### 8.1.4 Diversion channel

A diversion channel is another possible flood modification measure for Kandos. The Trib-12 flow path currently causes above floor flooding for two houses, with others impacted along Anzac Avenue and Cairo Street in the south west corner of the township. The runoff from the large upstream area could be diverted to the western side of Cairo Street in an open channel. The location of the channel can be seen in **Appendix B**. Modelling undertaken in HEC-RAS suggests that a constructed trapezoidal channel approximately 1m deep with a 5m base width and side slopes of 1:4 would be adequate to carry the 1% AEP flow. In directing this runoff from its existing path upstream of the properties on the southern side of Anzac Avenue would require a larger channel diversion, with approximately a 10m wide base with 1:8 side slopes. This larger channel would capture and

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divert flows westward around the existing houses and into the smaller channel that would then take the flows away from the existing development in a north westerly direction. The channel would follow an existing swale system and combine with additional flow crossing Cairo Street near Lloyd Avenue. This would then return to overland flow and continue to the downstream dam. This channel would, however, traverse several private properties and would be expensive to construct implying that this option is not a feasible one.

## **8.2 Property Modification Measures**

### **8.2.1 Voluntary purchase**

The four properties impacted by above floor flooding in events up to the 1% AEP in Kandos may be purchased by Council and demolished. This would return the site to a 'greenfield' state in which floodwaters may freely move over the land. This would be subject to further detailed investigation and discussion with land owners.

All four properties are subject to a high flood hazard in the 1% AEP event. The properties located on the Trib-12 flow path are subject to flood depths of up to approximately 2.5m, with velocities remaining under 2m/s. Flood depths such as these pose serious threat to habitable buildings, particularly since they are located on overland flow paths where short duration storms can cause rapid rise in flood waters with very little warning. The properties located on the Trib-8 flow path are subject to depths of up to approximately 1m. While the flood velocity is under 2m/s, the flood hazard still remains high. These properties may be considered for voluntary purchase.

### **8.2.2 House raising**

The four properties impacted by above floor flooding in events up to the 1% AEP in Kandos are suitable for house raising, being timber-framed 'weatherboard' houses. The properties located on the Trib-12 flow path would need to be raised a considerable height to make the house floor free in the 1% AEP event. Raising the houses by up to 2.5m would be required. The properties located on the Trib-8 flow path would need to be raised up to 1m above the ground to provide a flood free dwelling up to the 1% AEP event. This is considered a feasible option to reduce the flood risk to these properties.

### **8.2.3 Flood proofing**

Flood proofing measures may also be applied to the houses that experience above floor flooding up to the 1% AEP event in Kandos. This may take the form of measures such as making lower levels water tight or providing bunding around houses to divert floodwaters around the building. These options, however, are not considered feasible due to the high depth of flooding experienced at these properties.

## **8.3 Response Modification Measures**

### **8.3.1 Local flood plan**

Having a local flood plan is important for the community and State Emergency Service (SES) to be prepared when there is a flood. The plan would outline preparedness measures and the response to flooding in the area. The strategies and personnel responsible for their implementation would be detailed along with the plan for recovery afterwards. A local flood plan may prove to be a valuable resource in times of flood in order to coordinate a strategy to reduce flood risks. The existing Mid-Western Regional Council Local Flood Plan should be updated for the town of Kandos based on the flood information presented in this report and the 'Flood Study for Kandos and Rylstone' (SKM, 2013).

### **8.3.2 Flood education and awareness**

Flood education and awareness should be promoted throughout Kandos. Residents living on an overland flow path should be aware of this and have personal safety plans in place in case of a flood. This is most effectively implemented through signposting. On all roads that experience a high flood hazard during the 1% AEP event, flood signage should be implemented. This includes a "Road subject to flooding" sign, along with a flood depth indicator. This would be implemented in six areas, including along Cairo Street at the end of Anzac Avenue,

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along Ilford Road between Lloyd Avenue and Margaret Street, along Davies Road at the corners of Whites Crescent and Rodgers St, along Fleming Street at the intersections with McDonald Street and Noyes Street, and along Angus Avenue between Noyes Street and Dabee Road. These locations are identified on **Figure 8-1**. Signposting alerts residents to the issues of flooding in the local area and provides information about real time flooding conditions during an event and helps people manage where they travel. Additionally, Council or SES may run educational workshops or distribute information sheets to help people plan and prepare for a flood. Knowledge about local flooding issues is a valuable tool to equip the public with.

**8.3.3 Development control planning**

Development controls should be in place and applicable to the flood planning area (FPA). Minimum floor levels should be set 0.5m above the adopted 1% AEP flood level. New residential buildings should be constructed using flood-compatible materials to withstand hydrostatic pressures and debris load. Allowance for the passage of water should be considered, including the porous fencing policy discussed in **Section 4.5**. All new developments should be assessed in light of the findings presented in the 'Flood Study for Kandos and Rylstone' (SKM, 2013) and in this Floodplain Risk Management Study (Jacobs, 2015).

**8.3.4 Flood warning**

A flood warning system for Kandos has the potential to reduce flood risk. Overland flooding in Kandos is generally very shallow and there are minimal areas where a high flood risk is present. Overland flooding as a result of catchment flows will also occur within a short space of time, providing very little warning.

Flood warnings are issued by the Bureau of Meteorology to advise that flooding is occurring or expected to occur in a geographical area based on defined criteria. Flood warnings may include either qualitative or quantitative predictions or may include a statement about future flooding that is more generalised. The type of prediction provided depends on the quality of real-time rainfall and river level data, the capability of rainfall and hydrological forecast models and the level of service required.

A quantitative or qualitative flood warning of **Minor, Moderate or Major** flooding is provided in areas where the Bureau has specialised warning systems. They provide advanced warning about the locations along river valleys where flooding is expected, the likely class of flooding and when it is likely to occur. Predictions of expected water levels and the timing of flood peaks are provided at key forecast locations.

The Bureau also provides generalised flood warnings when there is not enough data to make specific predictions or in the developing stages of a flood. They typically rely on forecast rainfall and knowledge of historical flood response. Generalised warnings contain statements advising that flooding is expected in particular river valleys but do not provide information about flood class nor precise locations.

As part of its Severe Weather Warning Service, the Bureau also provides warnings for severe weather that may cause flash flooding. SES needs to consider providing flash flood warnings in Kandos.

**8.3.5 Improved flood evacuation**

Flood evacuation from Kandos is under the control of the SES. In an overland flood event, evacuation should not be an issue since there is a large amount of flood free area within the township that should be accessible to residents located on overland flow paths. While access in and out of the town via Ilford Road may be cut off in the 1% AEP event, these flood waters are not expected to last long. Information on flood evacuation plans were not available for this study, however there have been no evacuation issues raised before in the past.



## 9. Floodplain Risk Management Measures for Rylstone

### 9.1 Flood Modification measures

There is only one house that is subject to above floor flooding up to the 1% AEP event in Rylstone, and there are only 7 houses that experience flooding above the protection level (due to overland flooding). Therefore, there are no flood modification measures that are considered feasible for Rylstone for overland flooding. Riverine flooding in the PMF causes significant damage to the township. There are no proposed flood mitigation options for the Cudgegong River, due to the impractical nature of controlling floodwater from a large river for an extreme flood event.

### 9.2 Property Modification Measures

#### 9.2.1 Voluntary purchase

The property impacted by above floor flooding in events up to the 1% AEP in Rylstone is exposed to a low flood hazard, with flood depths being below 0.5m and flood velocities being below 1m/s. It is not considered necessary to earmark the property for voluntary acquisition.

#### 9.2.2 House raising

The property impacted by above floor flooding in events up to the 1% AEP in Rylstone is suitable for house raising, being a timber-framed 'fibro' house. The flood depth of the 1% AEP flood is approximately 0.2m. The house would not need to be raised significantly for it to be flood free in the 1% AEP. This is considered a feasible option to reduce the flood risk to this property.

#### 9.2.3 Flood proofing

Flood proofing measures may also be applied to the house that experiences above floor flooding up to the 1% AEP event in Rylstone. This may take the form of measures such as bunding around the house to divert floodwaters around the building. Given the land is very flat, this may not be an aesthetically pleasing option. Another option is to provide a watertight building with temporary flood-proofing structures over openings such as doors. Given the effort required to flood proof a building and the fact that the temporary measures are not practical for the short duration storms that would cause the overland flooding at this building, this option is not recommended.

### 9.3 Response Modification Measures

#### 9.3.1 Local flood plan

Having a local flood plan is important for the community and State Emergency Service (SES) to be prepared when there is a flood. The plan would outline preparedness measures and the response to flooding in the area due to all sources of flooding including local catchment runoff, riverine and potential failure of Rylstone Dam. The strategies and personnel responsible for their implementation would be detailed along with the plan for recovery afterwards. A local flood plan may prove to be a valuable resource in times of flood in order to coordinate a strategy to reduce flood risks. The existing Mid-Western Regional Council Local Flood Plan should be updated for the town of Rylstone based on the flood information presented in this report and the 'Flood Study for Kandos and Rylstone' (SKM, 2013).

#### 9.3.2 Flood education and awareness

Flood education and awareness should be promoted throughout Rylstone. Residents living on an overland flow path should be aware of this and have personal safety plans in place in case of a flood. This is most effectively implemented through signposting. On all roads that experience a high flood hazard during the 1% AEP event, flood signage should be implemented. This includes a "Road subject to flooding" sign, along with a flood depth



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indicator. This would be implemented in six areas, including along Short Street between Mudgee Street and Farrelly Street, Coomber Street between Mudgee Street and Cudgegong Road/Carwell Street, Mellon Street between Louee Street and Cudgegong Road/Carwell Street, along Cudgegong Road/Carwell Street between Coomber Street to just north of Mellon Street, along Tongbong Street off Dabee Street to Rylstone Dam Road, and along Bylong Valley Way just south of the railway crossing. These locations are identified on **Figure 9-1**. Signposting alerts residents to the issues of flooding in the local area and provides information about real time flooding conditions during an event and helps people manage where they travel. Additionally, Council or SES may run educational workshops or distribute information sheets to help people plan and prepare for a flood. Knowledge about local flooding issues is a valuable tool to equip the public with.

**9.3.3 Development control planning**

Development controls should be in place and applicable to the flood planning area (FPA). Minimum floor levels should be set 0.5m above the adopted 1% AEP flood level. New residential buildings should be constructed using flood-compatible materials to withstand hydrostatic pressures and debris load. Allowance for the passage of water should be considered, including the porous fencing policy discussed in **Section 4.5**. All new developments should be assessed in light of the findings presented in the 'Flood Study for Kandos and Rylstone' (SKM 2013) and in this Floodplain Risk Management Study (Jacobs, 2015).

**9.3.4 Improved flood evacuation**

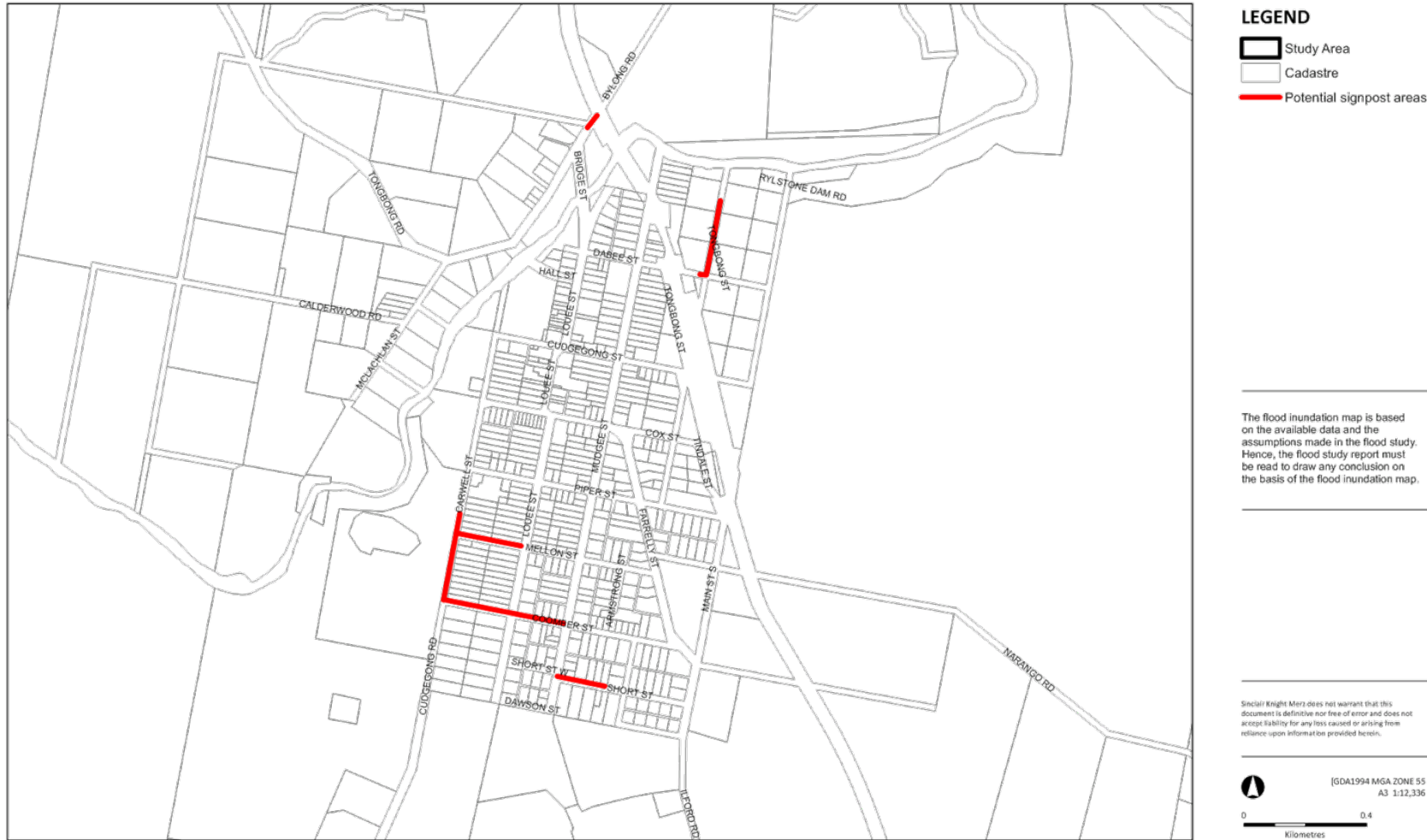
Flood evacuation from Rylstone is under the control of the SES. In an overland flood event, evacuation should not be an issue since there is high ground in the centre of the township and the flood risk is generally low. These flood waters are not expected to last long. In the case of riverine flooding in a rare event, evacuation can take place via Farrelly Street/Ilford Road and along Bylong Valley Way to the south. This route will be flood free as it traverses a ridgeline. Information on flood evacuation plans were not available for this study, however there have been no evacuation issues raised before in the past.

**9.3.5 Flood warning**

A flood warning system for Rylstone has the potential to reduce flood risk. Overland flooding in Rylstone is generally very shallow and there are minimal areas where a high flood risk is present. Overland flooding as a result of catchment flows will also occur within a short space of time, providing very little warning. A flood warning system for Rylstone for overland flooding is not considered practical.

Flooding from the Cudgegong River is only significant in rare flood events. In the case of a rare flood, there would be sufficient warning time given the catchment of the Cudgegong River is approximately 535km<sup>2</sup> (to Rylstone Dam). Operators of the dam would have information on large rainfall events through the issuing of warnings from the Bureau of Meteorology (BoM) and use of the onsite rainfall gauge in order to operate the dam correctly to avoid failure. The 'Dam Safety Emergency Plan for Rylstone Dam' (NSW Dept. of Services, Technology and Administration 2010) outlines measures to take given a flooding scenario, including alerting the SES or alerting the population at risk directly. The operators will have a 5 hour window, based on the critical (6hr) probable maximum precipitation (PMP) storm from the start of storm inflows to the spilling of the dam under normal operating conditions. This dam safety emergency plan is considered adequate and there are no further flood warning systems that need to be set up in Rylstone.

Figure 9-1 Potential Flood Signposting in Rylstone



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## 10. Draft Floodplain Risk Management Plan

### 10.1 Recommended Measures for Kandos

Measures considered	Required Funding	Features of the Measure	Consultant's Recommended Priority Rankings
1. Prepare a Local Flood Plan for Kandos.	SES costs	<ul style="list-style-type: none"> <li>SES to prepare a Local Flood Plan for Kandos utilising information in this study and the Flood Study for Kandos and Rylstone (SKM 2013)</li> </ul>	<b>Priority 1:</b> this measure has a high priority for inclusion in the FRMP. It does not require Government funding.
2. Implement controls over future residential development/ re-development in flood prone areas in Kandos.	Council costs	<ul style="list-style-type: none"> <li>Floor levels of new residential developments be located 0.5m above the adopted 1% AEP flood levels</li> <li>All new residential buildings on flood prone land be constructed using flood compatible materials to withstand hydrostatic pressures and debris load</li> <li>Council to formulate a porous fencing policy to minimise impact on local overland flood behaviour</li> <li>Evaluation of development proposals to use data presented in the Flood Study for Kandos and Rylstone (SKM 2013) and in this FRMS, 2015.</li> </ul>	<b>Priority 1:</b> this measure has a high priority for inclusion in the FRMP. It does not require additional Government funding.
3. Provide flood signage and flood depth indicators at roads crossing significant overland flow paths to enhance flood education and preparedness.	\$15,000 <sup>A</sup>	<ul style="list-style-type: none"> <li>Provide flood signage and flood depth indicators at all roads crossing significant overland flow paths within the study area (approximately 30 signs)</li> </ul>	<b>Priority 1:</b> this measure would improve flood education and flood preparedness for residents and tourists and has a high priority in terms of managing flood risk to people.
4. Protect four (4) residential buildings from flooding in the 1% AEP event	\$400,000+	<ul style="list-style-type: none"> <li>Initial investigation to determine cost-effective measures acceptable to owners of 4 properties to protect their dwellings from flooding up to 1%</li> </ul>	<b>Priority 2:</b> this measure would ensure that no residential buildings are damaged in the 1% AEP event. A high

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



Measures considered	Required Funding	Features of the Measure	Consultant's Recommended Priority Rankings
resulting from local catchment flooding		<p>AEP event. Measures to be considered to protect each house would include voluntary house raising, voluntary house purchase and construction of a ring levee around the house.</p> <ul style="list-style-type: none"> <li>Capital costs of implementing the preferred option to protect 4 houses from flooding up to 1% AEP event.</li> </ul>	priority is to be given to the initial investigation so that the preference of property owners are known and the cost of protecting the residential building can be finalized.

<sup>^</sup> Based on 900mm x 900mm sign on post, Rawlinsons 2015

**10.2 Recommended Measures for Rylstone**

Measures considered	Required Funding	Features of the Measure	Consultant's Recommended Priority Rankings
1. Prepare a Local Flood Plan for Rylstone.	SES costs	<ul style="list-style-type: none"> <li>SES to prepare a Local Flood Plan for Rylstone utilising information in this study and the Flood Study for Kandos and Rylstone (SKM 2013)</li> </ul>	<b>Priority 1:</b> this measure has a high priority for inclusion in the FRMP. It does not require Government funding.
2. Update the Dam Safety Emergency Plan for Rylstone Dam	Council costs	<ul style="list-style-type: none"> <li>Council to engage a consultant to update the Dam Safety Emergency Plan for Rylstone Dam utilising information in this study and the Flood Study for Kandos and Rylstone (SKM 2013)</li> </ul>	<b>Priority 1:</b> this measure has a high priority for protecting residents due to potential failure of Rylstone Dam. It does not require Government funding
3. Implement controls over future residential development/ re-development in flood prone areas in Rylstone.	Council costs	<ul style="list-style-type: none"> <li>Floor levels of new residential developments be located 0.5m above the adopted 1% AEP flood levels</li> <li>All new residential buildings on flood prone land be constructed using flood compatible materials to withstand hydrostatic pressures and debris load</li> <li>Council to formulate a porous fencing policy to minimise impact</li> </ul>	<b>Priority 1:</b> this measure has a high priority for inclusion in the FRMP. It does not require additional Government funding.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



Measures considered	Required Funding	Features of the Measure	Consultant's Recommended Priority Rankings
		on local overland flood behaviour <ul style="list-style-type: none"> <li>Evaluation of development/ re-development proposals to use data presented in Flood Study for Kandos and Rylstone (SKM 2013) and in this FRMS, 2015.</li> </ul>	
4. Provide flood signage and flood depth indicators at roads crossing significant overland flow paths to enhance flood education and preparedness.	\$10,000 <sup>A</sup>	<ul style="list-style-type: none"> <li>Provide flood signage and flood depth indicators at all roads crossing significant overland flow paths within the study area (approximately 20 signs)</li> </ul>	<b>Priority 1:</b> this measure would improve flood education and flood preparedness for residents and tourists and has a high priority in terms of managing flood risk to people.
5. Protect one (1) residential buildings from flooding in the 1% AEP event resulting from local catchment flooding	\$100,000+	<ul style="list-style-type: none"> <li>Initial investigation to determine cost-effective measures acceptable to owner of one property to protect the dwelling from flooding up to 1% AEP event. Measures to be considered to protect the house would include voluntary house raising, voluntary house purchase and construction of a ring levee around the house.</li> <li>Capital costs of implementing the preferred option to protect one house from flooding up to 1% AEP event.</li> </ul>	<b>Priority 2:</b> this measure would ensure that no residential buildings are damaged in the 1% AEP event. A high priority is to be given to the initial investigation so that the preference of the property owner is known and the cost of protecting the residential building can be finalised.

<sup>A</sup> Based on 900mm x 900mm sign on post, Rawlinsons 2015

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

## 11. Acknowledgement

The study was carried out by Jacobs Group Australia Pty Ltd with funding provided from Mid-Western Regional Council and the Commonwealth and NSW Governments, through the NSW Office of Environment and Heritage.

A number of organisations and individuals have contributed both time and valuable information to this study. The assistance of the following in providing data and/or guidance to the study is gratefully acknowledged:

- Residents of Kandos and Rylstone;
- Councillors and Council staff from Mid-Western Regional Council; and
- Office of Environment and Heritage.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



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**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



### 13. Glossary

Annual Exceedance Probability (AEP)	The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage.
Australian Height Datum (AHD)	A common national surface level datum approximately corresponding to mean sea level.
Average Annual Damage (AAD)	Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time.
Average Recurrence Interval (ARI)	The long-term average number of years between the occurrences of a flood as big as or larger than the selected event. For example, floods with a discharge as great as or greater than the 20 year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.
Catchment	The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
Development	Is defined in Part 4 of the EP&A Act  <u>In fill development</u> : refers to the development of vacant blocks of land that are generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development.  New development: refers to development of a completely different nature to that associated with the former land use. Eg. The urban subdivision of an area previously used for rural purposes. New developments involve re-zoning and typically require major extensions of exiting urban services, such as roads, water supply, sewerage and electric power.  Redevelopment: refers to rebuilding in an area. Eg. As urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either re-zoning or



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major extensions to urban services.

**DRAINS**

DRAINS is a comprehensive program for designing and analysing urban stormwater drainage systems

**Effective Warning Time**

The time available after receiving advise of an impending flood and before the floodwaters prevent appropriate flood response actions being undertaken. The effective warning time is typically used to move farm equipment, move stock, raise furniture, evacuate people and transport their possessions.

**Flood**

Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.

**Flood fringe areas**

The remaining area of flood prone land after floodway and flood storage areas have been defined.

**Flood liable land**

Is synonymous with flood prone land (i.e.) land susceptibility to flooding by the PMF event. Note that the term flooding liable land covers the whole floodplain, not just that part below the FPL (see flood planning area)

**Floodplain**

Area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is flood prone land.

**Floodplain risk management options**

The measures that might be feasible for the management of particular area of the floodplain. Preparation of a floodplain risk management plan requires a detailed evaluation of floodplain risk management options.

**Floodplain risk management plan**

A management plan developed in accordance with the principles and guidelines in this manual. Usually include both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defines objectives.

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



Flood plan (local)	A sub-plan of a disaster plan that deals specifically with flooding. They can exist at state, division and local levels. Local flood plans are prepared under the leadership of the SES.
Flood planning levels (FPLs)	Are the combination of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans. FPLs supersede the "designated flood" or the "flood standard" used in earlier studies.
Flood proofing	A combination of measures incorporated in the design, construction and alteration of individual buildings and structures subject to flooding, to reduce or eliminate flood damages.
Flood readiness	Readiness is an ability to react within the effective warning time.
Flood risk	<p>Potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk in this manual is divided into 3 types, existing, future and continuing risks. They are described below.</p> <p><u>Existing flood risk:</u> the risk a community is exposed to as a result of its location on the floodplain.</p> <p><u>Future flood risk:</u> the risk a community may be exposed to as a result of new development on the floodplain.</p> <p><u>Continuing flood risk:</u> the risk a community is exposed to after floodplain risk management measures have been implemented. For a town protected by levees, the continuing flood risk is the consequences of the levees being overtopped. For an area without any floodplain risk management measures, the continuing flood risk is simply the existence of its flood exposure.</p>
Flood storage areas	Those parts of the floodplain that are important for the temporary storage of floodwaters during passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**



flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas

Floodway areas	Those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.
Freeboard	Provides reasonable certainty that the risk exposure selected in deciding on a particular flood chosen as the basis for the FPL is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. Freeboard is included in the flood planning level.
Full supply level (FSL)	The normal maximum operating water level of a water storage when not affected by floods. This water level corresponds to 100% capacity.
Hazard	A source of potential harm or situation with a potential to cause loss. In relation to this manual the hazard is flooding which has the potential to cause damage to the community.
Local overland flooding	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.
m AHD	Metres Australian Height Datum (AHD)
m/s	Metres per second. Unit used to describe the velocity of floodwaters.
m <sup>3</sup> /s	Cubic metres per second or "cusecs". A unit of measurement of creek or river flows or discharges. It is the rate of flow of water measured in terms of volume per unit time.
Mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.
MIKE11	A computer program used for analysing behaviour of unsteady flow in open channels and floodplains.

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Modification measures	Measures that modify the flood, the property or the response to flooding.
Overland flow path	The path that floodwaters can follow as they are conveyed towards the main flow channel or if they leave the confines of the main flow channel. Overland flow paths can occur through private property or along roads.
PIPE <sup>++</sup>	A computer program for analysing water supply systems.
Probable Maximum Flood (PMF)	The largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain.
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of the manual it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
Runoff	The amount of rainfall which actually ends up as a streamflow, also known as rainfall excess.
Stage	The amount of rainfall which actually ends up as streamflow, also known as rainfall excess.
SES	State Emergency Service of New South Wales.
Stage hydrograph	A graph that shows how the water level at particular location changes with time during a flood. It must be referenced to a particular datum.
XP-RAFTS	A computer program used in the estimation of rainfall runoff

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

**Appendix A. Questionnaire**

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**Kandos and Rylstone Flood Study -  
 Questionnaire**

Mid-Western Regional Council is overseeing the “Kandos and Rylstone Flood Study”. Council has contracted the Consultant, Sinclair Knight Merz (SKM), to undertake the study. The study is aimed at addressing the stormwater flooding issues within Kandos and both stormwater and riverine flooding issues within Rylstone. The Consultant would like to receive feedback from the community on a number of issues and topics already highlighted by the Council with regard to stormwater/ riverine flooding in the townships of Kandos and Rylstone.

If you cannot answer any question, or do not wish to answer a question, then leave it unanswered and proceed to the next question. **Your input to this important study will be greatly appreciated.** If you need additional space, please add sheets.

If you would prefer to provide a letter with your comments or send your response to this questionnaire directly to the consultant, this would also be welcomed. Contact details of the Consultant's Project Manager are provided below:

Akhter Hossain  
 P O Box 164  
 St Leonards, NSW 1590  
 email: [ahossain@globalskm.com](mailto:ahossain@globalskm.com)

**Place a tick or write a number in the relevant box as per instruction or write answers.**

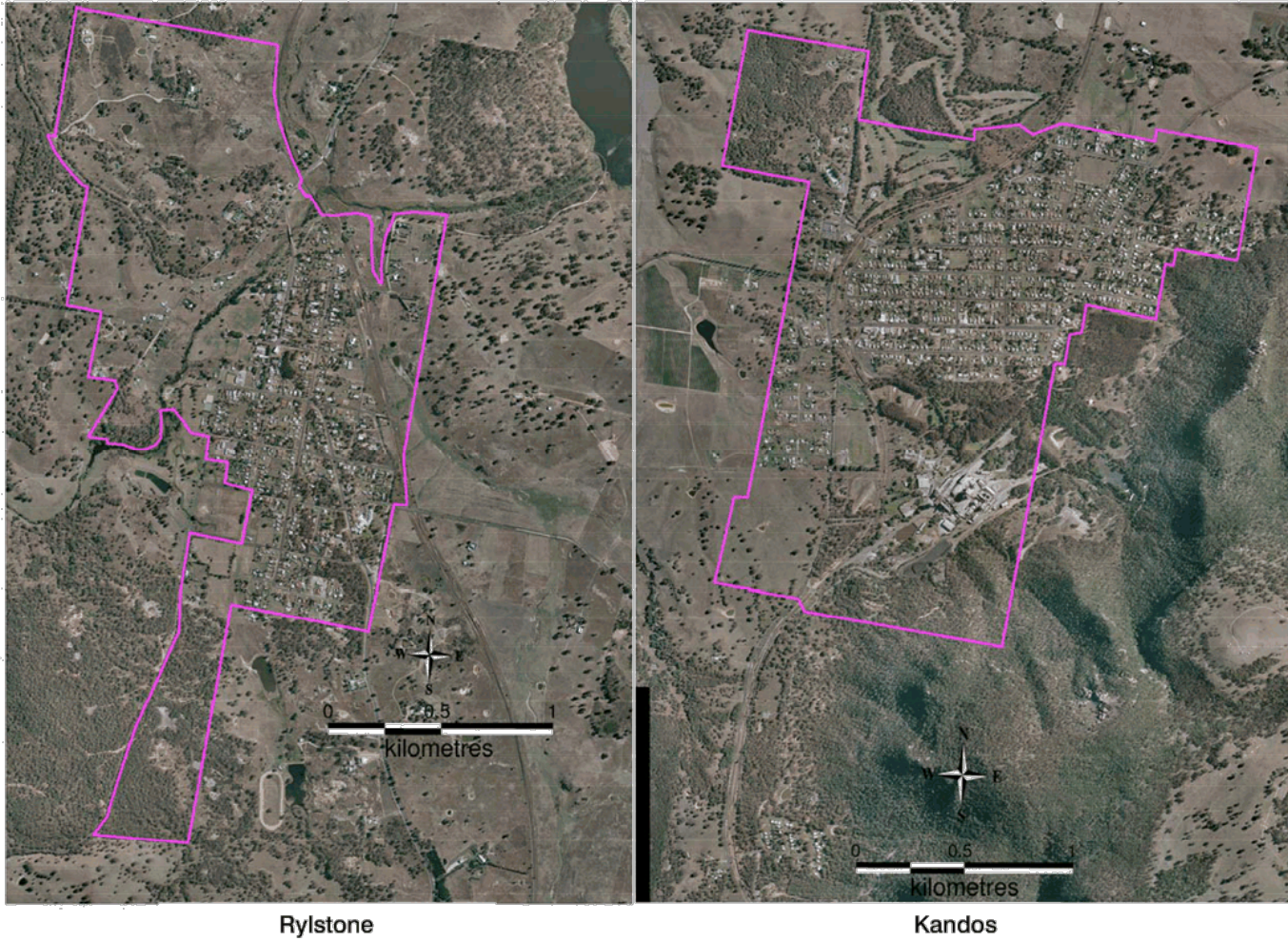
Question No.	Question and Answer
1.	<b>Do you live (reside) or have lived in the study area shown on the attached plan?</b> <input type="checkbox"/> Yes (Please provide your address) ..... <input type="checkbox"/> No (Go to Question 3)
2.	<b>Do you own or rent your residence in the study area (Kandos and Rylstone)?</b> <input type="checkbox"/> Own <input type="checkbox"/> Rent How long have you lived in the study area? (Please write number of years).....
3.	<b>Do you own or manage a business in the study area?</b> <input type="checkbox"/> Yes, For how many years? ..... <input type="checkbox"/> No (go to Question 5)
4.	<b>What kind of business?</b> <input type="checkbox"/> Home based business <input type="checkbox"/> Shop/commercial premises <input type="checkbox"/> Light industrial <input type="checkbox"/> Heavy industry <input type="checkbox"/> Others, please write type of business .....

Question No.	Question and Answer
5.	<p><b>Have you had any experience of flooding (due to storm events as well) in and around where you live or work?</b></p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No (Go to Question 14)</p>
6.	<p><b>How deep was the floodwater (from storm water as well) in the worst flood/ storm event that you experienced?</b></p> <p>Please estimate the depth .....</p> <p>What was the year of this flood?.....</p> <p>Where was this flood?</p> <p><input type="checkbox"/> At your house?</p> <p><input type="checkbox"/> At work?</p> <p><input type="checkbox"/> Elsewhere?</p> <p>Please provide the street address for this flood? .....</p>
7.	<p><b>How long did the floodwaters stay up?</b></p> <p><input type="checkbox"/> Few minutes</p> <p><input type="checkbox"/> Less than one hour</p> <p><input type="checkbox"/> More than one hour</p>
8.	<p><b>What damage resulted from this flood in your residence?</b>                      (Please indicate either "none", "minor", "moderate" or "major".</p> <p><input type="checkbox"/> Damage to garden, lawns or backyard</p> <p><input type="checkbox"/> Damage to external house walls</p> <p><input type="checkbox"/> Damage to internal parts of house (floor, doors, walls etc)</p> <p><input type="checkbox"/> Damage to possessions (fridge, television etc)</p> <p><input type="checkbox"/> Damage to car</p> <p><input type="checkbox"/> Damage to garage</p> <p><input type="checkbox"/> Other damage, please list.....</p> <p><input type="checkbox"/> What was the cost of the repairs, if any?.....</p>
9.	<p><b>What damage resulted from this flood in your business?</b>                      (Please indicate either "none", "minor", "moderate" or "major".)</p> <p><input type="checkbox"/> Damage to surroundings</p> <p><input type="checkbox"/> Damage to building</p> <p><input type="checkbox"/> Damage to stock</p> <p><input type="checkbox"/> Other damages, please list.....</p> <p><input type="checkbox"/> What was the cost of the repairs, if any?.....</p>
10.	<p><b>Was vehicle access to/from your property disrupted due to floodwaters during the worst flooding/ storm event?</b></p> <p><input type="checkbox"/> Not affected</p> <p><input type="checkbox"/> Minor disruption (roads flooded but still driveable)</p> <p><input type="checkbox"/> Access cut off</p>
11.	<p><b>What information can you provide on past floods/ storm events that created flooding?</b> (You can tick more than one box). Please write any descriptions at the end of the questionnaire</p> <p><input type="checkbox"/> No information</p> <p><input type="checkbox"/> Information on extent or depth of floodwater at particular locations, newspaper clippings or other images on the past floods</p> <p><input type="checkbox"/> Any permanent marks indicating maximum flood level for particular floods</p> <p><input type="checkbox"/> Memory of flow directions, depth or velocities</p>

Question No.	Question and Answer
12.	<p><b>Do you consider that flooding of your property has been made worse by works on other properties, or by the construction of roads or other structures?</b></p> <p><input type="checkbox"/> Yes (please provide further details. Attach extra page if necessary. Provide sketch if possible.)</p> <p><input type="checkbox"/> Unsure</p> <p><input type="checkbox"/> No</p>
13.	<p><b>Do you have any photographs of past floods that would be useful for the consultant to help him understand the area flooded or other flood effects?</b> If possible please attach the photographs (with dates and location) which will be copied and returned.</p> <p><input type="checkbox"/> Yes (either attach or the consultant will contact you to arrange for a copy to be made and returned)</p> <p><input type="checkbox"/> No</p>
14.	<p><b>Do you wish to comment on any other issues associated with this study? Please add comments at the end of the questionnaire Or please indicate your willingness to answer questions over the phone?.</b></p> <p>_____</p> <p>_____</p> <p>_____</p>
15.	<p><b>Do you wish to remain on the mailing list for further details, Newsletters etc?</b></p> <p><input type="checkbox"/> Yes (please provide contact details, see next question)</p> <p><input type="checkbox"/> No</p>
16.	<p>If you would like, please provide details of where you live and how we can contact you if we need to follow up on some details or seek additional comment.</p> <p><b>Name:</b> _____</p> <p><b>Address:</b> _____</p> <p>_____</p> <p><b>Telephone:</b> .....</p> <p><b>Fax:</b> .....</p> <p><b>Email:</b>.....</p>
	<p><b>Space for additional comments</b></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>



### Study Areas



Rylstone

Kandos

**Floodplain Risk Management Study and Floodplain Risk Management Plan for Kandos and Rylstone**

**Appendix B. Option Assessment**

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Figure B-4 Kandos Potential Channel Diversion



*Protecting our  
Natural Environment*

## Liquid Trade Waste Regulation Policy

Draft

February 2017





Liquid Trade Waste Regulation Policy

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Document Control

Amendment Number	Amendment	Sections Affected	Council Resolution Date	Amendment Date

## Purpose of this policy

This policy sets out how council will regulate sewerage and trade waste discharges to its sewerage system in accordance with the NSW Framework for Regulation of Sewerage and Trade Waste (section 3.1 on page 20). The policy is concerned with the approval, monitoring and enforcement process for liquid trade wastes discharged to Council's sewerage system and the levying of commercial sewerage and liquid trade waste fees and charges. It has been developed to ensure the proper control of liquid trade waste and hence protection of public health, worker safety, the environment, and Council's sewerage system. The policy also promotes waste minimisation, water conservation, water recycling and biosolids reuse.

Sewerage systems are generally designed to cater for waste from domestic sources that are essentially of predictable strength and quality. Mid-Western Regional Council **may** accept trade waste into its sewerage system as a **service** to businesses and industry.

Liquid trade wastes may exert much greater demands on sewerage systems than domestic sewage and, if uncontrolled, can pose serious problems to public health, worker safety, Council's sewerage system and the environment.

Impacts of poor liquid trade waste regulation include:

- Grease, oil, solid material, if not removed on-site, can cause sewer chokes and blockages and the discharge of untreated sewage to the environment.
- Strong waste may cause sewage odour problems and corrosion of sewer mains, pumping stations and sewage treatment works.

A person wishing to discharge liquid trade waste to the sewerage system must, under section 68 of the *Local Government Act 1993*, obtain prior approval from Council. Discharging liquid trade waste without an approval is an offence under section 626 of the Act.

The procedure for approval is governed by Chapter 7 of the Local Government Act and is subject to the Local Government (General) Regulation 2005.

Under clause 28 of the Local Government (General) Regulation, a council must not grant an approval under section 68 of the Act to discharge trade waste (whether treated or not) into a sewer of the council unless the Secretary, NSW Department of Industry, Skills and Regional Development (NSW Department of Industry) or the Secretary's nominee has concurred with the approval.

Under section 90 (2) of the Local Government Act, the Secretary, NSW Department of Industry may give the council notice that the concurrence may be assumed (with such qualifications or conditions as are specified in the notice). The Director Water and Sewerage Regulation has been nominated to give concurrence to trade waste approvals.

Liquid Trade Waste Regulation Policy

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### Glossary

**Assumed Concurrence:** Council may apply to the Secretary of the NSW Department of Industry, Skills and Regional Development (NSW Department of Industry) for authorisation to assume concurrence for Classification B or Classification S activities. Requests for assumed concurrence need to be forwarded to DPI Water<sup>1</sup>. If granted, Council will no longer need to forward such applications for concurrence.

**Automatic Assumed Concurrence:** Councils have been authorised to assume concurrence for Classification A activities. Such applications may be approved by Council without forwarding the application for concurrence.

**Bilge Water:** minor amounts of water collecting in the bilge of a vessel from spray, rain, seepage, spillage and boat movements. Bilge water may be contaminated with oil, grease, petroleum products and saltwater.

**Biochemical Oxygen Demand (BOD<sub>5</sub>):** The amount of oxygen utilised by micro-organisms in the process of decomposition of organic material in wastewater over a period of five days at 20°C. In practical terms, BOD is a measure of biodegradable organic content of the waste.

**Biosolids:** Primarily organic solid product produced by sewage processing. Until such solids are suitable for beneficial use, they are defined as wastewater solids or sewage sludge.

**Bundling:** Secondary containment provided for storage areas, particularly for materials with the propensity to cause environmental damage.

**Chemical Oxygen Demand (COD):** A measure of oxygen required to oxidise organic and inorganic matter in wastewater by a strong chemical oxidant. Wastewaters containing high levels of readily oxidised compounds have a high COD.

**Chemical Toilet:** Toilet in which wastes are deposited into a holding tank containing a deodorizing or other chemicals; wastes are stored and must be pumped out (and chemical recharged) periodically.

**Commercial Kitchen/Caterer:** For the purpose of these Guidelines, a commercial kitchen is a premise that is typically a stand-alone operation and prepares food for consumption off-site. These types of businesses typically cater to wedding functions, conferences, parties, etc. This definition would not apply to a food processing factory supplying pre-prepared meals to an airline company or similar.

**Concurrence** is required before a council may approve an application for the discharge of liquid trade waste to the sewerage system. It is a requirement under section 90(1) of the Local Government Act and clause 28 of the Local Government (General) Regulation 2005 that council obtain the written concurrence of the Secretary of the NSW Department of Industry, Skills and Regional Development (or the Secretary's nominee) prior to approving such waste to be discharged to the council's sewerage system. The Director Water and Sewerage Regulation, has been nominated to give concurrence to such approvals. Accordingly, such applications need to be provided to DPI Water.

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<sup>1</sup> A division of the NSW Department of Primary Industries.

**Contingency Plan:** A set of procedures for responding to an incident that will affect the quality of liquid trade waste discharged to the sewerage system. The plan also encompasses procedures to protect the environment from accidental and unauthorised discharges of liquid trade waste to the stormwater drainage system, and leaks and spillages from stored products and chemicals.

**Due Diligence Program:** A plan that identifies potential health and safety, environmental or other hazards (eg. spills, accidents or leaks) and appropriate corrective actions aimed at minimising or preventing the hazards.

**Effluent:** The liquid discharged following a wastewater treatment process.

**Effluent Improvement Plan (EIP):** The document required to be submitted by a discharger who is not meeting the acceptance limits for discharge waste quality set down in Council's approval conditions and/or liquid trade waste agreement. The document sets out how the discharger will meet the acceptance limits for the discharge of liquid trade waste to the sewerage system within the agreed timeframe.

**Galley Waste:** In this Policy, a liquid waste from a kitchen or a food preparation area of a vessel; solid wastes are excluded.

**Heavy Metals:** Metals of high atomic weight which in high concentrations can exert a toxic effect and may accumulate in the environment and the food chain. Examples include mercury, chromium, cadmium, arsenic, nickel, lead and zinc.

**Housekeeping:** is a general term, which covers all waste minimisation activities connected with the way in which operations within the premises are carried out.

**Industrial Discharges:** Industrial liquid trade waste is defined as liquid waste generated by industrial or manufacturing processes.

**Local Government Regulation:** Local Government (General) Regulation 2005 under the *Local Government Act 1993*.

**Liquid Trade Waste:** Liquid trade waste means all liquid waste other than sewage of a domestic nature.

**Mandatory Concurrence:** For the liquid waste in Classification C, councils will need to obtain concurrence for each discharger. DPI Water provides concurrence on behalf of the Secretary, NSW Department of Industry.

**Methylene Blue Active Substances (MBAS):** These are anionic surfactants (see Surfactants definition) and are called MBAS as their presence and concentration is detected by measuring the colour change in a standard solution of methylene blue dye.

**Minimal Pre-treatment:** For the purpose of this Policy includes sink strainers, basket arrestors for sink and floor waste, plaster arrestors and fixed or removable screens.

**National Framework for Wastewater Source Management:** refer to section 3.2

**NSW Department of Primary Industries, Water (DPI Water):** The NSW Department of Primary Industries, Water (DPI Water) has been established in accordance with the Administrative

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Arrangements (Administrative Changes – Public Service Agencies) Order 2015 from 1 July 2015. All trade waste matters (application for concurrence and policies for consent) should be provided to DPI Water.

**NSW Framework for Regulation of Sewerage and Trade Waste:** refer to section 3.1

**Open Area:** Any unroofed process, storage, washing or transport area potentially contaminated with rainwater and substances which may adversely affect the sewerage system or the environment.

**Pan:** For the purpose of this Policy “pan” means any moveable receptacle kept in a closet and used for the reception of human waste.

**pH:** A measure of acidity or alkalinity of an aqueous solution, expressed as the logarithm of the reciprocal of the hydrogen ion (H<sup>+</sup>) activity in moles per litre at a given temperature; pH 7 is neutral, below 7 is acidic and above 7 is alkaline.

**Premises:** Has the same meaning as defined in the Local Government Act Dictionary and includes any of the following:

- (a) a building of any description or any part of it and the appurtenances to it
- (b) land, whether built on or not
- (c) a shed or other structure
- (d) a tent
- (e) a swimming pool
- (f) a ship or vessel of any description (including a houseboat)
- (g) a van.

**Prescribed Pre-treatment Equipment** is defined as standard non-complex equipment used for pre-treatment of liquid trade waste, eg. a grease arrestor, an oil arrestor/separator, solids arrestor, cooling pit (refer to Table 7 of *Liquid Trade Waste Regulation Guidelines, 2009*).

**Primary Measurement Device:** A device such as a gauging pit, weir tank or flume installed in the liquid trade waste discharge line suitable for installation of instrumentation for flow measurement. In cases of commercial flows this can mean a removable section of pipe (in the fresh water supply to the trade waste area) and the installation of a check meter.

**Secretary:** Secretary means the Head of the NSW Department of Industry, Skills and Regional Development (NSW Department of Industry).

**Septage:** Material pumped out from a septic tank during desludging; contains partly decomposed scum, sludge and liquid.

**Septic Tank:** Wastewater treatment device that provides a preliminary form of treatment for wastewater, comprising sedimentation of settleable solids, flotation of oils and fats, and anaerobic digestion of sludge.

**Septic Tank Effluent:** The liquid discharged from a septic tank after treatment.

**Sewage Management Facility:** A human waste storage facility or a waste treatment device intended to process sewage and includes a drain connected to such a facility or device.

**Sewage of a Domestic Nature:** Includes human faecal matter and urine and waste water associated with ordinary kitchen, laundry and ablution activities of a household, but does not include waste in or from a sewage management facility.

**Sewerage System:** The network of sewage collection, transportation, treatment and by-products (effluent and biosolids) management facilities.

**Ship-to-Shore Pump-out:** Liquid waste from a vessel that may be considered for disposal to the sewerage system. This includes on-board toilet wastes, galley wastes and dry dock cleaning waste from maintenance activities.

**Sullage:** Domestic wastewater excluding toilet waste.

**Surfactants:** The key active ingredient of detergents, soaps, emulsifiers, wetting agents and penetrants. Anionic surfactants react with a chemical called methylene blue to form a blue-chloroform-soluble complex; the intensity of colour is proportional to concentration.

**Suspended Solids (SS):** The insoluble solid matter suspended in wastewater that can be separated by laboratory filtration and is retained on a filter. Previously also referred to as non-filtrable residue (NFR).

**Total Dissolved Solids (TDS):** The total amount of dissolved material in the water.

**Waste Minimisation:** Procedures and processes implemented by industry and business to modify, change, alter or substitute work practices and products that will result in a reduction in the volume and/or strength of waste discharged to sewer.



## Liquid Trade Waste Regulation Policy

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### What is liquid trade waste?

Liquid trade waste is defined in the Local Government (General) Regulation 2005 as below:

*Liquid trade waste means all liquid waste other than sewage of a domestic nature.*

Liquid trade waste discharges to the sewerage system include liquid wastes from:

- business/commercial premises (eg. beautician, florist, hairdresser, hotel, motel, restaurant, butcher, service station, supermarket, dentist)
- community/public premises (including craft club, school, college, university, hospital and nursing home)
- industrial premises
- trade activities (eg. mobile carpet cleaner)
- any commercial activities carried out at a residential premises
- saleyards, racecourses and from stables and kennels that are not associated with domestic households
- septic tank waste, chemical toilet waste, waste from marine pump-out facilities and established sites for the discharge of pan content from mobile homes/caravans to the sewerage system.

While septic tank, pan and ship-to-shore pump-out waste are defined as trade waste, specific procedures need to be applied to their management as the waste is often transported from its source to the sewerage system. Accordingly, specific references to these wastes are provided in this policy where necessary.

Liquid trade waste excludes:

- toilet, hand wash basin\*, shower and bath wastes derived from all the premises and activities mentioned above
- wastewater from residential toilets, kitchens, bathrooms or laundries (ie. domestic sewage)
- common use (non-residential) kitchen and laundry facilities in a caravan park
- residential swimming pool backwash.

\* Used for personal hygiene only

## Objectives

The objectives<sup>2</sup> of this policy are:

- to protect public health
- to protect the health and safety of Council employees
- to protect the environment from the discharge of waste that may have a detrimental effect
- to protect Council assets from damage
- to assist Council to meet its statutory obligations
- to provide an environmentally responsible liquid trade waste service to the non-residential sector
- to encourage waste minimisation and cleaner production in the commercial and industrial sectors
- to promote water conservation, water recycling and biosolids reuse
- to ensure compliance of liquid trade waste dischargers with Council's approved conditions
- to provide operational data on the volume and composition of industrial and commercial effluent to assist in the operation of the sewerage system and the design of augmentations or new sewerage systems
- to ensure commercial provision of services and full cost recovery through appropriate sewerage and liquid trade waste fees and charges.

## Scope of this Policy

This policy comprises three parts:

- Part 1 specifies the circumstances in which a person is exempt from the necessity to apply for an approval to discharge liquid trade waste to Council's sewerage system
- Part 2 specifies the criteria which Council will take into consideration in determining whether to give or refuse a liquid trade waste approval
- Part 3 specifies the framework for regulation of liquid trade waste, including the NSW Framework for Regulation of Sewerage and Trade Waste, alignment with the *National Framework for Wastewater Source Management*, application procedures, liquid trade waste discharge categories, liquid trade waste services agreements, monitoring of liquid trade waste discharges, liquid trade waste fees and charges, modification or revocation of approvals, prevention of waste of water and contaminated stormwater discharges from open areas.

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<sup>2</sup> The above objectives are consistent with the *National Framework for Sewage Quality Management* on page 17 of the *Australian Sewage Quality Management Guidelines, June 2012*, Water Services Association of Australia (WSAA).

Liquid Trade Waste Regulation Policy

## 1 Part 1 – Exemptions

### Exemptions

For obtaining approval of liquid trade waste discharge

**Table 1: Exemptions**

<p>This table lists commercial business activities that the Secretary, NSW Department of Industry has consented to an exemption from the requirement to apply for approval for liquid trade waste discharge to the sewerage system. Each such business must meet the standard requirements specified below. An annual trade waste fee applies to each such discharger.</p>	
Activity	Requirements
Beautician	Nil.
Bed and Breakfast (not more than 10 persons including proprietor)	Sink strainers in food preparation areas. Housekeeping practices (see Note 4).
Day care centre (no hot food prepared)	Sink strainers in food preparation areas. Housekeeping practices (see Note 4). Nappies are not to be flushed into the toilet.
Delicatessen – no hot food prepared	Sink strainers in food preparation areas. Housekeeping practices (see Note 4).
Dental technician (no X-ray)	Plaster arrestor required.
Doctor's surgery (plaster casts, no X-ray)	Plaster arrestor required.
Dog/cat groomer/salon	Floor waste basket and sink strainer required (see Note 3). Animal litter and any waste disposal products may not be discharged to sewer. No organophosphorus pesticides may be discharged to sewer.
Florist	Floor waste basket and sink strainer required. No herbicides/pesticides may be discharged to sewer.
Fruit and vegetable – retail	Floor waste basket and sink strainer required (see Note 3).
Hairdressing	Floor waste basket and sink strainer (where available).

## Liquid Trade Waste Regulation Policy

Activity	Requirements
Jewellery shop <i>miniplater</i>  <i>ultrasonic washing</i> <i>precious stone cutting</i>	Miniplater vessel to contain no more than 1.5 L of precious metal solution Nil If : < 1000 L/d plaster arrestor required > 1000 L/d general purpose pit required
Mixed business (minimal hot food)	Floor waste basket and sink strainer required (see Note 3). Housekeeping practices (see Note 4).
Mobile cleaning units carpet cleaning garbage bin washing	20 micron filtration system fitted to a mobile unit. Floor waste basket required. Discharge is via grease arrestor (if available).
Motel (no hot food prepared and no laundry facility)	Floor waste basket and sink strainer required (see Note 3). Housekeeping practices (see Note 4).
Nut shop	Floor waste basket and sink strainer required (see Note 3).
Optical service - retail	Solids settlement tank/pit required.
Pet shop – retail	Floor waste basket and sink strainer required (see Note 2).
Pizza reheating for home delivery	Housekeeping practices (see Note 4).
Venetian blind cleaning	Nil (see Note 2).

**Notes:**

1. Where "required" is used it means as required by Council.
2. If activity is conducted outdoors, the work area is to be roofed and banded to prevent stormwater ingress into the sewerage system.
3. All drainage from floors in food preparation areas is required to pass through a floor waste basket.
4. Food preparation activities need to comply with sound housekeeping practices including:
  - (a) Floor must be dry swept before washing.
  - (b) Pre-wiping of all utensils, plates, bowls etc. to the scrap bin before washing up.
  - (c) Use of a food waste disposal unit is not permitted.

## 2 Part 2 – Criteria for approval to discharge liquid trade waste into council’s sewerage system

### 2.1 Factors for consideration

Council’s decision to accept liquid trade waste into its sewerage system is on the basis of a preventive risk management framework for managing risks to the sewerage system within an integrated water cycle management<sup>3</sup> context. It will be based on the discharge meeting Council’s requirements<sup>4</sup>. When determining an application to discharge liquid trade waste to the sewerage system, Council will consider the following factors:

- The potential for the liquid trade waste discharge to impact on public health
- The possible impacts the discharge may pose to the environment (land, water, air, noise, or nuisance factors)
- The potential impacts of the discharge on the health and safety of the Council’s employees
- The possible impact of the discharge on Council’s sewerage infrastructure or sewage treatment process
- The capability of the sewerage system (both transportation and treatment components) to accept the quality and quantity of the proposed liquid trade waste discharge
- The impact the liquid trade waste will have on the ability of the sewerage scheme to meet its Environment Protection Authority licence requirements
- Compliance of the proposed liquid trade waste discharge with guideline limits in this policy<sup>5</sup>
- The potential impacts of the discharge on the quality of, and management practices for, effluent and biosolids produced from the sewage treatment process
- The adequacy of the pre-treatment process(es) to treat the liquid trade waste to a level acceptable for discharge to the sewerage system, including proposed safeguards if the pre-treatment system fails
- Whether appropriate safeguards are proposed to avoid the discharge of other, non-approved wastes to the sewerage system
- The adequacy of any chemical storage and handling facilities, and the proposed safeguards for preventing the discharge of chemicals to the sewerage system

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<sup>3</sup> *Integrated Water Cycle Management Guidelines for NSW Local Water Utilities, DWE, October 2004.*

<sup>4</sup> In considering options for waste management to drive resource efficiency, the following order of preference set out on page 80 of the *Australian Sewage Quality Management Guidelines, June 2012*, WSAA will be adopted:

- Avoidance
- Minimisation
- Re-use
- Recovery of energy
- Treatment
- Disposal

<sup>5</sup> The quality of trade waste from some low risk commercial activities in Classification A will exceed guideline limits in Council’s trade waste policy. As a higher level of pre-treatment is not cost-effective, such waste is acceptable if the discharger installs and properly operates and maintains the required pre-treatment equipment (refer to Table 4 on page 21 and Tables 7 to 9 of *Liquid Trade Waste Regulation Guidelines, 2009*). Similarly, septic and pan waste may exceed some guideline limits.

- Whether prohibited substances are proposed to be discharged
- The potential for stormwater entering the sewerage system and adequacy of proposed stormwater controls
- Waste minimisation and water conservation programs
- The adequacy of the proposed due diligence program and contingency plan, where required.

## 2.2 Discharge quality

Council has guideline limits for the acceptance of discharges, as set out in Table 2 on pages 16 to 18. Council may vary the guideline limits for a particular sewerage treatment works. Where the guideline limits cannot be met, applicants are required to provide justification for exceeding the limits. Based on the type and the proposed contaminant levels, Council may refuse the application, or may approve it subject to an effluent improvement program, or other conditions being implemented.

## 2.3 Prohibited substances

Some substances are not suitable for discharge to the sewerage system. Table 3 on page 19 sets out those substances which must not be discharged to the sewerage system. Council may not grant approval for the discharge of these substances to the sewerage system unless it is specifically approved under section 68 of the Local Government Act.

## 2.4 Stormwater discharges from open areas

Stormwater is a prohibited discharge under this policy. The ingress of stormwater into the sewerage system can cause operational problems to the system and result in sewer overflows, as the sewerage system does not have the capacity for such flows. Therefore, Council does not generally accept the discharge of stormwater to the sewerage system.

However, it is recognised that it may not always be possible or practical to prevent all stormwater entering the sewerage system at some liquid trade waste premises. The discharge of limited quantities of first flush stormwater from sealed areas will be considered where roofing cannot be provided because of safety or other important considerations. The discharge from unsealed areas is not permitted.

Before the stormwater will be considered for discharge to the sewerage system, the applicant must provide the following information:

- reasons why the area cannot be fully or partially roofed and bunded to exclude stormwater
- the dimensions and a plan of the open area under consideration
- whether the open area is sealed
- the estimated volume of the stormwater discharge
- information on rain gauging
- where a first-flush system is proposed, details on how the stormwater will be diverted to the drainage system after the first flush is accepted (the first flush to be limited to first 10 mm of storm run-off)

## Liquid Trade Waste Regulation Policy

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- measures proposed for diverting stormwater away from the liquid trade waste generating area
- report on other stormwater management options considered and why they are not feasible.

**Note:** Trade waste charges for the acceptance of stormwater to the sewerage system are indicated in section 3.7.9 on page 36.

### 2.5 Food waste disposal units

The use of food waste disposal units (also known as in-sinkerators, in-sink food waste disposers, or garbage grinders) is not permitted. Existing installations in hospitals and nursing homes may be permitted, provided that wastewater is discharged through an adequately sized grease arrestor. For existing premises, a food waste disposal charge will be levied based on the number of beds in the hospital or nursing home (refer to section 3.7.6 on page 33).

If the hospital or nursing home kitchen is refurbished, the food waste disposal unit must be removed.

### 2.6 Devices that macerate or pulverise waste

Macerators and any other similar devices that are used for pulverising of solid waste are not authorised to connect to Council's sewerage system. Solid waste includes, but is not limited to, sanitary napkin, placenta, surgical waste, disposable nappy, mache bedpan and urine containers.

Therefore Council will not accept any discharges from such devices to its sewerage system.

### 2.7 Use of additives in pre-treatment systems

Council does not allow solvents, enzymes, bioadditives, and odour control agents to be used in pre-treatment systems (except neutralising chemicals designated for the pre-treatment) except by specific written application and subsequent approval.

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Table 2: Guideline limits for acceptance of liquid trade wastes into sewerage system

Parameter*	Limits#	Analytical Method Reference#
<b>General acceptance guideline limits</b>		
Flow Rate	The maximum daily and instantaneous rate of discharge (kL/h or L/s) is set on the available capacity of the sewer. Large dischargers are required to provide a balancing tank to even out the load on the sewage treatment works.	
BOD <sub>5</sub>	Normally, approved up to 600 mg/L. In some cases higher concentration for low mass loadings may be acceptable, if the treatment works has sufficient capacity and odour will not be a problem.	5210B
Suspended solids	Concentrations up to 600mg/L may be acceptable.	2540D
COD	Normally, not to exceed BOD <sub>5</sub> by more than three times. This ratio is given as a guide only to prevent the discharge of non-biodegradable waste.	
Total Dissolved Solids	Up to 4000 mg/L may be accepted. However, the acceptance limit may be reduced depending on available effluent disposal options and will be subject to a mass load limit.	2510B
Temperature	Less than 38°C.	
pH	Within the range 7.0 to 9.0.	
Oil and Grease	100 mg/L if the volume of the discharge does not exceed 10% of the design capacity of the treatment works, and 50 mg/L if the volume is greater than 10%.	USEPA1664
Detergents	All industrial detergents are to be biodegradable. A limit on the concentration of 50 mg/L (as MBAS) may be imposed on large liquid trade wastes.	
Colour	No visible colour when the waste is diluted to the equivalent dilution afforded by domestic sewage flow.	
Radioactive Substances	The discharge must comply with the <i>Radiation Control Act 1990</i> .	

cont ...

\* See Glossary for explanation of terms

# Refer to *Australian Sewage Quality Management Guidelines, June 2012*



Liquid Trade Waste Regulation Policy

**Table 2 (Cont.) – Guideline limits for acceptance of liquid trade wastes into sewerage system**

Parameter	Maximum concentration (mg/L)	Analytical Method Reference
<b>Acceptance guideline limits for inorganic compounds</b>		
Ammonia (as N)	50	4500-NH3-B
Boron	5	3120B
Bromine	5	DPD-colorimetric test kit
Chlorine	10	DPD-colorimetric test kit
Cyanide	1	4500-CN-G and E
Fluoride	20	4500-F-C
Nitrogen (Total Kjeldahl)	100	4500-Norg B or C
Phosphorus (total)	20	4500P-I & 4500P-F
Sulphate (as SO <sub>4</sub> )	500	3120B
Sulphide (as S)	1	4500S2-C&D or E
Sulphite (as SO <sub>3</sub> )	15	4500BSO3B
<b>Acceptance guideline limits for organic compounds</b>		
Benzene	<0.001	6200
Toluene	0.5	6200
Ethylbenzene	1	6200
Xylene	1	6200
Formaldehyde	30	
Phenolic compounds (except pentachlorophenol)	5	6410B
Petroleum hydrocarbons (non-flammable)*	30	USEPA 8015B USEPA 8260B
Pesticides general (except organochlorine and organophosphorus)*	0.1	6410B
Polynuclear Aromatic Hydrocarbons (PAHs)	5	6410B & 6440

cont ...

\* Refer to Table 3

## Liquid Trade Waste Regulation Policy

Table 2 (Cont.) – Guideline limits for acceptance of liquid trade wastes into sewerage system

Parameter	Maximum concentration (mg/L)	Allowed daily mass limit (g/d)	Analytical Method Reference
<b>Acceptance guideline limits for metals</b>			
Aluminium	100	-	3120B
Arsenic	0.5	2	3114B
Cadmium	1	6	3120B
Chromium*	3	15	3120B
Cobalt	5	15	3120B
Copper	5	15	3120B
Iron	100	-	3120B
Lead	1	6	3120B
Manganese	10	30	3120B
Mercury	0.01	0.05	3112B
Molybdenum	5	30	3120B
Nickel	3	15	3120B
Selenium	1	15	3120B
Silver	2 <sup>#</sup>	6	3120B
Tin	5	15	3120B
Zinc	5	15	3120B
Total heavy metals excluding aluminium, iron and manganese	less than 30 mg/L and subject to total mass loading requirements		

\* Where hexavalent chromium (Cr<sup>6+</sup>) is present in the process water, pre-treatment will be required to reduce it to the trivalent state (Cr<sup>3+</sup>), prior to discharge into the sewer. Discharge of hexavalent chromium (Cr<sup>6+</sup>) from chromate compounds used as corrosion inhibitors in cooling towers is not permitted.

<sup>#</sup> This limit is applicable to large dischargers. The concentration of silver in photoprocessing waste where a balancing tank is provided is not to exceed 5 mg/L.

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**Table 3: Substances prohibited from being discharged into the sewerage system**

<ul style="list-style-type: none"><li>• organochlorine weedicides, fungicides, pesticides, herbicides and substances of a similar nature and/or wastes arising from the preparation of these substances</li><li>• organophosphorus pesticides and/or waste arising from the preparation of these substances</li><li>• any substances liable to produce noxious or poisonous vapours in the sewerage system</li><li>• organic solvents and mineral oil</li><li>• any flammable or explosive substance</li><li>• discharges from 'Bulk Fuel Depots'</li><li>• chromate from cooling towers</li><li>• natural or synthetic resins, plastic monomers, synthetic adhesives, rubber and plastic emulsions</li><li>• roof, rain, surface, seepage or ground water, unless specifically permitted (clause 137A of the Local Government (General) Regulation 2005)</li><li>• solid matter</li><li>• any substance assessed as not suitable to be discharged into the sewerage system</li><li>• waste that contains pollutants at concentrations which inhibit the sewage treatment process – refer <i>Australian Sewage Quality Management Guidelines, June 2012, WSAA</i></li><li>• any other substances listed in a relevant regulation.</li></ul>
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### 3 Part 3 – Framework for regulation of liquid trade waste

#### 3.1 The NSW framework for regulation of sewerage and trade waste

Due to the *Tragedy of the Commons*<sup>6</sup> in the use of common pool resources, sound regulation of sewerage and trade waste requires implementation of **all** the following integrated measures.

1. Preparation and implementation of a sound trade waste regulation policy, assessment of each trade waste application and determination of appropriate conditions of approval. The conditions must be consistent with the LWU's *Integrated Water Cycle Management Strategy* and demand management plan. In addition, execution of a liquid trade waste services agreement is required for large dischargers to assure compliance.
2. Preparation and implementation of a sound *Development Servicing Plan*<sup>7</sup>, with commercial sewerage developer charges to ensure new development pays a fair share of the cost of the required infrastructure.
3. Full cost recovery with appropriate sewer usage charges<sup>8</sup> and trade waste fees and charges<sup>9</sup> in order to provide the necessary pricing signals to dischargers. These charges must include non-compliance trade waste usage charges and non-compliance excess mass charges in order to provide the necessary incentives for dischargers to consistently comply with their conditions of approval.
4. Monitoring, mentoring and coaching of dischargers in order to achieve cleaner production and assist them to comply with their conditions of approval.
5. Enforcement, including appropriate use of penalty notices under section 222 of the *Protection of the Environment Operations Act 1997*. Orders may also be issued and penalties imposed for offences under sections 626, 627 and 628 of the *Local Government Act 1993*.
6. Disconnection of a trade waste service in the event of persistent failure to comply with the LWU's conditions of approval.

Together, the above six measures comprise the NSW framework for regulation of sewerage and trade waste. The framework involves a preventive risk management approach, which has been developed to address the use of common pool resources by providing economic incentives for dischargers to minimise their waste and to consistently comply with their conditions of approval.

<sup>6</sup> In the absence of appropriate controls and measures (such as conditions of approval, a sewer usage charge, a trade waste usage charge, a non-compliance trade waste usage charge, excess mass charges, non-compliance excess mass charges and penalty notices), it would be in the economic interest of each trade waste discharger to minimize their efforts and expenditure on control and pre-treatment of their trade waste before discharging it to the sewerage system. In the past, failure to implement these measures has caused multi-million dollar damage to sewerage networks, pumping stations and treatment works (refer to the examples shown on pages 30, 47 and 48 of the *Liquid Trade Waste Regulation Guidelines, 2009*).

<sup>7</sup> In accordance with the *NSW Developer Charges Guidelines for Water Supply, Sewerage and Stormwater, 2002*.

<sup>8</sup> In accordance with page 29 of the *NSW Water Supply, Sewerage and Trade Waste Pricing Guidelines, 2002*.

<sup>9</sup> In accordance with Appendices D and I of the *Liquid Trade Waste Regulation Guidelines, 2009*.

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### 3.2 Alignment with the national framework for wastewater source management

The NSW framework for regulation of sewerage and trade waste is outlined in section 3.1. The NSW framework is driven by the NSW Government's *Best-Practice Management of Water Supply of Sewerage Guidelines, 2007* and is consistent with that in the *National Framework for Wastewater Source Management*.<sup>10</sup>

In particular, under the *Best-Practice Management Guidelines* each LWU is required to achieve the following outcomes:

- Prepare and implement a 30-year Integrated Water Cycle Management Strategy, demand management plan, pay-for-use water supply pricing and community and customer involvement (Elements 1, 6, 8)
- Annual performance monitoring, including an annual triple bottom line (TBL) Performance Report and Action Plan to identify and address any areas of under-performance (Elements 5, 6, 9, 10, 11, 12)
- Achieve full cost recovery for water supply, sewerage and trade waste services and apply an appropriate non-residential sewer usage charge (Elements 3, 8)
- Prepare and implement a sound trade waste regulation policy and issue an appropriate approval to each trade waste discharger, including waste minimisation and cleaner production (Elements 1, 2, 3, 4, 7, 8)
- Appropriate trade waste fees and charges (including incentives to comply with LWU's approval conditions through non-compliance trade waste usage charges and non-compliance excess mass charges) (Elements 3, 8)
- Trade waste services agreement for large dischargers to assure compliance (Elements 3, 8)
- Appropriate training of LWU staff and monitoring, mentoring and coaching of trade waste dischargers (Elements 1, 4, 5, 7, 8)
- Enforcement, including appropriate use of penalty notices or orders (Elements 3, 8)

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<sup>10</sup> The following 12 elements of the *National Framework for Sewage Quality Management* are set out on page 18 of the *Australian Sewage Quality Management Guidelines, June 2012, WSAA*:

**COMMITMENT**

1. Commitment to Wastewater Source Management

**SYSTEM ANALYSIS and MANAGEMENT**

2. Assessment of the Wastewater System
3. Preventive Measures for Wastewater Input Quality Management
4. Operational Procedures and Process Control
5. Verification of Wastewater Inputs Quality
6. Management of Incidents/Complaints and Emergencies

**SUPPORTING REQUIREMENTS**

7. Employee Awareness and Training
8. Customer and stakeholder involvement and awareness
9. System Validation and Research and Development
10. Documentation and Reporting

**REVIEW**

11. Evaluation and Audit
12. Review and Continual Improvement

- Disconnection of a trade waste service in the event of persistent failure to comply with the LWU's conditions of approval (Element 8).

### 3.3 Application Procedures

To obtain Council's approval to discharge liquid trade waste to Council's sewerage system, a discharger must lodge an application in writing. Application forms are available from Council. If a person wishes to discharge liquid trade waste to the sewerage system but is not the owner of the premises, the person must obtain the owner's consent to the application.

The applicant must provide the following information:

- site owner's full name, address, contact telephone number
- address of the business/industry where discharge to the sewerage system will occur
- name of contact person for the premises and telephone contact for the business/industry
- type of process/activity generating the liquid trade waste
- normal hours of business operation
- rate of discharge, including
  - the average per day, maximum per day and per hour, and
  - hours of the day during which discharge will take place
- characteristics of wastes, including
  - nature of source
  - expected maximum and average concentrations of pollutants

(Where sampling and testing are required to establish the quality of the liquid trade waste, the testing should be carried out in accordance with the procedures set out in the *Standard Methods for the Examination of Water and Wastewater* published by the American Public Health Association, American Water Works Association and Water Pollution Control Federation.)

- chemicals to be used – supply Safety Data Sheets
- details of any proposed pre-treatment facilities, location and site plan. Details should include:
  - pre-treatment process details
  - internal wastewater drainage
  - pump size
  - rising main size, length and profile
  - system operational characteristics
  - operational procedures
  - provisions for sampling and flow measurement, where required
  - proposed connection point to the sewerage system
- flow diagram and hydraulic profile of proposed liquid trade waste pre-treatment facilities
- maintenance schedule for pre-treatment equipment, including contractor's details
- stormwater drainage plan

### Liquid Trade Waste Regulation Policy

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- measures for prevention of stormwater ingress into the sewerage system
- location, nature and chemical composition of all substances stored/used on site
- justification for disposing of the waste into the sewerage system over other possible options (if any)
- methods of disposal for other wastes that are not discharged to the sewerage system
- any relevant environmental impact assessments
- any additional information as requested by Council.

The following information needs to be provided in regard to the discharge of septic tank and pan waste to the sewerage system:

- identification of the pump out service provider
- proposed method of discharge including plans and drawings if appropriate
- details of any proposed facilities for a disposal point, location and site plan (if applicable). Details should include the proposed connection point to the sewerage system
- security arrangements at the proposed disposal site (if applicable)
- the provision of freshwater for hosing down where needed
- bunding and measures to prevent the ingress of stormwater at the proposed dump point, if applicable
- the use of odour inhibiting or other chemicals, if any, and their dosage rates
- statement that septic effluent will not be mixed with septage or grease trap pump out, ie. dedicated tankers will be used for each type of waste
- for boat/marina facility – the type and number of vessels either moored at the marina and/or would utilise the pump-out facility on a regular basis:
  - private
  - commercial.

Council may, under section 86 of the Local Government Act, request an applicant to provide more information to enable it to determine the application.

### 3.4 Approval of applications

Where an application is approved, Council will notify the applicant as soon as practical of the approval and any conditions of the approval. The duration of the approval will be as stated in the approval. In cases where Council requires a discharger to enter into a liquid trade waste services agreement (refer to section 3.9 on page 38), Council will issue a deferred commencement approval under section 95 of the Local Government Act requesting the discharger to do so within the time specified in Council's letter. In such cases, the approval will not be operative until the agreement has been executed by the discharger.

An applicant may make a minor amendment or withdraw an application before it is approved by Council. An applicant may also apply to Council to renew or extend an approval, in accordance with section 107 of the Local Government Act.

If an application is refused, Council will notify the applicant of the grounds for refusal.

An approval to discharge liquid trade waste to Council's sewer is not transferable. A new application must be lodged and a new approval obtained if there is a change of the approval holder or the activity. Council must be notified of change of ownership and/or occupier in all cases, whether a new approval is required or not, to allow updating of records.

### 3.5 Concurrence

If Council supports an application and has a notice stating that concurrence of the Secretary, NSW Department of Industry, can be assumed for the waste relevant to the application, Council will approve the application. Otherwise, Council will seek concurrence in accordance with the requirements of section 90(1) of the Local Government Act. DPI Water provides concurrence on behalf of the Secretary, NSW Department of Industry.

Liquid trade waste discharges are divided into four (4) classifications for the purpose of the concurrence process:

- Concurrence Classification A – liquid trade waste dischargers for which Council has been authorised to assume concurrence to the approval subject to certain requirements
- Concurrence Classification B – liquid trade waste dischargers whereby Council may apply for authorisation to assume concurrence to the approval subject to certain requirements
- Concurrence Classification S – the acceptance of septic tank, pan waste and ship-to-shore pump-out. Council may apply for authorisation to assume concurrence to the approval subject to certain conditions
- Concurrence Classification C – all other liquid trade waste dischargers that do not fall within Concurrence Classification A, B or S, and therefore require Council to forward the application for concurrence.

All councils have been authorised to assume concurrence for Concurrence Classification A liquid trade waste discharges. These are listed in Table 4 and Council will not need to seek concurrence for approval of trade waste applications for these activities.



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**Table 4: Liquid trade waste discharges with automatic assumed concurrence**

Commercial retail food preparation activities	Other commercial activities
Bakery (retail)	Animal wash (pound, stables, racecourse, kennels, mobile animal wash and veterinary with no X-ray)
Bed and Breakfast (<10 persons)	Beautician
Bistro	Boiler blowdown
Boarding house/hostel kitchen	Car detailing
Butcher shop (retail)	Cooling tower
Café/coffee shop/coffee lounge	Craft activities (making of clay pottery, ceramics, cutting and polishing of gemstones or making of jewellery at clubs, cottage industries)
Canteen	Dental surgery/dental specialist
Cafeteria	Dental technician
Chicken/poultry shop (only fresh chickens/game sold)	Doctor's surgery, medical centre - plaster casts (no X-rays)
Chicken/poultry shop (retail BBQ/charcoal chicken)	Florist
Club (kitchen wastes)	Funeral parlour, morgue
Commercial kitchen/caterer	Hairdressing (includes barbers)
Community hall/civic centre	Jewellery shop
Day care centre	Laboratory (pathology/analytical)
Delicatessen	Laundry or laundromat (coin operated)
Doughnut shop	Lawnmower repairs
Fast food outlet (McDonalds, KFC, Burger King, Pizza Hut, Red Rooster, etc.)	Mechanical repairs/workshop
Fish shop (retail – fresh and/or cooked)	Mobile cleaning units
Food caravan	Optical service
Fruit and vegetable shop (retail)	Pet shop (retail)
Function centre	Photographic tray work/manual development
Hotel	Plants retail (no nursery)
Ice cream parlour	School (Primary and Secondary)
Juice bar	Stone working
Mixed business	Swimming pool/spa/hydrotherapy

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Motel	Vehicle washing (by hand/wand, automatic car wash, external truck wash or underbody/engine degrease only)
Nightclub	Venetian blind cleaning
Nursing home kitchen	Veterinary /animal kennels with X-ray
Nut shop	Waterless minilab
Patisserie	
Pie shop	
Pizza shop	
Restaurant	
Salad bar	
Sandwich shop	
School canteen	
Supermarket (with butcher/delicatessen/ seafood/or charcoal chickens)	
Take-away food outlet	

*Notes:*

The volume of liquid trade waste must not exceed 5 kL/d or 1000 kL/a except in the case of commercial retail food preparation activities, where up to 16 kL/d is included in this category. If the waste discharged to the sewer exceeds these volumes, the application must be treated as Concurrence Classification B. Discharges over 20 kL/d must be treated as Classification C.

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### 3.6 Liquid trade waste charging categories

Four (4) classifications of liquid trade waste have been established for concurrence purposes, Classification A, B, C and S (refer section 3.5 on page 24). For trade waste charging purposes there are also four (4) charging categories, Category 1, 2, 2S and 3 (pages 28 and 29).

Figure 1 below shows that Classification A dischargers fall into Charging Category 1 or Category 2. Classification B dischargers fall into Charging Category 2, except for a few dischargers with low impact on the sewerage system which fall into Category 1. Classification S dischargers fall into Charging Category 2S. Classification C dischargers fall into Charging Category 3.

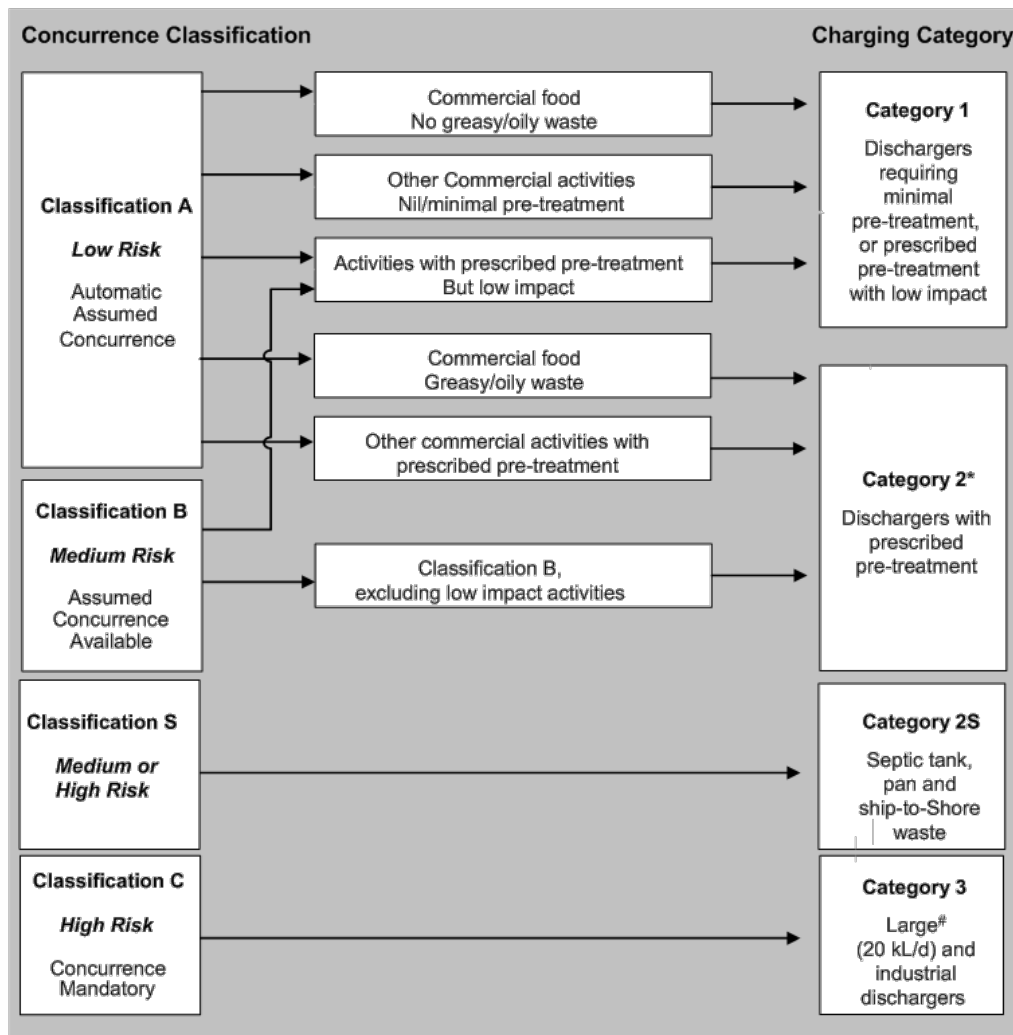


Figure 1: Charging categories for trade waste

\* Also includes fish shop (fresh fish for retail)

# Except shopping complexes and institutions (hospital, educational facilities, etc.). These will be charged as Category 2 in accordance with activities carried out on the premises.

## Category 1 Discharger

Category 1 liquid trade waste dischargers are those conducting an activity deemed by Council as requiring nil or only minimal pre-treatment equipment and whose effluent is well defined and of a relatively low risk to the sewerage system. In addition, Category 1 includes dischargers requiring prescribed pre-treatment but with low impact on the sewerage system.

**Classification A activities – Commercial retail food preparation activities that do not generate an oily/greasy waste:** bakery (only bread baked on-site), bistro (sandwiches, coffee only), café/coffee shop/coffee lounge, canteen, community hall (minimal food), day care centre, delicatessen, fruit and vegetable shop, hotel, ice cream parlour (take away only), juice bar, mixed business, motel, nightclub, nut shop, pizza cooking/reheating (no preparation or washing up on-site, pizza heated and sold for consumption off-site), potato peeling (small operation), sandwich shop/salad bar, take away food outlet.

**Classification A activities – Other commercial activities:** animal wash, beautician/hairdressing, crafts < 1000 L/d, dental surgery (plaster casts, no X-ray unless digital), doctor's surgery and medical centre (plaster casts, no X-ray), florist, funeral parlour, mobile cleaning units, morgue, jewellery shop, optical service (retail), pet shop, plants retail (no nursery), public swimming pool, photographic (tray work/manual development), venetian blind cleaning, veterinary (no X-ray).

**Classification A or B activities – dischargers with prescribed pre-treatment with low impact on the sewerage system:** boiler blowdown, cooling tower, industrial boilers, laboratory (analytical/pathology/tertiary institution), laundry, primary and secondary school<sup>11</sup>, vehicle washing.

## Category 2 Discharger

Category 2 liquid trade waste dischargers are those conducting an activity deemed by Council as requiring a prescribed type of liquid trade waste pre-treatment equipment and whose effluent is well characterised.

**Trade Waste dischargers with prescribed pre-treatment<sup>12</sup> include:**

**Classification A activities:** Premises that prepare and/or serve hot food or foods that generate an oily/greasy waste: bakery (pies, sausage rolls, quiches, cakes, pastries with creams or custards), bistro, boarding house/hostel kitchen, butcher, café/coffee shop/coffee lounge, cafeteria, canteen, fast food outlet, chicken/poultry shop, club, community hall<sup>13</sup>, commercial kitchen/caterer, nursing home, patisserie, supermarket, doughnut shop, fish shop (cooking on-site), function centre, hotel, ice cream parlour, motel, nightclub, pizza cooking, restaurant, sandwich shop/salad bar, take away food outlet.

**Other commercial Classification A activities:** car detailing, craft activities > 1000 L/d, dental surgery with X-ray, lawnmower repairs, mechanical workshop, stone working, veterinary (with X-ray), waterless mini-lab.

**Classification B activities:** auto dismantler, bus/coach depot, construction equipment maintenance and cleaning, equipment hire, maintenance and cleaning, glass cutting and grinding, graphic arts, hospital (with or without X-ray), medical centre (with X-ray), optical services (at medical or educational facilities, workshops), oyster processing – shucking, panel beating, photographic lab, radiator repairer, screen printing, service station forecourt, shopping complex, water wash mini-lab, X-ray radiologist.

**Other Classification A activities:** fish shop (fresh fish for retail).

<sup>11</sup> If significant hot food preparation is carried out, Category 2 charges may be levied by Council.

<sup>12</sup> Excludes low impact activities, listed under Category 1.

<sup>13</sup> If the type and size of kitchen fixtures installed enable catering for large functions.

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### Category 2S Discharger

Category 2S dischargers are those conducting an activity of transporting and/or discharging septic tank or pan content waste into the sewerage system.

#### Trade waste dischargers include the following Classification S activities:

**Classification S activities:** bus/rail coaches/caravan/motor home/caravan park waste dump points, mooring/marina dump points, pan waste, portable chemical toilet waste, septage, septic tank effluent, ship-to-shore pump-outs (galley waste and toilet waste).

### Category 3 Discharger (large or industrial waste dischargers)

Category 3 liquid trade waste dischargers are those conducting an activity which is of an industrial nature and/or which results in the discharge of large volumes (over 20 kL/d) of liquid trade waste to the sewerage system. Any Category 1 or 2 discharger whose volume exceeds 20 kL/d becomes a Category 3 discharger, except shopping complexes and institutions (eg. hospitals, educational facilities, correctional facilities, etc.)

**Large trade waste dischargers and other Classification C activities include:** abattoir, bakery (wholesale), brewery, cooling towers, cosmetics/perfumes manufacture, dairy processing (milk/cheese/yoghurt/ice cream etc.), food processing (cereals/cannery/condiments/ confectionary/edible oils/fats/essence/ flavours/fish/fruit juice/gelatine/honey/meat/pickles/ smallgoods/tea and coffee/vinegar/yeast manufacture etc.), fruit and vegetable processing, flour milling, glue manufacturer, egg processing, pet food processing, plants nursery (open areas), potato processing, poultry processing, saleyards, seafood processing, soft drink/cordial manufacture, starch manufacture, sugar refinery, tanker washing, tip leachate, transport depot/ terminal, water treatment backwash, wholesale meat processing, winery, wine/spirit bottling.

**Dischargers of industrial waste include the following Classification C activities:** acid pickling, adhesive/latex manufacture, agricultural and veterinary drugs, anodising, bitumen and tar, bottle washing, cardboard and carton manufacture, carpet manufacture, caustic degreasing, chemicals manufacture and repackaging, contaminated site treatment, cyanide hardening, detergent/soaps manufacture, drum washing, electroplating, engine gearbox reconditioning, extrusion and moulding (plastic/metal), feather washing, fellmonger, felt manufacture, fertilisers manufacture, fibreglass manufacture, filter cleaning, foundry, galvanising, glass manufacture, ink manufacture, laboratories (excluding those in Category 2), liquid wastewater treatment facility (grease trap receipt depot and other pump-out waste depot), metal finishing, metal processing (refining/rolling/ non-cyanide heat treatment/phosphating/ photo engraving/printed circuit etching/sheet metal fabrication etc.), mirrors manufacture, oil recycling (petrochemical) and refinery, paint stripping, paint manufacture, paper manufacture, pharmaceuticals manufacture, plaster manufacture, powder coating, printing (newspaper, lithographic), sandblasting, slipway, tannery, timber processing (joinery and furniture/plywood/hardwood), textile manufacture (wool dyeing/ spinning/scouring), truck washing (internal), waxes and polishes.

#### Phasing-in of charges

As indicated on page 24 of the *Best-Practice Management of Water Supply and Sewerage Guidelines, 2007*, the non-residential sewerage bills for customers facing a large increase as a result of implementing best-practice pricing are to be phased in over a period of five (5) years. Large increases in trade waste fees and charges may be phased in over a period of up to three (3) years.

### 3.7 Liquid trade waste fees and charges

Council provides sewerage and liquid trade waste services on a commercial basis, with full cost recovery through sewerage and liquid trade waste fees and charges. Council's proposed fees and charges are advertised annually for public comment in its draft Management Plan. In addition to the trade waste fees and charges described below, Council may elect to include any trade waste charges shown in Appendix I of the Liquid Trade Waste Regulation Guidelines, 2009.

Liquid trade waste discharged to the sewerage system from industrial, commercial or other non-residential customers can impose significant costs on sewage transport and treatment facilities. To recover these costs and to ensure removal of existing significant cross-subsidies from residential customers, in addition to a two-part tariff with an appropriate **sewer usage charge/kL** for non-residential sewerage, appropriate fees and charges are levied for liquid trade waste.

Council's liquid trade waste fees and charges may include:

- Application fee
- Annual trade waste fee
- Re-inspection fee
- Trade waste usage charge
- Septic tank and pan waste disposal charge
- Excess mass charges
- Food waste disposal charge
- Non-compliance trade waste usage charge
- Non-compliance excess mass charge and pH charge
- Non-compliance penalty.

#### 3.7.1 Application fee

The application fee recovers the cost of administration and technical services provided by Council in processing applications for approval to discharge liquid trade waste to the sewerage system. The application fee will be allocated on the basis of the category into which the discharger is classified and reflects the complexity of processing the application. Application fees will be set annually by Council.

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### 3.7.2 Annual trade waste fee

The purpose of this fee is to recover the cost incurred by Council for administration and the scheduled inspections each year to ensure a liquid trade waste discharger's ongoing compliance with the conditions of their approval.

As part of an inspection, Council or its agents may undertake monitoring of the liquid trade waste discharges from premises or business. Such monitoring may include but is not limited to, flow measurement and the sampling of the liquid trade waste. **Where more than one (1) instance\*** of such monitoring is undertaken by Council, or its agents, in a financial year, the cost involved may be recovered from the discharger.

Annual liquid trade waste fees are determined on the basis of the category of the discharger and are proportionate to the complexity of their inspection and administration requirements. Annual trade waste fees will be set by Council. Where the discharger is required to pay for monitoring this will be charged on the basis of full cost recovery<sup>#</sup>.

### 3.7.3 Re-inspection fee

Where non-compliance with the conditions of an approval has been detected and the discharger is required to address these issues, Council will undertake re-inspections to confirm that remedial action has been satisfactorily implemented. Council will impose a fee for each re-inspection. The re-inspection fee will be set annually by Council on the basis of full cost recovery. A re-inspection may include the monitoring of liquid trade waste discharges, the cost of which may be recovered from the discharger.

### 3.7.4 Trade waste usage charge

The trade waste usage charge is imposed to recover the additional cost of transporting and treating liquid trade waste from Category 2 dischargers.

Trade Waste Usage Charge (\$) = Q x \$1.73\*/kL (2016/17\$)

Where Q = Volume (kL) of liquid trade waste discharged to sewer.

### 3.7.5 Excess mass charges

Excess mass charges will apply for substances discharged in excess of the deemed concentrations in domestic sewage shown in Table 5 below. For excess mass charge calculation, equation (1) below will be applied.

**Table 5: Deemed concentration of substances in domestic sewage**

Substance	Concentration (mg/L)
Biochemical Oxygen Demand (BOD <sub>5</sub> )	300
Suspended Solids	300
Total Oil and Grease	50
Ammonia (as Nitrogen)	35
Total Kjeldahl Nitrogen	50
Total Phosphorus	10
Total Dissolved Solids	1000
Sulphate (SO <sub>4</sub> )	50 <sup>#</sup>

<sup>#</sup> The concentration in the potable water supply to be used if it is higher than 50mg/L.

NB. Substances not listed above are deemed not to be present in domestic sewage.

$$\text{Liquid Trade Waste Excess Mass Charge (\$)} = \frac{(S - D) \times Q \times U}{1,000} \quad (1)$$

Where: S = Concentration (mg/L) of substance in sample.

D = Concentration (mg/L) of substance deemed to be present in domestic sewage.

Q = Volume (kL) of liquid trade waste discharged to the sewerage system.

U = Charging rate (\$/kg) for discharge of substance to the sewerage system.

Charging rates (U) used in equation (1) are as shown in Council's Annual Management Plan.

With regard to BOD, equation (1) applies for BOD<sub>5</sub> up to 600 mg/L.

#### Excess mass charges for BOD exceeding 600mg/L

If Council approves the acceptance limits for BOD<sub>5</sub> higher than 600mg/L, an exponential type equation will be used for calculation of the charging rate U<sub>e</sub> (\$/kg) as shown in equation (2). Equation (2) provides a strong incentive for dischargers to reduce the strength of waste. In addition, equation (5) on page 31 will be used where the discharger has failed to meet their approved BOD limit on two (2) or more instances in a financial year.



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$U_e$  is the excess mass charging rate for BOD (\$/kg).

$$U_e = 2C \times \frac{(\text{Actual BOD} - 300\text{mg/L})}{600\text{mg/L}} \times 1.05 \frac{(\text{Actual BOD} - 600\text{mg/L})}{(600\text{mg/L})} \quad (2)$$

Where  $C$  = the charging rate (\$/kg) for  $BOD_5$  600mg/L.

Actual BOD = the concentration of  $BOD_5$  as measured in a sample

For example if  $C = \$0.78/\text{kg}$ , equation (2) would result in the following excess mass charging rates:

\$0.78/kg for  $BOD_5$  600mg/L

\$2.46/kg for  $BOD_5$  1200mg/L

\$6.32/kg for  $BOD_5$  2400mg/L

The excess mass charge for BOD is calculated using equation (1):

$$\text{Excess Mass Charge for BOD (\$)} = \frac{(S - D) \times Q \times U_e}{1,000}$$

### 3.7.6 Food waste disposal charge<sup>14</sup>

Where Council has permitted the use of a food waste disposal unit for an existing hospital, nursing home or other eligible facility, the following additional food waste disposal charge will be payable annually.

$$\text{Food Waste Disposal Charge (\$)} = B \times UF$$

Where  $B$  = Number of beds in hospital or nursing home.

$UF$  = Annual charging rate (\$/bed) for a food waste disposal unit at a hospital or nursing home.

**Note:** The recommended annual charging rate is \$29.00/bed (2016/17\$).

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<sup>14</sup> For existing installations only. New installations are not permitted.

### 3.7.7 Non-compliance charges

#### Category 1 and 2 Dischargers

If the discharger has not installed or maintained appropriate pre-treatment equipment, the following trade waste usage charges will be applied for the relevant billing period:

Category 1 Discharger - \$1.73\*/kL (2016/17\$)

Category 2 Discharger - \$15.86\*/kL (2016/17\$)

#### Category 3 Discharger

##### Non-compliance pH charge

Equation (3) is used for waste with pH being outside the approved range. This equation provides an incentive for dischargers to apply appropriate pH correction so their waste remains within the approved pH limits. Council may require industrial and large dischargers to install and permanently maintain a pH chart recorder or data logger as control of pH is critical to minimising odour and corrosion problems in the sewerage system.

Charging rate for pH where it is outside the approved range for the discharger =

$$K \times |\text{actual pH} - \text{approved pH}|^{\#} \times 2^{|\text{actual pH} - \text{approved pH}|^{\#}} \quad (3)$$

# absolute value to be used.

K = pH coefficient = 0.433 (2016/17\$) and needs to be adjusted in accordance with changes in the CPI.

*Example: Council has approved the pH range 8.0 to 9.0 for a large discharger generating high strength trade waste in order to prevent corrosion and odour problems in the sewerage system.*

*Case 1: pH measured 7.0*

$$\text{Charging rate (\$/kL)} = 0.433 \times |7 - 8|^{\#} \times 2^{|7 - 8|^{\#}} = \$0.866/\text{kL}$$

*Case 2: pH measured 11.0*

$$\text{Charging rate (\$/kL)} = 0.433 \times |11 - 9|^{\#} \times 2^{|11 - 9|^{\#}} = \$3.464/\text{kL}$$

# absolute value to be used.

##### Non-compliance excess mass charges

Where a discharge quality fails to comply with the approved concentration limits of substances specified in Council's approval conditions (or the acceptance criterion listed in Council's trade waste policy), Council incurs additional costs in accepting and treating that waste. Council may also face problems with the effluent and biosolids management.

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In order to recover Council's costs, equation (4) shall apply for non-compliance excess mass charges, except for BOD where equation (5) shall apply.

$$\text{Non-compliance Excess Mass Charges (\$)} = \frac{(S - A) \times Q \times 2U}{1,000} + \frac{(S - D) \times Q \times U}{1,000} \quad (4)$$

Where:

- S = Concentration (mg/L) of substance in sample.
- A = Approved maximum concentration (mg/L) of pollutant as specified in Council's approval (or liquid trade waste policy).
- Q = Volume (kL) of liquid trade waste discharged for the period of non-compliance.
- U = Excess mass charging rate (\$/kg) for discharge of pollutant to sewerage system, as shown in Council's Annual Management Plan.
- D = Concentration (mg/L) of substance deemed to be present in domestic sewage.

**Non-compliance excess mass charges for BOD**

If a discharger has failed to meet the approved maximum concentration of BOD on two or more instances in a financial year, the non-compliance excess mass charging rate for BOD  $U_n$  will be levied on the basis of equation (5):

$U_n$  is the BOD non-compliance excess mass charging rate.

$$U_n = 2C \times \frac{(A - 300 \text{ mg/L})}{600 \text{ mg/L}} \times 1.05^{\frac{(A - 600 \text{ mg/L})}{600 \text{ mg/L}}} + 4C \times \frac{(\text{Actual BOD} - A)}{600 \text{ mg/L}} \times 1.05^{\frac{(\text{Actual BOD} - A)}{600 \text{ mg/L}}} \quad (5)$$

*For example, if C = \$0.78/kg, BOD<sub>5</sub> actual (measured) level is 2400mg/L and the approved maximum concentration of BOD (A) is 1000mg/L, equation (5) would result in a non-compliance excess mass charging rate of \$10.04/kg.*

Non-compliance Excess Mass Charge for BOD is calculated using equation (1):

$$\text{Non-compliance Excess Mass Charge (\$)} = \frac{(S - D) \times Q \times U_n}{1,000}$$

**The non-compliance excess mass charges shown above are in lieu of the excess mass charges in section 3.7.5.**

**NB.** Council will continue applying the above non-compliance excess mass charge until the quality of discharge complies with Council's approved quality (or the trade waste policy) limits, within the time frame determined by Council for remedying the problem. If the discharger fails to rectify the problem within this time frame, the discharger may be required to cease discharging liquid trade waste into Council's sewerage system and may also be required to pay a 'non-compliance penalty' as indicated in the following section.

### 3.7.8 Non-compliance penalty

The non-compliance penalty covers instances where Council may seek compensation for its costs relating to legal action, damage to infrastructure, incurred fines and other matters resulting from illegal, prohibited or unapproved liquid trade waste discharged to the sewerage system. Refer also to section 3.10 on page 35.

### 3.7.9 Discharge of stormwater to the sewerage system

The discharge of roof, rain, surface, seepage or ground water to the sewerage system is prohibited under clause 137A of the Local Government (General) Regulation 2005 and this policy. As indicated in section 2.4, the acceptance of first flush stormwater runoff may be permitted. A charge of \$15.03/kL (2016/17\$) will be applied to Category 3 dischargers in accordance with the non-compliance trade waste usage charge, if approval is granted to accept the above waters. Excess mass charges will be also applied in accordance with section 3.7.5.

### 3.7.10 Septic and pan waste disposal charge

This charge is imposed to recover the cost of accepting and treating septic tank and pan waste.

Septic tank and pan waste disposal charge (\$) = Q x S

Where: Q = Volume (kL) of waste discharged to sewer.

S = Charging rate in \$/kL for septic tank effluent, septage or chemical toilet waste as indicated in Council's Annual Management Plan.\*

### 3.7.11 Responsibility for payment of fees and charges

Property (land) owners are responsible for the payment of fees and charges for water supply, sewerage and liquid trade services provided by Council. This includes property owners of marina, caravan park, etc., if a dump point located at their premises is connected to the sewerage system. Where another party (lessee) leases premises any reimbursement of the lessor (property owner) for such fees and charges is a matter for the lessor and the lessee.

Council will charge a septic tank and pan waste disposal charge for services it provides to transporters of septic tank and pan waste tankered and discharged to the sewerage system.

Liquid Trade Waste Regulation Policy

**Table 6: Summary of trade waste fees and charges<sup>15</sup>**

CHARGING CATEGORY	APPLICATION FEE	ANNUAL NON-RESIDENTIAL SEWERAGE BILL WITH APPROPRIATE SEWER USAGE CHARGE/kL	ANNUAL TRADE WASTE FEE	RE-INSPECTION FEE (when required)	TRADE WASTE USAGE CHARGE/kL	SEPTIC WASTE DISPOSAL CHARGE	EXCESS MASS CHARGES/kg	NON-COMPLIANCE TRADE WASTE USAGE CHARGE/kL	NON-COMPLIANCE EXCESS MASS/kg and pH CHARGES/kL (if required)
1	Yes <sup>16</sup>	Yes	Yes	Yes	No	No	No	Yes <sup>17</sup>	No
2	Yes	Yes	Yes	Yes	Yes	No	No	Yes <sup>17</sup>	No
2S	Yes	Yes <sup>18</sup>	Yes	Yes <sup>18</sup>	No	Yes	No	No	No
3	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes

All dischargers of liquid trade waste to Council’s sewerage system should be aware that they are subject to prosecution and imposition of fines under the *Local Government Act 1993* and the *Protection of the Environment (Operations) Act 1997* and Regulations. In addition to fines, Council may recover costs of damages and fines incurred by Council as a result of an illegal liquid trade waste discharge (refer to section 3.7.8 on page 32).

### 3.8 Monitoring

Council will carry out inspections of the premises of all liquid trade waste dischargers and their treatment facilities at least once per annum. Inspections of commercial premises preparing hot food may be carried out at least four (4) times per annum (refer to page 31 in section 3.7.2). Monitoring of the large and industrial dischargers is to be carried out as specified in the approval conditions.

The applicant may be required to monitor the liquid trade waste discharge as a condition of an approval or agreement. They may also be required to pay for any sampling and testing of liquid trade waste undertaken by Council.

For this purpose, an inspection/sampling point, where the waste can be inspected and sampled, will be specified in the approval and/or agreement. This point will normally be located after the pre-treatment facility. The discharger may need to install a suitable method of flow measurement.

<sup>15</sup> In addition, a Food Waste Disposal Charge will apply where Council has approved the use of an existing food waste disposal unit for a hospital, nursing home or other eligible facility (refer to section 3.7.6 on page 29).

<sup>16</sup> Not applicable for dischargers exempted in Table 1.

<sup>17</sup> Non-compliance trade waste usage charge, if the discharger fails to install or properly maintain appropriate pre-treatment equipment:

Category 1 - \$1.73/kL (2016/17\$)

Category 2 - \$15.86/kL (2016/17\$)

<sup>18</sup> Only applicable if the discharger has a dump point located at their premises which is connected to the sewerage system

Council may require the discharger to:

- install a permanent primary measurement device
- measure the volume and flow rate using the permanently installed flow measurement system (such as a flow metering system)
- install a flow measurement device on a temporary basis and obtain enough data to determine a basis for assessing the flow rate and volume
- provide a system which allows obtaining a flow weighted composite sample.

Testing of samples is to be undertaken by a NATA-registered or other laboratory recognised by DPI Water to ensure reliable and accurate results. Where the discharger is sampling the effluent, Council may randomly take duplicates to confirm the waste characteristics.

### 3.9 Liquid trade waste services agreement

In addition to its approval under the Local Government Act, Council may require certain dischargers, including those who wish to discharge liquid trade waste in large volumes (discharge >20 kL/d) or industrial waste (Concurrence Classification C discharges) or Classification S into its sewerage system to execute a liquid trade waste services agreement (refer to Attachment 1). The agreement will set out the conditions associated with the discharge and execution of the agreement will be a condition of the approval issued by Council (refer to section 3.4 on page 23). The conditions will be binding on the applicant and the Council. The agreement will be for a period of up to five (5) years. No discharge is to be made to Council's sewerage system until an agreement or an interim agreement has been executed.

Provision can be made in the agreement for (in addition to Council's approval conditions):

- additional conditions for discharge of liquid trade waste
- cancellation of the agreement and/or order to cease the discharge if the discharger is found to be in breach of the agreement or the liquid trade waste approval or, in the opinion of Council, the waste is adversely affecting the sewerage system or the environment
- entry by Council officers to inspect the liquid trade waste collection, treatment, monitoring and disposal systems
- the applicant to notify Council in advance of any changes that may affect the quality and quantity of the liquid trade waste
- the amount of bond/security to be lodged with Council prior to discharging to the sewerage system.

## Liquid Trade Waste Regulation Policy

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### 3.10 Enforcement of approvals and agreements

(see the attached sample agreement at Attachment 1 on page 41)

Failure to obtain Council's approval to discharge liquid trade waste into the sewerage system, or failure to comply with the conditions of the approval is an offence under s. 626 and s. 627 of the *Local Government Act 1993*. In addition, these offences are prescribed as penalty notice offences under the Act and Council may issue a penalty notice (ie an on the spot fine) to such discharger.

Furthermore, sections 628 and 634 to 639 list other offences related to water, sewerage and stormwater drainage.

Also, polluting of any waters by a discharger of liquid trade waste who does not have a Council approval or who fails to comply with the conditions of the approval is an offence under section 120 (1) of the *Protection of the Environment Operations Act 1997*. In addition, under section 222 of this Act, Council may issue a penalty notice to such a discharger.

Any person who fails to comply with the terms or conditions of a liquid trade waste services agreement (ie. there is a breach of the agreement) will be required to indemnify the Council against any resulting claims, losses or expenses in accordance with section 8 of the agreement. Suspensions may also apply and may include a notice to cease the discharge.

### 3.11 Modification and revocation of approvals

Council reserves the right to modify or revoke an approval to discharge liquid trade waste to the sewerage system in any of the following circumstances:

- if the approval was obtained by fraud, misrepresentation or concealment of facts
- for any cause arising after the granting of the approval which, had it arisen before the approval was granted, would have caused the council not to have granted the approval
- for failure to comply with a requirement made by or under the *Local Government Act 1993* relating to a condition of the approval
- for failure to comply with a condition of the approval.

### 3.12 Prevention of waste of water

Water must be used efficiently and must be recycled where practicable. It is an offence under section 637 of the *Local Government Act 1993* and its Regulation (refer to Attachment 2) to waste or misuse water.

Dilution of trade waste with water from any non-process source including Council's water supply, bore water, groundwater and/or stormwater as a means of reducing pollutant concentration is therefore strictly prohibited.

### 3.13 Effluent improvement plans

Where the existing liquid trade waste discharged does not meet Council's requirements, the applicant may be required to submit an Effluent Improvement Plan setting out how Council's requirements will

be met. The proposed plan must detail the methods/actions proposed to achieve the discharge limits and a timetable for implementation of the proposed actions. Such actions may include more intensive monitoring, improvements to work practices and/or pre-treatment facilities to improve the effluent quality and reliability.

### 3.14 Due diligence programs and contingency plans

For *Concurrence Classification A*, a discharger is not required to submit either a due diligence program or a contingency plan.

A discharger may be required to submit a due diligence program and a contingency plan for *Concurrence Classification B* or *Classification S* where it is considered that the discharge may pose a potential threat to the sewerage system. If required, a due diligence program and contingency plan must be submitted to Council within six (6) months and three (3) months respectively of receiving a liquid trade waste approval.

For *Concurrence Classification C*, a discharger may need to provide a due diligence program and contingency plan to Council within six (6) months and three (3) months respectively of receiving a liquid trade waste approval.

It should be noted that:

1. If the discharger has an accredited environmental management system in place, a due diligence program and contingency plan may not be required. However, proof of accreditation must be provided to Council with the application. The EMP may not include all necessary provisions in regard to trade waste. In such cases Council may require that a suitable due diligence program and contingency plan be developed and submitted to Council.
2. Where Council considers there is potential risk to the sewerage system from a discharge, it may request a due diligence program and contingency plan to be submitted prior to commencing the discharge.



Liquid Trade Waste Regulation Policy

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**Attachment 1**

Sample Liquid Trade Waste Services Agreement  
between Mid-Western Regional Council and [Applicant]

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## Liquid Trade Waste Services Agreement

### Between

1. Mid-Western Regional Council

### and

2. The Applicant

### Recitals

- A. The Council is the owner and operator of a sewerage system within the Mid-Western Region area.
- B. The Applicant has made application to the Council to discharge liquid trade waste from the Premises into the Council's sewerage system.
- C. The application has been approved by the Council on certain conditions ("the Approval"), including the condition that the Council and the Applicant enter into this Agreement.
- D. The Secretary of the NSW Department of Industry, Skills and Regional Development has concurred in the Approval in accordance with clause 28 of the Local Government (General) Regulation 2005.
- E. The Approval does not operate until this Agreement has been executed by both parties.
- F. The parties enter this Agreement in consideration of the mutual promises contained herein.

## Operative Part

### 1. Definitions and interpretation

#### 1.1 In this Agreement, unless the context otherwise requires:

"**Act**" means the *Local Government Act 1993* (NSW).

"**Annexure**" means the annexure to this Agreement.

"**Annual Management Plan**" means the annual management plan of the Council, as adopted by the Council from time to time.

"**Applicant**" means the entity named as such in the Annexure.

"**Approval**" means the approval described in Recital C.

"**Council**" means the council named as such in the Annexure.

"**Liquid Trade Waste Services**" mean the making available by the Council of its sewerage system for connection to the Premises, for the purpose of discharge by the Applicant of its liquid trade waste.

"**Premises**" means the premises described in the Annexure.

## Liquid Trade Waste Regulation Policy

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### 1.2 Unless the context otherwise requires:

- (a) A reference to this Agreement is a reference to this Agreement, including the Annexure, as amended from time to time in accordance with its terms
- (b) A reference to the discharge of liquid trade waste means the discharge of liquid trade waste by the Applicant from the Premises to the Council's sewerage system
- (c) A reference to any legislation is a reference to such legislation as amended from time to time
- (d) Where the Applicant is comprised of more than one person, each obligation of the Applicant will bind those persons jointly and severally and will be enforceable against them jointly and severally.

### 2. Liquid Trade Waste Services

*The Council will provide the Liquid Trade Waste Services to the Applicant on the terms of this Agreement.*

### 3. Additional conditions for discharge of liquid trade waste

- 3.1 The Applicant may discharge liquid trade waste to the Council's sewerage system in accordance with the Approval and subject to this Agreement.
- 3.2 The Applicant must comply with all applicable Acts, regulations, by laws, proclamations and orders and with any lawful direction or order given by or for the Council or any other competent authority.
- 3.3 The Applicant must not discharge liquid trade waste contrary to this Agreement or the Approval or in any manner which may have an adverse effect on any person or property (including the sewerage system and the ecological system in the waters, land or area receiving sewage treatment works effluent or biosolids), or which may cause the Council to be in breach of any applicable Act, regulation, by law, proclamation or order or of any lawful direction given by or for any competent authority.
- 3.4 The Applicant must at its own cost monitor its discharges in accordance with the requirements set out in the Approval and must maintain records of such monitoring for inspection by the Council for such period as may be specified in the Approval.
- 3.5 The Council will carry out routine sampling and testing of the waste stream.
- 3.6 Where any flow-metering device is installed, the Applicant must at its own cost cause the device to be calibrated at least annually by a person or company approved by the Council. The Applicant must obtain a calibration certificate and provide a copy of the certificate to the Council within one month of receiving it.
- 3.7 If the Applicant is required to cease discharging liquid trade waste for any period, then the Applicant must cease discharging such waste for the period specified.

Liquid Trade Waste Regulation Policy

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- 3.8 Where the Applicant ceases to discharge waste in the circumstances prescribed in clause 3.7, the Council may, at its discretion, elect to refund part of the annual trade waste fee on a pro rata basis, calculated according to the period of suspension.
- 3.9 If this Agreement is terminated, the Applicant must immediately cease to discharge liquid trade waste.

**4. Fees and charges**

- 4.1 In accordance with the section 560 of the *Local Government Act 1993*, Council will levy all water supply, sewerage and liquid trade waste fees and charges on the owner of the property.
- 4.2 In consideration of provision of the Liquid Trade Waste Services, the fees and charges as specified in the Council's Annual Management Plan and notified by Council to the owner and the Applicant must be paid to the Council, including fees for sampling and testing by Council in accordance with the Approval.
- 4.3 Fees and charges payable will include both non-residential sewerage charges and liquid trade waste fees and charges.
- 4.4 All monies payable to the Council must be paid within the time specified in the notice of charge.

**5. Term**

- 5.1 This Agreement will commence from the date it is signed on behalf of the Council, and will continue until the Applicant's Approval is revoked or the Applicant permanently ceases to discharge liquid trade waste pursuant to the Approval, whichever is the earlier. Upon such revocation or permanent cessation of the approved activity this Agreement shall automatically terminate by operation of this clause.
- 5.2 Termination of this Agreement is without prejudice to any accrued rights or obligations of either Party.

**6. Powers of the Council**

- 6.1 The Council may enter the Premises at a reasonable hour in the daytime or at any hour during which business is in progress or is usually carried on at the Premises for the purpose of conducting any inspection, examination, testing, monitoring or sampling to determine whether the Applicant is complying with the conditions of this Agreement.
- 6.2 The Applicant acknowledges that the Council has statutory powers available to it under the *Local Government Act 1993* and other Acts to issue orders and directions to the Applicant in relation to the discharge of liquid trade waste. The Applicant undertakes to comply with each such order or direction that may be notified by the Council to the Applicant within the time specified for compliance in that order or direction.
- 6.3 The Applicant releases the Council from any liability to the Applicant for any loss or damage due to the disruption of the Applicant's business arising out of the exercise of Council's rights pursuant to this clause.

## Liquid Trade Waste Regulation Policy

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### 7. Information supplied by the Applicant

- 7.1 The Applicant warrants that all information in its application for approval is true, complete and accurate to the best of its knowledge.
- 7.2 The Applicant must immediately notify the Council in writing of any error or omission in that information or any change to the information of which the Applicant becomes aware.
- 7.3 The Applicant must not provide any false or misleading information to the Council.

### 8. Indemnity

- 8.1 The Applicant indemnifies the Council from and against any claims, losses or expense (including legal costs on a solicitor and client basis) which the Council pays, suffers, incurs or is liable for as a result of:
  - (a) any unlawful, negligent, reckless or deliberately wrongful act or omission of the Applicant or its personnel or agents in connection with the discharge of liquid trade waste, including (without limitation) such acts or omissions which cause damage to property, personal injury or death
  - (b) a breach of this Agreement by the Applicant.
- 8.2 The Applicant's liability to indemnify the Council shall be reduced proportionally to the extent that any unlawful, negligent, reckless or deliberately wrongful act or omission of the Council caused or contributed to the liability or loss.

### 9. Insurance

The Applicant must effect and maintain for the term of this Agreement a public risk policy of insurance in the minimum of the sum specified in the Annexure and must, upon request by the Council, produce evidence of such insurance to the Council.

### 10. Bond

- 10.1 The Applicant must pay to the Council a bond in the sum specified in the Annexure.
- 10.2 The Council may at any time and without prior notice to the Applicant have recourse to the bond for the recovery of any sum due and owing by the Applicant to the Council.
- 10.3 Where the applicant fails to cease discharging trade waste as prescribed in clause 3.7, the Council may require the applicant to forfeit 50% of the bond.
- 10.4 The Council must return the bond to the Applicant, less any amount deducted by the Council under this clause, upon termination of this Agreement.

**11. No assignment**

The Applicant may not assign or otherwise transfer its rights and/or obligations under this Agreement.

**12. Notices**

12.1 A notice under this Agreement must be:

- (a) in writing, directed to the representative of the other party as specified in the Annexure
- (b) forwarded to the address, facsimile number or the email address of that representative as specified in the Annexure or the address last notified by the intended recipient to the sender.

12.2 A notice under this Agreement will be deemed to be served:

- (a) in the case of delivery in person - when delivered to the recipient's address for service and a signature received as evidence of delivery
- (b) in the case of delivery by post - within three business days of posting
- (c) in the case of delivery by facsimile – at the time of dispatch if the sender receives a transmission report which confirms that the facsimile was sent in its entirety to the facsimile number of the recipient
- (d) in the case of delivery by email, on receipt of confirmation by the recipient that the recipient has received the email.

12.3 Notwithstanding the preceding clause 12.2, if delivery or receipt of a communication is on a day which is not a business day in the place to which the communication is sent or is later than 5 pm (local time in that place) it will be deemed to have been duly given or made at 9 am (local time at that place) on the next business day in that place.

**13. Variation**

13.1 If the Applicant's Approval to discharge liquid trade waste from the Premises is varied, this Agreement shall be deemed to be varied in accordance with the variation made to that approval or to the fees, by operation of this clause.

13.2 In addition to automatic variation under clause 13.1, this Agreement may be varied by written agreement of the parties, provided that a variation to this Agreement that is inconsistent with:

- (a) the Approval, including rights granted under, and conditions attached to, the Approval
  - (b) any applicable legislation; or
  - (c) Council's Annual Management Plan in respect of applicable fees and charges,
- shall have no force or effect.

### Liquid Trade Waste Regulation Policy

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#### **14. Severability**

If any part of this Agreement is prohibited, void, voidable, illegal or unenforceable, then that part is severed from this Agreement but without affecting the continued operation, so far as possible, of the remainder of this Agreement.

#### **15. Applicable law**

15.1 This Agreement is governed by, and must be construed in accordance with, the laws in force in the State of New South Wales.

15.2 Each party submits to the exclusive jurisdiction of the courts exercising jurisdiction in the State of New South Wales and the courts of appeal there from.

#### **16. Rights cumulative**

The rights and remedies provided under this Agreement are in addition to, and not exclusive of, any other rights or remedies provided by law.

Liquid Trade Waste Regulation Policy

Executed as an agreement

Execution by Mid-Western Regional Council:

THE COMMON SEAL OF )  
 ..... was affixed this ) (Corporate Seal)  
 .....day of ..... 20..... )  
 in the presence of: )  
 ..... )  
 General Manager ) [signature of General Manager]  
 and )  
 ..... )  
 [print name of witness] )

Executed by the Applicant (corporate entity):

.....  
 .....  
 [signature of witness]

)  
 )  
 The COMMON SEAL of..... )  
 .....PTY LIMITED )  
 was affixed this .....day of )  
 .....20..... in the )  
 presence of: )  
 ..... )  
 [name of Director] ) [signature of Director]  
 ..... )  
 [name of Director/Secretary] ) [signature of Director/Secretary]  
 )



Liquid Trade Waste Regulation Policy

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**Executed by the Applicant (individual):**

Signed by: .....

[name of Applicant]

} .....

[signature of Applicant]

This.....day of.....20.....

} .....

in the presence of:

} .....

[signature of witness]

.....

[print name of witness]

## Annexure

### A. The Council

- 1. Full Name of Council \_\_\_\_\_
- 2. ABN \_\_\_\_\_
- 3. Address \_\_\_\_\_  
\_\_\_\_\_
- 4. Telephone \_\_\_\_\_
- 5. Emergency Contact \_\_\_\_\_  
Telephone \_\_\_\_\_

### B. The Applicant

- 1. Full Name of Applicant \_\_\_\_\_
- 2. ABN \_\_\_\_\_
- 3. Business or Trading Name \_\_\_\_\_
- 4. Address \_\_\_\_\_  
\_\_\_\_\_
- 5. Telephone \_\_\_\_\_
- 6. Emergency Contact \_\_\_\_\_  
Telephone \_\_\_\_\_

### C. The Premises

- 1. Lot and DP Number: Lot(S) \_\_\_\_\_ DP \_\_\_\_\_
- 2. Location \_\_\_\_\_  
\_\_\_\_\_
- 3. Description \_\_\_\_\_
- 4. Nature of Business \_\_\_\_\_

### D. Notices

- Applicant's Representative \_\_\_\_\_
- Postal Address \_\_\_\_\_  
\_\_\_\_\_
- Facsimile \_\_\_\_\_
- Email \_\_\_\_\_
- Council's Representative \_\_\_\_\_

Liquid Trade Waste Regulation Policy

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Postal address \_\_\_\_\_

Facsimile \_\_\_\_\_

Email address \_\_\_\_\_

**E. PUBLIC LIABILITY INSURANCE**

Minimum cover: \$ \_\_\_\_\_

**F. BOND** \$ \_\_\_\_\_

Liquid Trade Waste Regulation Policy

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Liquid Trade Waste Regulation Policy

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## **Attachment 2**

Provisions in the Local Government (General) Regulation 2005 in regard to acceptance of liquid trade waste into the sewerage system

**Clause 25 Matters to accompany applications relating to discharge into sewers**

An application for approval to discharge trade waste into a sewer under the control of a Council or that connects with such a sewer must be accompanied by the information required by Table 1 to the Liquid Trade Waste Management Guidelines<sup>#</sup>.

**Clause 28 Approval to discharge waste into sewers: concurrence required**

A council must not grant an approval under [section 68](#) of [the Act](#) to discharge trade waste (whether treated or not) into a sewer of the council unless the Director-General\* of the Department of Trade and Investment, Regional Infrastructure and Services (or that Director-General's nominee) has concurred with the approval.

**Note:** [Section 90](#) (2) of [the Act](#) permits any person or authority whose concurrence is required before an approval may be granted to give the council notice that the concurrence may be assumed (with such qualifications or conditions as are specified in the notice).

**Clause 32 Disposal of trade waste**

- (1) An approval to dispose of trade waste into a sewer of the council is subject to such conditions (if any) as the council specifies in the approval.
- (2) In imposing any such conditions, the council is to have regard to the matter set out in Table 5 to the Liquid Trade Waste Management Guidelines<sup>#</sup>.

**Clause 159 Prevention of waste and misuse of water**

The owner, occupier or manager of premises to which water is supplied by the council must:

- (a) prevent waste of water by taking prompt action to repair leaking taps, pipes or fittings located on the premises
- (b) take any other action that is reasonable to prevent waste and misuse of water.

**137A Substances prohibited from being discharged into public sewers**

- (1) For the purposes of [section 638](#) of [the Act](#) (Discharge of prohibited matter into sewer or drain), roof, rain, surface, seepage or ground water is prescribed as prohibited matter.
- (2) This clause does not apply in relation to:
  - (a) a discharge that is specifically approved under [section 68](#) of [the Act](#), or
  - (b) a discharge into a public drain or a gutter of a council, or
  - (c) a discharge in an area of operations within the meaning of the [Sydney Water Act 1994](#) or the [Hunter Water Act 1991](#).

**143 Inspection of pipes and drains and measurement of water and sewage**

- (1) The council may, at any reasonable time:
  - (a) inspect any service pipe connected to a water main, and
  - (b) inspect any drain connected to a sewer main, and

\* In accordance with the *Government Sector Employment Act 2013*, this is the Secretary of the NSW Department of Industry, Skills and Regional Development.

Liquid Trade Waste Regulation Policy

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- (c) install meters or other devices for measuring the quantity of water supplied to, or the quality and quantity of sewage discharged from, premises, and
  - (d) measure the quantity of water supplied to, or the quality and quantity of sewage discharged from, premises, and
  - (e) inspect any pre-treatment devices connected to the council’s sewerage system.
- (2) The occupier of the relevant premises must provide to the council such information as it requires to enable it to estimate the quantity of water actually supplied to, or the quality and quantity of sewage actually discharged from, the premises.
- (3) In this clause,  
**"pre-treatment device"** means any device used to reduce or eliminate contaminants in trade waste, or to alter the waste’s nature, before it is discharged into a sewer.

**SCHEDULE 12 – Penalty notice offences**

Column 1	Column 2
Offence under <a href="#">Local Government Act 1993</a>	Penalty
<a href="#">Section 626</a> (3)-carry out without prior approval of council an activity specified in item 4 of Part C (Management of waste) of the Table to <a href="#">section 68</a>	\$330
<a href="#">Section 627</a> (3)-having obtained the council’s approval to the carrying out of an activity specified in item 4 of Part C (Management of waste) of the Table to <a href="#">section 68</a> , carry out the activity otherwise than in accordance with the terms of that approval	\$330

# “Liquid Trade Waste Management Guidelines” means the Guidelines of that name produced by the Department of Energy, Utilities and Sustainability in March 2005, as in force from time to time. The 2005 Guidelines have now been superseded by *Liquid Trade Waste Regulation Guidelines, April 2009*.