

**ITEM 3 DRAFT ALLANS CREEK FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN**

The Wollongong Local Government Area is naturally prone to flooding due to our unique topography as water travels down the escarpment toward the ocean.

The draft Allans Creek Floodplain Risk Management Study and Plan (FRMSP) is the subsequent plan developed from the Flood Study adopted in 2019. The draft FRMSP was prepared in accordance with the New South Wales (NSW) Flood Prone Land Policy and the principles of the NSW Government's Flood Risk Management Manual (2023). The FRMSP reviewed options for managing the flood risk for the suburbs of Mount Keira, Figtree, Cordeaux Heights, Mount Kembla, Unanderra, Farmborough Heights, Port Kembla, Mangerton, and Mount St Thomas.

The draft Allans Creek Floodplain Risk Management Study and Plan was publicly exhibited from 4 September to 9 October 2023. Council received 211 submissions which commented on various aspects of the draft Study and Plan. Most residents were supportive of the recommended options within the draft Study and Plan. It is recommended that the Allans Creek Floodplain Risk Management Study and Plan be adopted.

### RECOMMENDATION

The Allans Creek Floodplain Risk Management Study and Plan be adopted.

### REPORT AUTHORISATIONS

Report of: Nathan McBriarty, Manager Infrastructure Strategy + Planning  
Authorised by: Joanne Page, Director Infrastructure + Works

### ATTACHMENTS

- 1 Location Plan - Allans Creek Catchment
- 2 Central Area Floodplain Risk Management Committee Meeting Minutes 3 April 2024
- 3 Executive Summary - Allans Creek Floodplain Risk Management Study and Plan
- 4 Engagement Report - Managing Flood Risk in the Allans Creek Catchment (2023)

### BACKGROUND

The Allans Creek Flood study (2006) was reviewed and updated in the revised Flood Study (2019) to account for changes associated with Council's Blockage Policy (2016). The Flood Study (2019) provides the most up-to-date information on flooding for the catchment and provided the basis for the draft Allans Creek Floodplain Risk Management Study and Plan.

The NSW Government's Flood Risk Management Manual (2023) provides a framework to ensure the sustainable development and activation of floodplain environments and incorporates the NSW Flood Prone Policy. Under the Policy, planning for flood liable land is led by Local Government, with State Government subsidising flood mitigation works and providing specialist technical advice to assist Councils in performing their floodplain management responsibilities. The Policy provides for technical and financial support by the State Government through five sequential stages:

1. Flood Study – Determines the nature and extent of flooding.
2. Floodplain Risk Management Study – Evaluates risks and management options for the floodplain in respect of both existing and proposed development.
3. Floodplain Risk Management Plan – Development of a plan of management for the floodplain based on the evaluation work in the Floodplain Risk Management Study.
4. Implementation of the Plan – Taking action to implement the agreed flood modification measures, response modification measures, and property modification measures.
5. Review – Reviews are recommended on average every 5-10 years and in response to significant changes or events.

The draft Allans Creek Floodplain Risk Management Study and Plan was prepared in accordance with the NSW Government's Flood Risk Management Manual (2023) and the Australian Rainfall and Runoff

2019 guidelines. It includes a review of the 2006 Allans Creek Floodplain Risk Management Study and Plan.

The preparation of this Study and Plan has been overseen by the Central Area Floodplain Risk Management Committee, comprising membership of Councillors, community representatives and State Government agencies.

On 3 April 2024, an overview of the draft Allans Creek Floodplain Risk Management Study and Plan was presented to the Central Area Floodplain Risk Management Committee, and the Committee recommended the report be adopted by Wollongong City Council (refer Attachment 2).

## PROPOSAL

It is proposed that Council adopt the draft Floodplain Risk Management Study and Plan for the Allans Creek catchment. This will enable Council to implement identified priority options and seek funding from the State Government.

Implementation of identified options in the Plan is estimated to cost in the order of \$12.7M, based on current cost estimates. Funding for specific options will be prioritised and considered in future budgeting cycles against works from all Floodplain Risk Management Studies and Plans. Executive Summaries of the 'Draft Floodplain Risk Management Study and Plan' are included as Attachment 3.

After the adoption of the Floodplain Risk Management Study and Plan, the following actions will be undertaken:

- Incorporate the Flood Risk Precinct Mapping into Council's Geographical Information System (GIS).
- Update the relevant Section 10.7 Planning Certificate codes relating to flooding.
- Update the Flood Planning Levels (FPL).
- Update the relevant sections within the Wollongong DCP 2009. Prepare grant submissions to State and Federal Government seeking assistance to implement options within the implementation plan; and
- Commence the implementation of the plan (subject to funding).

## CONSULTATION AND COMMUNICATION

The draft Allans Creek Floodplain Risk Management Study and Plan was developed through consultation with the local community, a Technical Working Group, and the Floodplain Risk Management Committee. The draft Allans Creek Floodplain Risk Management Study and Plan was publicly exhibited from 4 September to 9 October 2023.

Consultation occurred via:

- Distribution of over 5,800 newsletters and questionnaires/feedback forms to all residents, businesses, and property owners within the floodplain area at the commencement of the public consultation phase to give the opportunity to provide feedback.
- Media release and notice in the Illawarra Mercury.
- Council's website.
- Public exhibition and community information session.
- Emails/letters to Neighbourhood Forum 5 and 7.
- Emails/letters to other stakeholders including State Government agencies, schools, and business and industry bodies.
- Social media posts.
- Meetings of the Floodplain Risk Management Committee.
- Meetings of the Technical Working Group.

The exhibition project webpage was viewed 298 times and reports were downloaded 167 times.

Council received a total of 211 submissions (95 hardcopy surveys, 19 on-line surveys, 5 emails, 77 submissions at the community information sessions and 15 Aboriginal community submissions). The key themes from the submissions were creek maintenance and erosion concerns, Development Application (DA) issues, flood insurance premiums, specific location issues, infrastructure and environmental considerations and the widening of Byarong Creek. The submissions are summarised in Council’s Engagement Report (Attachment 4). Most residents were supportive of the recommended options within the draft Floodplain Risk Management Study and Plan.

**Drop-in Community Information Session**

A drop-in community information session took place on 13 September 2023 at Figtree Community Hall from 3:30pm to 6:30pm and was attended by 77 community members. Attendees were given the opportunity to ask questions to the engineers working on this project and provide comments on the proposed options.

**Aboriginal Stakeholder Meetings**

Meetings with Aboriginal Traditional Custodians and knowledge holders were held between 1 September to 23 October 2023. The engagement supported a preference for debris control structures if placed over existing culverts and concreted areas. There were concerns about impacting natural creek areas and questions about the installation process and appropriate structure heights. A request was made for Council to explore natural systems like reeds and vegetation as a strategy to mitigate water flow speed. Elders were concerned about hard infrastructure impacting biodiversity, with consideration for environmental impacts urged. The proposed widening of Byarong Creek caused alarm due to its connection to sacred sites and potential consequences for water flow and flooding. A site review and on-site monitoring were requested should this option be pursued.

**Central Floodplain Risk Management Committee**

On 3 April 2024, an overview of the draft Allans Creek Floodplain Risk Management Study and Plan was presented to the Central Floodplain Management Committee. The Committee recommended the report be adopted by Wollongong City Council (refer Attachment 2).

**Outcome of Community Consultation**

Comments from the community and from State Government agencies have been reviewed and, where appropriate, incorporated into the final version of the Allans Creek Floodplain Risk Management Study and Plan.

**PLANNING AND POLICY IMPACT**

This report contributes to the delivery of Our Wollongong 2032 Goal 1 – We value and protect our environment. It specifically delivers on the following:

Community Strategic Plan 2032	Delivery Program 2022-2026
Strategy	Service
1.3 Increase our resilience to natural disasters and a changing climate to protect life, property and the environment.	Stormwater Services

**SUSTAINABILITY IMPLICATIONS**

The recommended options within the draft Allans Creek Floodplain Risk Management Study and Plan have been assessed on the principles of sustainability in social, environmental, cultural, and economic terms using a multi-criteria assessment.

**RISK MANAGEMENT**

The draft Allans Creek Floodplain Risk Management Study and Plan provides a better understanding of the flood behaviour and flood risk on the existing and future communities within the catchment and provides ways to manage flood risk efficiently and effectively into the future.

## FINANCIAL IMPLICATIONS

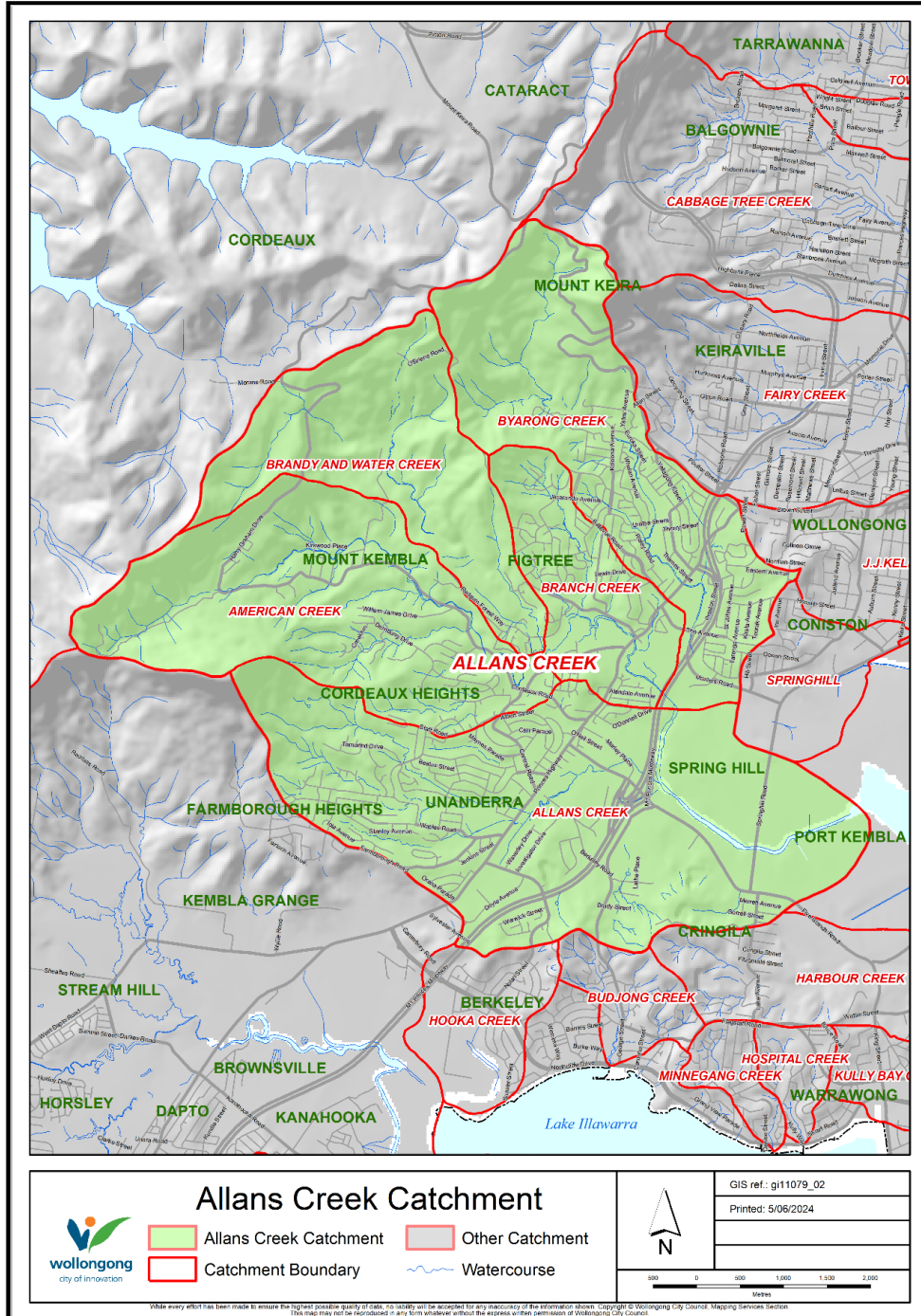
The preparation of this Floodplain Risk Management Study and Plan has cost \$217,558 (GST inclusive); with approximately two thirds being funded by the State Government (\$131,853). Implementation of all options within the Floodplain Risk Management Plan is estimated to cost in the order of \$12.7M based on current cost estimates. Allocation of funds to priority options will be considered in future budgeting cycles.

Pending adoption of the Floodplain Risk Management Study and Plan, applications to State and Federal Governments will be made for financial assistance to implement options within the Floodplain Risk Management Plan. Where successful, grants are usually provided in the ratio of 2:1 (two parts Government, one part Council).

## CONCLUSION

The draft Allans Creek Floodplain Risk Management Study and Plan has been prepared with the cooperation, assistance, and support of many stakeholders, including community members and State Government representatives.

Council's endorsement of the draft Allans Creek Floodplain Risk Management Study and Plan will allow the implementation of appropriate flood risk management strategies such as planning controls, emergency response measures, education, and infrastructure solutions that will benefit the community and businesses within the catchment. The report and associated flood data will be uploaded to the NSW Flood Data Portal so it can be publicly accessed, with the aim of providing an improved understanding of flood behaviour and flood risk while supporting future flood mitigation decision making within Allans Creek catchment.





## MINUTES

## FLOODPLAIN RISK MANAGEMENT COMMITTEE (CENTRAL AREA)

at 4.00 pm

Tuesday, 3 April 2024

### In Attendance

Cr J Dorahy (Chair), Cr T Brown, Cr C Blakey, Nathan McBriarty - Manager Infrastructure Strategy and Planning (Acting), Ali Sevenler - Floodplain Management Engineer, Yelia Pandika - Floodplain Management Engineer, Petar Milevski - Floodplain Management Engineer, Motiur Rahman - Floodplain Management Engineer, David Green - Land Use Planning Manager, Clare Robinson - Emergency Management Officer, Glenda Fewings - Administration Officer, Shaza Raini - Department of Planning Industry and Environment, Oscar Garratt - Rhelm, Leon Collins - Advisian, Felix Taaffe - GRC Hydro, Stuart Milling - Transport for NSW, Andrew Monk - Transport for NSW, Jean Groves - Neighbourhood Forum Representative, David Hearne - Community Representative.



**MINUTES**

**FLOODPLAIN RISK MANAGEMENT COMMITTEE –  
 CENTRAL AREA**



# INDEX

ITEM	PAGE NO.
<b>Contents</b>	
1	STANDING AGENDA ITEMS .....3
1.1	Welcome and Introduction ..... 3
1.2	Acknowledgement of Country ..... 3
1.3	Apologies ..... 3
1.4	Disclosures of Interests ..... 3
1.5	Confirmation of Minutes of Previous Meeting ..... 3
2	FLOOD MANAGEMENT UPDATE .....3
2.1	Allans Creek Floodplain Risk Management Study and Plan..... 3
2.2	Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan ..... 4
2.3	Wollongong City Floodplain Risk Management Study and Plan ..... 5
2.4	Detailed Design of McMahon Basin ..... 5
2.5	Allans Creek – Debris Control Structure at The Avenue (Figtree Oval) Design..... 6
3	GENERAL BUSINESS .....6
3.1	Business Arising from Previous Minutes ..... 6
4	NEXT MEETING ..... 6
5	CLOSE MEETING..... 6
	The meeting closed at 5.34pm ..... 6

## MINUTES

## FLOODPLAIN RISK MANAGEMENT COMMITTEE – CENTRAL AREA



### 1 STANDING AGENDA ITEMS

#### 1.1 Welcome and Introduction

In line with NSW Health guidelines about Novel Coronavirus, we have made some changes to the way we are engaging the community, to keep our staff and people in our community safe. Instead of having face-to-face conversations with people, meetings are currently being conducted via Teams.

#### 1.2 Acknowledgement of Country

The traditional owners of the land were acknowledged.

#### 1.3 Apologies

Apologies were received and accepted on behalf of M Mariner.

#### 1.4 Disclosures of Interests

Nil

#### 1.5 Confirmation of Minutes of Previous Meeting

The Minutes of the Meeting held on 19 July 2023 were accepted by the Committee.

### 2 FLOOD MANAGEMENT UPDATE

#### 2.1 Allans Creek Floodplain Risk Management Study and Plan

Public exhibition of the draft Allans Creek Floodplain Risk Management Study and Plan was completed on 9 October 2023. Following the closure of the exhibition period, the submissions received from the community were consolidated/reviewed.

An update on the progress of this project was presented by the consultants from Rhelm. The presentation outlined:

1. The Project Scope
2. Work Completed to Date
3. Public Exhibition Outcomes:
  - 211 Submissions received
  - 77 Attendees at drop in session
  - The key themes included creek maintenance and erosion concerns, development application approvals, flood insurance premiums, council responsiveness, specific location issues, individual property concerns, community education and widening of Byarong Creek upstream and downstream of the Princes Highway.

Cr J Dorahy questioned the risk options for Byarong Creek and channel widening – where on Byarong would this be located? Oscar advised widening upstream of Princes Highway and further explained that properties have been purchased through the voluntary purchase scheme. A detention basin to offset impacts down near Figtree Oval would be challenging and would not stack up in terms of the cost benefit ratio.

**Action: It is proposed that the committee recommend that Council adopt the Allans Creek Floodplain Risk Management Study and Plan (2024).**

Moved by Cr T Brown

Nil Objections



MINUTES

FLOODPLAIN RISK MANAGEMENT COMMITTEE –  
CENTRAL AREA



## 2.2 Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan

Public exhibition of the draft Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan was completed on 16 October 2023. Following the public exhibition, the submissions received from the community were consolidated/reviewed.

An update on the progress of this project was presented by the consultants from Advisian. The presentation outlined:

1. The Project Scope
2. Work Completed to Date
3. Public Exhibition Outcomes

Jean questioned if the reason for James Pearson Park not going ahead was because of the cost factor? Leon advised the benefit in terms of the traffic down stream did not add up economically as there was limited space to detain water and the impacts of this on flooding down stream.

Cr Dorahy noted that the view on page 10, figure 8.3 of the presentation, does highlight flooding, a higher number of properties are flooded in this catchment compared with the Allans Creek catchment. Leon noted he had not looked in detail at the Allans Creek study but noted flooding was relatively broad. Cr J Dorahy asked who looks after the flood warning monitoring and trigger levels and the the implementation of these functions is it the SES or WCC? Leon advised in terms of flood warning it would be BOM warnings, council does have some work under way and systems to place. Ali advised Council has Flood Aware which is a flash flood warning system however these can be precarious and we do not want a system that will warn people of every rainfall event, council is still investigating options – there is not simple solution. Nathan advised Council knows there are other means and measures and at the moment the team are providing You Tube videos for managing safety and the communications team have released these in multiple languages to help with prevention.

Jean advised water flows under James Pearson Park in the privately owned creek – the Williams Street creek between Chalmers and Williams Street - and this takes a lot of water in a big downpour, with the owners expected to keep this clear and clean. In this area of the creek there are huge concrete blocks, would council ever consider helping the owners as a one off to get these out of the creek with their machinery? Nathan advised 60% of water courses are private and therefore we need to be careful as a one off opportunity would normally be as a response to an emergency, without an emergency we could be asked to do on all private land and this is not feasible. Jean advised if council is happy to use the creek as a drainage system then council have a responsibility and conscience to help these property owners as its to councils benefit to remove the concrete blocks. Cr J Dorahy advised he understands the position however potentially there could be an option for council to provide advice on creek improvements.

Cr C Blakey advised College Place has a transient population and therefore there is not alot of knowledge in place for these residents and they are only targeted on an emergency basis. Is there something we can do? Nathan advised we can definately look at this and target locations once the plan is adopted.

Cr J Dorahy asked could Memorial Drive culvert upgrades be widened or expanded, would this be quite costly, would this come under state government as it is a state road? Ali advised this plan would be Transport for NSW (TfNSW) and Andrew advised TfNSW would fund this out of its own funds and not apply for grant money. Andrew advised he had a quick glance at the costing and TfNSW would need to assess to see if it would be financially viable.

Cr C Blakey advised she has heard from residents re McMahan Place as they are concerned with the impact of an environmental basin – Leon advised it was not on this project. Motiur advised this will be covered under Item 2.3 - McMahan Basin.

**Action: It is proposed that the committee recommend that Council adopt the Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan (2024).**

Moved by Cr T Brown

Nil Objections

MINUTES

FLOODPLAIN RISK MANAGEMENT COMMITTEE –  
CENTRAL AREA



### 2.3 Wollongong City Floodplain Risk Management Study and Plan

The final draft Wollongong City FRMS&P has been prepared by Council's consultant. An update on the progress of this project was presented by the consultants from GRC Hydro and covered:

1. Previous and current modelling.
2. The status of flood risk management plan measures.
3. An updated floodplain risk management plan.
4. Flood Mitigation.
5. Voluntary house raising and voluntary house purchase.
6. Flood modification measures.
7. Next Steps:
  1. Committee endorses public exhibition.
  2. Finalise report for public exhibition.
  3. Public exhibition and receipt of feedback.
  4. Incorporate feedback and finalise report for council adoption.

Andrew questioned if the road raising exercises had been assessed for what the affects upstream would be? Felix advised yes, I can show the impacts however it does not indicate impacts on properties as there are proposed road raising and culvert upgrades. Andrew questioned is this due to the flat nature of the downstream area? Felix advised, yes and it can get through and as the 3 locations do not have a huge upstream catchment it makes it more achievable.

Jean asked does the area of 1.8km that is very flat where the water slows down have a solution to speed up the water and clear it faster? Felix advised there are several options being looked at however nothing has been decided as yet; vegetation, earthworks in the park; can the water be drained somewhere else were all looked at.

Cr J Dorahy advised at the golf course at the end of Spring Hill Road there was a creek, has it ever been looked at as a more effective solution to have it reinvented than to raise the level of the road? Felix advised it was looked at in the 2015 study and it was a natural low point that would take flow and the constraints were going west to east; there was ecological impact for a large area and there would be a need for ongoing dredging for the required outlet and the cost was noted to be very high.

Cr T Brown asked for the options and if there had been any ball park costings on these options? – Felix advised costs estimates were not provided for three of the options for Spring Hill Road due to being TfNSW infrastructure. Andrew Monk advised cost will be significant and one of the option presents constraints with the railway over-bridge.

**Action: It is proposed that the Committee recommend exhibition of the draft plan to the community.**

Moved by Cr T Brown

Nil Objections

### 2.4 Detailed Design of McMahon Basin

Council did a concept design a couple of years ago:

- Stage 1: Data Collection
- Stage 2: Design Development Phase is ongoing

Once this has been finalised Council will seek committee consultation before going out to public consultation (limited to the directly impacted properties in the vicinity of the works)

Cr C Blakey and Stuart Milling raised environmental issues in this area. Motiur has forwarded to consultant to be considered in the report.

MINUTES

FLOODPLAIN RISK MANAGEMENT COMMITTEE –  
CENTRAL AREA



**2.5 Allans Creek – Debris Control Structure at The Avenue (Figtree Oval) Design**

Ali advised Northrope have been engaged and they are on track for delivering the design this financial year, 2023/2024.

Cr C Blakey asked if the potential bridges to connect to Figtree Oval needed to have the flood risk study first and does this now open up options for creek bridges to provide connectivity? Ali advised there is no specific proposal in that area – any proposed bridge will require a flood impact assessment to quantify flood impacts to the surrounding area.

**3 GENERAL BUSINESS**

**3.1 Business Arising from Previous Minutes**

Nil

**4 NEXT MEETING**

The date of the next meeting is to be advised.

**5 CLOSE MEETING**

The meeting closed at 5.34pm

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## Executive Summary

The Allans Creek Floodplain Risk Management Study (FRMS) has been prepared for Wollongong City Council (Council) in accordance with the New South Wales (NSW) Flood Prone Land Policy and the principles of the Flood Risk Management Manual (NSW Government, 2023). This will allow Council to better manage the existing, continuing and future flood risk to the community around the suburbs of Mount Keira, Figtree, Cordeaux Heights, Mount Kembla, Unanderra, Farmborough Heights, Port Kembla, Mangerton and Mount St Thomas through identifying mitigation strategies in the Allans Creek catchment, to ensure the safeguarding of residents, properties and other infrastructure.

### **Background**

This study has considered the 2006 Floodplain Risk Management Plan and revised modelling has utilised the hydrological and hydraulic models developed as part of the Allans Creek Flood Study (Advisian, 2019).

### **Objectives**

A key objective for this project was to provide understanding of flood risk and management within the Allans Creek catchment.

This study is intended to be used to:

- Identify measures to reduce the risk of flooding impacts on the community
- Reduce the manageable impact and risk of flooding on the community
- Assist in informing the community of flood risks in the study area
- Inform Council planning guidelines for the study area.

The outcomes of this FRMS are presented in the Floodplain Risk Management Plan (FRMP) which documents and conveys the decisions on the management of flood risk into the future. The FRMP outlines a range of measures to manage existing, future and residual flood risk effectively and efficiently. This includes a prioritised implementation strategy; what measures are proposed and how they will be implemented.

### **Flood Model Update**

The Allans Creek Flood Study (Advisian, 2019) was updated through a revision to the hydrological model and additional calibration of flood events. An update of the hydrology inputs and analysis approach to Australian Rainfall and Runoff 2019 (ARR2019) was also undertaken. The hydraulic model was updated to reflect current catchment condition and validated against historic events. The modelling approach was updated to reflect current best practice.

### **Property Flooding and Flood Damages**

An assessment of economic damages has been undertaken to quantify the existing flood damages based on design flood events within the study area. The results are summarised in **Table i**.

The average annual damages (AAD) for the Allans Creek floodplain under existing conditions is **\$7.96 million**. Over a 50-year assessment period and under a seven per cent discount rate, this is equivalent to a Net Present Value (NPV) of **\$109.8 million**. These damages were calculated based on the tangible damages only.



Table i Existing damages assessment results

	Over Ground Flooding	Over Floor Flooding	Max Over Floor Depth (m)	Total Damages (\$2022) <sup>1</sup>
<b>PMF</b>				
<b>Residential</b>	1,461	941	6.14	\$199,847,223
<b>Commercial</b>	135	106	3.71	\$22,775,884
<b>Industrial</b>	91	89	4.63	\$44,441,175
<b>Total</b>	1,687	1,136	-	\$287,049,004 <sup>(2)</sup>
<b>1% AEP</b>				
<b>Residential</b>	823	278	3.46	\$50,723,327
<b>Commercial</b>	79	103	1.21	\$5,592,833
<b>Industrial</b>	54	51	2.26	\$20,275,305
<b>Total</b>	956	432	-	\$81,663,797 <sup>(2)</sup>
<b>5% AEP</b>				
<b>Residential</b>	509	102	3.34	\$20,849,898
<b>Commercial</b>	47	50	1.04	\$2,533,034
<b>Industrial</b>	31	22	1.30	\$2,279,728
<b>Total</b>	587	174	-	\$27,747,650 <sup>(2)</sup>
<b>20% AEP</b>				
<b>Residential</b>	342	54	3.09	\$9,465,813
<b>Commercial</b>	35	31	0.76	\$1,613,539
<b>Industrial</b>	17	14	0.29	\$1,013,839
<b>Total</b>	394	99	-	\$13,039,773 <sup>(2)</sup>

<sup>1</sup>During the time of analysis latest CPI (Consumer Price Index) for 2023 was unavailable.

<sup>2</sup>Total Damages includes Infrastructure damage uplift which is 10% of residential damages.

### **Flood Risk Management – Options Assessment**

Flood risk is a combination of the likelihood of occurrence of a flood event and the consequences of that event when it occurs. It is the human interaction with a flood that results in a flood risk to the community. This risk will vary with the frequency of exposure to this hazard, the severity of the hazard, and the vulnerability of the community and its supporting infrastructure to the hazard. Understanding this interaction can inform decisions on which measures to use in managing flood risk.

Measures available for the management of flood risk can be categorised according to the way in which the risk is managed. There are three broad categories of management:

- Flood modification measures – options aimed at preventing/avoiding or reducing the likelihood of flood risks through modification of flood behaviour in the catchment.
- Property modification measures – options focused on preventing/avoiding or reducing the consequences of flood risks. Rather than necessarily modify flood behaviour, these options aim to modify existing properties (e.g. by house raising) and/or impose controls on property and

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## Allans Creek Floodplain Risk Management Study

infrastructure development for future properties. Property modification measures, such as effective land use planning and development controls for future properties, are essential for ensuring that future flood damages are appropriately contained, while at the same time allowing ongoing development and use of the floodplain.

- Emergency response modification measures – options focused on reducing the consequences of flood risks, by generally aiming to modify the behaviour of people during a flood event.

A range of measures to manage existing, future and residual flood risk effectively and efficiently have been assessed. There was a total of 106 options identified and assessed in the development of this FRMS. 86 of these options were not considered feasible as an outcome of the preliminary options assessment. The preliminary assessment considered flood risk, land ownership, constructability and potential environmental impacts. There was a total of 20 options assessed utilising a triple bottom line approach in the form of a Multi-Criteria Assessment (MCA). The emergency and property modification options generally ranked higher than the flood modification options. This was due to the emergency and property options being able to deliver reasonable reductions in flood risk without the capital outlay required for the flood modification options.

Overall, the top three ranked options were related to emergency response:

- EM1 – Data handover to SES: ranked (1st)
- EM2 – Update of emergency management material: (2nd)
- EM7 – Data collection following flood events (3rd).

The highest ranked flood modification options were:

- DCS2 – Debris control structure upstream of the M1 Princes Motorway, American Creek: (4th)
- DCS3 – Debris Control Structure, Phillips Cres, Mangerton: (6th)
- DCS1 – Debris Control Structure, O'Donnell Drive Figtree: (8th).

The outcome of the options assessment includes a prioritised implementation strategy; what measures are proposed and how they will be implemented. Preliminary costs have been developed for feasible options to allow for planning, implementation and integration with Council's existing long-term financial planning and asset planning processes. Works would directly benefit 65 properties and reduce average annual damages by over \$550,000.

Details of the implementation strategy are included in the Floodplain Risk Management Plan component of this study.

### Outcomes and Recommendations

This report presents the findings of the Floodplain Risk Management Study stage of the Flood Risk Management Process for Allans Creek, in accordance with the Flood Risk Management Manual (NSW Government, 2023). The investigations undertaken as part of this process identified a number of issues within the floodplain. Based on these issues, a series of floodplain management options were developed and recommended.

The outcomes of the multi-criteria assessment provide a sound basis upon which Council can make decisions about undertaking works, making planning decisions and developing response arrangement to reduce the impact of flooding on property and life.



Allans Creek Floodplain Risk Management Study

The implementation strategy associated with the outcomes of this study may not necessarily approach the options from “highest ranking to lowest ranking” but will also need to incorporate various other considerations such as existing works programs, availability of funding and other opportunities to combine floodplain works with other activities.

The options identified as having significant flood risk reductions that also do not have adverse social or environmental impacts are incorporated into the FRMP as proposed management actions. The FRMP provides a realistic strategy to manage flood risk and will outline the process of implementation for recommended management actions within the floodplain.



## Executive Summary

### Study Overview and Purpose

The Allans Creek Floodplain Risk Management Plan (FRMP) has been prepared for Wollongong City Council (hereafter referred to as Council) in accordance with the New South Wales (NSW) Flood Prone Land Policy and the principles of the Flood Risk Management Manual (NSW Government, 2023).

This FRMP is to be considered in conjunction with the Allans Creek Floodplain Risk Management Study (FRMS), prepared as a separate document to this FRMP. The FRMS (Rhelm, 2024b), examined options for managing flood risk in the suburbs of Mount Keira, Figtree, Cordeaux Heights, Mount Kembla, Unanderra, Farmborough Heights, Port Kembla, Mangerton and Mount St Thomas. This FRMP outlines the floodplain management measures recommended as an outcome of the assessment undertaken in the FRMS along with the implementation strategy associated with those measures.

The overall objective of this FRMP is to document and convey the decisions on the management of flood risk into the future. Drawing on the investigations undertaken as part of the FRMS, this plan outlines a range of measures to manage existing, future and residual risk effectively and efficiently. This document also presents a prioritised implementation strategy, to guide the implementation of the proposed measures.

### Study Area

The Allans Creek catchment is located approximately six kilometres south-west from the Wollongong CBD and encompasses the suburbs Mount Keira, Figtree, Cordeaux Heights, Mount Kembla, Unanderra, Farmborough Heights, Port Kembla, Mangerton and Mount St Thomas.

The catchment borders the Mullet Creek catchment to the south, the Fairy-Cabbage Creek catchment to the north, the Illawarra Escarpment to the west and Port Kembla Harbour to the east.

### Consultation

Community and stakeholder consultation is an important element of understanding and managing flood risk. The engagement approach undertaken as part of this study was in accordance with the IAP2 framework and the requirements of the NSW Government's Flood Risk Management Manual (2023).

The community and other stakeholders have been engaged through a range of engagement methods, including Council's floodplain management committee, meetings with State Government Agencies and Traditional Owners, and a public exhibition process to provide input on flooding issues experienced in the Allans Creek catchment and how they could be addressed.

A detailed discussion and analysis of the public exhibition has been documented in Council's Engagement Report, which is provided in Appendix D of the FRMS (Rhelm, 2024b). A summary of the outcomes of the public exhibition is provided below.

The survey received 114 submissions including 95 hardcopy surveys and 19 via the online portal, five via email. There were also 5 email submissions received. Key themes in the responses were:

- Creek maintenance and erosion concerns
- Development Application (DA) issues
- Flood insurance premiums



# Rhelm

## Allans Creek Floodplain Risk Management Plan

- Specific location issues Arrow Ave Figtree, flood and safety risks to residents of Figtree Caravan Park, and residential properties upstream of the M1 culverts along American Creek.
- Infrastructure and environmental considerations
- Widening of Byarong Creek Some residents advocated for further exploration of widening Byarong Creek to reduce flood impacts upstream and downstream.

### Floodplain Risk Management Study

The Allans Creek Floodplain Risk Management Study (Rhelm, 2024b) provided a comprehensive evaluation of the flood risks in the Allans Creek catchment and identified potential options to mitigate these risks.

The key outcomes of the FRMS include:

- Evaluation of flood risk to the community based on the flood behaviour of the catchment. This analysis included Flood hazard and emergency response mapping, and economic damages assessments.
- Review of flood planning policy, including flood-related controls covered by the Local Environment Plan (LEP), relevant Development Control Plans (DCPs), Council policies and plans. The recommendations proposed as an outcome of this review are presented in this FRMP.
- Identification of a range of flood mitigation measures to address existing and future flood risk and evaluation of these measures with the use of a Multi-Criteria Assessment (MCA) approach. The MCA enabled the comparative assessment of all options based on their economic, social, and environmental aspects, as well as on their effectiveness in mitigating flood risk.

This floodplain risk management plan draws from the conclusions of the analysis undertaken in the FRMS and present the recommended measures for managing flood risk within the Allans Creek catchment, as well as the strategy to implement these measures.

### Recommended Floodplain Risk Management Measures and Implementation Program

The outcomes of the assessment of the options undertaken in the FRMS form the basis of this FRMP. A detailed description of the recommended floodplain risk management measures is provided in **Section 4.2**. Details of options assessed in the FRMS that were not recommended for implementation as part of the FRMP, can be found in the FRMS.

**Table E-1** summarises the measures recommended as part of this FRMP.

In order to achieve the implementation of relevant management actions, a program of implementation has been developed. The proposed implementation program is presented in **Section 5**. The proposed program provides information on the estimated costs of each measure, the agency / organisation responsible for the action, as well as the priority and timeline for implementation.

Implementation of the identified actions in the FRMP is estimated to cost in the order of \$6.6M, excluding recurrent costs (e.g. maintenance costs).

It is recommended yearly monitoring of the plan be undertaken for progress against the objectives of the recommended actions, and to ensure that the findings of the FRMS and FRMP continue to be referenced.



## Conclusions and Recommendations

This FRMP provides a practical framework and implementation plan for managing existing, future and continuing flood risk within the study area.

Overall, it is considered that existing risks to the Allans Creek floodplain can be managed appropriately through the implementation of development controls, emergency response measures and selected ground works. The effective implementation of development controls will be of key importance in reducing the damages and risk to life associated with flooding into the future through the construction of flood compatible buildings and assets. Improving emergency response through flood free access, and improved community awareness of flooding, is critical to reducing the risks associated with flooding in the study area.

This FRMP fulfils its objectives in accordance with the New South Wales (NSW) Flood Prone Land Policy and the principles of the Flood Risk Management Manual (NSW Government, 2023).

**Table E-1 Summary of recommended floodplain risk management measures**

Option ID	Option Name	Measure
DCS1	Debris Control Structure, O'Donnell Drive Figtree	Flood Modification
DCS2	Debris Control Structure, American Creek Figtree	Flood Modification
DCS3	Debris Control Structure, Phillips Cres, Mangerton	Flood Modification
VM1	Catchment Wide Vegetation Management	Flood Modification
EM1	Data Handover to the NSW SES	Emergency Management
EM2	Update of Emergency Response Documentation	Emergency Management
EM3	Flood Warning System	Emergency Management
EM4	Emergency Plans for Flood Affected Businesses	Emergency Management
EM5	Flood Warning Signs and Information	Emergency Management
EM6	Community Education and Awareness	Emergency Management
EM7	Data Collection Following Flood Events	Emergency Management
EM8	Predictive Flash Flood Warning	Emergency Management
EM9	Installation of Additional Gauges	Emergency Management
EM10	Post-Flood Inspection Checklist	Emergency Management
PM1	Land Use Planning and Building Control Updates	Property Modification
PM2	Flood proofing guidelines	Property Modification
PM3	Voluntary Property Purchase (VP).	Property Modification



OUR WOLLONGONG JOIN THE CONVERSATION



# Managing Flood Risk in the Allans Creek Catchment

Draft Floodplain Risk Management Study & Plan

Engagement Report  
October 2023

## Table of Contents

Executive Summary.....	3
Background .....	5
Stakeholders.....	6
Methods.....	6
Results.....	8

The information in this report is based on data collected from community members who chose to be involved in engagement activities and therefore should not be considered representative.

This report is intended to provide a high-level analysis of the most prominent themes and issues. While it's not possible to include all the details of feedback we received, feedback that was relevant to the project has been provided to technical experts for review and consideration.

## Executive Summary

We've completed several studies to assess the flood risk within the Allans Creek Catchment. These studies and previous community input helped us assess the suitability of a range of flood management measures for the catchment. These measures include engineering works, vegetation management, development controls, planning measures and emergency response arrangements. We asked the community and other stakeholders to be involved in our flood risk management planning by sharing their thoughts on the draft Floodplain Risk Management Study and Plan.

### Engagement details

Engagement ran from 4 September to 9 October. We sent letters, Frequently Asked Questions (FAQ), a map and survey to more than 5,800 residents and owners of properties identified as being located within the extent of flood-prone land and flood planning area. They were invited to learn more and join the conversation. We sent the information to Neighbourhood Forum 5 and 7, participants in previous Allans Creek catchment flood engagements and other stakeholders including State Government agencies, schools and business and industry bodies. We published a project webpage on [our.wollongong.nsw.gov.au](https://our.wollongong.nsw.gov.au), which included the draft FRMSP reports, a map showing the location of the preliminary options, FAQ, an online survey and Q&A forum. We published a notice in the Illawarra Mercury Community Update. We sent information to and held meetings with Aboriginal stakeholders. We held a drop-in community information session at Figtree Community Hall. People could also access the information from Council's Customer Service Centre, and Wollongong and Unanderra Libraries.

### Engagement participation

We invited feedback on the draft FRMSP and received 211 submissions, including 95 hardcopy surveys, 19 online submissions, five emails, and meetings with 15 Aboriginal Traditional Custodians and knowledge holders. Some provided photos with their submissions. We had conversations with 77 attendees at the community information session. The project webpage had 298 unique views and three questions were submitted to the online Q&A.

### What we heard

#### Survey

Respondents were asked to indicate their level of support for the following options for managing flood risk in the Allans Creek Catchment. Debris control structures were supported by most. While some expressed support for options that were not recommended in the report, there were similar numbers of respondents who objected to them or indicated a response was not applicable. Most were supportive of all the other options for managing flood risk.

Residents highlighted key concerns in their feedback, emphasising the need for proactive measures in creek maintenance. Debris control, erosion prevention, and dredging to deepen creeks were proposed, with accountability urged for the developer of an estate in Figtree regarding American Creek. Vegetation management suggestions included removing invasive plants and planting water-loving trees. Infrastructure improvement requests covered drainage upgrades, culvert maintenance, and solutions like raised levy banks. Criticism arose over stormwater infrastructure, and residents called for transparent communication, extended community input time, and SMS notifications for flood warnings. Climate change considerations, consistent development controls, flood mapping access, and careful planning were also stressed, along with concerns about insurance premiums, emergency response collaboration, and pet evacuation during floods. Several provided photos or videos with their submissions, to share their observations and experiences of flooding.

#### Meetings with Aboriginal stakeholders

The Aboriginal Traditional Custodians and knowledge holders we spoke to indicated a preference for debris control structures if placed over existing culverts and concreted areas. There were

concerns about impacting natural creek areas and questions about the installation process and appropriate structure heights. A request was made for Council to explore natural systems like reeds and vegetation as a strategy to mitigate water flow speed. Elders were concerned about hard infrastructure impacting biodiversity, with consideration for environmental impacts urged. The proposed widening of Byarong Creek caused alarm due to its connection to sacred sites and potential consequences for water flow and flooding. A site review and on-site monitoring were requested should this option be pursued.

### **Open submissions**

We received five open, written submissions from local resident/s and property owners, an operator of an electrical distribution network and a government organisation that manages emergency response and preparedness. Lengthy and/or technical submissions were provided in full to the team working on the FRMSP.

Residents in areas like Figtree and Unanderra have voiced concerns over persistent flooding issues, perceiving the need for proactive measures, accurate flood modeling, and clear communication from Council. Specific issues include creek maintenance, debris build-up, and vegetation causing flooding, impacting properties and insurance costs. Some criticised Council's responsiveness, calling for practical solutions like stabilising creek banks and installing drainage structures. Concerns about specific locations like Figtree Gardens Caravan Park and Unanderra Pool were highlighted. Residents proposed solutions, including infrastructure improvements, zoning accuracy, and private landowner education.

The State government organisation prioritises evacuation as the primary response to flooding. They noted the likelihood of flash flooding within 180 minutes and proposing a potential flash flood warning system pilot study. They requested updated flood plan documents in electronic form.

The representative of the electrical distribution network operator provided advice regarding their flood response plan and impacts of floods on the network.

### **Information session**

Seventy-seven people attended the information session at Figtree Community Hall. The discussions focused on:

- Creek maintenance and erosion concerns.
- Development Application (DA) issues.
- Flood insurance premiums.
- Complaints regarding Council responsiveness to reported issues.
- Specific location issues, e.g. flooding on Arrow Ave, flood and safety risks to residents of Figtree Caravan Park, and the M1 culverts.
- Concerns including blocked drains and inadequate infrastructure.
- Detailed concerns about specific properties.
- Community education.
- Infrastructure and environmental considerations.
- Widening of Byarong Creek.

### **Next steps**

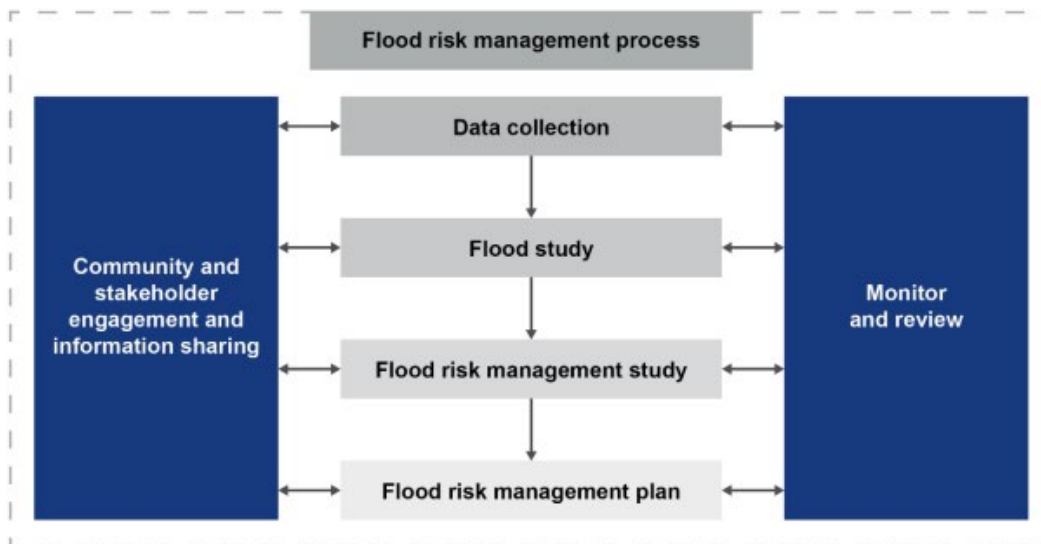
We will use this feedback to further refine the draft Floodplain Risk Management Study and Plan. These are preliminary discussions about the recommended options. They will each require further investigation, consultation and approvals before going ahead. We will continue sharing information with the community and key stakeholders and seek input as we progress.

## Background

As part of our commitment to managing flood risks in our region, we reviewed the Allans Creek Floodplain Risk Management Studies and Plans (FRMSP). The report identified flooding “hotspots”, and explained what the risks and damages from floods may be in the Allans Creek catchment. The report presented potential options for ways we could mitigate (reduce) those risks. Examples of these measures include:

- Emergency response plans.
- Building new or improving existing structures that collect and carry stormwater into drains or creeks, e.g. detention basins or culverts.
- Land zoning and development controls that guide what can and can't be built on flood-prone land.
- Voluntary purchase of houses built in areas of high flood-risk.
- Flood education programs.

We consider changes to flood risk as a result of these strategies and under future conditions, e.g. climate change and future development. The reports include recommendations for strategies to reduce flood risk.

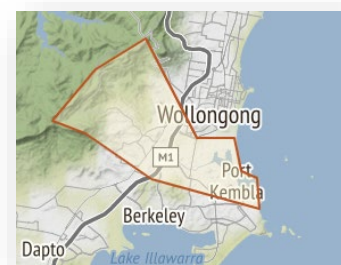


### Flood study review and previous engagement

Flood studies describe flood behaviour and identify areas that are flood prone. These studies are used to inform land use planning, planning certificates and for the development of the floodplain risk management studies. The community provided valuable input to previous flood investigations within the Allans Creek catchment, with the most recent inputs provided in 2019 as part of the flood study review. The community provided accounts of their observations of flooding and feedback on the flood mapping through online surveys and at community drop-in sessions. The flood models were updated as a result. The Allans Creek Flood Study report was adopted by Council at its meeting on 9 December 2019. This input helped us to assess the suitability of a range of flood management measures for the catchment.

### Allans Creek catchment

The study area is 45 km<sup>2</sup> and is located to the southwest of the Wollongong CBD. It includes Byarong Creek, Brandy & Water



Creek and the suburbs of Mount Keira, West Wollongong, Figtree, Mount Kembla, Unanderra, Farmborough Heights and Berkeley. Land uses include residential, commercial, industrial, and open space. The catchment drains from the Illawarra Escarpment to Port Kembla Harbour.

## Stakeholders

Stakeholders identified prior to the start of the engagement period included:

- Flood-affected residents, ratepayers and businesses
- Aboriginal stakeholders
- Participants in previous engagements
- Central Floodplain Committee
- Development industry
- NSW Department of Planning and Environment
- Endeavour Energy
- NSW SES Southeastern Zone
- Port Authority of NSW
- Lord Mayor & Councillors
- Sydney Water
- Register of Interest - Flood
- Neighbourhood Forums 5 and 7
- Transport for NSW
- Schools
- Emergency Services
- General community

## Methods

Communication Methods	
Methods	Details of Methods
Letter	More than 5,800 letters were delivered to local residents, businesses and property owners. It included copies of the: <ul style="list-style-type: none"> <li>• FAQ (responses to questions about the draft Floodplain Risk Management Study and Plan)</li> <li>• Study area and flood mitigation options map</li> <li>• Hardcopy survey (seeking to understand people’s responses to flood events, preferences on the options and any other comments or questions)</li> </ul>
Email to key stakeholders	An email about the project with FAQ and map was sent to key stakeholders
Aboriginal stakeholder meetings	We emailed, texted and phoned Aboriginal stakeholders to share the information. They were invited to attend a meeting with a flood engineer working on the project to learn more, have their questions answered and provide feedback.
Register of Interest	An email was sent to 836 participants registered on the Our Wollongong website with an interest in the topic of floods.
Maps	Draft maps showed the location of the study area, and recommended debris control structures and options that were assessed.
Our Wollongong website	The project webpage hosted background information and supporting documents: <ul style="list-style-type: none"> <li>• FAQ</li> <li>• Study area and flood mitigation options maps</li> <li>• Draft reports:               <ul style="list-style-type: none"> <li>○ Draft Floodplain Risk Management Study 2023</li> <li>○ Draft Floodplain Risk Management Plan 2023</li> <li>○ Draft Allans Creek Flood Study 2023 - ARR2019 Revision</li> </ul> </li> <li>• Q&amp;A forum</li> <li>• Online survey</li> </ul>



	<ul style="list-style-type: none"> <li>• Videos: <ul style="list-style-type: none"> <li>○ Flooding in Wollongong – Wollongong City Council</li> <li>○ Understanding Floods – Bureau of Meteorology</li> <li>○ Flood Estimation - What is a "One-in-100-Year" Flood? – Wollongong City Council</li> <li>○ Flood Studies - Could Flooding Affect Your Property? – Wollongong City Council</li> </ul> </li> <li>• Links: <ul style="list-style-type: none"> <li>○ <a href="#">Learn more about floodplain management in Wollongong</a></li> <li>○ <a href="#">Flood insurance explained - Insurance Council of Australia</a></li> <li>○ <a href="#">Financial Rights Legal Centre - Flood Insurance Factsheet</a></li> <li>○ <a href="#">Financial Rights Legal Centre - Flood Premiums Factsheet</a></li> <li>○ <a href="#">NSW SES - Flood Risk Information</a></li> <li>○ <a href="#">Wollongong City Council - Preparing for Flood and Storm Emergencies</a></li> <li>○ <a href="#">NSW SES - Plan Now For What You Will Do</a></li> <li>○ <a href="#">Wollongong City Council - Development on Flood Affected Land</a></li> <li>○ <a href="#">Wollongong City Council - Flood Level Information</a></li> </ul> </li> </ul>
Wollongong City Council website	Event listings promoting the information session were published on Council's website and corporate calendar.
Community Information Session	<p>A drop-in information session was held at Figtree Community Hall (West) on Wednesday 13 September 3:30pm – 6:30pm, where we displayed:</p> <ul style="list-style-type: none"> <li>• Draft FRMSP reports</li> <li>• Draft Allans Creek Flood Study - ARR2019 Revision</li> <li>• Maps: <ul style="list-style-type: none"> <li>○ 10% annual exceedance probability (AEP) event</li> <li>○ 1% AEP event</li> <li>○ Probable Maximum Flood event</li> <li>○ Flood risk precinct</li> <li>○ Location of the recommended options</li> <li>○ Vegetation management plan</li> </ul> </li> <li>• Multi-criteria analysis and scoring sheet</li> <li>• Poster showing implemented mitigation works in the catchment</li> <li>• Insurance factsheets</li> </ul>
Library information stand	<p>Located at Wollongong City libraries there was the following:</p> <ul style="list-style-type: none"> <li>• Hardcopy survey</li> <li>• FAQ</li> <li>• Study area and flood mitigation options maps</li> <li>• Draft reports: <ul style="list-style-type: none"> <li>○ Draft Floodplain Risk Management Study 2023</li> <li>○ Draft Floodplain Risk Management Plan 2023</li> <li>○ Draft Allans Creek Flood Study 2023 – ARR 2019 Revision</li> </ul> </li> </ul>
Illawarra Mercury Community Update	Notices appeared on the Council page in the 6 September 2023 and 4 October editions of the Illawarra Mercury to promote the engagement.
<b>Engagement Methods</b>	
Our Wollongong website	<ul style="list-style-type: none"> <li>• An online survey was used to capture participants' comments</li> <li>• An online Q&amp;A forum was provided for participants to ask questions about the draft FRMSP.</li> </ul>

Aboriginal stakeholder meetings	Stakeholders shared feedback with Council staff at the meetings.
Information session	The flood engineers working on this project attended a drop-in session on 13 September 2023 to answer people's questions. A summary of open feedback and actions was noted.
Email	People emailed in open written submissions and completed hardcopy surveys.
Post	People posted in open written submissions and completed hardcopy surveys.
Phone	People phoned in with their feedback and questions.

## Results

All affected residents, owners and identified stakeholders were invited to provide feedback on the Draft Allans Creek Floodplain Risk Management Plan from 4 September – 9 October 2023. Aboriginal engagement commenced 1 September 2023.

## Engagement Participation

Engagement Activities	Participation
Phone calls	9
Emails with open submissions	5
Drop-in session attendees	77
Hardcopy surveys (submitted via email, post, and at the information session)	95
Aboriginal stakeholder meetings	15
Online Participation	
<ul style="list-style-type: none"> <li>Aware – Total number of people who viewed the project webpage.</li> </ul>	298
<ul style="list-style-type: none"> <li>Informed – Total number of people who clicked a hyperlink, e.g. to download the draft plans.</li> </ul>	167
<ul style="list-style-type: none"> <li>Engaged – Total number of people who actively contributed to the project, e.g. by submitting comments via the survey or posting a question to the Q&amp;A.</li> </ul>	20

## Submission results

We heard from 211 respondents, with most submissions being via the survey. Some people provided multiple submissions, e.g. writing an email as well as submitting an online survey. These have been counted as one submission.

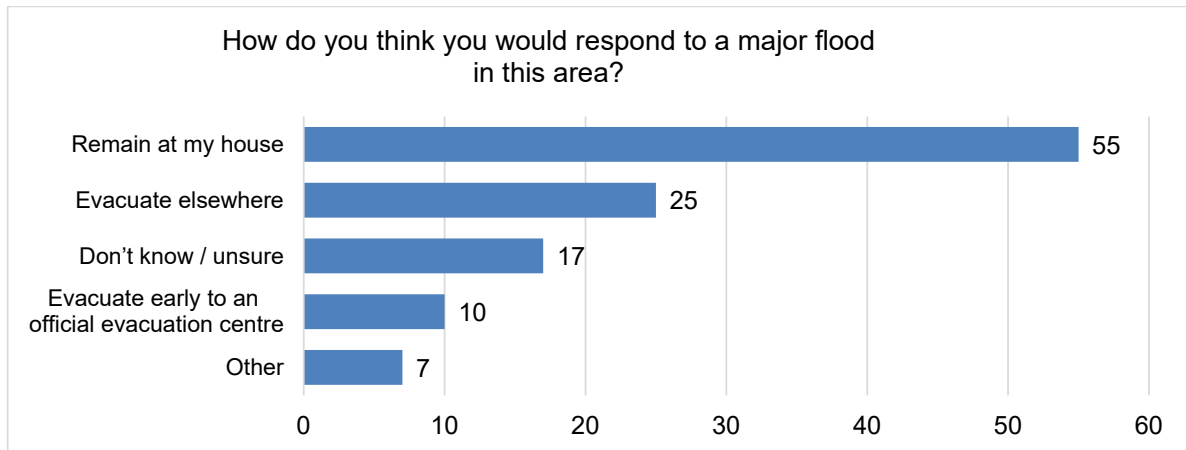
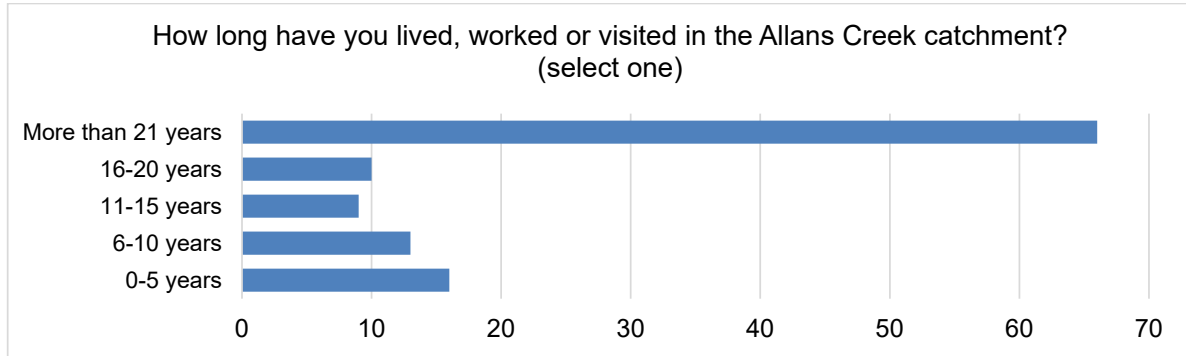
Representatives from the following organisations and groups made either an open submission or submitted responses via the survey:

- Aboriginal Traditional Custodians and knowledge holders
- A water engineering firm
- Endeavour Energy
- NSW SES – South Eastern Zone
- Mount St Thomas Primary School

- A business in Unanderra
- A resident action group

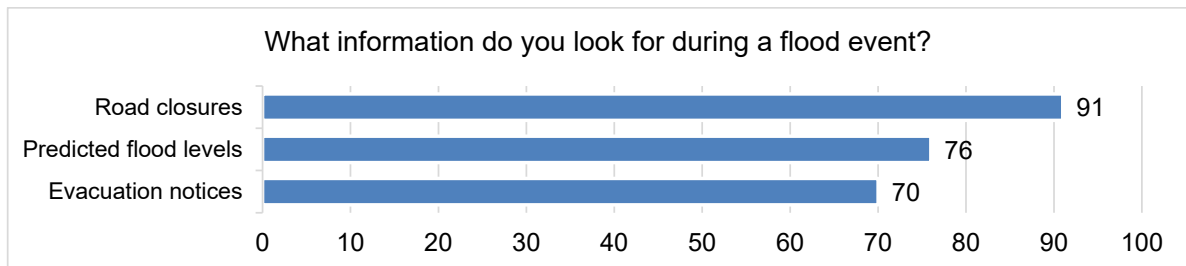
**Online and Hardcopy Survey Feedback**

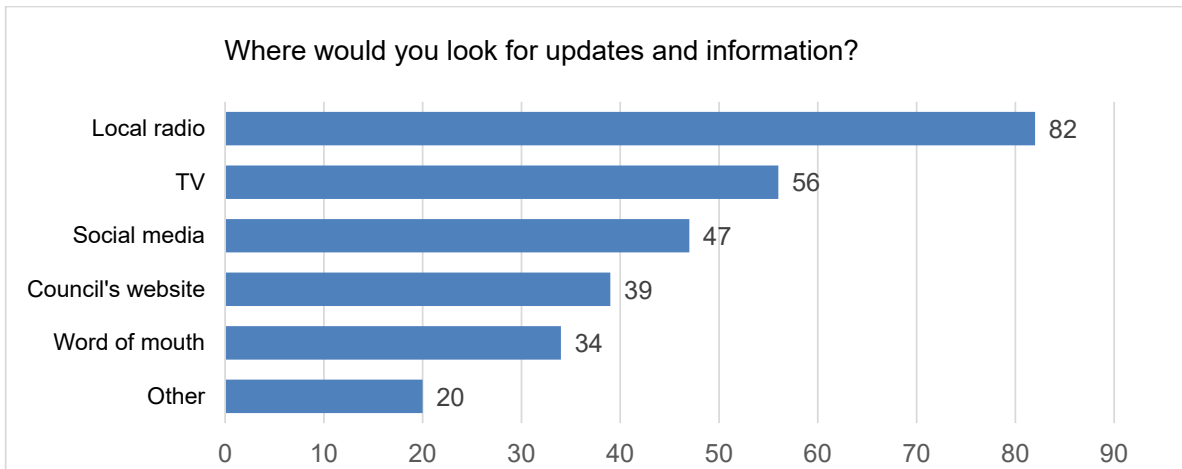
We received 114 online and hardcopy surveys. Some were only partially completed, with either some of the questions skipped or only partially completed. Following is a summary of the feedback we received via the survey.



Of the respondents who selected 'other', their reasons for doing so were mainly due to having a secondary option if remaining at their house wasn't viable due to rising water levels. In this instance, they would evacuate elsewhere, move to higher ground / a second storey, or go to an official evacuation centre.

It would depend on how high the water level came up. In the case of my own property alongside Byarong Creek West Wollongong, it flooded our backyard and garage, but the house was unharmed.

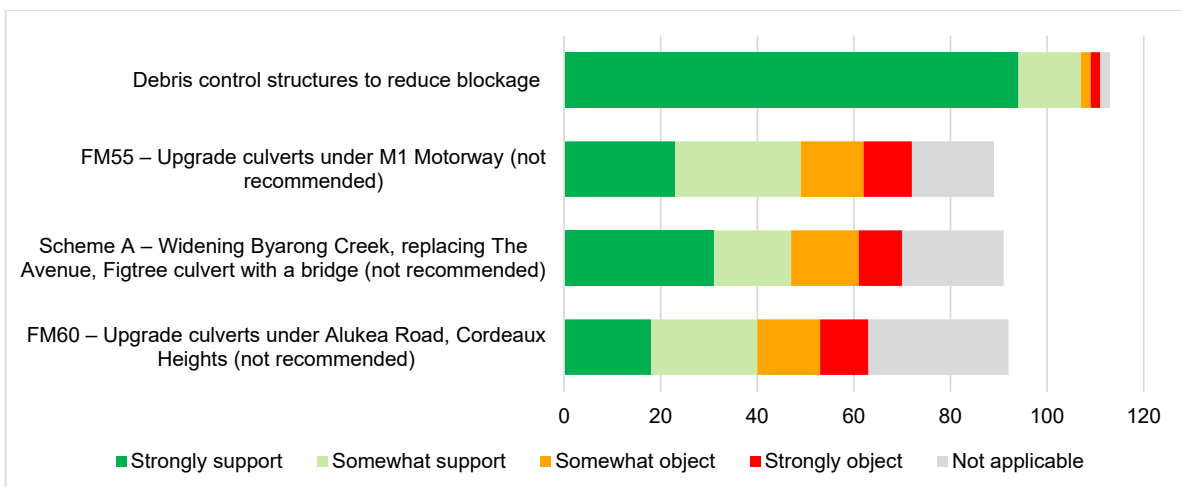




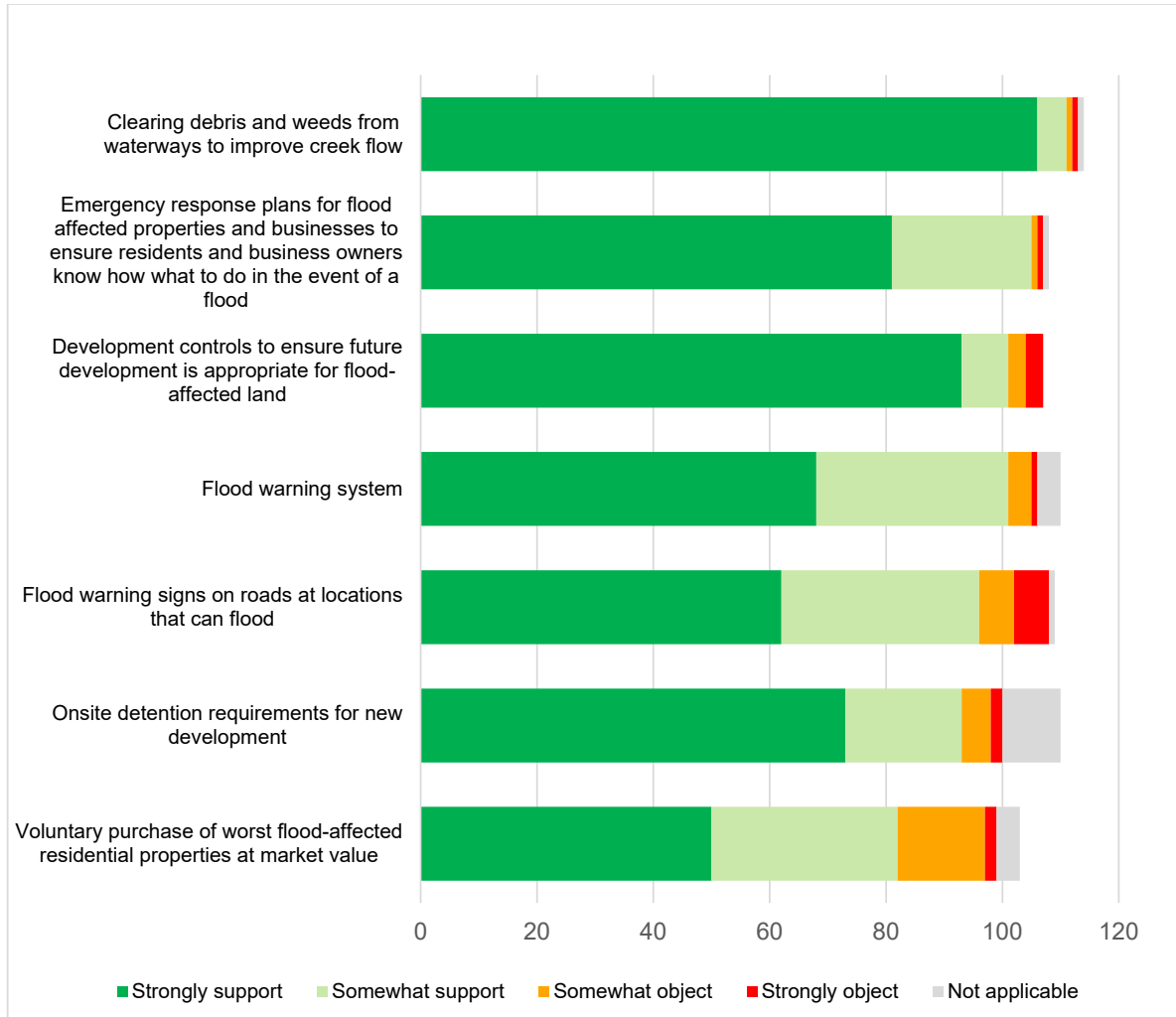
Of the respondents who selected 'other', they said other places they would look for updates and information included:

- Other businesses in the street
- NSW State Emergency Service website, social media and Hazard Watch
- Apps such as 'Hazards Near Me' and Illawarra Mercury
- Direct observation of water levels and creeks
- Friends, family and neighbours
- Text / SMS
- Wollongong weather websites
- ABC website
- Internet
- Bureau of Meteorology
- Workplace announcements

Respondents were asked to indicate their level of support for the following options for managing flood risk in the Allans Creek Catchment. Debris control structures were supported by most. While some expressed support for options that were not recommended in the report, there were similar numbers of respondents who objected to them or indicated a response was not applicable. This table presents respondents' level of support for specific options that were assessed:



Most were supportive of all the other options for managing flood risk. The following table presents respondents' level of support for the other options:



Respondents were asked whether they had any other suggestions for managing flood risk in this catchment. They commonly spoke about ecological considerations, infrastructure improvements, and active community involvement. Their suggestions are summarised as follows:

**Creek maintenance**

Debris control was most commonly raised in the feedback. Many respondents said it's vital to regularly/frequently remove fallen trees and large items in creeks to prevent blockages. There were requests for erosion control to shore up creek banks, especially for areas like Byarong Creek where it has been observed that successive flooding events have led to bank erosion. Dredging sections of creeks was proposed to make them deeper, along with rehabilitation efforts using rocks and timber supports to prevent erosion. There is a view by some respondents that the Red Gum developer needs to be held accountable for maintaining American Creek.

Ensure that owners of properties backing onto creeks understand the importance of not throwing rubbish and trees into it

Stop private owners filling in and planting in creek beds on their property

### Vegetation management

Requests were made to remove lantana and invasive plants in creeks, such as American Creek and the one in the reserve behind Tamarind Drive, with replanting to prevent their return. Some respondents advocated for planting more water-loving trees with specific root systems to reduce flooding, and implementing regular upkeep. It was suggested to draw inspiration from successful practices in the UK that reduced flooding in flood-prone areas. There was a focus on rehabilitating riverbanks with native trees, preventing erosion, and allocating a budget for ongoing vegetation management to improve creek flows.

### Infrastructure maintenance and improvements

Requests were made for drainage upgrades. It was suggested to replace cement pipes with a flexible row of plastic concertina pipes. Suggestions from respondents for new infrastructure included:

- Implementing debris control structures at Byarong Creek
- Exploring earthen-made raised levy banks and “holding pits”
- Preventing culvert blockages under the M1 motorway and examining stormwater management around the freeway
- Enhancing drainage capabilities and extending pipes for specific locations
- Implementing open drains for landslip-affected areas
- Resolving water runoff issues
- Using concrete lining on bridge abutments
- Advocating for more drainage on major roads
- Support for debris control structures, so long as they are regularly maintained
- Fixing Koloona Ave bridge to clear span (recommended in 1997 by Lawson and Trelour) and addressing the need for new bridges
- Exploring weirs/baffles for regulating flows
- Improving drainage in new and old developments
- Ensuring outflow in specific areas

Other Councils have implemented waste initiatives to reduce debris, i.e. rubbish bin lids with closures. Wollongong has high winds which contributes greatly to rubbish blowing out of bins into streams.

There were calls for ongoing checks and cleaning of stormwater drains, ensuring they are capable of managing excess water during heavy rainfall. A need for proper maintenance of culverts was suggested, along with addressing blockages, such as those observed under The Avenue in Figtree. The importance of regular clearing of stormwater drain outlets, trash racks, and removing fallen trees and large items in creeks to prevent blockages was stressed.

There is concern for the safety of school children in Unanderra, with a view the culvert under the road Cummins Street is inadequate and the channel on the corner of Hargreaves and Blackman Parade reported to have invasive weeds growing in it.

People sweep/blow leaves/clippings into drains.

There was some criticism relating to stormwater infrastructure:

- “M1 motorway culvert was a mistake when it was put in, causing flooding within the first year”
- “There was a debris control structure previously installed behind the pool in Whelan Ave and Council removed it”

It was asked to revisit the benefits of FM27 to offset the waterway restriction imposed by the access road

to a property on Suttor Place, “especially as the most recent analysis indicates the risk to the nursing home for events including and greater than the 20% AEP event”.

It was reported that Sydney Water had done some drainage work that has helped alleviate flooding in and surrounding Hurt Parade, Unanderra. There is a view more needs to be done to collect water before it reaches Albert Street and Hurt Parade.

The expression "the cost outweighed the benefits" in relation to various remedial options was obviously written by someone who has not gone through a flood in this area. We need help now.

**Communication and engagement**

The importance of improved communication between residents and Council regarding flood-related concerns was stressed. Some respondents cited instances where responses were perceived as unsatisfactory. It was asked to provide more time for community input as “one day for a drop-in session is much too short”. It was suggested that Council have a section on its website where people can report creek blockages, fallen trees and other relevant information. It was asked that Council share its maintenance schedule and post the results for transparency. A suggestion was made for SMS notification to direct recipients to the Council website for more comprehensive flood warnings.

**Climate change consideration**

Consideration of climate change impacts on flooding in future assessments was urged. A holistic approach that combines natural land management with artificial solutions was suggested.

**Planning and development**

Frustration was expressed over perceived inconsistent application of development controls, particularly in areas prone to flooding, and the challenges faced in obtaining development consent. Some respondents advocated for consistent development controls in flood-prone areas, questioning the approval of development applications in such regions. There is a view that flood mapping for site-specific properties should be made available for free; “crazy we have to pay \$101!”. Some reported allegedly illegal development as increasing flood impacts on their property.

A geotech report on my property indicates the land is a creek bed. Why was it ever allowed to be developed?

There were calls to:

- Have policies promoting permeable surfaces to reduce overland flow from developed areas and on-site storage in water tanks.
- Address concerns about developing creek beds
- Investigate and rectify issues from inappropriate developments
- Consider infrastructure limitations in the Illawarra escarpment
- Assess culvert adequacy for large housing developments
- Monitor land contour modifications
- Build public infrastructure that serves an additional function of mitigating flood risk, e.g. bike tracks along creeks could also serve as levees to direct floodwater back into the waterway
- Support onsite detention for new development
- Not approve developments on flood-affected land, halt large-scale development in flood-prone areas, and enforce the prohibition of building in floodplains.

**Flood observations**

Some reported never having experienced flooding at their properties, including those who have lived in the same property for decades. This is why some said they would remain at their house during a flood

event. Others shared what they had observed in specific locations. One resident said the changes to Byarong Creek since the 1998 floods had made a positive difference and they have not experienced any issues since. A resident living south of Keiraville Primary School said they are always 'close' to flooding. They expressed concern that the FRMSP will direct more water their way, thereby increasing their risk; "you shouldn't be planning to flood someone".

**Insurance premiums**

Some believe the studies and mapping lead to increases in insurance premiums. Residents of Govett Crescent want detailed flood mapping specific to their properties, "similar to Figures 8-2 to 8-4 for other zones". They believe this would alleviate the issue of insurers charging premiums based on "broad brush-mapping, and not the actual results for their particular properties".

Stop doing stupid studies and mapping areas that insurance use to jack up premiums. Locals have lived here since the '50s and never had levels anywhere near their house, but your dumb survey says it happens every 10 to 20 years.

**Emergency response**

It was asked that Council engage better with NSW SES. It was suggested to investigate when flood rescues have occurred and see what additional measures are needed.

It was also asked what systems might be put in place to handle an influx of pets to official evacuation centres, noting that the Allans Creek catchment has a large population of dogs, cats and other pets.

**Photos and video accompanying submissions**

The following is a selection of the photos provided with submissions. The entirety of all submitted photos and videos have been provided to the project team for assessment.


Photo	Location and/or comment
	<p>American Creek needs to have dead trees removed</p>







Photo	Location and/or comment
	<p>Chapman St Unanderra looking from Princes Highway, February 2023</p>
	<p>Hurt Pd Unanderra looking to Unanderra Public Pool, April 2022</p>
	<p>Hurt Pd Unanderra looking to Unanderra Public Pool, March-April 1976</p>
	<p>Hurt Pd Unanderra looking to Chapman St, March-April 1976</p>






Photo	Location and/or comment
	<p>These photos were taken of the back of my property on Seddon St, Figtree during the April 2022 floods. It shows how the small creek that crosses my land and meets up with Allans Creek had risen extensively. On one occasion a few years ago, a team from Roads and Waterways Services came to clear the rubbish that had accumulated in the creek. Should this be a more regular service? Can Council investigate the possibility of incorporating this into its Management Plan?</p>
	<p>A folder containing numerous photos and videos of flooding at Govett Crescent, Figtree was shared.</p>
	<p>A folder containing numerous photos and videos of flooding and erosion at Byarong Creek was shared, along with links to media reports.</p>

Photo	Location and/or comment
	<p>Looking south at the old slip now vegetated, build up of material in main creek line, eroded and undermined creek banks, a good number of dead or dying trees ready to fall in and block culverts under the Avenue or M1.</p>
	<p>A document containing numerous photos of erosion, debris and infrastructure requiring maintenance behind Valley Drive, Figtree was shared.</p>
	<p>The discharge zone of this major drain from Mt Keira is in very poor condition, it is not maintained</p>
	<p>A submission was provided with multiple photos showing erosion of American Creek and failed measure for flood mitigation on private property.</p>

### Aboriginal Stakeholder Engagement

Engagement with Aboriginal stakeholders commenced on 1 September 2023. We spoke to 15 Traditional Custodians and knowledge holders. Some have lived experience of flooding, including the 1998 floods.

There was support for debris control structures to be erected, so long as they were over existing culverts and concreted areas. Impacting on natural creek areas to install debris control structures was a concern. Questions were asked about the process of installing them, and to have the heights considered to be appropriate for the area.

A request was made for Council to investigate natural systems including reeds, rocks and vegetation as a mitigation strategy to slow down the speed of water flow. It is thought this would assist with creek erosion, but also create a natural filtering system in waterways. Elders spoke about their concerns relating to hard infrastructure impacts on biodiversity, including eels, birds and frogs. They want Council to be considerate of the environmental impacts that some of the recommendations alluded to, including upgrading culverts.

The proposed mitigation strategy of Scheme A - widening Byarong Creek caused alarm. The proposal was contentious with the Aboriginal community given the connection and sensitivities relating to creeks. This was particularly relevant to Byarong Creek given the close proximity it has to the sacred Fig Tree in American Creek. Concerns were raised about the creek being widened, that it would result in the water flowing faster and causing more damage and flooding. It is also a creek bed that has been present in the area for as far back as Council mapping permits. This alludes to the fact the creek was likely to have been used by Traditional Custodians. A site review and site officer onsite to monitor activities were requested should this option be pursued.

### Open submissions

We received five open, written submissions from:

- Local resident/s and property owners
- An operator of an electrical distribution network
- A State government organisation that oversees emergency preparedness and response

Lengthy and/or technical submissions were provided in full to the team working on the FRMSP. Following is a summary of the key points raised in these submissions, along with some of the comments received in addition to completed surveys.

Residents called for proactive measures, accurate flood modeling, and clear communication from Council to address persistent flooding issues, mitigate environmental impact, and ensure the safety and wellbeing of the community.

Residents across various areas, including Cringila, Figtree, and Unanderra, shared common concerns about flooding problems. They specifically highlighted issues such as creek maintenance, debris build-up, and vegetation causing flooding, with some residents experiencing over 1.5 metres of flooding in their yards. The impact on properties, including damage to fencing and pollution from upstream debris, is a recurring theme. There are worries about zoning inaccuracies in flood-prone land notifications, potentially affecting insurance costs for homes perceived to be well above flood levels.

Some criticised Council's perceived lack of responsiveness, citing instances where zoning decisions appeared disconnected from the actual topography. Some residents proposed practical solutions, such as stabilising creek banks, installing drainage structures, and conducting regular maintenance to mitigate erosion.

There were concerns about specific locations like Figtree Gardens Caravan Park and Unanderra Pool, where residents face recurrent flooding issues. There was a call for more drainage infrastructure and proactive measures to prevent water reaching critical areas.

Zoning concerns were also raised regarding Northview Estate in Figtree, with the importance of accurate flood modeling raised and its potential impact on home insurance costs. Residents stressed the need for technically accurate assessments to guide flood mitigation measures effectively.

There were detailed reports about erosion along American Creek, with a view creek rehabilitation and vegetation management is needed. Concerns were expressed about potential liabilities for Council regarding erosion on land owned by a developer.

Residents in Govett Crescent Figtree highlighted issues with a retention basin, citing flooding problems and a perceived lack of support from Council. The concerns included overflow from American Creek and the approval of a raised driveway exacerbating flooding issues.

Some expressed dissatisfaction with the Allans Creek Floodplain Risk Management Study, with a view there is a lack of detailed information at the micro level. Specific requests were made for urgent intervention, responsible land management, and effective communication between stakeholders.

Specific suggestions were shared, with the aim of addressing diverse concerns raised by residents. These focused on:

#### **Creek maintenance and vegetation management**

- Regular maintenance of creeks to prevent debris build-up.
- Clearing of overgrowth and installation of grated pits to assist with water flow.
- Conduct creek rehabilitation works to stabilise banks and prevent erosion.
- Provide support to private landowners for creek bank revegetation.
- Clear debris and vegetation regularly behind the Solomon Inn Motel Figtree towards the east.

#### **Zoning accuracy and notifications**

- Review and correct inaccuracies in flood-prone land notifications.
- Ensure zoning decisions align with the actual topography to prevent misinformation.

#### **Infrastructure improvement**

- Install larger grate pits or similar infrastructure in culverts to improve overland flow.
- Consider property acquisition for optimal drainage outcomes.
- Address drainage issues perceived to be contributing to highway flooding near the Slovenian Church in Figtree.
- Urgently rectify the reportedly hazardous concrete driveway situation perceived to be affecting traffic safety near a nursing home in Figtree.

#### **Insurance implications**

- Address concerns about potential insurance cost increases due to inaccurate flood zone designations.
- Provide clear communication to residents about the accurate flood risk assessment.

#### **Private landowner education and action**

- Undertake an education campaign for private landowners on creek bank stabilisation.
- Establish volunteer groups to assist with creek rehabilitation on private properties.
- Engage with developers to address erosion issues on land owned by Redgum Ridge. Establish clear responsibilities regarding creek maintenance and stabilisation.

#### **Emergency management plans**

- Develop emergency management plans for high-risk areas, such as Figtree Gardens Caravan Park.
- Conduct awareness campaigns, including letterbox drops and door knocks, to inform residents at risk.

#### **Specific infrastructure modifications**

- Modify the solid causeway impacting a nursing home in Figtree to reduce damming effects.
- Consider installing pipes, culverts, or drains to reduce floodwater levels.

- Reevaluate the effectiveness of existing retention basins and propose necessary modifications.
- Propose flood mitigation measures, such as augmenting Byarong Creek culverts.

**Detailed flood information**

- Provide detailed flood impact information at the micro-level, including specific flood levels for streets and houses.
- Consider individual house situations for fair insurance premiums.

**Review blockage policies**

- Reevaluate blockage policies to ensure compliance with current guidelines.

**Public access to information**

- Provide residents with information sheets on creek maintenance for private property.
- Allow public access to detailed flood risk assessment reports and plans.

The submission from the operator of the electrical distribution network provided advice regarding their flood response plan and impacts of floods on the network.

All the outputs from Council's flood studies are valuable to Endeavour Energy's operations, from the initial design of the network to the flood response plans.

The submission from the State government organisation that oversees emergency preparedness and response said they consider evacuation as the primary response strategy during flooding to protect the at-risk community. They noted:

- The study was updated using ARR2019 and the revised flood study.
- Historical floods are briefly mentioned.
- Due to the area's topography, flash flooding within 180 minutes is likely.
- Local gauge-based flood warnings are deemed impractical.
- The study uses five pluviograph and three flood level gauges, proposing a potential flash flood warning system pilot study.
- Additional upper catchment rainfall gauges are considered for better event recording.

They supplied information about the Australian Warning System (AWS). They requested to be sent a copy of the document and compendium maps to the NSW SES in electronic form in portable document format (PDF) and GIS format as soon as practicable after the plan is updated and finalised.

**Information session**

Seventy-seven people attended an information session at Figtree Community Hall. The community is grappling with a range of issues, from immediate property concerns to broader questions about development impacts, insurance, and the management of waterways. Effective communication, education, and proactive measures by Council were seen to be essential for addressing these complex challenges. Feedback shared during this session related to:

**Creek maintenance and erosion concerns**

There were multiple instances of residents expressing worries about creek erosion. People reported issues with private developers exacerbating creek-related problems, such as in Redgum Estate.. There were discussions about responsibility for managing vegetation in creeks, both on public and private land.

Residents requested more proactive actions, like clearing debris from creeks. It was reported that elderly property owners face challenges in maintaining creeks on their land.

#### **Development Application (DA) issues**

Residents questioned the impact of developments on their DAs. Concerns were shared about flood insurance premiums being affected by development activities. Some had specific concerns about rejected development applications and perceived obstacles to property use changes.

#### **Flood insurance premiums**

Many had concerns about flood insurance and feared premium increases if insurers discover issues like creek erosion.

#### **Council responsiveness**

There were complaints about Council's delayed response to drainage issues, e.g. in Farmborough Heights.

#### **Specific location issues**

People shared concerns relating to various locations e.g. flooding on Arrow Ave, flood and safety risks to residents of Figtree Caravan Park, and the M1 culverts. Concerns including blocked drains, inadequate infrastructure, and development-related challenges. Detailed concerns were raised about specific properties, including flood mapping, infrastructure, erosion, and development-related issues.

#### **Community education**

Requests were made for targeted education and information dissemination regarding flood risks for residents, especially in vulnerable areas. A Council engineer reported having to make clarifications on the differences between stormwater and floodplain management.

#### **Infrastructure and environmental considerations**

Some had concerns about the adequacy of culverts, bridges, and other infrastructure in managing floodwaters. It was asked to treat waterways as valuable natural assets, with suggestions for ecological enhancements.

#### **Widening of Byarong Creek**

Some residents advocated for further exploration of widening Byarong Creek to reduce flood impacts upstream and downstream.

The following photos show some of the attendees, members of the project team and information displays at the event. Those pictured provided their consent to be included in these photos.



### Next steps

We will use this feedback to inform any required revisions to the draft Floodplain Risk Management Study and Plan. These are preliminary discussions about the recommended options. They will each require further investigation, consultation and approvals before going ahead. We will continue sharing information with the community and key stakeholders and seek input as we progress.