Clyde River Flood Study and Floodplain Risk Management Study and Plan

Summary Report

January 2025

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Project Overview

Flooding is a known risk within the Clyde River catchment, affecting road access, and poses significant risks to life, as well as private and public property. The flooding of key roads not only impacts residents, but also restricts the response of emergency services personnel.

No prior flood study has been undertaken for the portion of the Clyde River that Shoalhaven Council is responsible for, and as such, flood information has been limited to records and observations of historical flooding. Good quality flood information is essential for planning of roads, development and emergency response arrangements in the catchment.

The Clyde River Flood Study and Floodplain Risk Management Study and Plan project was undertaken to address this data gap. This summary report presents the key assessments, findings and outcomes from the project.

Background

The New South Wales (NSW) Government has a Flood Prone Land Policy which is included within the Flood Risk Management Manual. This policy aims 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.

The NSW Government has authored the *Flood Risk Management Manual* to assist councils to meet their obligations through the preparation and implementation of Floodplain Risk Management Plans.

Shoalhaven City Council is responsible for local land use planning in its local government area, including in the Clyde River catchment. Council has committed to prepare a comprehensive Floodplain Risk Management Plan for the study area following the NSW Government's *Flood Risk Management Manual* and as illustrated in **Figure 1-1.**

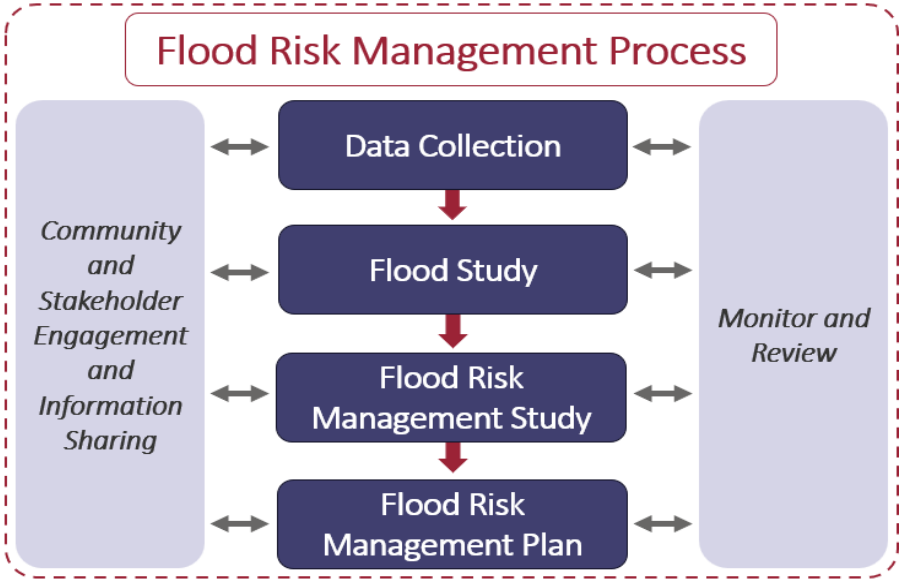


Figure 1 - 1 The Floodplain Risk Management Process (NSW Government, 2023)

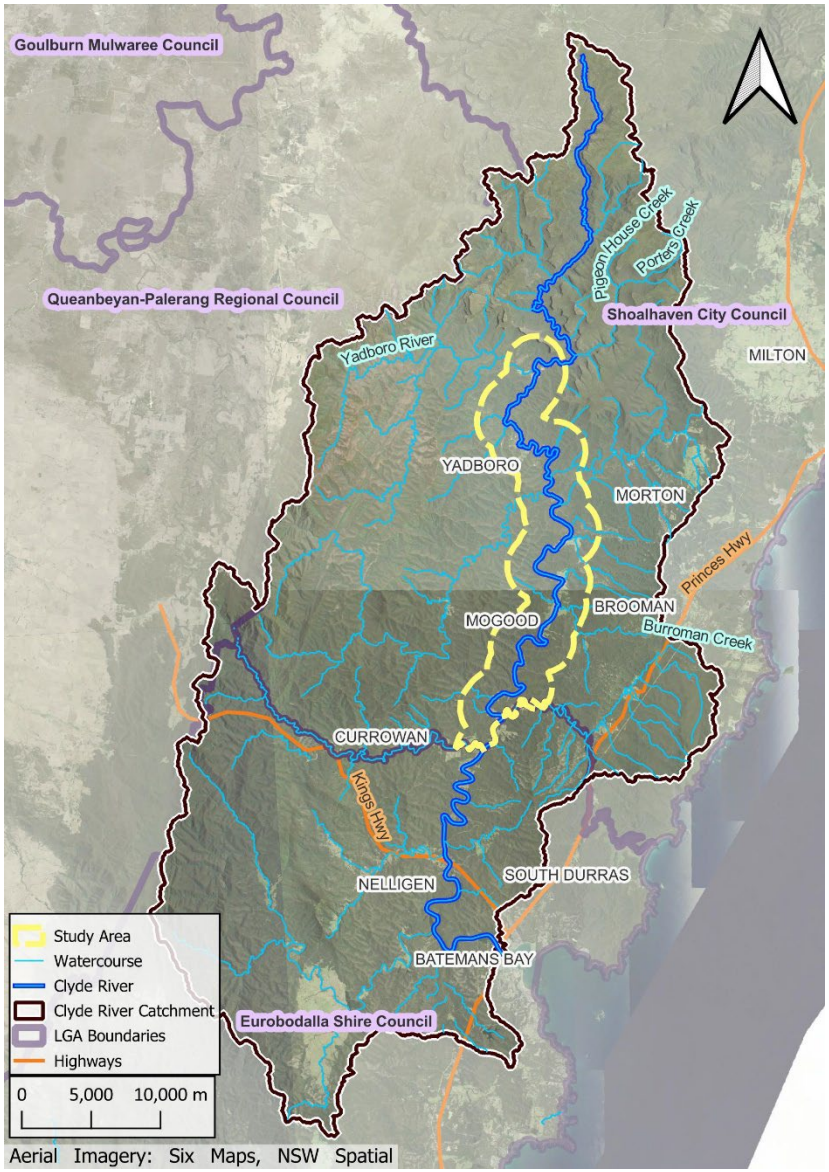
Study Area

The Clyde River has a total catchment area of approximately 1,800km^2, of which 1,100km^2 is located within the Shoalhaven Local Government Area (LGA). The steep, constrained river channel drives the quick response and rapid rise of river levels that has historically characterised flooding in the system.

Shoalhaven City Council is responsible for the management of the Clyde River catchment localities of Yadboro, Brooman and Currowan (see map below). There are also several remote campgrounds and properties with short stay accommodation that may be impacted by flooding from the Clyde River. The population within the study area is typically located along the river, between Yadboro and Currowan.

High Water Levels of Currowan Creek on River Road Affecting Cyclist ***(Source: S. Spinks 28 December 2021)***

The focus of the Floodplain Risk Management Plan is the 50km stretch of the Clyde River, starting just upstream of the Yadboro River confluence, passing through the localities of interest, and ending at the southern boundary for the Shoalhaven City Council LGA at the Currowan River confluence.



Map of Study Area and Regional Context

Studies Undertaken

Over the course of the project, reports were prepared:

- **Clyde River Flood Study** – establishes the flood behaviour and risk.
- **Clyde River Floodplain Risk Management Study** – details the assessments undertaken to define the flood risk in the catchment, and to develop strategies to manage these risks.
- **Clyde River Floodplain Risk Management Plan** – presents an implementation strategy for Council to undertake floodplain risk management strategies.

In addition, a mapping compendium was prepared with detailed flood and planning maps based on the study results.

Community Engagement

The involvement of residents and the community is an important part of this study to keep the community informed, to invite contributions to the process, and to establish a common understanding of flood risk and how decisions are made.

The initial community engagement aimed to inform the public about the study and flood risks in the area, gather local experiences of past flooding to help improve the flood model, and collect input on possible flood prevention measures for the Clyde River Floodplain Risk Management Study and Plan.

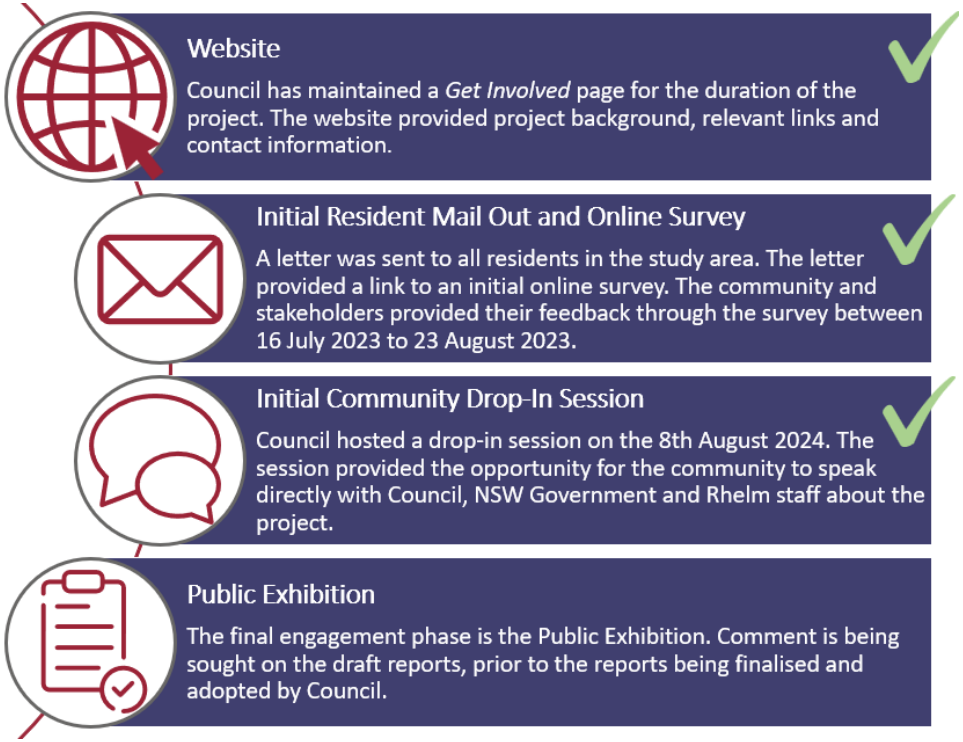
Further engagement is now being undertaken through the public exhibition of the draft reports.

The public exhibition period is from Tuesday 28 January to Monday 24 February. During this time the reports will be available on the project Get Involved webpage:

https://getinvolved.shoalhaven.nsw.gov.au/clyde-river-flood-study

Comments and feedback can be provided via an online survey via the Get Involved webpage.

This summary report has been prepared to provide an overview of the key assessments, findings and recommendations from these technical documents.



The Clyde River Flood Study

Objective

The Clyde River Flood Study was prepared to refine the understanding of flood risk in the study area.

Defining Flood Behaviour

Historical flood data was available from rainfall and stream gauges, both within and around the catchment. There was enough data to adjust the flood estimation models based on past events from 2023, 2022, 2020, and 2015. The model successfully matched these floods, confirming that the study's flood model could reliably represent flood behaviour and provide predictions of a range of flood events. The flood models were used to understand flood behaviour for events ranging from common (1 in 2-year chance) Annual Exceedance Probability (AEP) to very rare (the Probable Maximum Flood). They provided information on flood levels, depth, speed, and risk.

What is a design flood event?

A design flood event is a hypothetical event, with a given likelihood of occurring in any given year. Design flood events may be small (a 1-in-2 year design event) or large (a 1-in-500 year event).

Design flood events are used to inform planning and development considerations, as well as emergency response.

It is important to note that design flood events are planning and information tools. Real flood events may vary from the design flood events due to the specific pattern of rainfall and the ground conditions at the time of the flood event.

Findings

The river channel is low, shallow, and has steep banks, which causes floods to be highly confined, with deep, fast-moving water and little nearby flood storage or fringe areas.

Access to people and properties during a flood event was identified as a key challenge, with most river crossings becoming inundated in events as small as the 1 in 2-year AEP. All identified crossings were inundated in the 1 in 100-year AEP.

Climate Change

Climate change impacts have been assessed across the study area based on the years of 2050 and 2100 as the planning horizons. The assessment includes both sea level rise and rainfall intensity increases.

Climate change will result in an increase in flood levels, but not an increase in the area affected by flooding. That is, the steep valley shape of the floodplain means the water is forced up (increased flood levels), not “out” (flood extent). Typical flood level increases in the 2100 scenario were observed of:

- 1.5 – 2m in the 1 in 2-year AEP;
- 2 – 2.5m in the 1 in 100-year AEP; and,
- 3 – 4m in the PMF.

Outcomes

The Flood Study provided an understanding of flood behaviour, both for current catchment conditions, and potential future catchment conditions as a result of climate change. The information from the Flood Study formed the basis for the subsequent studies which sought to define the flood risks, and to develop measures to manage this risk.

The Clyde River Floodplain Risk Management Study

Objectives

The Clyde River Floodplain Risk Management Study evaluates flood risks in the study area and identifies possible measures to manage these risks. The outcomes from this assessment informs the Floodplain Risk Management Plan actions and strategies.

Property Flooding and Flood Damages

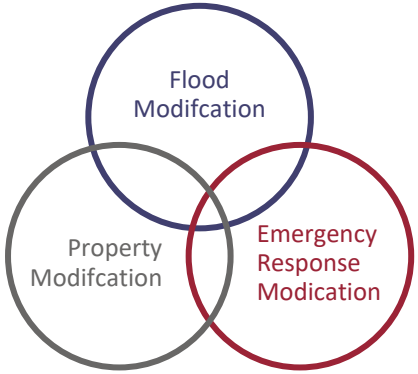
An economic damages assessment has also been undertaken to quantify the existing flood damages based on design flood events within the study area. The results are summarised in the table below. Within the Shoalhaven LGA, the overall flood damages are relatively low, due to the limited development present within the catchment.

AEP	Properties with Over-Floor Flooding	Properties with Over Ground Flooding	Total Flood Damages
PMF	22	35	$ 12,300,000
1 in 100-year AEP	13	14	$5,800,000
1 in 20-year AEP	7	9	$1,900,000
1 in 10-year AEP	2	5	$320,000
1 in 5-year AEP	0	0	-

Flood Risk Management

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 treatments 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 risk through modification to existing properties (e.g. by house raising) and/or impose controls on property and infrastructure development. Property measures, like proper land use planning and development conditions for future properties, are important to prevent flood damage while still allowing development and use of the floodplain.
- **Emergency response modification measures** – options focused on reducing the consequences of flood risks, by generally aiming to modify people's behaviour during a flood event.

A preliminary list of 23 management options were developed. These options were assessed for the suitability and feasibility.

A total of 12 management options were recommended for inclusion in the Floodplain Risk Management Plan, comprised of:

- Eight emergency response modification options; and,
- Four property modification option.

The high depths and velocities associated with floods in the Clyde River precluded any flood modification options (such as levees, basins, drainage structures, etc).

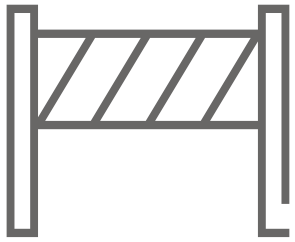
The identified management options were assessed with a Multi Criteria Assessment (MCA) to assess how they compared across a range of measures including:

- Cost;
- Benefits to the community; and,
- Feasibility and timeframe.

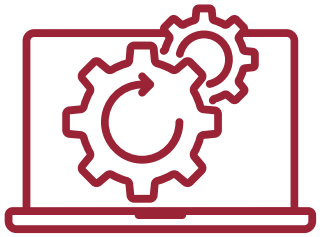
The 12 identified suitable options were carried forward into the Floodplain Risk Management Plan, where their priority in terms of implementation is assessed. Options Included:

Education Campaigns

Voluntary House Relocation



Online Reporting of Road Closures



Update Emergency Response Documentation

The Clyde River Floodplain Risk Management Plan

Objectives

The Floodplain Risk Management Plan 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.

Outcomes

To achieve the implementation of relevant management actions, an implementation program has been developed. The proposed program provided information on:

the estimated costs of each measure,

the agency / organisation responsible for the action, and

the priority and timeline for implementation.

The options included in the draft Floodplain Risk Management Plan are presented in the table below. The table also notes the priority of each option (***high***, ***medium***, *or* ***low***) for implementation by Council.

Management Scenario	ID	Name	Priority
Emergency Response Management Measures	EM1	Data handover to SES	High
	EM2	Update of Emergency response documentation	High
	EM3	Installation of additional gauges	High
	EM4	Flood education	High
	EM5	Campground education campaign	Medium
	EM6	Flood depth markers	Medium
	EM8	Online reporting of road closures	Medium
	EM14	Improve the immunity of flood crossings	Low
Property Management Measures	FP1	Planning and Development Controls	High
	FP4	Voluntary house purchase	Low
	FP5	Voluntary house relocation	Low
	FP6	Post flood data collection	Medium

Next Steps

The public exhibition period provides an opportunity for the community to provide comments and feedback on the draft reports prepared as part of this project.

Feedback will also be sought from Government agencies and other stakeholders.

After the public exhibition period, all comments will be reviewed, and the various reports will be updated and finalised as necessary.

The final reports will be provided to Council for adoption, after which they will be used by Council to manage the flood risks present in the Clyde River catchment.

Get Involved

To review the reports and provide feedback on the study, please visit Council's Get Involved website:

If you have any questions on the project, the website also has Council contact information.

https://getinvolved.shoalhaven.nsw.gov.au/clyde-river-flood-study

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