

# Woy Woy Peninsula Climate Change Adaptation Study

## COUNCIL NAME

Central Coast Council

## WEB ADDRESS

[www.centralcoastcouncil.com.au](http://www.centralcoastcouncil.com.au)

## SIZE

1,680 square kilometres

## POPULATION

Approximately 345,000

## Overview of the project

The Woy Woy Peninsula is located within the Brisbane Water catchment, in the Central Coast Local Government Area. Previous studies of Brisbane Water [Brisbane Water Foreshore Flood Study (Cardno Lawson Treloar, 2013) and the Floodplain Risk Management Study and Plan (Cardno, 2015)] have shown that low-lying portions of Woy Woy Peninsula will become increasingly untenable for residential use under climate change projections for sea level rise. Of special concern are Woy Woy, Blackwall, Booker Bay and Ettalong as climate change would intensify the existing threat from flooding in and around Brisbane Water Estuary.

Raising existing ground levels and associated infrastructure is a potential solution, but raising land is not practical on a large-scale regional basis given the multiple landholders and existing development in these suburbs. Over the longer term though, a regional adaptation masterplan could allow for incremental elevation increases on individual or multiple sites through development and urban renewal.

The purpose of this study is to help maintain the liveability of the area by recommending a final adaptation landform that fits within the existing cadastral boundaries and road network. This study defines the conceptual landform designs and informs a future masterplan, addressing constructability, possible adaptation pathways and significant issues likely to arise while raising the landform.



Tidal flooding in the Woy Woy Central Business District



---

## How the project was carried out

### Identification of Existing Flood Risk

Four study locations within the Woy Woy Peninsula have been identified as being low-lying and susceptible to sea level rise within this century: Woy Woy CBD, Booker Bay, Blackwall, and Ettalong. The four study areas are impacted by Brisbane Water flooding as a result of ocean storms, local catchment flooding due to rainfall and tidal inundation during high tides. These flood risks would increase as a result of sea level rise. Sea level rise for this study is based on the RCP8.5 projections, as adopted by Council and assumes a business-as-usual response by the global community to climate change. The minimum elevations selected for landform raising, based on these existing and potential flood risks, range from 1.6 to 1.8 m across the study areas.

### Conceptual Landform Design

The adaptation landform design was developed iteratively to achieve an outcome where:

- Flood risk for the 1% Probability of Exceedance of tidal level (for sea level rise to 2100) and the 1% Annual Exceedance Probability of ocean storm (existing conditions) are eliminated.
- Flood risk from local catchment run-off is significantly reduced.
- Fill levels for private properties are minimised, generally around 0.5 m, with a maximum of approximately 1.5 m in isolated instances.

To achieve these outcomes, the adaptation landforms make use of existing open spaces and laneways, which can be converted into drainage paths, as well as the introduction of new drainage easements. This allows the stormwater drainage network to run a shorter distance (i.e. not all the way to the foreshore), requiring less rise from the outlet and less fill for the surrounding land. The easements and open space drainage paths will eventually become tidal due to sea level rise and can take on multiple forms, such as culverts, open channels, riparian areas, or a combination of these with the incorporation of floodgates at outlets, as needed.

### Adaptation Pathways

A series of adaptation pathways were generated following the guidance outlined in the Decision Support for Coastal Adaptation: The Handbook (HCCREMS, 2012). The pathways included conceptual breakdown of the options and actions necessary to achieve the final proposed landform over the next century.

The adaptation pathway most likely to be enacted requires planning actions to be taken this decade to preserve liveability of some properties in the Woy Woy CBD study location.

## Outcomes now and in the future

### Maintenance of Liveability

The primary outcome of the study is a conceptual landform design, which protects the viability of public and private property within the study locations from the effects of sea level rise for the remainder of this century. It is proposed that adjustments to the Council Development Control Plan and Local Environment Plan will enable private properties to fill their lots to achieve the final landform. Raising public areas, such as roads and open spaces, can be completed when the surrounding private properties have completed their land raising.

### Adaptation Pathways

The conceptual adaptation pathways will provide Council with a 'roadmap' to complete the proposed landform raising. Indicative liveability loss thresholds and decision-making triggers to avoid controlled retreat of public and private land are provided. Community engagement in

## REFERENCES

Cardno Lawson Treloar,  
2013. Brisbane Water  
Foreshore Flood Study

Cardno, 2015. Brisbane  
Water Foreshore  
Floodplain Risk  
Management Study

Cardno, 2015. Brisbane  
Water Foreshore  
Floodplain Risk  
Management Plan

HCCREMS, 2012. Decision  
Support for Coastal  
Adaptation: The Handbook.  
Hunter Councils NSW

Rhelm, 2021. Woy Woy  
Peninsula Climate Change  
Study Report

determining mutually acceptable thresholds for loss of liveability is a key element still to be undertaken.

### Drainage Improvement

In addition to maintaining liveability, the proposed landform will ameliorate the overall flood risk from catchment flooding across the study locations. To address climate change proactively, drainage works (such as easements and culverts) are identified for inclusion in Council capital works programs. These can assist in both raising surrounding properties and/or improving the existing drainage system.

### Strategic Land Use Planning

This project is considered a first step in directing a future masterplan for areas affected by sea level rise in the Woy Woy Peninsula. It identifies constraints and opportunities for future land use patterns in both the private and public domains.

### Green Grid Opportunities

The proposed landform presents unique synergies with Council's 'Green Grid' strategy. Open spaces can be created and/or redeveloped along the proposed easements to connect with open spaces across the Woy Woy Peninsula.

### Floodplain Risk Management Study & Plan, Woy Woy Peninsula including Kahibah Creek Catchment

One of the aims of this study is to provide a mechanism to ensure that Council's operational planning considers the projected consequences of climate change. Additionally, it recommends that critical elements of the landform be constructed, particularly those that provide immediate drainage improvements and flood risk reduction.

## Benefits and lessons learned

Aside from the benefit of reduced flood risk across the study locations, the study also provides guidance to Council on the actions and timing required to realise this landform strategy.

Implementation of the landform may carry potential issues for both Council and the community if the community is not engaged throughout the process. To ensure the best outcomes, a thorough engagement strategy will be required to inform affected communities during the adaptation process and seek their input. The outcomes of this study can be used to develop climate change adaptation studies for other at-risk locations. To facilitate knowledge sharing, a working group should be established with other coastal councils in NSW that are considering landform raising as a sea level rise adaptation strategy.

## More information

For more information on this study, please refer to the PowerPoint presentation provided on the LGNSW website and the Woy Woy Peninsula Climate Change Study Report (Rhelm, 2021).

## Contact

**Name:** Parissa Ghanem  
**Position:** Team Leader, Floodplain Management  
**Phone:** 0408436948  
**Email:** Parissa.Ghanem@centralcoast.nsw.gov.au



Proudly funded by  
the NSW  
Government in  
association with  
Local Government  
NSW.