



# Positions Paper

## The Threat of Coastal Inundation and Sea Level Rise in Sydney and Options to Address Through the Coastal Management Framework

Version 3  
May 2023

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

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## 1 Purpose of this document

Coastal inundation of Sydney's coastal and estuarine foreshore is a present-day problem that will only be exacerbated with projected sea level rise. This has significant implications for urban planning, asset management and long-term financial planning. Foreshore councils and their communities will bear the brunt of this problem and hence will be at the forefront in planning for coastal adaptation.

Foreshore councils and regional organisations of councils (ROCs) such as the SCCG play a critical role in assisting their communities plan for and adapt to the threat of coastal inundation with sea level rise. Coastal Management Programs (CMPs) are a key policy mechanism available under the NSW *Coastal Management Act 2018* to assist councils in this critical task. However, there are significant barriers in place that are inhibiting councils and ROCs from developing CMPs in a consistent and coordinated manner.

The purpose of this document is to identify the key issues facing foreshore councils in addressing this threat and to recommend that a framework for coastal adaptation in Sydney be developed.

## 2 SCCG's active role in coastal adaptation

Sydney Coastal Councils Group (SCCG) is a regional organisation of councils that promotes the sustainable management of Sydney's coasts and estuaries through collaboration, capacity building, advocacy and research. We comprise nine member councils who represent approximately 1.3 million Sydneysiders. One of our six goals identified in our [2019-2029 Strategic Plan](#) is that people and places adapt to the future shocks and stressors from a changing climate.

The SCCG is project managing the development of the Greater Sydney Harbour Coastal Management Program (CMP) where the increasing risk of coastal inundation with sea level rise is a priority threat that the CMP seeks to mitigate against. However, to assist in achieving these goals, coastal councils and ROCs require greater support and leadership from the State.

The SCCG has long been aware of the increased risk of coastal inundation with sea level rise, and the need to plan for adaptation. In 2012, the SCCG commissioned the CSIRO and NSW Environmental Defenders Office to map the extent of coastal inundation in Sydney and outline how councils could respond through improved urban planning and risk communication. In 2014, the SCCG commissioned the development of a guide for local government to prioritise, monitor and evaluate options for coastal adaptation.

Since 2021, SCCG in collaboration with the Parramatta River Catchment Group (PRCG) has project managed the staged preparation of the [Greater Sydney Harbour Coastal Management Program](#) (GSHCMP). GSHCMP Stages 1 and 2 have highlighted coastal inundation with sea level rise as a key threat facing many foreshore councils around the harbour. Unfortunately, there is no consistent approach to quantifying the impacts of coastal inundation or for planning for coastal adaptation.

The work has led Prof. Bruce Thom, Chair of the Greater Sydney Harbour CMP Project Management Committee, to submit a report in November 2022 to the then Minister for Local Government making recommendations around coastal adaptation.

### **3 The increasing problem of coastal inundation**

Coastal inundation caused by a combination of high tides and non-tidal anomalies such as storm surge, regularly occurs in Sydney during storm events, particularly east coast lows. This inundation can lead to over-floor property flooding, erosion, risk to public safety and loss of public access.

The extant nature of coastal inundation has been studied by many Sydney foreshore councils as part of coastal zone management plans, estuary management studies, estuary planning level studies and overland flood studies. The resultant impact of coastal inundation on public built assets, ecosystems or private property, and the consequent implications for asset management, urban planning and long-term financial planning is, however, less well understood. The impact of coastal inundation will only be exacerbated with projected sea level rise.

First pass 'bathtub' type tidal inundation mapping prepared nationally by the Federal Government in 2009 shows coastal and estuarine foreshore areas that could be tidally inundated in the future with higher sea levels. Mapping at [www.coastalrisk.com.au](http://www.coastalrisk.com.au) reveals that under an assumed 0.84 m rise in sea levels by 2100 a future high tide will inundate many low-lying foreshore areas around Sydney. Notable suburbs that are particularly badly affected include Woolloomooloo, Taren Point, Sylvania Waters, Arncliffe, Tempe and Sydney Olympic Park.

A second pass tidal inundation assessment of NSW estuaries was subsequently completed by the NSW Government in 2018. The assessment improved on bathtub type mapping to consider how estuarine water levels varied along the tidal plane, as well as quantify the number of properties and public assets inundated under three sea level rise scenarios.

This assessment found that a 1.0 m rise in sea level increased the number of tidally inundated properties in metropolitan Sydney almost four-fold from 2,340 to 9,530. Metropolitan Sydney was also the second most exposed region in NSW, representing about 22% of the total state-wide exposure to sea level rise. Importantly, the assessment concluded that inundation impacts within estuaries (such as Sydney Harbour, Georges River and Cooks River) were an order of magnitude greater than for the open coast.

These preliminary studies imply a grim future where, without intervention, increasingly frequent and severe coastal inundation of foreshore areas could lead to flooded streets with restricted vehicular and pedestrian access, the loss of valuable public open space, and some private property becoming potentially uninsurable or even uninhabitable.

#### **4 Varying government responses and need for greater consistency, support and leadership**

The risks of coastal inundation and the need for coastal adaptation in the face of ongoing sea level rise have been acknowledged by all levels of government for many years. The degree to which they have been addressed has, however, varied.

Early reports by the Australian Senate, Productivity Commission and Infrastructure Australia on climate change and adaptation highlight the need for greater collaboration and coordination across all levels of government. These reports note that local councils are on the frontline in dealing with climate change impacts and require national and state government support.

The Federal Government established the National Climate Change Adaptation Research Facility (NCCARF) which ran for five years between 2014 to 2019 and was promoted through [CoastAdapt](#). NCCARF produced a suite of information manuals, research reports, policy guidance and case studies, however, its influence on adaptation practice is uncertain. It is however encouraging that the Federal Government is currently re-invigorating its approach to climate change and coastal adaptation.

The NSW Government has in recent years released strategies and guides for climate change risk assessment and adaptation at state and local levels. Many of these documents are available from [AdaptNSW](#). While a necessary step, these documents are generally high level, dealing with broad risk management functions that do not specially address coastal adaptation.

The NSW Government's coastal management framework is the obvious mechanism for promoting best practice approaches to coastal adaptation. Although Part B of the NSW Coastal Management Manual regarding CMP Stage 3 introduces adaptative management, it provides, however, very little guidance on how to undertake adaptation pathway planning.

Moreover, the Coastal Management Manual does not acknowledge the work of NCCARF particularly the 10 NCCARF information manuals that address multiple aspects of coastal adaptation including pathway approaches, economic analyses, urban planning and legal risk. We suggest that the NCCARF work as well as more recent work on adaptation by researchers, the private sector, utilities and other government agencies, be considered for inclusion as part of the next update of the manual.

The NSW Government has engaged XDI: The Cross Dependency Initiative to establish a platform for state agencies and local councils to understand the synergistic impacts of climate change on infrastructure. We understand, however, there is contention within state agencies about how well the XDI platform accounts for risks from coastal inundation. In the absence of any consultation with local councils or ROCs, it is not clear if the XDI platform is even suitable for local foreshore councils in planning for adaptation.

The NSW Government is commencing an update of its 2018 NSW tidal inundation exposure assessment to account for the latest sea level rise trends as well as non-tidal anomalies like storm surge and coastal trapped waves. We expect that this updated assessment will make use of the latest hydrodynamic model for Greater Sydney Harbour. It will be important for updated data and mapping on coastal inundation to be immediately made available to foreshore councils to assist in planning for coastal adaptation.

The need for coastal adaptation is acknowledged in the Greater Sydney Region Plan – A Metropolis of Three Cities 2018 which aims to ensure people and places are adapted to climate change and future shocks and stresses. Interestingly, although the discussion paper on the proposed Six Cities Region Plan (which will replace the Greater Sydney Region Plan) recently released by the Greater Cities Commission (GCC) also acknowledges climate change adaptation and resilient cities, it doesn't identify the threat from coastal inundation and sea level rise. We would hope that coastal adaptation will become a topic of research under the GCC's Research Strategy that will subsequently inform the new Region Plan and City Plans.

## **5 Foreshore councils' approaches to mitigation vary greatly across Sydney**

Coastal inundation is addressed by local foreshore councils to varying degrees within their community strategic plans, climate change adaptation strategies, planning instruments and in technical flood and estuary studies according to local priorities, available resources and the predicted impact of coastal inundation. Councils are currently more concerned with and assign a greater priority to minimising the impact of future coastal inundation on new development via planning controls, than on minimising impact to public assets.

Some councils have assessed the current and future risk of coastal inundation to their low-lying assets. However, coastal inundation is typically only considered during project-based asset renewal or upgrades and not more comprehensively across an entire asset class as part of asset management plans or long-term financial plans.

We are not aware of any Sydney council that is pursuing the more detailed coastal adaptation pathway planning approach described in the NCCARF literature. In the absence of any push for a pathways planning approach to be adopted as a consistent, best-practice approach and without appropriate resources, councils will be reluctant to progress with further individual LGA-specific assessments.

It is encouraging that in its 2021 Future Directions Statement for the NSW Coastal and Estuary Management Program, the NSW Government committed to work with councils and others to develop guidance around sea level rise and coastal adaptation. We are concerned, however, that the work program, resources and accountabilities for meeting this commitment are unclear.

The past lack of support for NSW coastal councils to undertake coastal adaptation stands in contrast to earlier capacity building work in other states, such as the Tasmanian Coastal Adaptation Pathways Project, the South-East Queensland Climate Adaptation Research Initiative and the Victorian Centre for Climate Change Adaptation Research. This improved capacity has resulted in adaptation pathway planning being reflected in leading coastal management plans, for example the 2021 Sunshine Coast Coastal Hazard Adaptation Strategy.

Although we believe coastal adaptation practice in NSW currently lags other jurisdictions there is a good opportunity to build on previous and ongoing work by NCCARF, CSIRO and others to build public and private sector capacity for coastal adaptation in NSW. We would expect the Department of Planning and Environment (DPE) as well as AdaptNSW to take a leading role, with potential collaboration with the CSIRO Climate Adaptation National Research Flagship.

## **6 The need for developing a framework for coastal adaptation in Sydney**

The SCCG believes that a coastal adaptation framework is needed to provide a consistent approach for foreshore councils to assess and manage risk from coastal inundation as well as coincident overland flooding within their LGAs. We recommend this framework be developed through a partnership with the SCCG and the NSW Government and be first tested as part of the Greater Sydney Harbour CMP.

The coastal adaptation planning framework would detail the process by which foreshore councils can progress from a second pass risk assessment to a more detailed third pass risk assessment. Importantly, preparation of the framework is not dependent on the NSW Government completing the update to its coastal inundation mapping and exposure assessment as discussed above – there is deemed to be already sufficient information on tidal inundation available from the Federal and NSW Governments that would allow the framework to be prepared. Implementing the completed framework should, however, draw from the updated inundation mapping and exposure assessment once available.

It is appreciated that preparation of a coastal adaptation planning framework may overlap with the preparation of guidance on coastal adaptation triggers and thresholds that the NSW Government has committed to in its [Future Directions Statement](#). However, given the lack of progress in preparing this guidance, SCCG has taken the initiative to commence scoping the work required to prepare the framework as part of the continuing development of the Greater Sydney Harbour CMP.

SCCG believes that, in the first instance, the NSW Government should take the lead in developing the planning framework. A state-led approach is consistent with the *Coastal Management Act 2016* where the NSW Government, through its NSW Coastal Management Manual, is responsible for providing guidance to councils on the integration of CMPs within their IP&R frameworks. The proposed coastal adaptation planning framework also provides a broader context in which to embed the current work on adaptation triggers and thresholds.

The application of the framework to coastal vulnerability areas will help meet one of the objectives of the *Coastal Management Act 2016*, specifically, 'to mitigate current and future risk from coastal hazards by taking into account the effects of coastal processes and climate change'. It also provides a context for foreshore councils to apply the development controls for coastal vulnerability areas given in the State Environmental Planning Policy (Resilience and Hazards) 2021. Ultimately, we would envisage a state-led framework could be developed and issued as an addendum guideline to the NSW Coastal Management Manual.

If the NSW Government declines to take the lead, then SCCG believes it has the capacity and capability to prepare the planning framework for Greater Sydney Harbour. Over the past few years, we have significantly increased our internal capacity to coordinate complex coastal management projects, most notably the Greater Sydney Harbour CMP. We have also developed strong working relationships with key stakeholders such as DPE, Sydney Water, Sydney Institute of Marine Science (SIMS) and other ROCs, who will all be consulted about the framework.

We understand well the needs of both our member councils as well as the foreshore councils participating in the GSHCMP. We can act as a trusted intermediary to ensure the best available science and adaptation practice is appropriately translated for use by local councils.

Overall, our approach to preparing a coastal adaptation planning framework would be consistent with Professor Thom's call for a transparent, coordinated, whole-of-government, whole-of-system approach to coastal management. Ultimately, we envisage that the framework completed for Greater Sydney Harbour would serve as an exemplar for other coastal councils in Sydney as well as across NSW.