

Coastal Change Management Area Methodology

North Somerset Council

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Non-Technical Summary

North Somerset Council commissioned AECOM to prepare a methodology to define Coastal Change Management Areas (CCMAs) along the North Somerset Council coastline.

The commission follows changes in August 2022 to the flood risk and coastal change section of the Planning Practice Guidance (which was originally published in 2014 and last updated in 2021). The updated Planning Practice Guidance can be found at <https://www.gov.uk/guidance/flood-risk-and-coastal-change>.

A review of key literature on CCMA development was undertaken, including the recent changes to the Planning Practice Guidance. In addition datasets that could be used to identify CCMAs in North Somerset were also reviewed. This focussed on the Shoreline Management Plans (SMPs) covering the area, information on coastal defences, erosion risk, flood risk, local plans and strategies and other key datasets such as environmental designations.

Following the data review a methodology was developed. The methodology is split into three key steps.

- Step 1 involves reviewing the SMP policy and economic case of each part of the coastline.
- Step 2 involves identifying the key coastal risk to each part of the coastline (e.g. coastal flood risk, coastal erosion risk, or both).
- Step 3 involves deciding on the boundaries of each CCMA designation, such as the landward extent.

In total 11 CCMAs have been proposed for the North Somerset coastline using the methodology developed. The largest of the CCMAs is CCMA 6, in SMP policy unit KIN1 (Clevedon to St Thomas' Head). The majority of the CCMAs that have been proposed are in areas with either a No Active Intervention or Managed Realignment SMP policy. Two CCMAs have also been identified in areas with a Hold the Line SMP policy.

Areas of the North Somerset coastline without a CCMA proposed include SMP policy units 7E06 (Weston-super-Mare, KIN3 (Sand Point to Kewstoke) and BRIS6 (Avon Road to Portishead Pier, including Portbury Nature Reserve).

Following the submission of this report, the next step for North Somerset Council will be to review the proposed CCMA boundaries and adjust accordingly based on internal discussions and engagement. The CCMAs can then be incorporated into the emerging Local Plan 2038 and further guidance will need to be provided to developers relating to appropriate development and the requirements of Coastal Vulnerability Assessments.

The CCMA designations should be considered as iterative and should evolve as more evidence becomes available over time. For example, improved erosion predictions on the North Somerset coastline would provide valuable evidence to reassess many of the CCMA boundaries. In addition, as the economic case for coastal schemes becomes clearer in the future (as business cases are developed), then this would also provide an opportunity to revisit the CCMAs.

1. Introduction

1.1 This Commission

North Somerset Council commissioned AECOM to prepare a methodology to define Coastal Change Management Areas (CCMAs) along the North Somerset Council coastline.

The commission follows changes in August 2022 to the flood risk and coastal change section of the Planning Practice Guidance (which was originally published in 2014 and last updated in 2021). The updated Planning Practice Guidance can be found at <https://www.gov.uk/guidance/flood-risk-and-coastal-change>. The update to the guidance was undertaken following:

- The Government's review of policy for development in areas at flood risk which committed to a 'significantly revised and updated' flood risk section of the Planning Practice Guidance.
- Updates to the National Planning Policy Framework.
- The Jenkins Review, Public Accounts Committee review and the Environment, Food and Rural Affairs Committee review.

1.2 Study Area

The study area encompasses the coastline of North Somerset within the administrative boundary of North Somerset Council, between Brean Cross Sluice in the Axe Estuary to Leigh Woods on the bank of the River Avon in the city of Bristol. The study area is shown in Figure 1-1.

1.3 This Report

This report provides an initial methodology for North Somerset Council to use to identify and define CCMAs along the North Somerset Council coastline. The report also includes an initial CCMA identification for further consideration by North Somerset Council. The report is divided into the following key sections:

1. Introduction: an introduction to the commission, study area and report
2. Background to CCMAs: a summary of CCMAs and a review of how CCMAs are defined elsewhere in the country
3. Planning Practice Guidance updates: a summary of the recent changes to the guidance
4. Data Review: a review of the key datasets available for defining CCMAs in North Somerset.
5. Methodology: an overview of the step by step process to define CCMAs in North Somerset.
6. Initial CCMA identification: a preliminary identification of potential CCMAs in North Somerset, to be reviewed and confirmed by North Somerset Council as part of the Local Plan development.
7. Summary: summary of CCMAs and recommendations for the next steps.

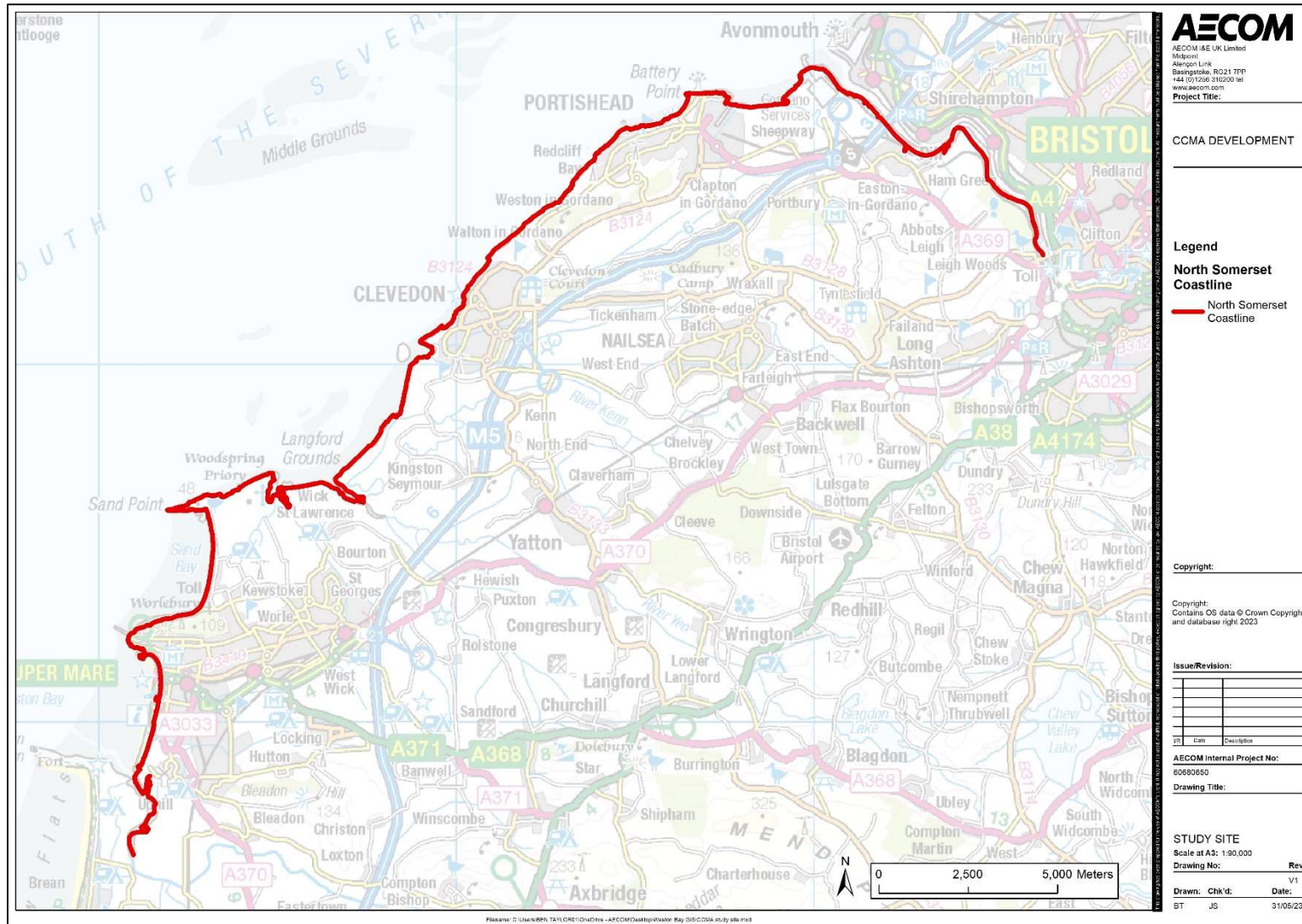


Figure 1-1: Study area

2. Background

2.1 Coastal Change Management Areas

The UK government has an aim to enhance community resilience to coastal change. This can be achieved in a number of ways. Coastal zonation and national planning policy, through the National Planning Policy Framework, is one such approach.

The National Planning Policy Framework (first published in 2012 and last updated in 2021) mandates Local Planning Authorities (LPAs) to include climate change adaptation policies within local planning strategies. The National Planning Policy Framework is supported by the Planning Practice Guidance which has recently been updated (August 2022).

CCMAs were introduced to the planning process in England in 2010 and Coastal Planning Authorities¹ (CPAs) are encouraged to identify CCMAs in their Local Plans. The full definition of a CCMA is provided below:

Coastal Change Management Areas (CCMAs) are areas defined in plans as likely to be affected by physical changes to the coast. Such changes include coastal erosion, coastal landslip, permanent inundation or accretion (Planning Practice Guidance, Flood Risk and Coastal Change, 2022).

Defining CCMAs is an integral part of coastal zone planning and can help ensure that any development at the coastline is appropriate and sustainable. CCMAs provide planners with the ability to identify and designate areas of coastal risk which can provide greater control over future development. Defining an area as a CCMA limits development within the zone to mitigate the risk of future erosion and flooding.

Once a CCMA has been defined, LPAs develop regulations for each specific region regarding new development and infrastructure construction within a CCMA zone. Development within CCMAs is then regulated and planning applications within these zones may require a Coastal Vulnerability Assessment (CVA) to determine the impacts of coastal change.

The exact nature of the development permitted within a CCMA is determined by individual LPAs and is not fixed nationally. LPAs will only permit development when the CCMA designation is not compromised and there will be no adverse effect on the coast during the lifetime of the development. Permanent new residential development (including through change of use) is not appropriate within a CCMA.

The identification, development and adoption of a CCMA is not a simple pre-defined process. It requires the involvement and expertise of a range of stakeholders such as planning authorities, the Environment Agency and coastal specialists to help inform and shape the final implementation and definition (University of Plymouth, 2019).

The National Planning Policy Framework and associated Planning Practice Guidance recommend that LPAs should identify CCMAs where there is expected to be significant coastal change over the next 100 years. However, currently, few LPAs have undertaken this task and the uptake of LPAs designating CCMAs is low. North Somerset Council are among the majority of LPAs yet to designate any areas of the coastline as CCMAs.

2.2 Shoreline Management Plans

CCMAs are linked to the policies set for managing the coastline in Shoreline Management Plans. Around the England and Wales coastline, a total of 22 Shoreline Management Plans (SMPs) are currently in place. The SMPs were developed by regional coastal groups with input from CPAs and the Environment Agency. The first iteration of SMPs (SMP1) were developed in 2005 and were updated in 2010 (SMP2). Currently the SMPs are being reviewed as part of the nationwide SMP refresh project.

SMPs are a large scale assessment of the risks associated with coastal processes. SMPs help to reduce these risks to people and the developed, historic and natural environment by identifying the most sustainable approach to managing the coastline over three time epochs; short term (0-20 years), medium term (20-50 years) and the long term (50-100 years). For each area of the coastline, the SMPs identify one of four policies:

¹ Coastal Planning Authorities are typically responsible for delivering coastal change adaptation policy

- No Active Intervention: no investment in coastal defences or operations. Allow the coastline to evolve naturally without any interventions.
- Hold the Line: by maintaining or changing the standard of protection of defences.
- Managed Realignment: allowing the shoreline to move backwards or forwards, with management to control or limit movement (such as reducing erosion or building new defences on the landward side of an existing defence)
- Advance the Line: building new defences on the seaward side of the original defences to reclaim land.

In the past, CCMA's have typically been designated in areas where the SMP policy is either No Active Intervention or Managed Realignment. The original National Planning Policy Framework guidance and associated Planning Practice Guidance stated that CCMA's did not need to be considered where the SMP policy is Hold the Line. However, this statement has since been caveated with the need for CPAs to be able to demonstrate that the SMP policy is financially sustainable over the next 100 years. Recent changes to the Planning Practice Guidance outline this change, as discussed in Section 3 of this report.

The study area is covered by two separate SMPs. The coastline between the Axe Estuary and Anchor Head (encompassing Weston-super-Mare) is covered within SMP 18 (Hartland Point to Anchor Head). The rest of the North Somerset coastline between Anchor Head and the River Avon is covered within SMP 19 (The Severn Estuary SMP between Anchor Head to Lavernock Point).

2.3 CCMA Examples

There is limited guidance available to LPAs and CPAs on how to determine CCMA boundaries and extents and the literature indicates that many different approaches have been followed around the English coastline. Therefore, to support the development of CCMA's in North Somerset, a desk based review of existing information on the approaches followed elsewhere in England has been undertaken.

Key studies such as the Halcrow study (2015), the University of Plymouth study (2019) and the Kirby et al. (2021) study are summarised below. Whilst each of these studies were completed before the latest Planning Practice Guidance update in 2022, the review of approaches elsewhere in England still provides useful information and context, particularly with regards to the datasets used and the philosophy of planners in identifying CCMA areas.

2.3.1 Halcrow CCMA study (2015)

In 2015, consultants Halcrow developed Coastal Change Adaptation Planning guidance for coastal managers, engineers, planners and professionals involved in managing coastal change and implementing the National Planning Policy Framework. The guidance was designed to aid the identification and delivery of CCMA's and the development of suitable adaptation approaches within the CCMA's. The client for the project was East Riding of Yorkshire Council.

The guidance recommended that planners follow a staged approach when developing CCMA's. The approach is outlined in Figure 2-1.

Stages 1-3 are of particular interest for this project as they are focussed on identifying and mapping coastal change risks. The guidance recommended that at each stage a series of questions are considered to guide the CCMA development.

Stage 1

During Stage 1, the questions relate to the SMP policies. The full list of questions is not presented here, but to summarise, the questions are aimed at establishing whether the SMP policy for the area is either No Active Intervention or Managed Realignment, and whether shoreline change is expected to be significant over the next century. If either of these are confirmed, then a CCMA is likely to be required and the process should proceed to Stage 2.

Stage 2

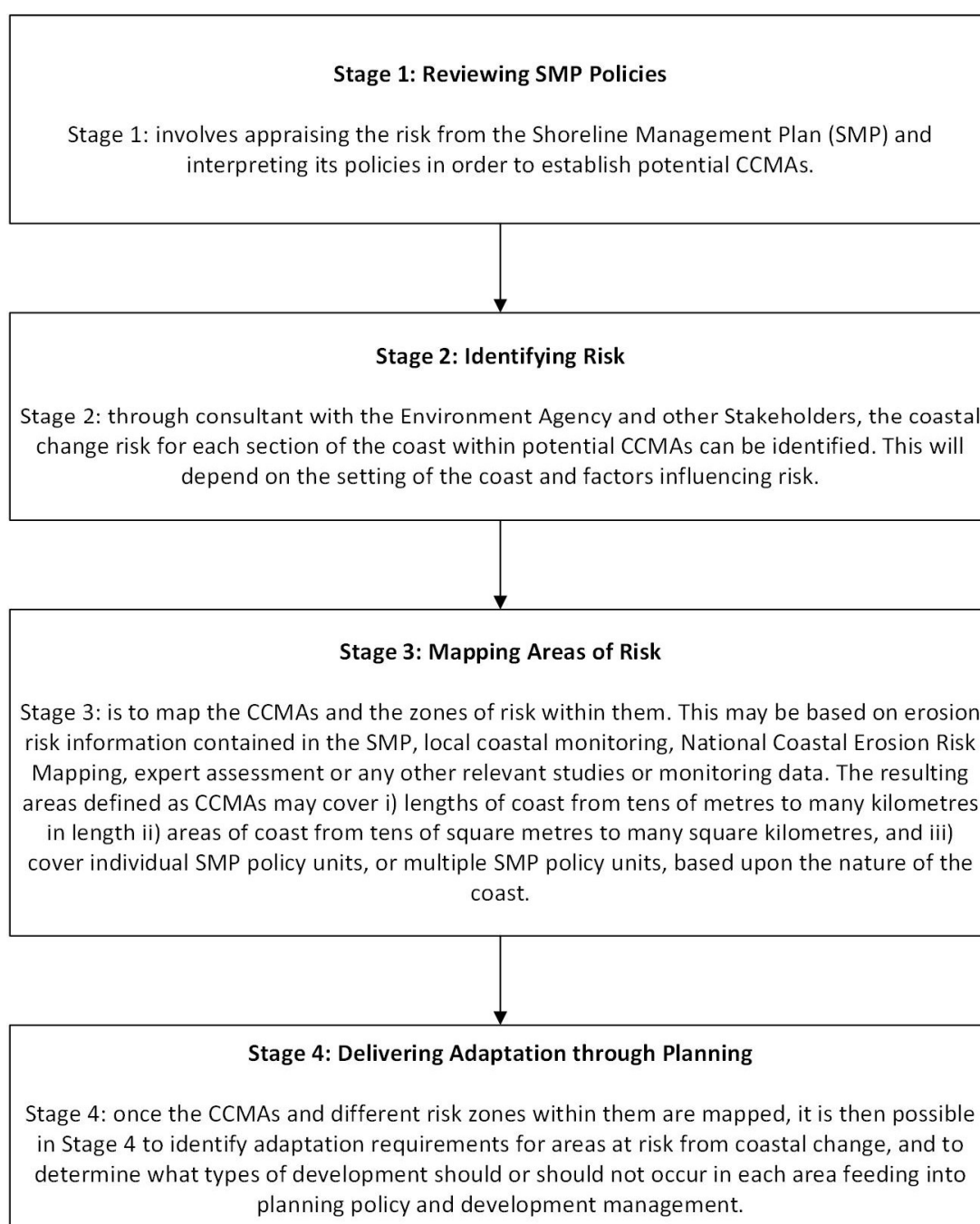
Stage 2 involves identifying specific risks within the potential CCMA's identified in Stage 1. The specific risks within a potential CCMA will depend on the coastal setting. In the context of the guidance, 'risk' is defined as the adverse impact and consequences of a hazard, which may be coastal erosion, coastal land sliding, coastal accretion or coastal flooding resulting in regular or permanent inundation.

There are a series of questions that should be considered in relation to the coastal setting and the factors influencing coastal change risks. The full list of questions is not presented here, but in summary the questions are aimed at establishing:

- The physical setting of the coastline and whether a potential CCMA covers more than one physical setting.
- What features, assets, land uses, planned and future development are of interest.
- What are the key factors influencing coastal risks in the CCMA area – e.g. flood risk, funding of coastal defences, localised land and property management, managed realignment, coastal erosion and accretion.

The discussion in the guidance on how Managed Realignment may influence CCMA definition is of interest to this project as parts of the North Somerset coastline are earmarked for Managed Realignment as part of the current SMP policies. The guidance notes how in some cases feasibility studies may have already been undertaken or be underway for Managed Realignment schemes. In these cases, the definition of CCMA in areas of Managed Realignment can be based upon the detailed work.

Figure 2-1: Staged approach to developing CCMA (obtained from Halcrow, 2015).



Stage 3

Stage 3 is focussed on how best to map the areas of risk and provides guidance on which datasets to use if available. As per the previous sections, a number of questions are presented to consider. These include considering what risk zone mapping is most appropriate to use and whether CCMA boundaries need amending from the risk zones in order to avoid cutting through settlements or infrastructure.

It is recommended in the guidance that as a starting point, the CCMA boundaries should adopt individual or combined SMP policy areas, but that these should be refined as the CCMA's are developed.

For erosion risk, the guidance outlines how mapping can be based on erosion risk information contained in the SMP, local coastal monitoring, National Coastal Erosion Risk Mapping (NCERM), or any other relevant studies or monitoring data. The assessment of erosion risk for 'simple cliffs', 'simple landslide' and 'composite cliff' types of cliff can be treated the same way and be based upon a long term average erosion rate (typically provided in each SMP or NCERM). However, 'complex cliffs' should be treated separately due to their complex pattern of change (NCERM does not include erosion rates for complex cliff areas).

For flood risk, the Environment Agency's flood zone maps provide a rapid means of assessing flood risk, whilst Strategic Flood Risk Assessments and Preliminary Flood Risk Assessments provide further detail on flood risk in an area. Alternatively numerical modelling of flood risk for a specific location can be undertaken if there is insufficient data available from these sources.

It is recommended that consultation with the relevant stakeholders is undertaken to decide on the most appropriate data sources to use in an area.

Stage 4

Stage 4 is focussed on developing suitable adaptation approaches and how these may be implemented in planning policy. A range of planning policies are discussed and matched to coastal physical settings where each may be considered. The planning policies to be implemented in CCMA's that are developed along the North Somerset coastline are beyond the scope of this study but the LPA may wish to refer to the Halcrow guidance for further information in the future.

Key points for developing North Somerset methodology

The Halcrow guidance (2015) provides a clear step by step process for defining CCMA's, based on SMP policies and coastal risks and identifies a range of datasets that can be used to inform the process. A similar step by step process can be applied to North Somerset. However some additions / modifications are required due to recent changes in the latest planning practice guidance, such as considering funding availability for implementing Hold the Line or Advance the Line SMP policies. The changes to the planning practice guidance are outlined in Section 0 of this report and feed into the proposed methodology outlined in Section 5.

2.3.2 University of Plymouth CCMA study (2019)

In 2019, the Coastal Processes Research Group at the University of Plymouth undertook a study to review how LPAs designate CCMA's. The study was undertaken as part of the South West Partnership for Environment and Economic Prosperity (SWEEP) initiative and was undertaken for Natural England, North Devon Council, Torridge District Council and East Devon District Council.

The study was delivered in several parts; a review of existing CCMA uptake in England including an analysis of the approach and methods used to designate CCMA's, a detailed review of relevant CCMA case studies, and a methodology for identifying CCMA's for the Taw Torridge Estuary and the East Devon coastline.

A summary of the key findings from each part of the study is provided below.

Part 1: Review of existing CCMA update and approach

A systematic review of CCMA's in England was undertaken in which the geographical distribution of CCMA's within England was identified as well as the methodologies used to define the CCMA extents. This review was undertaken by reviewing Local Development Plans and supporting information, liaising with specific council regions to obtain further information and circulating a questionnaire to CPAs.

The results revealed that at the time of the research, few planning authorities have felt confident to identify CCMAAs, citing a lack of reliable or consistent methodology to establish such designations. In total only 22 out of 95 CPAs were found to be using CCMAAs. It was also noted that CCMAAs are often spatially sporadic within an LPA's jurisdiction, with CCMAAs often in sub-regions over a small stretch of coast, rather than a broader CCMA designation for the whole stretch of coastline.

Broadly speaking, in the regions where CCMAAs have been defined they are designated in areas with SMP policies of No Active Intervention or Managed Realignment, and rarely for areas with a policy of Hold the Line. Of the 22 regions who had adopted CCMAAs at the time of the research, the majority of the CCMAAs were defined in response to coastal erosion risk, with a minority of CCMAAs defined in response to coastal flood risk.

The review found that a range of datasets were typically used to define CCMA areas. Erosion rates were typically obtained from SMP erosion zones or the NCERM dataset. Areas at risk from flooding / inundation were typically obtained from the publicly available Environment Agency flood zones (i.e. zones 1,2 and 3).

CCMA extents were found to be typically defined using one erosion or flood line, with certain regions then applying additional buffer zones. The inclusion of buffer zones provided more conservative boundaries, although the way in which buffer zones were applied varies. For example Newquay defined three different zones to their CCMAAs. There is an absolute CCMA boundary, defined on the basis of the SMP 100-year erosion rate, plus an exclusion zone (10m buffer) and a coastal vulnerability zone (30m buffer). The review highlighted how many different approaches have been used to define CCMAAs around the coastline. It is clear that a broad brush approach to tackling coastal erosion risk, flood risk and vulnerability has not been established.

The research outlines how there is a recognition by planners that CCMAAs are viewed as a working iteration based on the best available information at the time. As the supporting datasets are updated, CCMAAs can equally be updated and revised accordingly.

One of the concerns identified in the research was the omission of sections of coastline with a Hold the Line policy in CCMA areas. Whilst some sections of coastline have a Hold the Line policy for all SMP epochs, there is often limited long term funding streams identified to implement this policy. Given this funding uncertainty, the research recommended following a precautionary CCMA designation to provide greater checks on development proposals.

Part 2: Case studies

This part of the study presented different case studies where CCMAAs have been adopted. The examples provide an overview of existing methodologies that were used for three different coastal environments – cliffs, estuaries and beaches.

- Dover District Council (cliffs): seven CCMAAs were identified where the SMP policy was No Active Intervention or Managed Realignment for the 100 year epoch. There was one exception at Folkstone Warren where the policy was Hold the Line in the short to medium term, followed by No Active Intervention in the long term. The CCMAAs were defined using the digitised cliff top and the 100 year erosion zone for this area.
- Wyre Council (estuary): four CCMAAs were identified in the Wyre District in areas of No Active Intervention or Managed Realignment. The CCMAAs were defined using the Environment Agency flood zone mapping . A buffer zone was also applied using the NCERM long term erosion rate, rounded up to the nearest 10m to be conservative.
- Swale Borough Council (mixed environment – cliffs, dunes, estuaries): Swale Borough Council implemented a CCMA along a 111km shoreline around the Swale Estuary and the Isle of Sheppey, covering a range of environments from cliffs, intertidal mudflats and beaches. The CCMA was defined using a combination of approaches, including Environment Agency flood maps and information from the Swales Strategic Flood Risk Assessment.

Part 3: CCMA methodology

Methods for helping to define CCMAAs for a cliff backed coastline, a floodable estuary and frontages with beaches / sea defences in the boundaries of the study area were developed and are presented in this section of the study. It is recognised that while the methods outlined have been developed through case studies, there will undoubtedly be some modifications / refinements required when applied to other areas.

Cliff backed coastline:

A methodology for identifying areas at risk from erosion along an eroding cliff coastline in East Devon was developed. This fed into the decision making framework for defining a CCMA in this location.

The proposed methodology for assessing the erosion risk requires GIS software for data analysis and is mainly focussed on how to project retreat rates of eroding cliffs. The suggested approach is to determine historical retreat rates, and project this into the future, adjusting the rate for the influence of projected sea level rise.

Once the cliff top retreat rates have been developed it is recommended that a comparison with the SMP erosion zones is undertaken. Where uncertainty arises as to which erosion zones to use in planning decisions, the guidance recommends using the most conservative (furthest inland).

The suggested methodology for projecting cliff retreat rate is based on historical rates of retreat obtained from GIS analysis. This is an appropriate solution for actively eroding cliffs, however, in situations where cliffs are not actively eroding or there is resistant / hard geology this approach may not be applicable. The methodology notes how this approach becomes more uncertain where stretches of cliff have experienced little or no cliff retreat historically. In such situations, the methodology recommends using the SMP erosion zones instead.

Floodable estuary:

A methodology was also developed for establishing the flood risk in estuarine / tide dominated coasts. In such environments, shoreline change and erosion play a smaller role in determining the CCMA extent than enhanced coastal flooding because storm surge is considered the main coastal hazard. The focus for defining CCMA's in these environments is therefore about understanding the flood risk, not necessarily generating a modified coastline position (as with the erosion based approach).

The Taw Torridge estuary in North Devon was used as a case study to develop the methodology. A combination of the Environment Agency flood risk mapping, strategic flood risk mapping and LiDAR datasets were used to depict the flood risk at the site. The LiDAR data was used alongside the Environment Agency's Coastal Flood Boundary dataset (2017) and sea level rise projections to identify areas potentially at flood risk in the future (where land levels are lower than projected extreme water levels). The methodology suggested adding a buffer to the mapped regions to account for uncertainty in the datasets. A vertical buffer of 0.25m was applied as well as horizontal buffers to account for features such as coastal paths.

The long term plan for the Taw Torridge estuary is to allow the estuary to respond naturally to climate change, particularly in its upper reaches, while to continue to provide flood defence to people, property and infrastructure where settlements exist. In the methodology the final step in the defining the extent of the CCMA is a comprehensive review of the flood risk areas, the SMP policy and future funding.

Beaches and sea defences:

To assist with definition of CCMA's, a methodology was developed for projecting the future shoreline position for sandy and gravel barrier beaches. For gravel barrier beach systems, with use of beach profiles and LIDAR data the first step suggested by the methodology is to determine the historic retreat rate of the beach. This step is not required for sandy beaches as sandy beaches are characterised by both accretion and erosion phases.

The next step suggested by the methodology is to project the future retreat of the beaches in response to sea level rise. For gravel beaches the formula developed from Orford et al (1995) is recommended. This formula predicts the future rate of barrier retreat from estimates of current retreat rate and past and future sea level rise. For sandy beaches the methodology recommends using the Bruun rule to estimate future retreat rate. This formula is the most widely used concept for sandy shorelines.

Using the projected rates of beach retreat, projected beach positions at various points in time are then developed from the current shoreline position in GIS.

The methodology for sandy and gravel beaches is appropriate for natural sites where landward migration of the beaches is possible and not restricted. However, for sites where existing coastal defences are in place, predicting the future shoreline position is more challenging, as it will be coincident with the sea defence itself. The methodology proposes that in areas where coastal defences are present, a future shoreline retreat prediction is made assuming that the sea defence is not there. Therefore if the sea defence fails or is removed in the future, a reasonable estimate of the future shoreline position would have been considered in the CCMA. This approach is similar to that which is adopted for flood zones, and allows for a CCMA to become a continuous zone along the coast, regardless of engineered structures from which informed planning decisions can be made.

Once projected shoreline positions have been established, existing SMP predictions can also be consulted to provide an alternative estimate, and if necessary the most conservative estimate can be used to define a CCMA region.

Shoreline buffers:

For any new shoreline projections that are used to define the extent of CCMA, the methodology outlines how a buffer of between 10-30m is advocated by the National Planning Policy Framework guidance. The methodology points out however that there is variability in how this is applied and very little detail on the reasons for the distance adopted. Instead the methodology proposed alternative buffer approaches:

- For tidal coastlines a buffer of 2m horizontal allowance for features such as coastal paths and a 0.25m vertical allowance for uncertainties in the flood zone topography.
- For erosive coastlines a 10m horizontal buffer or a variable horizontal buffer of 10% of the projected retreat distance for each section of coastline assessed.

Summary:

Each of the steps outlined above ends with a preliminary CCMA boundary that can be explored further alongside the SMP, LPAs and further guidance from organisations such as the EA. The methodology anticipates that the final output from any exercise would be a series of GIS layers that could be incorporated into existing planning systems and used to flag up development proposals that require further assessment. The number of CCMA boundaries that are developed depends on the policy of each council. The most recent climate change projections (UKCP18) provides three emissions scenarios for future sea level rise and for each emission scenario the projected coastline position will differ. In addition, there may be a requirement for multiple CCMA boundaries representing different points in time, to align with the SMP epochs.

Key points for developing North Somerset methodology

The CCMA study provides methods for identifying CCMA areas for different types of coastline. The North Somerset coastline is typically either high cliffs or low lying defended areas. For the cliff areas, the primary risk is from erosion. In the low lying areas, erosion may also occur, but flood risk is generally the key risk that would lead to a much larger CCMA extent. Whilst the methods suggested for mapping CCMA in the study provide useful context, there are limits to how these could be applied directly to North Somerset. Data availability, the unique low-lying nature of much of the county combined with many areas having a Managed Realignment policy mean the approach suggested by the Plymouth University study cannot be applied directly to North Somerset without some modifications. For example, applying the methodology directly would result in large swathes of the county being classified as a CCMA, including key urban areas and key infrastructure. Further considerations such as potential new defence alignments as part of Managed Realignment policies are needed for the North Somerset methodology.

2.3.3 Study on Coastal Adaptation to Climate Change through Zonation (Kirby et al. 2021)

Kirby et al. (2021) undertook a study that examined how CPAs in England have implemented coastal change adaptation policies, specifically in relation to CCMA. The study produced similar conclusions to the University of Plymouth CCMA study (2019) outlined above; only 15% of CPA have designated a CCMA, with just 5.7% of the coast of England designated. The main reason for this was found to be inadequate and ambiguous guidance that has reduced the effectiveness of the National Planning Policy Framework. CPAs are unsure of which datasets to apply for delineating areas of coastal change.

The research found that the 15 CPAs that have implemented CCMA all used different methodologies to determine their boundaries. All used the SMP policy as guidance and almost half of these omitted areas of coastline with a Hold the Line policy stretching over the three SMP epochs. However, this approach is not consistent throughout all CPAs.

The methodology used for each CCMA designation that was reviewed varies considerably, with no two CPAs using the exact same method to determine the physical areas affected by coastal change. For erosion risk, the most common erosion projection used by CPAs is the erosion zones from the SMPs with the SMP policies in

place. However, some CPAs adopted the 5th percentile NCERM prediction. For flood risk, numerous CPAs used the Environment Agency's flood risk mapping for planning.

A key finding from the research related to how the interpretation of the National Planning Policy Framework guidance varies between CPAs. The original National Planning Policy Framework guidance stated that CCMA did not need to be considered where the SMP policy is Hold the Line. However, in the revised guidance issued in 2019, this statement was caveated with the need for CPAs to be able to demonstrate that the SMP policy was financially sustainable over the next 100 years. As very few (if any) coastal defence schemes will be able to demonstrate funding for this length of time, CPAs need to decide if a CCMA should now be considered in areas that fall under a Hold the Line policy. The research found that most CPAs omit Hold the Line policy areas from CCMA, and it is evident that the National Planning Policy Framework guidance, relating to non-inclusion of Hold the Line policy areas, can be, and has been, interpreted in many different ways.

Furthermore, the research findings continue with the fact that the CCMA guidance suggesting not to include areas of Hold the Line is in itself problematic. SMPs are not statutory and therefore there is no guarantee that the SMP policies will be implemented. Hold the Line areas are often in the most vulnerable, and hence defended, parts of the coastline and have the most economic importance. There is a concern that excluding Hold the Line areas from CCMA could lead to unsustainable development behind coastal defences that may not be funded or maintained in the future. The research suggests that incorporating Hold the Line areas into CCMA would be beneficial to increase resilience and allow defended communities to adapt to future scenarios. Another important reason to include Hold the Line areas in CCMA is the gap in knowledge about coastline evolution once a defence is removed or fails. Various studies have indicated a phenomenon of 'coastal catch up' where accelerated erosion occurs after a defence fails or is removed.

Erosion datasets

The research provides a summary of the typical datasets used by CPAs to establish erosion risk and inform the boundaries of CCMA. The two main datasets used to determine coastal erosion rates are the NCERM dataset and erosion mapping from SMPs. Each dataset has limitations which are discussed extensively in the research, such as failing to incorporate the latest current climate projections, a reliance on the measurement of historical retreat rates and the application of the calculations to non-cliff coastlines (such as sand dunes and beaches).

The research suggests that for coastal zonation policy to be successful (including the designation of CCMA), there is a need for CPAs to identify the coastal types and recognise the response of each coastal type to sea level rise. This would allow CPAs to confidently determine recession rates and delineate CCMA, which could also be updated to reflect changes to sea level rise projections. It would also allow CPAs to include the coastal morphologies that the NCERM and SMP fail to cover at a resolution more appropriate to the coastal areas that the CCMA will cover.

Key points for developing North Somerset methodology

The study reviewed existing practice and key datasets rather than proposing a methodology. Many of key discussions points in the study, such as whether to consider Hold the Line Areas in CCMA, have fed into developing the methodology for North Somerset.

3. Planning Practice Guidance Updates

In August 2022, an update was provided to the flood risk and coastal change section of the Planning Practice Guidance. The superseded version of the guidance was originally published in 2014 and was last updated in 2021.

One of the main parts of the 2022 update was to provide additional guidance on how to define CCMA's, particularly with respect to how Shoreline Management Plan policies may be considered in this process. The information below outlines the main changes to the guidance in the 2022 update.

3.1 Links to Shoreline Management Plans

Updates to the Planning Practice Guidance with respect to Shoreline Management Plans

The previous version of the Planning Practice Guidance referred to the SMP policies in providing guidance in defining CCMA's. In the updated version of the guidance (2022) the SMP specific text has been modified and additional text has been added to provide further context to the decision making process when defining CCMA's.

Table A-8-1 in Appendix A shows a word by word comparison between both versions of the guidance. The points below summarise the changes:

- Both versions of the guidance state that CCMA's should only be identified where coastal change is expected to be 'significant' over the next century, taking into account climate change. Both versions of the guidance also link strongly to SMP's and suggest that LPAs will need to demonstrate that they have considered the SMP policies when developing CCMA's.
- In the 2022 version of the guidance, it states that CCMA's should always be defined where the SMP policy is anything other than Hold the Line or Advance the Line at any time during its plan period.
- The superseded version of the guidance stated that CCMA's would not need to be defined where the SMP policy is either Hold the Line or Advance the Line. However, in the 2022 version, this statement was caveated, with the statement being that CCMA's would not 'normally' need to be defined where the SMP policy is either Hold the Line or Advance the Line.
- The 2022 version outlines how CCMA's can still be defined where there is uncertainty about securing funding for the implementation of Hold the Line or Advance the Line policies.

In general, the inclusion of the wording around funding uncertainty for Hold and Advance the Line areas described above and the other wording changes indicate a more precautionary approach to designating CCMA's.

The inclusion of the statement around funding uncertainty for Hold the Line or Advance the Line policies could be interpreted in different ways. SMP's are not statutory documents and do not guarantee funding availability for coastal defence schemes. Therefore there is generally always uncertainty on funding for schemes to Hold or Advance the Line until funding has been secured following approval of an outline or full business case. One may argue that given that there is always funding uncertainty until a business case is developed, all Hold the Line or Advance the Line areas without an approved business case and funding in place could be designated as a CCMA. In reality, an element of pragmatism may be required by planning authorities in designating CCMA's.

Whilst not shown in Table A-8-1, both versions of the guidance also refer to other documents and information that can be used to support the identification of CCMA's. These include catchment flood management plans, shoreline / coastal strategies, estuary management plans, harbour management plans, river basin management plans and the Environment Agency's National Erosion Risk Map.

3.2 Appropriate Development in CCMA's

The Planning Practice Guidance also provides details on what type of development may be appropriate within a CCMA. In the updated 2022 version of the guidance additional content has been added on appropriate development. Table A-8-2 shows a comparison of the content between both versions of the guidance. In summary:

- In the updated 2022 version of the guidance there are several new paragraphs on appropriate development. The first new paragraph outlines how strategic plans should be sufficiently flexible to deal with changing circumstances in coastal locations, such as changes to SMPs or the standard of protection of defences. This is particularly relevant with respect to the ongoing SMP refresh process and also relates to uncertainty around funding of coastal defence schemes.
- The second new paragraph in the 2022 version adds information about the National Planning Policy Framework tests.
- The third new paragraph outlines how existing buildings, infrastructure and land uses can be adapted to diversity for changing circumstances to reduce vulnerability.
- Generally the wording elsewhere in this section is similar between the superseded and the updated 2022 versions. The exception to this is in the final paragraph of the appropriate development section, where it is made clear in the 2022 version that residential development being created through change of use is not appropriate for CCMA. Previously this was unclear.

3.3 Coastal Change Vulnerability Assessments

The Planning Practice Guidance outlines how Coastal Vulnerability Assessments (CVAs) may be required to support applications for development in a CCMA. The scope of a CVA should be proportional and appropriate to the degree of risk and the scale, nature and location of a development. In the updated 2022 version of the guidance, additional content has been added on CVAs. Table A-8-3 shows a comparison of the content between both versions of the guidance. In summary:

- The updated 2022 guidance provides a stronger steer that LPAs should seek CVAs as part of development applications, however, it is still for LPAs to decide.
- It is recommended in the updated 2022 guidance that LPAs specify in local policy or guidance where applications for development will need to be accompanied by a CVA.
- Additional guidance is also provided on how a CVA may consider ways of managing development at the end of a development lifecycle, such as modular forms of construction.

3.4 Further changes

There are several other changes to the guidance between the superseded version and the 2022 version, including to the sections on relocation, permitted development and neighbourhood plans. These changes are outlined in Table A-8-4. In summary:

- It is now recommended that the Local Plan evidence base should identify areas that are not likely to be sustainable in the long term. Further guidance on considering relocation in local plans and strategies is also provided.
- The timescale element has been removed around considering permitted development or planning permission.
- There is very minor changes to the wording around neighbourhood plans.

3.5 Summary

Figure 3-1 below outlines the key changes in relation to CCMA's between the superseded version of the guidance and the 2022 version.

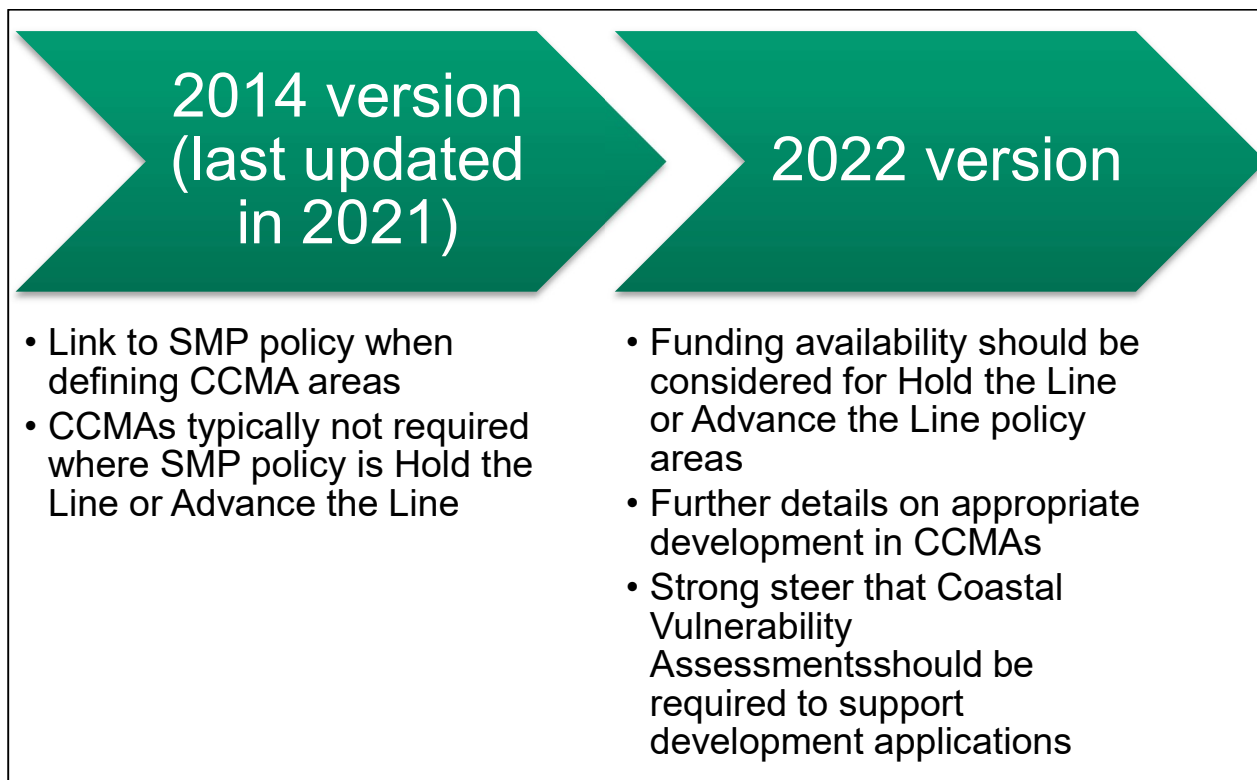


Figure 3-1: Summary of Planning Practice Guidance updates

4. Data Review

4.1 Shoreline Management Plans

The North Somerset coastline is covered by two separate SMPs; SMP 18 (Hartland Point to Anchor Head) which covers the coastline between the Axe Estuary and Anchor Head, and SMP 19 (Anchor Head to Lavernock Point) which covers the coastline between Anchor Head and the River Avon).

Both SMPs are currently being reviewed as part of the nationwide SMP2 refresh process. One of the key aims of the refresh process is to better incorporate trigger points into the plans, transitioning the plans towards an adaptive management approach rather than a purely time driven approach based on epochs.

A summary of the management policies for each area of the frontage is provided below.

4.1.1 SMP 18 (Hartland Point to Anchor Head)

SMP 18 covers the coastline between Hartland Point to Anchor Head. The north-east part of this coastline, between the Axe Estuary and Anchor Head is within the jurisdiction of North Somerset Council and is covered by six policy units; 7E03 to 7E06.

In summary:

- 7E03 (Axe Estuary, east bank) – the policy is to Hold the Line by continuing to maintain existing defences and to also investigate opportunities for managed realignment. Subject to the outcome of the investigations, transition to managed realignment where possible and then hold the line (either in the new setback position after managed realignment, or by rebuilding / maintaining the existing defence alignment if managed realignment is not possible).
- 7E04 (Axe Estuary mouth and Uphill) – the policy is to Hold the Line by continuing to maintain existing defences and to also investigate opportunities for managed realignment. Subject to the outcome of the investigations, transition to managed realignment where possible and then hold the line (either at the new setback position after managed realignment, or by rebuilding / maintaining the existing defence alignment if managed realignment is not possible).
- 7E05 (Sand dunes between Weston-super-Mare and Uphill) – the policy is for managed realignment. The intent of this policy is to allow natural coastal evolution to continue as far as possible, undertaking dune monitoring and management if required. If monitoring identifies that the dunes are at risk of breaching, then construct a secondary defence embankment.
- 7E06 (Weston-super-Mare) – the policy is to Hold the Line. The intent of this policy is to minimise the risk of flooding and erosion to Weston-super-Mare by maintaining and improving the defences.

4.1.2 SMP 19 (Anchor Head to Lavernock Point)

SMP 19 covers the coastline in the Severn Estuary between Anchor Head to Lavernock Point. This includes the coastline on the south side of the Estuary, between Anchor Head and the River Avon, that is within the jurisdiction of North Somerset Council. This area is covered by a total of ten policy units; KIN1 to KIN4, PORT1 to PORT4, and BRIS 5 and BRIS 6.

In summary:

- KIN4 (Kewstoke to Birnbeck Island) – the policy is No Active Intervention, allowing natural processes to continue. High ground and hard geology naturally limit the risk of flooding and erosion in the short term, but the medium and long term rates of erosion are unclear.
- KIN3 (Sand Point to Kewstoke) – the policy is to Hold the Line by actively managing the sand dunes, which are the main line of defence in this location.
- KIN2 (St Thomas' Head to Sand Point) – the policy is No Active Intervention, allowing natural processes to continue. High ground and hard geology naturally limit the flooding and erosion risks in this location.
- KIN1 (Clevedon to St Thomas' Head) – the policy here is Managed Realignment. In the short term the current coastal defences are expected to remain in place and the Managed Realignment should focus on the area around Congresbury Yeo. In the medium and long term the existing coastal defences will come to

the end of their service life and new realignment defences along the shoreline will be needed to the north (Commissioner's Bank) and south of Congresbury Yeo to enable intertidal habitat to be created.

- PORT4 (Clevedon) – the policy is to Hold the Line. High ground and hard geology naturally limit the risk of flooding and erosion in much of this policy unit. Hold the Line should therefore focus on the key areas at risk rather than the on the whole length of the policy unit.
- PORT3 (Lake Road to Ladye Point) – the policy is No Active Intervention, allowing natural processes to continue. High ground and hard geology natural limit the flooding and erosion risks in this location.
- PORT2 (Esplanade Road to Lake Road, Portishead) – the policy is No Active Intervention, allowing natural processes to continue. High ground and hard geology natural limit the flooding and erosion risks in this location.
- PORT1 (Portishead Pier to Esplanade Road, Portishead) – the policy is No Active Intervention, allowing natural processes to continue. High ground and hard geology natural limit the flooding and erosion risks in this location.
- BRIS6 (Avon Road to Portishead Pier) – the policy is to Hold the Line, replacing existing defences when they come to the end of their service life and maintaining the defences thereafter.
- BRIS5 (Netham Weir to Avon Road) – the policy is to Hold the Line. This will be achieved by maintaining the existing embankments and walls along the River Avon channel in the short term and replacing these structures once they come to the end of their service life.

4.1.3 SMP overview

Figure 4-1 and Table 4-1 provide a summary of the management policies along the North Somerset coastline. The majority of the North Somerset coastline has a policy of either No Active Intervention or Managed Realignment. The SMP policy for policy units 7E05, 7E06, KIN4, KIN3, KIN1 and BRIS6 all have high benefit-cost ratios. The economic case for policy units 7E03, 7E04, KIN2, PORT1-4 and BRIS5 may be more marginal, with benefit cost ratios typically less than 20:1 or not calculated.

On initial inspection, some of the costs for the policies in the SMP appear low relative to the potential lengths of defences that may be required. There is therefore uncertainty around the costs provided in the SMP and further study / studies would be required to provide more confidence in the cost estimates provided. It is also likely that since SMP was developed / published, the FCERM benefits of the SMP policies could have increased due to increases to Multicoloured Manual valuations and also via the incorporation of wider benefits such as mental health impacts.

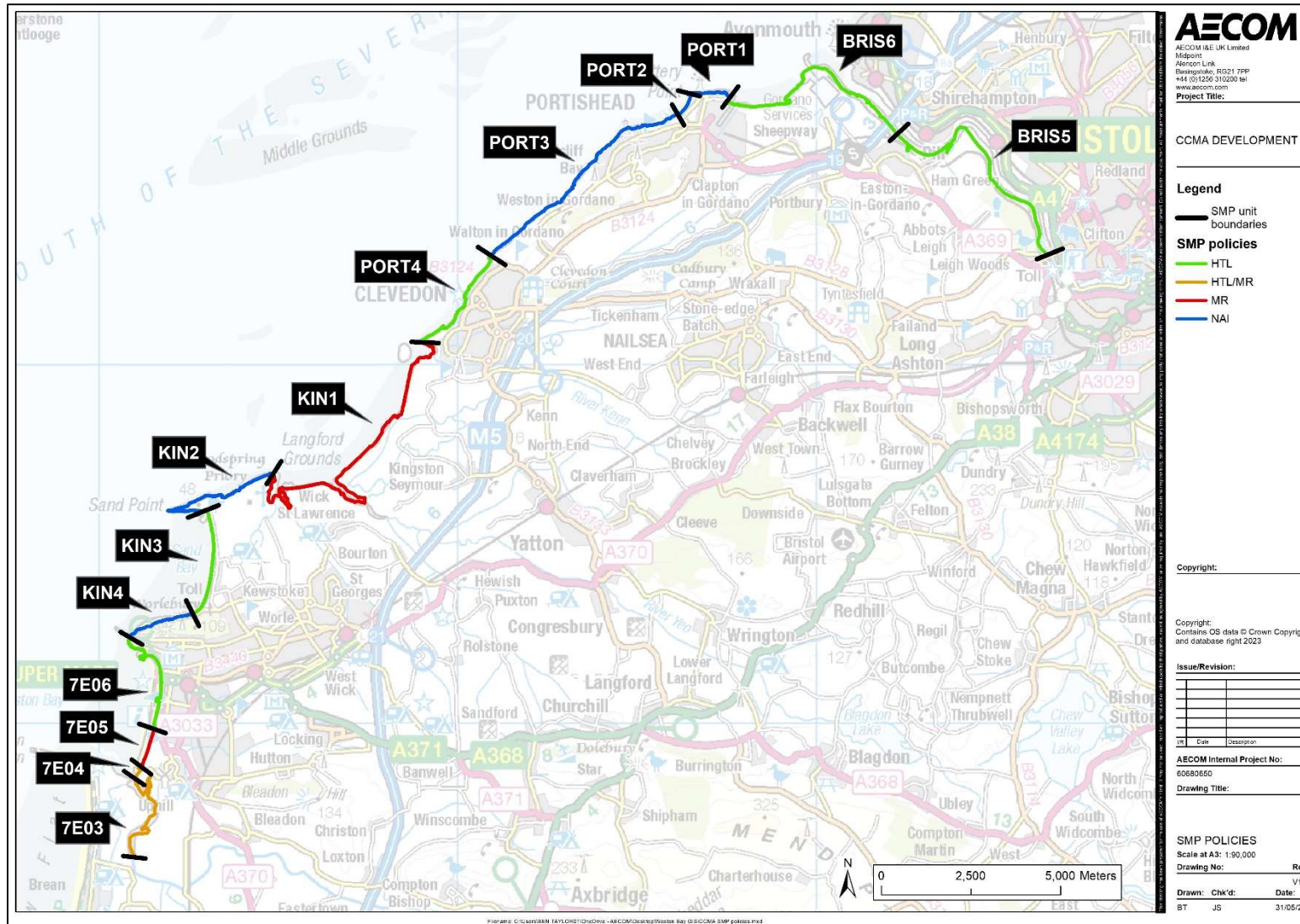


Figure 4-1: Summary of SMP policies along the North Somerset coastline

Table 4-1: Summary of SMP 18 and SMP 19 policies along North Somerset coastline

SMP	Policy unit	Policy	Summary of policy implications	Supporting information
SMP18	7E03 – Axe Estuary right (east) bank (near Diamond Farm to mouth)	- Hold the line and investigate opportunities for managed realignment. Subject to investigations, either implement managed realignment and maintain setback position or rebuild / maintain existing alignment.	<ul style="list-style-type: none"> - Continue to protect homes and businesses against flood risk, as well as key infrastructure including the A38 and M5, the mainline railway and associated facilities. - Potential benefits to the Severn Estuary SSSI, SAC, SPA and Ramsar site by creating intertidal habitat areas of managed realignment in the medium term. A hold the line policy in the long term will cause coastal squeeze (narrowing of the shoreline) and loss of intertidal habitat. - Potential impacts on a number of non-designated archaeological features, depending upon extent of realignment, which would be determined through further detailed study. 	<ul style="list-style-type: none"> - The objectives of the plan here are to provide sustainable protection against flood risk to the wider Somerset Levels and Moors, working with natural processes as far as possible. - There are opportunities here for managed realignment to provide flood storage and create habitat. - Implementing this policy could involve constructing a setback defence embankment and making a breach in the existing defence, which would require more detailed investigation. - On parts of this section not subject to realignment, defences would be maintained and improved along existing alignments. <p>- SMP benefit-cost ratio for this policy was estimated to be 17:1</p>
SMP18	7E04 – Axe Estuary mouth to uphill	- Hold the line and investigate opportunities for managed realignment. Subject to investigations, either implement managed realignment and maintain setback position or rebuild / maintain existing alignment.	<ul style="list-style-type: none"> - Continued protection against flood risk for homes and businesses in Uphill and for key infrastructure including the A38 and M5, the mainline railway and associated facilities. - Potential to retain beach along this frontage by allowing it to adapt to realigned position as sea levels rise. - Habitat creation could benefit the Severn Estuary SSSI SAC, SPA, Ramsar site, Uphill SSSI and the CWS in the long term. - A hold the line policy may cause coastal squeeze (narrowing of the shoreline) and the loss of intertidal habitat. 	<ul style="list-style-type: none"> - The objectives of the plan here are to provide sustainable flood protection for the wider Somerset Levels and Moors, working with natural processes as far as possible. - Continued maintenance of the seawall here will become increasingly technically difficult to sustain as sea level rise makes the beaches narrower. - Once defences reach the end of their effective life, the defence line could be realigned landwards to a more sustainable position. - This will not only continue to reduce flood risk to Uphill from this area but could also provide an opportunity for retaining more beach material to benefit Uphill. <p>- SMP benefit-cost ratio for this policy was estimated to be 1.5:1</p>
SMP18	7E05 – Uphill to Weston-super-Mare	- Managed realignment, allowing natural processes to continue as far as possible but undertaking dune monitoring and management to support the defence function of the dunes. If monitoring suggests the dunes are at risk of breaching, a	<ul style="list-style-type: none"> - In the long term there will be continued protection against flood risk for homes and businesses in Uphill, as well as for key infrastructure including the A38 and M5, the mainline railway and associated facilities. - Habitat creation could benefit the Severn Estuary SSSI SAC, SPA and Ramsar site in the long term. - The dunes here will be allowed to evolve naturally as much as possible to provide a robust natural defence. 	<ul style="list-style-type: none"> - The objectives of the plan here are to provide sustainable protection against flood risk for people, property and infrastructure at Uphill and Weston-super-Mare, working with natural processes as far as possible. - Between Uphill and Weston-super-Mare, a short section of undefended dunes provides a natural defence. Pro-active dune management will support this defence function. - As sea levels rise, the effectiveness of these dunes as a defence

SMP	Policy unit	Policy	Summary of policy implications	Supporting information
		secondary defence embankment may be constructed to support this policy.	- Potential impacts on a number of non-designated archaeological features and the Weston-super-Mare Conservation area, depending upon extent of future erosion of the dunes.	could be compromised. - A secondary defence embankment could be constructed landwards of the dunes to minimise flood risk to people, property and infrastructure in Uphill and Weston-super-Mare. - SMP benefit-cost ratio for this policy was estimated to be 100:1
SMP18	7E06 – Weston-super-Mare	- Hold the line, aiming to minimise the risk of flooding and erosion to Weston-super-Mare by maintaining and improving the defences	- Continued protection against flood risk for a significant number of homes and businesses in Weston-super-Mare, as well as for key infrastructure including the A370 and M5, the mainline railway and associated facilities and infrastructure including major substations serving around 84,000 homes and businesses. - Potential for beach to reduce over time. - Potential for habitat loss due to coastal squeeze (narrowing of the shoreline) where defences are held, adversely affecting Severn Estuary SAC, SPA and Ramsar site.	- The objective of the plan here is to continue protecting people, property and infrastructure at Weston-super-Mare against flood and erosion risk. - SMP benefit-cost ratio for this policy was estimated to be 27:1
SMP19	KIN4 – Kewstoke to Birnbeck Island	- No active intervention, allowing natural processes to continue	- High ground and hard geology naturally limit the risk of coastal flooding and erosion in this unit. In the short term, there will be little or no impact, but in the medium and long term the rate of erosion is unclear and should be monitored. - Limited flood and erosion risk, therefore policy not expected to impact on landscape, historic environment or amenity / recreation value of the area.	- Flood risk to property and land use from linked policy units (KIN1 and KIN3) cannot be affected by SMP actions in KIN4. - In the medium and long term a NAI policy will allow habitats to roll back so intertidal habitats and features will be maintained. Roll back will however be limited due to restriction by hard geology and high ground. - SMP benefit-cost ratio for this policy was estimated to be 211:1
SMP19	KIN3 – Sand Point to Kewstoke	- Hold the line. Actively managing the sand dunes which are the main line of defence in this location	- In the short term, the sand dunes are expected to remain in place with historic accretion at the north end projected to continue. In the medium and long term, the sand dunes will require active management. Historic accretion at the north end is expected to stop and possible reverse as sea levels rise and the management of the dunes will need to consider these processes. - Management of the sand dunes in the future will manage flood and erosion risk, will help to maintain visual character of area, the historic environment and amenity / recreation value of the area. With sea level rise, coastal squeeze is anticipated which may result in loss of intertidal habitats.	- The flood zone in policy units at KIN1 and KIN4 are linked to this policy unit and actions need to consider the impacts on these policy units (and vice versa). - There is a strong economic case for flood and erosion risk management activities across all three linked units. - SMP benefit-cost ratio for this policy was estimated to be 211:1

SMP	Policy unit	Policy	Summary of policy implications	Supporting information
SMP19	KIN2 – St Thomas' Head to Sand Point	- No active intervention, allowing natural processes to continue	- High ground and hard geology naturally limit the risk of coastal flooding and erosion in this unit.	- KIN2 is not linked to adjacent areas, therefore flood risk to property and land in KIN 1, 3 and 4 cannot be impacted by the policy in KIN2. - SMP benefit-cost ratio for this policy was not calculated as minimal costs and benefits
SMP19	KIN1 – Clevedon to St Thomas' Head	- Managed realignment, initially around Congresbury Yeo and then along the open coast to the north and south of Congresbury Yeo.	- In the short term, the current defences along the coastal shoreline are expected to remain in place with minimal maintenance. During this period, managed realignment should focus on the area around Congresbury Yeo. - In the medium and long term, the existing defences along the open coast will come to the end of their service life. Managed realignment should focus on new, realigned defences further inland during these periods. - Land, nature conservation and historic environment features in front of any setback new defences will be at increased risk of flooding and erosion. - Habitat created in this policy unit will help compensate for areas lost elsewhere in the estuary and help to maintain/improve the condition.	- This approach manages the risk of impacts from flooding to this and linked policy units (KIN3, KIN4). - In the medium and long term, new setback defences are likely to be required to the north (Commissioner's Bank) and south of Congresbury Yeo. - Any new setback defences constructed around Congresbury Yeo, or to the north or south will need to be maintained throughout the duration of the SMP. - Adaptation options for any assets located seawards of new setback defences may need to be considered. - There is a strong economic case for flood and erosion risk management activities across all three linked units (KIN1, KIN3 and KIN4). - SMP benefit-cost ratio for this policy was estimated to be 211:1
SMP19	PORT4 – Clevedon	- Hold the line, focussed on areas at risk.	- High ground and hard geology naturally limit the risk of coastal flooding and erosion in much of this policy unit. Hold the line should therefore focus on the key areas of risk rather than on the whole length of the policy unit. - Allow natural processes to continue in areas where there are currently no defences – there is expected to be little impact on the properties or assets along the cliff / shoreline. - Limited flood and erosion risk, so minimal impact on property / assets, landscape / visual character, historic environment and amenity / recreation.	- SMP benefit-cost ratio for this policy was not calculated as minimal costs and benefits (and adjacent policy units in PORT2 and PORT 3).
SMP19	PORT3 – Lake Road to Ladye Point	- No active intervention, allowing natural processes to continue.	- High ground and hard geology naturally limit the risk of coastal flooding and erosion in this policy unit. No impacts anticipated to properties, caravan park, golf club etc. on the cliff top in the short term. - In the medium and long term the risk of erosion is unclear and action should be considered if assets along the cliff top become at	- SMP benefit-cost ratio for this policy was not calculated as minimal costs and benefits (and adjacent policy units in PORT2 and PORT4).

SMP	Policy unit	Policy	Summary of policy implications	Supporting information
			risk.	
SMP19	PORT2 – Esplanade Road to Lake Road, Portishead	- No active intervention, allowing natural processes to continue.	<ul style="list-style-type: none"> - High ground and hard geology naturally limit the risk of coastal flooding and erosion in this policy unit. - In the medium and long term the risk of erosion is unclear and action should be considered if assets along the cliff top become at risk. 	<ul style="list-style-type: none"> - SMP benefit-cost ratio for this policy was not calculated as minimal costs and benefits (and adjacent policy units in PORT3 and PORT4).
SMP19	PORT1 – Portishead Pier to Esplanade Road, Portishead	- No active intervention, allowing natural processes to continue.	<ul style="list-style-type: none"> - High ground and hard geology naturally limit the risk of coastal flooding and erosion in this policy unit. - In the medium and long term the risk of erosion is unclear and action should be considered if assets along the cliff top become at risk. 	<ul style="list-style-type: none"> - This policy unit is not linked to any others. - SMP benefit-cost ratio for this policy was not calculated as minimal costs and benefits
SMP19	BRIS6 – Avon Road to Portishead Pier	- Hold the line.	<ul style="list-style-type: none"> - In the short term any defences reaching the end of their service life should be replaced. - In the medium and long term on-going maintenance should continue. - In some areas, high ground naturally limited the risk of coastal flooding. - A Hold the line management policy will manage the risks of impacts to the docks and other key policy drivers in this unit e.g. lighthouse, sewage treatment works. - Saltmarsh in front of new defences will likely erode as sea levels rise and other similar habitats should be created elsewhere in the estuary to help maintain / improve the condition of the European protected sites. 	<ul style="list-style-type: none"> - This policy unit is not linked to any others. - The current earth embankment defences are expected to come to the end of their service life in the short term and will need to be replaced. - SMP benefit-cost ratio for this policy is estimated to be 45:1
SMP19	BRIS5 – Netham Weir to Avon Road	- Hold the line (left bank of the River Avon downstream from Netham Weir).	<ul style="list-style-type: none"> - In the short term maintain earth embankment defences and concrete / masonry walls. - In the medium and long term, undertake significant maintenance / replacement of the defences. - There is likely to be some constrained tidal flood risk to property / land but there is expected to be only limited impact on the landscape / visual amenity, the historic environment and the amenity / recreational value of the area. 	<ul style="list-style-type: none"> - This policy will manage the risk of impacts to key policy drivers in this and linked units (BRIS1, BRIS2, BRIS3 and BRIS5). - The policy does not guarantee funding, but there is a strong economic case for the policy in this and linked policy units. The total economic damages in the linked policy units are over 7x larger than the projected costs of implementing the policy in the SMP. - SMP benefit-cost ratio for this policy (combined units BRIS1-5) is estimated to be 8:1

4.2 Coastal Defences

Much of the North Somerset coastline is defended with either hard engineered coastal defences (e.g. seawalls, earth embankments) or soft natural solutions (e.g. beach or sand dunes). The remainder of the coastline is either undefended cliffs (typically on the open coast) or natural high ground (typically adjacent to river channels / estuaries). The Environment Agency shared their most recent asset information for the North Somerset coastline for use in this project. Using this data the different types of coastal defences are shown in Figure 4-2. The undefended coastline (cliffs and natural high ground) are shown in red and dark blue.

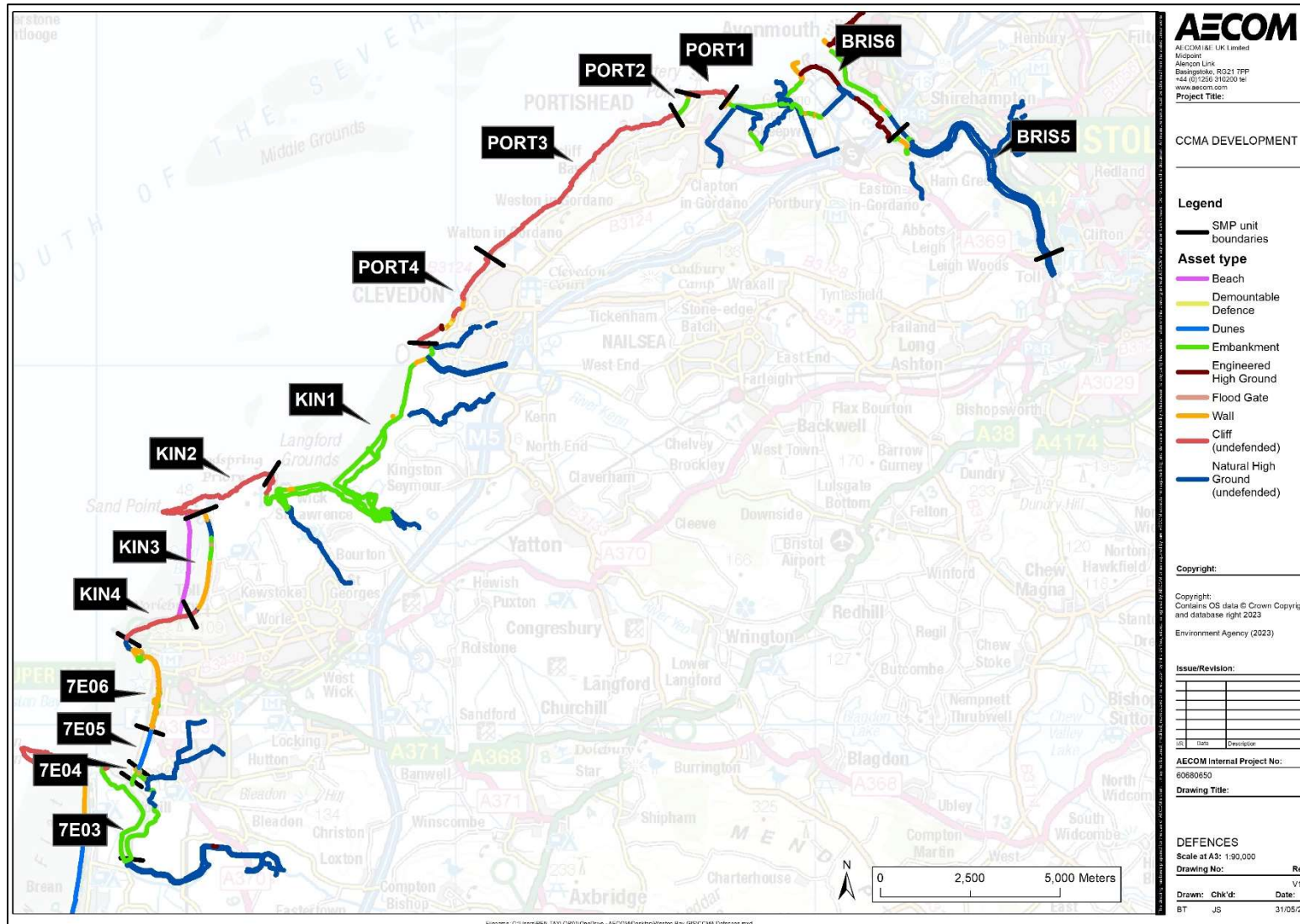


Figure 4-2: Coastal defence types

4.3 Erosion Risk

As outlined in section 2.3, the typical datasets used to establish erosion risk when defining CCMAAs are the erosion zones generated from SMPs and the erosion zones generated from the NCERM erosion rates.

In the case of the North Somerset coastline, erosion zones from SMP 18 and SMP 19 are not available to use in this project:

- For SMP 18 it is not clear if the erosion zones presented in the SMP appendices were generated separately as part of the SMP process or were generated from the NCERM dataset at the time the SMP was written. It was not possible to confirm this through communication with the Plymouth Coastal Observatory or the Environment Agency. Regardless, shapefiles of the erosion zones were not available for use in this project as they could not be sourced.
- For SMP 19, communication with the Environment Agency and the Severn Estuary Partnership indicates that the NCERM dataset was used in the SMP to inform the erosion risk.

4.3.1 NCERM dataset

The first National Coastal Erosion Risk Map (NCERM) for England and Wales was developed by consultants CH2M (as Halcrow) between 2006 and 2012 in a joint project funded by the Environment Agency, Defra and the Welsh Assembly Government (WAG). It formed part of Defra's Making Space for Water programme and WAG's Environment Strategy. It aimed to provide greater clarity on erosion predictions and the management approach for both the public at risk of flooding or erosion and for professional bodies involved in flood and coastal erosion risk management. It provided the first consistent, national assessment of coastal erosion risk in England and Wales.

The methodology used to produce the NCERM dataset was based on the Risk Assessment of Coastal Erosion (RACE) R&D project (DEFRA FD2324) (Halcrow, 2006) approach. RACE produced a probabilistic method for assessing the risk of coastal erosion using historic retreat rates. It initially used national datasets such as the National Flood and Coastal Defence Database and Futurecoast (Halcrow, 2002). The information taken from these datasets was subsequently updated with information extracted from the 2nd generation of SMPs and later refined through a validation exercise with CPAs.

In the NCERM dataset, the erosion risk is presented by a series of erosion risk rates, covering the short term (0-20 years), medium term (20-50 years) and long term (50-100 years). Each epoch is presented in three percentiles (5th percentile, 50th percentile and 95th percentile) that represent the confidence in the erosion risk. The 50th percentile is the mean erosion likely to occur over that time period, the 95th percentile is the minimum erosion that might occur, and the 5th percentile is the maximum erosion that might occur. The RACE method uses different analytical techniques to determine coastal erosion risk depending on the coastal geomorphology and which data are available for the area.

NCERM focusses on cliff and slope erosion and incorporates it with the probability of failure of defences. NCERM does not cover all coastal types, such as complex cliffs (complex large coastal landslides), or dune systems because of their dynamic nature.

The final NCERM outputs were published between late 2011 and early 2012 and are available as open data on the gov.uk website. The outputs consist of GIS files of the erosion rate and high level statistics summarising the data. The NCERM dataset is currently in the process of being updated. The latest available version of the NCERM GIS files is dated February 2022.

The NCERM GIS dataset has been used to project the erosion zones along the North Somerset coastline. The areas of the coastline where NCERM projects erosion to occur are shown in red on Figure 4-3. Areas where NCERM does not project erosion to occur are shown in blue. As can be seen, only a small percentage of the North Somerset coastline is projected to erode according to the NCERM dataset. Erosion is projected to occur in policy unit 7E05, KIN4, KIN3, KIN1 and PORT 1. Interestingly, the erosion projected in 7E05 is where the Weston Bay sand dunes are located. Sand dunes are not typically included in the NCERM dataset.

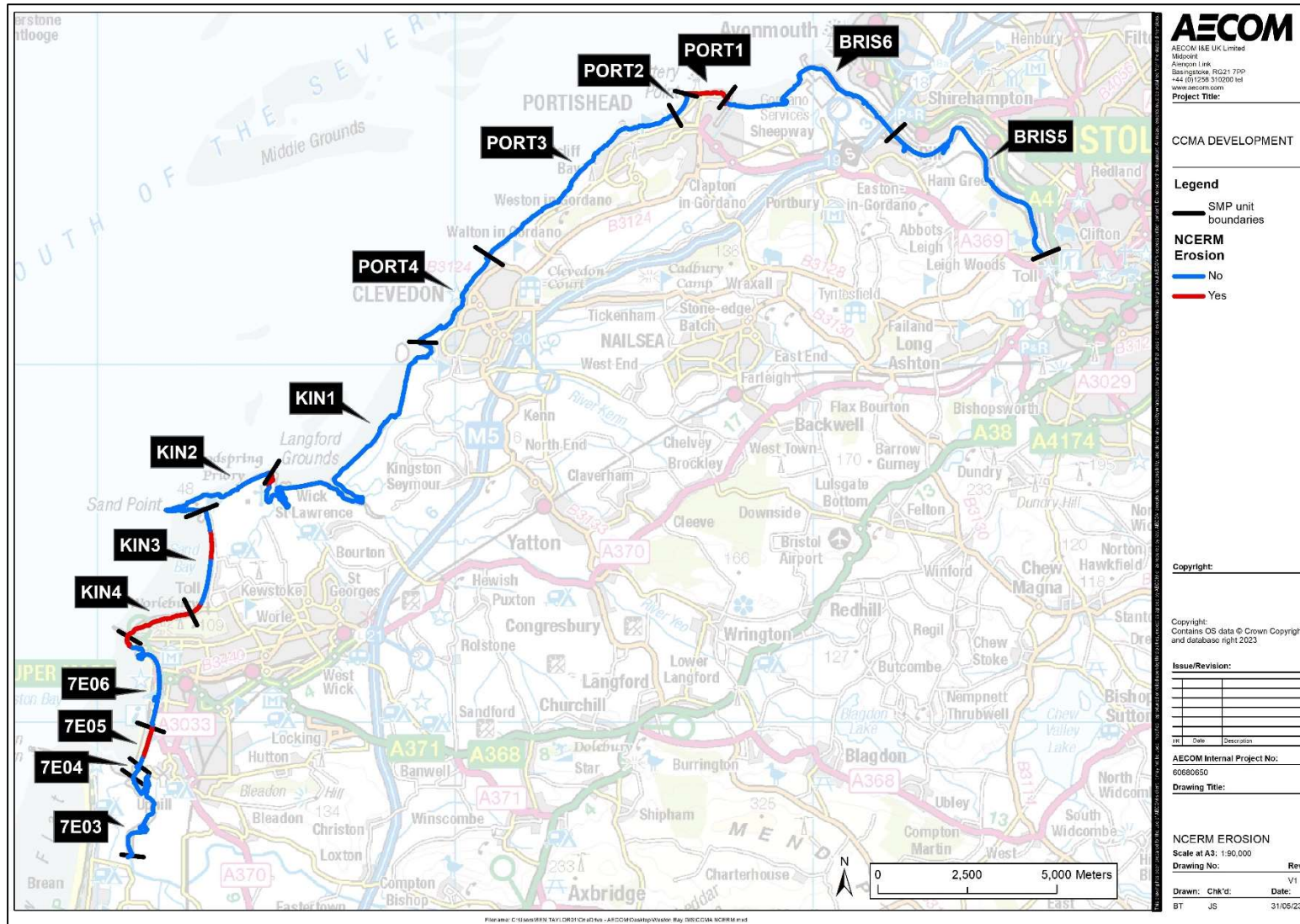


Figure 4-3: Areas of North Somerset coastline where NCERM projects erosion

Explanations for why much of the North Somerset coastline is not projected to erode in the NCERM dataset could include:

- Geology – much of the North Somerset coastline is comprised of high ground / hard geology. These areas may not have eroded much in the past, making it difficult to establish a historical rate of erosion and project future rates of erosion in the NCERM methodology.
- Coastal features – the other parts of the North Somerset coastline are of a different coastline type, for example sand dunes in Sand Bay (that are not typically included in the NCERM projections) or may have coastal defences present (e.g. Weston-super-Mare). NCERM does not typically include erosion projections for these types of coastline.

Table 4-2 provides a summary of the NCERM dataset in relation to SMP policy units, information on the geology, type of coastline and defence status. The majority of areas where the NCERM dataset does not include erosion are either defended (with the defences retaining the position of the coastline) or characterised by hard cliff geology that may be naturally resistant to erosion. Therefore it would have been difficult for the NCERM methodology to estimate potential future rates of erosion in these locations (for an undefended scenario) and an alternative methodology would be required.

Table 4-2: Summary of NCERM erosion, geology, coastline type and defence status

SMP policy unit	NCERM erosion	Coastline type	Geology information (if available from SMP)	Coastal defences	Comments
7E03	No	River bank / estuary	-	Flood defence embankments	Estuary / sheltered environment. Rates of erosion likely low and limited by presence of embankments
7E04	No	Estuary / open coast	-	Seawalls and embankments	Rates of erosion limited by presence of coastal defences
7E05	Yes	Sand dunes	-	Sand dunes	Unusual for NCERM to include erosion projections for sand dune frontages
7E06	No	Beach with seawall	-	Seawall / revetment	Rates of erosion limited by presence of coastal defences
KIN4	Yes	Cliffs	Hard geology	Primarily undefended	Hard geology likely to naturally limit the risk of coastal erosion (SMP 19, 2010)
KIN3	Yes / No	Sand dunes	-	Sand dunes	Area of erosion projected in north part of this unit, otherwise no erosion projected. Sand dunes are not typically included in NCERM projections.
KIN2	No	Cliffs	Hard geology	Undefended	Hard geology likely to naturally limit the risk of coastal erosion (SMP 19, 2010)
KIN1	No	Low lying estuary / embankments	-	Embankments	Rates of erosion limited by presence of embankments. Area has a managed realignment policy.
PORT4	No	Cliffs / seawall	Hard geology	Seawall / undefended cliffs	In defended areas, the rates of erosion limited by presence of the seawall. In undefended areas, the cliffs are hard geology and are likely to naturally limit the risk of coastal erosion (SMP 19, 2010)

SMP policy unit	NCERM erosion	Coastline type	Geology information (if available from SMP)	Coastal defences	Comments
PORT3	No	Cliffs	Hard geology	Undefended	Hard geology likely to naturally limit the risk of coastal erosion (SMP 19, 2010)
PORT2	No	Cliffs / seawall	Hard geology	Seawall / undefended cliffs	In defended areas, the rates of erosion limited by presence of the seawall. In undefended areas, the cliffs are hard geology and are likely to naturally limit the risk of coastal erosion (SMP 19, 2010)
PORT1	Yes	Cliffs	Hard geology	Undefended	Hard geology likely to naturally limit the risk of coastal erosion (SMP 19, 2010)
BRIS6	No	Intertidal areas / port area	-	Embankment / quay / flood walls	Rates of erosion limited by presence of coastal defences.
BRIS5	No	River bank	-	Natural banks / embankments	River / sheltered environment. Rates of erosion likely low and limited by presence of embankments / natural river banks

4.4 Flood risk

This section summarises the information available on coastal flood risk along the North Somerset coastline. Various sources of information have been reviewed and are summarised below. Much of North Somerset is low lying and is below high tide levels and only remains dry due to the coastal defences / strip of higher land along the coastline.

4.4.1 Environment Agency flood zones

The Environment Agency flood zones are used primarily for planning purposes and have been used by planners to help designate CCMA elsewhere in the country. The flood zones are provided by DEFRA and the Environment Agency and cover the risk of both coastal and fluvial flooding. The zones indicate the probability of flooding in certain areas based on four zones of flood risk:

1. Flood Zone 1 (low probability) – land having a less than 1 in 1000 annual probability of sea or river flooding
2. Flood zone 2 (medium probability) – land having between a 1 in 200 and 1 in 1000 annual probability of sea flooding, or land having between a 1 in 100 and 1 in 1000 annual probability of river flooding
3. Flood zone 3a (high probability) – land having a 1 in 200 or greater annual probability of sea flooding, or land having a 1 in 100 or greater annual probability of river flooding
4. Flood zone 3b (functional flood plain) – land where water has to flow or be stored in times of flooding.

The flood zones do not take into account the possible impacts of climate change and changes in the future probability of flooding.

The review of how CCMA have been defined elsewhere in the country (see section 2.3) indicates that of the Environment Agency flood risk zones available, flood zones 2 and 3a have typically been used to indicate CCMA areas. Figure 4-4 and Figure 4-5 show the extent of flood zones 2 and 3a respectively at North Somerset.

As can be seen, large parts of the county are within flood zones 2 and 3a. This is due to the low lying topography of much of the coastal frontage. There are two main flood cells along the coastline, as summarised below:

- A flood cell covering the south-west part of the North Somerset coastline, that covers the area between the Axe Estuary and Clevedon. This flood cell includes Weston-super-Mare and Sand Bay, as well as Kingston-Seymour area.
- A flood cell covering the north-east part of the North Somerset coastline, arising from Portishead and the area around the mouth of the River Avon.

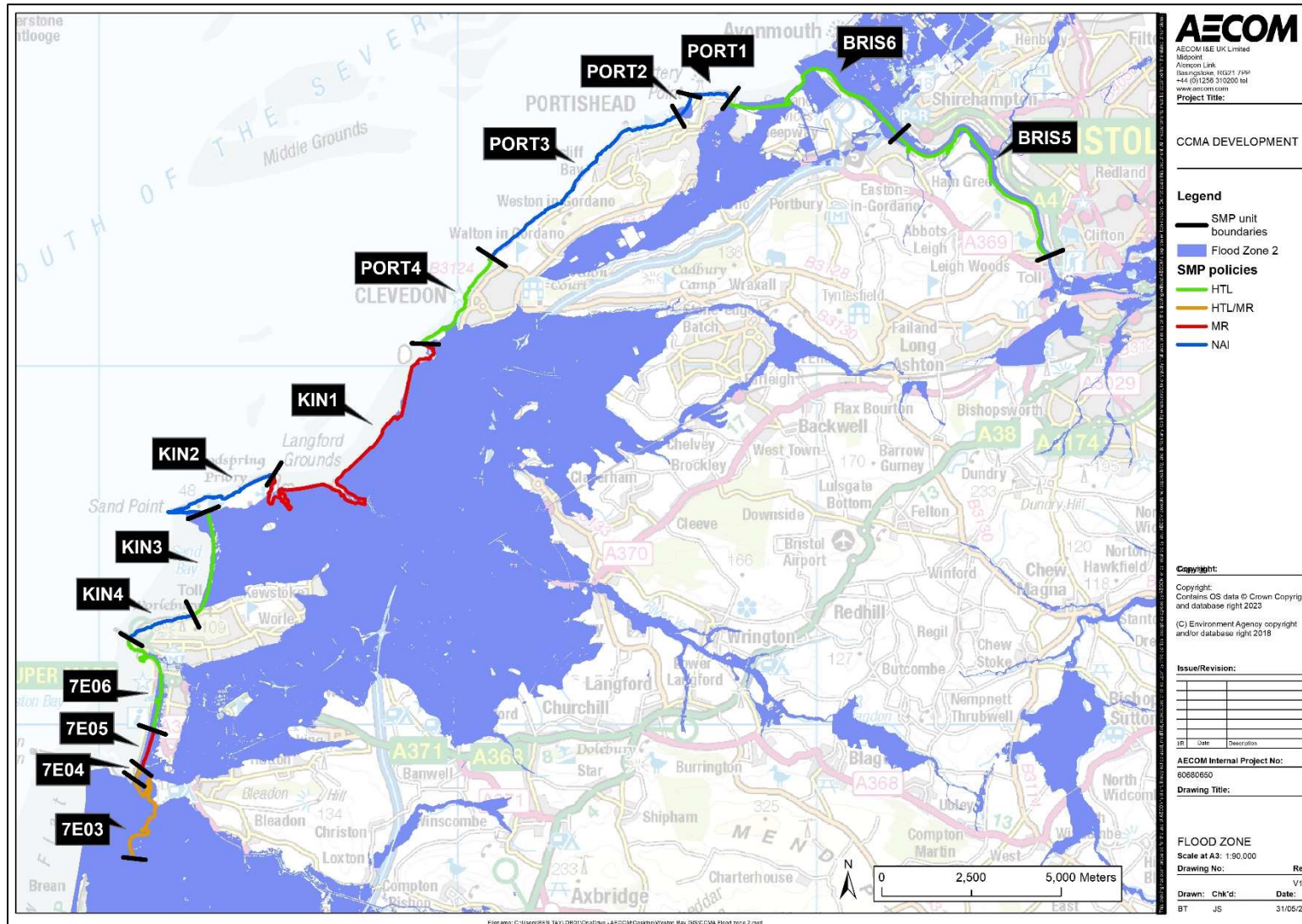


Figure 4-4: Environment Agency Flood Zone 2

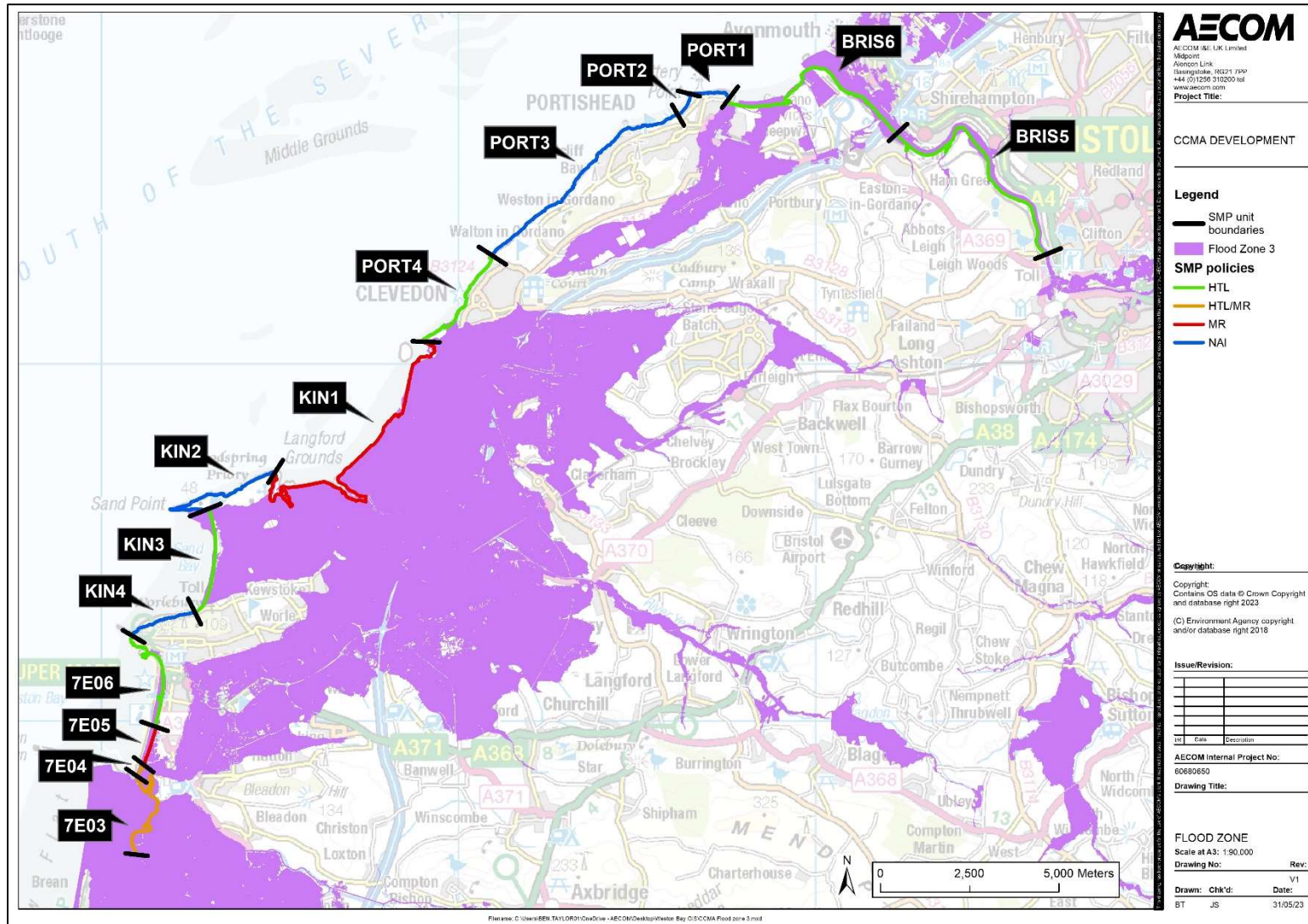


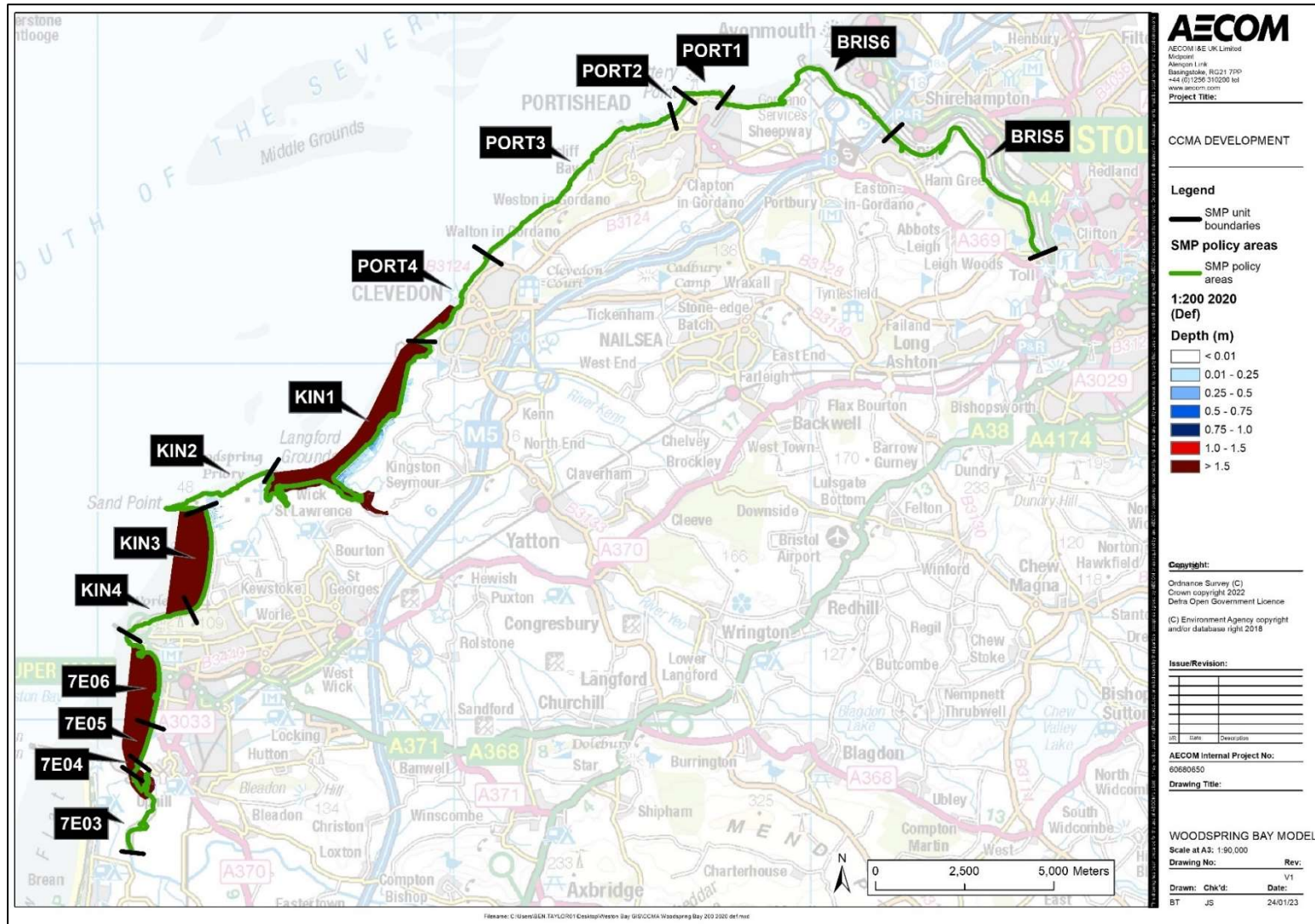
Figure 4-5: Environment Agency Flood Zone 3

4.4.2 Coastal models

Several coastal flood models have been developed for the North Somerset coastline in the past. The most recent of these that covers the majority of the study area is the Woodspring Bay model (2020).

The Woodspring Bay model (2020) covers the main coastal flood cell in North Somerset, in the south-west part of the coastline, between Weston-super-Mare and Clevedon. The model was developed by consultants JBA Consulting in 2020 for the Environment Agency. It includes the risk from tidal inundation, and in some locations also includes wave overtopping boundaries. A range of return periods were modelled for the present day (1:10 year, 1:20 year, 1:30 year, 1:50 year, 1:75 year, 1:100 year and 1:200 year) for both defended and undefended scenarios. Model simulations were also undertaken that included climate change / sea level rise with the 1:200 year return period available for the years 2068 and 2118 (defended and undefended scenarios). However, the sea level rise projections used were based on UKCP09, which has now been superseded by UKCP18.

Figure 4-9 and Figure 4-7 show the modelled depth and extent for the defended 2020 and 2118 scenarios. Figure 4-8 and Figure 4-9 show the depth and extent for the undefended 2020 and 2118 scenarios. As can be seen, the existing standard of protection for the coastal defences in the model domain are high, with very little flooding simulated during the 2020 1:200 year defended scenario. However, over time with anticipated sea level rise the defences standard of protection falls and widespread flooding is anticipated. With the undefended scenarios there is widespread flooding from 2020.



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Figure 4-6: Woodspring Bay model 2020 1:200 year flood depth and extent (defended scenario)

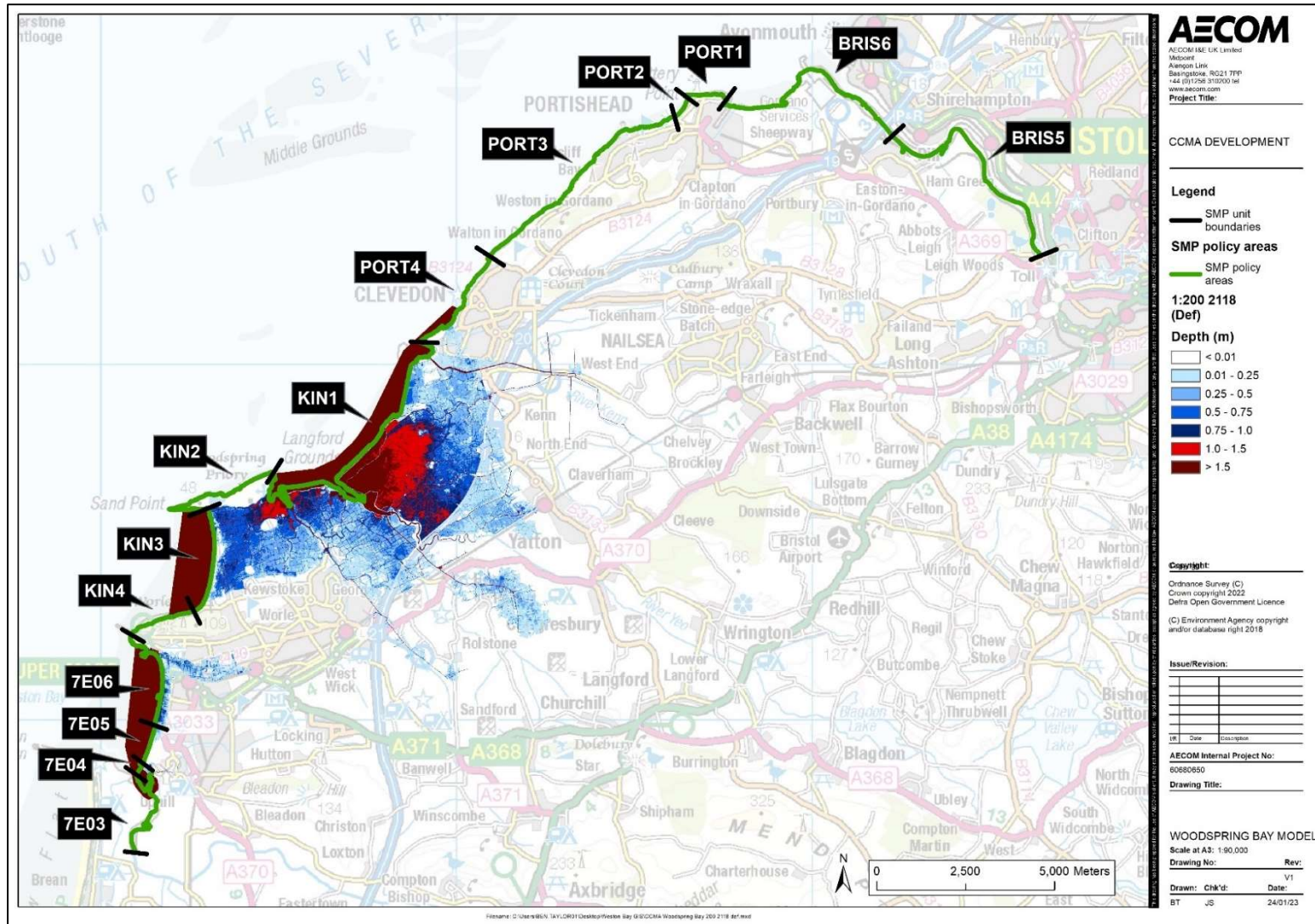


Figure 4-7: Woodspring Bay model 2118 1:200 year flood depth and extent (defended scenario)

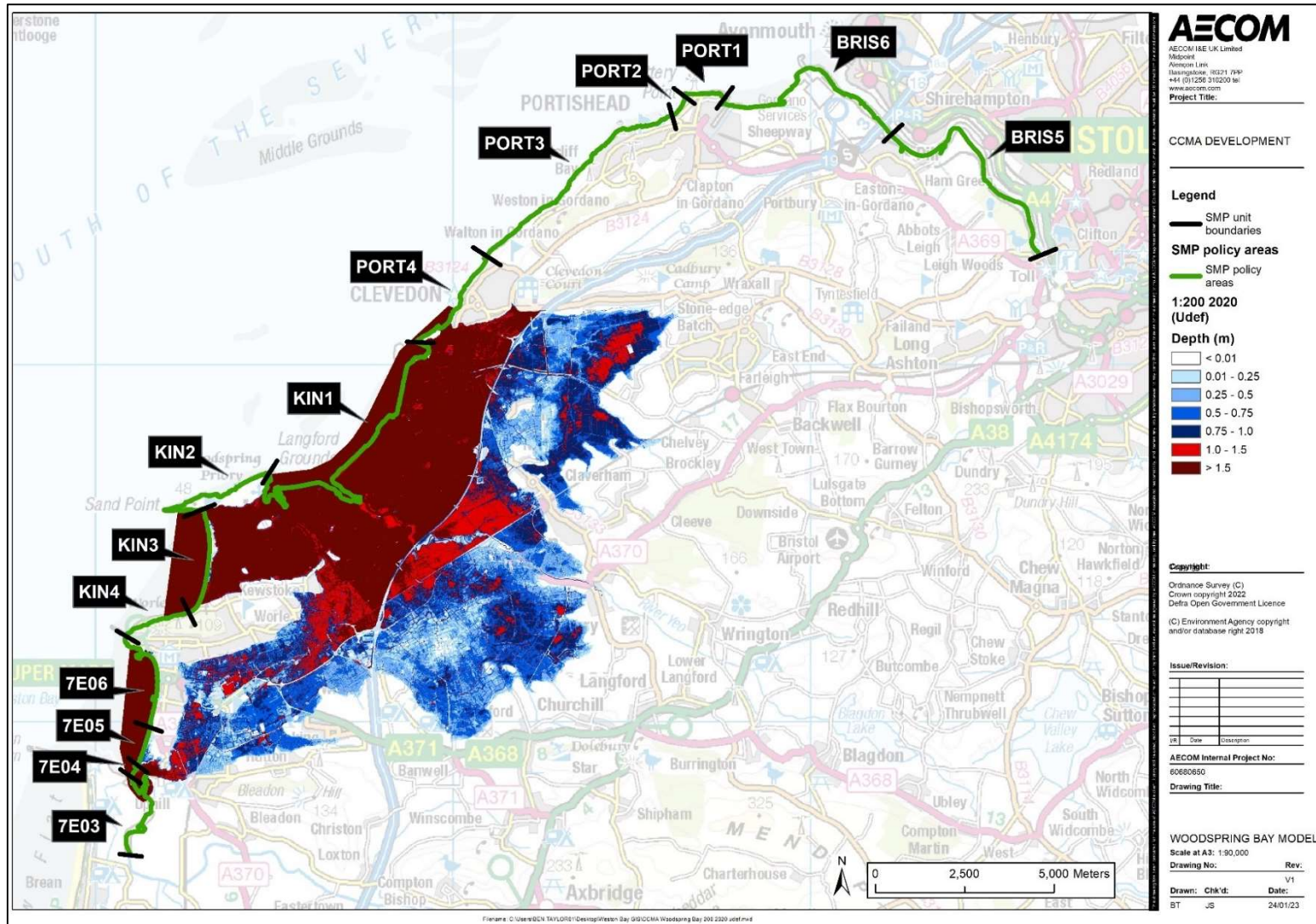


Figure 4-8: Woodspring Bay model 2020 1:200 year flood depth and extent (undefended scenario)

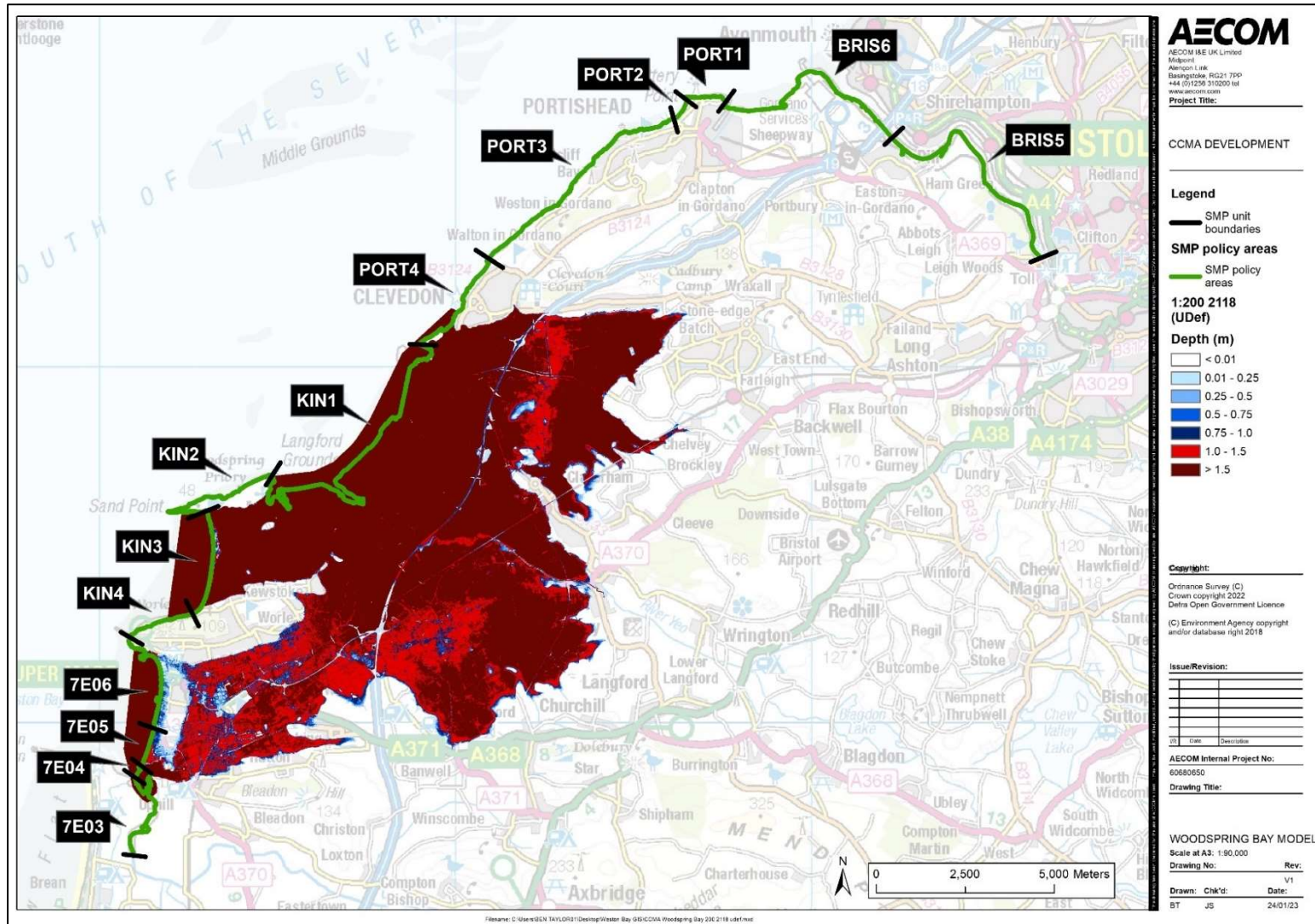


Figure 4-9: Woodspring Bay model 2118 1:200 year flood depth and extent (undefended scenario)

4.4.3 Inundation mapping

To inform the identification of CCMAAs as part of this project a comparison of land levels in North Somerset and tide levels has been undertaken in GIS. The comparison shows the areas of land that are below certain tide levels, indicating the potential areas at risk from tidal inundation should existing coastal defences be removed or fail. The approach is simplistic in nature as it does not account for flood flow mechanisms or other sources of flooding such as wave overtopping. However, for the purpose of defining the CCMAAs the comparison provides useful information of the potential flood risks from a range of tide conditions in an undefended scenario and is similar to the approach suggested by the University of Plymouth CCMA study (2019) reviewed in section 2.3.2.

Flood inundation layers have been created for a range of tide conditions. The following tide levels and return periods have been created:

- Mean High Water Springs (2022, 2072, 2122)
- 1:1 year return period (2022, 2072, 2122)
- 1:10 year return period (2022, 2072, 2122)
- 1:100 year return period (2022, 2072, 2122)
- 1:200 year return period (2022, 2072, 2122)

The base date for the MHWS and extreme water levels used in the analysis is 2017 and the values were obtained from the Coastal Flood Boundary dataset (Environment Agency, 2017). The values change along the coastline so therefore a GIS raster surface was created by interpolating between the values along the coastline. For the 2022 water levels and the water levels in the future time epochs (2072 and 2122), two different sea level rise scenarios were included; the higher central (70th percentile) and upper end (95th percentile) sea level rise projections from UKCP18 RCP8.5. Land levels were obtained from the most recent LiDAR survey data available (2020).

Figure 4-10 shows the extent of potential inundation for the 1:200 year return period for the years 2022 and 2122. The area shaded in purple is the potential inundation extent in year 2022. As can be seen, the area is very similar to the Environment Agency flood zone 3 (shown in Figure 4-5). The area shaded in yellow shows the additional areas that could be inundated by year 2122, accounting for sea level rise. The low-lying topography of the flood cells means that the additional area expected to be at risk by 2122 is comparatively small relative to the area at risk in 2022. However, it is worth noting that the flood depth in the area at risk from 2022 would be expected to increase in line with sea level rise over time, resulting in greater flood damages and more disruption following flood events.

Figure 4-11 shows the extent of potential inundation for the MHWS tidal level for the years 2022 and 2122. As can be seen, a large part of North Somerset is below the MHWS tide level and the area of potential inundation extent for MHWS is similar in shape to the areas at risk from the 1:200 year return period. This figure further illustrates the low-lying nature of the North Somerset topography and indicates how important the existing defences are in preventing widespread and frequent inundation of the area.

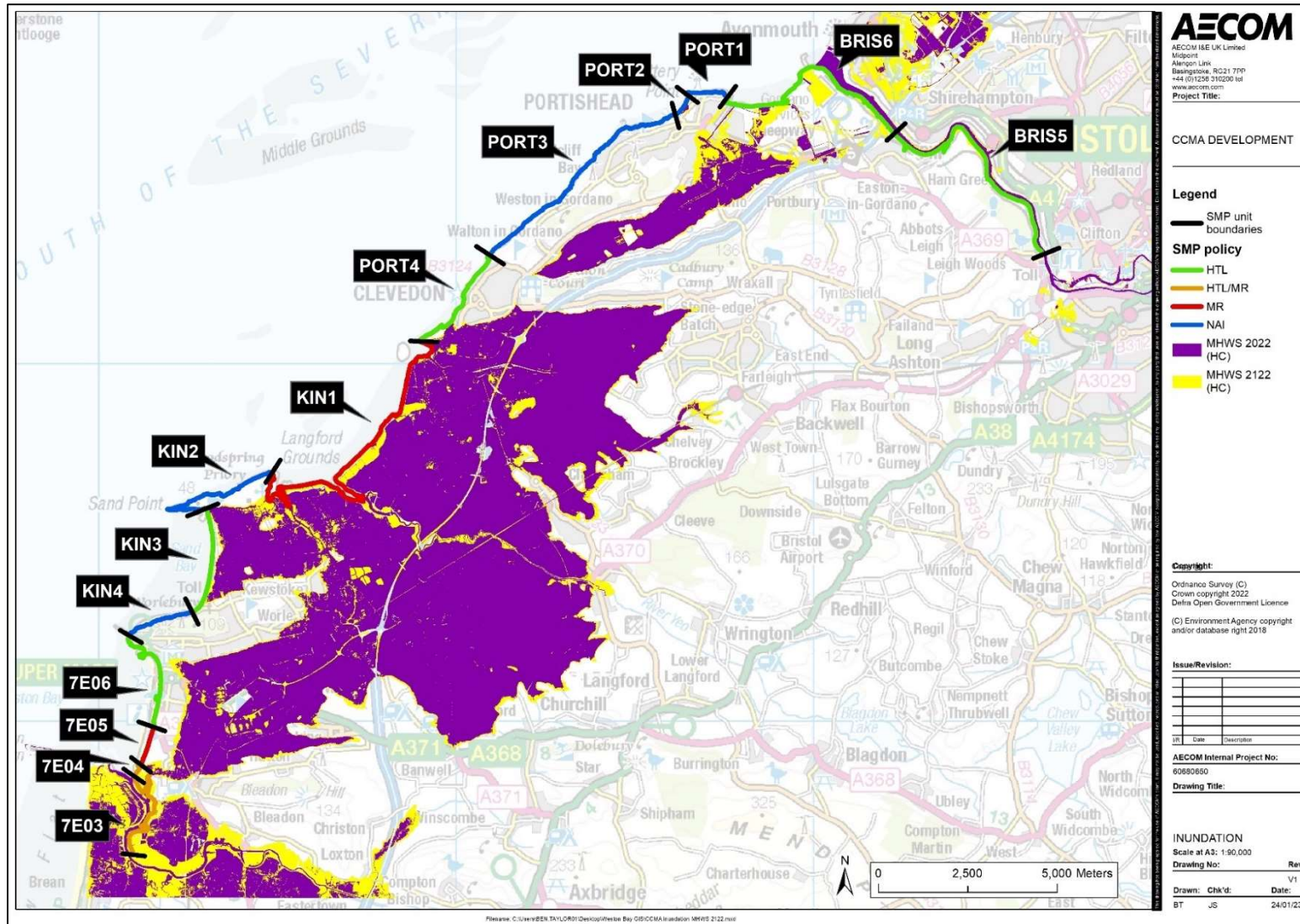


Figure 4-11: Comparison of land elevations against the MHWS tidal water level (2022 and 2122 using higher central sea level rise allowance - HC)

4.5 Managed Realignment Areas

Section 4.1 outlines the SMP policies for the North Somerset coastline. Significant parts of the coastline have a Managed Realignment policy. This section reviews any work that has been undertaken in establishing potential Managed Realignment sites and new inland defence alignments during and following the SMP. This information will feed into the decision making process for defining the CCMA's, particularly the landward extent.

4.5.1 Policy units 7E03 and 7E04

Policy units 7E03 and 7E04 are on the east bank and mouth of the Axe estuary. The policy units are within SMP 18 (Hartland Point to Anchor Head) and have a policy to initially Hold the Line but to investigate opportunities for Managed Realignment. If the investigations find that Managed Realignment is feasible then this will be implemented. Any new setback defences will be held in place thereafter to ensure continued flood and erosion risk benefits to the areas landward of the new defences.

SMP 18 does not include any information on potential new defence alignments for the Managed Realignment policy areas and at the time of writing this report no further work has been undertaken to identify potential new defence alignments around the Axe Estuary. Further work is currently planned by the Environment Agency to investigate the long term plan for the Axe banks but this work will not be completed / available for a number of years.

In the SMP, the economic case for the policies in 7E03 and 7E04 appear to be viable. The policy in 7E03 has a benefit-cost ratio of 16.45 which is far above unity and suggests that there is a robust economic case for the delivery of the SMP policy. In contrast, the policy in 7E04 has a benefit-cost ratio of 1.5. Whilst this is above unity, it is marginal and therefore the policy does not have such a strong economic case as policy unit 7E03. With the recent price rises and inflation pressures, it remains to be seen if the economic case for this policy is viable. When delivering the policies in these units, it may be possible to deliver as one scheme, helping to improve deliverability, provide cost efficiencies and a more robust economic case for both areas.

4.5.2 Policy unit 7E05

Policy unit 7E05 covers the sand dune area between Weston-super-Mare and Uphill. The policy unit is within SMP 18 (Hartland Point to Anchor Head) and has a policy of Managed Realignment. The intent of this policy is to allow natural coastal evolution to continue as far as possible, undertaking dune monitoring and management as required. If monitoring identifies that the dunes are at risk of breaching, then the plan would be to construct a secondary defence embankment.

SMP 18 does not include any information on potential new defence alignments for the sand dunes or for a secondary defence in this area.

As outlined in the updated Weston-super-Mare beach and dune management plan (AECOM, 2022), with the Managed Realignment policy the sand dunes could evolve in a number of ways in the future in response to sea level rise:

- The sand dunes could migrate inland over time. The sand dunes are located seaward of the golf course which is a large area of open space that would not constrain the movement of the sand dunes provided wind-blown sand and new vegetation growth was not removed.
- The sand dunes could maintain their position but get narrower over time as the seaward face is eroded.
- The sand dunes could increase in width and accrete seaward over time.

In the event that the dune monitoring indicated that the dunes were at increased risk of breaching, the SMP outlines how a new defence structure should be constructed inland to provide a secondary line of defence and reduce the risk of inland flooding should the dunes breach. As part of the updated beach and dune management plan, the potential for a secondary defence alignment along A370 road, on the landward side of the golf course was considered. This would result in the golf course being at risk of flooding if the dunes were to breach but would help manage the flood risk to the residential and urban areas further inland. Further detailed appraisal or design was not undertaken on this defence alignment and further studies are required to confirm the most appropriate defence alignment in this location.

In the SMP, the economic case for the Managed Realignment policy in 7E05 had a benefit-cost ratio of over 100, suggesting a very robust economic case with a high likelihood of attracting significant central government funding. However, it is not clear if this includes costs for a potential new setback defence alignment. Even with a setback alignment included, the benefit-cost ratio would still be expected to exceed unity and remain economically viable.

4.5.3 Policy unit KIN1

Policy unit KIN1 covers the area between Clevedon to St Thomas' Head, including the Congresbury Yeo estuary. The policy unit is within SMP 19 (Anchor Head to Lavernock Point) and has a policy of Managed Realignment. The intent of the option varies over time:

- In the short term the current defences along the open coast (reinforced earth embankments) are expected to remain in place. Managed Realignment should be focussed on the area around Congresbury Yeo.
- In the medium term, the current defences along the open coast are expected to come to the end of their service life. Therefore Managed Realignment should focus on the creation of new, realigned defences along the open coast shoreline, specifically to the north (Commissioner's Bank) and south of Congresbury Yeo. This will enable new intertidal habitat to be created.
- In the long term, the new realigned defences should be maintained and further Managed Realignment along the open coast shoreline to the north (Commissioner's Bank) and south of Congresbury Yeo should be considered as and when the defences created in the previous epoch need to be replaced.

SMP 19 does not include any further information on potential defence alignments for the realigned defences that are suggested as part of the SMP policy. It was noted in the SMP that a project was being undertaken at the time of writing the SMP that was investigating potential realignment areas. It is understood that this was referring to the Severn Estuary Flood Risk Management Plan. This plan was never formally approved or adopted and has not been made available for this project.

In 2015, the Environment Agency completed a scheme that improved the standard of protection to the tidal defences around the Congresbury Yeo, raising the defences to provide a consistent 1:75 year SoP. In 2023 the Environment Agency are starting on a detailed study (including updated modelling) to investigate adaptation options for Kingstone Seymour and Clevedon. The findings of this study will not be ready or available to inform the CCMA's.

In the SMP the economic case for the Managed Realignment policy in KIN1 is very robust. Given the joined up flood cell between policy units KIN1, KIN3 and KIN4, the economic case for the policies in all three units was combined in the SMP. The benefit-cost ratio for these units was in excess of 200, indicating a strong economic case that is likely to attract significant central government funding to deliver it. The total cost for delivering the policy in all three areas was estimated to be approximately £15million, although it is now recognised that this value may be low given the recent inflation and industry cost increases that have occurred since the SMP was developed

4.5.4 Summary

In summary, since SMP 18 and SMP 19 were completed, little progress has been made in defining the alignments for new defences in the areas where the policy is Managed Realignment. Further work to investigate Managed Realignment and potential alignments is planned by the Environment Agency but is unlikely to be completed in time to inform the CCMA development process for North Somerset.

4.6 Local Plans and Strategies

This report will feed into the Local Plan 2038 that is currently being developed by North Somerset Council. The Local Plan 2038 will provide information on development between 2023-2038.

Consultation on the emerging Local Plan 2038 has been undertaken. In March-April 2022 consultation on the Preferred Options took place. During this period a range of consultation methods were used to inform the public of the consultation and create momentum in the process.

The emerging plan includes proposed residential and employment sites. An interactive map showing the locations of the sites can be found at <https://map.n-somerset.gov.uk/LocalPlan2038.html>. Figure 4-12 and Figure 4-13 below show the maps. The majority of proposed residential sites are in Weston-super-Mare, to the east of Weston-super-Mare near Locking, Clevedon, and to the east of the M5 at Congresbury and Nailsea. The proposed employment sites are in mainly in Weston-super-Mare, Clevedon and Portishead.

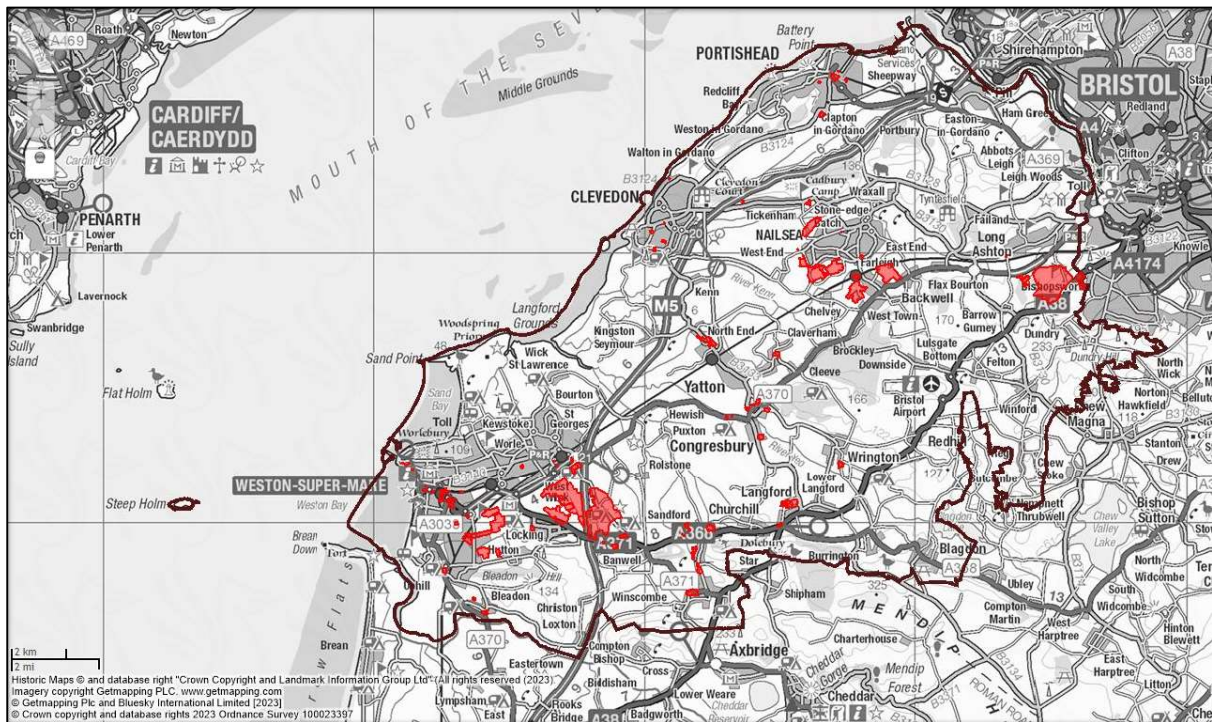


Figure 4-12: Local Plan 2038 – proposed residential sites (highlighted in red). Image obtained directly from <https://map.n-somerset.gov.uk/LocalPlan2038.html>

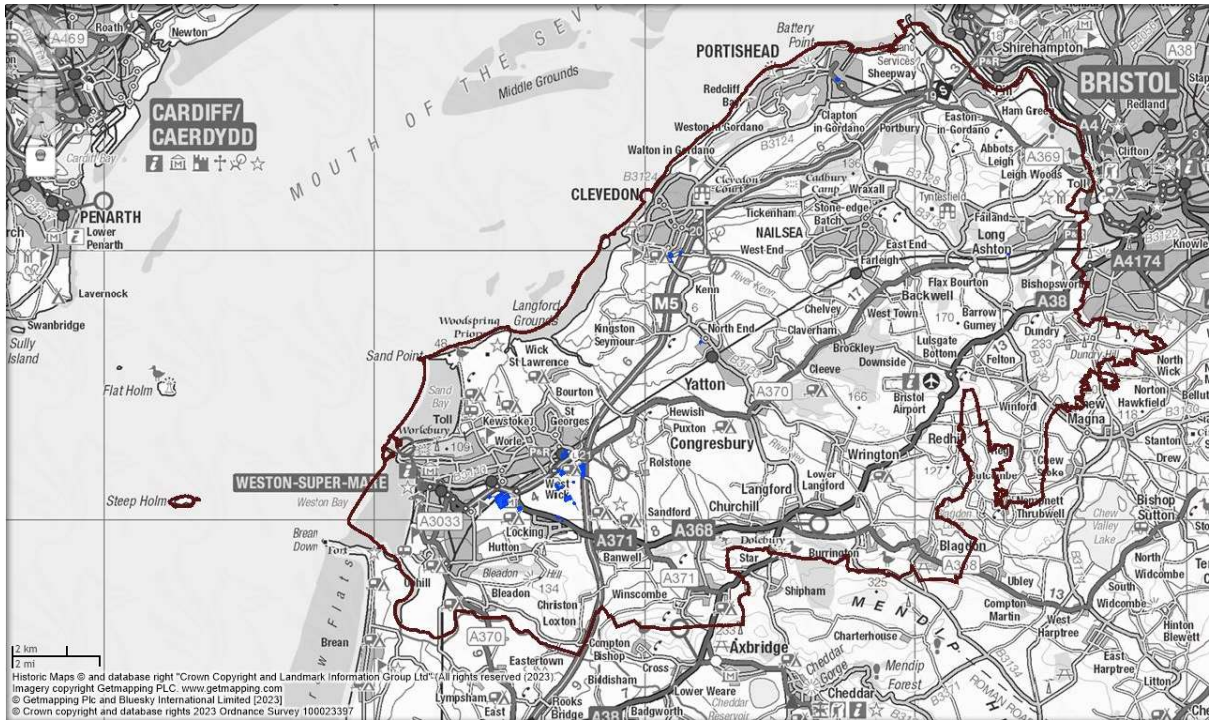


Figure 4-13: Local Plan 2038 – proposed employment sites (highlighted in blue). Image obtained directly from <https://map.n-somerset.gov.uk/LocalPlan2038.html>

4.7 Other Key Datasets

A range of other data may be relevant when defining CCMA's. These include environmental datasets such as boundaries of environmental designations, data about historic landfill sites or areas of potentially contaminated land, and data on key infrastructure. This section provides an overview of relevant available data.

4.7.1 Environmental designations

There are many key environmental designations within North Somerset. Figure 4-14 shows the location of designations including Sites of Special Scientific Interest, Ramsar Sites, Local Nature Reserves, Special Areas of Conservation and Special Protection Areas. Many other designations are also located within North Somerset, including conservation areas and historic and heritage designations such as listed buildings and monuments.

4.7.2 Potentially contaminated land

No data is available at the time of writing relating to sites of historic landfill or potentially contaminated land. Whilst not essential for the identification of CCMA's, knowledge of where historic landfill sites or sites of potentially contaminated land may be located within North Somerset should inform areas of Managed Realignment in future studies.

5. Methodology

This section outlines the proposed methodology for identifying CCMA within North Somerset. The methodology has been developed in line with the best practice approaches used elsewhere in England and the latest updates to the Planning Practice Guidance. In developing the approach it has been imperative to consider the site specific characteristics of North Somerset to ensure that the methodology is appropriate and can supplement the Local Plan development.

5.1 CCMA Identification Methodology

The methodology is split into three key steps that are discussed below. Step 1 involves reviewing the SMP policy and economic case of each part of the coastline. Step 2 involves identifying the key coastal risk to each part of the coastline (e.g. coastal flood risk, coastal erosion risk, or both). Step 3 involves deciding on the boundaries of each CCMA designation, such as the landward extent.

5.1.1 Step 1: Review SMP policy and economic case

The first step in the process is to review the SMP policy and indicative economic case for each part of the coastline. This should be done on a policy unit by policy unit basis.

As per the Planning Practice Guidance, all policy units with either a No Active Intervention or Managed Realignment policy at any time during the SMP period should have a CCMA developed.

Where the SMP policy is either Hold the Line or Advance the Line, it is also imperative to consider the potential funding availability and economic case of these areas. The economic case of implementing these policies should be reviewed as part of the methodology and information on the benefit-cost ratio can be found in the SMP appendices. A high benefit-cost ratio does not guarantee funding to implement the policy, but it can indicate whether a higher proportion of FCERM Grant in Aid (GiA) may be available and whether funding may be more likely than not.

In the methodology any policy units that have either a Hold the Line or Advance the Line policy and a benefit-cost ratio less than 20:1 should be taken forward to the next stage and have a CCMA developed. Any policy units that have a benefit-cost ratio greater than 20:1 for a Hold the Line or Advance the Line policy can be excluded from further consideration and do not need a CCMA. The use of a benefit cost ratio value of 20:1 has not been obtained from any guidance or research. However, it has been introduced as part of this methodology as a way of screening SMP policies that are likely to have a higher or lower chance of being funded, and therefore delivered.

The justification for the 20:1 benefit cost ratio value is that a scheme with a benefit cost ratio of 20:1 (based on SMP level economics) is likely to generate a Partnership Funding score in excess of 50%, excluding any potential Outcome Measure 2 (residential properties at risk), Outcome Measure 3 (erosion risk) or Outcome Measure 4 (environmental impacts) benefits. This assumes that the scheme has been developed in compliance with the FCERM Appraisal Guidance and Partnership Funding rules. Whilst a Partnership Funding score of 50% would not result in a full funding from FCERM-GiA, a policy with a score around this level or above would typically be expected to have a reasonable chance of attracting supplementary funding from funding partners to help make up the funding shortfall. This is not guaranteed and the situation will vary by the location, the beneficiaries and the funding partner objectives, but on balance it seems a reasonable screening threshold to use for the purpose of this methodology where there are a range of uncertainties surrounding the economic case of schemes / policies.

It is recognised that using a 20:1 benefit cost ratio or greater to screen funding viability is subjective and somewhat crude and there are uncertainties associated with this approach. However, in the case of North Somerset there is no further information on the economic viability of the SMP policies. More detailed work including Coastal FCERM Strategies or Business Cases, that typically include more detailed economic information have generally not been developed in enough detail or approved by the Environment Agency. The exception is along the River Avon where a Flood Risk Management Strategy has been developed and is close to completion (the business case is being written at the time of writing this report). One of the key objectives in developing the methodology was to make it straightforward and easy to apply, and whilst there are uncertainties with the approach, the 20:1 benefit cost ratio screening criteria is a quick and simple approach to infer the potential funding availability and deliverability of the SMP policies along the North Somerset coastline.

It is worth noting that on initial inspection some of the costs for the policies in the SMP appear low relative to the potential lengths of defences that may be required. If costs are higher than anticipated in the SMP, this has the potential to reduce the benefit cost ratios and reduce the viability of the SMP policies. However, in the absence of more detailed FCERM Strategies or Business Cases for the majority of the frontage, no further information on the economic case of the SMP policies is available. It has therefore been necessary to use the SMP economic information in the development of the CCMA, but it is recognised that the CCMA areas may need adjusting in the future if updated information on costs and benefits becomes available through further studies.

Figure 5-1 presents the key decisions in step 1. Figure 5-2 presents the results of applying step 1 of the methodology to the North Somerset coastline. As can be seen, the majority of policy units are taken forward to the next stage for a CCMA to be developed. Policy units 7E06 (Weston-super-Mare frontage), KIN3 (Sand Bay) and BRIS6 (Portbury) are not taken forward to the next stage. Each of these areas has a Hold the Line Policy with a benefit-cost ratio in the SMP of greater than 20:1.

Note that BRIS6 (Portbury) includes Portbury Nature Reserve. The project team considered the merits of including a CCMA in this area to cover the nature reserve. However, it was decided not to do so as development in the vicinity of the nature reserve would be subject to broader planning decisions relating to the impact on the nature reserve and environment and therefore would not rely upon a CCMA designation to manage appropriate development.

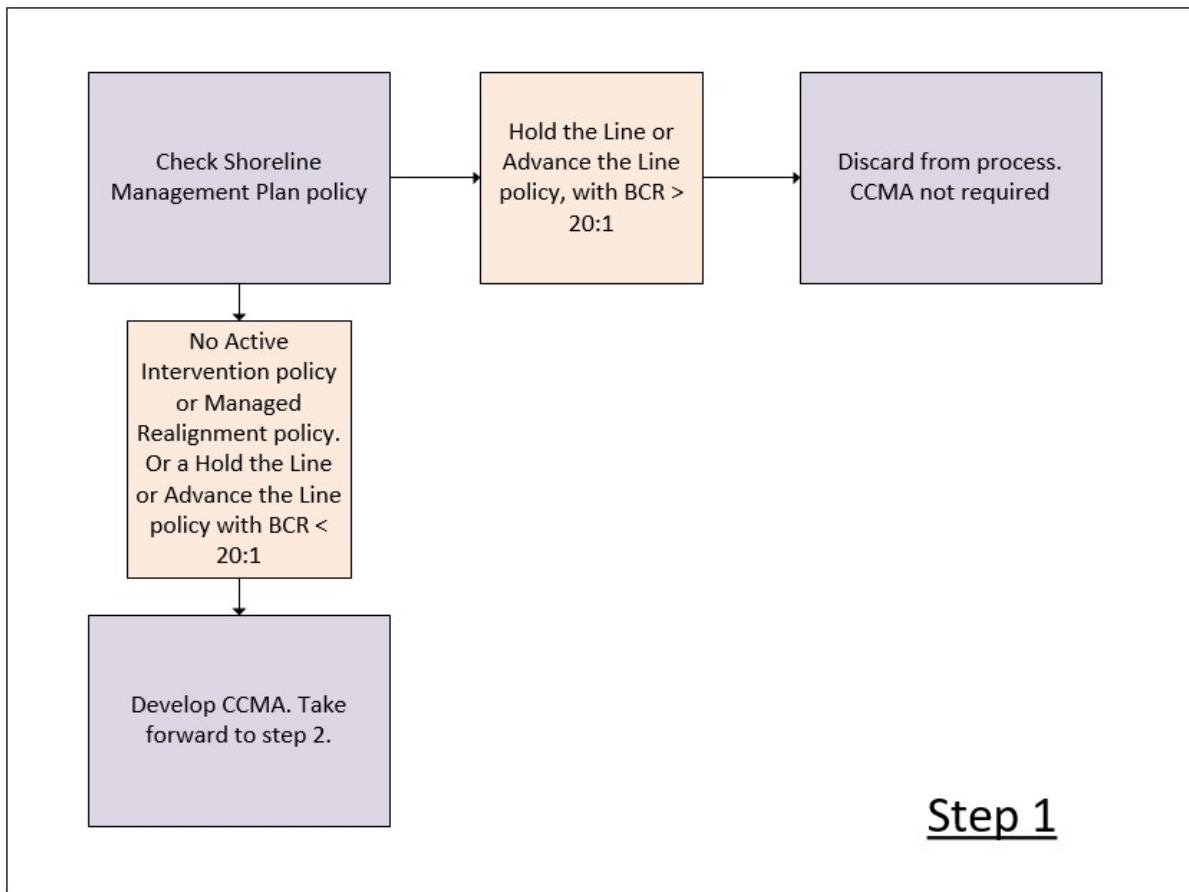


Figure 5-1: Summary of Step 1

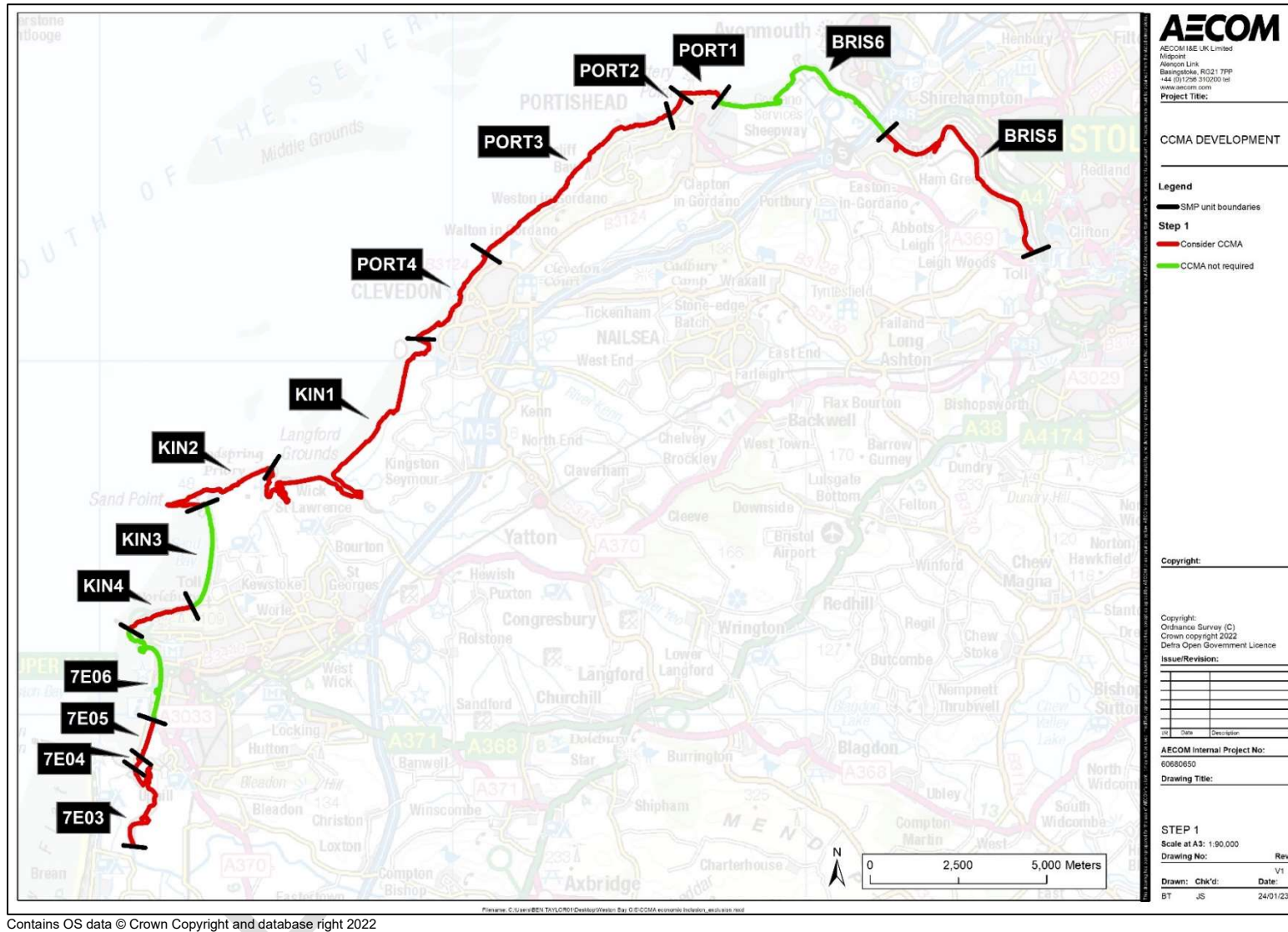


Figure 5-2: Policy units excluded at step 1 or taken forward to step 2

5.1.2 Step 2: Identify key risk

The second step in the process is to identify the key coastal risk for each of the policy units brought forward from step 1. The coastal risk can be from coastal flooding, coastal erosion or from both.

Coastal flooding should be identified as the key risk if a policy unit has areas of land at risk from coastal flooding, as determined by the 1:200 year inundation map for 2122 (see Figure 4-10) or from the Environment Agency flood zone 2. If a policy unit is not at risk from coastal flooding, then it is assumed that the key risk will be from coastal erosion. Given the inconsistent coverage of the NCERM dataset in the study site, the policy unit does not need to have projected erosion rates from the NCERM to be considered at risk from erosion. In addition, some areas may be subject to both flood and erosion risk. For example, parts of the policy unit may have areas at risk from flooding with other areas just at risk from erosion.

In the context of this methodology, the presence of coastal defences should not influence whether a policy unit is considered to be at risk or not. All the policy units taken forward to step 2 have either a No Active Intervention policy, a Managed Realignment policy or have a Hold the Line policy that has uncertain funding availability. In all of these cases existing coastal defences may not be present in the future along the existing shoreline position.

Figure 5-4 presents the results of applying step 2 of the methodology to the North Somerset coastline. Coastal flooding is the key risk in policy units 7E03, 7E04, 7E05, KIN1 and PORT2. Coastal erosion is the key coastal risk in KIN4, KIN2, PORT3 and PORT1. Policy units PORT4 and BRIS5 have areas at risk from flooding but not across the full coastal frontage. The areas within these units that are not at risk from flooding are potentially at risk from erosion so therefore these units are classified as having both risks.

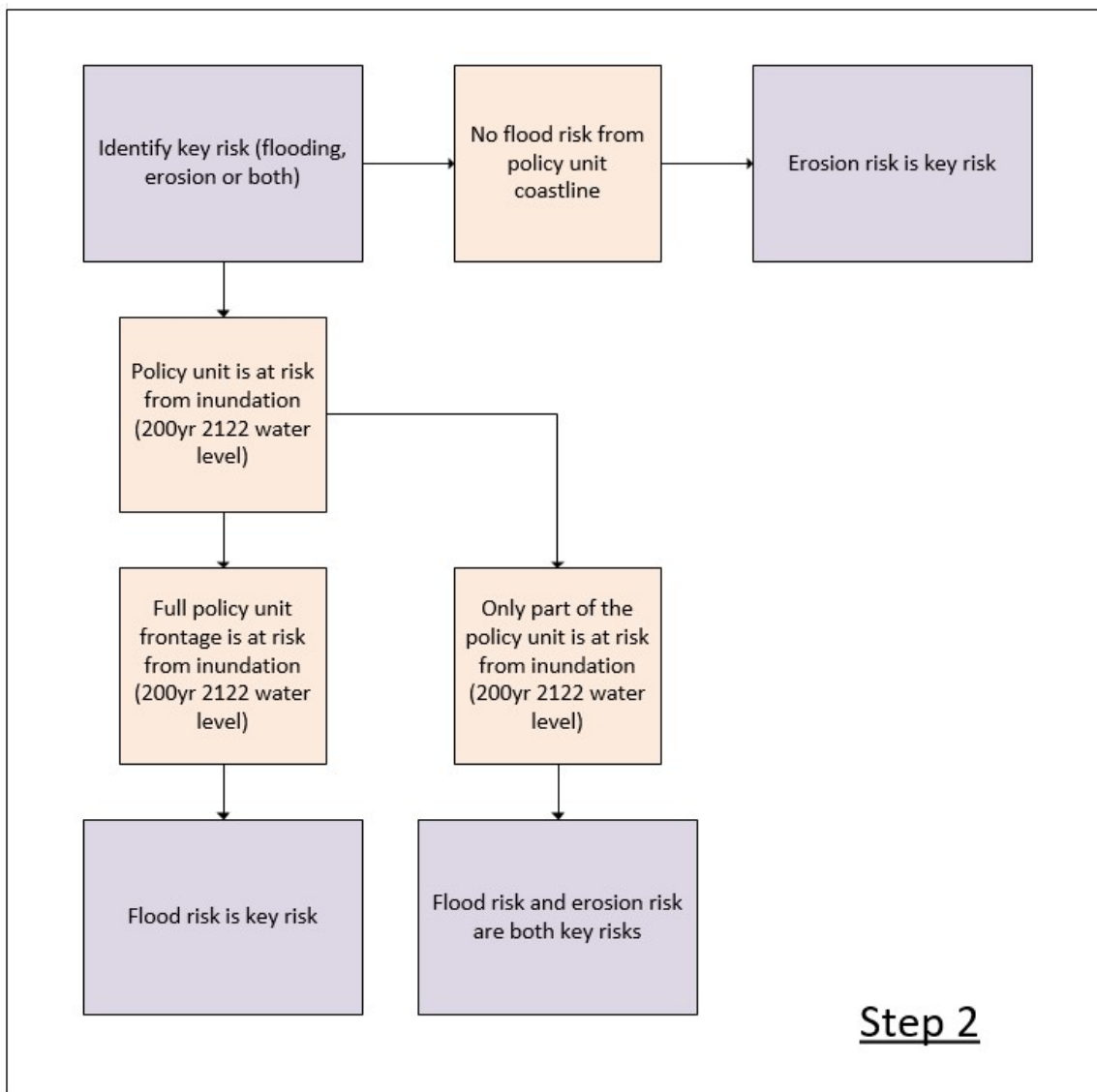


Figure 5-3: Summary of Step 2

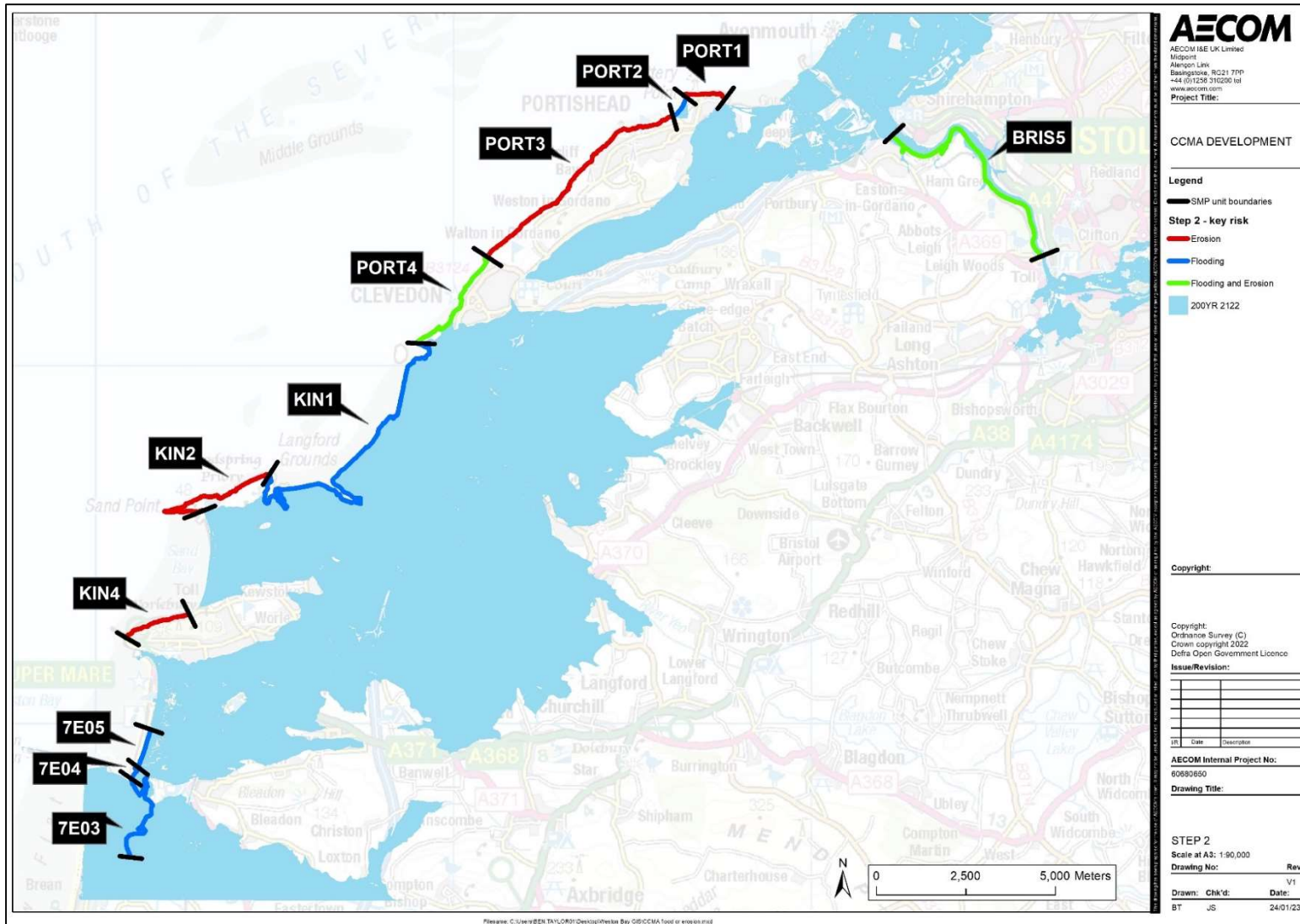


Figure 5-4: Key coastal risks identified for each policy unit in step 2

5.1.3 Step 3: Define boundaries of CCMA

The final step of the methodology is to define the boundaries of each CCMA. Different approaches to defining the boundaries need to be followed depending on the key risk and the SMP policy at each location around the coastline.

The offshore boundary of the CCMA areas has been placed at the boundary of the North Somerset Council unitary district area. On the open coast the offshore boundary is typically at approximately the low water mark, on the River Axe it is on the east bank of the river and on the River Avon it is on the west bank of the river. The North Somerset Council unitary district area was obtained from the Ordnance Survey Boundary line dataset, available to download on the Ordnance Survey website.

Areas with key risk from flooding and No Active Intervention Policy (PORT2)

In policy units where the SMP policy is No Active Intervention and the key risk is from flooding, the extent of the projected inundation area for the 1:200 year return period in 2122 should be used to define the landward boundary of the CCMA. As per the University of Plymouth CCMA methodology (2019) for floodable estuaries, a 0.25m vertical buffer to the landward boundary should be also applied to the inundation area to account for LiDAR and water level uncertainties.

Policy unit PORT2 has a No Active Intervention policy with a key risk from flooding and therefore this approach will be applied here.

Areas with key risk from flooding and Managed Realignment Policy (7E03, 7E04, 7E05 & KIN1)

In policy units where the SMP policy is Managed Realignment at any point within the SMP period and the key risk is from flooding, the CCMA boundaries should be defined using a best estimate of the maximum potential Managed Realignment area. As outlined in section 4.5.4, since SMP 18 and SMP 19 were completed, little progress has been made in defining defence alignments for the Managed Realignment policy units. Therefore, as part of this project a high level working estimate of the maximum potential extent of realignment has been developed using a combination of the inundation mapping, the location of key settlements, key infrastructure (e.g. M5 motorway) and natural features (e.g. river channels).

The Managed Realignment extents have been developed in collaboration with North Somerset Council (FCERM team and planners) and the Environment Agency. The extents represent the maximum potential area that could realistically be realigned without leading to a loss of key settlements, infrastructure or environmental designations. In practice, when Managed Realignment schemes are developed in the future it is likely that the realignment may cover significantly smaller areas, but for the purpose of defining CCMA in this project a precautionary approach has been adopted.

Policy units 7E03, 7E04, 7E05 and KIN1 all have a Managed Realignment policy with a key risk from flooding and therefore this approach will be used.

Areas with key risk from erosion and No Active Intervention policy (KIN4, KIN2, PORT3 & PORT1)

Policy units KIN4, KIN2, PORT3 and PORT1 have a No Active Intervention policy and the key risk is from coastal erosion. Different approaches should be used to define the CCMA boundaries depending on what erosion data is available in each location.

In policy units that have erosion rates from the NCERM dataset, the erosion zones generated from this data should be used in the first instance to define the landward boundary of the CCMA. As per the University of Plymouth CCMA methodology (2019), a horizontal buffer should be applied to the NCERM erosion zones. The maximum distance of either a 10m horizontal buffer or a variable horizontal buffer of 10% of the projected retreat distance should be applied to define the CCMA boundaries. Policy units KIN4 and PORT1 have NCERM erosion rates and therefore this approach will be applied in these locations.

Policy units KIN2 and PORT3 do not have NCERM erosion rates and therefore a different approach is required to define the CCMA boundaries. Both policy units are undefended cliff lines characterised by hard geology that is more resistant to erosion. Alternative erosion datasets (such as SMP erosion zones) are not available to use and estimating erosion rates based on historical retreat distances would be challenging due to the hard geology in these locations. Instead a precautionary high level buffer of 50m should be applied from the existing coastline position to determine the CCMA boundaries in these locations.

There is limited scientific basis for using the 50m buffer, but it provides a conservative approach in the absence of erosion information. The 50m erosion distance is several times the erosion of the NCERM dataset where it is available in nearby policy units (for example in KIN4, PORT 1). It is recommended that in future iterations of the CCMA and the Local Plan that more detailed assessment following an evidence based approach is adopted to estimate the rates of erosion in these locations. Compared to the rates of erosion in nearby areas where NCERM erosion rates are available (KIN4 and PORT1), the 50m buffer significantly exceeds the maximum erosion distance projected over the next century, and is therefore likely to be an overestimate in areas with similar geology and coastal processes. For example the total NCERM erosion distance over the next century is <10m for KIN4 and PORT1. The 50m buffer also allows for suitable space for development footprints landward of the buffer zone should they occur.

Areas with risk from flooding and erosion with a Hold the Line Policy (uncertain economic case) (PORT4 & BRIS5)

Policy units PORT4 and BRIS5 have a Hold the Line policy but there is uncertainty around the economic case (benefit-cost ratios < 20:1) which could make delivering and/or funding the policy more challenging. PORT4 has defended sections and also undefended cliffs of hard geology. BRIS5 is largely undefended and is comprised of natural high ground adjacent to the River Avon.

There are areas of flood risk within both policy units and the entirety of each policy unit may also be at risk from erosion. In the areas of each policy unit which are at risk from flooding, the key risk has been classified as flood risk. In the areas of each policy unit where there is no or limited flood risk, the key risk has been classified as being from erosion.

In the flood risk areas within each policy unit, different approaches could be used to define the CCMA boundaries, including:

1. Use the extent of the 1:200 year return period flooding and 0.25m vertical buffer to define the CCMA boundaries (similar to areas with No Active Intervention policy)
2. Assume that all developed areas would be defended from flooding in the future. Assign a CCMA area to the areas of undeveloped land / open space between the coastline and any inland development.

With the second of these approaches, there is a risk that defences in the future may not be funded which could result in a much wider area of coastal risk compared to the CCMA extent. The decision on which approach to adopt in each policy unit was discussed with North Somerset Council (FCERM team and planners) and the Environment Agency. It was agreed that for both areas the second approach would be used, accepting the risks associated with this approach and making a provision to reconsider the CCMA areas as new information becomes available. The rationale for adopting this approach in each location is described below:

- PORT4: the flood cell in PORT4 is part of the wider flood cell coming from the adjacent policy unit at KIN1. The policy in KIN1 is for Managed Realignment which appears to have a strong economic case (benefit-cost ratio of 211:1). In order to deliver the Managed Realignment policy in KIN1, either the existing defences will need to be maintained in PORT4, or new setback defences will be required in PORT4. Given the economic case and strategic importance of delivering the Managed Realignment policy in KIN1, maintaining existing defences or constructing new setback defences in PORT4 are thought to be likely as part of an overall scheme in this location.
- BRIS5: the areas at risk from flooding in this policy unit are generally constrained to small areas adjacent to the River Avon channel. The majority of these areas are currently undeveloped, open space or woodland. The exception is at the settlement of Pill which is an urban area and has existing flood defences along the river bank. Pill is covered by the Bristol Avon Flood Strategy that is nearing completion and the preferred option for the Pill area is to replace / improve the existing defences. This provides greater confidence that the Hold the Line policy can be delivered at Pill.

In the areas within each policy unit that are not at risk from flooding, the key risk is from erosion. In these locations the NCERM data does not include any erosion rates and therefore a 50m buffer has been applied to the existing shoreline position to determine the CCMA boundaries. Where the 50m buffer extends further inland than any areas of flooding, the 50m buffer was used. There is limited scientific basis for using the 50m buffer but it provides a conservative approach in the absence of any further information and makes no assumptions that any existing defences in the non-flood risk areas will continue to be maintained. If erosion predictions are generated for these locations in future studies it is recommended that the CCMA boundaries are updated and refined accordingly.

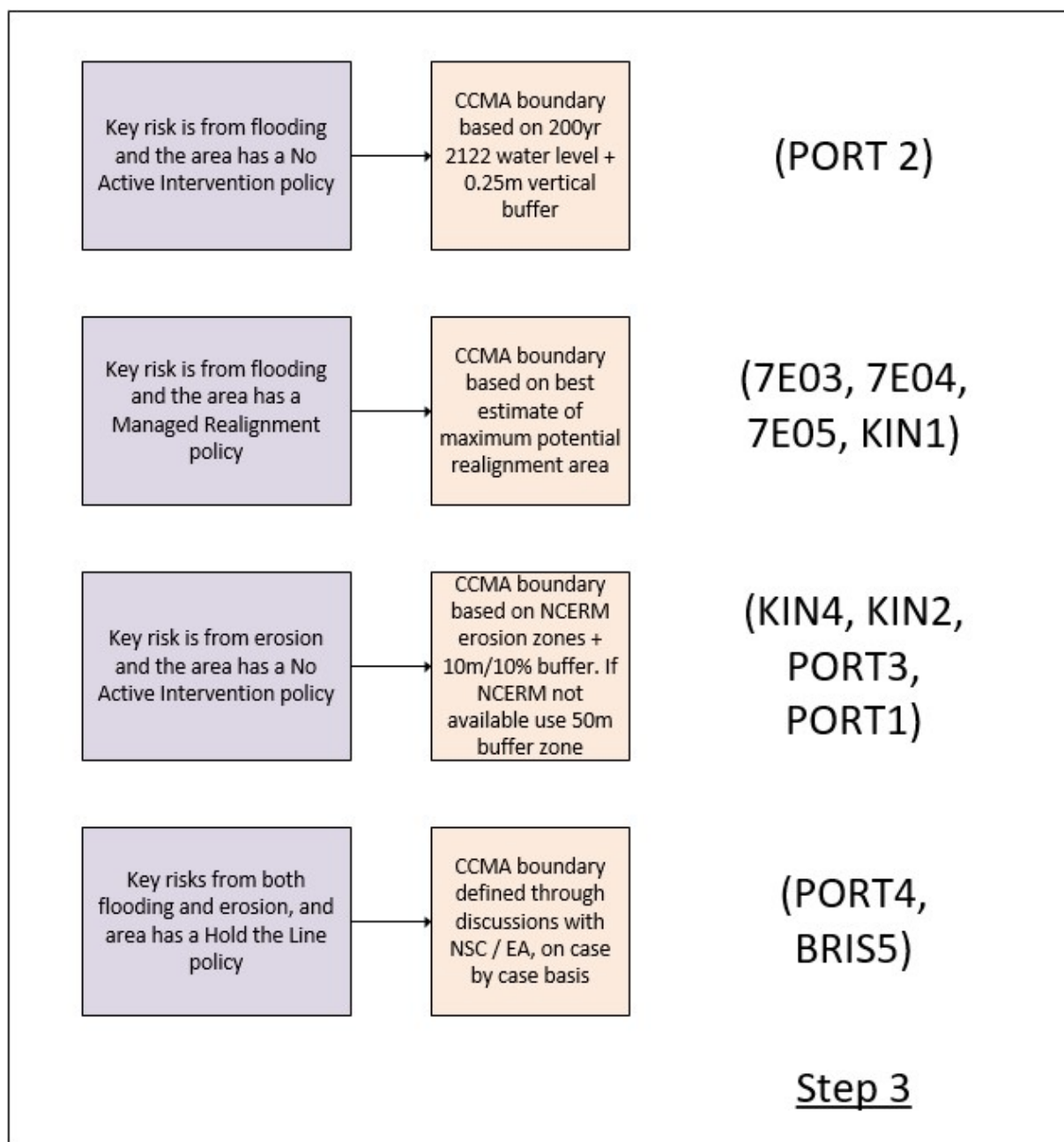


Figure 5-5: Summary of Step 3

6. CCMA Identification

This section presents the proposed draft CCMA's in North Somerset. The CCMA's are not final and will need to be further assessed and confirmed as part of the Local Plan development process.

In total 11 CCMA's have been defined. Figure 6-1 shows the locations of the CCMA's. More detailed figures of each CCMA follow in the remainder of this section.

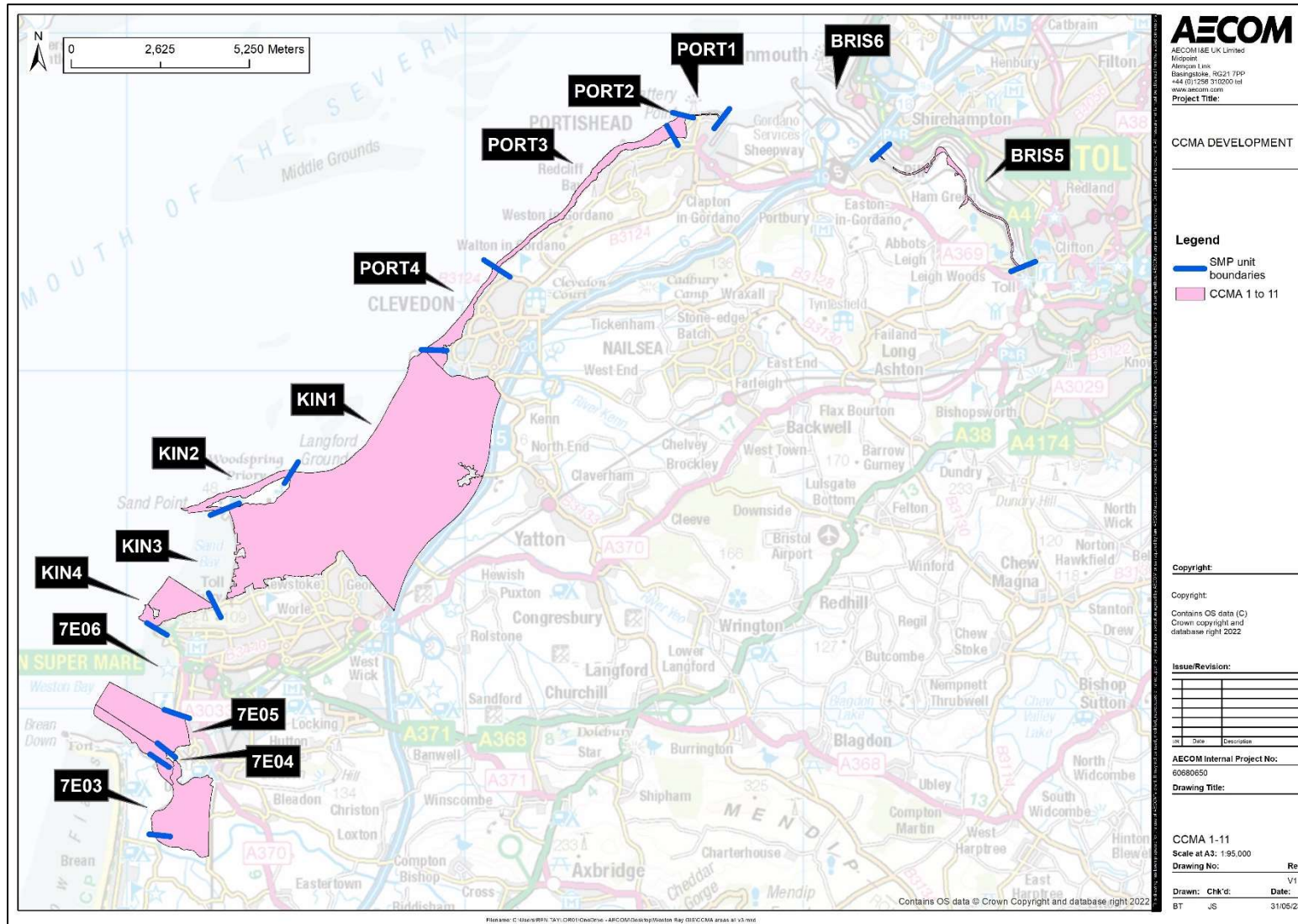


Figure 6-1: CCMA 1-11

6.1 CCMA 1 (Policy Unit 7E03)

CCMA 1 is in policy unit 7E03 which has a policy that includes Managed Realignment. Figure 6-2 below shows the proposed boundaries. The boundaries were determined by using a best estimate of the maximum potential managed realignment area.

6.2 CCMA 2 (Policy Units 7E03 & 7E04)

CCMA 2 is in policy unit 7E03 and 7E04 which have a policy that include Managed Realignment. Figure 6-3 below shows the proposed boundaries. The boundaries were determined by using a best estimate of the maximum potential managed realignment area (rather than assuming specific proposed future alignments).

6.3 CCMA 3 (Policy Unit 7E05)

CCMA 3 is in policy unit 7E05 which has a policy of Managed Realignment. Figure 6-4 below shows the proposed boundaries. The boundaries were determined by using a best estimate of the maximum potential managed realignment area.

6.4 CCMA 4 (Policy Unit KIN4)

CCMA 4 is in policy unit KIN4 which has a policy of No Active Intervention. Figure 6-5 below shows the proposed boundaries. The boundaries were determined by using the NCERM dataset plus a horizontal buffer of 10m.



Figure 6-5: Proposed CCMA 4 boundaries

6.5 CCMA 5 (Policy Unit KIN2)

CCMA 5 is in policy unit KIN2 which has a policy of No Active Intervention. Figure 6-6 below shows the proposed boundaries. The boundaries were determined by using a 50m buffer from the existing coastline.

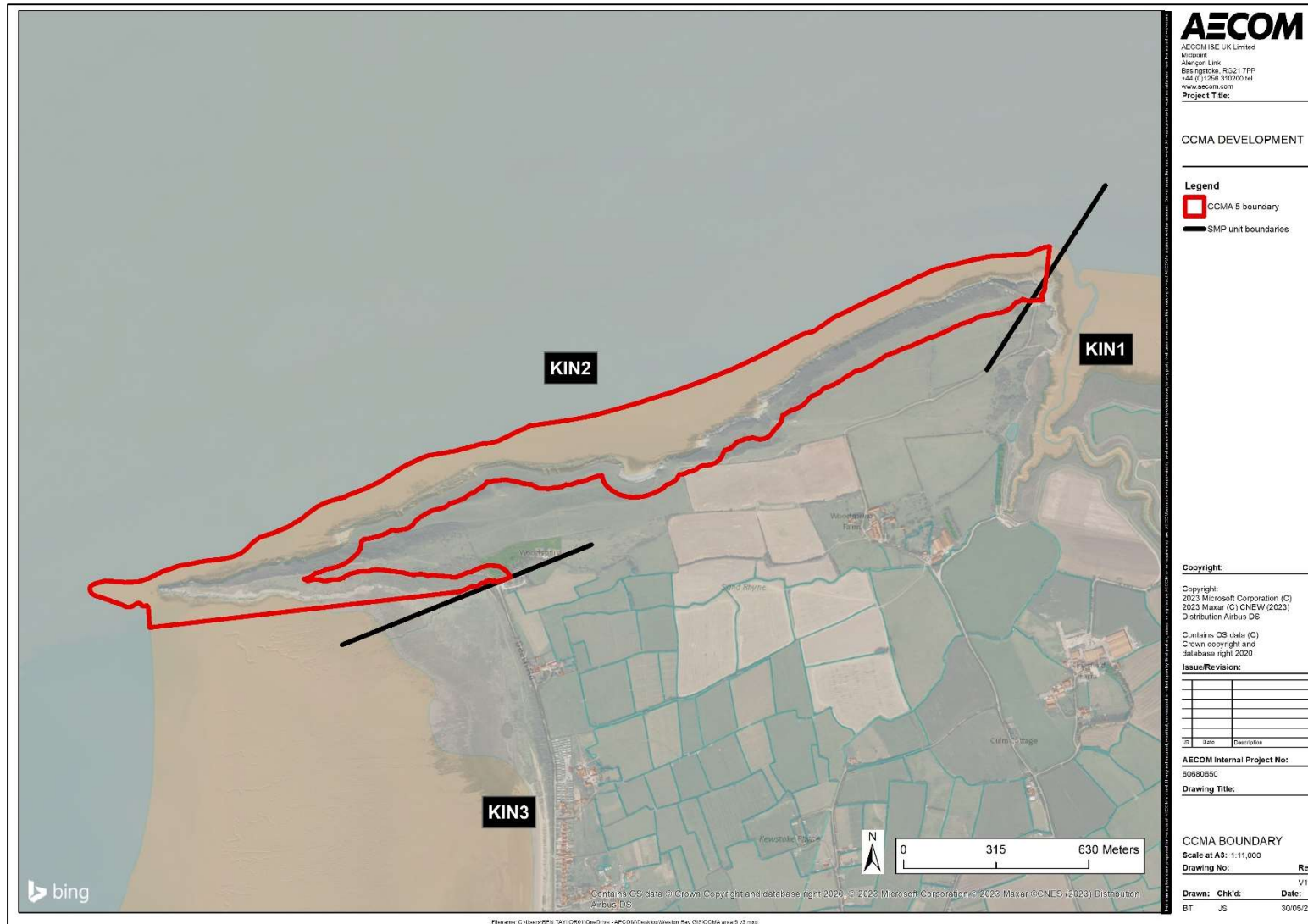


Figure 6-6: Proposed CCMA 5 boundaries

6.6 CCMA 6 (Policy Unit KIN1)

CCMA 6 is in policy unit KIN1 which has a policy of Managed Realignment. Figure 6-7 below shows the proposed boundaries. The boundaries were determined by using a best estimate of the maximum potential managed realignment area with key settlements and the M5 motorway used as landmarks to define the boundary for most of the CCMA.

The west side of the maximum potential realignment area has been defined using the settlement boundary of Kewstoke. Extending the CCMA area this far to the west (from KIN 1) does not impact the delivery of the SMP policy in KIN 3 (Hold the Line policy) and it is important to note that CCMA 6 originates from the KIN 1 direction, rather than from KIN 3. The extent of CCMA 6 shows the maximum potential area that could in theory be realigned from the KIN 1 direction based on the criteria used to define the CCMA boundaries (i.e. extending managed realignment areas inland but stopping at key infrastructure, settlement boundaries etc). In practice, it is considered unlikely that realignment would extend this far to the west as it would create a peninsular in Sand Bay and would significantly change the coastal morphology / evolution of the coastline in this area. However, this would need to be investigated in more detail during further appraisal and whilst this uncertainty exists it is important that the CCMA covers this area to help manage appropriate development.

In the south-east part of CCMA 6, the boundary wraps around the settlement of Kingston Seymour. No settlement boundaries were available for Kingstone Seymour and therefore the boundary here was developed in GIS based on a visual interpretation of developed areas from aerial imagery. In future iterations of the CCMA boundaries it may be necessary to refine the boundary position at Kingston Seymour.

6.7 CCMA 7 (KIN1 & PORT4)

CCMA 7 is in policy units KIN1 and PORT4. KIN 1 has a policy of Managed Realignment whereas PORT4 has a policy of Hold the Line. Figure 6-8 below shows the proposed boundaries. See section 5.1.3 for an explanation of how the boundaries were derived for this location.

6.8 CCMA 8 (PORT3)

CCMA 8 is in policy unit PORT3 which has a policy of No Active Intervention. Figure 6-9 below shows the proposed boundaries. The boundaries were determined by using a 50m buffer from the existing coastline.



Figure 6-9: Proposed CCMA 8 boundaries

6.9 CCMA 9 (PORT2)

CCMA 9 is in policy unit PORT2 which has a policy of No Active Intervention. Figure 6-10 below shows the proposed boundaries. The boundaries were primarily determined by using the extent of the 1:200 year return period in 2122 plus a vertical buffer. In the north part of the unit there the risk of flooding reduces and therefore the 50m buffer zone (erosion) was used to define the boundary.



Figure 6-10: Proposed CCMA 9 boundaries

6.10 CCMA 10 (PORT1)

CCMA 10 is in policy unit PORT1 which has a policy of No Active Intervention. Figure 6-11 below shows the proposed boundaries. The boundaries were determined by using the NCERM dataset plus a horizontal buffer of 10m.



Figure 6-11: Proposed CCMA 10 boundaries

6.11 CCMA 11 (BRIS5)

CCMA 11 is in policy unit BRIS5 which has as a policy of Hold the Line. Figure 6-12 below shows the proposed boundaries. See section 5.1.3 for an explanation of how the boundaries were derived for this location.

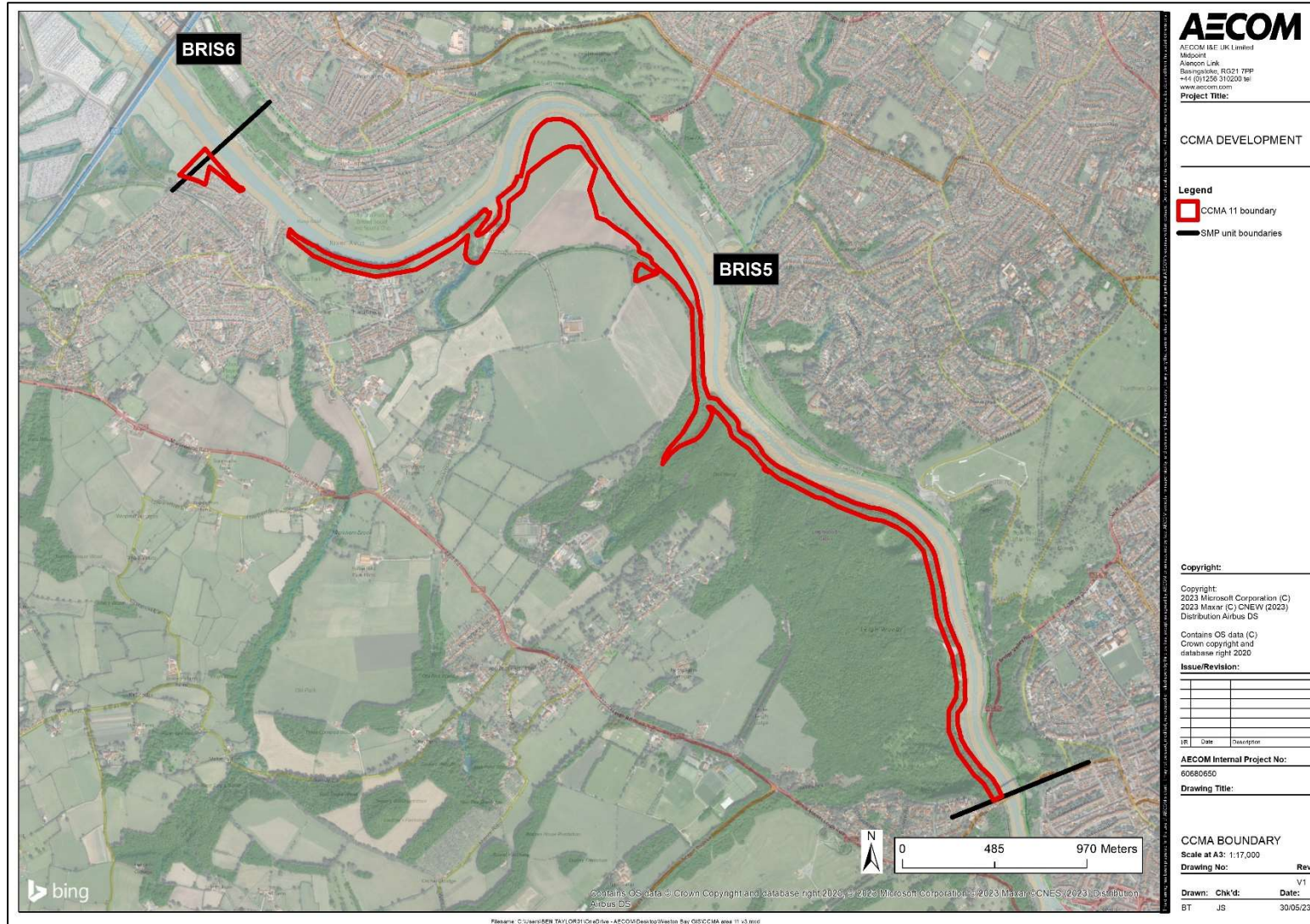


Figure 6-12: Proposed CCMA 11 boundaries

7. Summary

A methodology has been developed to define CCMA's along the North Somerset coastline. The methodology takes into account the latest updates to the Planning Practice Guidance from 2022. In total 11 CCMA's have been proposed for the North Somerset coastline using the methodology developed. The largest of the CCMA's is CCMA 6, in SMP policy unit KIN1.

Following the submission of this report, the next step for North Somerset Council will be to review the proposed CCMA boundaries and adjust accordingly based on internal discussions and engagement. The CCMA's can then be incorporated into the emerging Local Plan 2038 and further guidance will need to be provided to developers relating to appropriate development and the requirements of Coastal Vulnerability Assessments.

The CCMA designations should be considered as iterative and should evolve as more evidence becomes available over time. For example, improved erosion predictions on the North Somerset coastline would provide valuable evidence to reassess many of the CCMA boundaries. In addition, as the economic case for coastal schemes becomes clearer in the future (as business cases are developed), then this would also provide an opportunity to revisit the CCMA's.

8. Appendices

Appendix A: Planning Practice Guidance Updates

The tables presented in Appendix A show the changes in the Planning Practice Guidance wording between the superseded version and the updated 2022 version. Note that the tables only show the changes that are most relevant to CCMAAs, and do not cover all the changes between the two versions of the guidance.

The superseded version of the guidance was originally published in 2014 and was last updated in 2021. It has been archived and is available at:

<https://webarchive.nationalarchives.gov.uk/ukgwa/20220802221446/https://www.gov.uk/guidance/flood-risk-and-coastal-change>

The updated 2022 version of the guidance is available at:

<https://www.gov.uk/guidance/flood-risk-and-coastal-change>

Table A-8-1: Planning Practice Guidance comparison – Shoreline Management Plans

Shoreline Management Plan specific text included in the Planning Practice Guidance, in relation to Coastal Change Management Areas	
Superseded version	Updated 2022 version
<p><i>“A Coastal Change Management Area will only be defined where rates of shoreline change are significant over the next 100 years, taking into account climate change. They will not need to be defined where the accepted shoreline management plan policy is to hold or advance the line (maintain existing defences or build new defences) for the whole period covered by the plan, subject to evidence of how this may be secured.”</i></p>	<p><i>“A Coastal Change Management Area will only need to be defined where rates of shoreline change are expected to be significant over the next 100 years, taking account of climate change. They will not normally need to be defined where the accepted shoreline management plan policy is to hold or advance the line (maintain existing, or build new flood and coastal erosion risk management infrastructure) for the whole period covered by the shoreline management plan, subject to evidence of how this may be secured, taking advice from the Environment Agency. A Coastal Change Management Area should be defined where the shoreline management plan policy is anything other than hold or advance the line at any time during its plan period. In addition, where there is uncertainty about securing funding for the implementation of hold or advance the line policies, local planning authorities can still identify areas that could be affected by coastal change to ensure prospective developers are made aware of the potential risks and inappropriate development is avoided.”</i></p>
<p><i>“Local planning authorities should demonstrate that they have considered shoreline management plans, which provide a large-scale assessment of the risks associated with coastal processes, and should provide the primary source of evidence in defining the coastal change management area and inform land allocation within it.”</i></p>	<p><i>“Local planning authorities will need to demonstrate that they have considered shoreline management plans, which provide a large-scale assessment of the risks associated with coastal processes, and provide the primary source of evidence in defining the coastal change management areas”</i></p>
<p><i>“Shoreline Management Plans identify risk in 3 time horizons (up to 20, 50 and 100 years) and include maps showing the geographical extent of each risk area. Local planning authorities have discretion to determine how these are interpreted in planning terms to define the coastal change management area and whether it should show the separate zones for each of the 3 time horizons – or whether it should rely on the shoreline management plan for the area to provide that level of information. Where the shoreline management plan policy is to hold the line over part of the 100-year period, evidence would be expected to be provided of how this may be secured.”</i></p>	<p><i>“Shoreline Management Plans identify risk on time horizons up to 100 years and include maps showing the geographical extent of each risk area. In defining Coastal Change Management Areas, local planning authorities, using the best available evidence, may wish to identify separate sub-zones for each of the time horizons – or may alternatively rely on the latest shoreline management plan to provide that level of information.”</i></p>
<p><i>“Although the primary basis for defining the coastal change management area are the physical processes affecting the coast, the local planning authority may want to take into account the boundaries of existing settlements and requirements for facilitating roll-back and relocation of land uses.”</i></p>	<p><i>“Although the primary basis for defining the Coastal Change Management Area are the physical processes affecting the coast, the local planning authority may also wish to take into account the extent of existing settlements and requirements for land-use change or facilitating roll-back and relocation of land uses.”</i></p>

Table A-8-2: Planning Practice Guidance comparison – Appropriate Development

Appropriate development specific text included in the Planning Practice Guidance, in relation to Coastal Change Management Areas	
Superseded version	Updated 2022 version
<p><i>“Essential infrastructure may be permitted in a coastal change management area, provided there are clear plans to manage the impacts of coastal change on it, and it will not have an adverse impact on rates of coastal change elsewhere.”</i></p> <p><i>“Ministry of Defence installations that require a coastal location can be permitted within a coastal change management area, provided there are clear plans to manage the impacts of coastal change. Where the installation will have a material impact on coastal processes, this must be managed to minimise adverse impacts on other parts of the coast.”</i></p> <p><i>“For other development the following criteria can be used as a basis for decisions on what may be appropriate:</i></p> <ul style="list-style-type: none"> • <i>Within the short-term risk areas (i.e. 20-year time horizon) only a limited range of types of development directly linked to the coastal strip, such as beach huts, cafes/tea rooms, car parks and sites used for holiday or short-let caravans and camping – all with time-limited planning permissions;</i> • <i>Within the medium (20 to 50-year) and long-term (up to 100-year) risk areas, a wider range of time-limited development, such as hotels, shops, office or leisure activities requiring a coastal location and providing substantial economic and social benefits to the community, may be appropriate. Other significant development, such as key community infrastructure, is unlikely to be appropriate unless it has to be sited within the coastal change management area to provide the intended benefit to the wider community and there are clear, costed plans to manage the impact of coastal change on it and the service it provides;</i> • <i>Permanent new residential development will not be appropriate within a coastal change management area.”</i> 	<p><i>“Local Planning Authorities should ensure that strategic plans are sufficiently flexible to deal with changing circumstances in coastal areas, such as updates to relevant Shoreline Management Plans or sudden shifts in the protection afforded to a particular area.”</i></p> <p><i>“General policy tests for considering development in Coastal Change Management Areas are set out in the National Planning Policy Framework.”</i></p> <p><i>“Within this context, essential infrastructure may be permitted in a Coastal Change Management Area, provided there are clear plans to manage the impacts of coastal change on it, and it will not have an adverse impact on rates of coastal change elsewhere.”</i></p> <p><i>“Ministry of Defence installations that require a coastal location can be permitted within a Coastal Change Management Area, provided there are clear plans to manage the impacts of coastal change. Where the installation will have a material impact on coastal processes, this will need to be managed to minimise adverse impacts on other parts of the coast.”</i></p> <p><i>“For other development, the following may be appropriate, subject to the tests in the National Planning Policy Framework:</i></p> <ul style="list-style-type: none"> • <i>Within the short-term risk areas (i.e. losses are expected within 20-years), a limited range of development directly linked to the coastal strip, such as beach huts, cafes/tea rooms, car parks and sites used for holiday or short-let caravans and camping – all with time-limited planning permissions;</i> • <i>Within the medium (20 to 50-year) and long-term (up to 100-year) risk areas, a wider range of time-limited development, such as hotels, shops, office or leisure activities requiring a coastal location and providing substantial economic and social benefits to the community. Other significant development, such as key community infrastructure, is unlikely to be appropriate unless it has to be sited within the Coastal Change Management Area to provide the intended benefit to the wider community and there are clear, costed plans to manage the impact of coastal change on it and the service it provides;</i> • <i>Existing buildings, infrastructure and land-use subject to the relevant planning permission could adapt and diversify to changing circumstances, where it reduces vulnerability, increases resilience and raises funds to facilitate subsequent relocation</i> • <i>Permanent new residential development (including through change of use) will not be appropriate within a Coastal Change Management Area.”</i>

Table A-8-3: Planning Practice Guidance comparison – Coastal Vulnerability Assessments

Coastal Vulnerability Assessment specific text included in the Planning Practice Guidance, in relation to Coastal Change Management Areas	
Superseded version	Updated 2022 version
<p><i>“Local planning authorities may wish to consider whether information about the vulnerability of new development would be helpful to demonstrate the appropriateness of a development in a coastal change management area. It would be advisable for the developer to agree the scope of a vulnerability assessment (which should be appropriate to the degree of risk and the scale, nature and location of the development) in advance with the local planning authority and in consultation with the Environment Agency and any other relevant stakeholders.”</i></p> <p><i>“In considering the requirements in paragraph 168 of the National Planning Policy Framework a vulnerability assessment might demonstrate that the development:</i></p> <ul style="list-style-type: none"> • <i>would not impair the ability of communities and the natural environment to adapt sustainably to the impacts of a changing climate;</i> • <i>will be safe through its planned lifetime, without increasing risk to life or property, or requiring new or improved coastal defences;</i> • <i>would not affect the natural balance and stability of the coastline or exacerbate the rate of shoreline change to the extent that changes to the coastline are increased nearby or elsewhere.”</i> <p><i>“The assessment could also consider measures for managing the development at the end of its planned life, including any proposals for the removal of the development before the site is immediately threatened by shoreline changes.”</i></p> 	<p><i>“Applications for development in a Coastal Change Management Area may need to be accompanied by a coastal change vulnerability assessment, demonstrating whether or not the requirements of National Planning Policy Framework paragraph 172 can be met. It would be advisable for the developer to agree the scope of a coastal change vulnerability assessment (which should be appropriate to the degree of risk and the scale, nature and location of the development) in advance with the local planning authority and in consultation with the coast protection authority, the Environment Agency (where flood risk is also an issue) and any other relevant stakeholders.”</i></p> <p><i>“In considering the requirements in paragraph 172 of the National Planning Policy Framework a vulnerability assessment will need to demonstrate that the development:</i></p> <ul style="list-style-type: none"> • <i>would not impair the ability of communities and the natural environment to adapt sustainably to the impacts of a changing climate;</i> • <i>will be safe through its planned lifetime, without increasing risk to life or property, or requiring new or improved coastal defences;</i> • <i>would not affect the natural balance and stability of the coast or exacerbate the rate of shoreline change to the extent that changes to the coast are increased nearby or elsewhere.”</i> <p><i>“The coastal change vulnerability assessment should also consider measures for managing the development at the end of its planned life, including any proposals for the removal or relocation of the development before the site is immediately threatened by shoreline changes. The use of modular forms of construction can mean buildings can be disassembled and reassembled in a new location as a way of minimising the cost of relocation.”</i></p> <p><i>“Local Planning Authorities may also wish to set out in local policy or guidance other areas where applications for development will need to be accompanied by a coastal change vulnerability assessment.”</i></p>

Table A-8-4: Planning Practice Guidance comparison – Other Relevant Changes

Other changes in the Planning Practice Guidance	
Superseded version	Updated 2022 version
<p><u>How can planning limit the planned lifetime of the development?</u></p> <p><i>“This can be achieved by time-limited planning permissions that can contain conditions relating to the review of that permission in relation to rates of coastal change and removal of the development prior to the anticipated impact of the coastal change. The Local Planning authority should be satisfied that adequate and secure financial arrangements are in place for the removal of time-limited development.”</i></p>	<p><u>How can planning limit the planned lifetime of the development?</u></p> <p><i>“This can be achieved by time-limited planning permissions that can contain conditions relating to the review of that permission in relation to factors that may mean the development will need to relocate, for example:</i></p> <ul style="list-style-type: none"> • Rates of coastal erosion and change; • Rate of increased flood risk due to climate change. <p><i>The Local Planning Authority should be satisfied that adequate and secure financial arrangements are in place for the removal of time-limited development.”</i></p>
<p><u>What approach should be taken to making provision for the relocation of development away from Coastal Change Management Areas?</u></p> <p><i>“Formally allocating land in Local Plans for relocation of development and habitat affected by coastal change may be appropriate in some instances. An approach that takes into account the exceptional circumstances of having to replace existing development at risk of coastal change by granting planning permissions where normally they would be refused may be more suitable for some coastal authorities.</i></p> <p><i>See related policy in paragraph 166 of the National Planning Policy Framework.”</i></p>	<p><u>What approach should be taken to making provision for the relocation of development and infrastructure?</u></p> <p><i>“Ongoing coastal erosion or change and increasing flood risk due to climate change may mean that some existing development and infrastructure may not be sustainable in the long term. Plans can address this by:</i></p> <ul style="list-style-type: none"> • Identifying locations where existing development and infrastructure may not be sustainable in the long term. Such locations could include those which are, or are expected to be in future, subject to coastal erosion (e.g. Coastal Change Management Areas), frequent (e.g. areas likely to be permanently inundated by the sea or tidal estuaries/rivers or with sufficient frequency as to become intertidal, Flood Zone 3b or areas likely to be in 3b in future), disruptive or hazardous flooding, combined with little or no prospect of these risks being adequately mitigated by new or improved flood and coastal erosion risk management infrastructure, or property level resilience measures. • Including policies setting out the types of development that will and will not be appropriate in these locations, including by limiting the planned lifetime of the development and preventing increases in vulnerability and development footprint. Local authorities could also consider whether it would be appropriate to make use of their powers under Article 4 of the Town and Country Planning (General Permitted Development) Order 2015 to remove a permitted development right and require planning permission to be sought in each case. • Formally allocating additional land in plans for relocation or roll-back of existing development (particularly development completed prior to Shoreline Management Plans) and habitat affected by coastal change or increasing flood risk due to climate change. Including policies in plans and conditions on permissions to ensure identified land is used for this purpose. <p><i>An approach that considers the exceptional circumstances of having to replace existing development at risk of flooding or coastal change by granting planning permissions where normally they would be refused may be more suitable for some local planning authorities. This could involve for example granting planning permission in open countryside allowing caravan parks to be moved back from the coast when the site is affected by coastal erosion or tidal inundation.”</i></p>

Other changes in the Planning Practice Guidance	
Superseded version	Updated 2022 version
<p><u>What issues do local planning authorities need to consider in relation to permitted development rights in coastal change areas?</u></p> <p><i>“Where extensions and alterations which are permitted development under the Town and Country Planning (General Permitted Development) (England) (Order) 2015 are likely to result in an increase in the scale of property and number of occupants at risk from coastal change in the short-term (ie next 20 years), local planning authorities should consider whether to make use of their powers under article 4 of the order to require planning permission to be sought in each case.”</i></p>	<p><u>What issues do local planning authorities need to consider in relation to permitted development rights in coastal change areas?</u></p> <p><i>“Where development is permitted development under the Town and Country Planning (General Permitted Development) (England) (Order) 2015 and is likely to result in an increase in the scale of property or the number or vulnerability of occupants at risk from coastal change, local planning authorities may want to consider whether to make use of their powers under article 4 of the order to require planning permission to be sought in each case.”</i></p>
<p><u>How neighbourhood plans and neighbourhood development/community right to build orders should take account of coastal change</u></p> <p><i>“In line with the core planning principles and the policy on coastal change neighbourhood plans and neighbourhood Development/Community Right to Build Orders should avoid allowing inappropriate development in areas vulnerable to coastal change or adding to the impacts of physical changes to the coast.”</i></p> <p><i>“In any instance where a neighbourhood planning area is proposed in a coastal change management area, careful attention should be paid to the guidance on what development would be appropriate in such an area, including whether time-limiting planning permissions would be needed. The local planning authority should be consulted on what information about the vulnerability of new development would be helpful to demonstrate appropriateness in a coastal change management area.”</i></p>	<p><u>How can neighbourhood plans and neighbourhood development/community right to build orders take account of coastal change?</u></p> <p><i>“In any instance where a Neighbourhood Area is proposed in a Coastal Change Management Area, careful attention should be paid to the guidance on what development would be appropriate in such an area, including whether time-limiting planning permissions are needed. The local planning authority will need to be consulted about existing and anticipated levels of risk, and the types of development that may or may not be appropriate.”</i></p>

