

Thames Estuary 2100

Briefing

The Thames Estuary 2100 Plan sets out how the Environment Agency and its partners can work together to manage tidal flood risk until the end of the century and beyond. It aims to protect 1.3 million people and £275 billion worth of property and infrastructure from increasing tidal flood risk. In addition to this, the Plan aims to help London and the Thames Estuary adapt to the impacts of climate change, enable sustainable development, protect the social and commercial value of the Thames, and enhance estuarine ecosystems.

Monitoring a changing estuary

The Plan recognises that there is significant uncertainty surrounding future climate change and its impacts, and addresses this by recommending that the proposals in the plan are adjusted throughout delivery, as the climate changes and our understanding of the impacts develop.

In order to understand how the estuary is changing and therefore ensure the Plan adapts appropriately, we monitor 10 indicators of change in the estuary and use this monitoring to carry out a 5-yearly review of the Plan. The first 5 year review of the 10 indicators of change was published in October 2016 and shows that changes in the estuary are generally taking place in line with the Plan's predictions.

Thames Estuary 2100 and climate change

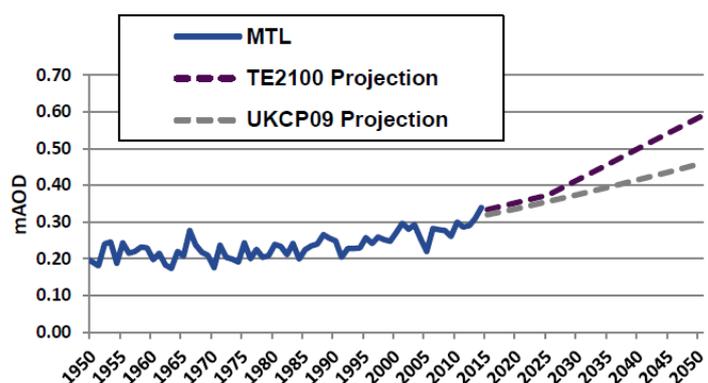
Climate change is at the core of the Plan. It was based on a relative estimate of 90cm sea level rise by the year 2100, however it is adaptable to differing rates of sea level rise up to 2.7m, and an increase of 40% in peak river flood flows. The Environment Agency funded major, new research on changes to fluvial river flows, sea storm surges and sea level rise due to thermal expansion and polar ice melt. The Thames Estuary 2100 Plan is now internationally recognised as a leading example of climate change adaptation.

Climate change models

Global mean sea level has risen by 2mm per year during the last century with an increase to 3mm per year during the 1990s and beyond. This could be the result of the human impact on climate change. Projections for future sea levels globally indicate that the current trend will increase. However, these changes become highly uncertain when applied at local scales.

Most recent forecasts have been provided by the Met Office UK Climate Projections 2018 (UKCP18) model. Early analysis of the UKCP18 sea level rise projections suggests we may need to plan in detail for slightly more sea level rise by the end of the century than we are currently. However, all the current projections fall within the variations the Thames Estuary 2100 Plan was designed to manage.

Figure 1: Recorded & predicted changes in mean tide levels (MTL) at Southend



Worst case scenario H++

As part of developing the Thames Estuary 2100 Plan, an extreme scenario (including polar ice melt) was developed, known as the High Plus Plus (H++) scenario. Initially this scenario estimated a maximum water level of 4.2m, and consequently the Plan's early development included an option for managing sea level rise up to 4.2m. The inclusion of an H++ scenario was subsequently adopted by the UK Climate Projections (UKCP09) and revised down to 2.5m. Based on this updated science, the Plan has revised down the worst case scenario, but maintains the ability to manage up to 4.2m increase in extreme water levels.

The majority of climate models project a smaller change and there is no evidence that the rapid sea level rise of the kind that scientists believe to have occurred in the past will occur again in the next century. Therefore, this scenario is unlikely, but one that cannot be ruled out completely. Adapting immediately to this amount of sea level change would very likely be over-adaptation. However, we feel there is merit in taking a precautionary approach of evaluating the adaptation options required for H++ and continuing to monitor sea level, land and ice sheet movement so as to identify any changes indicating the likeliness of a H++ scenario.

The latest UK specific climate change projections (UKCP18) have not updated the H++ scenario, finding that recent evidence supports the UKCP09 scenario as still being a plausible but unlikely high-end sea level rise projection.

Adaptive pathways approach

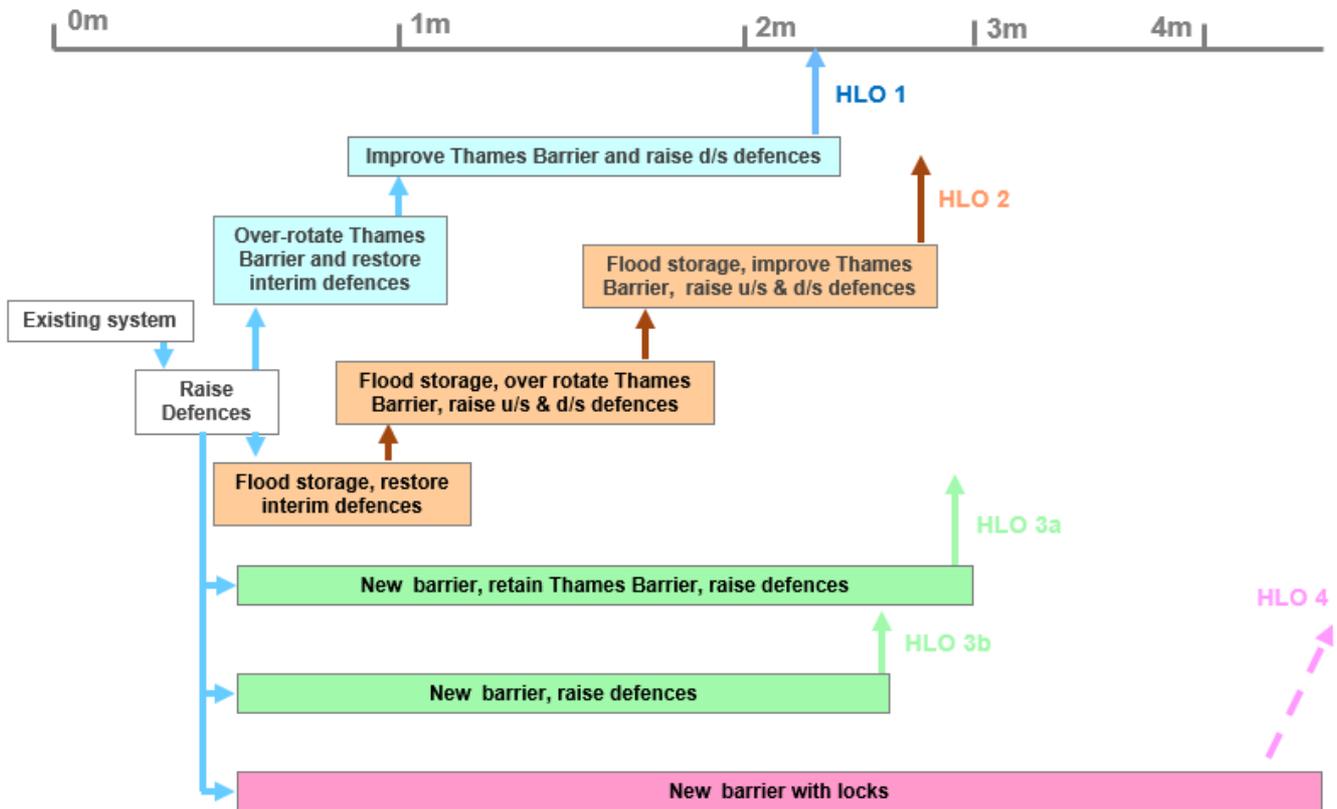
The Thames Estuary 2100 Plan takes an adaptive pathways approach to accommodating these potential future changes in climate change and other changes that might take place in the estuary. This approach enables flood risk management to be carried out in a way that can be adjusted to the latest climate science, growth and other changes in our local environment. It was recommended by the C40 Cities Climate Leadership Group as good practice for climate change adaptation.

Should sea levels rise beyond current predictions, a range of options are available to us, allowing us to choose different pathways to providing future tidal flood protection in the Thames Estuary, based on what we see happen through monitoring or predict to happen through modelling. A series of adaptation pathways identify the decisions for managing flood risk that need to be taken now and those which can be made in the future, along with trigger points and thresholds to aid our decision making. The different pathways can be seen in Figure 2 below.

Figure 2: Potential options for flood defence based on sea level rise.

Adaptive Pathways: moving between options

Maximum sea level rise:



The options labelled HLO 1-4 are the different pathways available to us depending on the total amount of sea level rise (indicated on the x axis) that is expected over the century. The length and position of the bars show us the range of total sea level rise each option is appropriate for.

We are currently following pathway 1, based upon the Defra06 climate change projection of 94cm sea level rise between 2000 and 2100.

Throughout our 5-yearly reviews, we will continue to review which pathway we are on. By 2050, we will need to ensure we are on the correct one for the “end of the century option”, which will need to be in place by 2070. Essentially this will be determining the future of the Thames Barrier. We currently expect option 3 to be our frontrunner pathway at this date, and Long Reach is our current preferred location for a new Thames Tidal Barrier.

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