

Environmental Statement

Appendix J2

**Technical Note - Review of Extreme Water
Levels and Sea Level Rise Guidance**

August 2020

Langstone FCERM SCHEME

Langstone Coastal Defence Scheme – Review of Extreme Water Levels and Sea Level Rise Guidance

In 2018, guidance was released for both the UK coastal extreme water levels ([Coastal Flood Boundary Dataset, 2018](#)) which now supersedes the 2011 dataset and sea level rise guidance ([UK Climate Projections 2018](#)) which now supersedes the UKCP09 data. These older datasets were used to determine design heights for the Langstone Scheme. This technical note highlights any differences between the superseded dataset and recent guidance.

The [Environment Agency guidance for Flood Risk assessments: climate change allowances](#) updated and released in July 2020 advises using the RCP8.5 scenario (high emissions) for the 70th %ile for design. For sensitivity testing and testing against very extreme events, the 95th %ile for the same scenario should be used. This information will be compared to the UKCP09 data where the EA advised using the medium emissions scenario, 95th %ile. The raw dataset could not be obtained due to EA retention policies, instead, the information was taken from the Data Review carried out for the Langstone FCERM Scheme by [AECOM \(2018\)](#).

A copy of the datasets and a comprehensive analysis of their differences is saved in the spreadsheet located here: [J:\HBC\Coastal\Coastal\ESCP\3 CAPITAL PROJECTS\1. Schemes\LDW 42220 Langstone FCERM\Q-DELIVERABLES\R5 - Coastal Processes\UKCP18 Analysis.xlsx](#). A summary of the key points and important information is summarised below.

UKCP09/UKCP18 and UKCP18/CFBD18

Figure 1 shows the locations of the data points for the CFBD 2018 dataset. The points in green inside the harbours are new to the 2018 dataset, but the yellow offshore points were all available in the 2011 dataset.

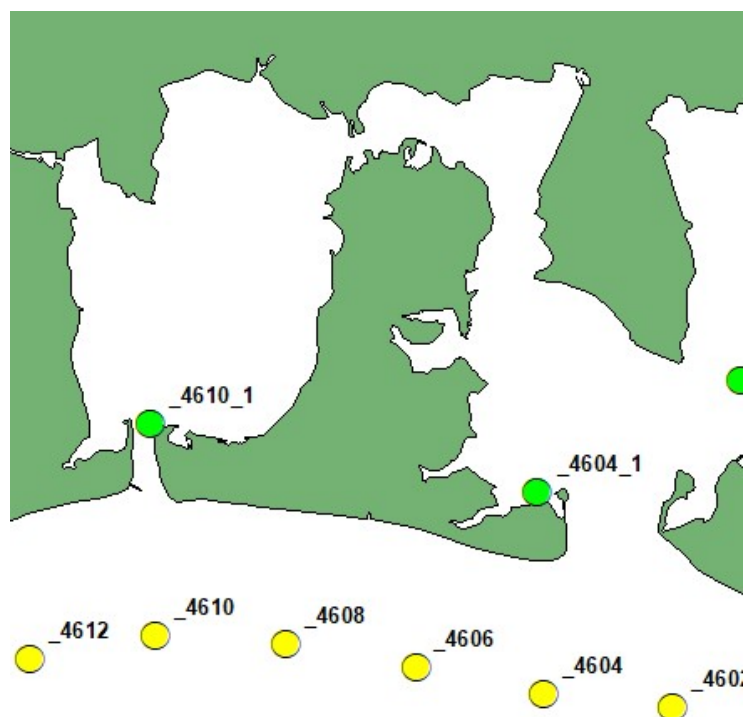


Figure 1 CFBD 2018 point locations

A direct comparison using Point 4610 for a 1 in 200 year return period is shown in Figure 2. This shows that at the present day (2020, with no sea level rise), the CFBD2018 dataset shows values approximately 10cm lower than the CFBD2011 data. This is consistent with the other points assessed which show a 10-15cm difference between the two datasets for present day scenarios.

Figure 2 highlights how the UKCP09 and UKCP18 datasets vary from present day to 2070 (the end of the design life for the Langstone Scheme) for a 1 in 200 year return period at Point 4610 (see Figure 1). UKCP18 shows a steeper increase in sea levels between present day and 2070 so even though the recent data starts 10cm lower than the old data, by 2070 they are on par. When adding the UKCP18 95th %ile scenario to a 1 in 200 year return period event (CFBD2018), the results are 10cm above the UKCP18 70th %ile data and UKCP09 data.

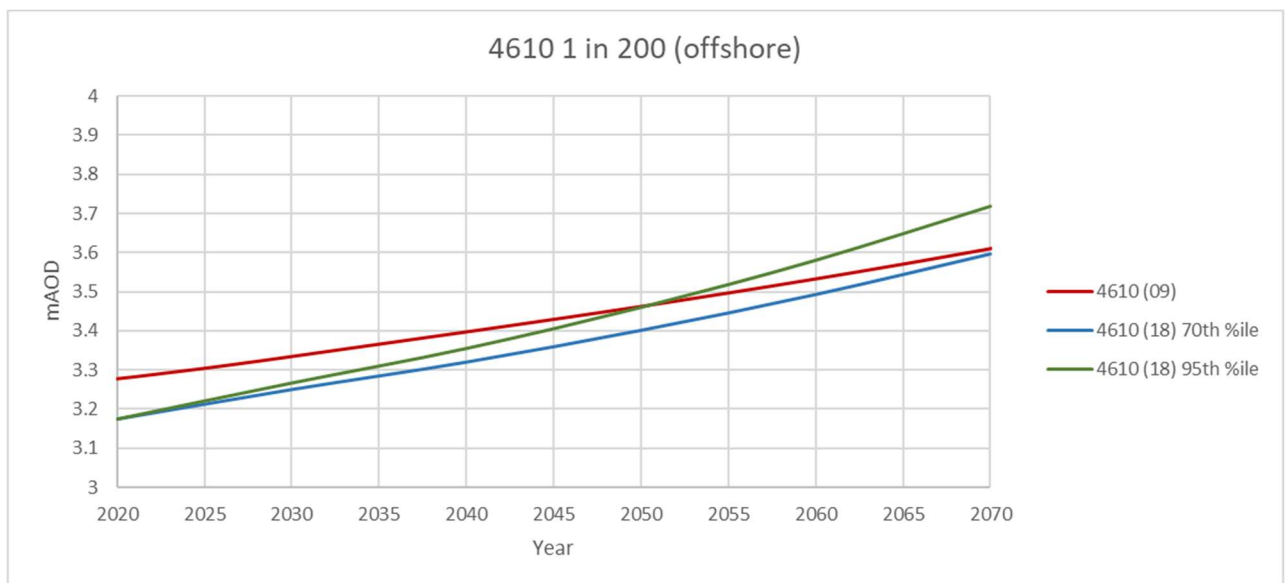


Figure 2 A comparison between the 2011 and 2018 datasets. The UKCP09 data is added to the CFBD2011 data and the UKCP18 data (for 70th and 95th %iles) is added to the CFBD2018 data, all at the Point 4610.

JBA Flood Modelling and Site-Specific Comparison

In 2017, [JBA carried out a flood modelling exercise](#) to assess tidal flood risk along the Hampshire coast and update the tidal procedures. This project used CFBD2011 and UKCP09 information to drive the model.

The 2018 Data Review from AECOM indicates that Boundaries 1 and 5 (Figure 3) use the CFBD11 points 4606 and 4610, respectively (Figure 1). To account for these being inside the harbour, 14cm and 16cm were added onto each of the points, respectively. The model development report states that the increase in water level as you move upstream through Chichester Harbour was identified from the Southern Estuaries and Harbours Dataset (JBA, 2015) and the at Langstone harbour was identified the from the Littlehampton to Emsworth flood inundation model (JBA, 2016).

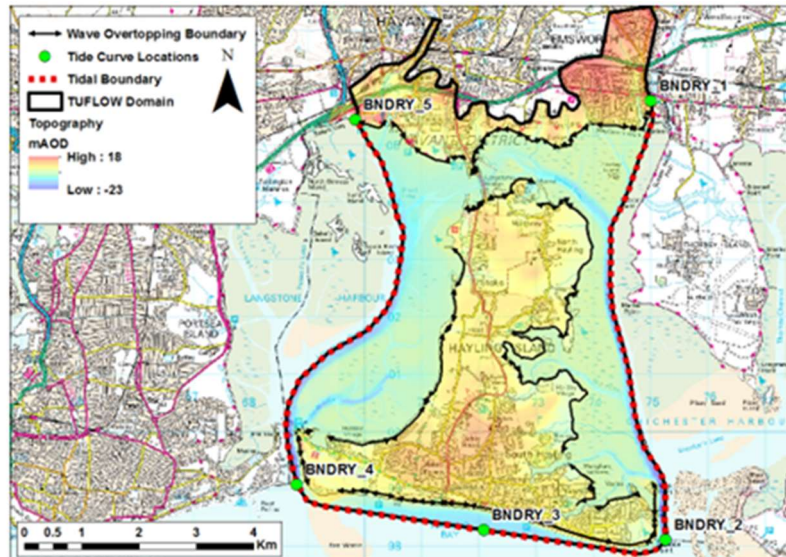


Figure 1: Hayling Island model boundaries. Figure extracted from JBA East Solent Model Development Report, 2018, pg43.

Figure 3 The JBA model domain showing the locations for sea level boundary conditions

Figure 4 and Figure 5 show the comparison between these boundary conditions (which use the CFBD09 information and UKCP09 data) and the modern harbour data points for CFBD2018 and UKCP18 for sea level rise (Figure 1). These both show that there is a 20cm present day difference in water level but by 2070, the 95th %ile data lines up with the UKCP09 data, indicating a greater acceleration of sea level rise than previously predicted. The 70th %ile comes in approximately 10cm below both.

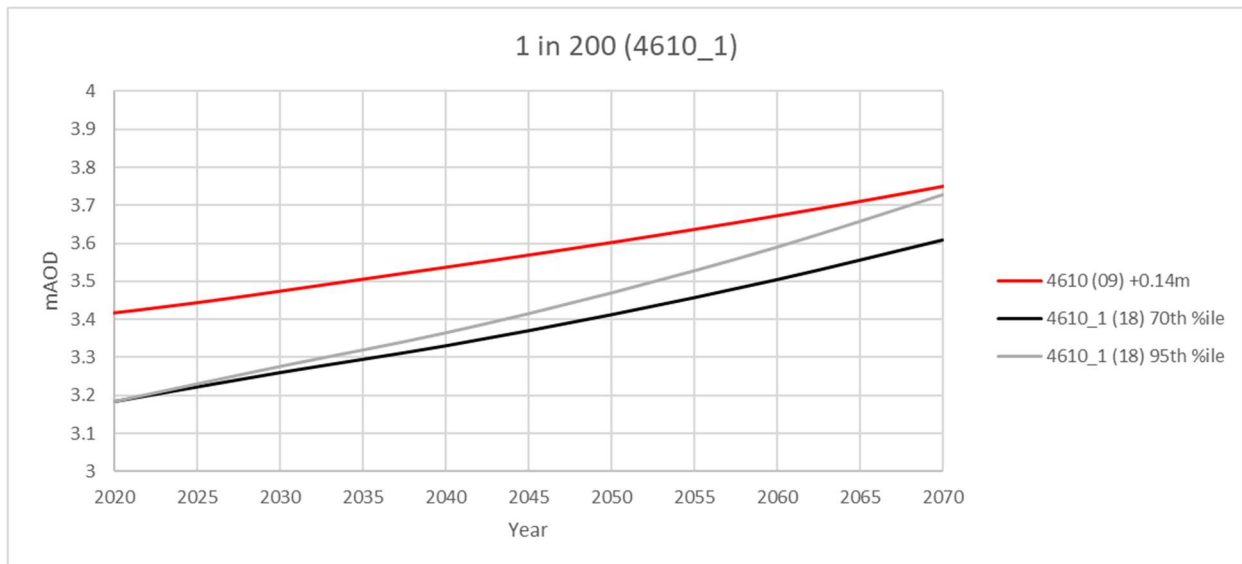


Figure 4 A comparison of the modern datasets against the water levels that were used in the JBA flood model (Boundary Condition 5)

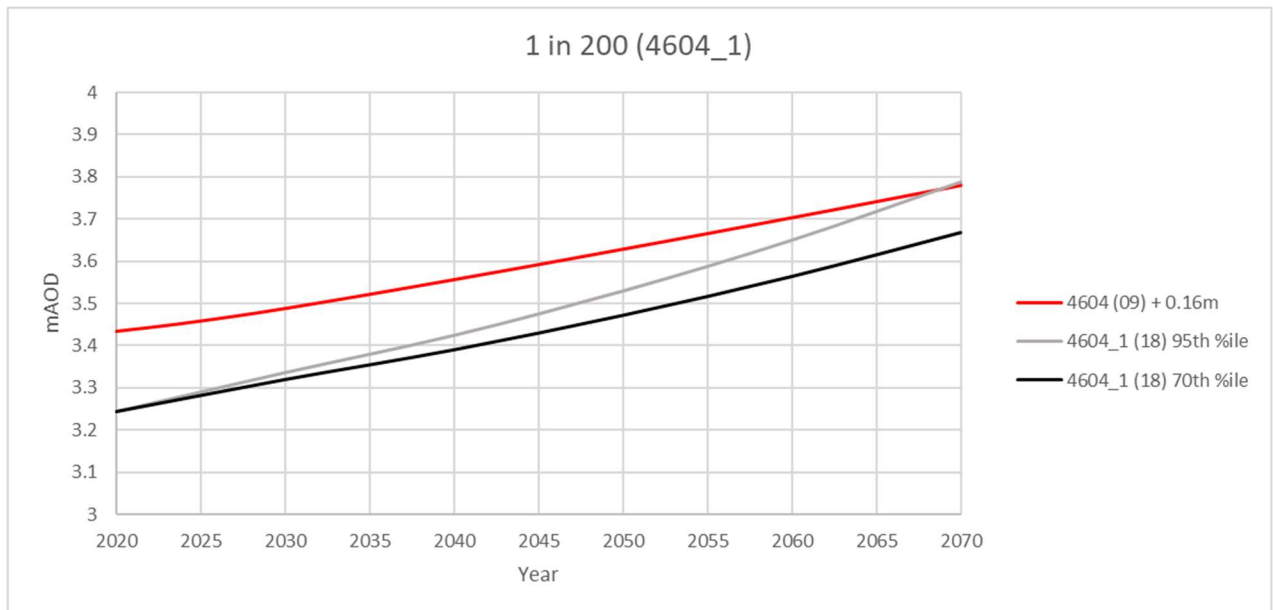


Figure 5 A comparison of the modern datasets against the water levels that were used in the JBA flood model (Boundary Condition 1)

End of Life Standard of Protection

The final assessment was to compare all the datasets to the defence heights, to understand whether further assessments by the consultants are required for design levels to provide a 1 in 75 standard of protection until year 2070. Figure 6 shows that for Point 4610 (Figure 1) under all extreme values and sea level rise scenarios, the primary defence at 3.8m will protect to a 1 in 200 year event (orange lines on Figure 6), even at the end of its design life. The 3.6m defence height will continue to protect to a 1 in 75 year event (blue lines on Figure 6), according to the latest datasets. The information below represents still water level only and **does not include allowances for waves**.

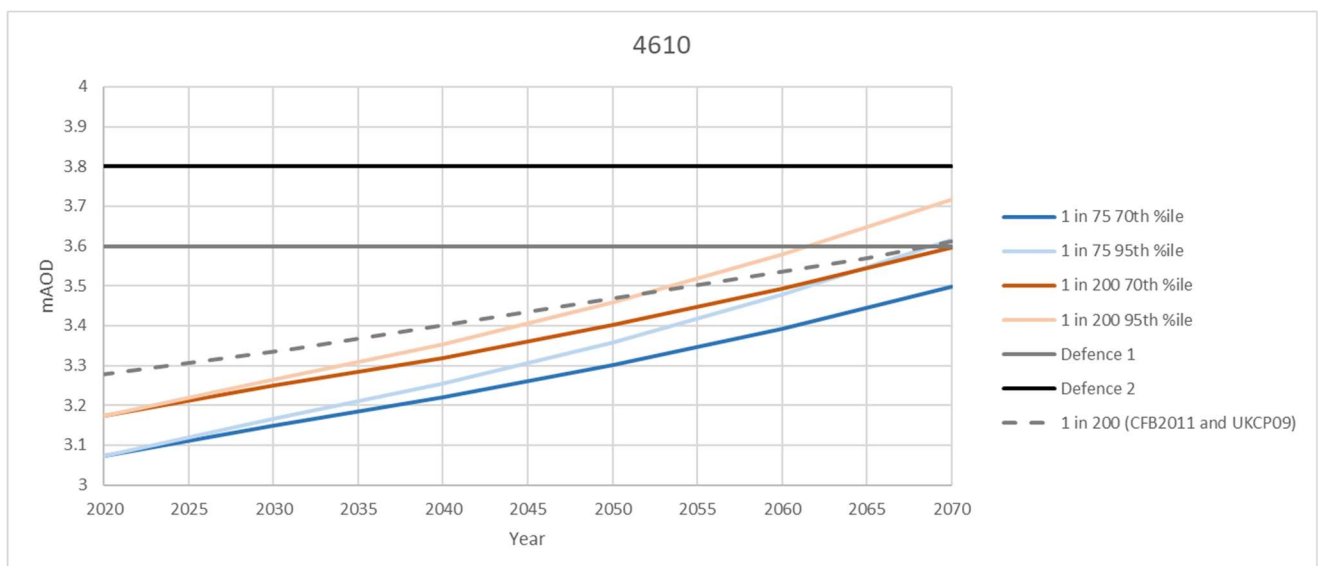


Figure 6 A comparison of various water level scenarios against the defence height, including the 1 in 75 and 1 in 200 scenarios using both the 70th and 95th %iles for CFB2018/UKCP18. The dashed line shows the 1 in 200 year water level for the CFB2011 and UKCP09 data.