TECHNICAL NOTE

JBA Project Code	2021s1436
Contract	Chichester SFRA Update
Client	Chichester District Council
Version and Date	V1 / December 2021
Author	Ed Hartwell
Reviewer / Sign-off	Ffion Wilson
Subject	Undefended case climate change modelling: Aldingbourne Rife

1 Introduction

JBA Consulting was commissioned by Chichester District Council as part of their Strategic Flood Risk Assessment (SFRA) update to prepare updated climate change fluvial flood risk modelling and mapping using watercourses within the SFRA area. The updated flood risk modelling was required given updates to the climate change fluvial allowances guidance[1] made by the Environment Agency in July 2021.

The flood modelling was required for the 1% Annual Exceedance Probability (AEP) undefended case scenario (without the presence of flood risk management infrastructure), for each of the three allowances applicable for the 2080s epoch (year 2070-2125).

1.1 Climate change allowances

The climate change allowances applicable to the Chichester SFRA area for the 2080s epoch are:

- Central allowance: +25%
- Higher central allowance: +36%
- Upper end allowance: +64%

Given that the +35% allowance had previously been simulated for some models in accordance with the previous climate change allowance guidance, the Environment Agency advised that this allowance could be used in place of the +36% flow allowance for the SFRA, given that there is only 1% difference between the allowances.

1.2 Base model

The base model to which updates have been made is the surface water Aldingbourne Rife climate change model (2016s3840_ALD_UNDEF_CC.icmt), used to create climate change flood extents following the pervious update to the guidance in 2016. The model is a InfoWorks ICM 1D-2D linked model. The geometry of the model remains as per the original model, with the only changes made for this Chichester SFRA modelling being to the flood flow inputs, and tidal downstream boundary condition, which are discussed in section 2.

2 Updates to the modelling

2.1 Software

The climate change modelling simulations were completed using InfoWorks ICM version 10.5.

[1] Flood risk assessments: climate change allowances. Environment Agency. Last updated 6 October 2021. Available: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

2.2 Fluvial inflows

The fluvial flows are applied to the model as rainfall input, applied directly to the 2D mesh outside of subcatchments. Each rainfall file is made up of three rainfall profiles and each of these has been uplifted by the scaling factor for the relevant climate change allowance described above.

2.3 Downstream boundary condition

For this modelling, increases to the tidal boundary condition have been applied so that water levels are reflective of the predicted change in sea level rise to the year 2121 (sea level rise change from 2022 to 2121 are applied) based on UKCP18 projections for grid square 714.

The Central, Higher Central and Upper End sea level rise allowances have been applied to the respective fluvial allowance conditions. Sea level rise uplifts applied are as follows:

- Central: +0.915m
- Higher central: +1.033m
- Upper end: +1.390m

The downstream boundary condition applied to the model is a Mean High Water Spring (MHWS) tidal time-series applied to four locations;

- 1.001_b: located at the outfall of the Aldingbourne Rife
- 1.001_a: located at the outfall of the Aldingbourne Rife
- 2.001!!!!_out: located at the outfall of the Ryebank Rife
- 1.001!!!!out: located at the outfall of the Ryebank Rife

3 Model run names

Model simulations are named as listed below. The InfoWorks ICM simulation dialogue file which controls the simulation has this name:

- 1% AEP +25% events:
  - Aldingbourne Design Runs -Undefended -1% AEP +25% CC_Central
- 1% AEP +35% events:
  - Aldingbourne Design Runs -Undefended -1% AEP +35% CC_HighCentral
- 1% AEP +64% events:
  - Aldingbourne Design Runs -Undefended -1% AEP +64% CC_UpperEnd

All simulations were run using the Aldingbourne Rifes and SWS - 0.1% AEP Undefended Network v2 [142]

4 Deliverables

Mapped outputs have been supplied for the individual storm simulations.in raw and cleaned format. The raw format consists of direct exports from the hydraulic model and includes both surface water and fluvial flood components.

For the cleaned format the surface water components have been removed by extracting only areas where flood depths were greater than 0.01m or the hazard was greater than 0.575. These areas were then clipped so that only areas of flooding that intersected the Detailed River Network (DRN) or Main River channels were retained. This is in line with the approach taken previously.

The following files were delivered as part of this modelling:

- Summary note: this document
- InfoWorks ICMT: 2016s3840_ALD_UNDEF_CC_2021.icmt
- Maximum flood extent outputs:
  - Raw outputs: Surface Water flood extents have been removed from the original ICM results to produce a fluvial only extent. This forms the basis of the gridded outputs described below.
  - Cleaned outputs: Surface Water flood extents have been removed from the original ICM results to produce a fluvial only extent. The individual triangles have been merged, holes larger than 200m^2 have been removed from the dataset and the 1D network (river reach and confluence polygons) has been then merged in to the 2D flood extent to produce a continuous flood extent.
- Cleaned maximum flood grid outputs:
  - Depth: Raw extents shapefile model outputs converted to a 1m depth grid
  - Water level: Raw extents shapefile model outputs converted to a 1m water level grid
  - Velocity: Raw extents shapefile model outputs converted to a 1m velocity grid
  - Hazard rating: Raw extents shapefile model outputs converted to a 1m hazard grid

TECHNICAL NOTE

JBA Project Code	2021s1436
Contract	Chichester SFRA Update
Client	Chichester District Council
Version and Date	V1 / December 2021
Author	Ben Gibson
Reviewer / Sign-off	Ffion Wilson
Subject	Undefended case climate change modelling: Bosham Stream

1 Introduction

JBA Consulting was commissioned by Chichester District Council as part of their Strategic Flood Risk Assessment (SFRA) update to prepare updated climate change fluvial flood risk modelling and mapping for watercourses within the SFRA area. The updated flood risk modelling was required given that updates were made in July 2021 to the climate change fluvial allowances guidance[1] published by the Environment Agency.

The flood modelling and mapping was required for the 1% Annual Exceedance Probability (AEP) undefended case scenario (without the presence of flood risk management infrastructure), for each of the three allowances applicable for the 2080s epoch (year 2070-2125).

1.1 Climate change allowances

The climate change allowances applicable to the Chichester SFRA area for the 2080s epoch are:

- Central allowance: +25%
- Higher central allowance: +36%
- Upper end allowance: +64%

Given that the +35% allowance had previously been simulated for some models in accordance with the previous climate change allowance guidance, the Environment Agency advised that this allowance could be used in place of the +36% flow allowance for the SFRA, given that there is only 1% difference between the allowances.

1.2 Base model

The base model to which updates have been made is the fluvial Bosham Stream Model Improvements modelling, prepared by Hyder Consulting (UK) Limited for the Environment Agency in 2012[2]. The model is a Flood Modeller-TUFLOW 1D-2D linked model. The geometry of the model remains as per the 2012 project, with the only changes made for this Chichester SFRA modelling being to the flood flow inputs, and tidal downstream boundary condition, which are discussed in section 2. The model folder structure has also been modified, to simplify the structure where the shorter 1.9-hour storm duration simulation files was previously contained within sub-folders

2 Updates to the modelling

2.1 Software

The climate change modelling was completed using Flood Modeller version 4.5 and TUFLOW Build 2020-01-AB-iDP-w64.

[1] Flood risk assessments: climate change allowances. Environment Agency. Last updated 6 October 2021. Available: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

[2] Hyder Consulting (UK) Limited for the Environment Agency. Environment Agency - Southern Region, Bosham Stream Model Improvements Modelling Report, Final Issue, February 2012.

2.2 Fluvial inflows

The fluvial flow are applied to the model as either flow-time (QTBDY) or Revitalised Flood Hydrograph (ReFH) method inputs in Flood Modeller. For each of the inputs to the model, either A) the hydrograph scaling factor was set to the relevant climate change allowance described above or B) the specific peak flow value was increased by the relevant percentage change, so that flow inputs are increased by the required amount.

2.3 Downstream boundary condition

For this modelling, increases to the tidal boundary condition have been applied so that water levels are reflective of the predicted change in sea level rise to the year 2121 (sea level rise change from 2022 to 2121 are applied) based on UKCP18 projections for grid square 712.

The Central, Higher Central and Upper End sea level rise allowances have been applied to the respective fluvial allowance conditions. Sea level rise uplifts applied are as follows:

- Central: +0.915m
- Higher central: +1.033m
- Upper end: +1.390m

The downstream boundary condition applied to the model is a tidal time-series at the Deep End level gauge which the report states is comparable to a 1 in 1 event (informed by the Extreme Sea-Levels for Southern Estuaries and Harbours Study, 2012).

The Deep End gauge does not record the lowest levels as theses exceed the reporting range of the gauge. Therefore, the modelling implements a single fixed level across the low-point of the tidal time-series. The 2012 project states that since these levels are below the bed levels of the modelled channels, flows are free-flowing out of the model during this time period, so the precise values modelled at lower stages are not of significance. However, if climate change allowances were applied to this data without modification, this would raise the fixed levels by the corresponding amount, resulting in a tidal curve which is not representative, as in practice this same bottom level of the tidal time-series would be recorded. Figure 2-1 presents what this tidal time-series would look like if the bottom level of the curve was not adjusted.

Note that the previous climate change modelling did not increase water levels to reflect predicted sea level changes, so the approach from previous modelling cannot be taken forward here.

It was agreed with the Environment Agency to modify the bottom levels of the tidal curve so that the data is extrapolated down to the water level that the Deep End gauge stops recording data (circa -0.28mAOD). The tidal boundary conditions applied to the modelling are presented in Figure 2-2. While the extrapolation may be simplified, it is expected to produce a more representative tidal curve for the modelling.

The use of the Deep End gauge tidal condition, and the uplifts applied to this for sea level rise between 2022 and 2121 reflect only one set of tidal conditions possible. Future users of the modelling (e.g. for the purpose of site specific assessments) should consider whether predictions at their site may be sensitive to the choice of downstream boundary condition, and assess other tidal conditions if appropriate.

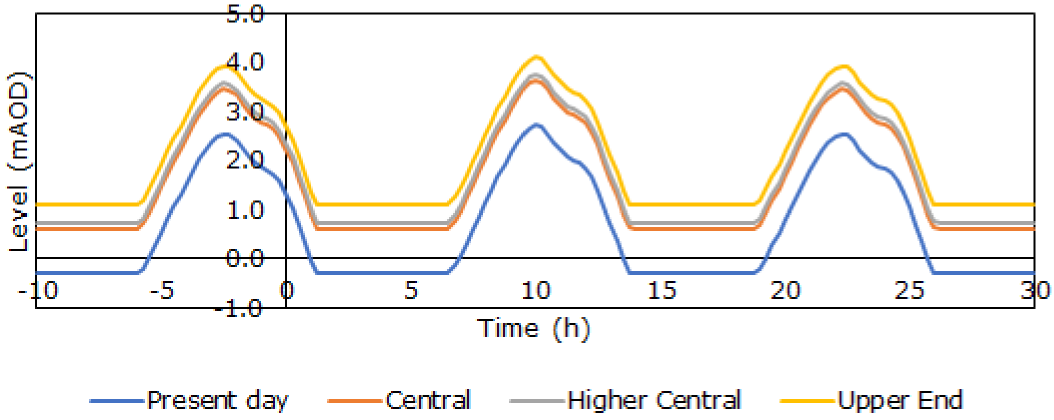

Figure 2-1: Downstream boundary tidal time-series, if the existing data (blue) was directly uplifted by the sea-level rise allowance

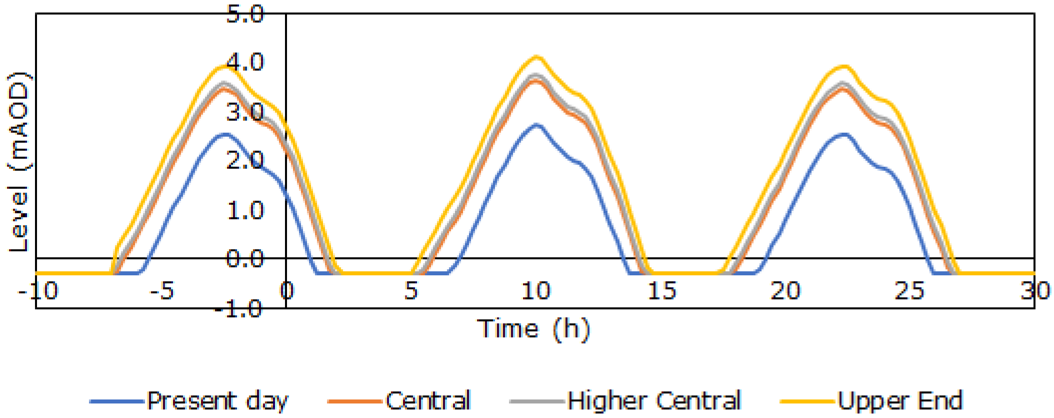

Figure 2-2: Downstream boundary tidal time-series taken forward for modelling – with the bottom curve profile extrapolated down

3 Model run names

Model simulations are named as listed below. The Flood Modeller Event file which controls the simulation has this name, and so too do the Flood Modeller and TUFLOW results:

- 1% AEP +25% events:
  - 7.5-hour duration: Bosham_Existing_0100plus25pc_2121
  - 1.9-hour duration: Bosham_OBD_Existing_0100plus25pc_2121_1.9hr
- 1% AEP +35% events:
  - 7.5-hour duration: Bosham_Existing_0100plus35pc_2121
  - 1.9-hour duration: Bosham_OBD_Existing_0100plus35pc_2121_1.9hr
- 1% AEP +64% events:
  - 7.5-hour duration: Bosham_Existing_0100plus64pc_2121
  - 1.9-hour duration: Bosham_OBD_Existing_0100plus64pc_2121_1.9hr

4 Deliverables

Mapped outputs have been supplied for the individual storm duration simulations (1.9-hour and 7.5-hour), but also a combined output has been provided, which represented the maximum extent/gridded output valued between the two simulations.

The following files were delivered as part of this modelling:

- Summary note: this document
- Flood modelling input, output and check files
- Maximum flood extent outputs:
  - Raw outputs: with flood extents as per the modelling grids
  - Cleaned outputs: with dry islands less than 200m^2 removed, and with bow ties (a GIS geometry irregularity) removed
- Maximum flood grid outputs:
  - Depth
  - Water level
  - Velocity
  - Hazard rating

TECHNICAL NOTE

JBA Project Code	2021s1436
Contract	Chichester SFRA Update
Client	Chichester District Council
Version and Date	V1 / December 2021
Author	Ben Gibson
Reviewer / Sign-off	Ffion Wilson
Subject	Undefended case climate change modelling: Chichester Lavant

1 Introduction

JBA Consulting was commissioned by Chichester District Council as part of their Strategic Flood Risk Assessment (SFRA) update to prepare updated climate change fluvial flood risk modelling and mapping for watercourses within the SFRA area. The updated flood risk modelling was required given that updates were made in July 2021 to the climate change fluvial allowances guidance[1] published by the Environment Agency.

The flood modelling and mapping was required for the 1% Annual Exceedance Probability (AEP) undefended case scenario (without the presence of flood risk management infrastructure), for each of the three allowances applicable for the 2080s epoch (year 2070-2125).

1.1 Climate change allowances

The climate change allowances applicable to the Chichester SFRA area for the 2080s epoch are:

- Central allowance: +25%
- Higher central allowance: +36%
- Upper end allowance: +64%

Given that the +35% allowance had previously been simulated for some models in accordance with the previous climate change allowance guidance, the Environment Agency advised that this allowance could be used in place of the +36% flow allowance for the SFRA, given that there is only 1% difference between the allowances.

1.2 Base model

The base model to which updates have been made is the fluvial Chichester Lavant modelling, prepared by JBA Consulting for the Environment Agency in 2018[2]. The model is a Flood Modeller-TUFLOW 1D-2D linked model. The geometry of the model remains as per the 2018 project, with the only changes made for this Chichester SFRA modelling being to the flood flow inputs, and tidal downstream boundary condition, which are discussed in section 2.

2 Updates to the modelling

2.1 Software

The climate change modelling was completed using Flood Modeller version 5.0 and TUFLOW Build 2020-10-AA-iDP-w64.

[1] Flood risk assessments: climate change allowances. Environment Agency. Last updated 6 October 2021. Available: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

[2] JBA Consulting for the Environment Agency. Chichester Lavant Model Update Modelling Study, Final Report, September 2018.

2.2 Fluvial inflows

The fluvial flow are applied to the model as flow-time (QTBDY) inputs in Flood Modeller. For each of the inputs to the model, the hydrograph scaling factor was set to the relevant climate change allowance described above, so that flow inputs are increased by the required amount.

2.3 Downstream boundary condition

The downstream boundary condition applied to the model is a Mean High Water Spring (MHWS) tidal curve at Dell Quay located in the Fishbourne Channel. Previous climate change modelling did not increase water levels to reflect predicted sea level changes.

For this modelling, increases to the tidal boundary condition have been applied so that water levels are reflective of the predicted change in sea level rise to the year 2121 (sea level rise change from 2022 to 2121 are applied) based on UKCP18 projects for grid square 713. The Central, Higher Central and Upper End sea level rise allowances have been applied to the respective fluvial allowance conditions. Sea level rise uplifts applied are as follows:

- Central: +0.915m
- Higher central: +1.033m
- Upper end: +1.390m

The use of the MHWS tidal condition, and the uplifts applied to this for sea level rise between 2022 and 2121 reflect only one set of tidal conditions possible. Future users of the modelling (e.g. for the purpose of site specific assessments) should consider whether predictions at their site may be sensitive to the choice of downstream boundary condition, and assess other tidal conditions if appropriate.

3 Model run names

Model simulations are named as listed below. The Flood Modeller Event file which controls the simulation has this name, and so too do the Flood Modeller and TUFLOW results:

- 1% AEP +25% event: Q0100plus25pc_2121_U_Lavant_085
- 1% AEP +35% event: Q0100plus35pc_2121_U_Lavant_085
- 1% AEP +64% event: Q0100plus64pc_2121_U_Lavant_085

4 Deliverables

The following files were delivered as part of this modelling:

- Summary note: this document
- Flood modelling input, output and check files
- Maximum flood extent outputs:
  - Raw outputs: with flood extents as per the modelling grids
  - Cleaned outputs: with dry islands less than 200m^2 removed, and with bow ties (a GIS geometry irregularity) removed
- Maximum flood grid outputs:
  - Depth

- Water level
- Velocity
- Hazard rating

TECHNICAL NOTE

JBA Project Code	2021s1436
Contract	Chichester SFRA Update
Client	Chichester District Council
Version and Date	V1 / December 2021
Author	Ed Hartwell
Reviewer / Sign-off	Ffion Wilson
Subject	Undefended case climate change modelling: East Wittering

1 Introduction

JBA Consulting was commissioned by Chichester District Council as part of their Strategic Flood Risk Assessment (SFRA) update to prepare updated climate change fluvial flood risk modelling and mapping using watercourses within the SFRA area. The updated flood risk modelling was required given updates to the climate change fluvial allowances guidance[1] made by the Environment Agency in July 2021.

The flood modelling was required for the 1% Annual Exceedance Probability (AEP) undefended case scenario (without the presence of flood risk management infrastructure), for each of the three allowances applicable for the 2080s epoch (year 2070-2125).

1.1 Climate change allowances

The climate change allowances applicable to the Chichester SFRA area for the 2080s epoch are:

- Central allowance: +25%
- Higher central allowance: +36%
- Upper end allowance: +64%

Given that the +35% allowance had previously been simulated for some models in accordance with the previous climate change allowance guidance, the Environment Agency advised that this allowance could be used in place of the +36% flow allowance for the SFRA, given that there is only 1% difference between the allowances.

1.2 Base model

The base model to which updates have been made is the fluvial East Wittering climate change model, previously provided by the Environment Agency in 2018 and used to prepare the previous climate change flood extents. The model is a InfoWorks ICM 1D-2D linked model. The geometry of the model remains as per the original model, with the only changes made for this Chichester SFRA modelling being to the flood flow inputs, and tidal downstream boundary condition, which are discussed in section 2.

2 Updates to the modelling

2.1 Software

The climate change modelling simulations were completed using InfoWorks ICM version 8.5.

[1] Flood risk assessments: climate change allowances. Environment Agency. Last updated 6 October 2021. Available: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

2.2 Fluvial inflows

The fluvial flow are applied to the model as flow-time (QTBDY) inputs in InfoWorks ICM. Each QTBDY is made up of three inflows at Chapel Lane, Hale Farm and Cakeham Road. Each of these has been uplifted by the scaling factor for the relevant climate change allowance described above.

2.3 Downstream boundary condition

or this modelling, increases to the tidal boundary condition have been applied so that water levels are reflective of the predicted change in sea level rise to the year 2121 (sea level rise change from 2022 to 2121 are applied) based on UKCP18 projections for grid square 712.

The Central, Higher Central and Upper End sea level rise allowances have been applied to the respective fluvial allowance conditions. Sea level rise uplifts applied are as follows:

- Central: +0.915m
- Higher central: +1.033m
- Upper end: +1.390m

The downstream boundary condition applied to the model is named "Typical Week matching peak to 14hr storm" and this has been applied to two locations;

- 1.001: located at the channel outfall near Charlmead
- Tidal: applied to the length coastline along the south extent of the model

3 Model run names

Model simulations are named as listed below. The InfoWorks ICM simulation dialogue file which controls the simulation has this name:

- 1% AEP +25% events:
  - M100-14hr W +25pcCC_Central
- 1% AEP +35% events:
  - M100-14hr W +35pcCC_HighCentral
- 1% AEP +64% events:
  - M100-14hr W +64pcCC_UpperEnd

4 Deliverables

Mapped outputs have been supplied for the individual storm simulations.

The following files were delivered as part of this modelling:

- Summary note: this document
- InfoWorks ICMT: East Wittering IA Model_2021.icmt
- Maximum flood extent outputs:
  - Raw outputs: from ICM included with all component elements. This shapefile formed the basis of the gridded outputs described below.

  - Cleaned outputs: from ICM included with all component elements. This was then merged with the 1D network (river reach and confluence polygons) to produce a continuous flood extent
- Maximum flood grid outputs:
  - Depth: Raw extents shapefile model outputs converted to a 1m grid
  - Water level: Raw extents shapefile model outputs converted to a 1m grid
  - Velocity: Raw extents shapefile model outputs converted to a 1m grid
  - Hazard rating: Raw extents shapefile model outputs converted to a 1m grid

TECHNICAL NOTE

JBA Project Code	2021s1436
Contract	Chichester SFRA Update
Client	Chichester District Council
Version and Date	V1 / December 2021
Author	Ben Gibson
Reviewer / Sign-off	Ffion Wilson
Subject	Undefended case climate change modelling: Upper Arun

1 Introduction

JBA Consulting was commissioned by Chichester District Council as part of their Strategic Flood Risk Assessment (SFRA) update to prepare updated climate change fluvial flood risk modelling and mapping for watercourses within the SFRA area. The updated flood risk modelling was required given that updates were made in July 2021 to the climate change fluvial allowances guidance[1] published by the Environment Agency.

The flood modelling and mapping was required for the 1% Annual Exceedance Probability (AEP) undefended case scenario (without the presence of flood risk management infrastructure), for each of the three allowances applicable for the 2080s epoch (year 2070-2125).

1.1 Climate change allowances

The climate change allowances applicable to the Chichester SFRA area for the 2080s epoch are:

- Central allowance: +25%
- Higher central allowance: +36%
- Upper end allowance: +64%

Given that the +35% allowance had previously been simulated for some models in accordance with the previous climate change allowance guidance, the Environment Agency advised that this allowance could be used in place of the +36% flow allowance for the SFRA, given that there is only 1% difference between the allowances.

1.2 Base model

The base model to which updates have been made is the fluvial Upper River Arun 'Hot Spot' modelling, prepared by Peter Brett Associates for the Environment Agency in 2003[2]. The model is a Flood Modeller 1D only model. It comprises 30 *VPMC Routing Sections* (MUSK-RSEC units) and 22 VPMC Cross Sections (MUSK-XSEC units) to describe the flow of channel through the modelled watercourses and floodplain.

The geometry of the model remains as per the 2003 project, with the only changes to the model made for this Chichester SFRA modelling being to the flood flow inputs. A more update to date Digital Elevation Model (DEM) has used to prepare the flood mapping outputs via post-processing routines. The hydrology inputs and DEM are discussed in section 2.

[1] Flood risk assessments: climate change allowances. Environment Agency. Last updated 6 October 2021. Available: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

[2] Peter Brett Associates for the Environment Agency. Section 105 Phase 2 River Arun Flood Study Modelling Report Project Ref:10509/36. January 2003.

2 Updates to the modelling

2.1 Software

The climate change modelling was completed using Flood Modeller version 5.0.

2.2 Model parameters

The original modelling used a fixed timestep of 60 seconds to simulate the model. Modelling with this, and also when testing a 20 second timestep, was found to contain instabilities when climate change allowances were applied (the largest event tested in the 2003 project was the present day 1% AEP event, so flows as large as those now being modelled were not tested), and so a 2 second timestep was taken forward or final simulations as this was found to provide a stable simulation.

2.3 Fluvial inflows

The fluvial flow are applied to the model as either flow-time (QTBDY) or FEH Rainfall Runoff Method (FEHBDY) inputs in Flood Modeller. For each of the inputs to the model the hydrograph scaling factor was set to the relevant climate change allowance described above so that flow inputs are increased by the required amount.

2.4 Downstream boundary condition

The downstream boundary condition applied as a water level versus time boundary to the 2003 flood modelling close to Pallingham Weir varies between the event magnitudes tested, as displayed in Figure 2-1. It is not easy to understand from the 2003 reporting how this data was derived, but the time-series data appears to be a simplified flood hydrograph shape. Given uncertainties regarding the approach to deriving the downstream boundary condition, and absence of climate change modelling as part of the project, it is not clear if and how coastal/tidal climate change allowances would influence the downstream boundary condition. The Environment Agency could not provide any further information on the approach taken forward for the modelling.

The approach advised to use for the 1% AEP climate change modelling was to use the existing 1% AEP downstream boundary condition, and this is what has been configured in the modelling.

Other options considered, but discounted were A) to apply the climate change sea level rise allowances directly to the 1% AEP downstream boundary water level data, and B) to use a rating curve for the site available from the National Flow River Archive site (https://nrfa.ceh.ac.uk/data/station/peakflow/41014). For option A it is likely that directly applying the sea level rise climate change allowance to the time-series data may overestimate the change in water level, and for option B it is unclear whether the existing rating relationship is the latest information and whether this would be expected to change as a result of sea level rise.

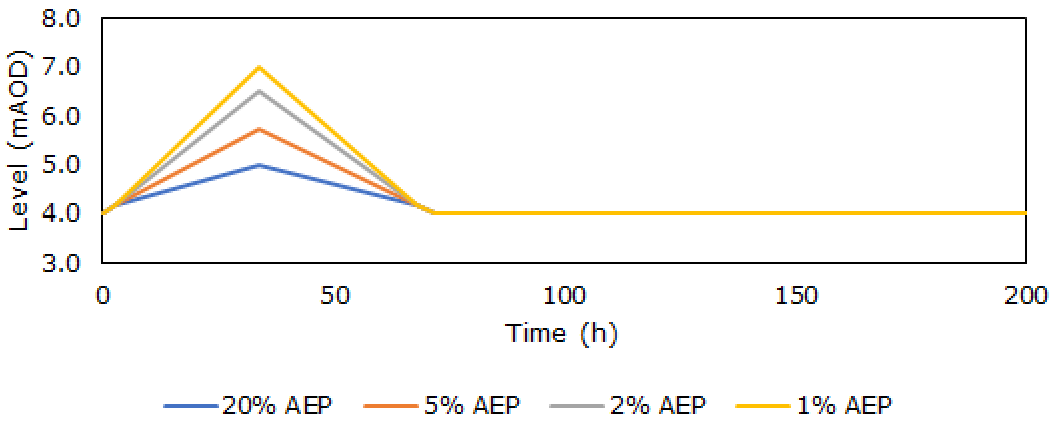

Figure 2-1: Downstream boundary condition water level versus time data for the events tested in the 2003 project

2.5 Digital Elevation Model used for post-processing flood outputs

The DEM used for the production of flood mapping outputs is the LIDAR Composite Digital Terrain Model prepared in 2020 at 2m resolution. The Composite LIDAR data comprises data from different collection periods with the latest data taking precedent, provided it is at a resolution the same as, or finer than, the output resolution. The collection years for the LIDAR covering the mapping area are 2015, 2019 and 2020. It is unknown what DEM was used for the 2003 project, but the report indicates that this is likely to have been Photogrammetric data.

3 Model run names

Model simulations are named as listed below. The Flood Modeller Event file which controls the simulation has this name, and so too do the results files:

- 1% AEP +25% event: Arun100plus25pc_02s
- 1% AEP +35% event: Arun100plus35pc_02s
- 1% AEP +64% event: Arun100plus64pc_02s

4 Flood mapping

Flood map outputs cannot be directly extracted from 1D models, so post-processing routines are used to derive this information.

Using cross-section extents provided from the 2003 project (file: UArun_Sections_Existing_polyline.shp), which were attributed with the peak water levels predicted from the climate change modelling at corresponding model cross-sections, a water surface was produced, from which flood depths were derived by subtracting the DEM. Some adjustments were made to the cross-section locations to improve the definition of the water surface produced. Flood extents were then extracted from this information and flood depth and water level grids extracted for the flooded areas. Note that of the 438 cross-sections present within the file above, only 45 represent sections within the Upper Arun model, and even fewer cover the

Chichester SFRA area. These smaller number of sections are what inform the flood mapping outputs.

5 Deliverables

The following files were delivered as part of this modelling:

- Summary note: this document
- Flood modelling input and output files
- Maximum flood extent outputs:
    - Raw outputs: flood extents without any additional processing (e.g. potentially containing bow ties and dry islands)
    - Cleaned outputs: with dry islands less than 200m^2 removed, and with bow ties (a GIS geometry irregularity) removed
- Maximum flood grid outputs:
    - Depth
    - Water level
- Flood map processing information:
    - LIDAR Composite 2m DTM
    - Cross-sections attributed with peak water levels

The flood mapping outputs have been clipped to the extent of the Chichester SFRA area.