Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified locations and/or overtopping of defences. Breaches have been modelled to occur at the peak tidal level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodologies and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences at specified points.

The model simulates 3 tidal cycles with the peak level occurring on the second peak and the slightly smaller peaks either side. Breaches in the defences were modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.

NOTES

Scale: 1:27,000

Legend:
- Breach Location
- Maximum Flood Depth (m)

1. 0 to 0.5 m
2. 0.5 to 1 m
3. 1 to 1.5 m
4. 1.5 to 2 m
5. 2 to 2.5 m
6. 2.5 to 3 m
7. 3 to 3.5 m
8. 3.5 to 4 m
9. 4 to 4.5 m
10. 4.5 to 5 m
11. 5 to 5.5 m
12. 5.5 to 6 m
13. > 6 m
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences. Hydraulic modelling was undertaken in a stepwise manner, with breaches occurring on the second peak and 10 to 30 years between each peak events. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the UCDAIR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will almost certainly vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences.

The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defences are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will almost certainly vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.

LEGEND

- Breach Location
- Maximum Flood Depth (m)
  - > 0 to 0.5m
  - > 0.5 to 1m
  - > 1 to 1.5m
  - > 1.5 to 2m
  - > 2 to 2.5m
  - > 2.5 to 3m
  - > 3 to 3.5m
  - > 3.5 to 4m
  - > 4 to 4.5m
  - > 4.5 to 5m
  - > 5 to 5.5m
  - > 5.5 to 6m
  - > 6m

NOTES

- Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences.
- The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defences are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.
- The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.
- When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will almost certainly vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.
- It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.
- A thorough description of methodology and assumptions is included within the SFRA Main Report.

**SOUTH ESSEX**
**LEVEL 1 SFRA**
**ROCHFORD BREACH**
**MAXIMUM FLOOD DEPTH**
**2016, 0.5% AEP**
NOTES

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver. 2011), to assess the effect of breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second cycle and two slightly smaller peaks either side. Breaches in the defence walls are simulated to occur in advance of the peak tide level to assess the maximum potential volume of water into the flood cell. Flood hazard is calculated at a specific point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People FPD201 (Defra & EA, 2005). These hazard classifications do not indicate a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach location, and that the exact extent and velocity vary with breach location. Flood hazard varies spatially if the breach locations are in different local areas. It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
NOTES

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver. 2011), to assess the effect of breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are included to occur in advance of the peak level to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People FD2320 (Defra & EA, 2005). These hazard classiﬁcations do not include a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more speciﬁc breach locations, and that the level and extent of hazard vary spatially if the breach locations are in different local areas. It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
NOTES

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011), to assess the effect of breach at a specific point in the defences. The model simulates a tidal cycle with the use of two stages of tidal input: a major peak, and a smaller peak either side. Breaches in the defence walls are modelled to occur in advance of the peak defences to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People FD232 (Defra & EA, 2005). These hazard classifications do not indicate a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the rating will almost certainly vary spatially if the breach locations are in different local areas. It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011), to assess the effect of a breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur in advance of the peak tide level to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People (CIRIA, 2005). These hazard classifications do not include a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the scoring will remain entirely very local to these areas. It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.

NOTES

This document has been prepared pursuant to and subject to the terms of AECOM's appointment by its client. AECOM accepts no liability for any use of this document other than by its original client or following AECOM's express agreement to such use, and only for the purposes for which it was prepared and provided.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences. The breaches have been modelled occurring on the second peak and have slightly smaller peaks either side. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each breach in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary if breaches are occurring in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and has slightly smaller peaks either side. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation. When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodologies and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences due to climate change. Breaches are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater. The maximum flood depth is calculated by subtracting the LiDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will almost certainly vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences. Each breach was modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will almost certainly vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.
NOTES
Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011) to assess the effect of a breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur in advance of the peak tides to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodcell, along with a suitable debris factor and is based on the methodology from Flood Risk to People FD2320 (Defra & EA, 2016). These hazard classifications do not include a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations and that the hazard will depend on the variability of tidal inflows. In practice, it would be expected that the breach width and depth, though based on defences, are arbitrary and have been chosen to represent the actual dimensions of a potential breach at a given location. A thorough description of the methodology and assumptions is included within the SFRA Main Report.

LEGEND
- Breach Location
- Maximum Flood Hazard
  - Low Hazard
  - Moderate Hazard (Danger to Some)
  - Significant Hazard (Danger to Most)
  - Extreme Hazard (Danger to All)
NOTES

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011), to assess the effect of a breach at a specific point in the defences. The model simulates 3 tidal cycles with the breach occurring at spring tides to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a debris factor. Hazard classifications do not indicate a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the rating will alter certainty values in a specific area. It should be noted that the breach width and depth, though based on local guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
NOTES
Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver. 2011), to assess the effect of breach at a specific point in the defences. The model simulates a tidal cycle with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur in advance of the peak level to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor to represent any change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the ratings will almost certainly vary spatially if the breach locations are in different local areas. It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
NOTES

Hydraulic modeling has been undertaken using 2-D hydraulic modeling software MIKE21-HDFM (ver.2011), to assess the effect of breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are installed to occur in advance of the peak defences to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodcell, along with a suitable debris factor is based on the methodology from Flood Risk to People F0220 (Defra & EA, 2005). These hazard classifications do not include a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and do not the siting with uncertainty very well. Breaches in the wall of the flood cell are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences at specified locations. The effect of overtopping is captured by considering the effect of breaches occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation. When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodologies and assumptions is included within the SFRA Main Report.

NOTES

The flood depth values are provided for each breach location as follows:

- > 0 to 0.5 m
- > 0.5 to 1 m
- > 1 to 1.5 m
- > 1.5 to 2 m
- > 2 to 2.5 m
- > 2.5 to 3 m
- > 3 to 3.5 m
- > 3.5 to 4 m
- > 4 to 4.5 m
- > 4.5 to 5 m
- > 5 to 5.5 m
- > 5.5 to 6 m
- > 6 m

Each flood depth value is assigned to a specific area on the map, with the boundaries of the areas defined by the breach locations.

Client File Name: K:\5004 - Information Systems\60532482 - South Essex SFRA\02_Maps\Figure E39 Rochford Breach Maximum Flood Depth 2016 0.1 AEP_DDP.mxd
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009) to assess the effect of breaches at specified points and the effect of overtopping of defences. Maximum flood depth has been calculated assuming a breach occurring at the second peak and has slightly wider spatial extent. Breaches in the defences were modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.

NOTES

Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009) to assess the effect of breaches at specified points and the effect of overtopping of defences. Maximum flood depth has been calculated assuming a breach occurring at the second peak and has slightly wider spatial extent. Breaches in the defences were modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.

NOTES

Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009) to assess the effect of breaches at specified points and the effect of overtopping of defences. Maximum flood depth has been calculated assuming a breach occurring at the second peak and has slightly wider spatial extent. Breaches in the defences were modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences. The floods are simulated over 4 tidal cycles with the peak level occurring on the second peak and one slightly smaller peak either side. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation. When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary spatially. The maximum depth is calculated through each breach location. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should also be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.

NOTES

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Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences. The hydraulic model consists of 3 tidal cycles, with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will almost certainly vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should also be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.

NOTES
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NOTES

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011), to assess the effect of breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second cycle and two slightly smaller peaks either side. Breaches in the defence walls are simulated in advance of the peak tides in order to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People F0230 (CICRA et al., 2006). These hazard classifications do not include a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the rating can vary significantly from one breach location to another. Hazard classifications do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
NOTES

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011), to assess the effect of a breach at a specific point in the defences. The model simulates a local scenario with the breach occurring at a set time, which is then propagated over a number of tidal cycles. The model is not intended to be an accurate representation of the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People FD232 (Defra & EA, 2005). These hazard classifications do not include a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and not the varying and uncertain probability of breaches occurring in different areas. It should be noted that the breach width and depth, though based on EA guidance on arbitrary and not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
NOTES

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011), to assess the effect of breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second cycle and two slightly smaller peaks either side. Breaches in the defence walls are modelled as a specific breach location and are assumed to occur at the peak level. Hydraulic modelling was carried out to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor, based on the methodology from Flood Risk to People FD232 (Defra & EA, 2005). These hazard classifications do not indicate a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the rating will almost certainly vary spatially if the breach locations are in different local areas. It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
NOTES

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011), to assess the effect of breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and two smaller peaks either side. Breaches in the defence walls are modelled to occur in advance of the peak defences to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People FDR231 (Defra & EA, 2005). These hazard classifications do not include a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the rating will almost certainly vary spatially if the breach locations are in different local areas. It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and no attempt has been made to accurately represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences at the location shown on the map. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will almost certainly vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should also be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodologies and assumptions is included within the SFRA Main Report.

NOTES
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences. Tidal cycles were simulated over a period of 24 hours, assuming the breach was assumed to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model throughout the simulation. When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will vary spatially and in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location.

It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.
Hydraulic modelling has been undertaken using 2D hydraulic modelling software MIKE21-HDFM (ver. 2009), to assess the effect of breaches at specified points and/or overtopping of defences occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

The maximum flood depth is calculated by subtracting the LIDAR topographic data from the peak water level achieved at each element in the model through the simulation.

When using flood depth maps, it should be noted that they represent the flood depth arising from one or more specified breach locations, and that the depth will almost certainly vary spatially if the breach locations are in different local areas. Changes in inundation extent or maximum depth are non-linear to changes in breach location. It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location.

A thorough description of methodology and assumptions is included within the SFRA Main Report.

NOTES

NOTES

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver. 2011), to assess the effect of a breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second cycle and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur in advance of the peak tide level to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People FD2320 (CIRIA, 2012). These hazard classifications do not indicate a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the rating will almost certainly vary spatially if the breach locations are in different local areas. It should be noted that the breach width and depth, though based on the guidance and on the basis of the flood cell being breached, are arbitrary in the model and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.

HYDRAULIC MODEL OF ROCHESTER BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.1% AEP

LEGEND

- Breach Location
- Maximum Flood Hazard
  - Low Hazard
  - Moderate Hazard (Danger to Some)
  - Significant Hazard (Danger to Most)
  - Extreme Hazard (Danger to All)


AECOM Internal Project No.

Scale @ A3

60532482

JW

BB

CP

08/04/2018

Client

File Name: K:\5004 - Information Systems\60532482 - South Essex SFRA\02_Maps\Figure E42 Rochford Breach Maximum Flood Hazard 2116 with climate change 0.1 AEP_DDP.mxd

Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver. 2011), to assess the effect of a breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second cycle and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur in advance of the peak tide level to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People FD2320 (CIRIA, 2012). These hazard classifications do not indicate a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the rating will almost certainly vary spatially if the breach locations are in different local areas. It should be noted that the breach width and depth, though based on the guidance and on the basis of the flood cell being breached, are arbitrary in the model and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
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Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver. 2011), to assess the effect of a breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are modelled to occur in advance of the peak tide level to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor. Flood hazard classifications do not include a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the hazard will reduce consider only very close to the breach location. Hazard classifications do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
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Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011), to assess the effect of breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls are simulated as a source in addition to the peak defences to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People FD2320 (Defra & EA, 2005). These hazard classifications do not include a change in the flood probability. When using flood hazard maps, it should be noted that they represent the hazard arising from one or more specified breach locations, and from the model with inherent uncertainty. Hazard classifications for flood cell can be used to represent the flood hazard at the site, subject to the assumptions, uncertainties and model limitations. It should be noted that the breach width and depth, though based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
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Hydraulic modelling has been undertaken using 2-D hydraulic modelling software MIKE21-HDFM (ver.2011) to assess the effect of breach at a specific point in the defences. The model simulates 3 tidal cycles with the peak level occurring on the second peak and two slightly smaller peaks either side. Breaches in the defence walls were modelled to occur in advance of the peak defences to assess the maximum potential volume of inflow into the flood cell. Flood hazard is calculated as a function of flood depth and flow velocity at a particular point in the floodplain, along with a suitable debris factor and is based on the methodology from Flood Risk to People F2320 (CAH, 2008). These hazard classifications do not include a change in the flood probability. When using flood hazard maps it should be noted that they represent the hazard arising from one or more specified breach locations, and that the rating in the flood cells are likely to vary spatially if the breach locations are in different local areas. It should be noted that the breach width and depth, based on EA guidance, are arbitrary and do not necessarily represent the actual dimensions of a potential breach at a given location. A thorough description of methodology and assumptions is included within the SFRA Main Report.
Time to inundation mapping illustrates the length of time from a breach before floodwaters reach a particular site. This information is particularly useful for emergency planning as it provides details of the time available for evacuation to a place of safety.

Time zero is set to the time when tidal water enters the specific breach. This means that the <1 hour band encompasses all areas that are flooded within the first hour of water travelling through the specific breach and into the flood cell. Further bands have been produced to show wet cells at: 1-4 hours, 4-8 hours, 8-12 hours, 12 to 16 and 16-20 hours. Time to inundation is specific to each breach location.

Mapping has been provided for the 1 in 1000 year + CC event as it represents the most conservative scenario and should be used for emergency planning purposes when considering safe access/egress routes from any potential development area.
Time to inundation mapping illustrates the length of time from a breach before flooding reaches a particular site. This information is particularly useful for emergency planning purposes as it provides details of the time available for evacuation in a given area.

Time zero is set to the time when tidal water enters the breach. This means that the <1 hour band encompasses all areas that are inundated (wet) within 1 hour of water travelling through the specific breach and into the flood cell. Further bands have been produced to show wet cells at 1-4 hours, 4-8 hours, 8-12 hours, 12-16 hours and 16-20 hours. Time to inundation is specific to each breach location.

Mapping has been provided for the 1 in 1000 year + Climate Change (1% AEP) event as it represents the most conservative scenario and should be used for emergency planning purposes when considering safe access/egress routes from any potential development area.
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**NOTES**

This document is to be used only for the purpose of issue that it was issued for and is subject to amendment.

**LEGEND**

- **Breach Location**
- **Time to Inundation (Hours)**
  - < 1 Hour
  - 1 - 4 Hours
  - 4 - 8 Hours
  - 8 - 12 Hours
  - 12 - 16 Hours
  - 16 to 20 Hours
  - > 20 Hours

**SCALE**

1:20,000

**REFERENCES**

Time to inundation mapping illustrates the length of time from a breach before floodwaters reach a particular site. This information is particularly useful for emergency planning as it provides details of the time available for evacuation in a given area.

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Mapping has been provided for the 1 in 1000 year + CC event as it represents the most conservative scenario and should be used for emergency planning purposes when considering safe access/egress routes from any potential development sites.

**NOTES**

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**LEGEND**

- Breach Location
- Time to Inundation (Hours)
  - < 1 Hour
  - 1 - 4 Hours
  - 4 - 8 Hours
  - 8 - 12 Hours
  - 12 - 16 Hours
  - 16 - 20 Hours
  - > 20 Hours

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**Copyright**

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