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**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 overlapping 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 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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD DEPTH 2016, 0.5% AEP, WITH BARRIER**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
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Drawing Number **FIGURE E1** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E1\_Basildon Breach Maximum Flood Depth - 2016, 0.5 AEP with barrier.mxd

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**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 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 FD2320 (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.

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Purpose of Issue **FINAL**

Client



Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD HAZARD 2016, 0.5% AEP, WITH BARRIER**

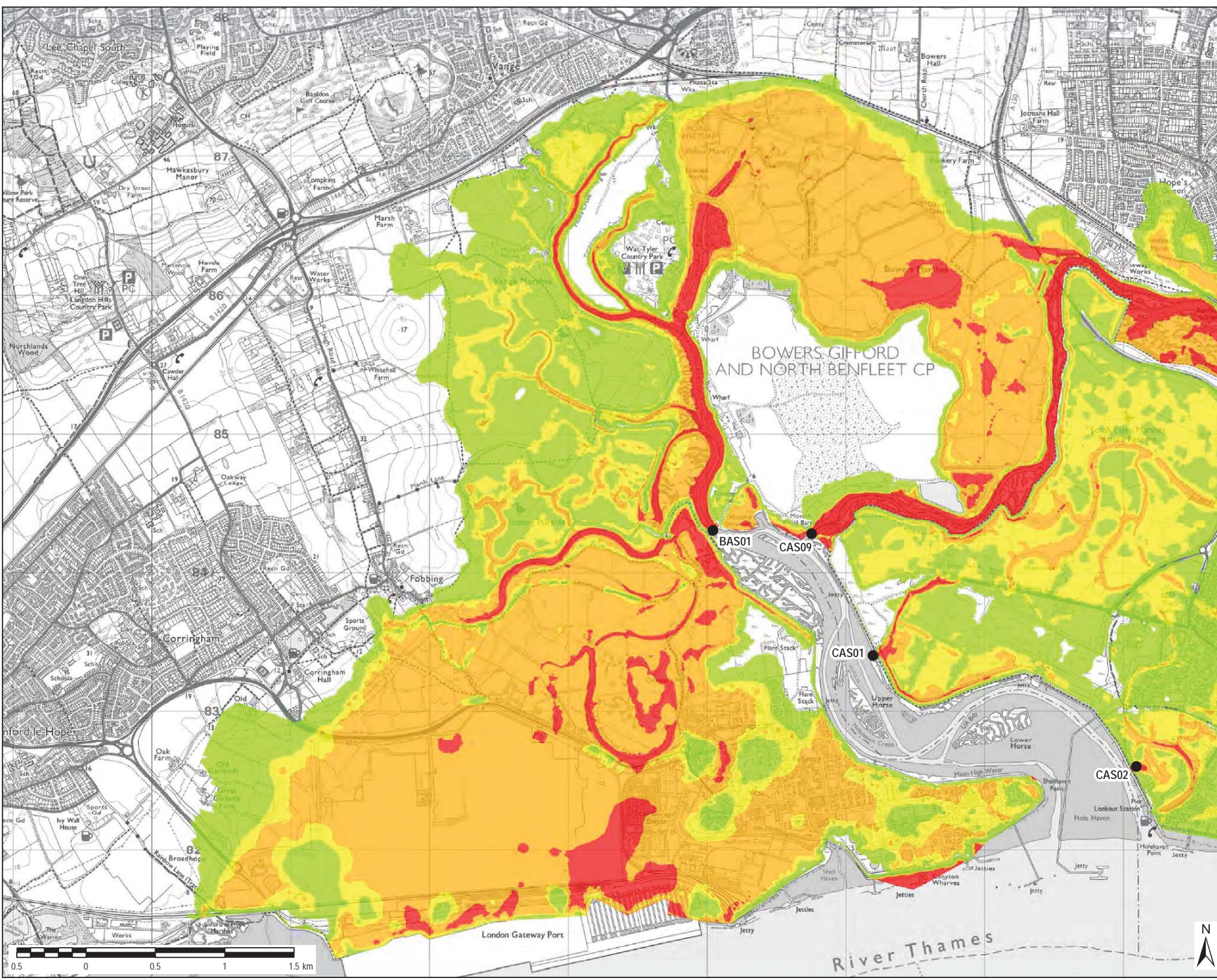
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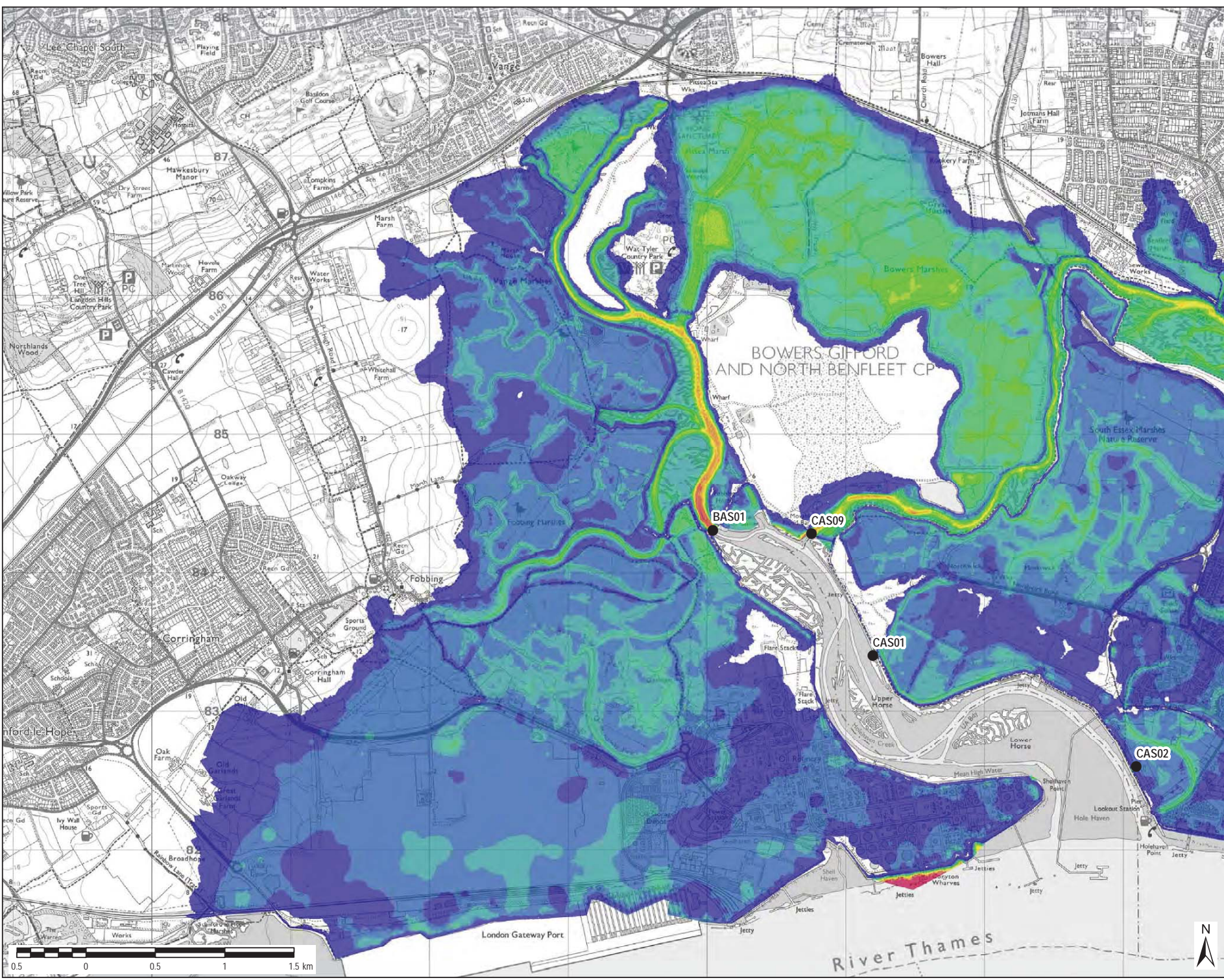
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Drawing Number **FIGURE E2** Rev **1**



File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E2\_Basildon Breach Maximum Flood Hazard - 2016.05 MEP with barrier.mxd



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**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**

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD DEPTH 2016, 0.5% AEP, WITHOUT BARRIER**

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Drawing Number **FIGURE E3** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E3\_Basildon Breach Maximum Flood Depth - 2016\_0.5\_AEP\_without barrier.mxd

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**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 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 FD2320 (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.

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Purpose of Issue **FINAL**

Client



Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD HAZARD 2016, 0.5% AEP, WITHOUT BARRIER**

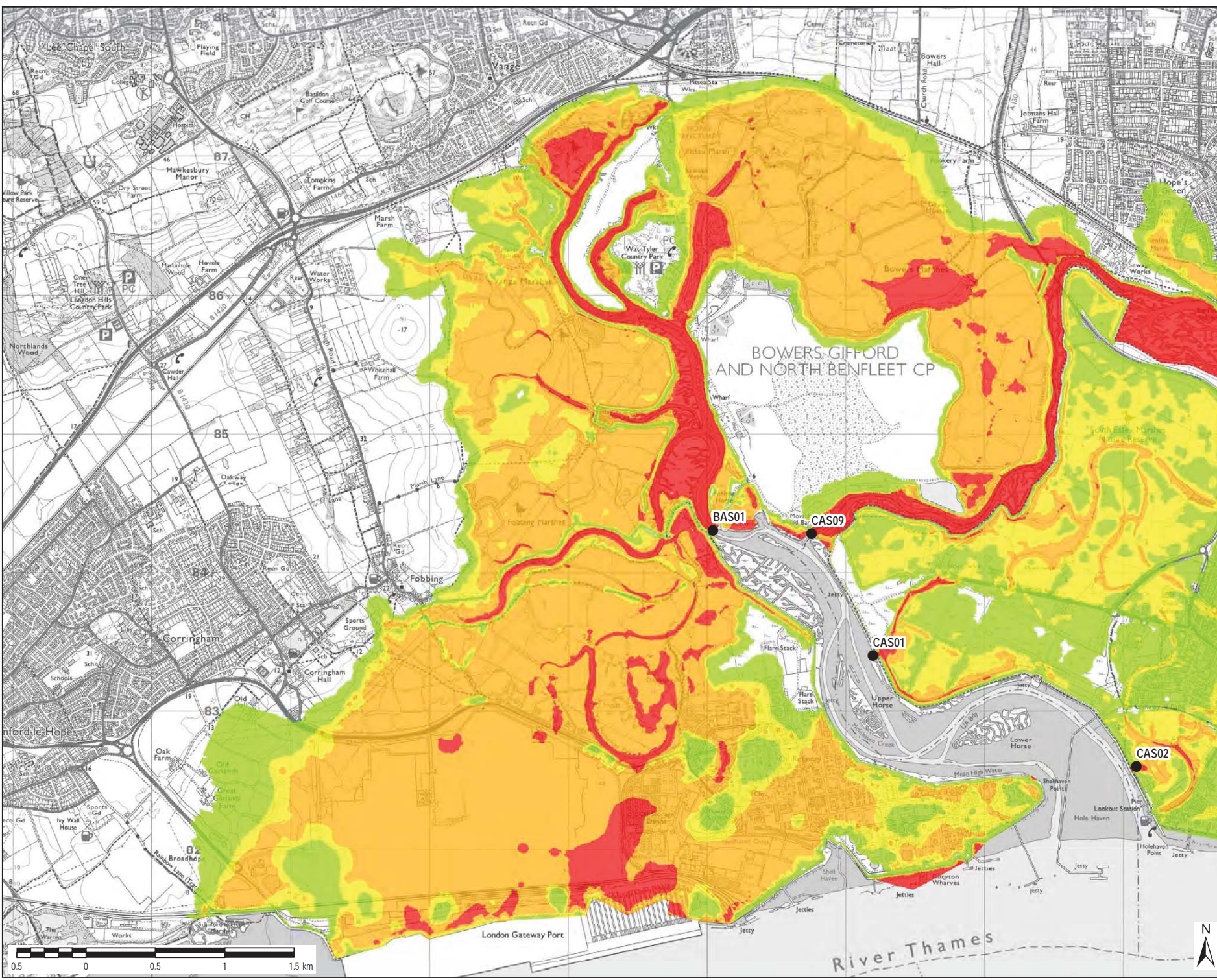
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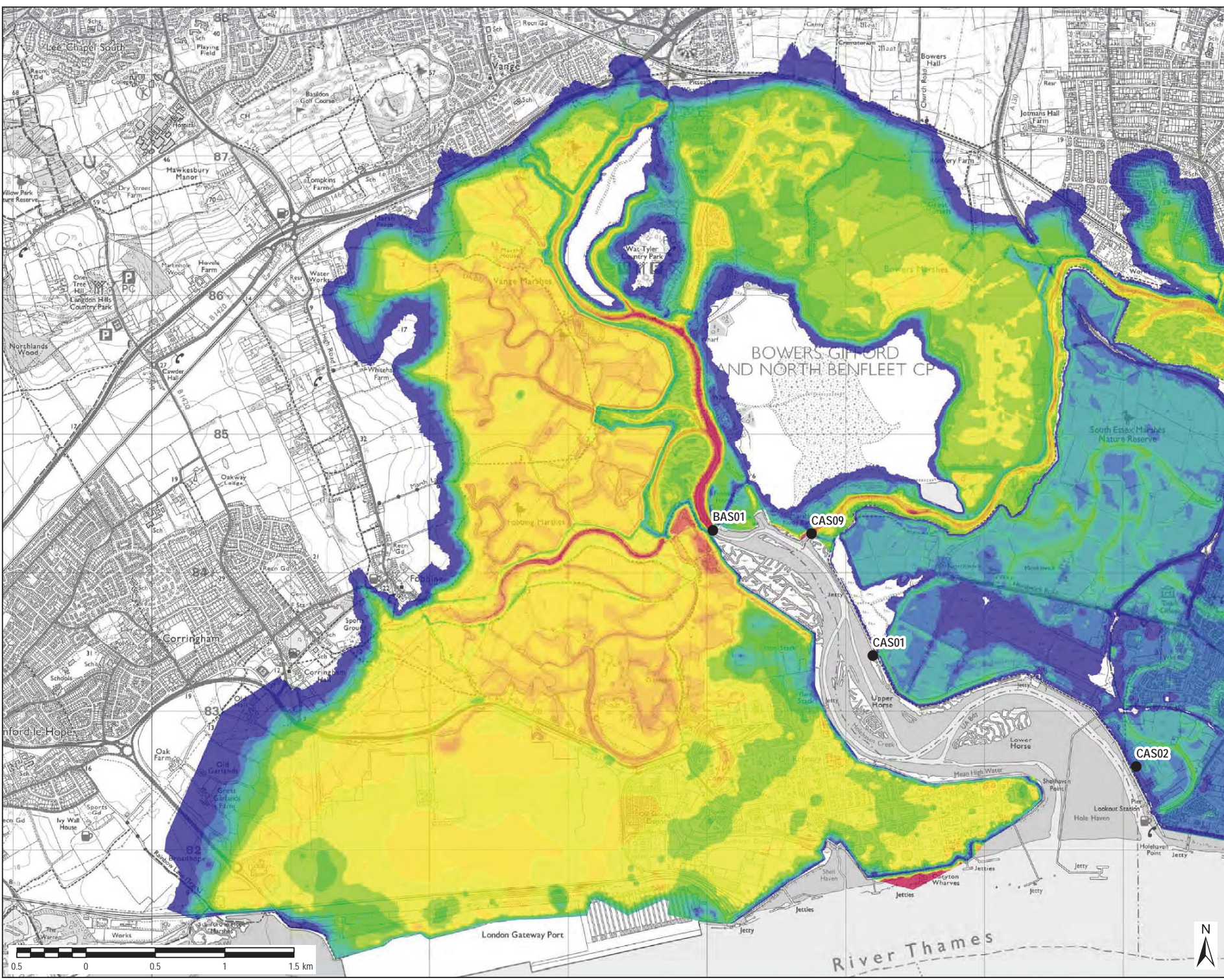


Drawing Number **FIGURE E4** Rev **1**



File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E4\_Basildon Breach Maximum Flood Hazard - 2016.05.REP without barrier.mxd

File Name: K15004 - Information Systems\6532482 - South Essex SFRA\02\_Maps\Figures\ES\_Basildon Breach Maximum Flood Depth - 2116 with climate change 0.5 CEP with barrier.mxd



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**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**

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1SFRA**

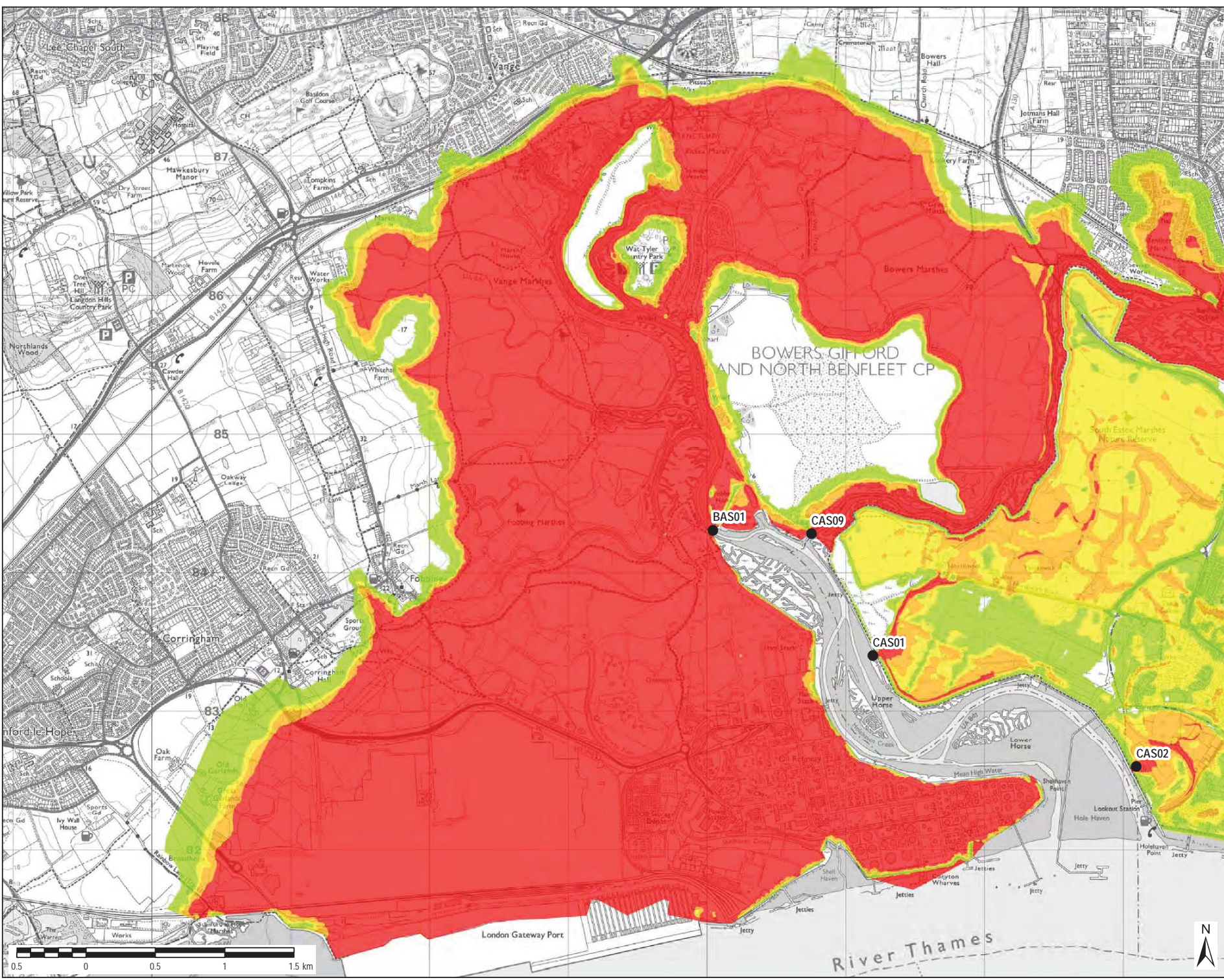
Drawing Title **BASILDON BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.5% AEP, WITH BARRIER**

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Drawing Number **FIGURE E5** Rev **1**



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

**NOTES**

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.5% AEP, WITH BARRIER**

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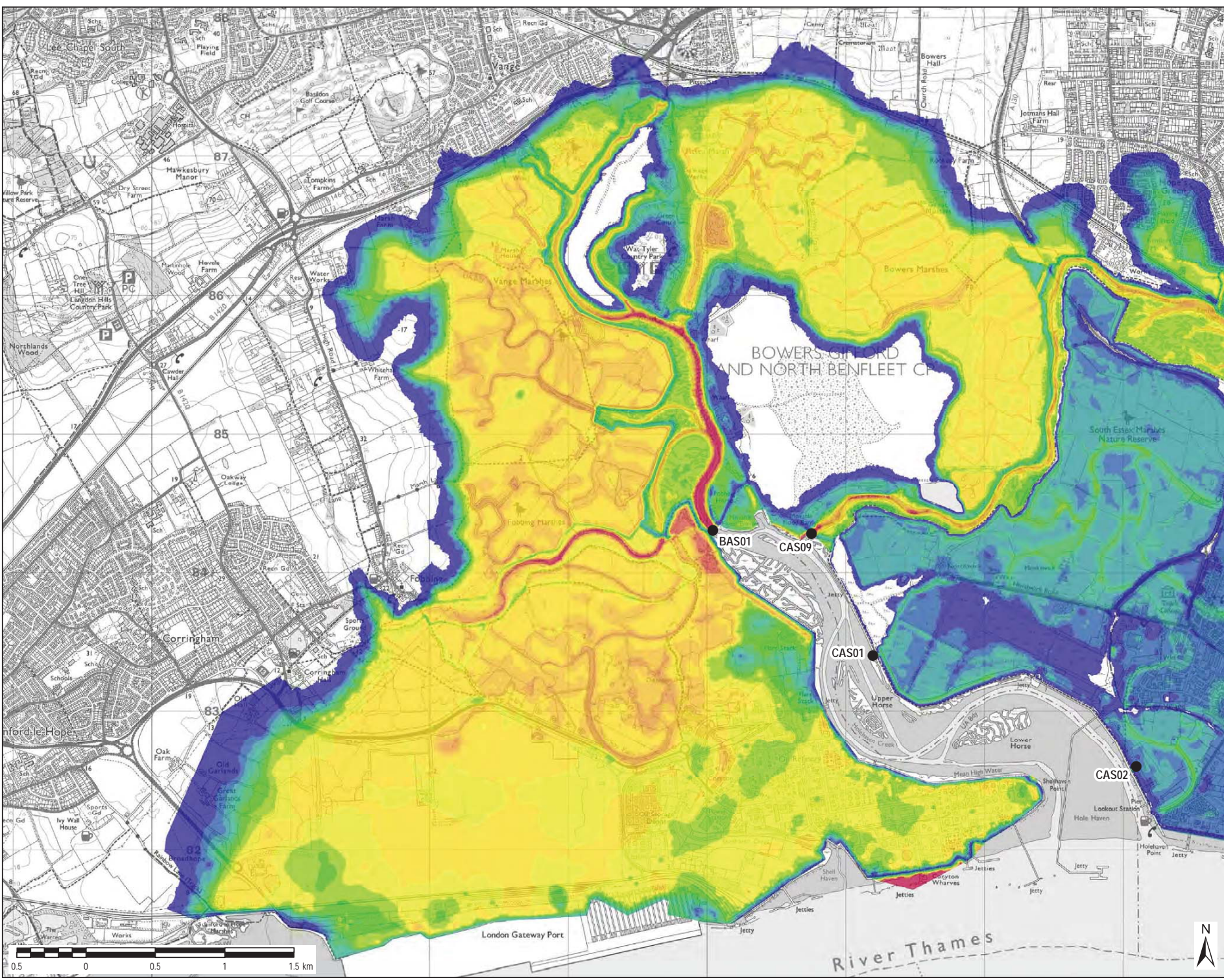
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Drawing Number **FIGURE E6** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\Fig E6\_Basildon Breach Maximum Flood Hazard - 2116 with climate change 0.5 AEP with barrier.mxd



File Name: K15004 - Information Systems\60532402 - South Essex SFRA\02\_Maps\Figures\F7\_Basildon Breach Maximum Flood Depth - 2116 with climate change 0.5 AEP without barrier.mxd



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**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**

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.5% AEP, WITHOUT BARRIER**

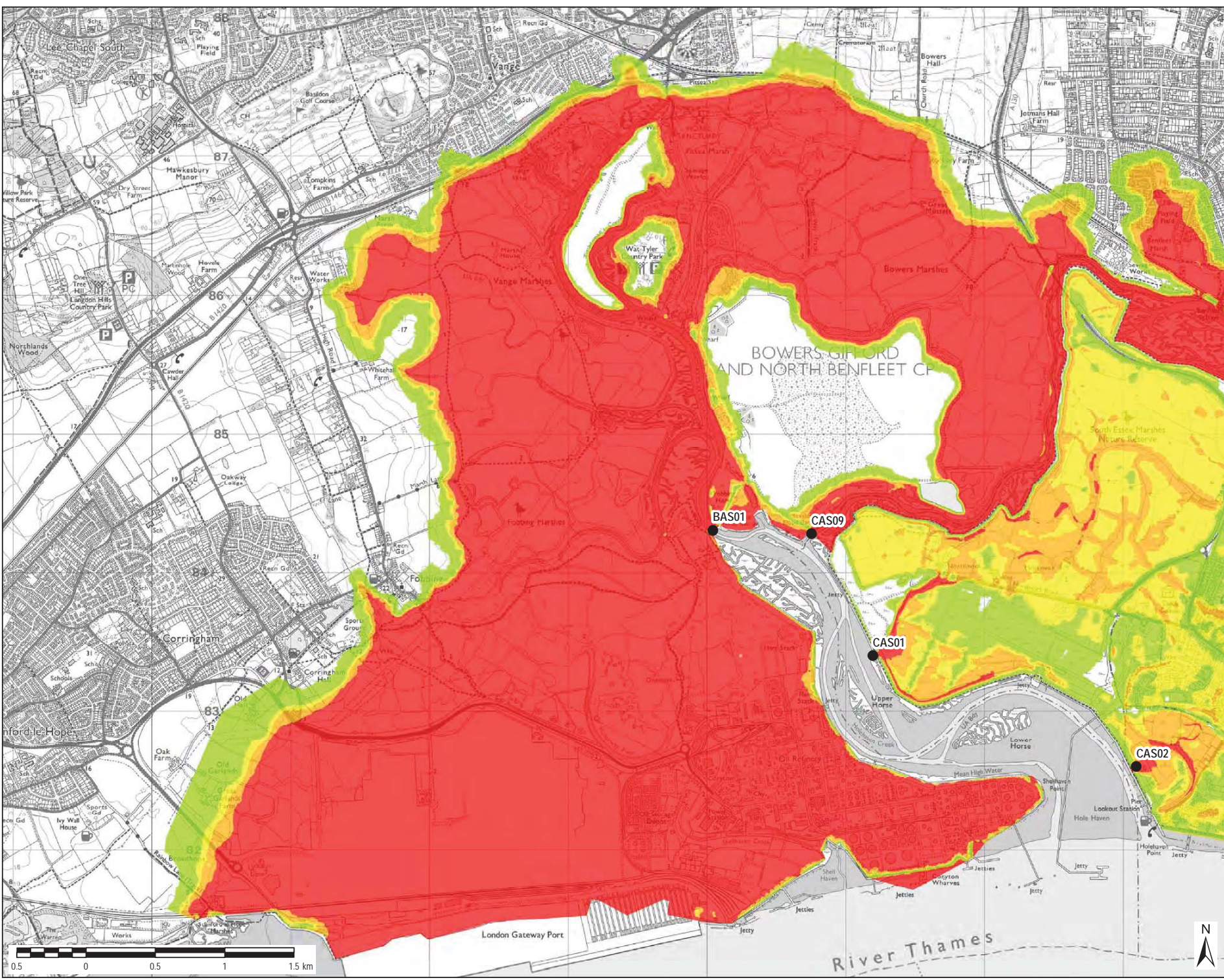
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Drawing Number **FIGURE E7** Rev **1**

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**LEGEND**

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

**NOTES**

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.5% AEP, WITHOUT BARRIER**

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Drawing Number **FIGURE E8** Rev **1**

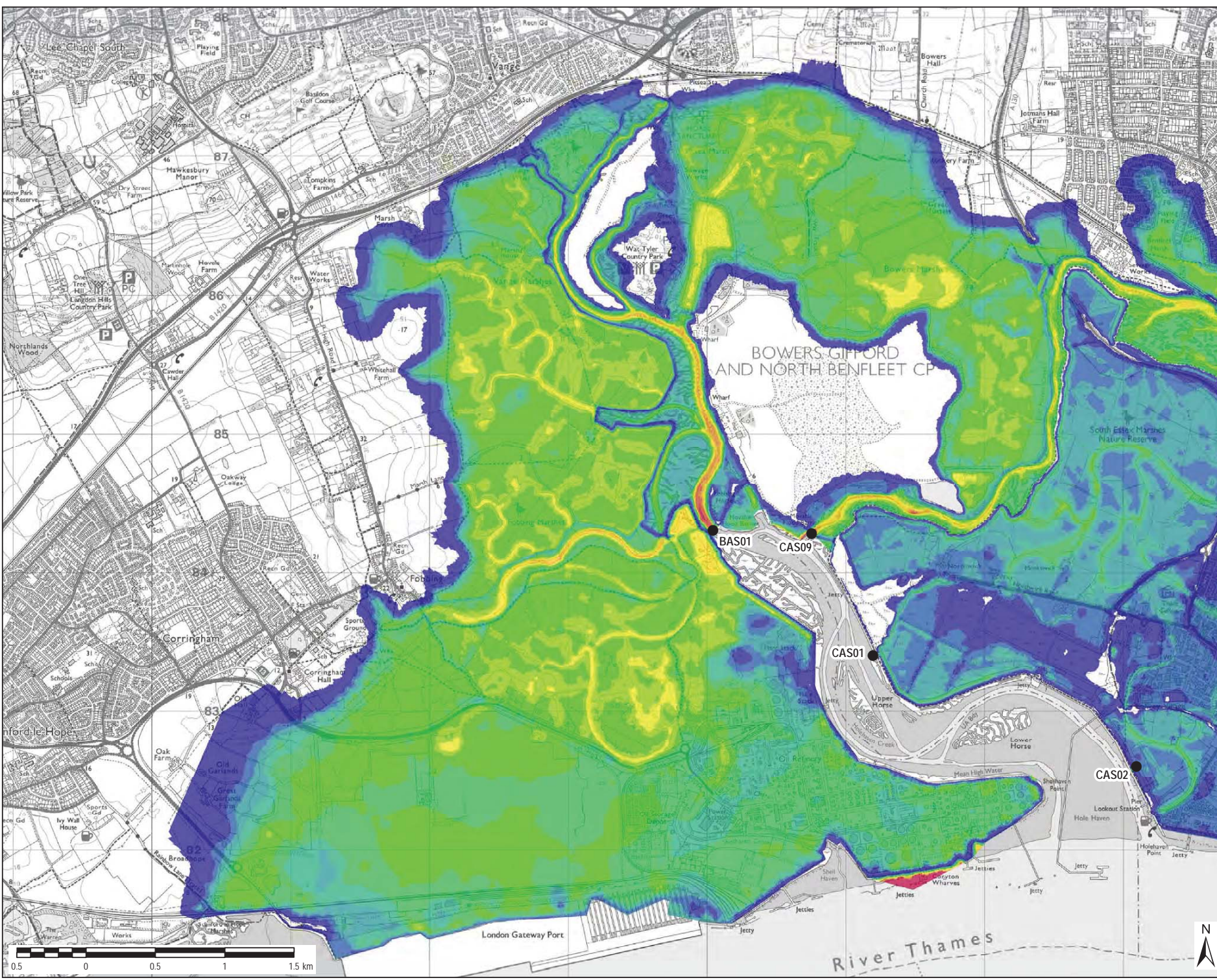


River Thames

London Gateway Port



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**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
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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD DEPTH 2016, 0.1% AEP, WITH BARRIER**

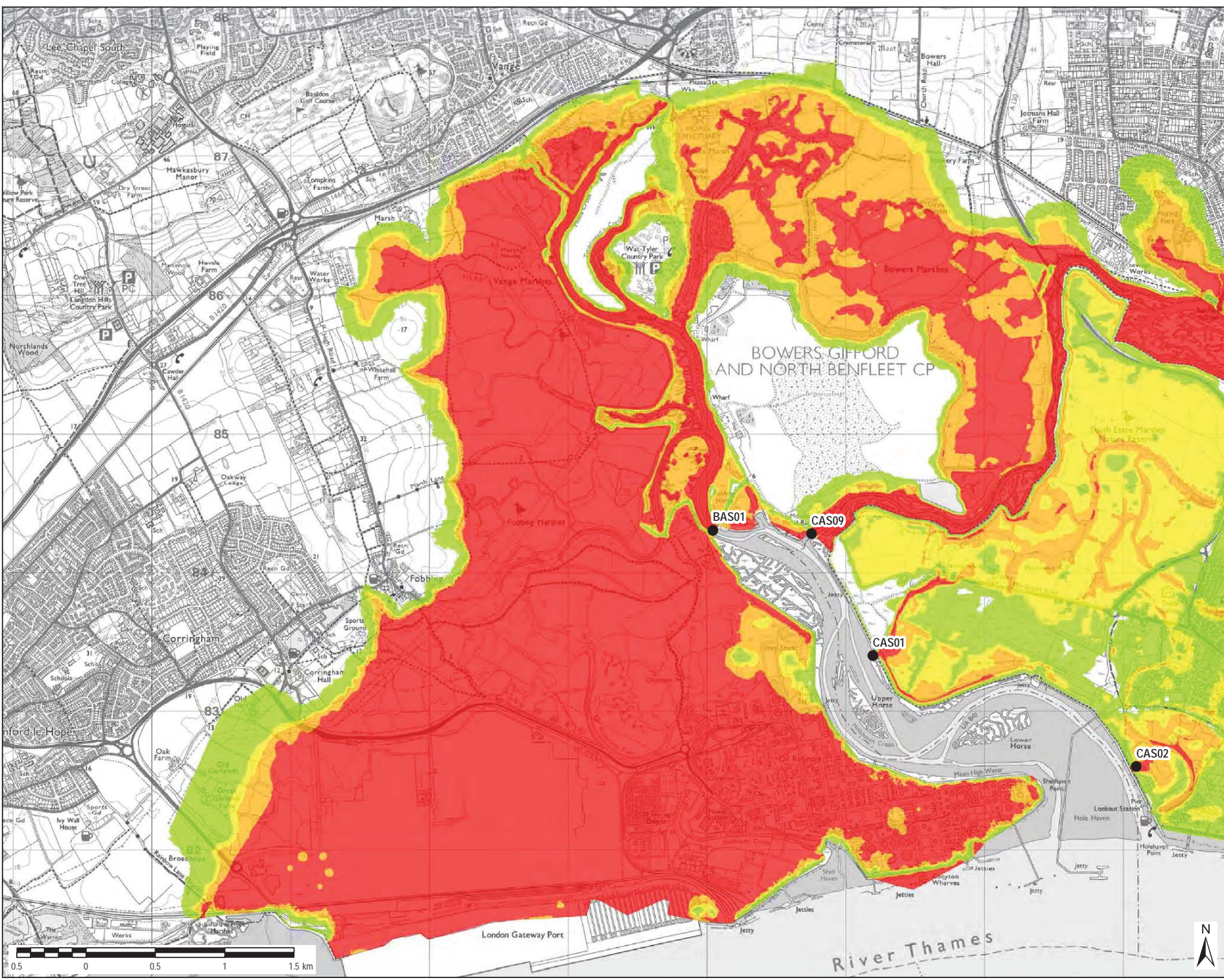
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Drawing Number **FIGURE E9** Rev **1**

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- 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 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 FD2320 (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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD HAZARD 2016, 0.1% AEP, WITH BARRIER**

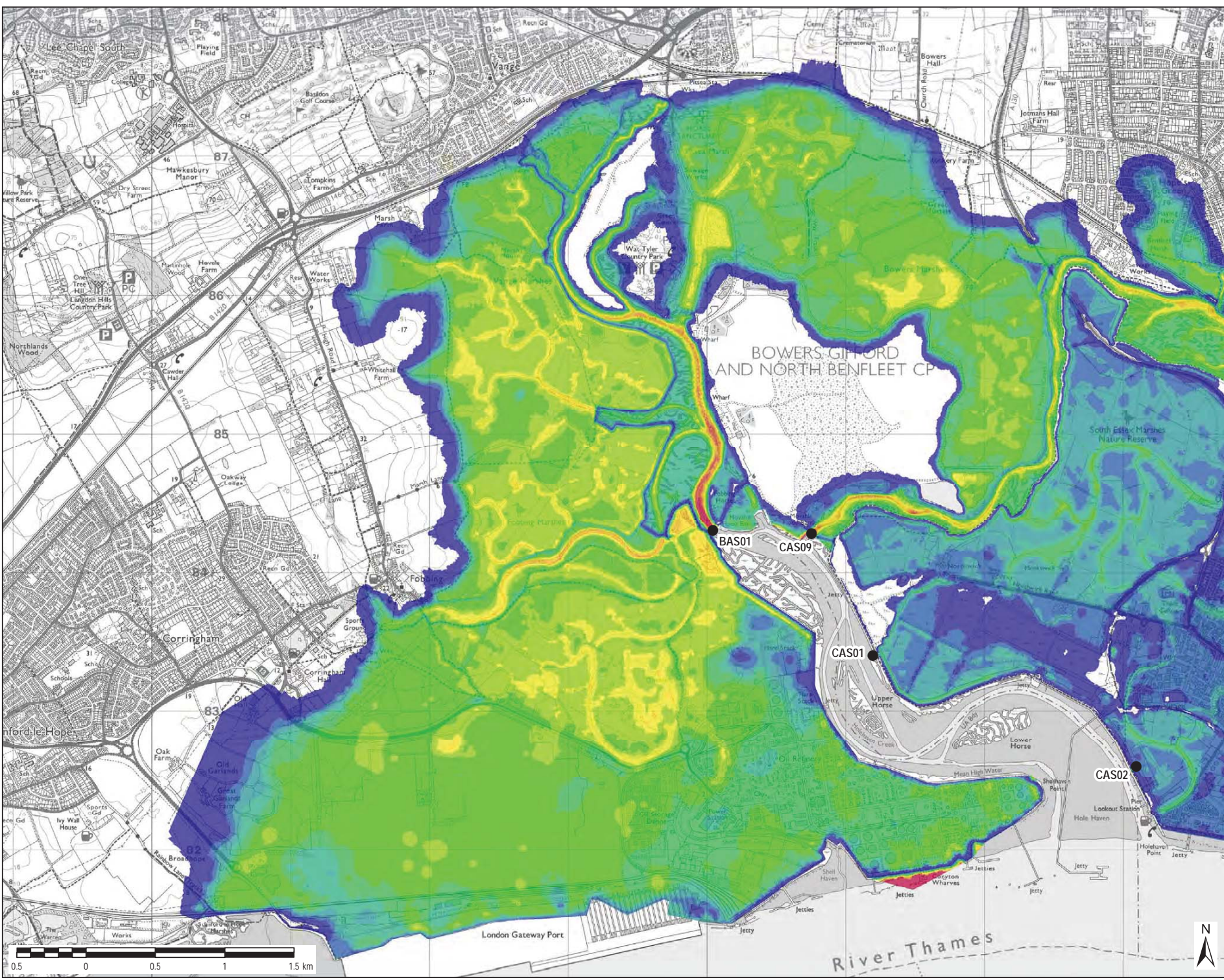
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Drawing Number **FIGURE E10** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures E10 Basildon Breach Maximum Flood Hazard - 2016.01.AEP with barrier.mxd



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- 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 overlapping 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 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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD DEPTH 2016, 0.1% AEP, WITHOUT BARRIER**

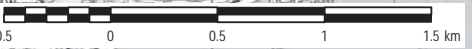
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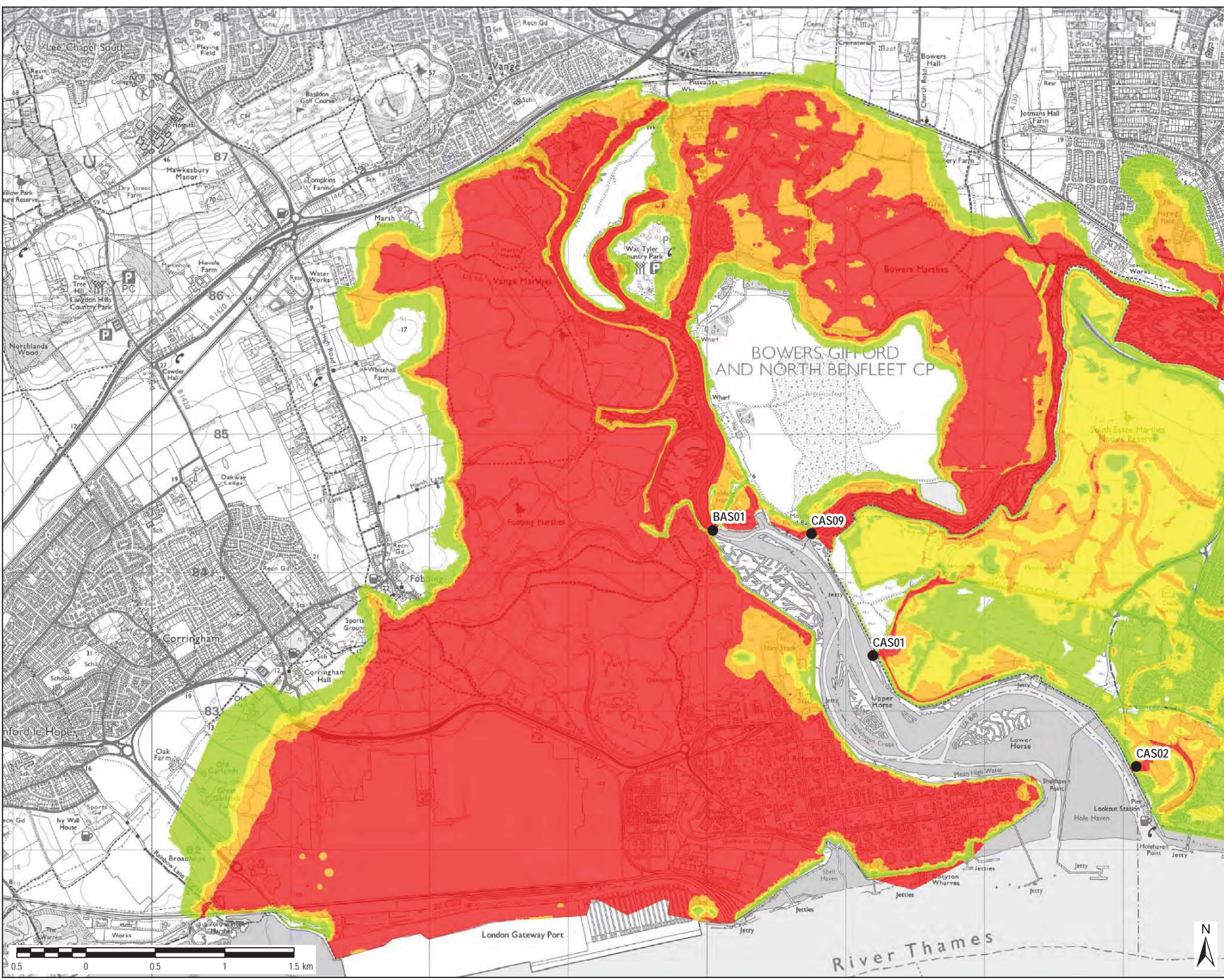
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Drawing Number **FIGURE E11** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E11\_Basildon Breach Maximum Flood Depth - 2016, 0.1% AEP - without barrier.mxd





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- 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 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 FD2320 (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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD HAZARD 2016, 0.1% AEP, WITHOUT BARRIER**

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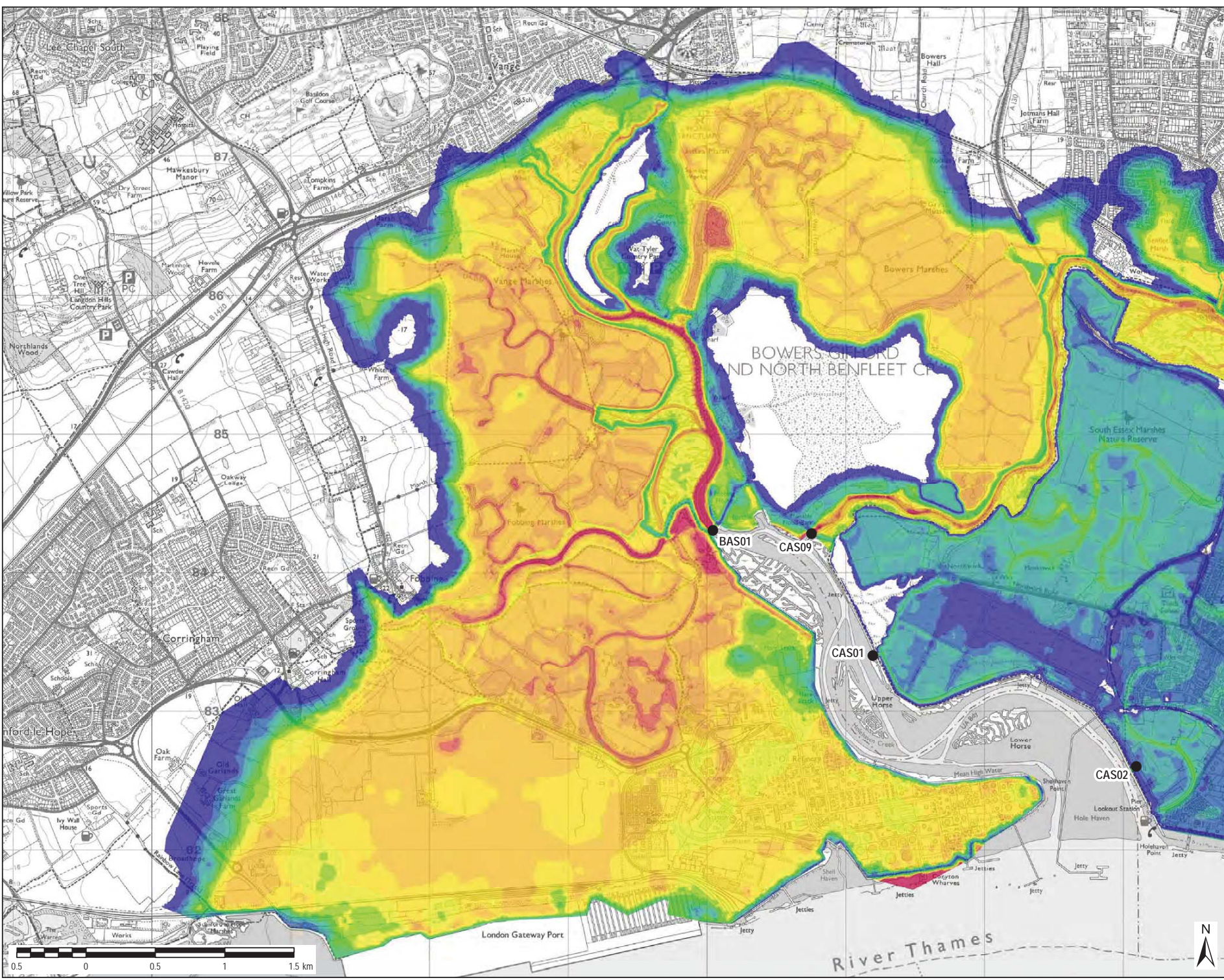
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Drawing Number **FIGURE E12** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E12\_Basildon Breach Maximum Flood Hazard - 2016\_0.1 AEP - without barrier.mxd

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E13 Basildon Breach Maximum Flood Depth - 2116 with climate change 0.1 AEP with barrier.mxd



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**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 overlapping 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 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.

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.1% AEP, WITH BARRIER**

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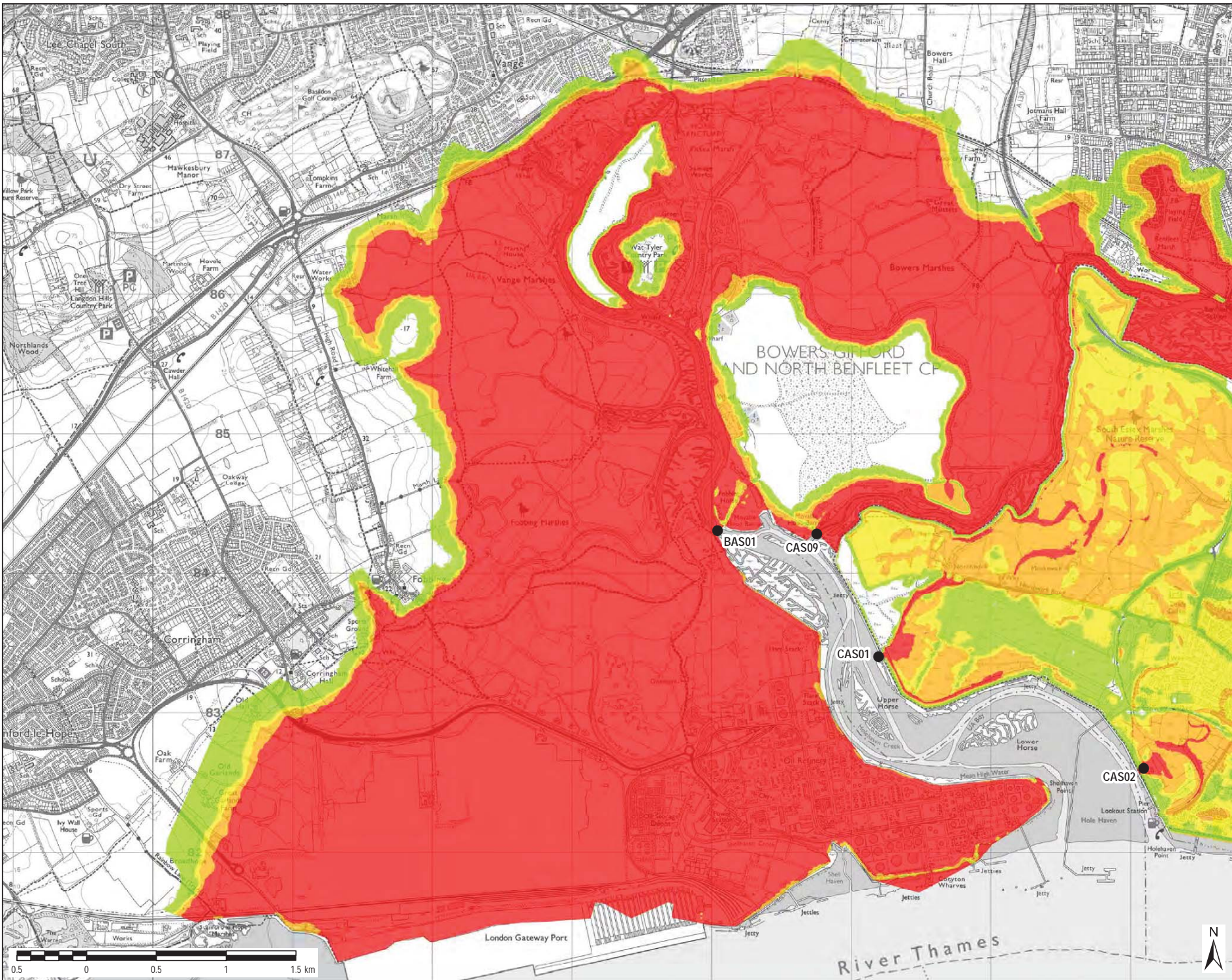
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Drawing Number **FIGURE E13** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRM02\_Maps\Figures\E14\_Basildon Breach Maximum Flood Hazard - 2116 with climate change 0.1 ACP with barrier.mxd



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**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 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 FD2320 (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 SFRM Main Report.

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRM**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.1% AEP, WITH BARRIER**

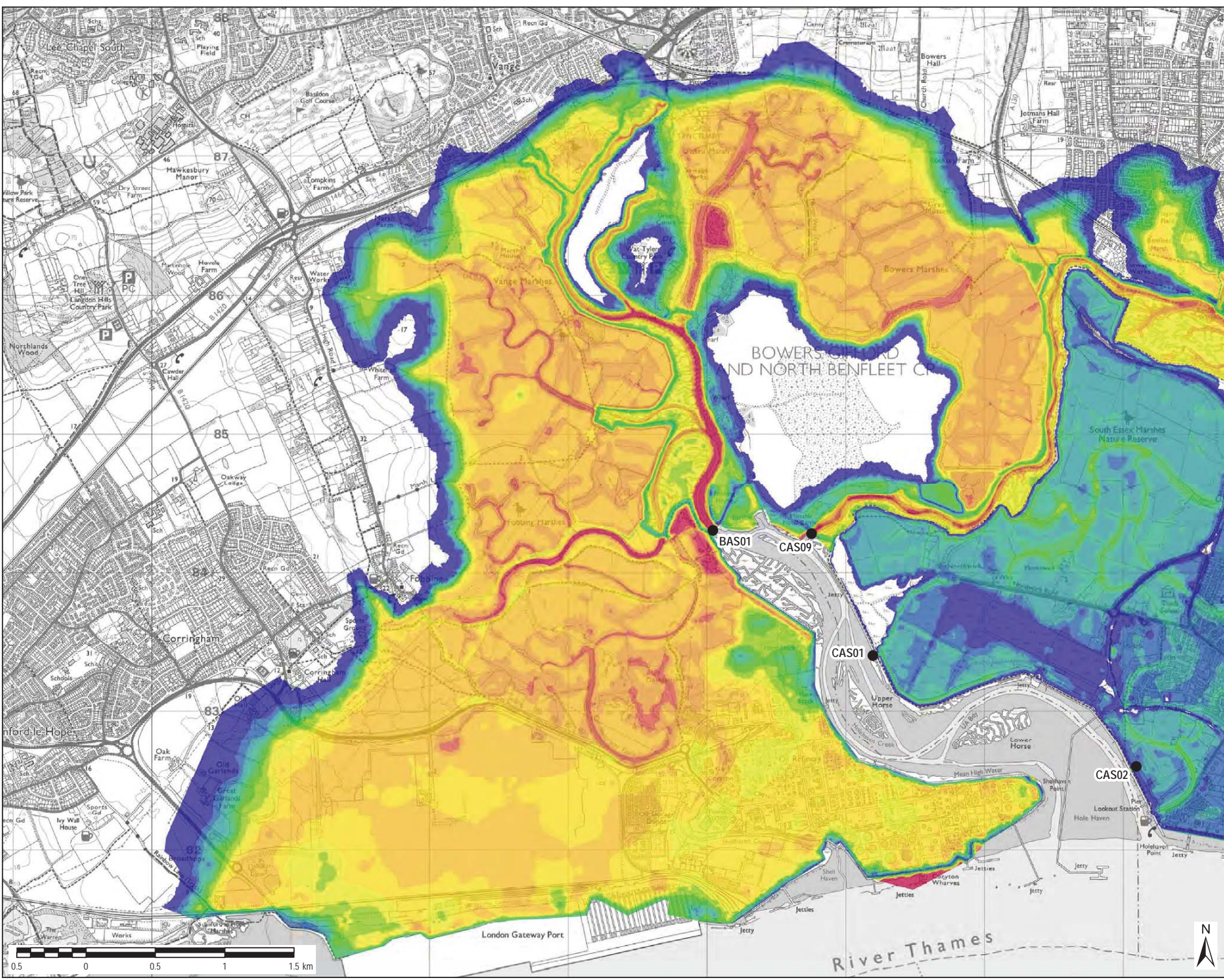
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Drawing Number **FIGURE E14** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures E15 Basildon Breach Maximum Flood Depth - 2116 with climate change 01 AEP without barrier.mxd



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**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 overlapping 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.

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.1% AEP, WITHOUT BARRIER**

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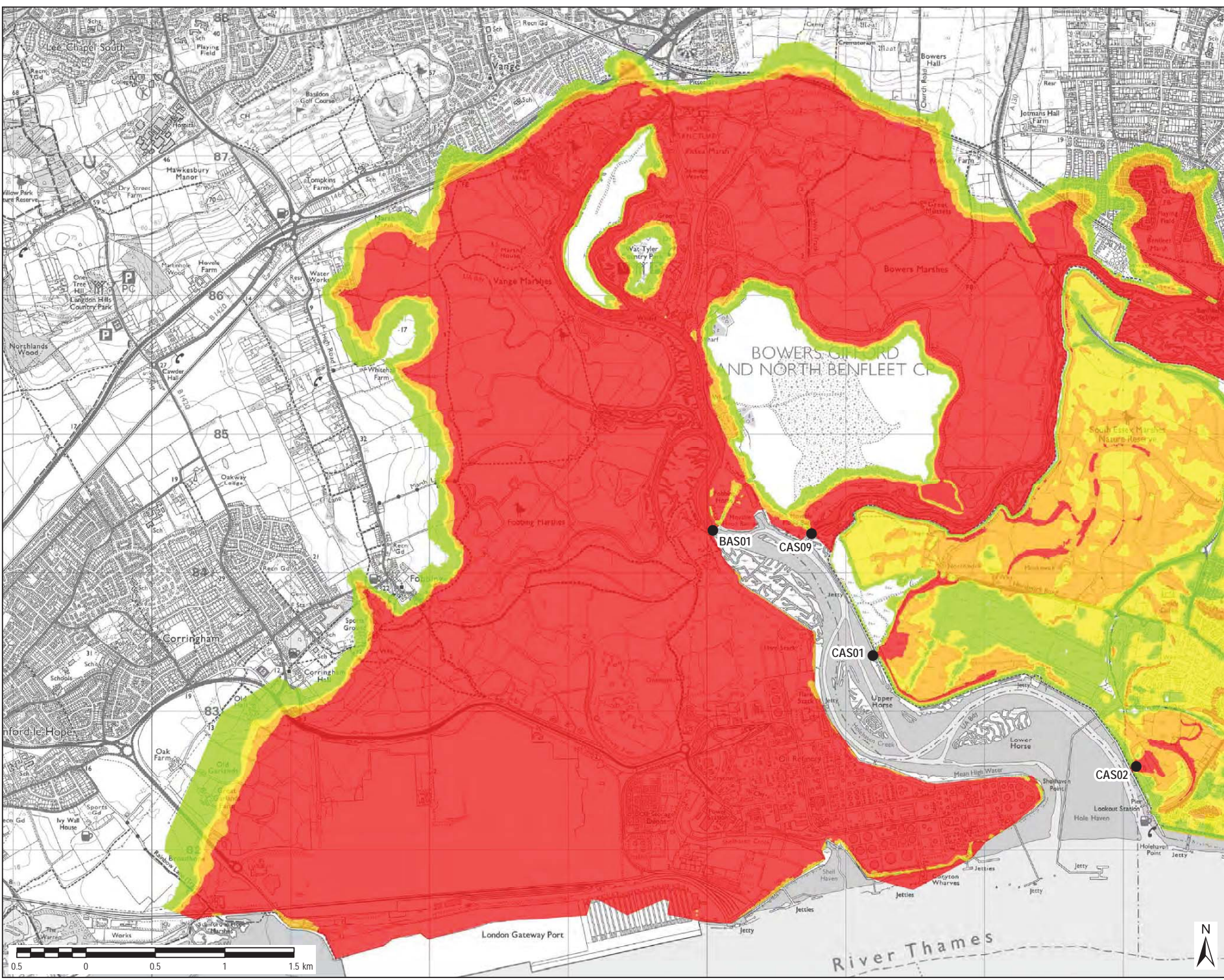
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Drawing Number **FIGURE E15** Rev **1**



File Name: K15004 - Information Systems\60532482 - South Essex SFR\002\_Maps\Figures\E16\_Basildon Breach Maximum Flood Hazard - 2116 with climate change - 0.1 AEP - without barrier.mxd



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**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 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 FD2320 (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 SFR Main Report.

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Project Title **SOUTH ESSEX LEVEL 1 SFR**

Drawing Title **BASILDON BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.1% AEP, WITHOUT BARRIER**

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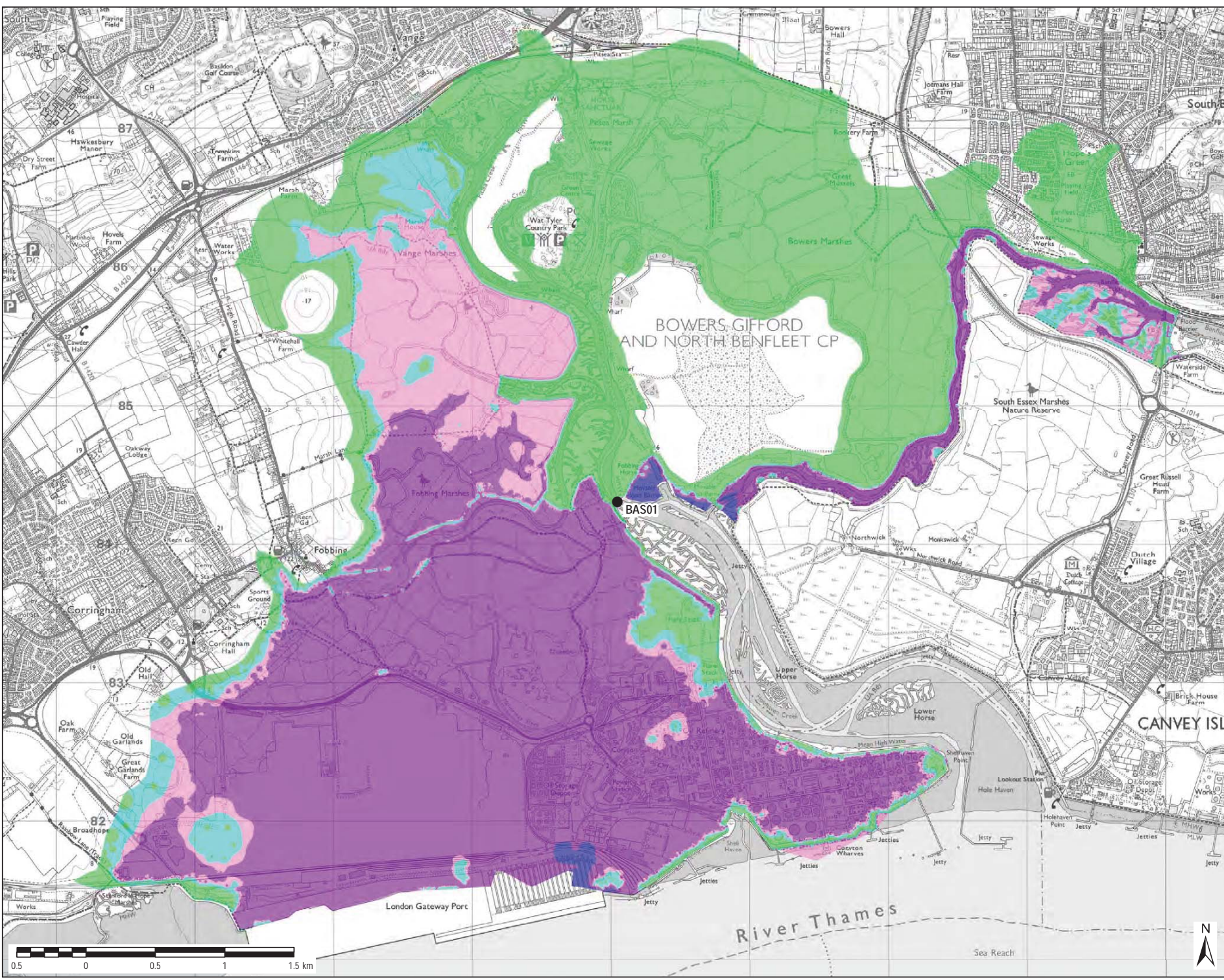
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Drawing Number **FIGURE E16** Rev **1**







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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 to 20 Hours
    - > 20 Hours

**NOTES**

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 inundated (wet) 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 site.

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Purpose of Issue: **FINAL**

Client:

Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **BREACH BAS01 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP WITH BARRIER**

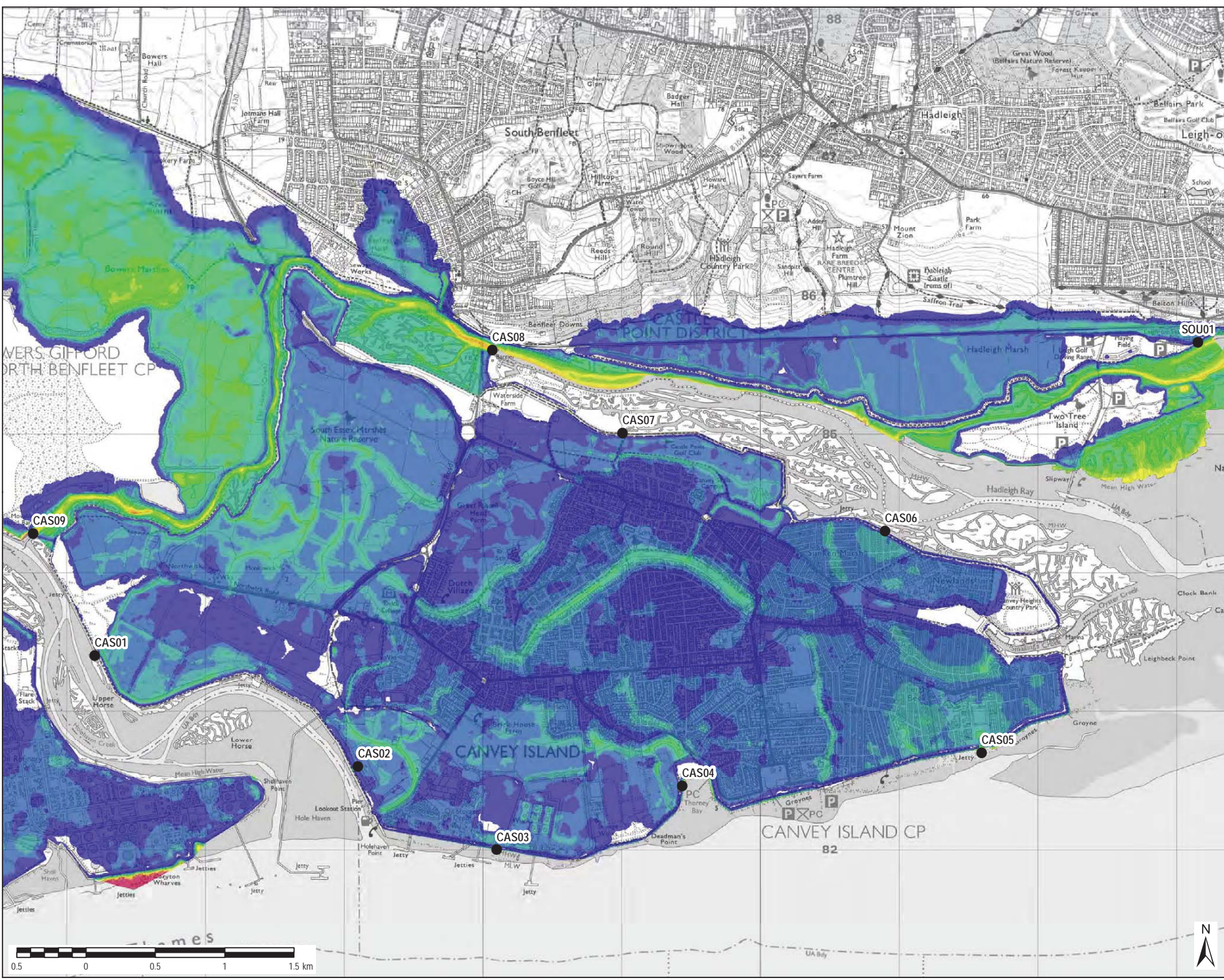
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Drawing Number: **FIGURE E17** | Rev: **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Inundation\_Maps\Figure E17\_Breach BAS01\_Time to Inundation - 2116 with climate change 0.1 AEP with Barrier.mxd



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**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 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 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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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **CASTLE POINT BREACH MAXIMUM FLOOD DEPTH 2016, 0.5% AEP, WITH BARRIER**

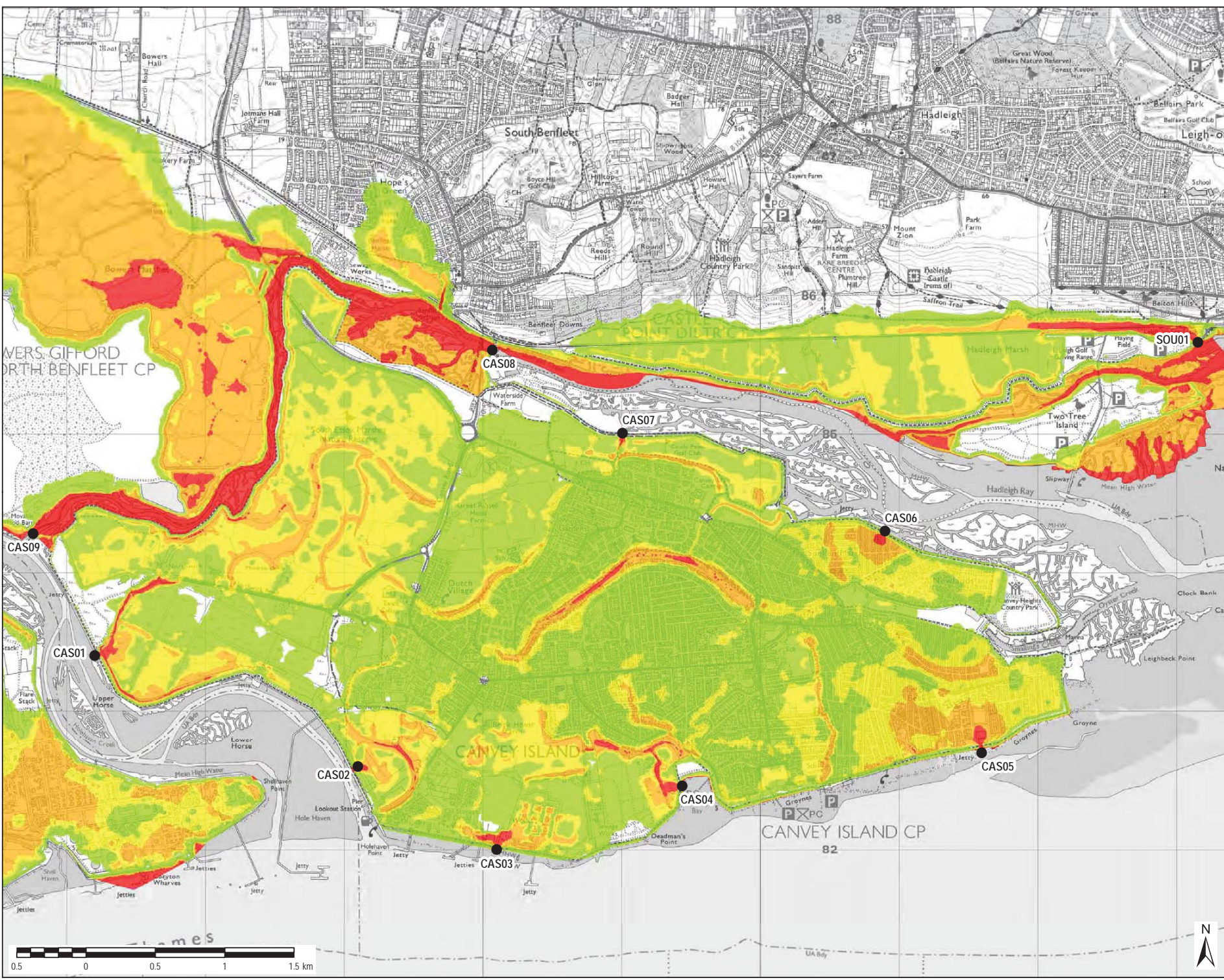
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Drawing Number **FIGURE E18** Rev **1**

File Name: K15004 - Information Systems\62532482 - South Essex SFRA\02\_Maps\Figures\E18\_Castle Point Breach Maximum Flood Depth - 2016.05.FEP - with barrier.mxd



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- 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 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 FD2320 (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.

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Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **CASTLE POINT BREACH MAXIMUM FLOOD HAZARD 2016, 0.5% AEP, WITH BARRIER**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
AECOM Internal Project No. 60532482		Scale @ A3 1:25,000	

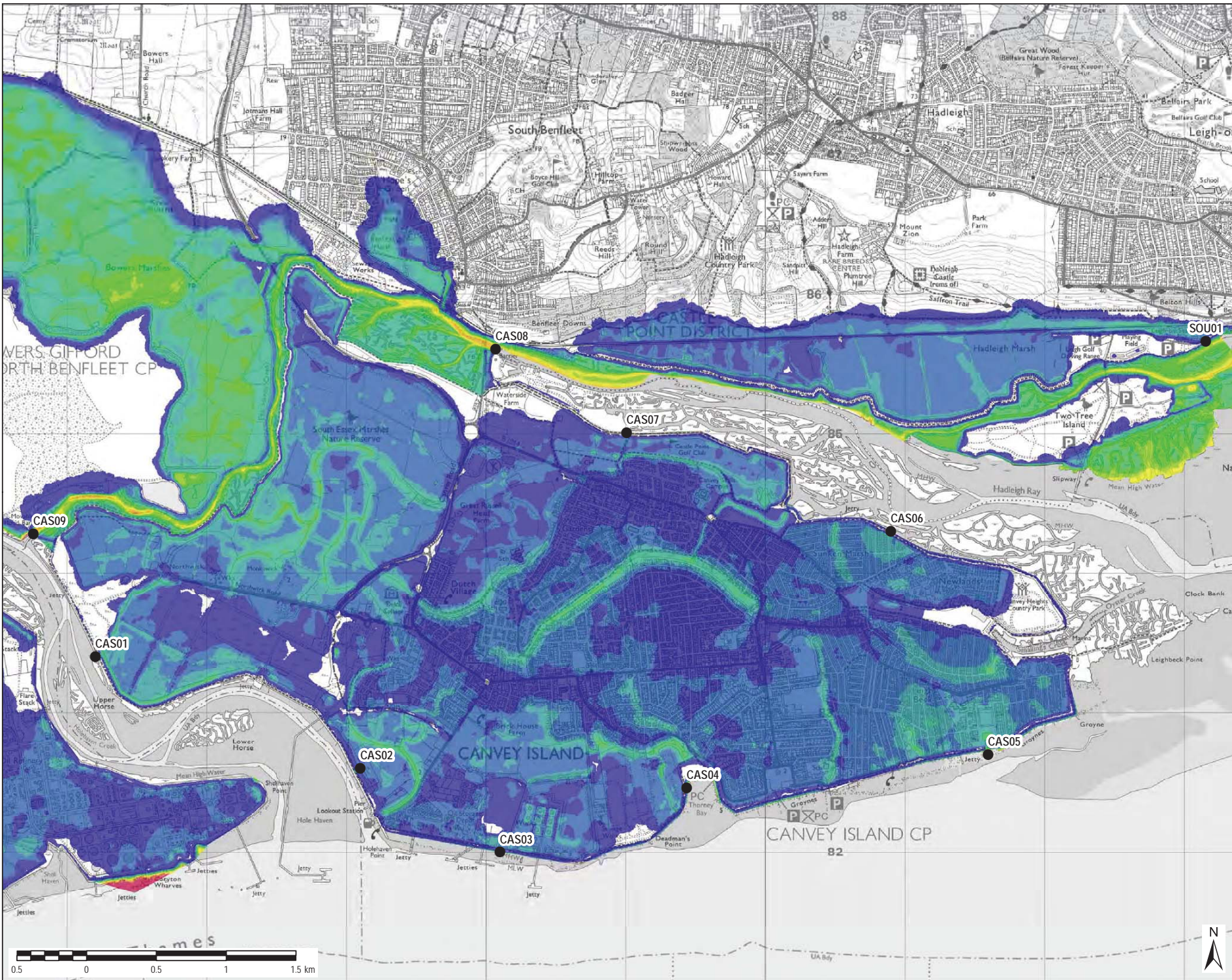
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Drawing Number **FIGURE E19** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures E19 Castle Point Breach Maximum Flood Hazard - 2016 0.5 AEP with barrier.mxd



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**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 overlapping 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 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.

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Purpose of Issue: **FINAL**

Client:

Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **CASTLE POINT BREACH MAXIMUM FLOOD DEPTH 2016, 0.5% AEP, WITHOUT BARRIER**

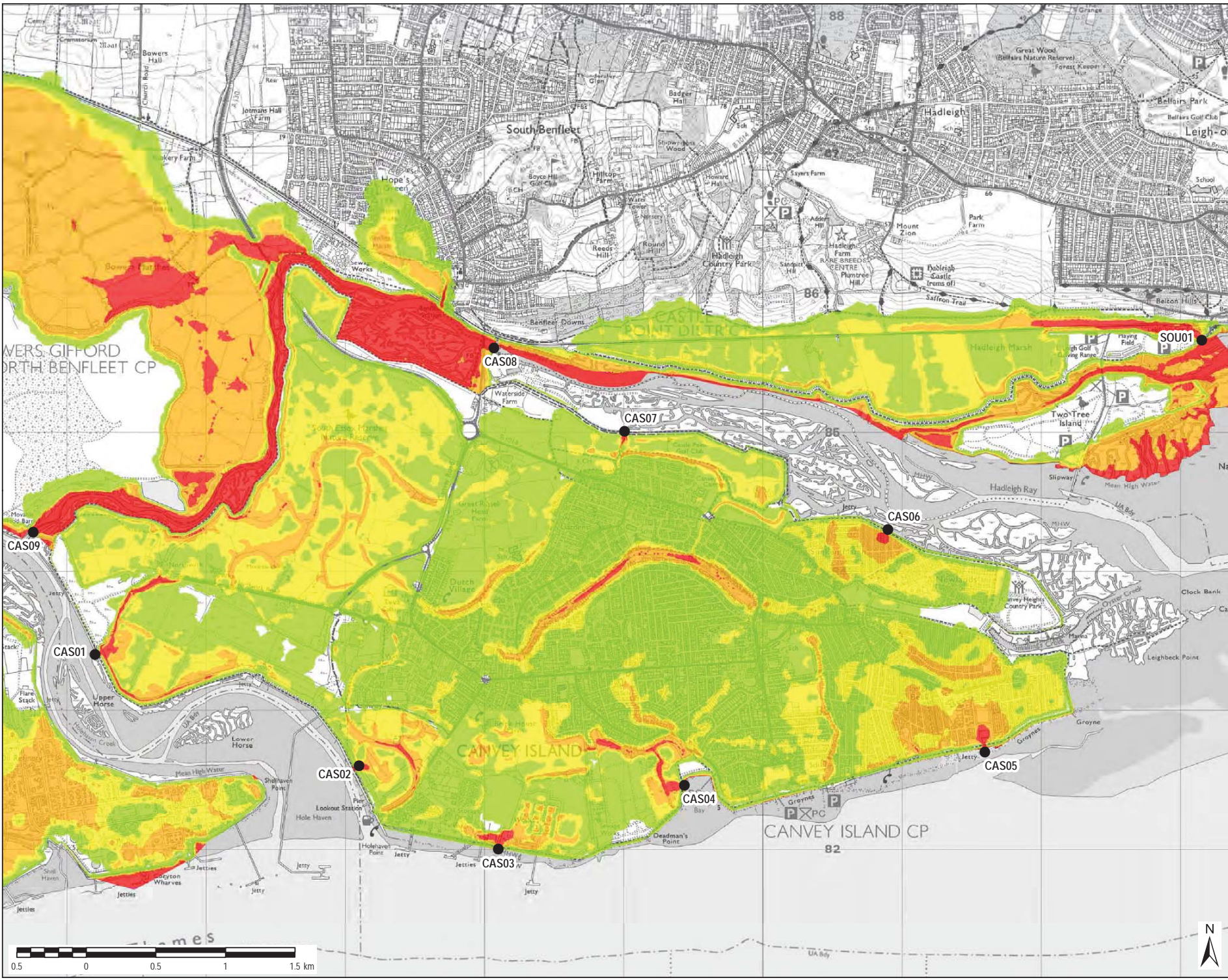
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File Name: K15004 - Information Systems\62532482 - South Essex SFR\002\_Maps\Figures\E21\_Castle Point Breach Maximum Flood Hazard - 2016\_05\_AEP\_Without Barrier.mxd



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**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 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 FD2320 (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 SFR Main Report.

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Purpose of Issue: **FINAL**

Client:

Project Title: **SOUTH ESSEX LEVEL 1 SFR**

Drawing Title: **CASTLE POINT BREACH MAXIMUM FLOOD HAZARD 2016, 0.5% AEP, WITHOUT BARRIER**

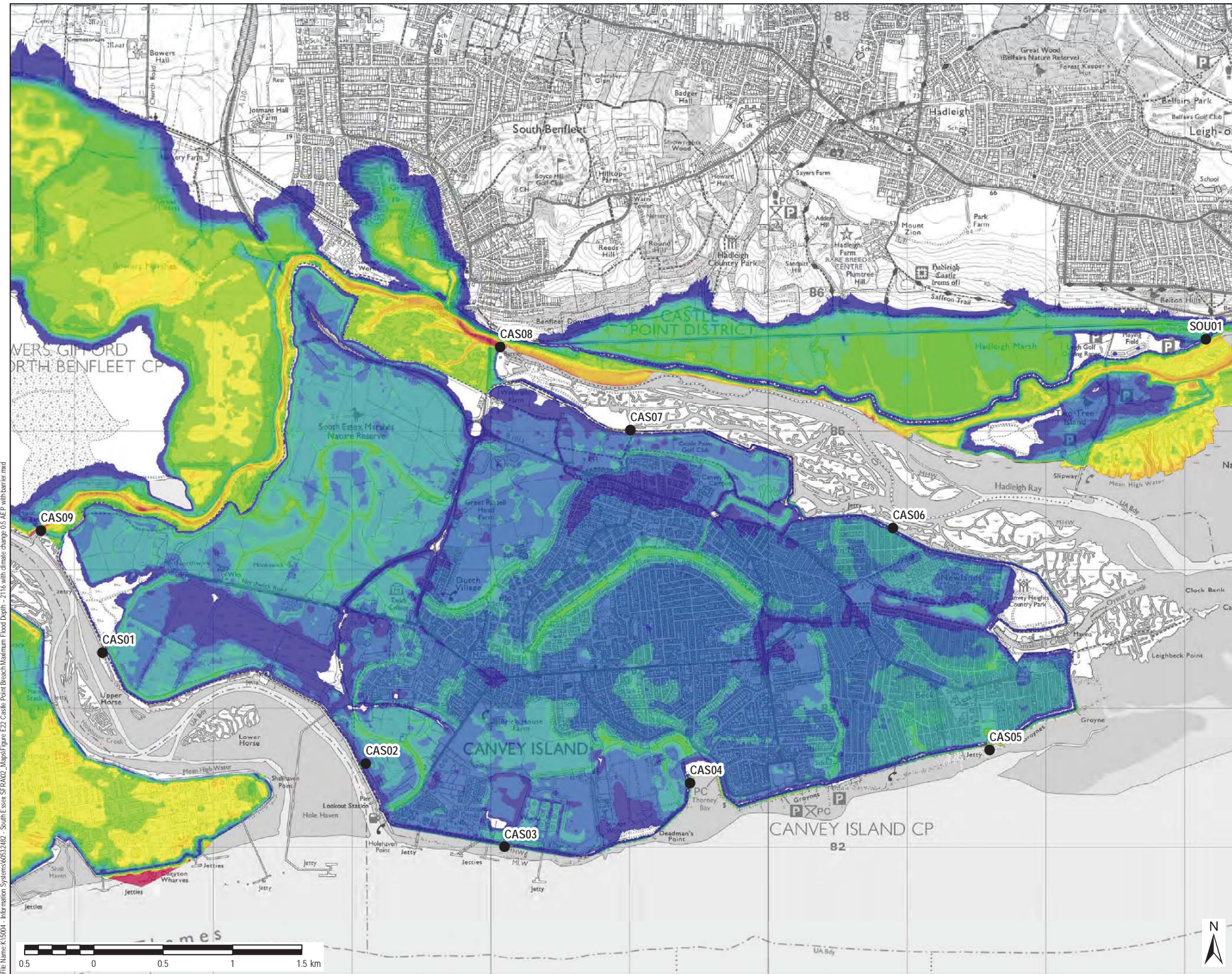
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Drawing Number: **FIGURE E21** Rev: **1**



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- 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 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 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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Purpose of Issue: **FINAL**

Client:

Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **CASTLE POINT BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.5% AEP, WITH BARRIER**

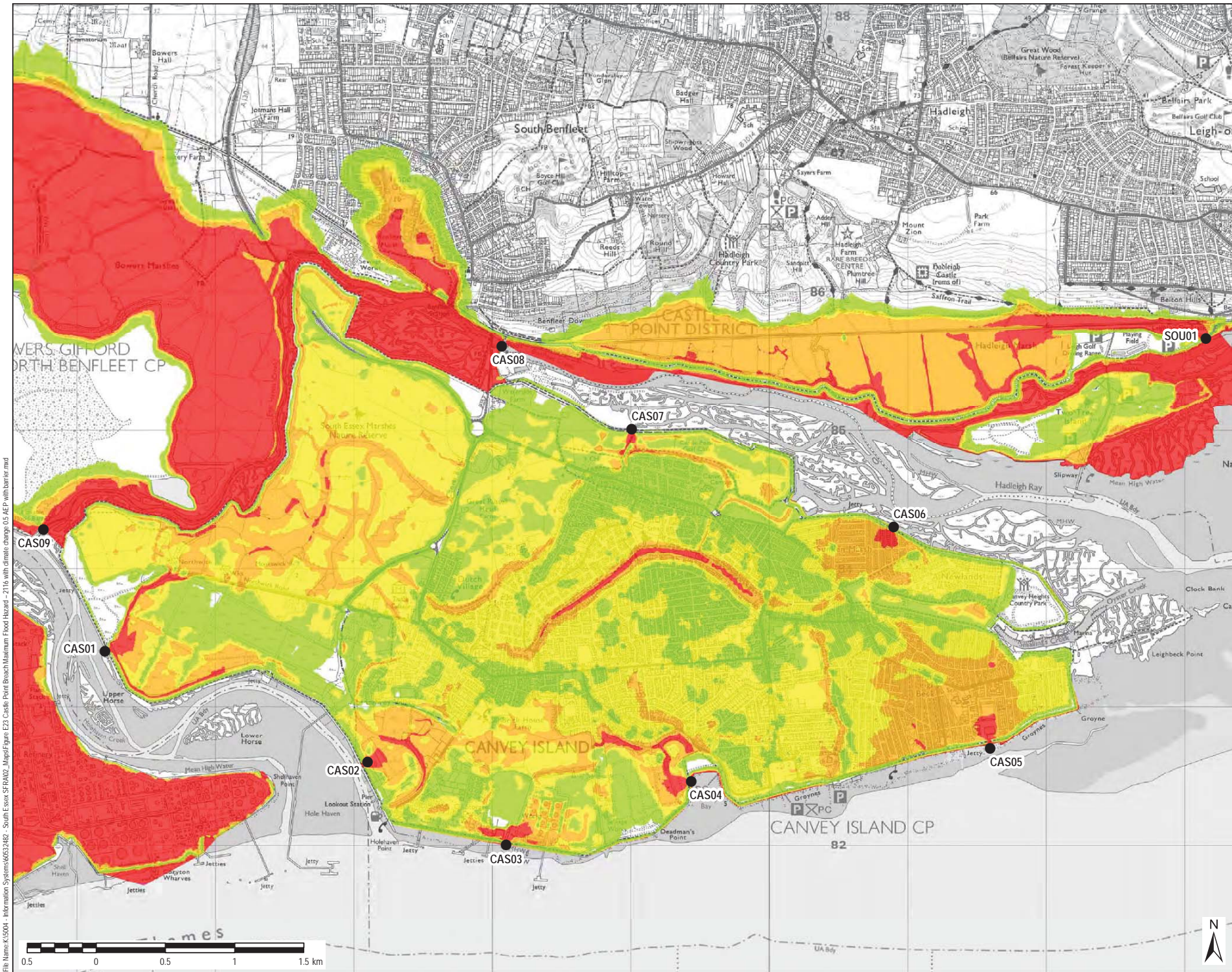
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Drawing Number: **FIGURE E22** Rev: **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figure E22\_Castle Point Breach Maximum Flood Depth - 2116 with climate change 0.5\_AEP\_with\_barrier.mxd



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- 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 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 FD2320 (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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **CASTLE POINT BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.5% AEP, WITH BARRIER**

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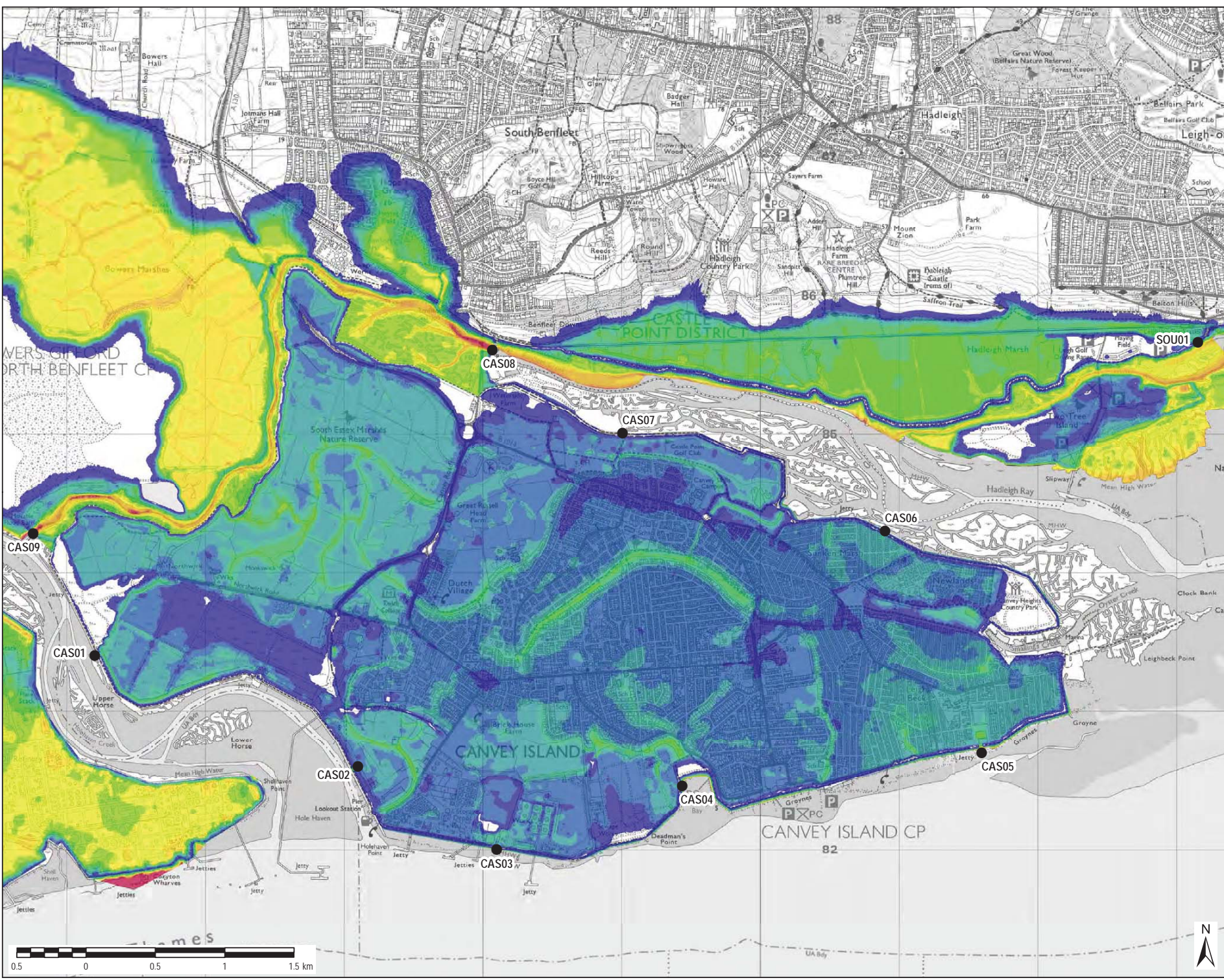
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Drawing Number **FIGURE E23** Rev **1**

File Name: K15004 - Information Systems\62532482 - South Essex SFRA\02\_Maps\Figures\E23\_Castle Point Breach Maximum Flood Hazard - 2116 with climate change 0.5% AEP with barrier.mxd

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E24 Castle Point Breach Maximum Flood Depth - 2116 with climate change 0.5 AEP without barrier.mxd



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**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 overlapping 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.

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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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Purpose of Issue: **FINAL**

Client:

Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **CASTLE POINT BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.5% AEP, WITHOUT BARRIER**

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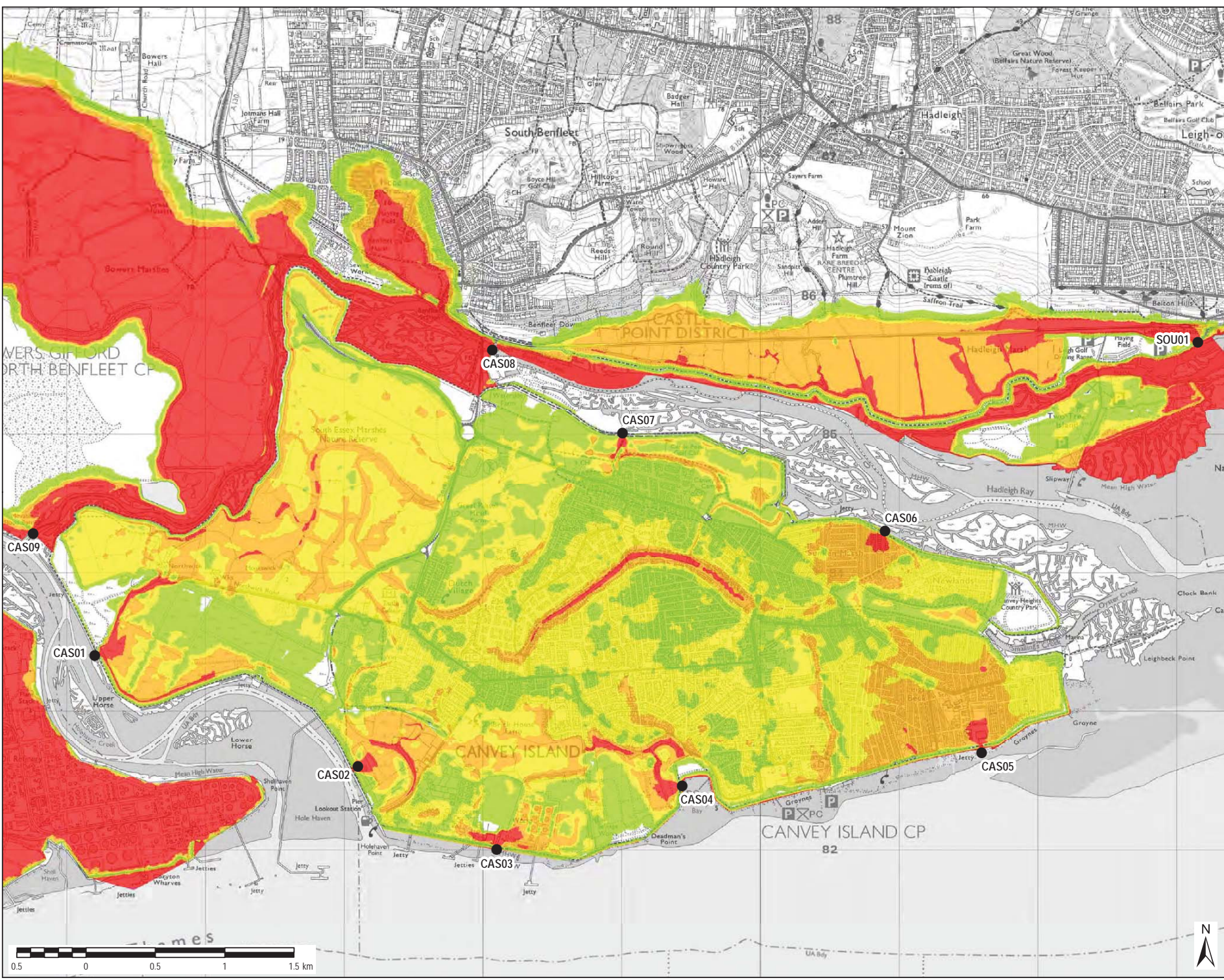
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Drawing Number: **FIGURE E24** Rev: **1**







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- 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 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 FD2320 (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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **CASTLE POINT BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.5% AEP, WITHOUT BARRIER**

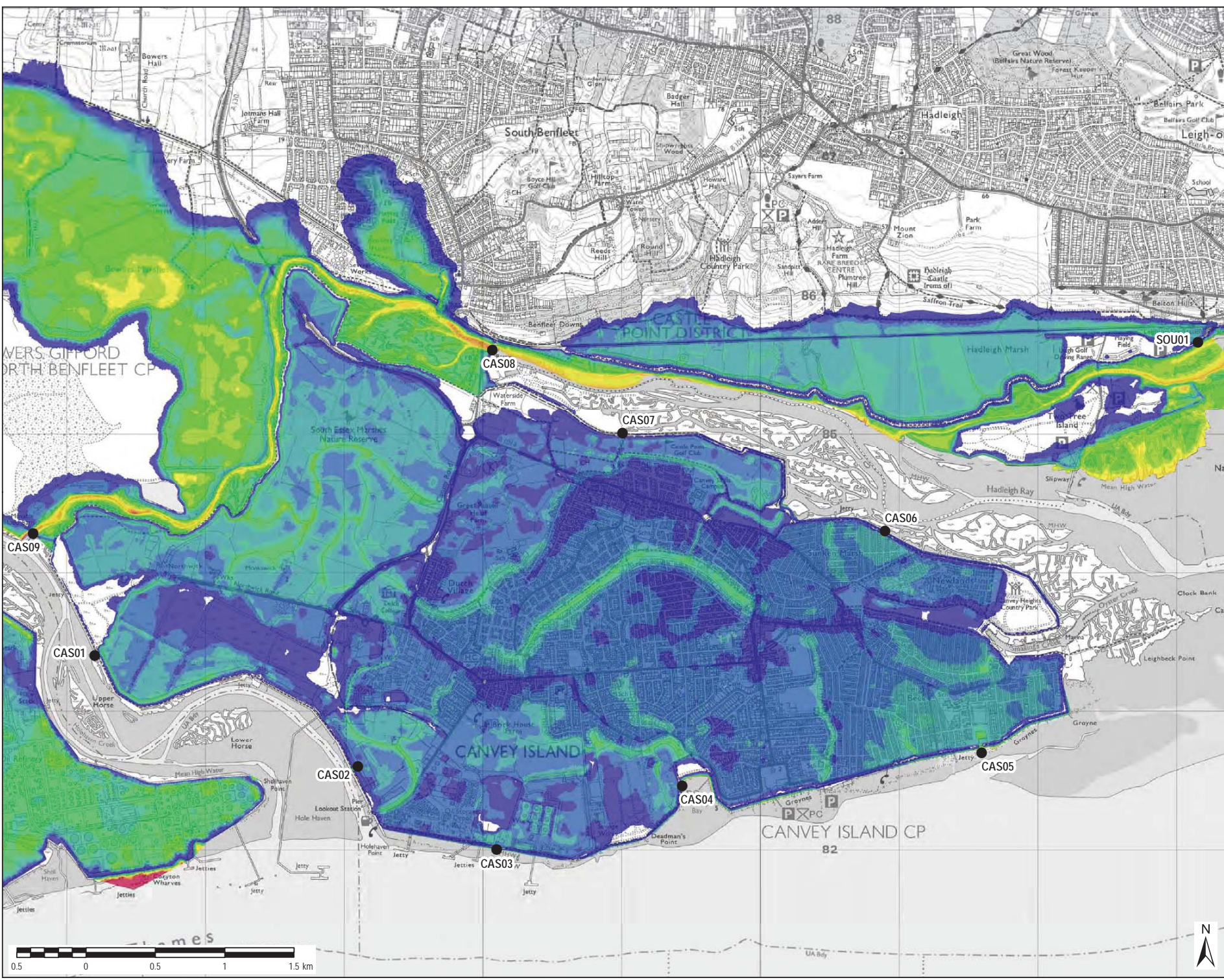
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Drawing Number **FIGURE E25** Rev **1**

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- 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 defence walls are modelled to occur immediately before the peak tidal level to assess the potential impact of rapid inundation of floodwater.

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **CASTLE POINT BREACH MAXIMUM FLOOD DEPTH 016, 0.1% AEP, WITH BARRIER**

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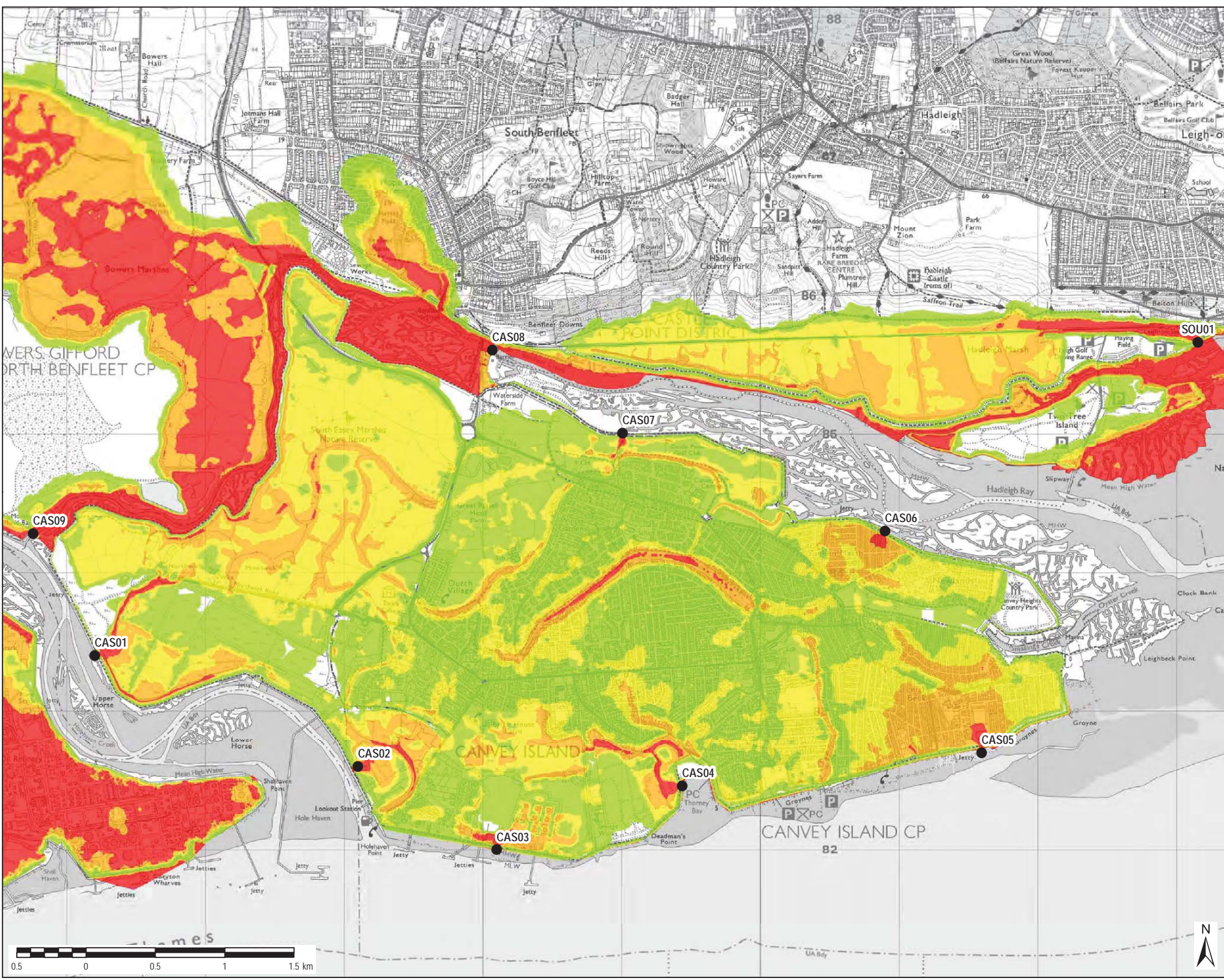
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Drawing Number **FIGURE E26** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E26\_Castle Point Breach Maximum Flood Depth - 2016.01 MEP with barrier.mxd





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- 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 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 FD2320 (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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **CANVEY ISLAND BREACH MAXIMUM FLOOD HAZARD 2016, 0.1% AEP, WITH BARRIER**

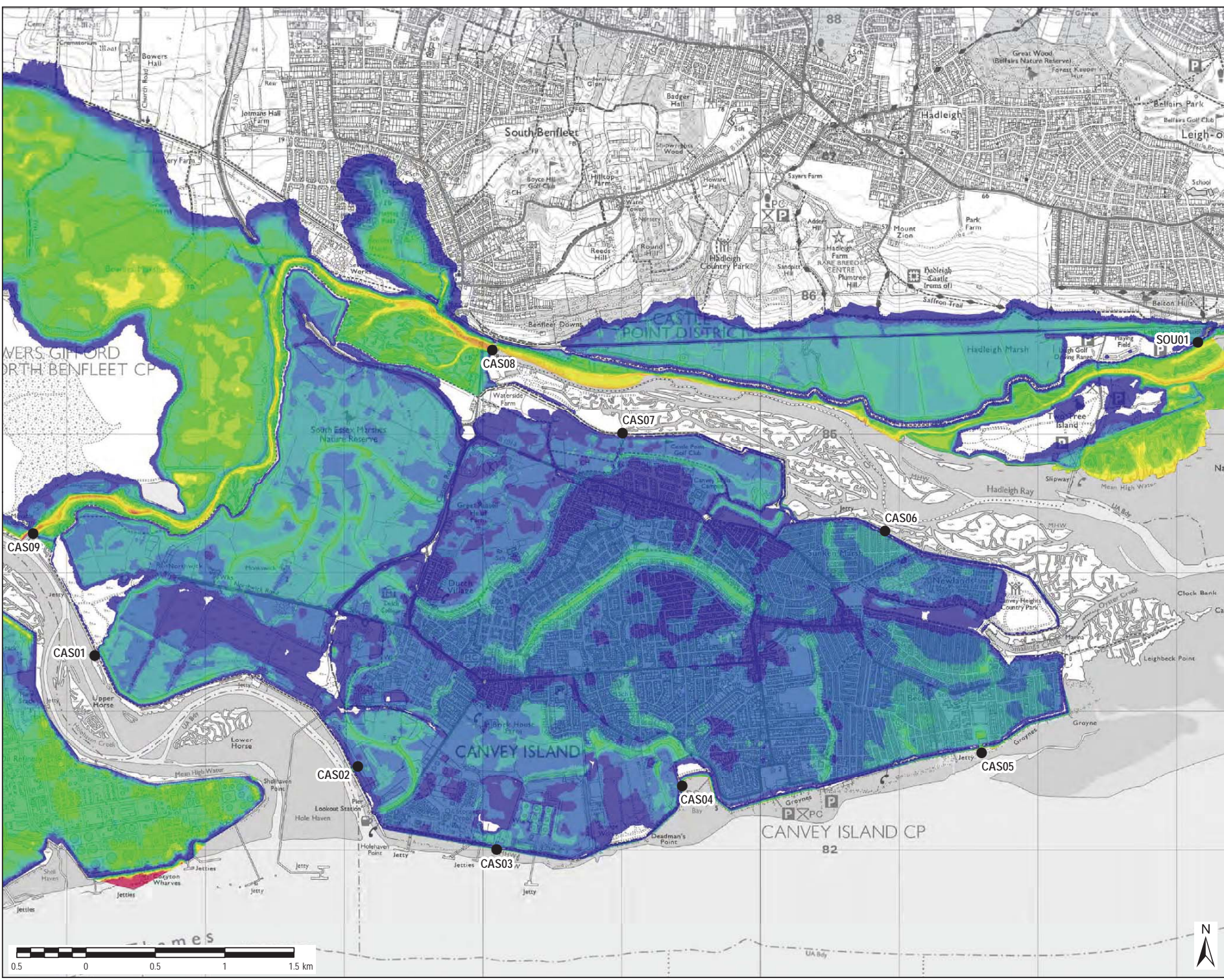
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Drawing Number **FIGURE E27** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E27\_Canvey Point Breach Maximum Flood Hazard - 2016\_01\_AEP\_with barrier.mxd



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- 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 overlapping 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.

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Purpose of Issue: **FINAL**



Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **CASTLE POINT BREACH MAXIMUM FLOOD DEPTH 2016, 0.1% AEP, WITHOUT BARRIER**

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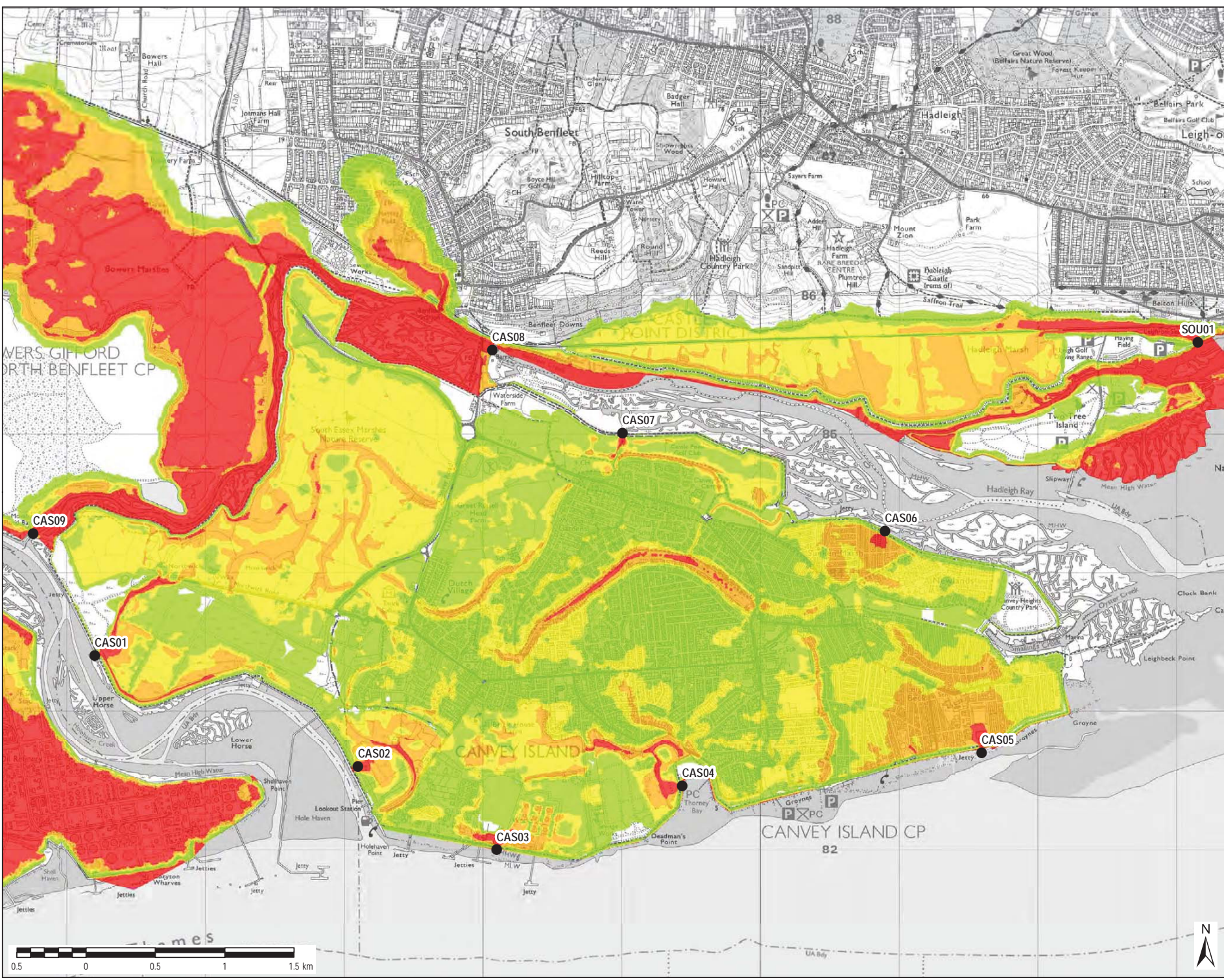
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Drawing Number: **FIGURE E28** Rev: **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figure E28\_Castle Point Breach Maximum Flood Depth - 2016.01 MEP - without barrier.mxd



File Name: K15004 - Information Systems\6532482 - South Essex SFRA\02\_Maps\Figures\E29\_Castle Point Breach Maximum Flood Hazard - 2016.01\_AEP\_Without Barrier.mxd



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- 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 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 FD2320 (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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **CASTLE POINT BREACH MAXIMUM FLOOD HAZARD 016, 0.1% AEP, WITHOUT BARRIER**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
AECOM Internal Project No. 60532482		Scale @ A3 1:25,000	

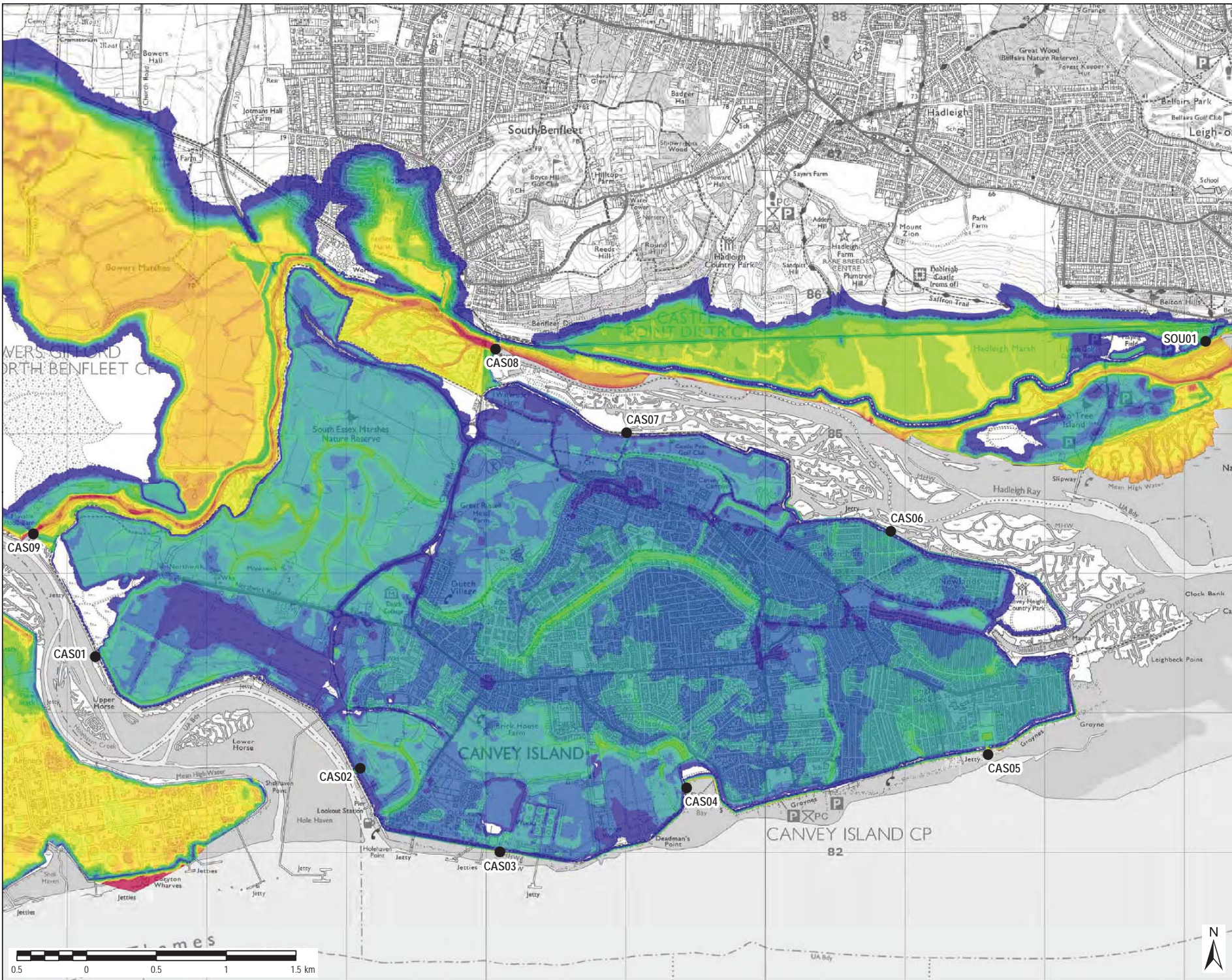
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Drawing Number **FIGURE E29** Rev **1**



File Name: K15004 - Information Systems\6532482 - South Essex SFRA\02\_Maps\Figure E30 Castle Point Breach Maximum Flood Depth - 2116 with climate change 01\_AEP with barrier.mxd



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- 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 overlapping 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 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.

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Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

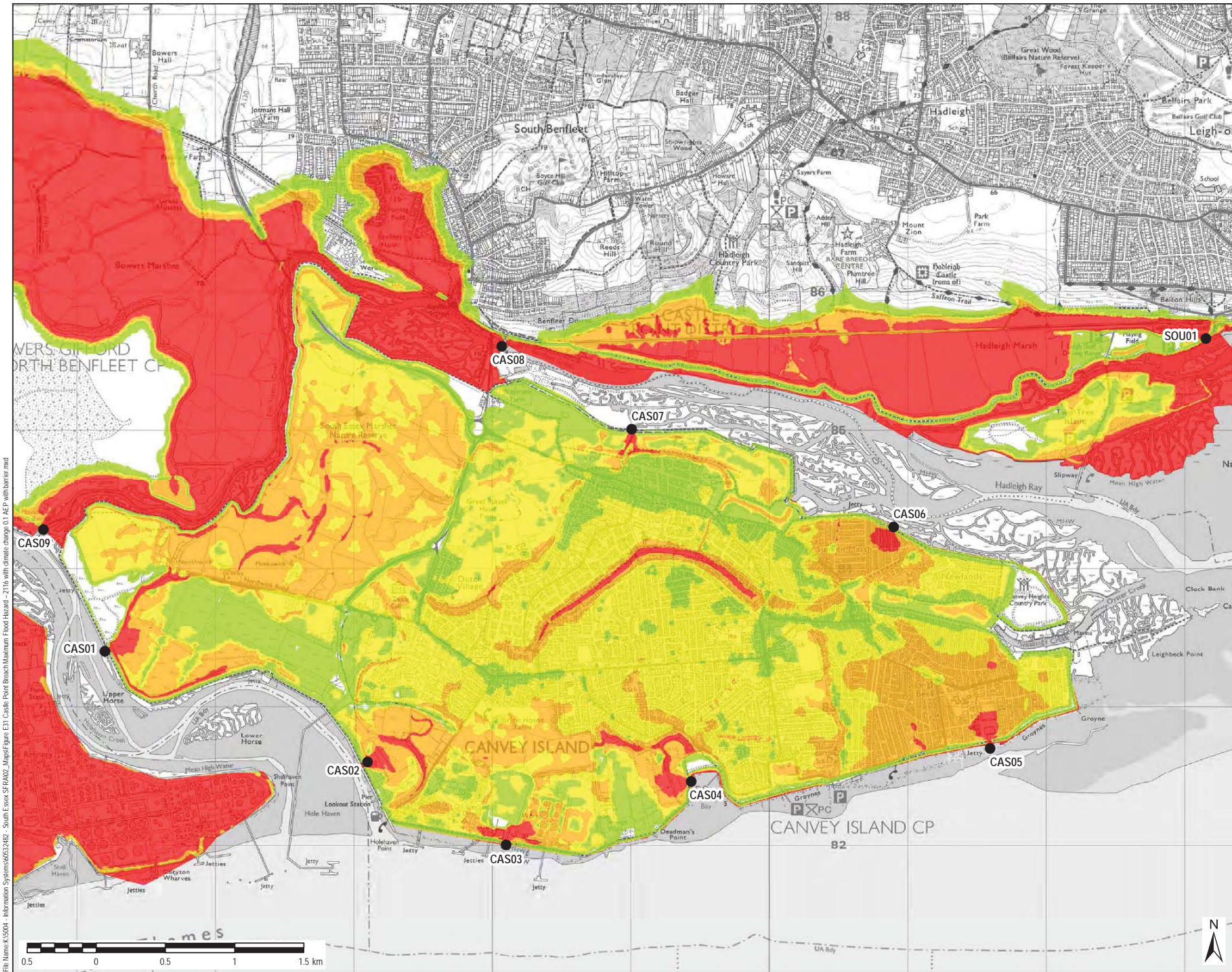
Drawing Title: **CASTLE POINT BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.1% AEP, WITH BARRIER**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
AECOM Internal Project No. 60532482		Scale @ A3 1:25,000	

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Drawing Number: **FIGURE E30** Rev: **1**



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- LEGEND**
- Breach Location
  - Maximum Flood Hazard (m)
  - 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 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 FD2320 (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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **CASTLE POINT BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.1% AEP, WITH BARRIER**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
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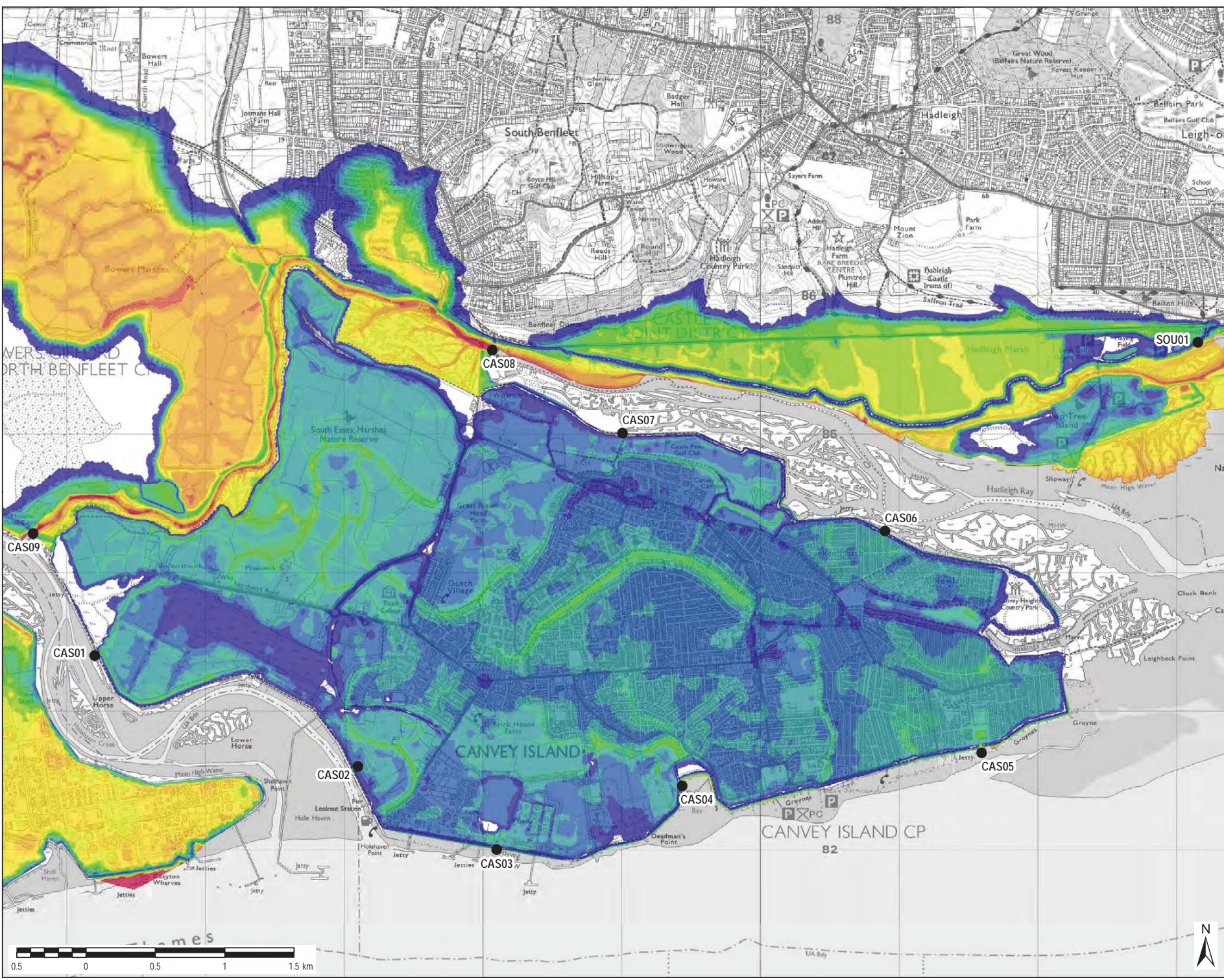
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Drawing Number **FIGURE E31** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E31\_Castle Point Breach Maximum Flood Hazard - 2116 with climate change 0.1 AEP with barrier.mxd

File Name: K15004 - Information Systems\6532\A02 - South Essex SFRA\02\_Maps\Figures\ES2\_Castle Point Breach Maximum Flood Depth - 2116 with climate change 01\_AEP without barrier.mxd



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**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 overlapping 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 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.

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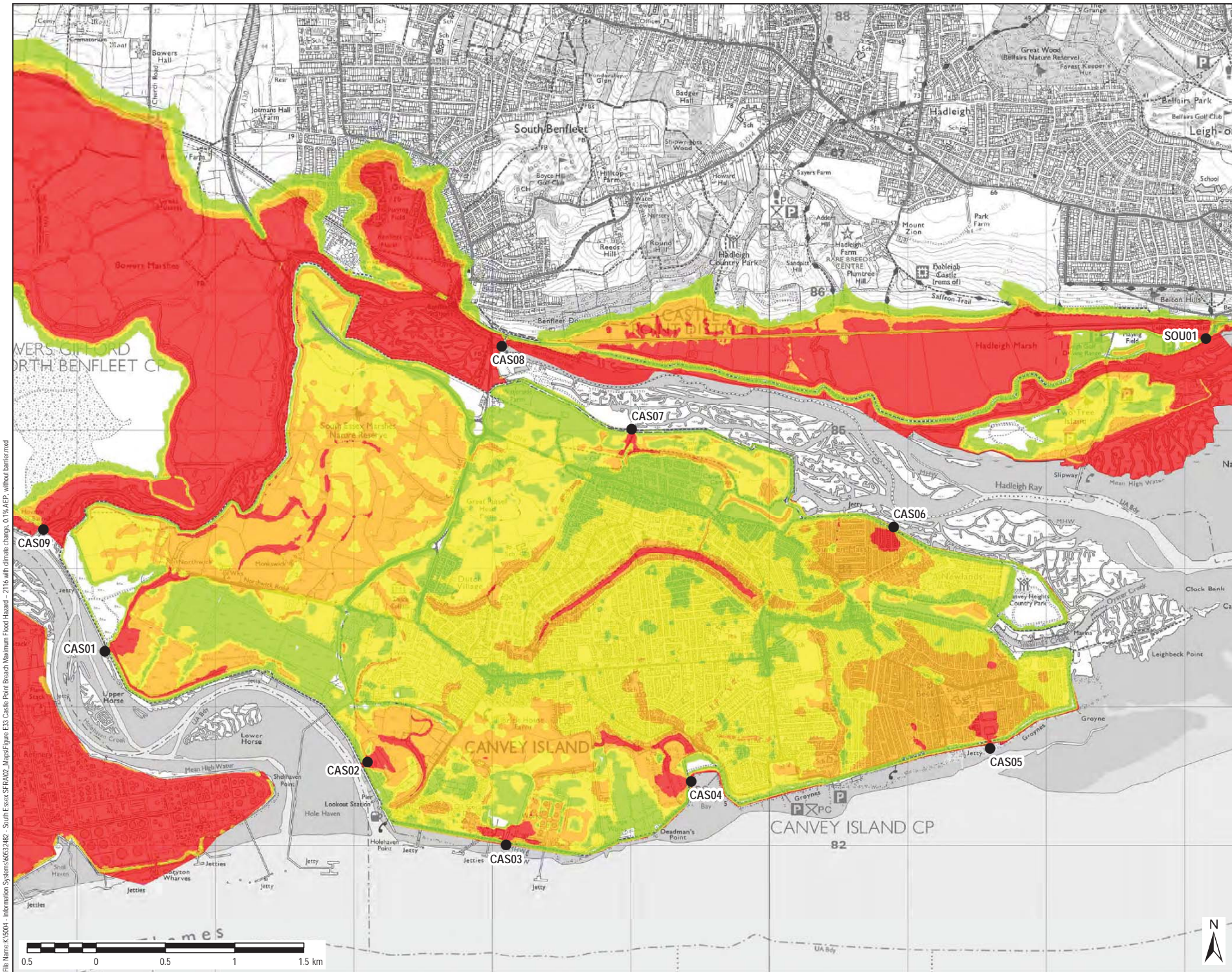
Drawing Title: **CASTLE POINT BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.1% AEP, WITHOUT BARRIER**

Drawn	Checked	Approved	Date
JW	BB	CP	08/04/2018
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- LEGEND**
- Breach Location
  - Maximum Flood Hazard (m)
    - 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 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 FD2320 (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.

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Purpose of Issue **FINAL**



Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **CASTLE POINT BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE, 0.1% AEP, WITHOUT BARRIER**

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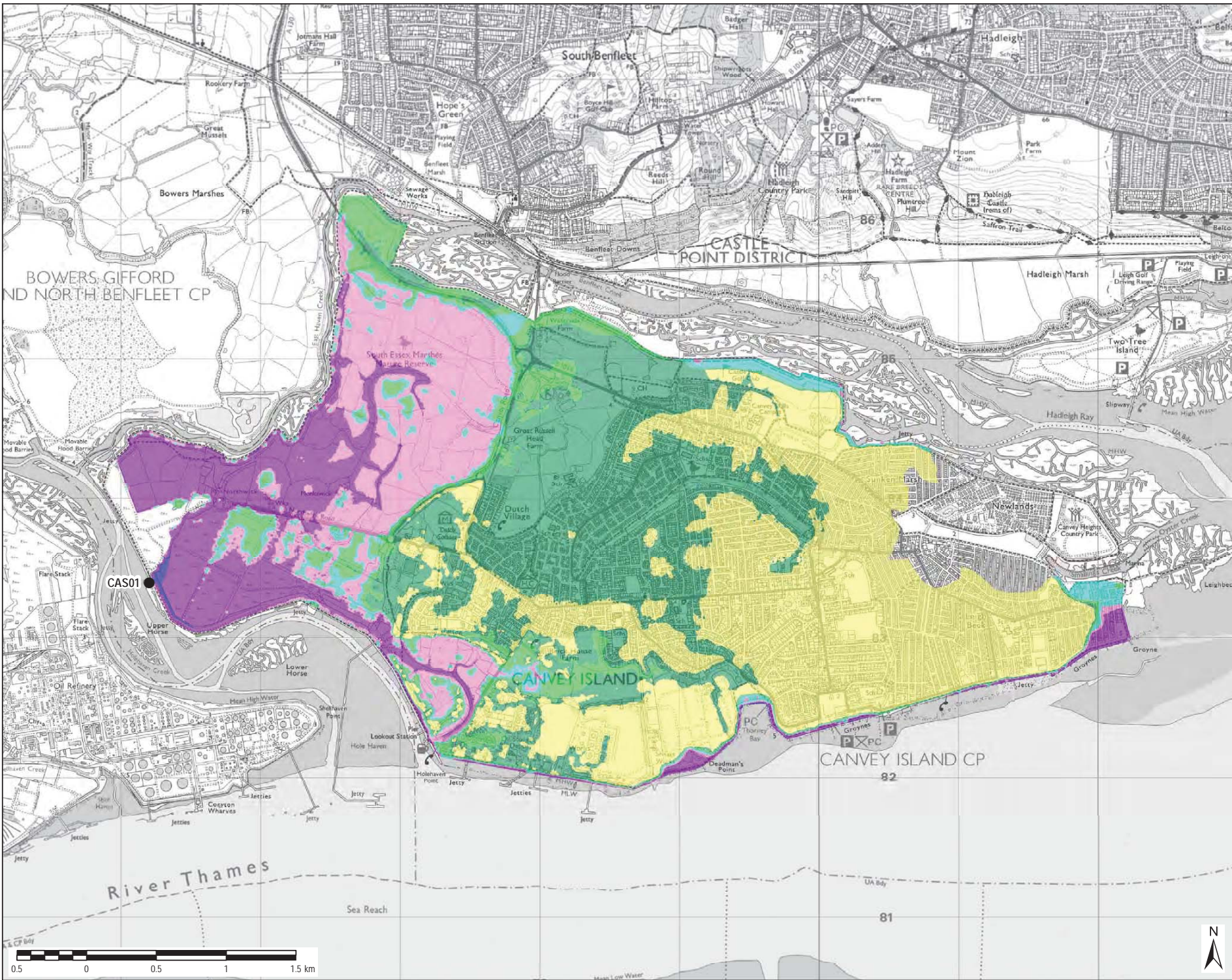
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Drawing Number **FIGURE E33** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E33\_Castle Point Breach Maximum Flood Hazard - 2116 with climate change - 0.1% AEP - without barrier.mxd

File Name: K:\5004 - Information Systems\6532\6532\_02 - South Essex SFRAN\02\_Maps\Inundation Maps\Figure E34a-Breach\_CAS01\_Time to Inundation\_2116\_withClimateChange\_0.1\_AEP.mxd



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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 to 20 Hours
  - > 20 Hours

**NOTES**

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 inundated (wet) 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 site.

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Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

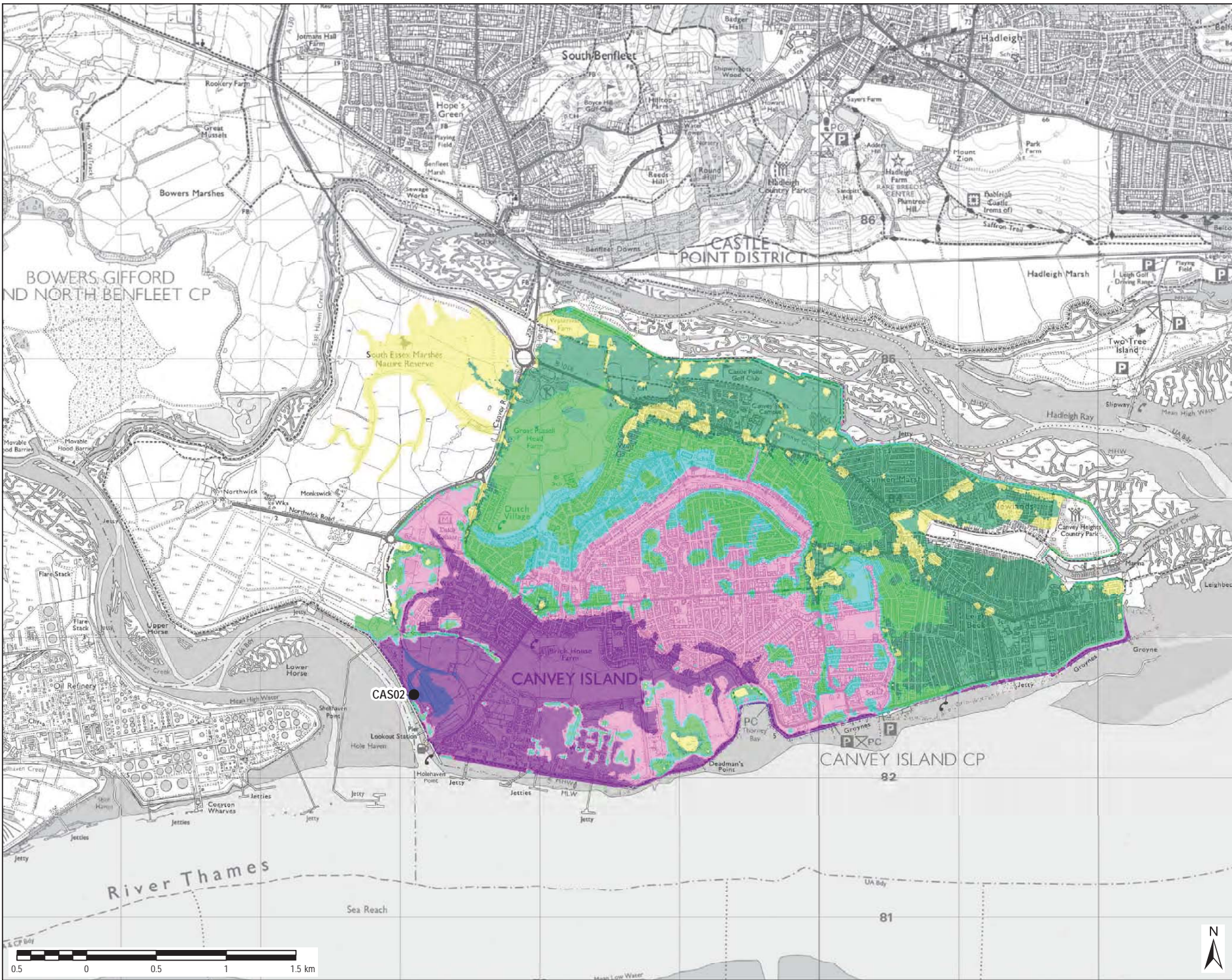
Drawing Title: **BREACH CAS01 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP**

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Drawing Number <b>FIGURE E34a</b>	Rev <b>1</b>
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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 to 20 Hours
    - > 20 Hours

**NOTES**

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 inundated (wet) 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 site.

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Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **BREACH CAS02 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP**

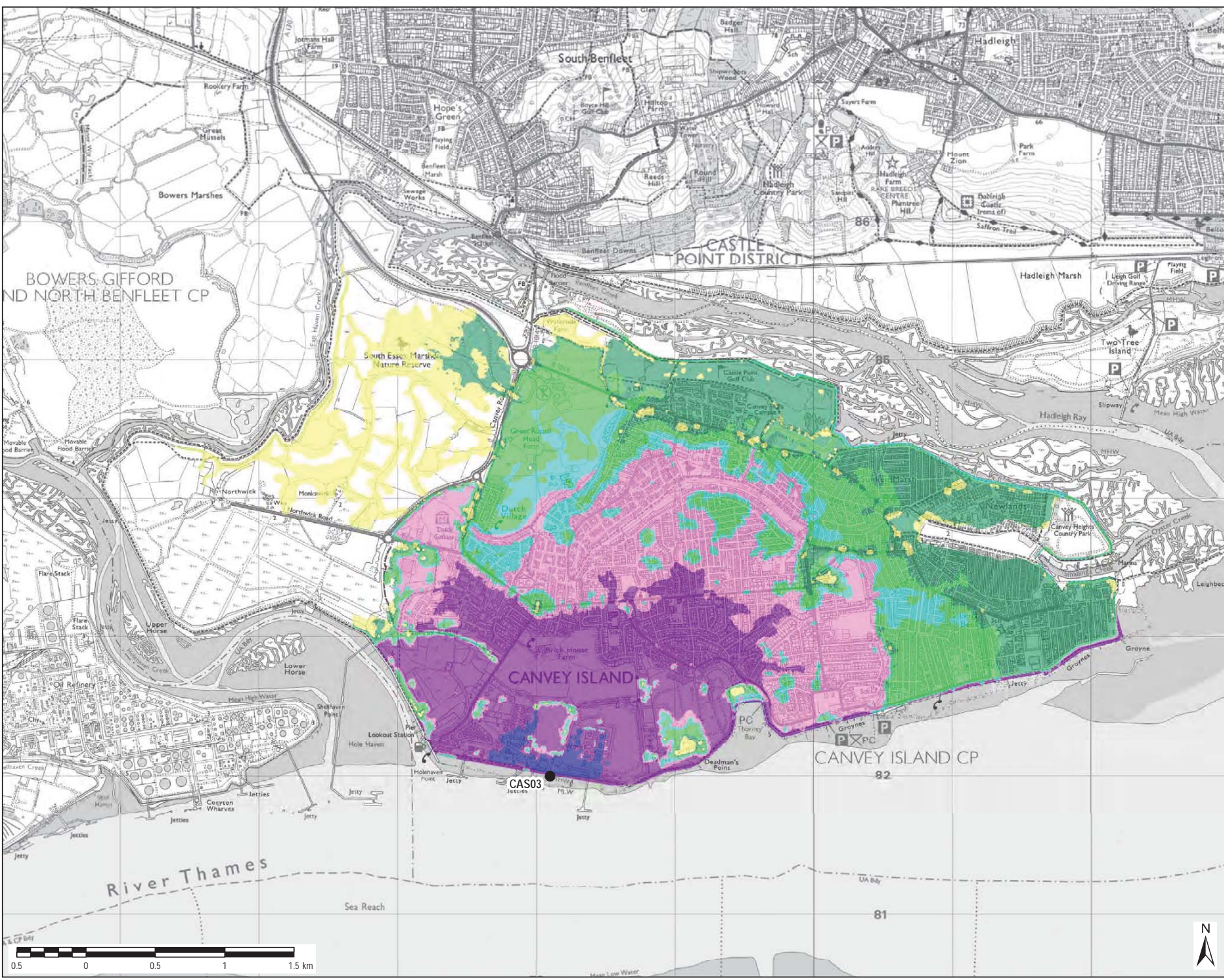
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Drawing Number: **FIGURE 34b** Rev: **1**

File Name: K:\5004 - Information Systems\63532482 - South Essex SFRA\02\_Maps\Inundation Maps\Figure E24b-Breach CAS02 - Time to Inundation - 2116 - with climate change 0.1 AEP.mxd



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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 to 20 Hours
  - > 20 Hours

**NOTES**

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 inundated (wet) 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 site.

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Purpose of Issue: **FINAL**

Client:

Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **BREACH CAS03 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP**

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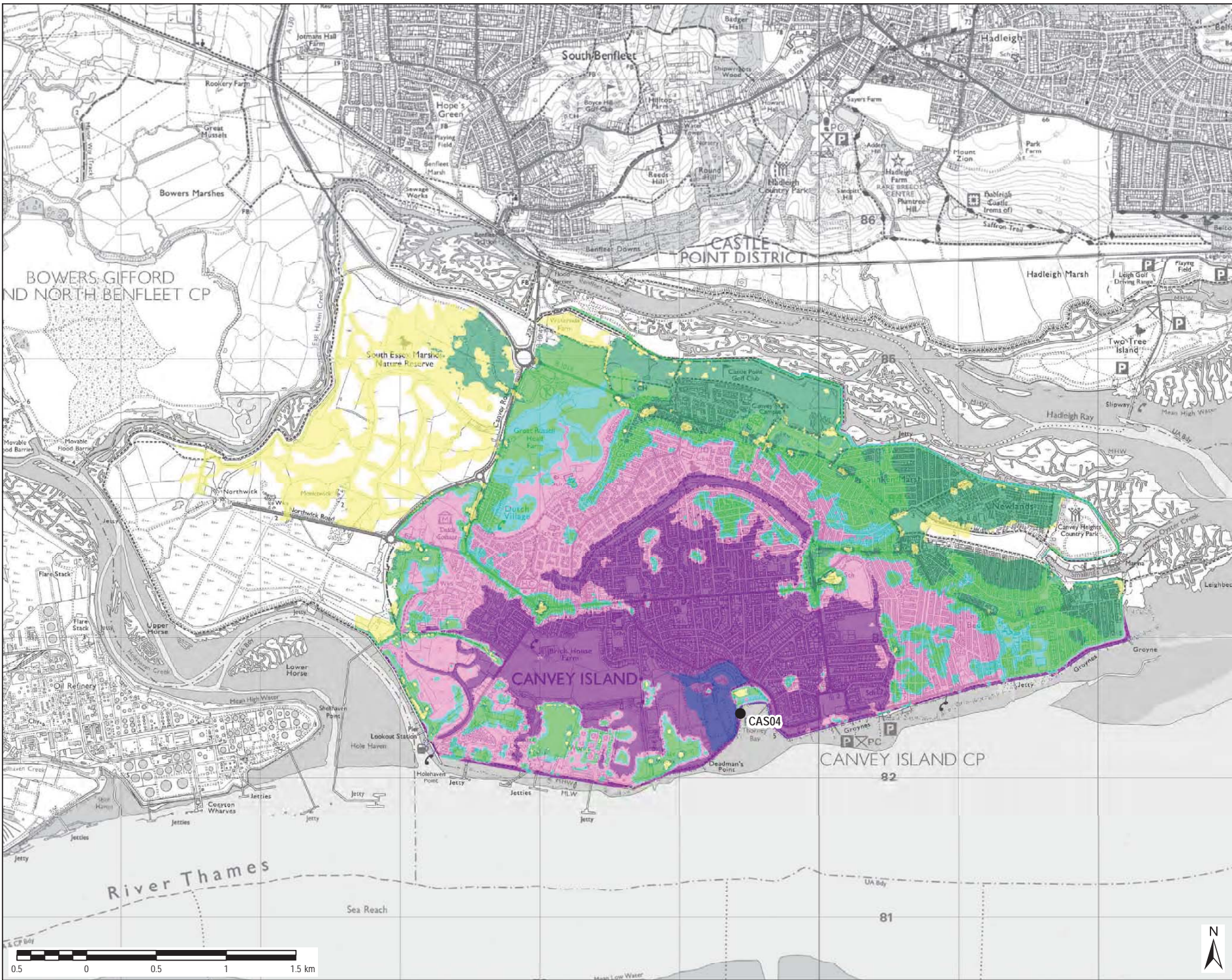
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Drawing Number: **FIGURE E34c** Rev: **1**

File Name: K:\5004 - Information Systems\60532482 - South Essex SFRA\02 Maps\Inundation Maps\Figure E34c Breach CAS03 Time to Inundation - 2116 with climate change 0.1 AEP.mxd



File Name: K15004 - Information Systems\GIS\3402 - South Essex SFRAN02 Maps\Inundation Maps\Figure E34d\Breach CAS04 Time to Inundation - 2116 with climate change 0.1 AEP.mxd



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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 to 20 Hours
  - > 20 Hours

**NOTES**

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 inundated (wet) 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 site.

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Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **BREACH CAS04 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP**

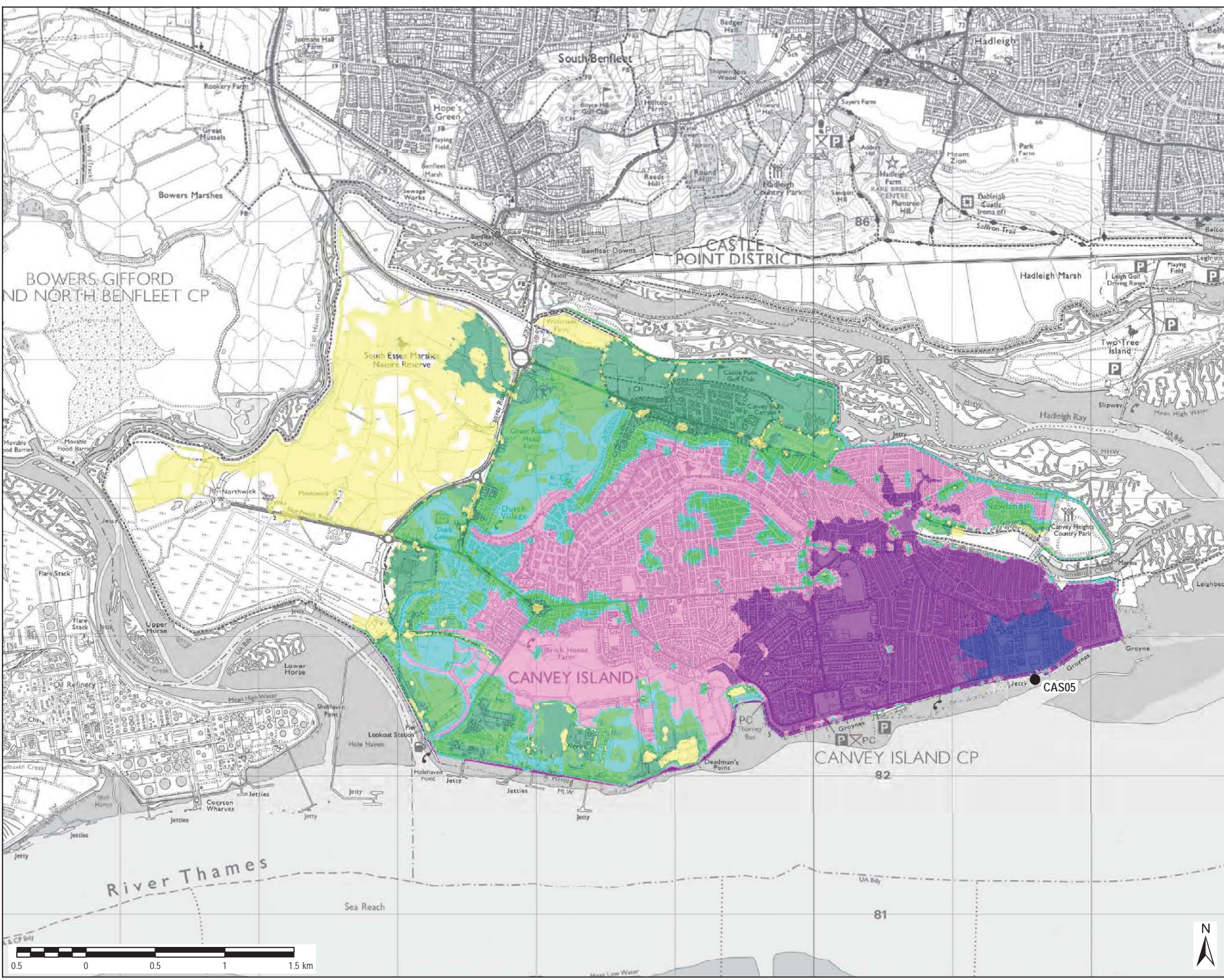
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Drawing Number: **FIGURE E34d** Rev: **1**





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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 to 20 Hours
    - > 20 Hours

**NOTES**

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 inundated (wet) 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 site.

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BREACH CAS05 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP**

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AECOM Internal Project No. 60532482		Scale @ A3 1:25,000	

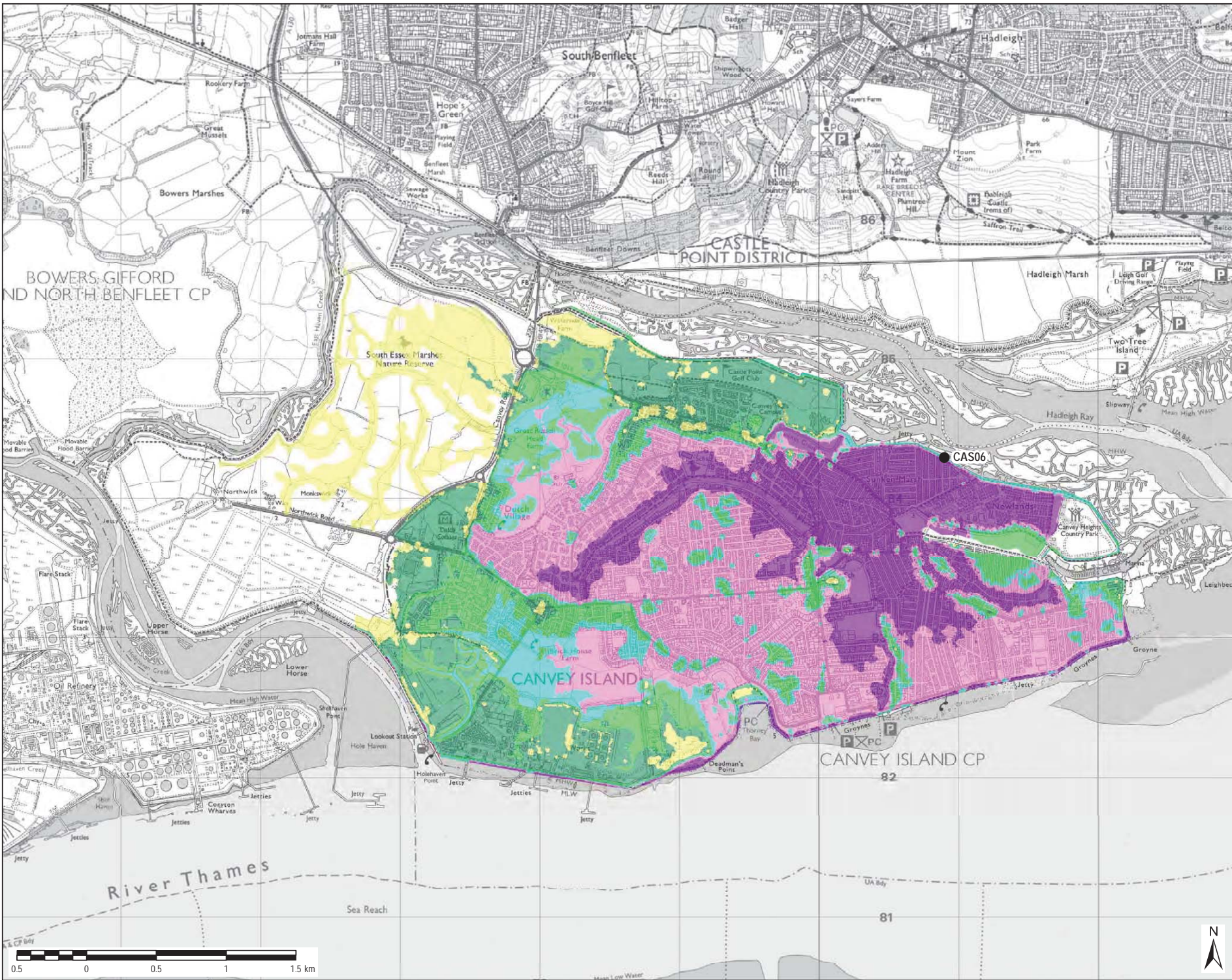
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Drawing Number <b>FIGURE E34e</b>	Rev <b>1</b>
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File Name: K:\0004 - Information Systems\06532482 - South Essex SFRA\02 Maps\Inundation Maps\Figure E34e-Breach CAS05 - Time to Inundation - 2116 with climate change 0.1% AEP.mxd

File Name: K15004 - Information Systems\03\2018 - South Essex SFRAN02 Maps\Inundation Maps\Figure E34f Breach CAS06 Time to Inundation - 2116 with climate change 0.1 AEP.mxd



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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 to 20 Hours
  - > 20 Hours

**NOTES**

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 inundated (wet) 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 site.

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Purpose of Issue: **FINAL**

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Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **BREACH CAS06 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP**

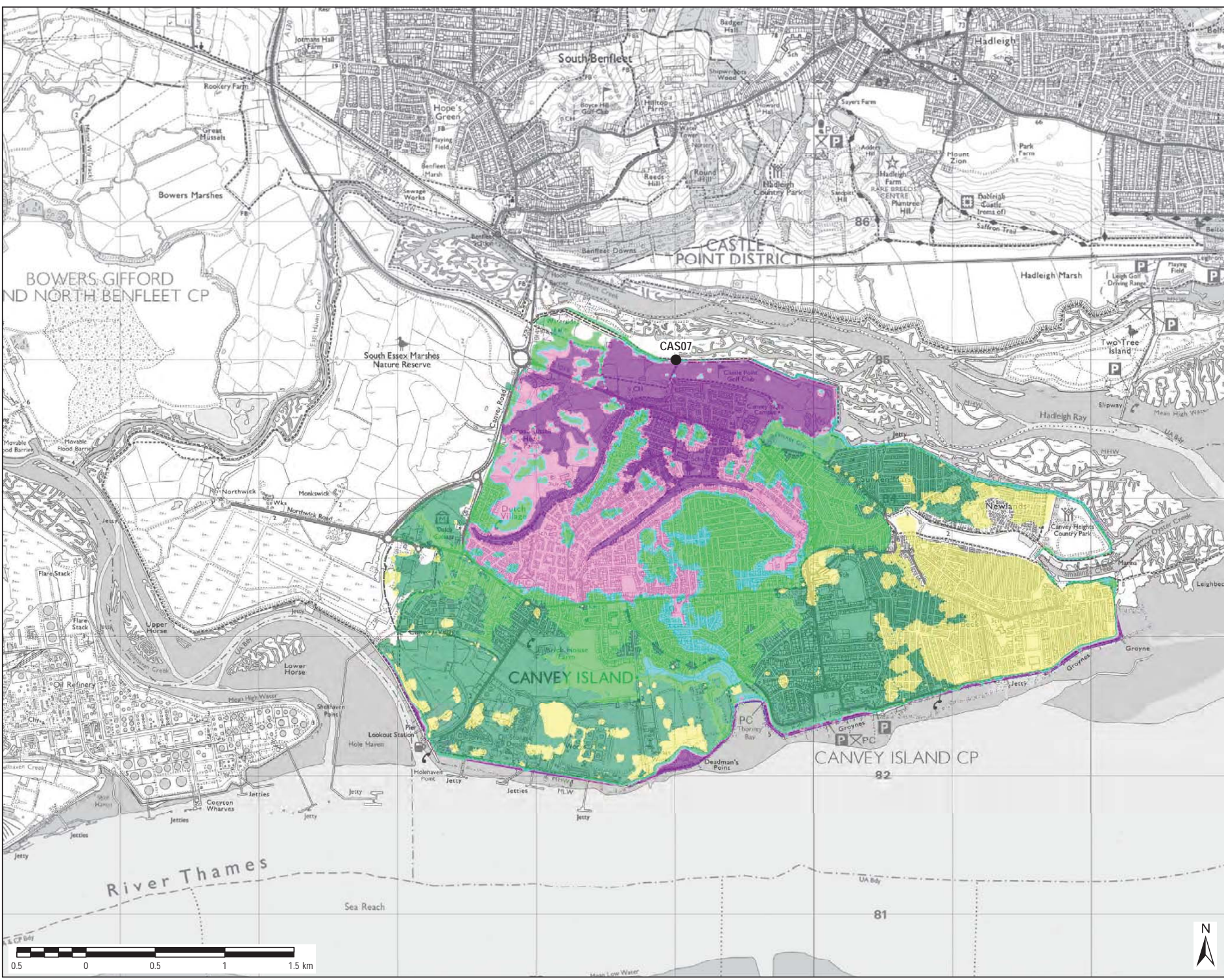
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Drawing Number: **FIGURE E34f** Rev: **1**





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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 to 20 Hours
    - > 20 Hours

**NOTES**

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 inundated (wet) 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 site.

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Purpose of Issue: **FINAL**

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Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **BREACH CAS07 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP**

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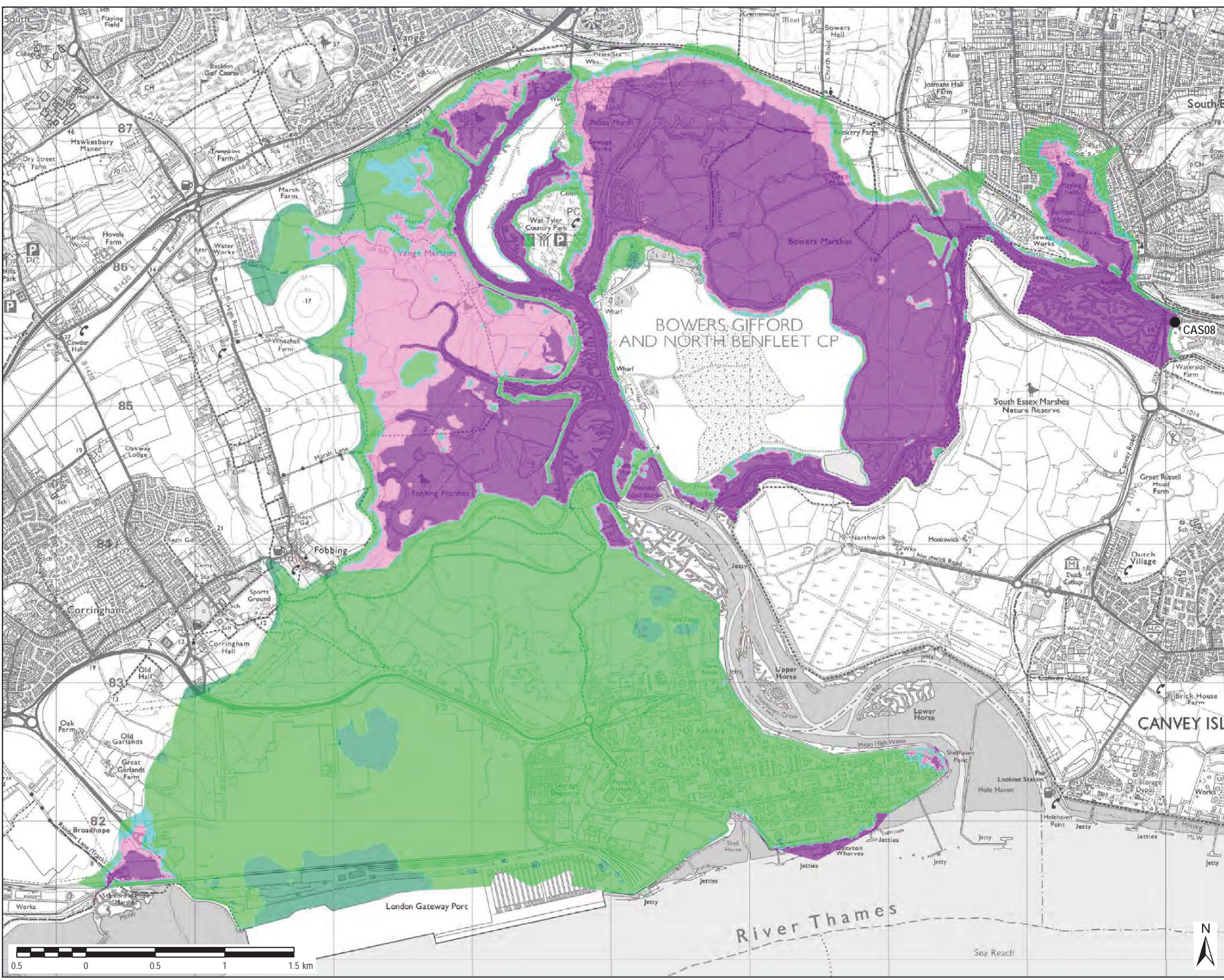
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Drawing Number <b>FIGURE E34g</b>	Rev <b>1</b>
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File Name: K:\5004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Inundation Maps\Figure E34g\_Breach\_CAS07\_Time to Inundation\_2116\_withClimateChange\_0.1\_AEP.mxd





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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 to 20 Hours
  - > 20 Hours

**NOTES**

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 inundated (wet) 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 produced 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 site.

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **BREACH CAS08 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP**

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AECOM Internal Project No. 60532482		Scale @ A3 1:25,000	

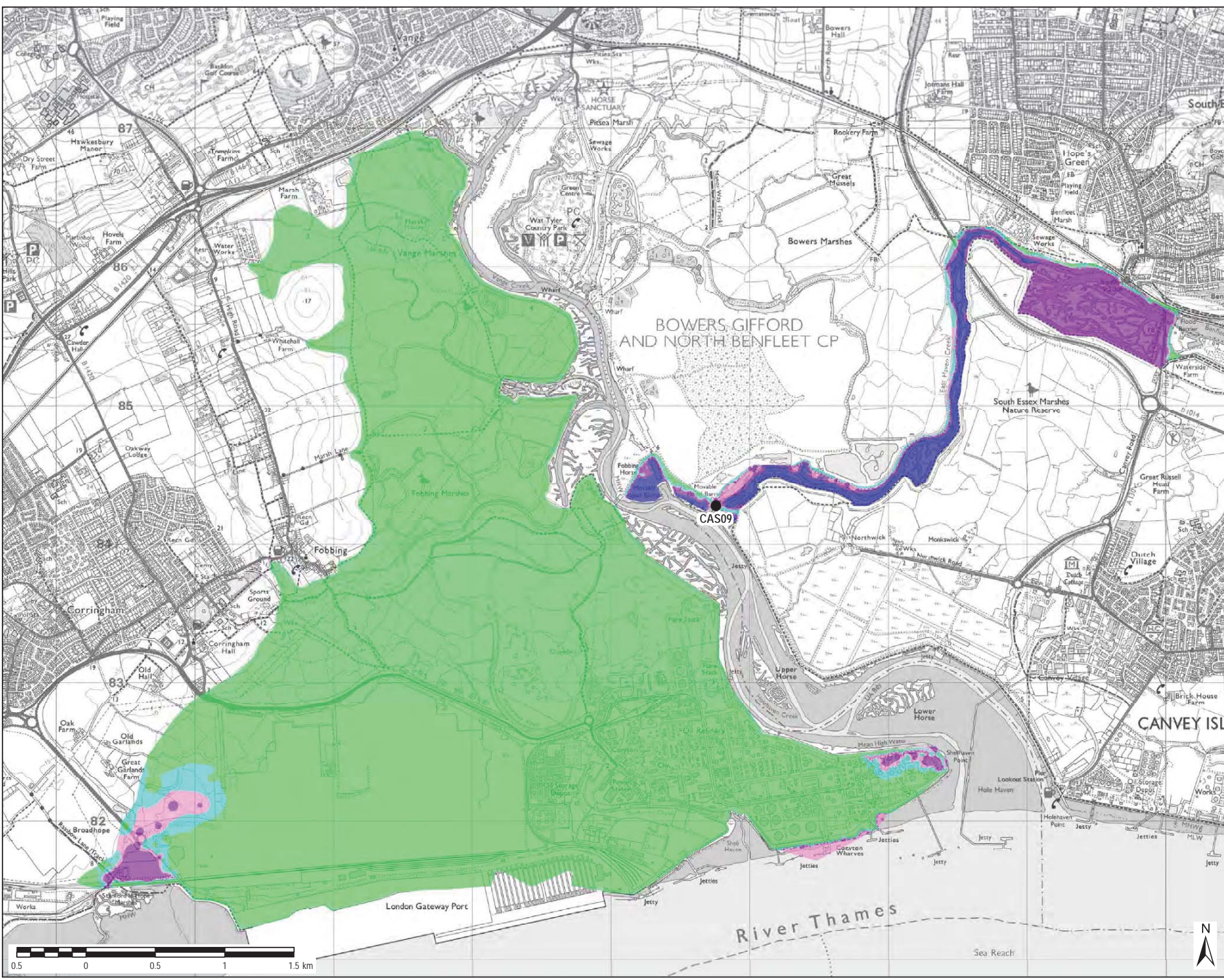
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Drawing Number **FIGURE E34h** Rev **1**

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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 to 20 Hours
  - > 20 Hours

**NOTES**

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 inundated (wet) 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 produced 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 site.

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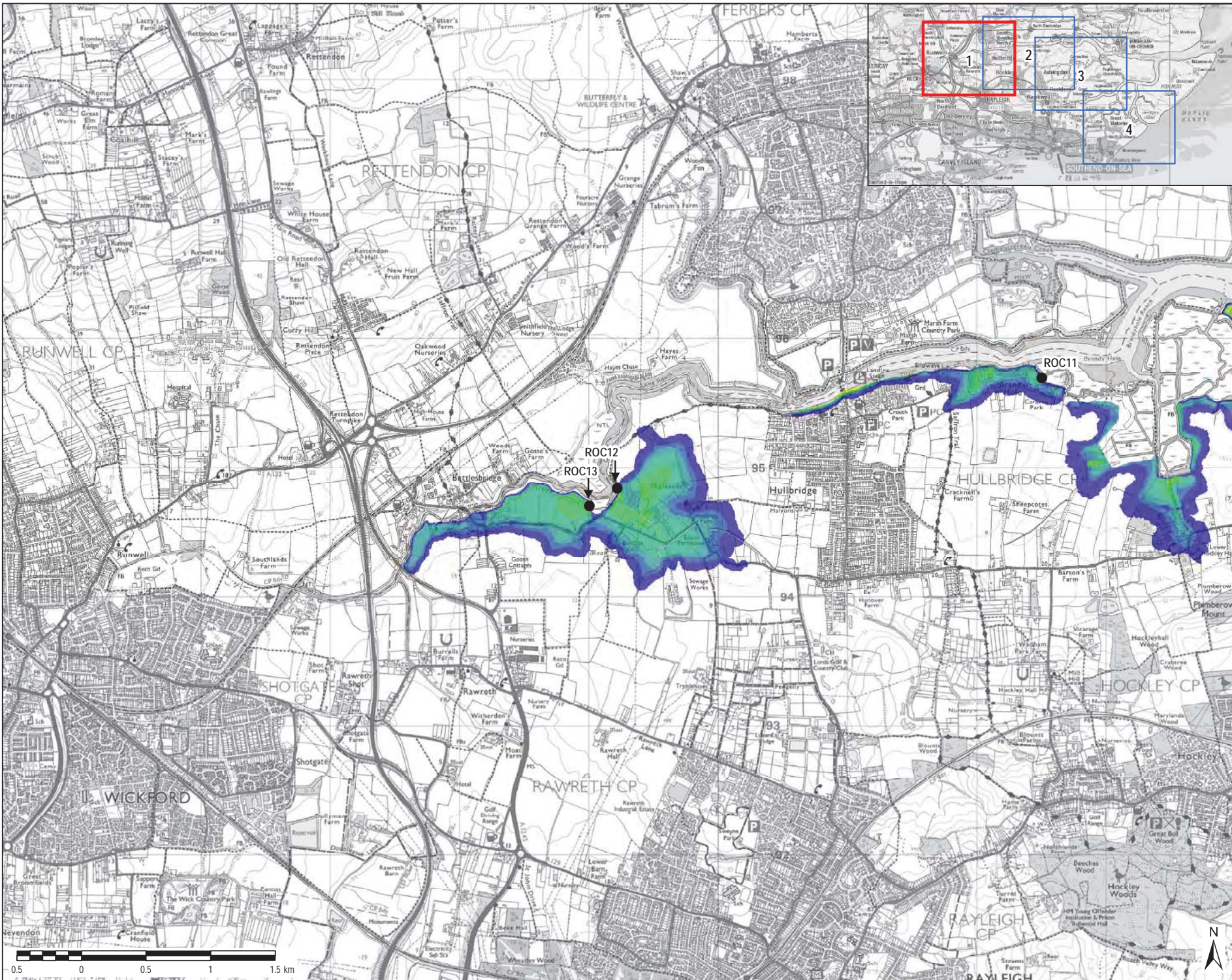
Drawing Title **BREACH CAS09 TIME TO INUNDATION 2116 WITH CLIMATE CHANGE 0.1% AEP**

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**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 overlapping 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 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.

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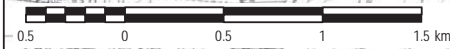
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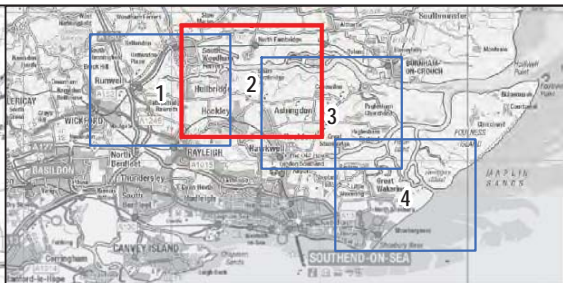
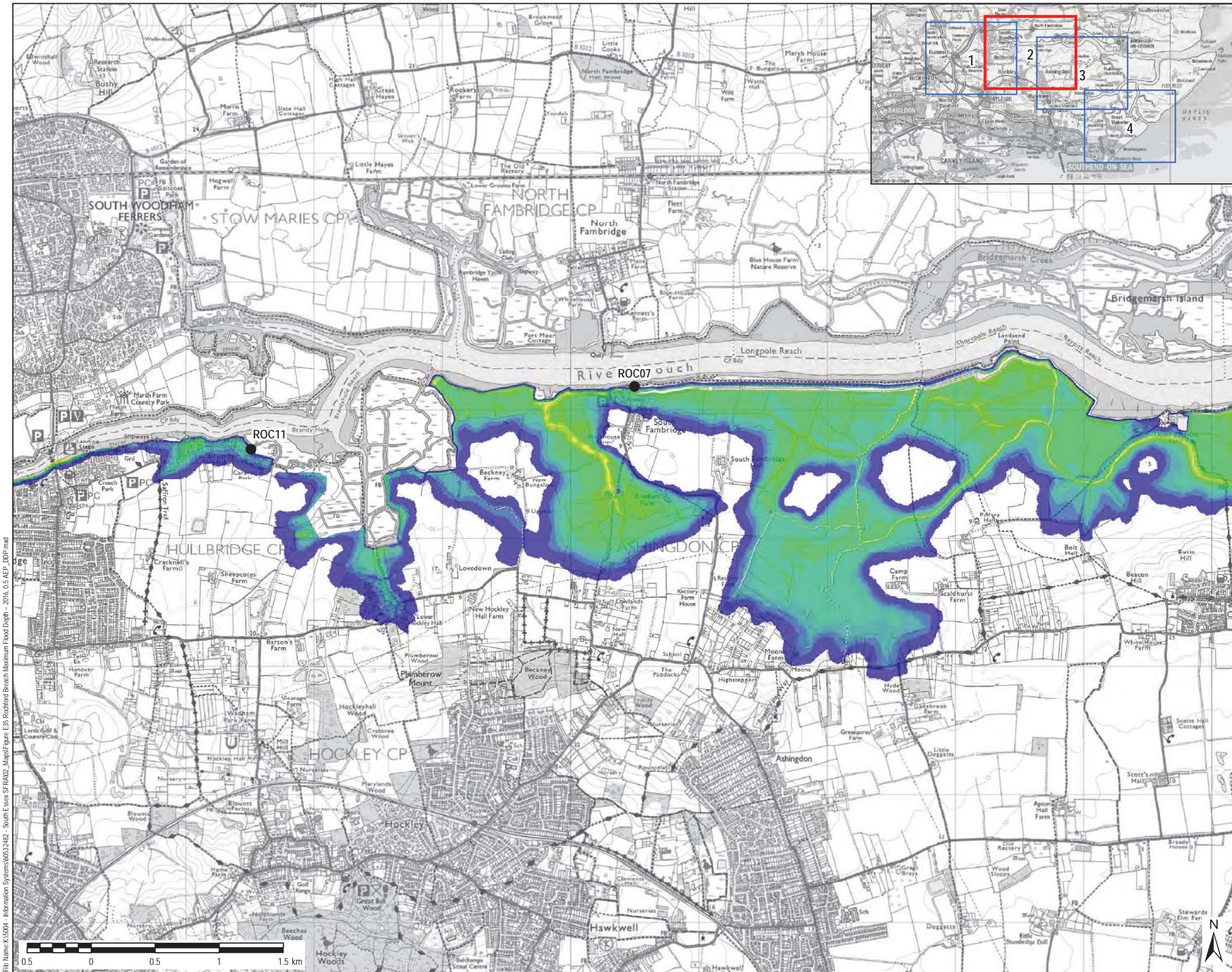
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**LEGEND**

- 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 overlapping 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 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.

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Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

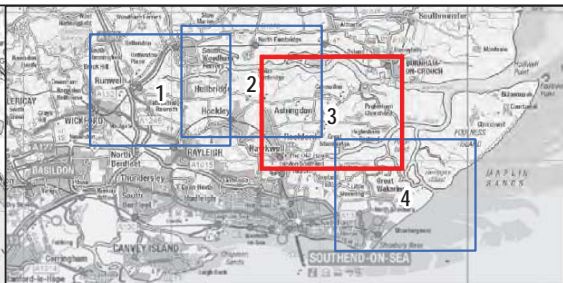
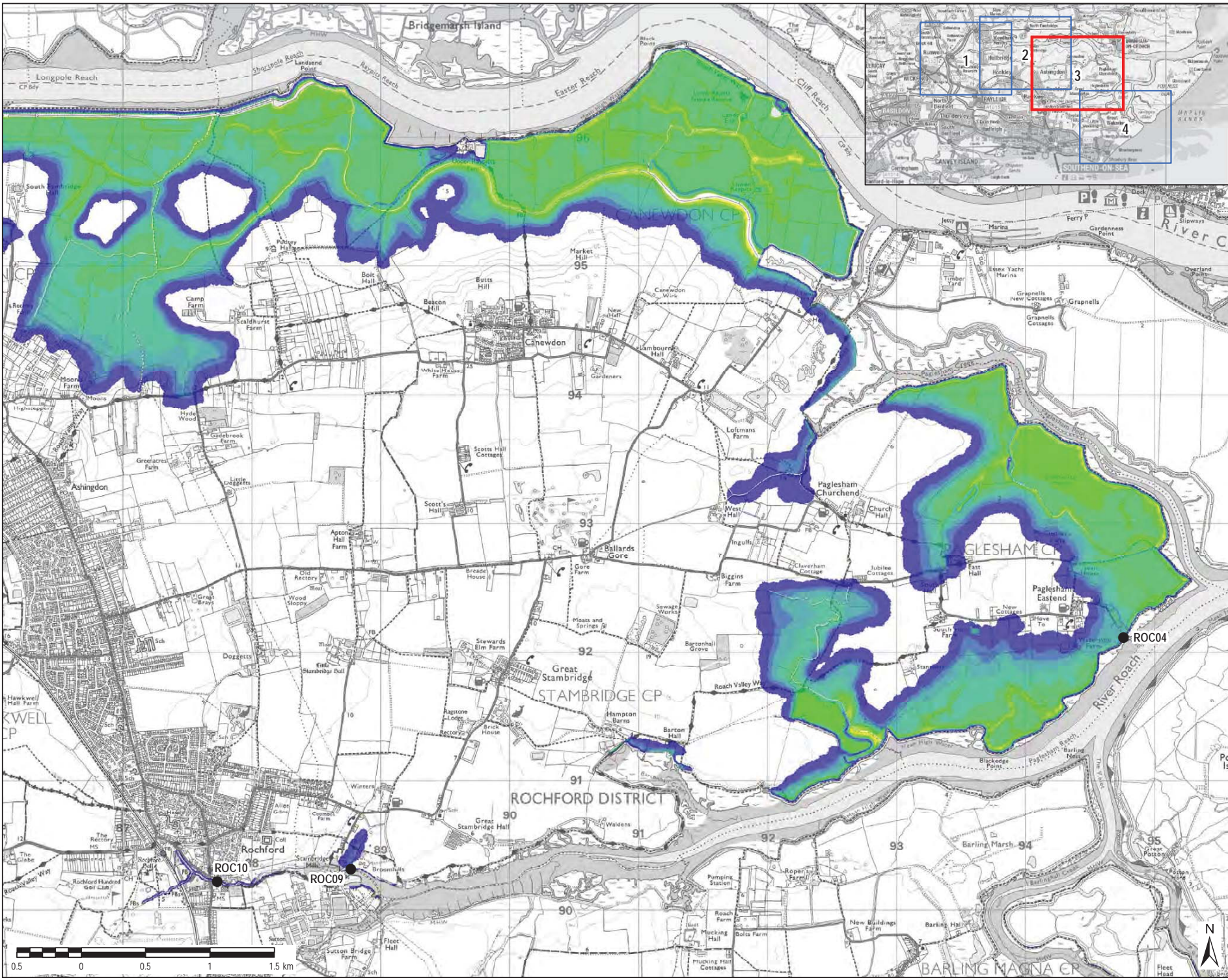
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**LEGEND**

- 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 overlapping 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 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.

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD DEPTH 2016, 0.5% AEP**

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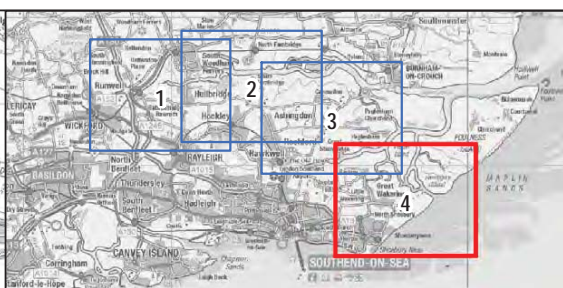
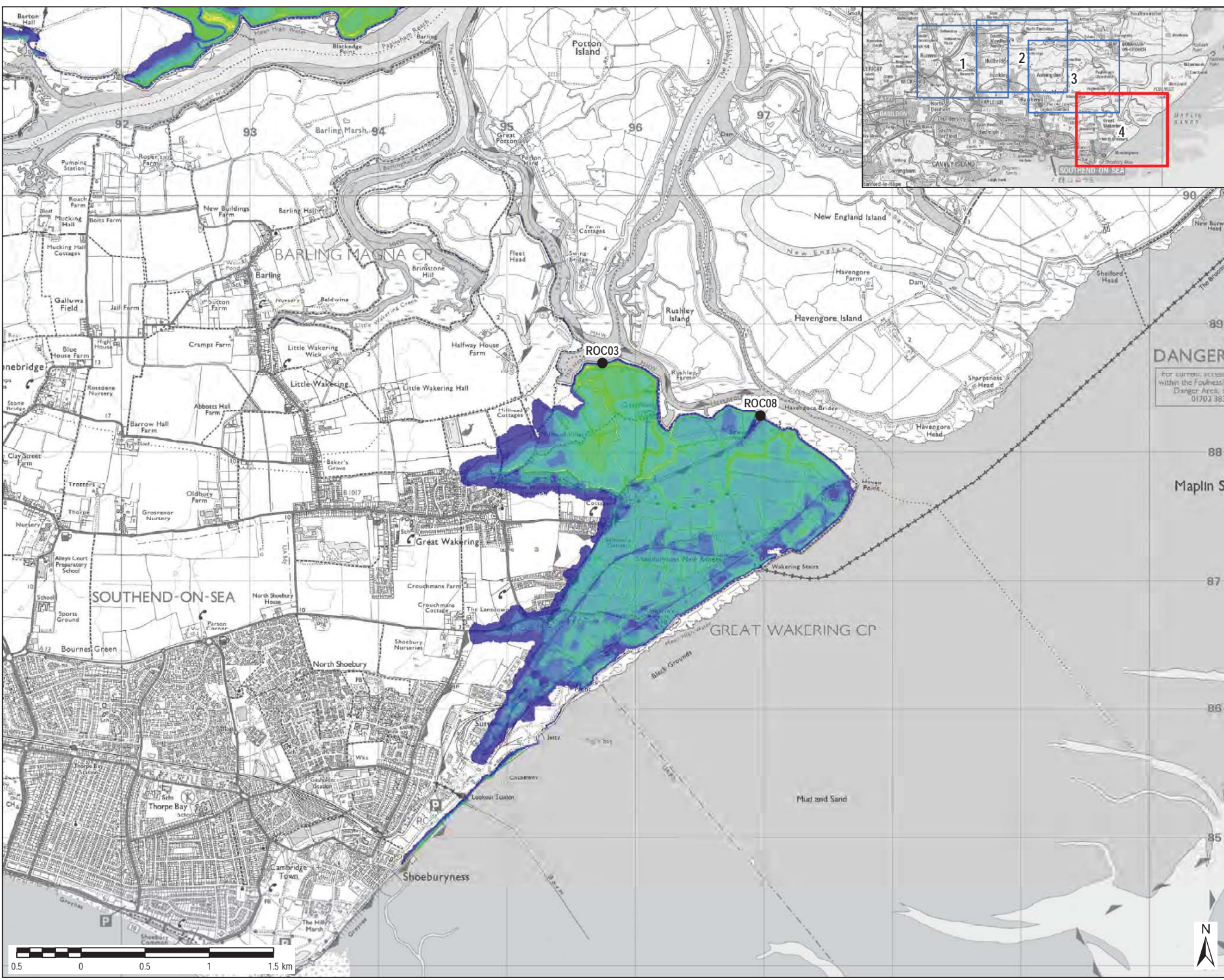
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Drawing Number **FIGURE E35c** Rev **1**

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**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 overlapping 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 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.

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD DEPTH 2016, 0.5% AEP**

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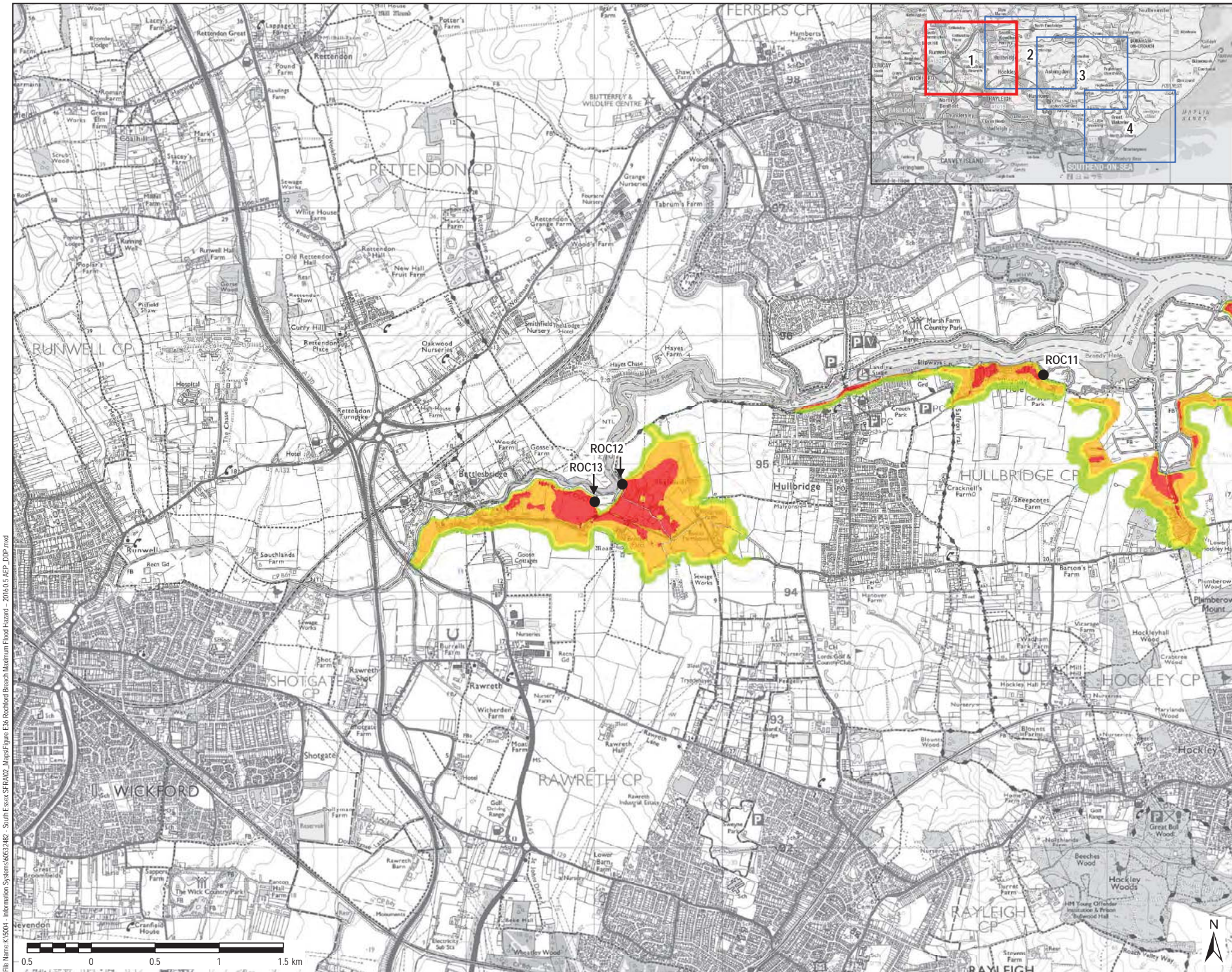
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Drawing Number **FIGURE E35d** Rev **1**

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**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 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 F2320 (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.

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD HAZARD 2016, 0.5% AEP**

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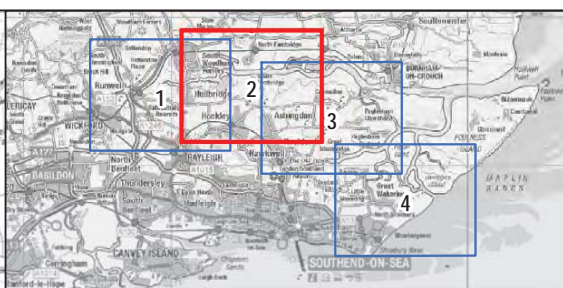
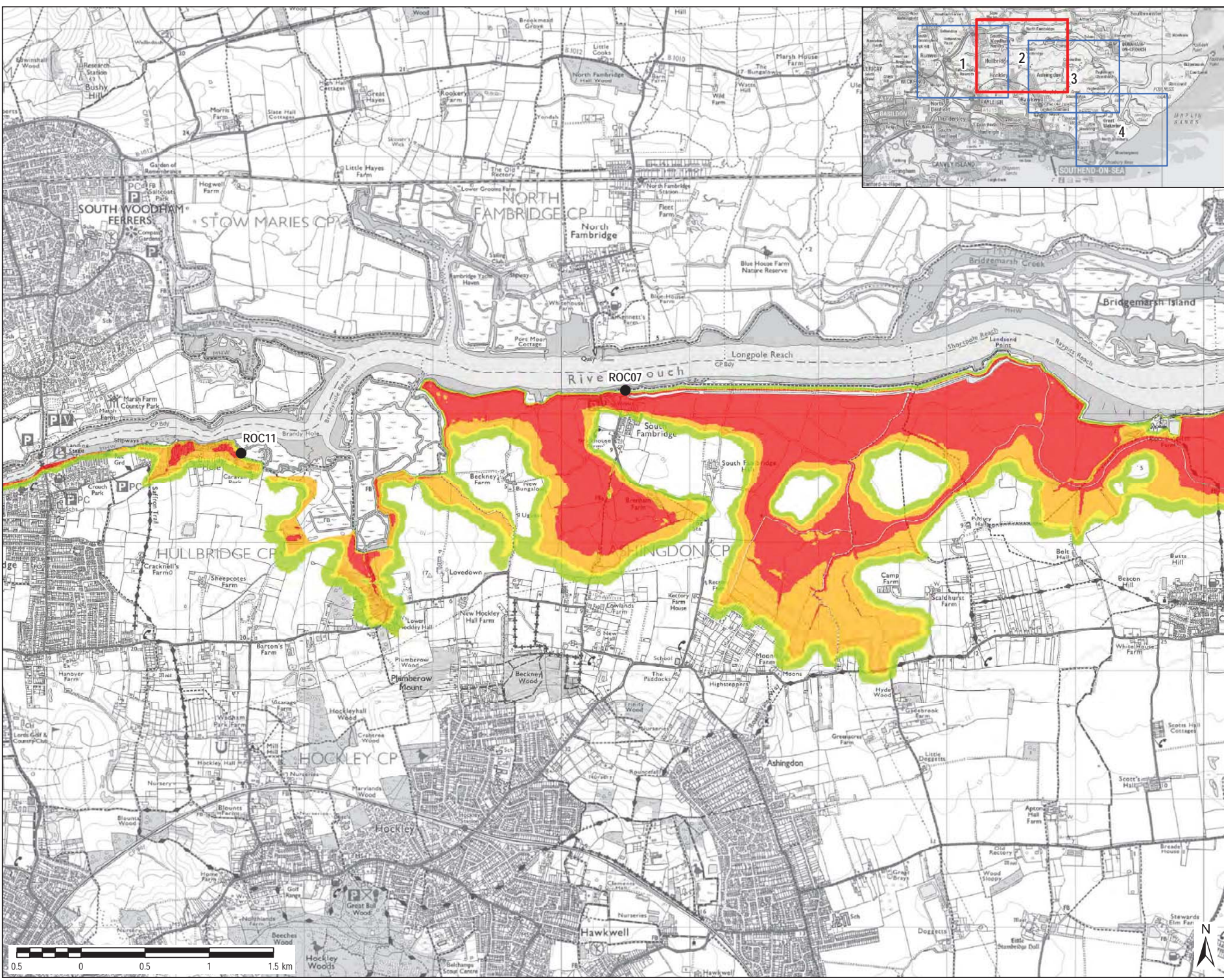
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Drawing Number **FIGURE E36a** Rev **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Maps\Figures\E36\_Rochford Breach Maximum Flood Hazard - 2016\0.5\_AEP\_DDP.mxd



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**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 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 F02320 (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.

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Purpose of Issue **FINAL**

Client

Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD HAZARD 2016, 0.5% AEP**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
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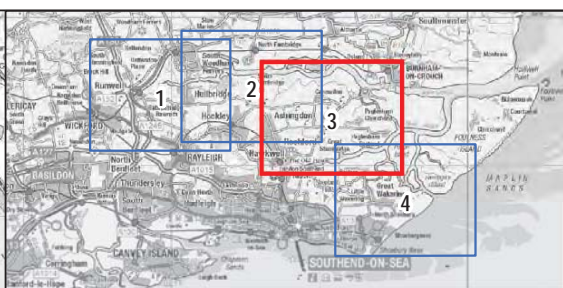
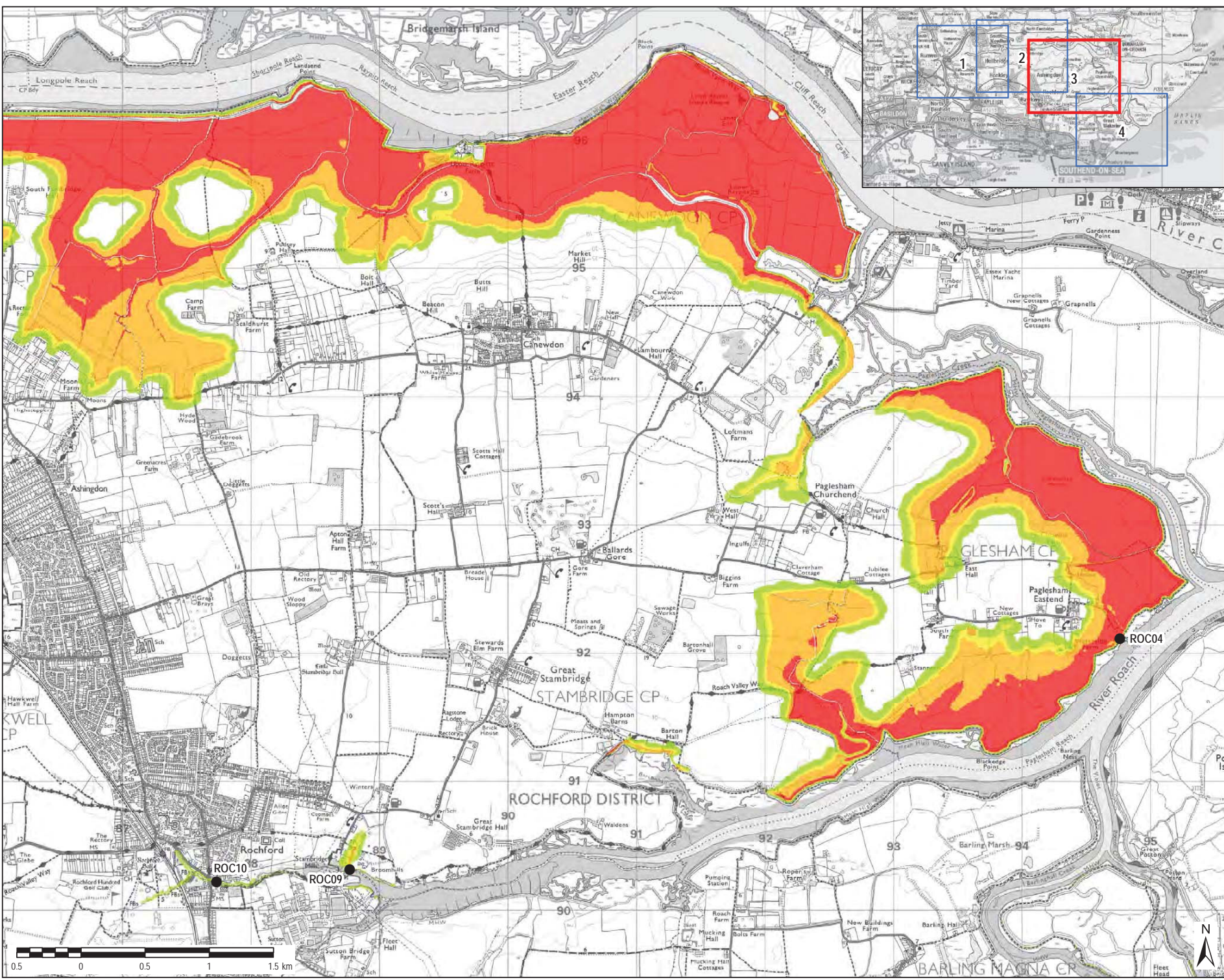
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Drawing Number **FIGURE E36b** Rev **1**

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- 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 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 FD2320 (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.

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Purpose of Issue: **FINAL**

Client:

Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **ROCHFORD BREACH MAXIMUM FLOOD HAZARD 2016, 0.5% AEP**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
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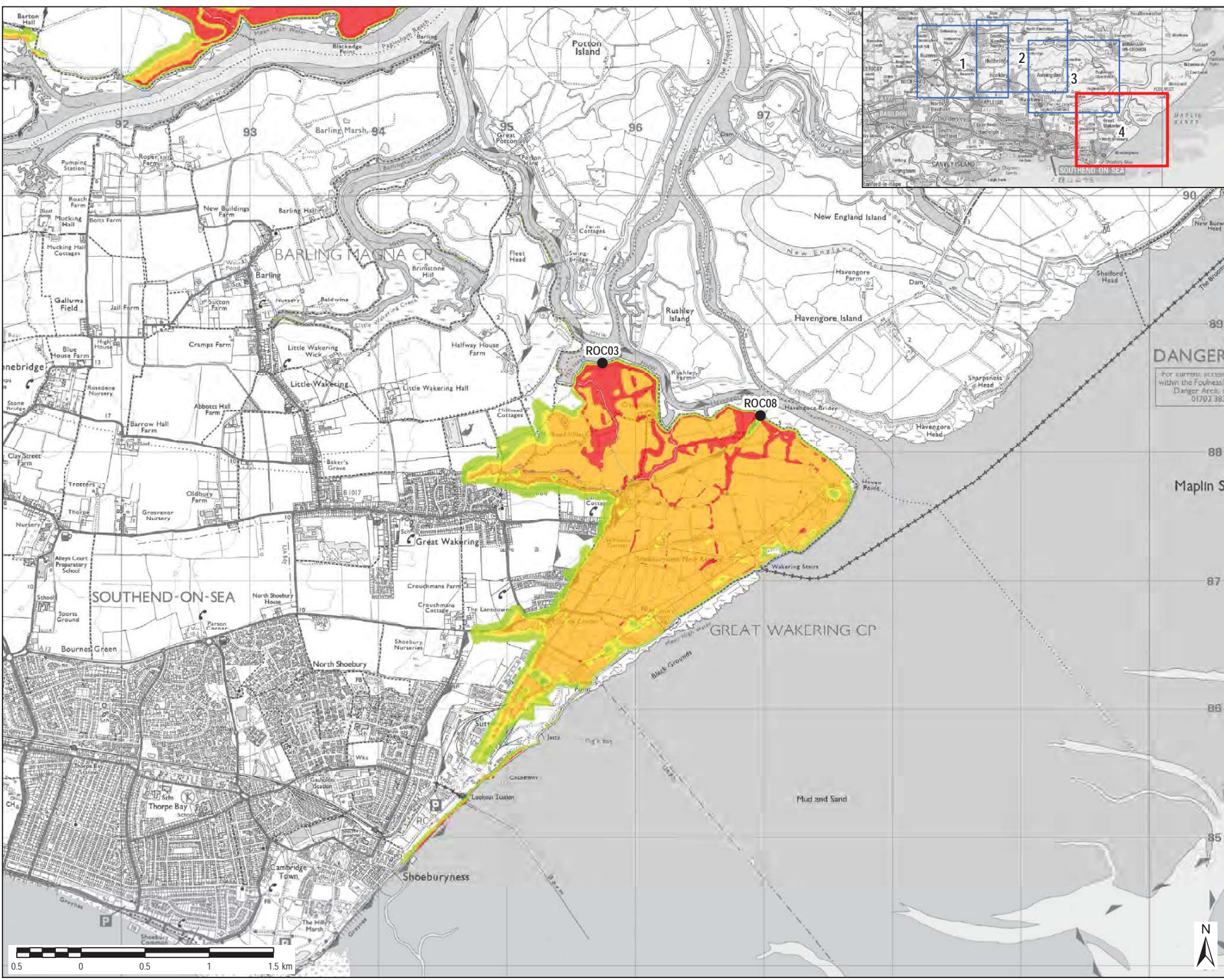
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Drawing Number: **FIGURE E36c** Rev: **1**

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

**NOTES**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD HAZARD 2016, 0.5% AEP**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
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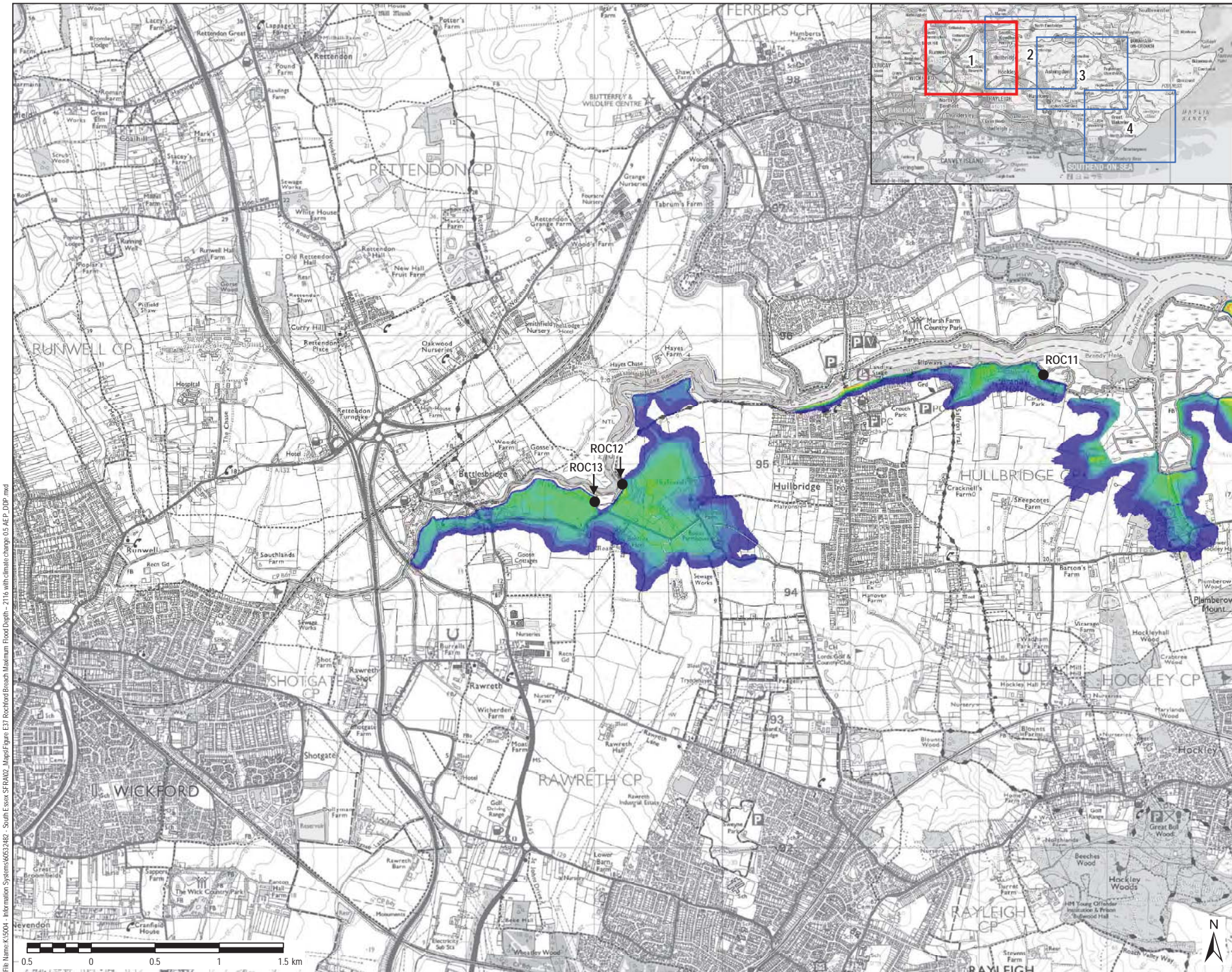
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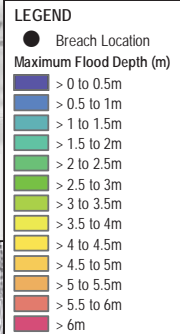
Drawing Number **FIGURE E36d** Rev **1**

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**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 overlapping 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 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.

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

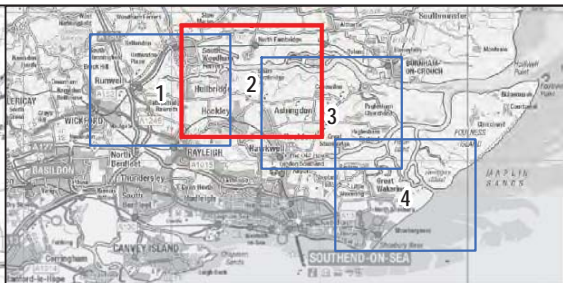
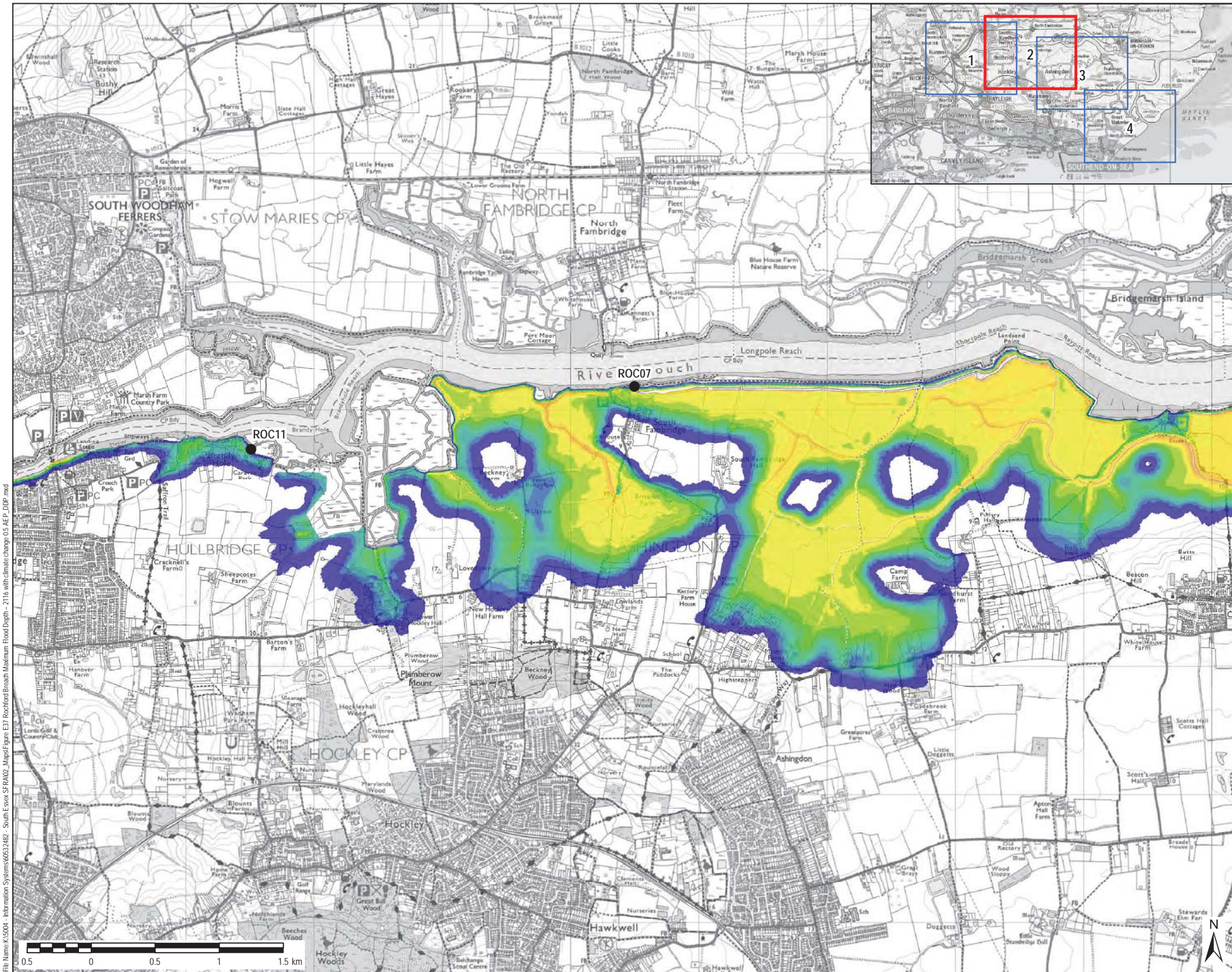
Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.5% AEP**

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Drawing Number **FIGURE E37a** Rev **1**



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**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 overlapping 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 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.

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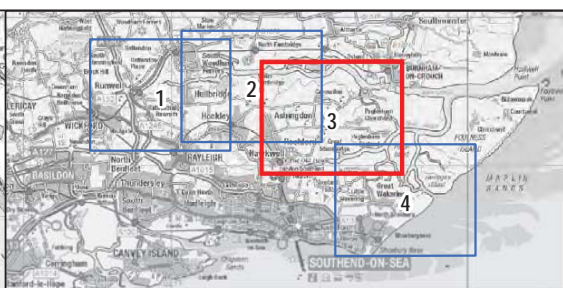
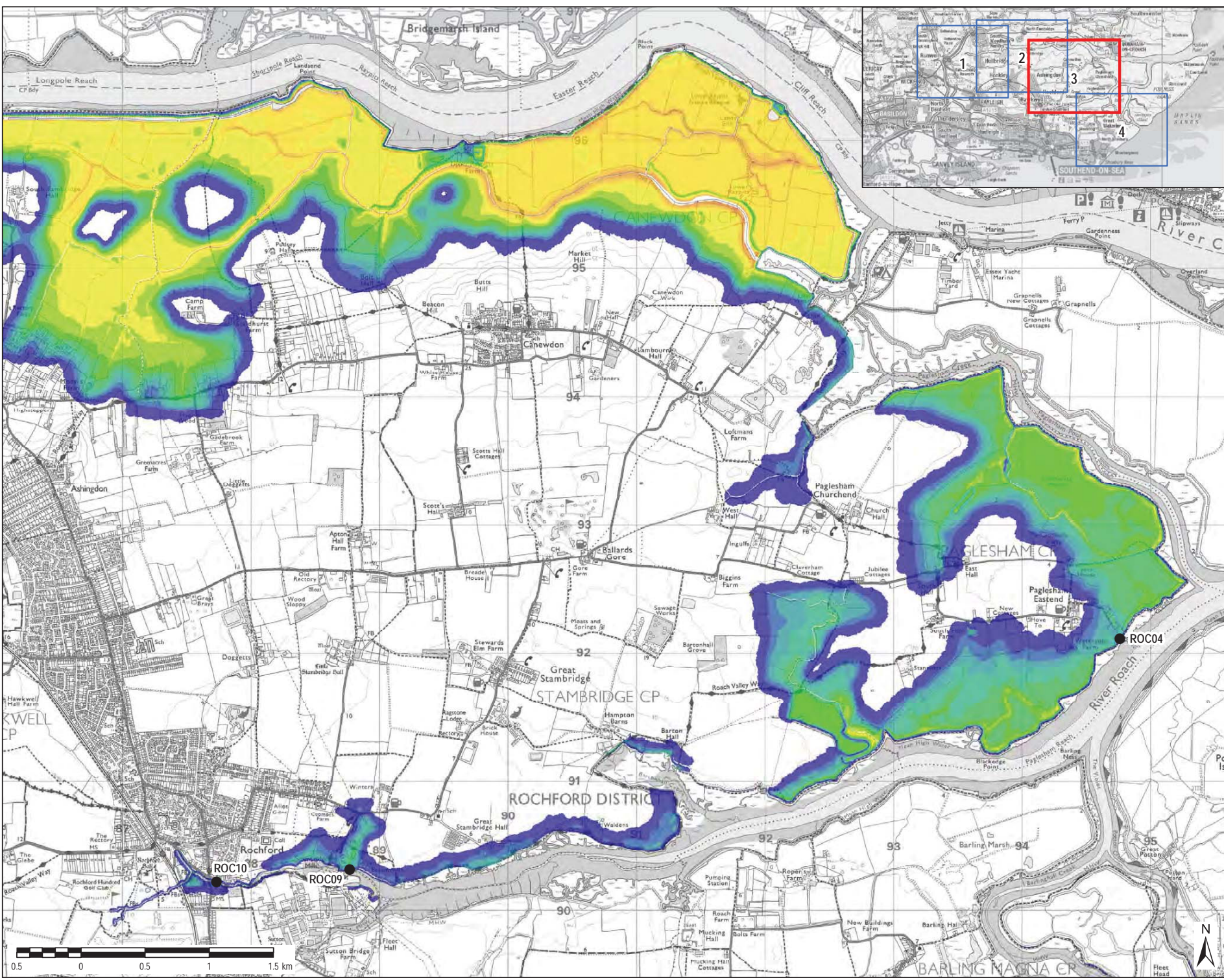
Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.5% AEP**

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**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 overlapping 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.

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.5% AEP**

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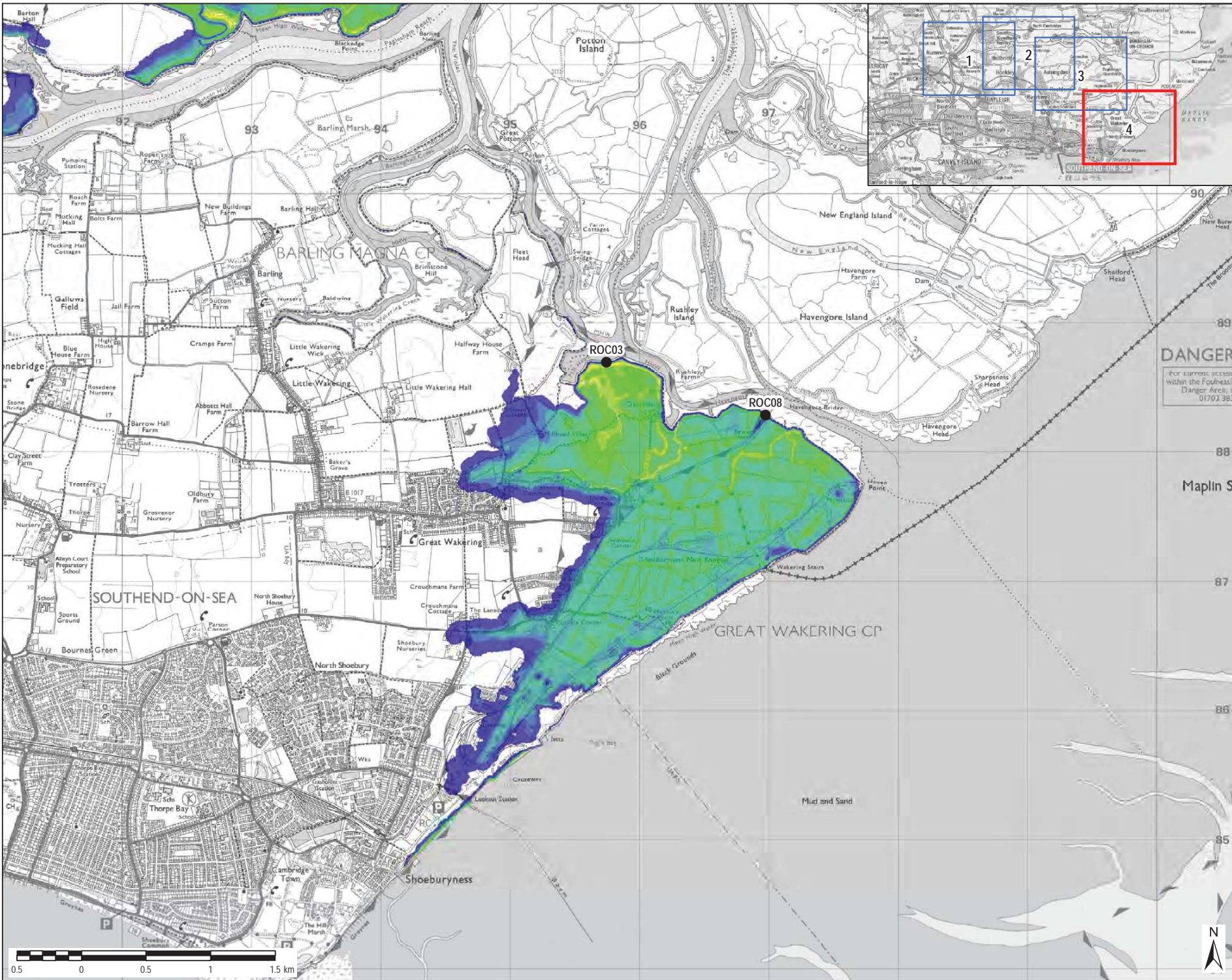
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Drawing Number **FIGURE E37c** Rev **1**

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**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**

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Purpose of Issue **FINAL**

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Project Title **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD DEPTH 2116 WITH CLIMATE CHANGE 0.5% AEP**

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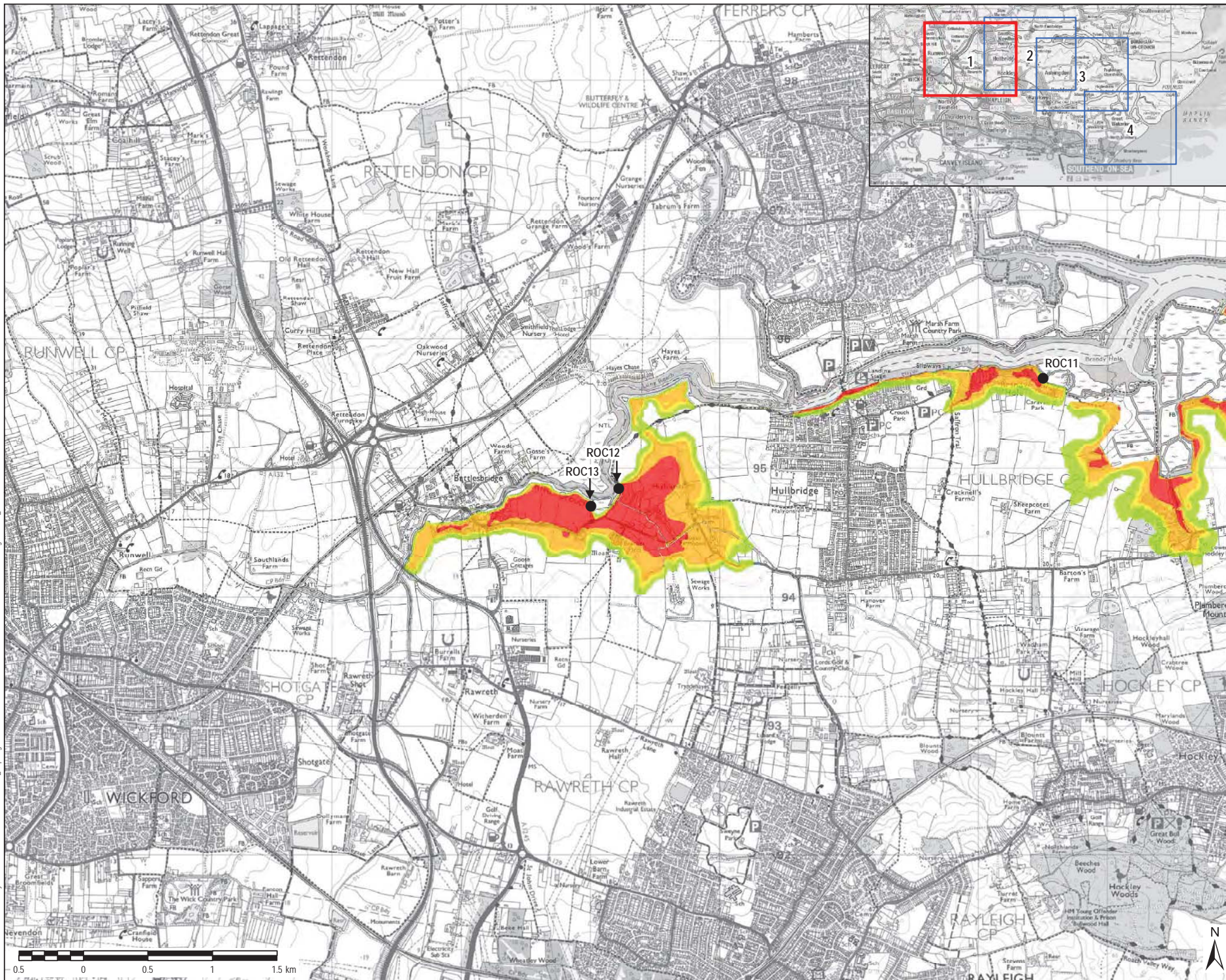
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Drawing Number **FIGURE E37d** Rev **1**



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**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 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 F02320 (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 SFR Main Report.

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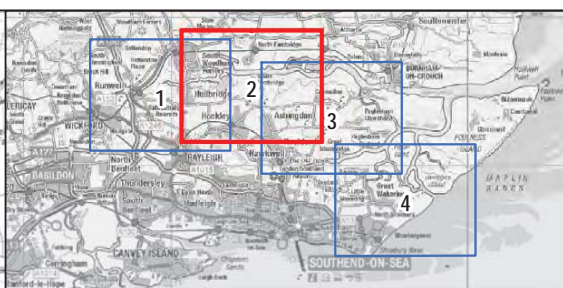
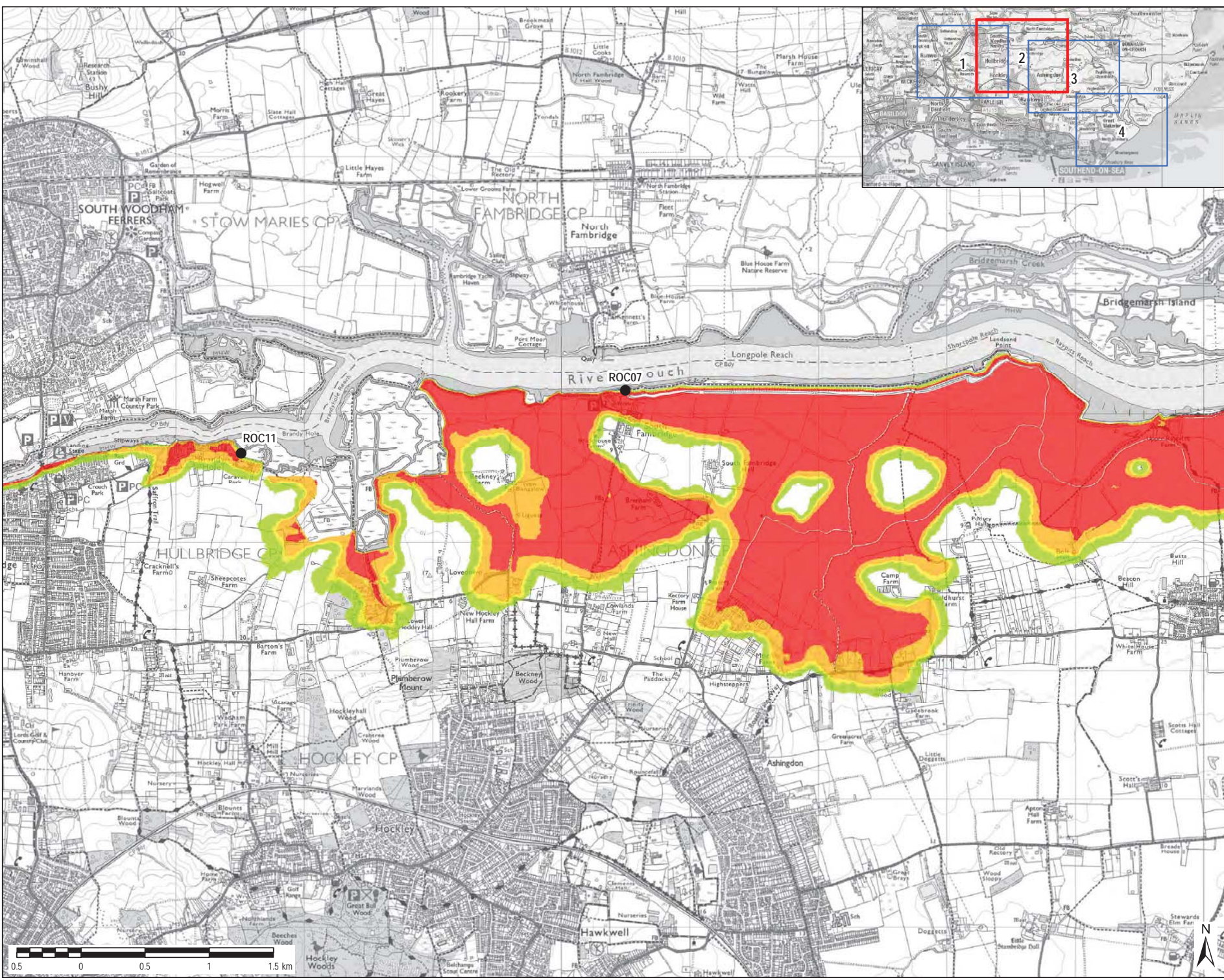
Project Title **SOUTH ESSEX LEVEL 1 SFRAN**

Drawing Title **ROCHFORD BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.5% AEP**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
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**LEGEND**

- Breach Location
- Maximum Flood Hazard
- Low Hazard
- Moderate Hazard (Danger to Some)
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**NOTES**

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**Rochford District Council**

Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **ROCHFORD BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.5% AEP**

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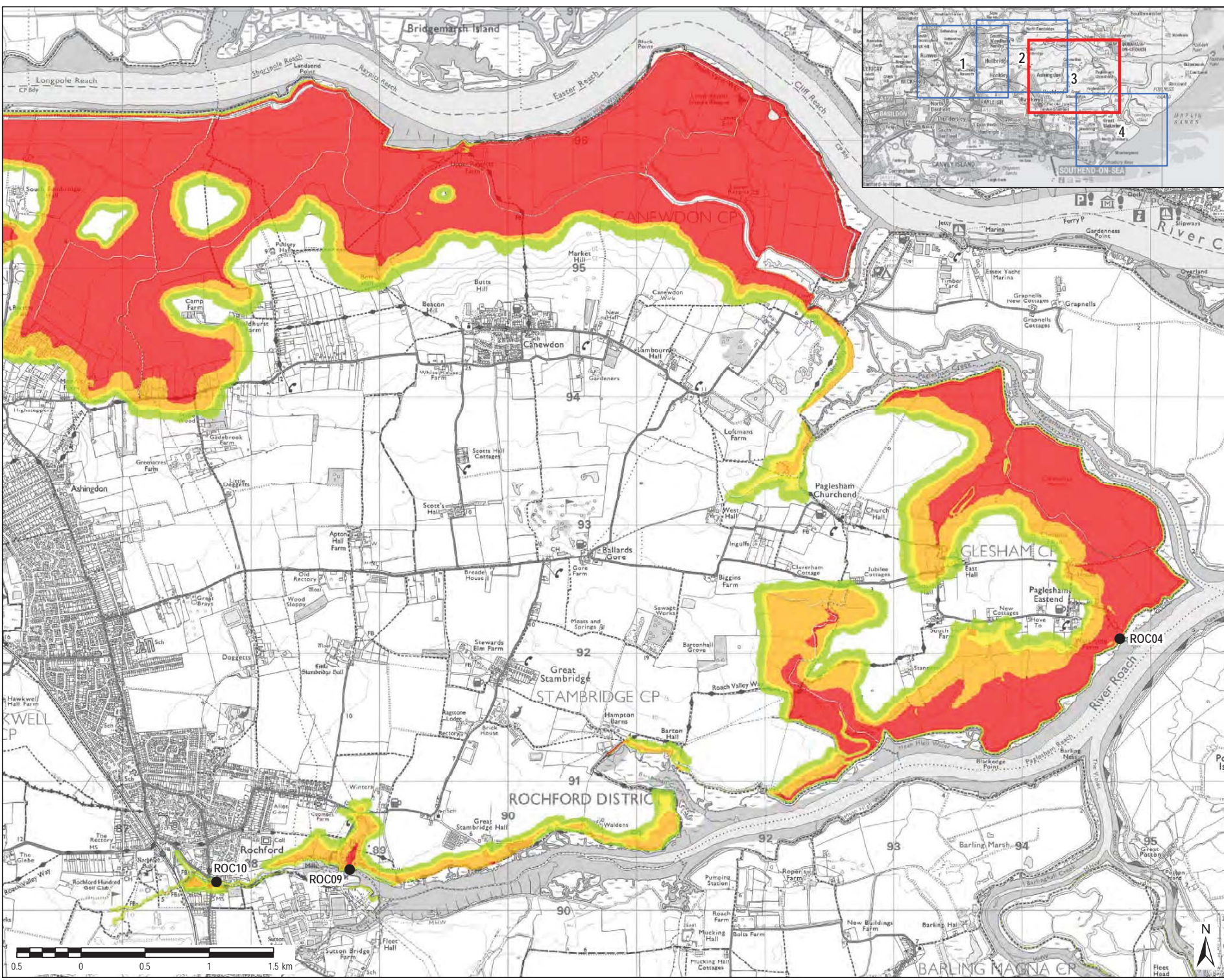
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Drawing Number: **FIGURE E38b** | Rev: **1**

File Name: K15004 - Information Systems\60532482 - South Essex SFRA\02\_Map\Fig E38 Rochford Breach Maximum Flood Hazard - 2116 with climate change 0.5 AEP - DDP.mxd







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**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 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 F02320 (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.

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Purpose of Issue: **FINAL**

Client:

Project Title: **SOUTH ESSEX LEVEL 1 SFRA**

Drawing Title: **ROCHFORD BREACH MAXIMUM FLOOD HAZARD 2116 WITH CLIMATE CHANGE 0.5% AEP**

Drawn JW	Checked BB	Approved CP	Date 08/04/2018
AECOM Internal Project No. 60532482		Scale @ A3 1:27,000	

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Drawing Number: **FIGURE E38c** Rev: **1**

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