KENT FLOOD RISK MANAGEMENT COMMITTEE

Monday, 22nd July, 2019

2.00 pm

Council Chamber - Sessions House

AGENDA

KENT FLOOD RISK MANAGEMENT COMMITTEE

Monday, 22nd July, 2019, at 2.00 pm Ask for: **Andrew Tait**

Council Chamber - Sessions House Telephone **03000 416749**

Tea/Coffee will be available 15 before the start of the meeting in the meeting room

Membership (7)

Conservative (6): Mr A R Hills (Chairman), Mr A H T Bowles, Mrs L Hurst, Mr P W A Lake, Mr K Pugh and Mr H Rayner

Liberal Democrat (1) Mr I S Chittenden

UNRESTRICTED ITEMS

(During these items the meeting is likely to be open to the public)

Webcasting Notice

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By entering the meeting room you are consenting to being filmed and to the possible use of those images and sound recordings for webcasting and/or training purposes. If you do not wish to have your image captured then you should make the Clerk of the meeting aware.

4. Presentation by Samantha Howe (Environment Agency) on the latest coastal modelling for Kent (Pages 5 - 30)

EXEMPT ITEMS

(At the time of preparing the agenda there were no exempt items. During any such items which may arise the meeting is likely NOT to be open to the public)

Benjamin Watts
General Counsel
03000 416814

Friday, 12 July 2019

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Coastal modelling in Kent

Samantha Howe
East Kent Partnerships and Strategic Overview Team Leader
Flood and Coastal Risk Management

22 July 2019

Environment Agency

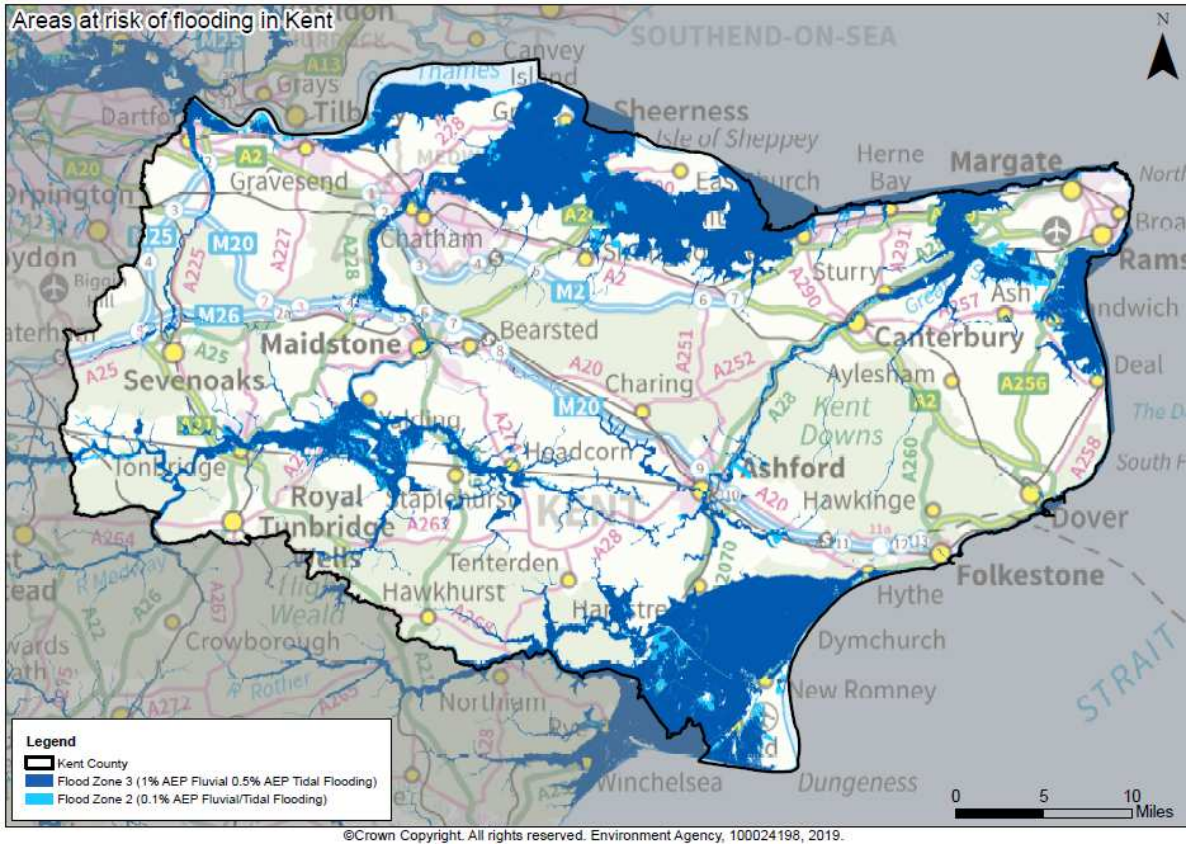
Contents

- Flood risk in Kent – overview
- Our flood mapping
- Kent coastal model coverage and overview
- East Kent Coast modelling – case study
- North Kent Coast and Romney Marsh modelling updates overview

Flooding in Whitstable - 1953 tidal surge

Environment Agency

Flood risk in Kent overview



- 60,000 properties (residential and commercial) are at risk of flooding from rivers and the sea
- We use computer models help us to understand the areas at risk

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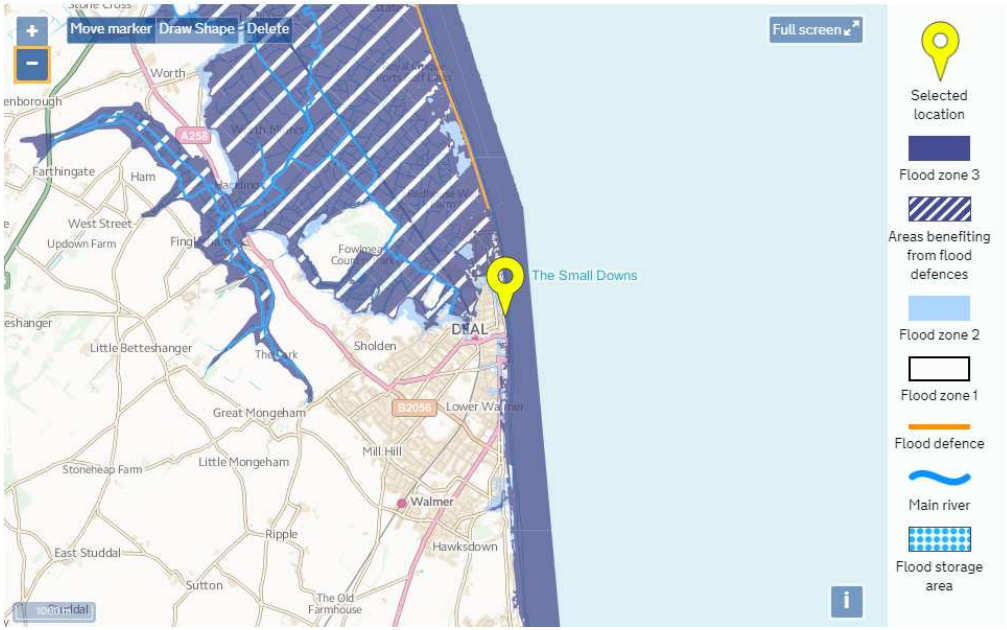
Flood map for planning

- Shows the **present day** risk of flooding to land from main rivers and/or the sea
- Two flood zones
  - Flood zone 3 – 1% chance of flooding from rivers or 0.5% chance of flooding from the sea in any given year
  - Flood zone 2 – 0.1% chance of flooding in any given year
- Does not take into account the presence of flood defences



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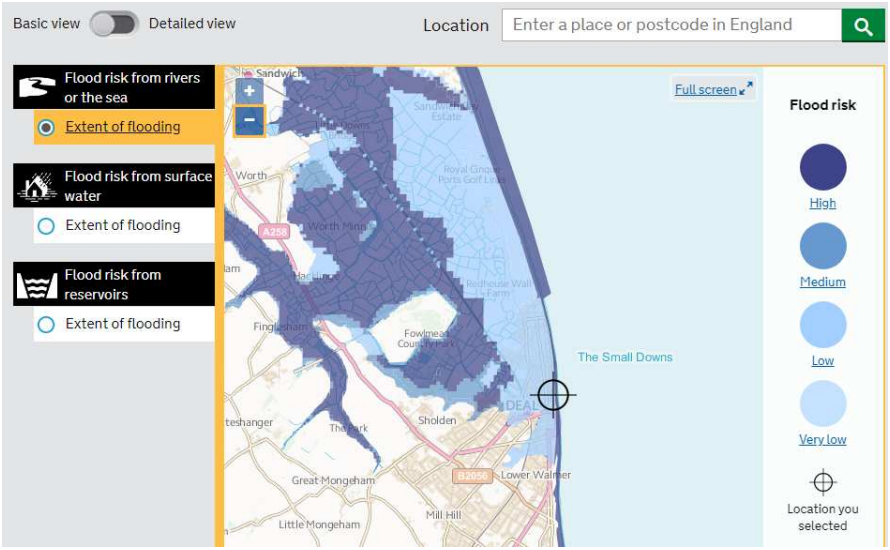
Risk of flooding from rivers and the sea

- Calculates the probability of flooding from main rivers or the sea
- Likelihood expressed as very low, low, medium or high risk
- Takes into the account the presence and condition of flood defences



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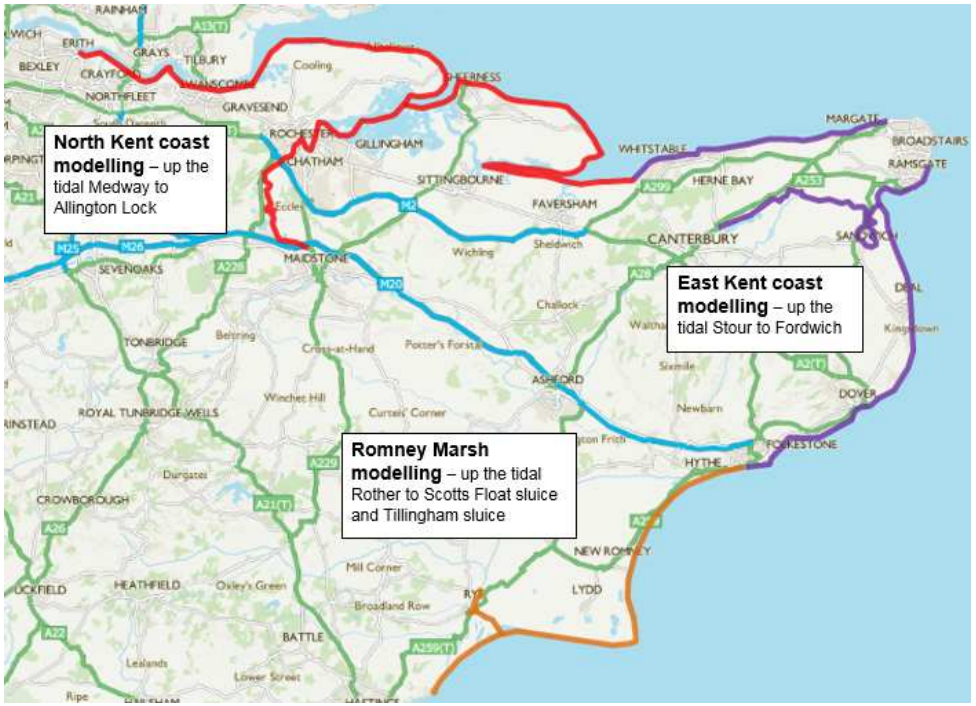
Kent coastal model coverage

- We have three flood risk models that cover the Kent coast

- Each model uses a similar approach and methodology and includes the following scenarios:
  - Defended and undefended
  - Present day
  - Climate change taken into account by:
    - Sea level rise
    - Increases in offshore wind speed
    - Offshore wave height



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Kent coastal model overview

- **East Kent Coast**
  - Detailed model completed in 2018
  - Previously had incomplete coverage and used broad scale approaches

- **North Kent Coast**
  - Completed in 2013, but is currently being updated to include:
    - Data collected during the December 2013 tidal surge
    - Most recent extreme sea level dataset (2015)

- **Romney Marsh**
  - Updated in 2017 but further work being undertaken to:
    - Undertake breach modelling at 14 locations
    - Represent the Broomhill Sands defences
    - Undertake further climate change runs

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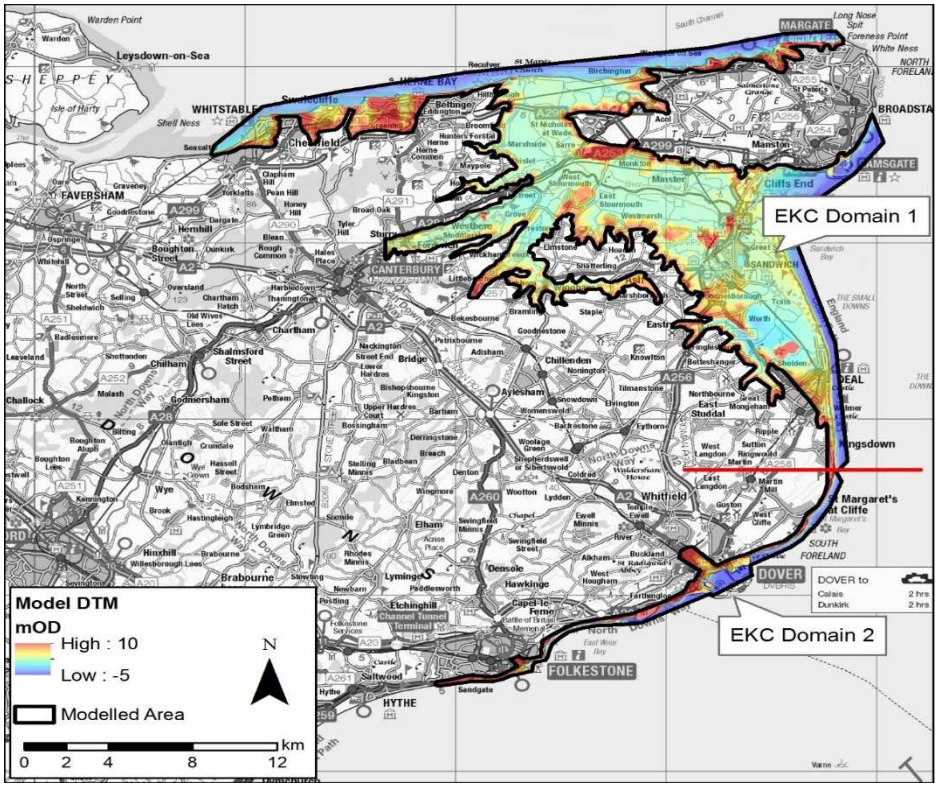
East Kent Coast Model – 2018 study area

- The East Kent coast had not previously been modelled in detail
- Large area split into two models:-
  - Domain 1 – Whitstable to Kingstown
  - Domain 2 – Kingsdown to Sandgate



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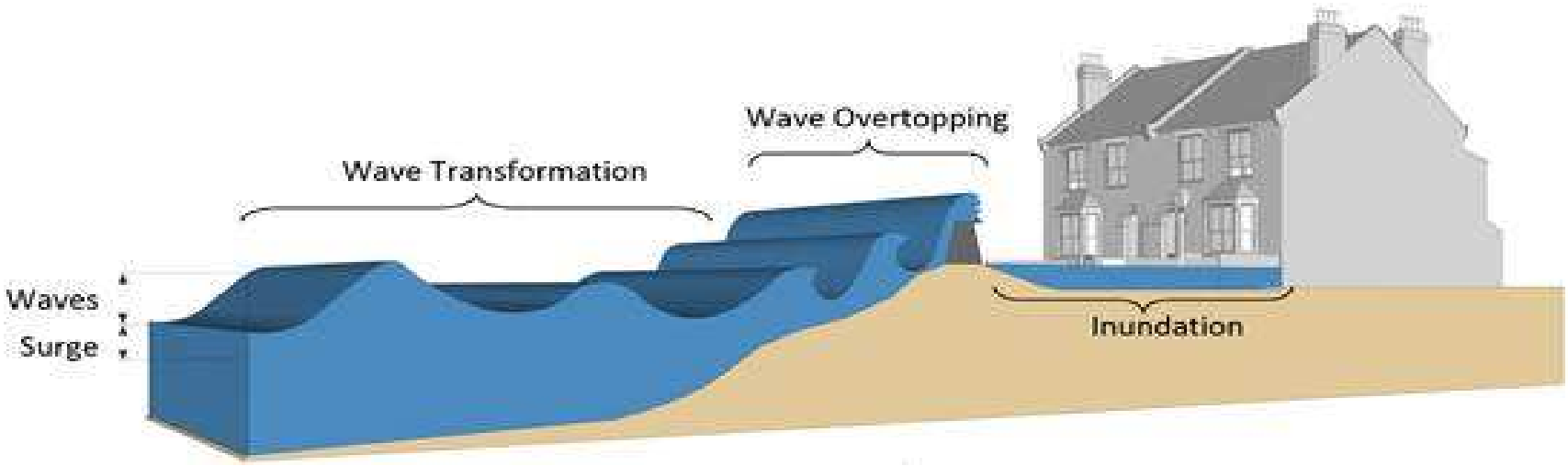
East Kent Coast Model – model build



- No single model is capable of simulating the wave transformation, wave overtopping and flood inundation
- Each process is modelled separately

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East Kent Coast Model – model scenarios

Event (% AEP)	Baseline Scenarios		Additional scenarios		
	Defended	Undefended*	Lower Stour embankment removed	Breach	Secondary breaches
20	✓	✓			
10	✓	✓			
5	✓	✓			✓
3.33	✓	✓			
2	✓	✓		✓	
1.33	✓	✓			
0.5	✓	✓	✓	✓	
0.1	✓	✓			
0.5 + climate change UKCP09 (2070)	✓	✓		✓	
0.5 + climate change UKCP09 (2115)	✓	✓		✓	
0.1 + climate change UKCP09 (2070)	✓	✓			
0.1 + climate change UKCP09 (2115)	✓	✓			
0.5 + climate change NPPF (2070)	✓	✓		✓	✓
0.5 + climate change NPPF (2115)	✓	✓		✓	✓

- **Defended** = extreme sea level and wave action
- **Undefended** = extreme sea level (still water) only NO WAVE ACTION
- In line with national guidance

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East Kent Coast Model – key outputs

- Flood depths and levels
- Velocities
- Flood extents
- Hazard grids
- Animations
- Flood Zones (combines undefended and defended flood extents)
- Areas Benefitting from Defences
- Evaluation of Standard of Protection (SoP) of local defences
- Review of the current Flood Warning Areas and criteria/procedures for flood incident management
- Forecasting tool

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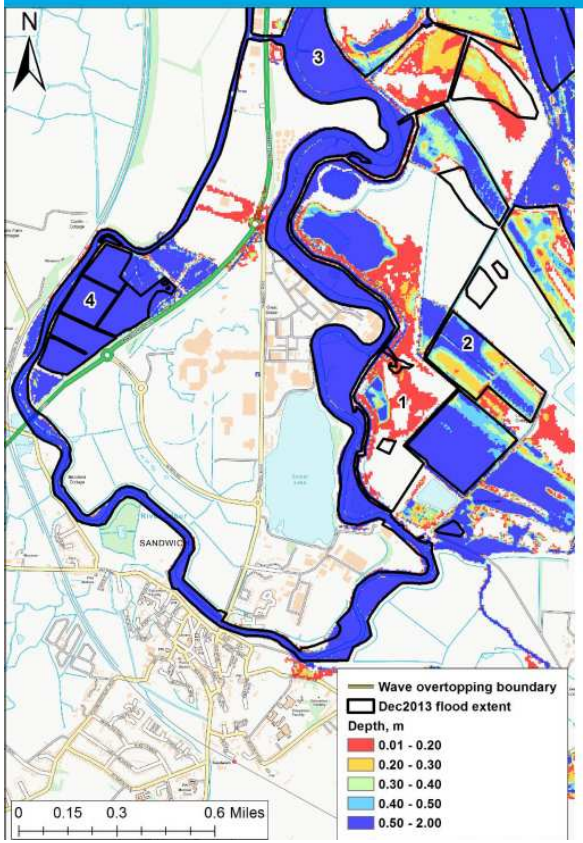
East Kent Coast Model – calibration at Sandwich

- Results calibrated using the December 2013 tidal surge data

Figure 5-3: Sandwich Calibration Modelled Flood Extent




Site Location 1


Site Location 2


Site Location 3


Site Location 4

Photographs supplied by the Environment Agency.
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East Kent Coast Model – calibration at Margate

Site Location 1

Site location 2

Site location 3

Site location 4

Photographs supplied by the Environment Agency.

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East Kent Coast Model - results overview

As a result of this new detailed modelling study:

- 5,768 residential and 714 commercial properties have been removed from flood zone 3.
- 432 residential and 126 commercial properties will now be included in flood zone 3
- 2,064 residential and 243 commercial properties will now be included in the Area Benefitting from Defence (ABD)

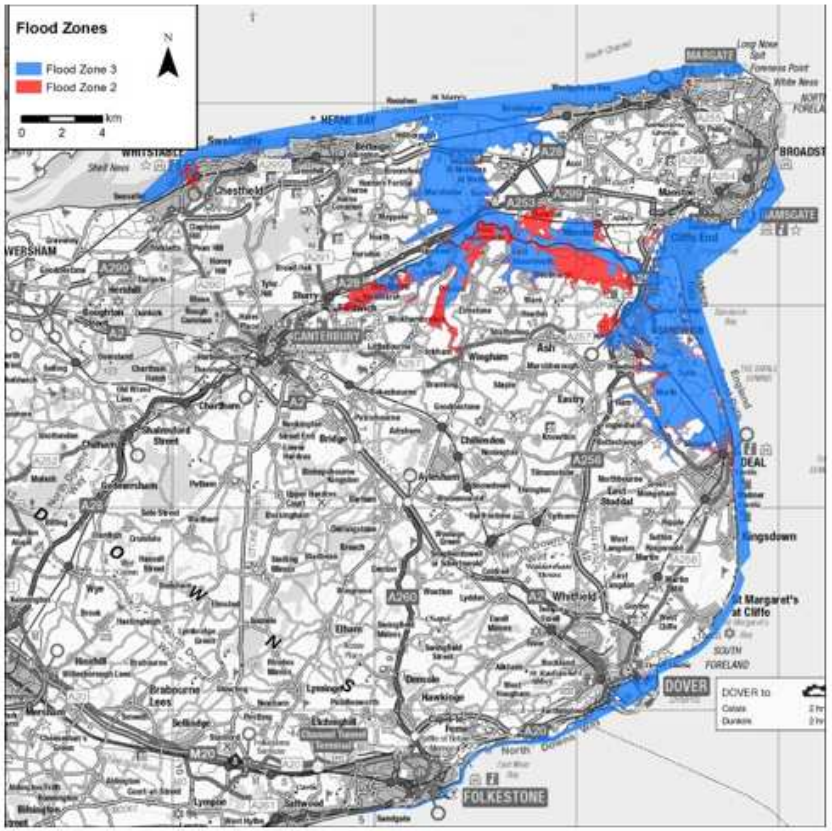

Figure 9-1: Proposed Flood Zone 2 (red) and Flood Zone 3 (blue)

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East Kent Coast Model – why the large change in property at risk numbers?

- Previous modelling had incomplete coverage and used broad scale methods
- This model has used the latest techniques and data including:
  - Latest topographic data
  - Updated defence data
  - Wave overtopping not taken into account previously
  - Roughness value implemented for the floodplain based on landuse/urban areas
  - Smaller grid size

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Model results – Sandwich town tidal defences scheme overview

Sandwich Town Tidal Defences scheme

Reach	Name	Crest level (m AOD)	Spillway level (m AOD)	Notes
		Right bank		
1a	Richborough Roman Amphitheatre	3.8	—	
1	Richborough Rd North	4.0	3.4 (1 in 50 yr)	
2	Richborough Rd South	4.1	—	
3	Gazen Salts	4.2	—	
4	Strand Street	4.15	—	
5	Sandwich Quay	4.2	—	
6	Sandwich Haven	4.4	—	
7	Black Sluice	4.4	—	
8-11	Broad Salts TFRA	4.8	3.8 (1 in 20 yr)	3,000,000 m^3 capacity
		Left bank		
12	Monks Wall Nature Reserve TFRA	4.1	—	
12a	Monks Wall TFRA Spillway		3.2 (1 in 20 yr)	250,000 m^3 capacity
13	Willowbank Development Site	4.2	—	Not part of formal scheme
14	Sandwich Industrial Estate	4.3	—	
15	Stonar Lake	4.4	—	
16	Discovery Park	4.8	—	

The two Tidal Flood Relief Areas (TFRAs) will fill up in 3 successive high tides of a 1 in 200 year event. They will then take a week to drain down.

Broad Salts TFRA (Reach 8-11)

Existing river embankments fronting defences were lowered in 50m intervals to allow better operation of new spillway

Spillway level set to 3.9m AOD, starts to spill in 1 in 20 yr event

Mid embankment within Broad Salts TFRA has a crest level of 3.2m AOD

Remaining embankments have a crest level of 4.8m AOD

Following an event, water drains out through culverts in the embankments

Monks Wall Nature Reserve TFRA (Reach 12 / 12a)

The spillway level varies; the lowest section is set at 3.2m AOD, starts to spill in 1 in 20 yr event

The rear embankment crest level is set to 4.1m AOD

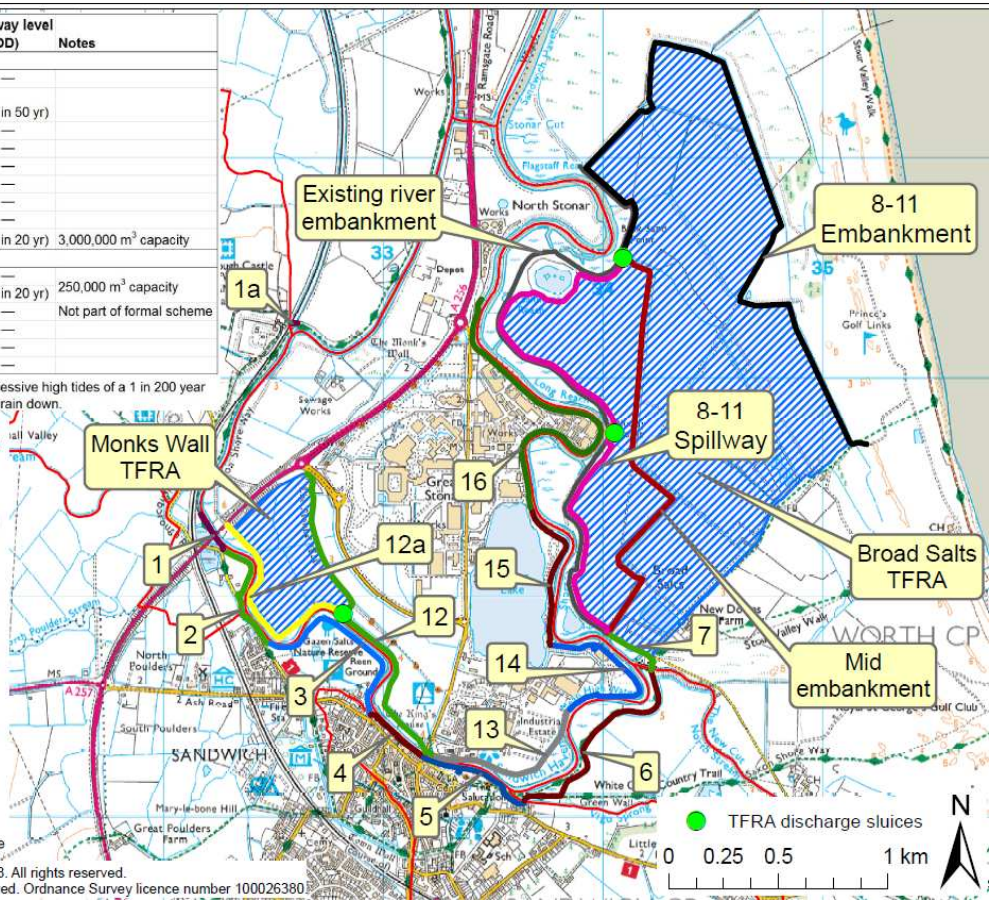
Following an event, water drains out through culverts in the spillway

Richborough Road North (Reach 1)

Although not technically a TFRA, water can flow into the Goshall Marshes via this spillway

Spillway level set to 3.4m AOD, starts to spill in 1 in 50 yr event

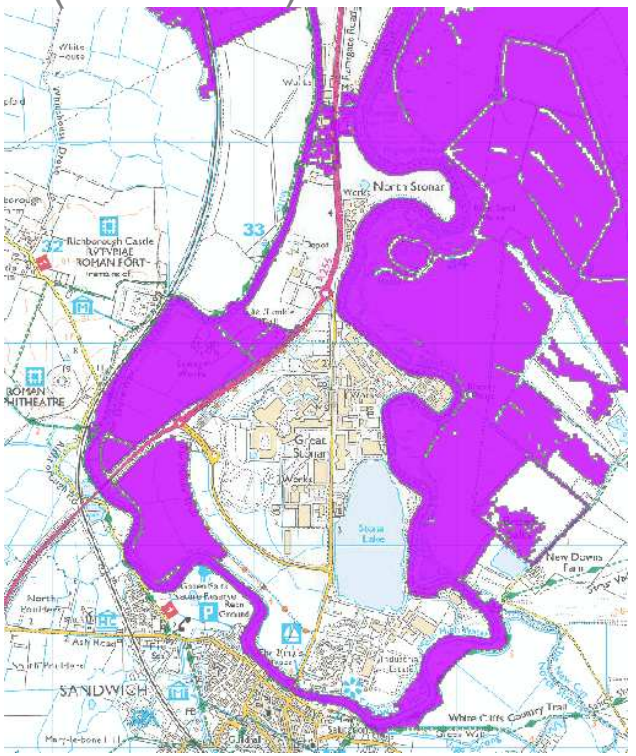
After the event, water then drains back out via Goshall Sluice



Model results – Sandwich undefended and defended scenario

Undefended 200 year (0.5% AEP)

Defended 200 year (0.5% AEP)



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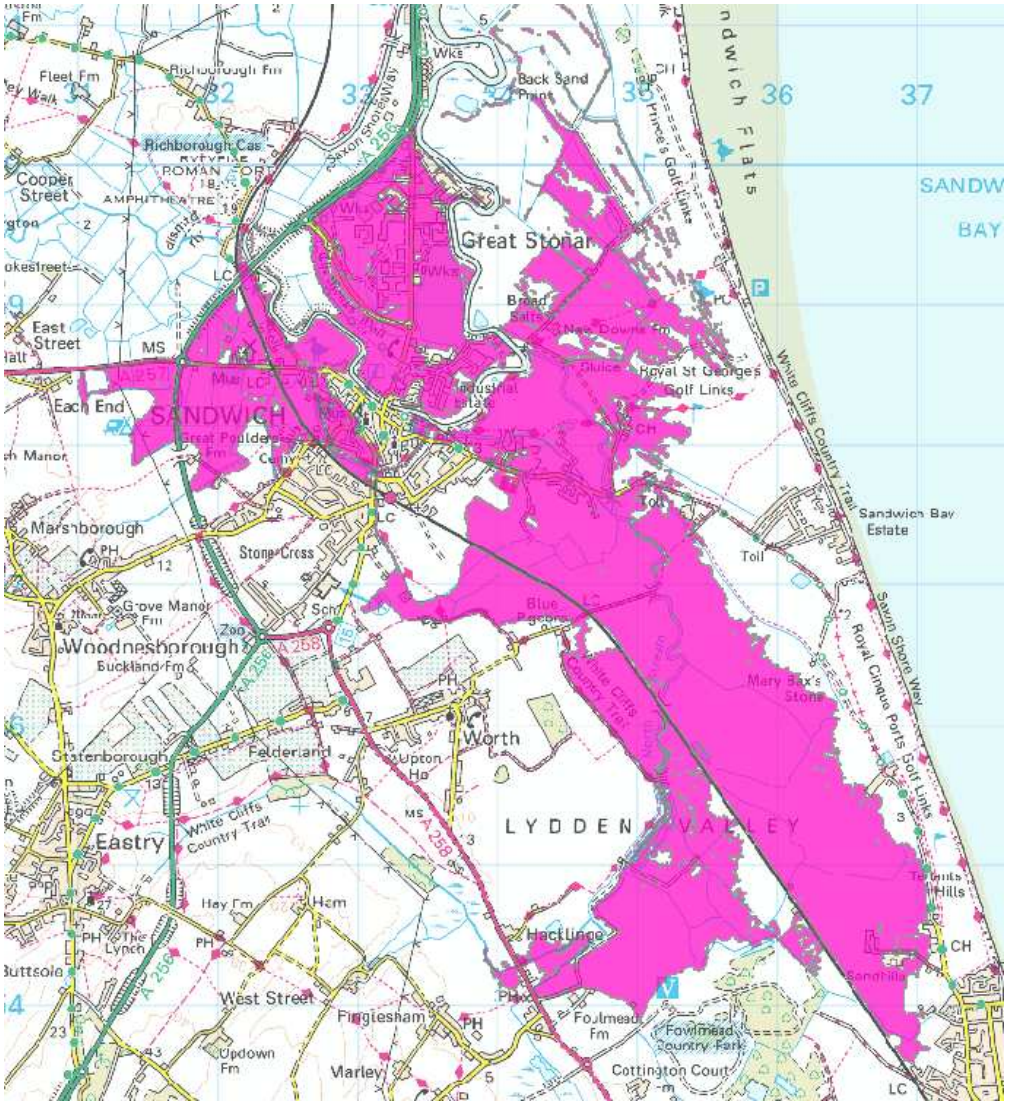
Model results – Sandwich 200 year Area Benefitting from Defences



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Model results – Sandwich animation

Animation for this area showing how the flood propagates for the 200 year (0.5% AEP) defended scenario over 3 tidal cycles

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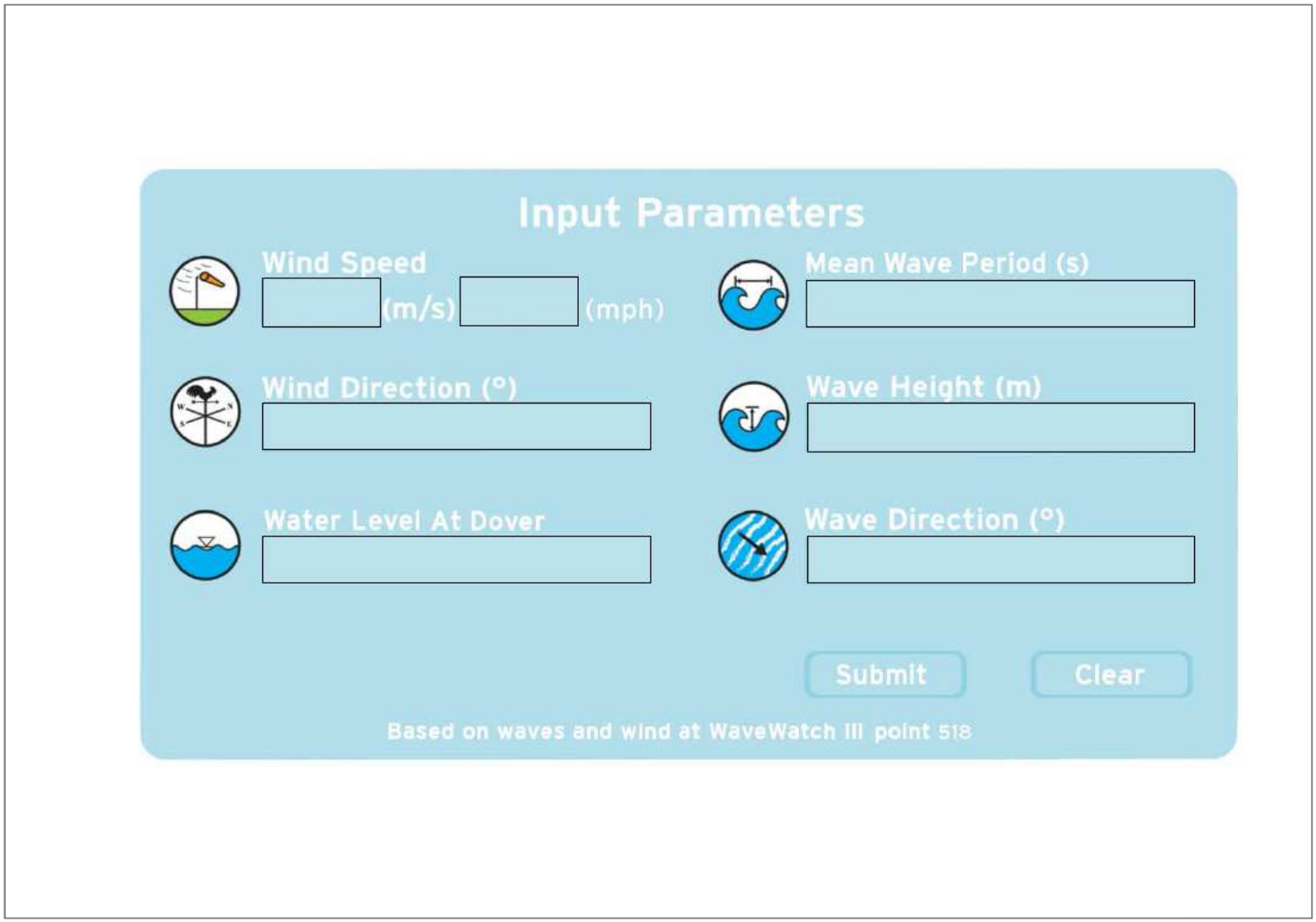
Model outputs - forecoast tool



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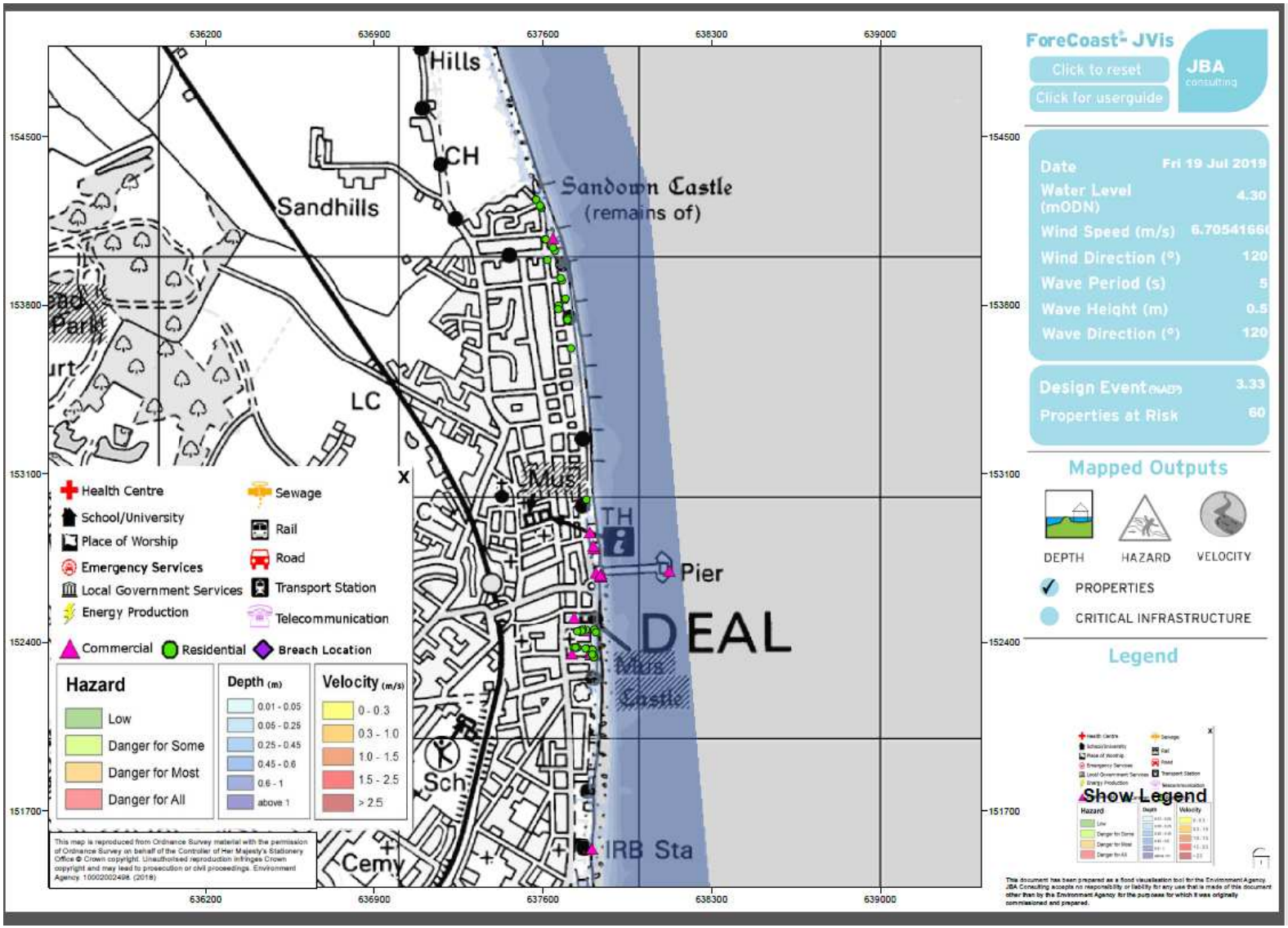
Model outputs - forecoast tool example



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East Kent Coast Model – key considerations

- No account has been taken of combined flood risk - only coastal flooding from tides and waves modelled.
- Wave action only applied to the defended scenarios
- A conservative approach of no infiltration has been taken.
- No surface water drainage or sewer network included
- Model assumes no infiltration into the shingle

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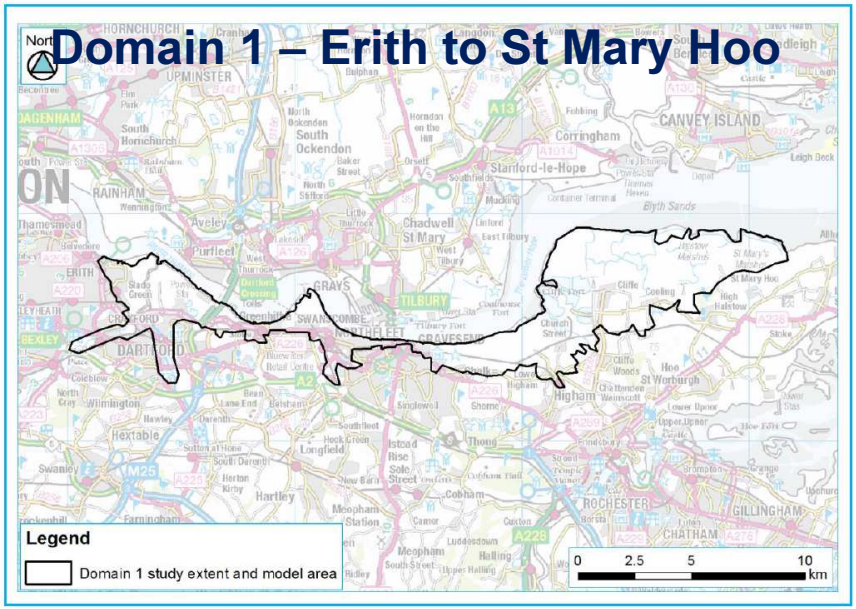
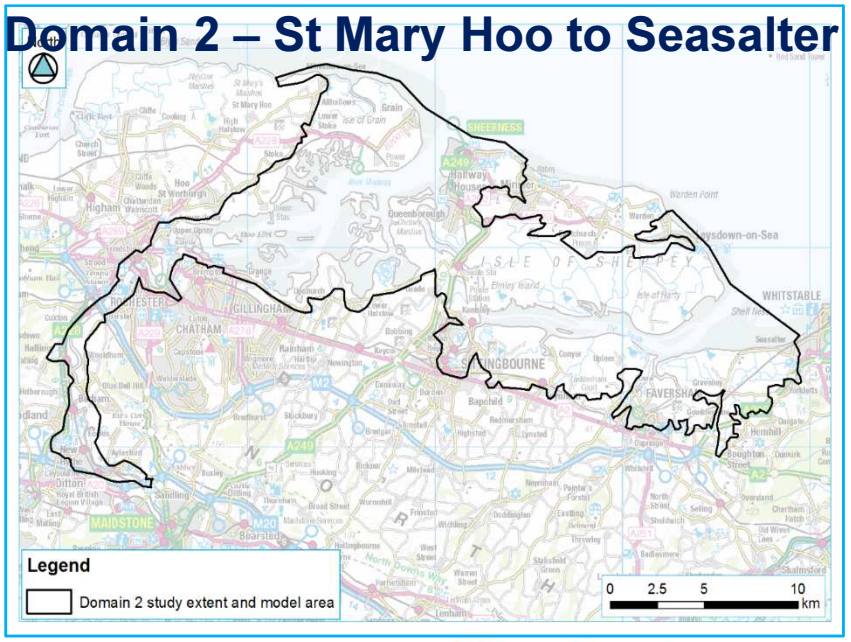
North Kent Coast Model

- Completed in 2013, currently being updated to include:
  - Data collected during the December 2013 tidal surge
  - Most recent extreme sea level dataset (2015)
- Flood map and flood warning areas to be updated by the end of 2019
- Forecasting tool commissioned to assist with incident response
- Model has been independently reviewed as part of a national project





Romney Marsh Model

- Updated in 2017 but further work underway to:
  - Model defence breaches at 14 locations, to inform strategic planning and incident response
  - Represent the Broomhill Sands defences
  - Undertake additional climate change runs
  - Develop a forecasting tool to assist with incident response

Figure 2.1: Romney Marsh study area

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Coastal Modelling – practical applications

- Understanding areas at risk of flooding to plan and prepare
  - Flood map and risk of flooding from rivers and the sea mapping
  - Flood warning areas
  - Incident response procedures

- Development and Planning
  - Strategic planning - SFRAs
  - Site scale - FRAs

- Asset management and scheme development

- Incident Response - data sharing across multi-agency partners

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Thank you for listening…..any questions?

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