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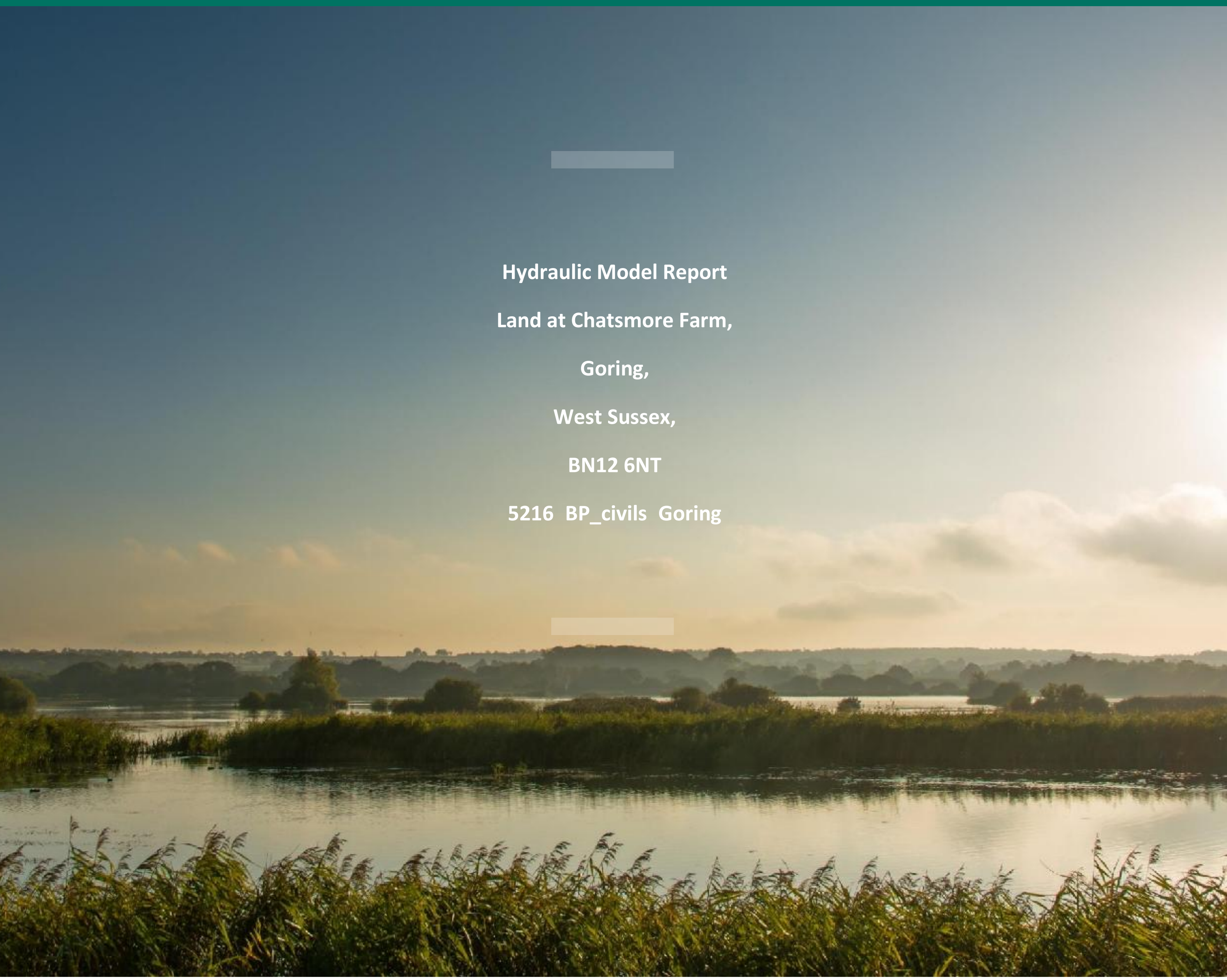

Hydraulic Model Report

Land at Chatsmore Farm,

Goring,

West Sussex,

BN12 6NT

5216 BP_civils Goring

Hydraulic Modelling Report

Project:	Land at Chatsmore Farm, Goring
Prepared for:	BP Civils
Model Scope:	Hydraulic Modelling

Rev.	Date	Purpose	Author	Document Check	Authorisation
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Glossary & Acronyms

AEP	Annual Exceedance Probability is the probability of a rainfall or tidal event occurring within any one year. For example an event of a 100 year return period has an AEP of 1:100 or 1%.
Courant Number	A function of the amount of fluid that crosses the cell in a given time step. For 2d modelling the Courant Number generally needs to be less than 10 and typically around 5 or less for real world applications.
Critical Storm Duration	The duration of a specific storm event which creates the largest volume or highest rate of net storm water runoff for typical durations up to and including the 10 day duration event.
ESTRY	Dynamic flow program suitable for mathematic modelling floods and tides (and/or surges) in a virtually unlimited number of combinations.
Flood Defences	Artificial structures maintained to a set operational level designed to protect land people and property from Tidal and Fluvial flood sources to an established AEP threshold.
Flood Source: Fluvial	When flows within watercourses exceed the capacity of the watercourse causing out of bank flows.
Flood Source: Pluvial	When rainfall causes overland flows which exceed the capacity of the drainage network, causing flooding to land that is normally dry.
Flood Source: Tidal	When high tide events overtop the shoreline to cause flooding to land behind.
Flood Zone 1	Low Probability. Land defined as having a less than 1:1000 AEP of flooding from tidal and fluvial sources.
Flood Zone 2	Medium Probability. Land defined as having a risk of fluvial flooding between 1:100 AEP and 1:1000 AEP. Or Land defined as having a risk of tidal flooding between 1:200 AEP and 1:1000 AEP.
Flood Zone 3 (A)	High Probability. Land defined as having a fluvial risk of 1:100 AEP or greater. Or a tidal risk of 1:200 AEP or greater.
Flood Zone 3 (B)	Functional Floodplain. Defined by SFRA s as areas where floodwater is stored during lower AEP events, typically the 1:20 AEP.
Flood Zone Map	The Environment Agency has produced a mapping data set which covers England and provides the general extents of Flood Zones 1, 2, and 3. However the national data set available online does not differentiate between Flood Zone 3 (A) and 3 (B)
LiDAR	Light Detection And Ranging is an accurate ground terrain model obtained by aerial survey. The typical vertical accuracy is +/ 150 mm, the horizontal spacing of survey points (resolution) is normally 0.5m in city centres, 1m in urban areas and 2m in rural areas.
Main River	Defined on the Main River map and relate to river's on which the Environment Agency have powers to carry out flood defence works
Model Event	The Model Event is the AEP storm or flow profile used within each Model Scenario
Model Scenario	Each Model Scenarios considers a range of Model Events to assess the impact of the Scenario, typical Model Scenarios are; base case, post development, post mitigation.
m AOD	Metres Above Ordnance Datum
OS	Ordnance Survey.
Ordinary Watercourse	A watercourse which does not form part of a Main River
PMF	Probable Maximum Flood
Puddle	The direct rainfall modelling process can result in water being caught between local ridges and depressions creating "puddles" these artefacts are normally the result of subtle changes in the ground data that has been sampled to create the DEM.
SuDS	*Sustainable Drainage Systems*, which are designed to manage surface water flows in order to mimic the Greenfield run-off from an undeveloped site.
TUFLOW	TUFLOW is one dimensional (1D) and two dimensional (2D) flood and tide simulation software. It simulates the complex hydrodynamics of floods and tides using the full 1D St Venant equations and the full 2D free surface shallow water equations.

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Introduction

Appointment & Brief

1. BP Civils commissioned Ambiental Environmental Assessment to undertake numerical hydraulic modelling services to support the proposed development at Chatsmore Farm, Goring (hereafter referred to as the "Site").

Purpose of the Report

2. This report sets out the hydraulic modelling works conducted to date and the methodology from which the model was derived, as well as providing the findings of the modelling.

Background & Context

3. The study area considered by the Hydraulic model is indicated on the 'Hydraulic Model Extents' drawing, provided below, a larger version of all the figures are appended to this document.

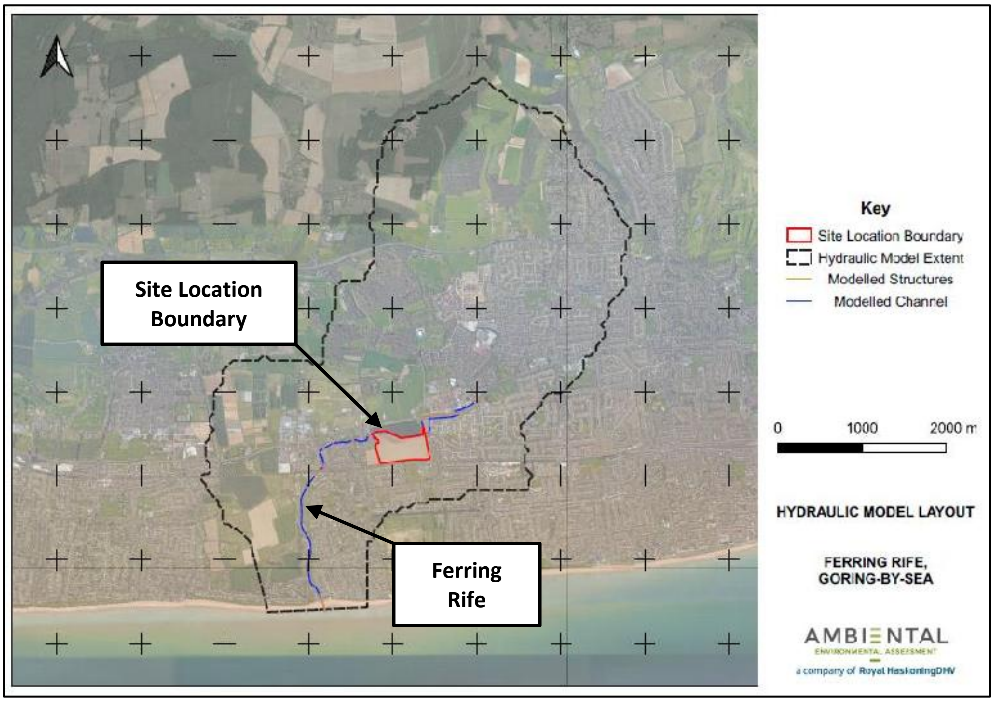

Figure 1: Hydraulic Model Layout

4. The hydrological setting of the Site is summarised below:

   a. The Ferring Rife is the dominant watercourse within the catchment contributing to flooding patterns in the vicinity of the site. The Ferring Rife bounds the proposed development site to the north. It should be noted that Ferring Rife the catchment was determined to be approximately 16.5km^2 in size based on the FEH Web Service.

   b. The English Channel has the potential to tidally influence the catchment. Where the Ferring Rife meets the English Channel, there is an outfall structure consisting of three 900mm diameter uni-directional culverts (flapped culverts). As such, tidal water should not propagate upstream through the Ferring Rife, however, the catchment will be limited in its outlet capacity due to this tidal influence.

5. A Digital Elevation Model has been prepared using OS Terrain50 data, Environment Agency 2m LiDAR, and Environment Agency 1m LiDAR.

Site Inspections

6. Ambiental have attended a site walkover (13/03/2020). The purpose of this site walkover was to verify several structure and material details of the proposed surface water model. The purpose of the hydraulic model is to demonstrate that the development can be delivered in a way that does not increase flood risk to others.

7. In advance of the site visit, Ambiental produced a preliminary TUFLOW model (based on LiDAR and OS Terrain 50 data only) to assist the site walkover and highlight the potential flooding patterns in the vicinity of the site. The preliminary outputs of this model are shown below.

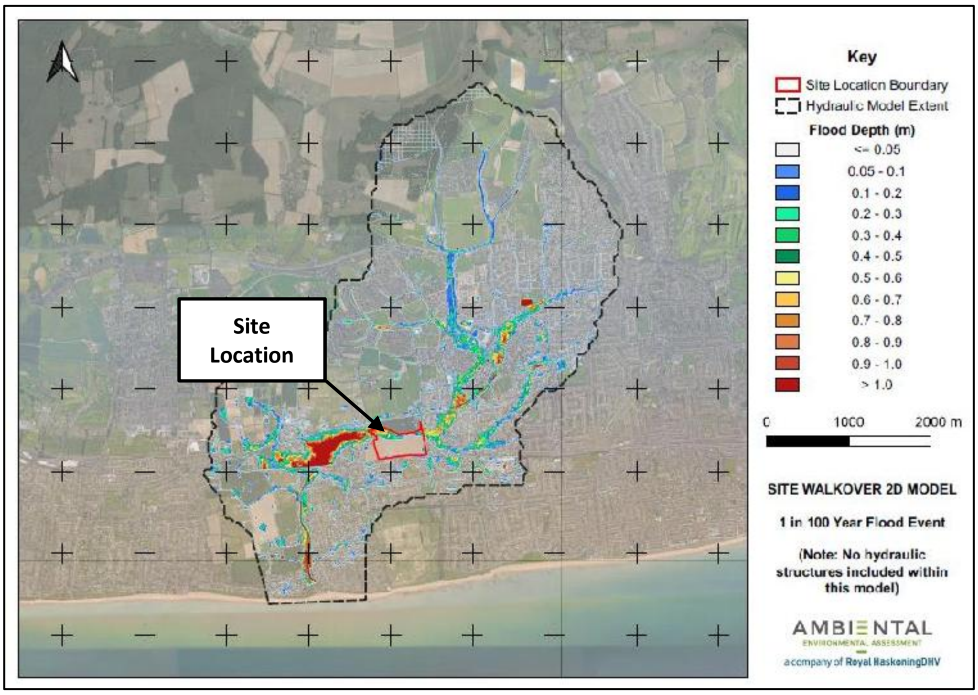

Figure 2: Site Walkover 2D Model – note this model does not include structures / observations from site walkover and shall not be used for determining flood risk in the area.

Methodology

Overview

8. The numerical flood model has been developed using a systematic approach of defining the study area based on the hydrological and hydraulic characteristics of the study area.

Catchment Definition

FEH Catchment Map

9. The FEH web-service (2) provides standardised catchment descriptors for the UK, which enables the national data set to be used to predict the catchment run-off characteristics for most of the UK.

LiDAR Catchment Map

10. LiDAR data obtained from the Environment Agency, has been used to develop a Digital Elevation Model (DEM). This data can then be processed using GIS tools to determine the catchment area. LiDAR data is more accurate than the FEH catchment map, due to the improved accuracy of the underlying ground terrain model.

Preliminary Surface Water Flood Model

11. Through analysis of the preliminary surface water flood model, which Ambiental produced to assist the site walkover, it is possible to determine the broad extents of the catchment contributing to surface water flooding at the site.

Approach Adopted

12. The FEH and LiDAR catchment areas have been compared, and the LiDAR catchment definition has been used to update the FEH Catchment Descriptors.

13. The preliminary surface water flood model was further used to validate this catchment definition.

Hydrological Approach

14. Ambiental utilised the Flood Estimation Handbook (FEH) Web Service to obtain rainfall and catchment data for the site.

15. ReFH2.3 was then used to determine the design rainfall at the site for varying return periods (Appendix B). The direct rainfall return periods assessed are:

    a. 1 in 2 year return period / 50% annual exceedance probability;

    b. 1 in 30 year return period / 3.33% annual exceedance probability;

    c. 1 in 100 year return period / 1% annual exceedance probability;

    d. 1 in 1000 year return period / 0.1% annual exceedance probability;

e. 1 in 100 year return period plus 40% climate change / 1% annual exceedance probability plus 40% climate change.

16. Ambiental assessed five different rainfall storm durations for each of these return periods, namely:

    a. 15 minute storm duration / 0.25 hour storm duration;

    b. 60 minute storm duration / 1 hour storm duration;

    c. 270 minute storm duration / 4.5 hour storm duration;

    d. 360 minute storm duration / 6 hour storm duration;

    e. 720 minute storm duration / 12 hour storm duration.

17. Ambiental also utilised ReFH2.3 to assess the fluvial impact to the proposed development site. The fluvial return periods assessed are:

    a. 1 in 2 year return period / 50% annual exceedance probability;

    b. 1 in 30 year return period / 3.33% annual exceedance probability;

    c. 1 in 100 year return period / 1% annual exceedance probability;

    d. 1 in 1000 year return period / 0.1% annual exceedance probability;

    e. 1 in 100 year return period plus 45% climate change / 1% annual exceedance probability plus 45% climate change;

    f. 1 in 100 year return period plus 105% climate change / 1% annual exceedance probability plus 105% climate change.

18. It was determined that "Net Rainfall"[1] data would be most appropriate for use with the surface water model. This is due to this data accounting for several factors such as the area reduction factor, seasonal variation factor as well as taking into account catchment infiltration parameters. Therefore, the "Net Rainfall" data was utilised for input into the direct rainfall hydraulic model as it provided the most representative design rainfall for the catchment.

19. It should also be noted that the aforementioned "Net Rainfall" factors are also accounted for with the ReFH2.3 flow modelling, enabling a better comparison of the results.

[1] Net Rainfall applies the FEH equations to determine the resultant rainfall that would run-off taking into account the catchment descriptors for the area. The Design Rainfall does not factor for the interception or evaporation of rainfall, and therefore if the Design Rainfall was used, these factors would need to be defined within the rainfall run-off model.

Hydraulic Modelling Approach

20. Based on the study area, and the type of flood dynamics expected within the model, it has been considered to implement a 1D-2D flood modelling regime, using the ESTRY-TUFLOW computational engine.

21. The ESTRY-TUFLOW computational engine has been benchmarked by the Environment Agency (3), and is considered suitable for predicting flood levels, flood depths, flow velocities, and flood hazard ratings, associated with tidal and fluvial flood inundation.

22. Based on experience of development of 1D-2D numerical flood models for assessment of site-specific flood risks, the ESTRY-TUFLOW solver is considered appropriate for the simulation of the baseline scenario, and for testing of potential future mitigation options.

Model Schematisation

1D Domain

Structures

23. The 1D Network represents channels, culverts and bridges, used within the model. Where the data record is incomplete or the survey ambiguous, these elements have been sensitivity tested.

24. The following structures were identified within the topographic channel survey as well as the site walkover. Through analysis of the preliminary surface water model, it was determined that the inclusion of the following structures in the proposed hydraulic model is necessary.

Reference	Type	Width/Diameter (m)	Height (m)	Manning's n	Data Source
GOR_61_B	Bridge	Variable	Variable	Variable	Feb 2020 Channel Survey
GOR_47_B	Bridge	Variable	Variable	Variable	Feb 2020 Channel Survey
GOR_28_B	Bridge	Variable	Variable	Variable	Feb 2020 Channel Survey
GOR_4	Circular Culvert	0.9	N/A	0.025	Site Walkover (13/03/2020)
GOR_124	Rectangular/Box Culvert	2.41	1.22	0.025	Feb 2020 Channel Survey
GOR_59	Rectangular/Box Culvert	2.68	1.71	0.025	Feb 2020 Channel Survey
GOR_43_B	Rectangular/Box Culvert	2.06	1.38	0.025	Feb 2020 Channel Survey
GOR_32	Rectangular/Box Culvert	4	2.16	0.025	Feb 2020 Channel Survey
GOR_13	Rectangular/Box Culvert	4.78	1.78	0.025	Feb 2020 Channel Survey
GOR_11	Rectangular/Box Culvert	2.71	1.78	0.025	Feb 2020 Channel Survey
GOR_2	Rectangular/Box Culvert	4	2.3	0.025	Network Rail Asset Data
GOR_1	Unidirectional Circular Culvert	3 No. 0.9	N/A	0.025	Site Walkover (13/03/2020)
GOR_42_W	Weir	N/A	N/A	0.025	Feb 2020 Channel Survey
GOR_36_W	Weir	N/A	N/A	0.025	Feb 2020 Channel Survey
GOR_25_W	Weir	N/A	N/A	0.025	Feb 2020 Channel Survey

Reference	Type	Width/Diameter (m)	Height (m)	Manning's n	Data Source
GOR_22_W	Weir	N/A	N/A	0.025	Feb 2020 Channel Survey
GOR_17_W	Weir	N/A	N/A	0.025	Feb 2020 Channel Survey

Table 1: Schedule of Culverts and Bridges within the numerical flood model.

25. Several structures were of particular interest due to both their proximity to the proposed development site, and their impact on flooding patterns in the vicinity of the proposed development site. These structures include:

- GOR_1 (Ferring Rife Outfall Structure)
    - Ambiental measured the culverts contained within this outfall structure to be 3 off 900mm circular culverts.

Figure 3: Upstream Face of GOR_1

Figure 4: Downstream Face of GOR_1

    - Ambiental noted the presence of uni-directional flap valves on the outlet of these culverts. As such, this structure has been modelled as three uni-directional circular culverts to represent tidal floodwater being held back by these valves.

- GOR_2 (Network Rail Box Culvert)
    - Ambiental measured the width and height of this structure at the downstream face. It was not possible to measure the upstream face of the structure due to access constraints. As such, the dimensions of the structure were assumed to be uniform throughout.

Figure 5: Upstream Face of GOR_2

Figure 6: Downstream Face of GOR_2

    - Ambiental later received Network Rail Asset Data (Appendix C) relating to the structure. This confirmed the structure dimensions which Ambiental measured on site.

2D Domain

26. The 2D domain has been developed using Environment Agency LiDAR data.

27. The two-dimensional grid size used on this hydraulic model was 4 metres, which is considered suitable due to the size of the floodplain, and features being considered.

Digital Elevation Model

28. The Digital Elevation Model has been developed from a number of sources of ground terrain data sources, as follows:

    a. OS Terrain50 Topographic Data;

    b. Environment Agency LiDAR data (2m resolution);

    c. Environment Agency LiDAR data (1m resolution).

Boundary Conditions

29. The boundary conditions represent the inflow and outflow conditions around the edge of the modelled domain. The purpose of the boundary condition is to simulate the flood flows outside of the area under consideration. For the purpose of this assessment, a tidal water level vs time boundary has been utilised at the outlet of the model. The tidal mean high water spring (TMHWS) curve was determined to be the most appropriate downstream boundary condition for this assessment (Appendix C).

Surface Roughness

30. Definition of surface roughness within the floodplain is important, especially for areas of shallow flow, where the roughness factor of the ground can have an impact on the flow velocity due to the impacts of friction.

31. The land use classification has been determined by the use of Ordnance Survey ZoomStack Data (6). The Ordnance Survey ZoomStack Topography layer provided a detailed view of Great Britain's landscape, including; roads, fields, buildings, trees, paths, etc.

32. ZoomStack includes feature codes which delineate the types of ground surface, these feature codes have been used to determine appropriate surface roughness values with reference to the work of Chow (7), Table 2 provides the feature codes and surface roughness values used.

ZoomStack Feature Code	Manning's Roughness 'n'	Description
999	0.045	General surface (Default)
101	0.060	Urban Areas
102	0.035	Greenspace
103	0.080	Woodland
104	0.020	Surface Water
105	0.050	Foreshore
106	0.020	Waterlines
107	0.040	Buildings

ZoomStack Feature Code	Manning's Roughness 'n'	Description
108	0.025	Roads

Table 2: Definition of Surface Roughness Values with respect to ZoomStack data and Chow.

Infiltration Parameters

33. Infiltration parameters were not included within the hydraulic modelling for the 2D floodplain as the effect of infiltration is included within the hydrological model in determining both the fluvial input hydrograph as well as the pluvial "Net Rainfall" input.

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Assumptions and Limitations

Assumptions

34. In developing numerical hydraulic models, it is necessary to include certain assumptions due to ambiguity in the data, and underlying parameters, such as infiltration potential across a catchment. The key assumptions made as part of this numerical model are:

    a. The Digital Elevation Model has been derived from filtered Environment Agency LiDAR, it is assumed that this data is representative of the topography.

    b. Some culvert / structure data has been derived from site inspection. It has been assumed that structure invert levels estimated from site measurements are representative.

    c. 2D surface roughness values have been assumed based on Ordnance Survey ZoomStack data. Verification of roughness areas has been undertaken, using online aerial photography and site visits.

    d. All structures in the model were assumed to be free and clear of debris in the Baseline model runs. Sensitivity testing was carried out as part of an assessment of blockage.

Limitations

35. The following limitations of the hydraulic model should be noted:

    a. The numerical flood model has been produced to determine the flood risk profile on the project site, and should not be used by third parties to assess flood risk elsewhere in the model domain.

    b. The model has been tested on normal design storms only, due to the complexity and variability of real storm events, the flood risk profile determined by this model is a prediction only.

Model Condition

Overview

36. In order to provide an assessment of the condition of the model, a range of indicators have been reviewed, including undertaking sensitivity testing on a range of input variables of the model.

37. Calibration of the model is important to ensure that the model schematisation accurately represents the system being modelled. Calibration data is not always available; and, in such circumstances, greater emphasis should be put on understanding the model sensitivity and model uncertainties.

Significant Issues

38. In the development of this numerical flood model, no significant issues have been determined. The model runs within normal operating parameters, and the outputs have been visually verified with topographic data.

39. Analysis of the mass balance for the pluvial 100 year plus 40% climate change event indicates that the TUFLOW mass balance is within the typical +/-2% limits. Additionally, TUFLOW indicates that there were no negative depths within this simulation.

Calibration

40. Calibration is the adjustment of a model's parameters, such as roughness, and hydraulic structure co-efficients, so that it reproduces observed data to an acceptable accuracy.

41. No calibration data was available for the model and therefore calibration has not been undertaken. Consequently, only sensitivity testing was undertaken on key model parameters.

Sensitivity Testing

42. Sensitivity analysis should be undertaken to develop an understanding of the relationship between key input factors, especially when assumptions have had to be made. Sensitivity analysis reveals which parameters the model most depends upon for its accuracy.

43. To understand the influence of the above assumptions and limitations on the model results and consequently, the confidence that can be associated with them, sensitivity tests have been undertaken. As such, a sensitivity test which applies a 50% blockage to the modelled structures has been included.

44. Additionally, a sensitivity test of the storm duration was conducted. As such, five storm durations (15min, 60min, 270min, 360min, 540min and 720min) were assessed to test the sensitivity of the catchment to storm duration.

Model Conclusions

45. Upon review of the model results (Appendix A), Ambiental found that the critical storm duration for the site is the 720 minute / 12 hour storm. This is likely due to the surface water (pluvial) flooding patterns in the vicinity of the site being storage driven, rather than flow or velocity driven.

46. The maximum out-of-bank flood depth experienced on site during the fluvial 1 in 100 year plus 45% climate change event is less than 300mm (approximately 280mm).

47. Similarly, the maximum flood depth experienced on site during the pluvial (surface water) 1 in 100 year plus 40% climate change event is less than 300mm (also approximately 280mm).

48. The similarity in fluvial and pluvial results is likely due to the catchment contributing flooding patterns at the site being relatively small (16.5km^2). As such, pluvial and fluvial flooding patterns will likely be of similar magnitude/extent. It should be noted that the majority of the proposed development site is unaffected by flood water in both the fluvial and pluvial design events.

49. A comparison of the modelled 1 in 100 year and 1 in 1000 year flood extents with the EA Flood Zones is shown below.

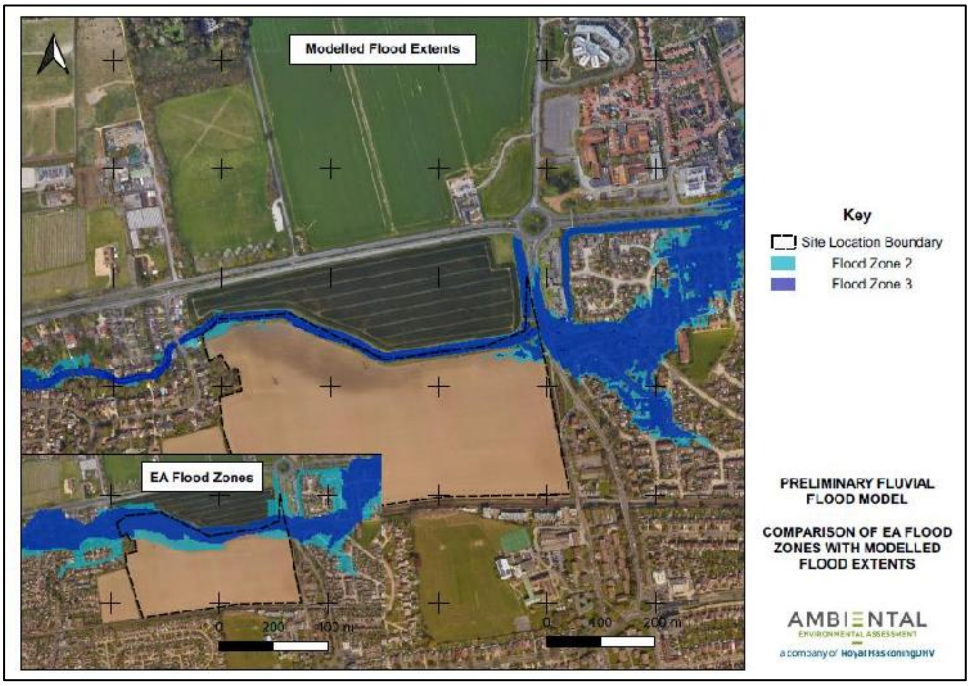

Figure 7: Comparison of EA Flood Zones with Modelled Flood Extents

50. Therefore, the proposed development is unlikely to significantly impact fluvial and pluvial flooding patterns in the vicinity of the site.

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Appendix A: Fluvial and Surface Water Flood Mapping

Key

Site Location Boundary

Flood Depth (m)

	<= 0.05
	0.05 - 0.1
	0.1 - 0.2
	0.2 - 0.3
	0.3 - 0.4
	0.4 - 0.5
	0.5 - 0.6
	0.6 - 0.7
	0.7 - 0.8
	0.8 - 0.9
	0.9 - 1.0
	> 1.0

PRELIMINARY DIRECT RAINFALL FLOOD MODEL

1:2 Year Flood Event
720 Minute Storm

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Key

Site Location Boundary

Flood Depth (m)

Flood Depth (m)
<= 0.05
0.05 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
> 1.0

PRELIMINARY DIRECT RAINFALL FLOOD MODEL

1:30 Year Flood Event
720 Minute Storm

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Key

Site Location Boundary

Flood Depth (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0

PRELIMINARY DIRECT RAINFALL FLOOD MODEL

1:100 Year Flood Event
720 Minute Storm

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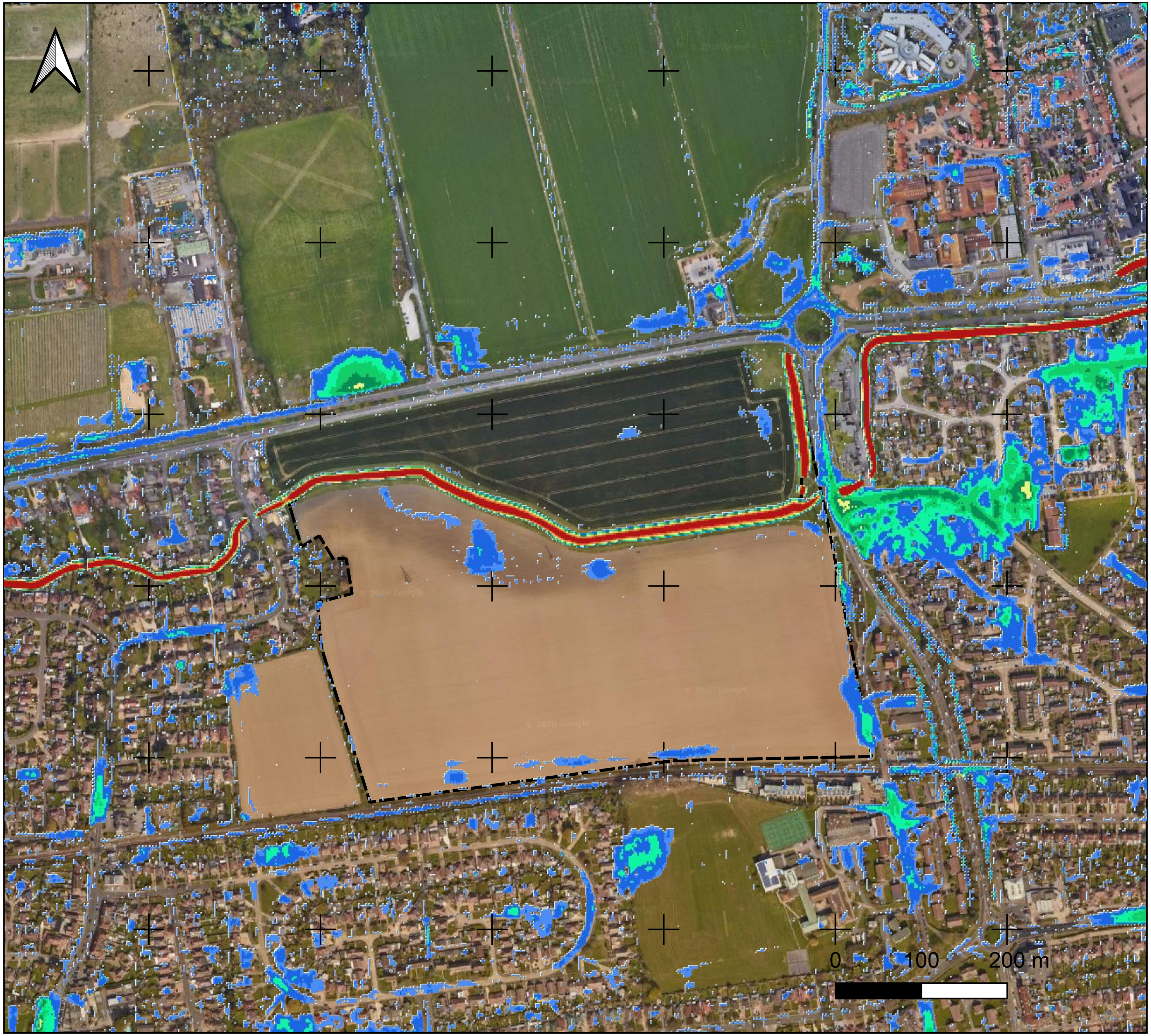

Key

Site Location Boundary

Flood Depth (m)

	<= 0.05
	0.05 - 0.1
	0.1 - 0.2
	0.2 - 0.3
	0.3 - 0.4
	0.4 - 0.5
	0.5 - 0.6
	0.6 - 0.7
	0.7 - 0.8
	0.8 - 0.9
	0.9 - 1.0
	> 1.0

PRELIMINARY DIRECT RAINFALL FLOOD MODEL

1:1000 Year Flood Event
720 Minute Storm

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Key

Site Location Boundary

Flood Depth (m)

<= 0.05

0.05 - 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

0.5 - 0.6

0.6 - 0.7

0.7 - 0.8

0.8 - 0.9

0.9 - 1.0

> 1.0

PRELIMINARY DIRECT RAINFALL FLOOD MODEL

1:100 Year plus 20% Climate Change Flood Event 720 Minute Storm

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Key

Site Location Boundary

Flood Depth (m)

<= 0.05
0.05 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
> 1.0

PRELIMINARY DIRECT RAINFALL FLOOD MODEL

1:100 Year plus 40% Climate Change Flood Event 720 Minute Storm

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Key

Site Location Boundary

Flood Depth (m)

Flood Depth (m)
<= 0.05
0.05 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
> 1.0

PRELIMINARY FLUVIAL FLOOD MODEL

1:2 Year Flood Event
720 Minute Storm

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Key

Site Location Boundary

Flood Depth (m)

Flood Depth (m)
<= 0.05
0.05 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
> 1.0

PRELIMINARY FLUVIAL FLOOD MODEL

1:30 Year Flood Event
720 Minute Storm

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Key

Site Location Boundary

Flood Depth (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0

PRELIMINARY FLUVIAL FLOOD MODEL

1:100 Year Flood Event
720 Minute Storm

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Key

Site Location Boundary

Flood Depth (m)

<= 0.05
0.05 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
> 1.0

PRELIMINARY FLUVIAL FLOOD MODEL

1:1000 Year Flood Event
720 Minute Storm

AMBIENTAL
ENVIRONMENTAL ASSESSMENT
a company of Royal HaskoningDHV

Key

Site Location Boundary

Flood Depth (m)

<= 0.05
0.05 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
> 1.0

PRELIMINARY FLUVIAL FLOOD MODEL

1:100 Year plus 45% Climate Change Flood Event 720 Minute Storm

AMBIENTAL
ENVIRONMENTAL ASSESSMENT
a company of Royal HaskoningDHV

Key

Site Location Boundary

Flood Depth (m)

Flood Depth (m)
<= 0.05
0.05 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
> 1.0

PRELIMINARY FLUVIAL FLOOD MODEL

1:100 Year plus 105% Climate Change Flood Event 720 Minute Storm

AMBIENTAL ENVIRONMENTAL ASSESSMENT

a company of Royal HaskoningDHV