New Salts Farm Road, Shoreham Modelling Report

Final Report

March 2017

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Revision History

Revision Ref / Date Issued	Amendments	Issued to
Version 1.0 (February 2017)	Draft	Andrew Picton
Version 2.0 (March 2017)	Final - update Appendix	Andrew Picton

Contract

This report describes work commissioned by Andrew Picton from Tully De'ath Consultants on behalf of Hyde Housing Association Ltd, by an email dated 02/11/2017. Aaron Barber, Ffion Wilson and Jack Southon of JBA Consulting carried out this work.

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Purpose

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JBA Consulting has no liability regarding the use of this report except to Hyde Housing Association Ltd.

Acknowledgements

We would like to acknowledge and thank Andrew Picton and Julian Turner from Tully De'ath Consultants as well as Environment Agency for their provision of the relevant information required for this assessment

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JBA is aiming to reduce its per capita carbon emissions.

Contents

List of Figures

1 Introduction

JBA Consulting was appointed by Andrew Picton from Tully De'ath to prepare a Flood Risk Modelling Report to support the assessment of fluvial flood risk to New Salts Farm Road, Shoreham.

The above referenced site was identified as a potential strategic development site for residential purposes within Adur District Council's emerging 2016 Local Plan. Hyde Housing Association Ltd have proposed to develop the agricultural area between New Salts Farm and the Hasler Estate to provide a new residential area in five phases.

A hydraulic model was required to refine the understanding of current and future flood risk to the site and identify the effect of possible mitigation measures that could be implemented within the site's existing drainage system known as the Lancing Brooks. The hydraulic modelling will be used to inform the Flood Risk Assessment (FRA) for the site (to be prepared by others).

2 Hydraulic modelling

An existing 1D ISIS model of the area had been developed to inform the 2015 Surface Water Management Plan. This model was based on cross section topographical survey and run for steady state flow estimates that did not appear to be based on any recognised method of flow estimation. The model was not suitable for the purposes of supporting a site-specific Flood Risk Assessment. Therefore, a new model and new hydrology was required. To this end a new model was development in InfoWorks ICM based on open LiDAR data and river sections were taken from the 1D Lancing Brook ISIS Model. Direct rainfall inflows for the hydraulic model have been derived based on the Environment Agency's flood estimation guidelines (Version 5, 2015). An FEH Calculation Record can be found in Appendix A.

2.1 Catchment boundary

The catchment boundary was based on two neighbouring FEH catchments which are located within in the proposed development site. These are identified as the south-western and south-eastern FEH catchments in Figure 2-1 below. The entire Lancing Brooks catchment was not used as it was considered too large an area and may not represent the sites characteristics as accurately..

From review of channel gradients and flow direction in the existing ISIS model it was identified that a number of channels drained away from the site to the north. Additionally, the northern FEH catchment, illustrated in Figure 2-1, drains to the north-east as illustrated by the coloured nodes. Therefore, the northern FEH Catchment was not considered as representative of the development site characteristics as the south-eastern and south-western FEH Catchments.

The Lancing SWMP indicates that surface water runoff from the A27 drains via a series of outfalls into the Lancing Brooks. However, this will flow south and eastwards from the A27 into the Northern catchment area shown in Figure 2-1. As the outflow for this FEH catchment is approximately 1km to the north-east of the site, the outflow from the A27 was not considered in the model.

The catchment area used was sensitivity tested - details of this testing and further details of the direct rainfall methodology can be found in the accompanying FEH Calculation record.

Figure 2-1: FEH catchments in proximity to the site draining to their respective colour nodes

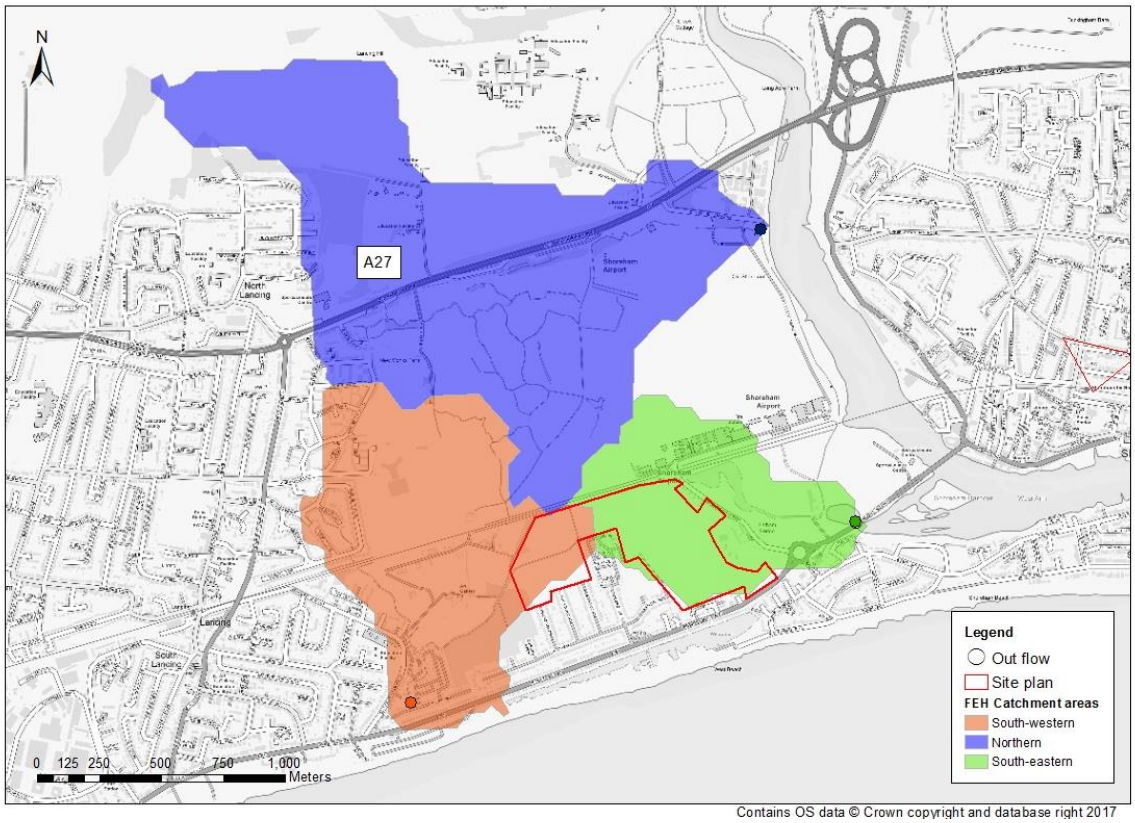
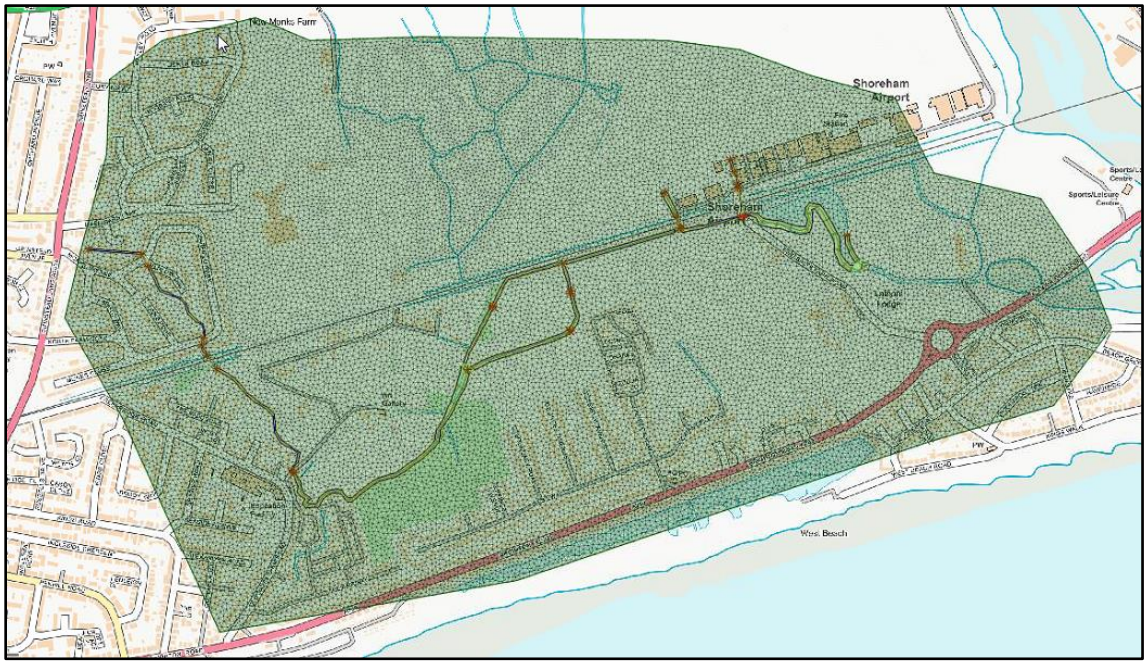


Figure 2-2 below shows the extent of the model 2D domain and 1D channel elements.

Figure 2-2: Extent of the modelled 2D domain and 1D channel elements



2.2 Return periods

The model was run for a range of baseline conditions for the following return periods:

- 100-year (1% AEP)
- 1000-year (0.1% AEP)
- 100- year (1% AEP) + 20% climate change

- 100-year (1% AEP) + 40% climate change

In February 2016 new climate change guidance was published by the Environment Agency (Flood risk assessments: climate change allowances) to support the assessment of flood risk in line with National Planning Policy Framework (NPPF) which sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change.

The climate change allowances are predictions of anticipated change for peak river flow by river basin district and peak rainfall intensity.

They are based on climate change projections and different scenarios of carbon dioxide (CO2) emissions to the atmosphere. There are different allowances for different epochs or periods of time over the next century.

To inform the Flood Risk Assessment we have, in line with Table 2 of the updated climate change guidance, applied the a 20% and 40% uplift to account for the "Central" and "Upper End" respectively to represent the anticipated changes in extreme rainfall intensity in small catchments for the 2080s epoch (2070 to 2115)

https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

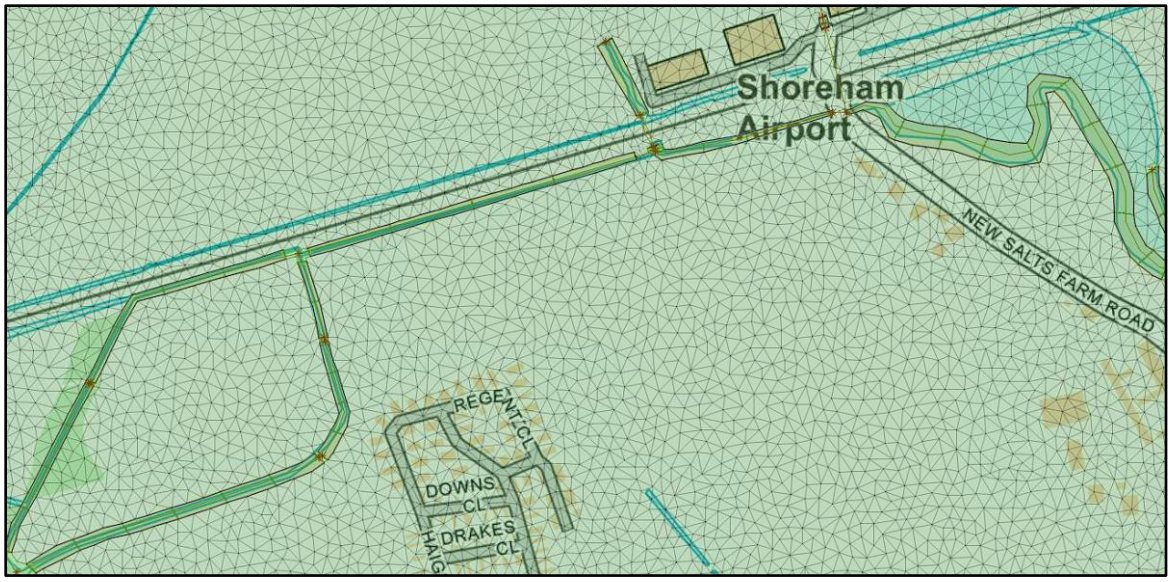
2.3 Scenario testing

The model was then used to test various scenarios. These scenarios were:

- **Baseline**: This is considered to represent the existing topographic situation.

Figure 2-3 below shows a section of the baseline model between New Salts Farm Road and Windsor Way.

Figure 2-3: Section of the baseline model between New Salts Farm Road and Windsor Way



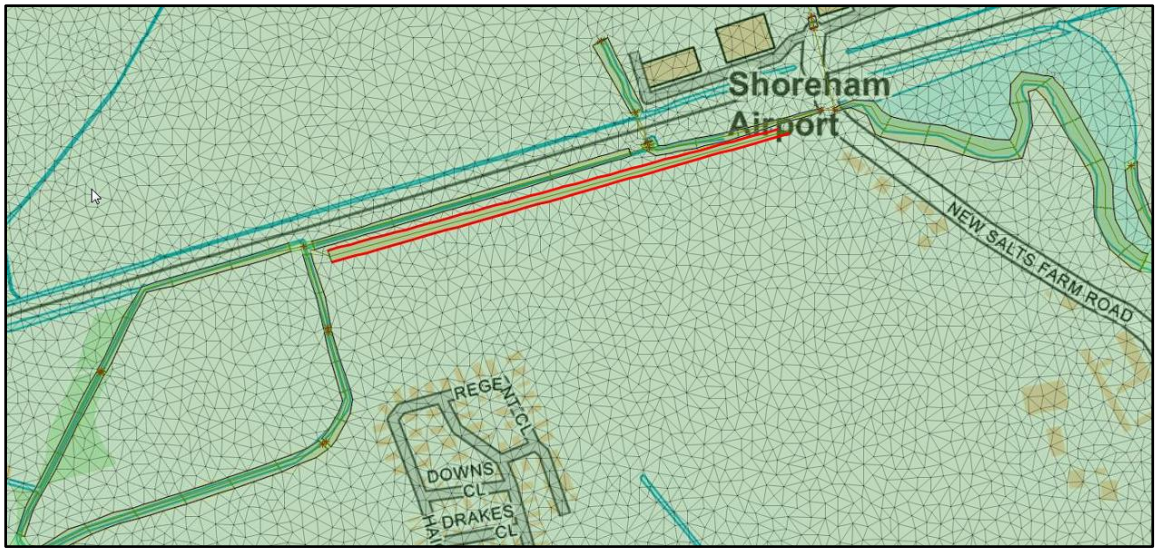
- **NSFR V1**: Increase the size of the bridge under New Salts Farm Road from a 950mm circular culvert to a 3700mm(w) by 1000mm(h) rectangular culvert.
- **NSFR V2:** Increase the size of the bridge under New Salts Farm Road from a 950mm circular culvert to a 4000mm(w) by 1500mm(h) rectangular culvert.

Figure 2-4 below highlights (in red) the bridge under New Salts Farm Road that is amended in scenarios NSFR V1 and NSFR V2.

Figure 2-4: Location of the bridge under New Salts Farm Road

- **Swale**: Using a 'corridor' of land to provide a new channel (highlighted in red on Figure 2-5 below) which connects the ditch towards the western end of the site and flows back into the existing channel on the eastern boundary of the site just upstream of the bridge.

Figure 2-5: Swale location



- **Tide lock**: Re-run the above scenarios assuming the outfall is tide locked for the duration of the event.

3 Results

The results of the model were converted into .shp files and then represented within maps produced in ArcGIS v10.4. Two versions of the maps were produced:

- Version 1: Raw depth data
- Version 2: Hazard and depth maps which excluded flooding with a Hazard less than 0.575m in line with the national updated Flood Map for Surface Water Guidance

Appendices

A FEH Calculation Record

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