

Hydraulic Model User Report: Wombwell

Final Report

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Introduction

This model user report provides a detailed record of the model build of an ISIS-TUFLOW model for Bulling Dike for the purposes of wetland design and flood risk mapping. It also provides details of QA and validation checks as well as running the model in the future. It complements the information in the main report which gives general information on the model, the study area and objectives of the commission.

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Revision History

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Draft copy April 2015	-	Jeff Lunn 1 digital copy
Final – October 2015	Further work	Jeff Lunn 1 digital copy
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Contents

1.	Introduction	2
1.1	Aim of modelling	2
1.2	Previous work	2
1.3	Report structure	3
2.	Review of Existing Model	4
2.1	Existing model	4
2.2	Existing model - review.....	4
2.3	Proposed changes	5
3.	Modelling approach	7
3.1	Modelling rationale.....	7
3.2	Available data	7
3.3	Model build-up	8
4.	Overview	9
4.1	Overview of models	9
4.2	2D Topographic modifications	12
5.	Structures	13
5.1	General procedures for all structures	13
5.2	New structures.....	13
5.3	Check survey comparison	14
6.	Model modifications for scenario runs	17
6.1	Summary of proposed scheme.....	17
6.2	1D modifications	17
6.3	2D modifications	18
7.	Sensitivity testing	20
7.1	Further model testing.....	24
8.	Model performance	28
8.1	Run times.....	28
8.2	Known start-up checks and warnings	28
8.3	Negative depths.....	28
8.4	Performance measures	28
8.5	Robustness.....	29
9.	Model simulations	30
9.1	Calibration/validation	30
9.2	Explanation of TUFLOW model file types.....	33
9.3	Baseline model runs	33
	Introduction	34
	Initial modelling updates	34
	River Dove - model updates	34
	Bulling Dike - model updates	34
	Limitations of model updates	34
	Conclusion and findings of initial modelling updates	35

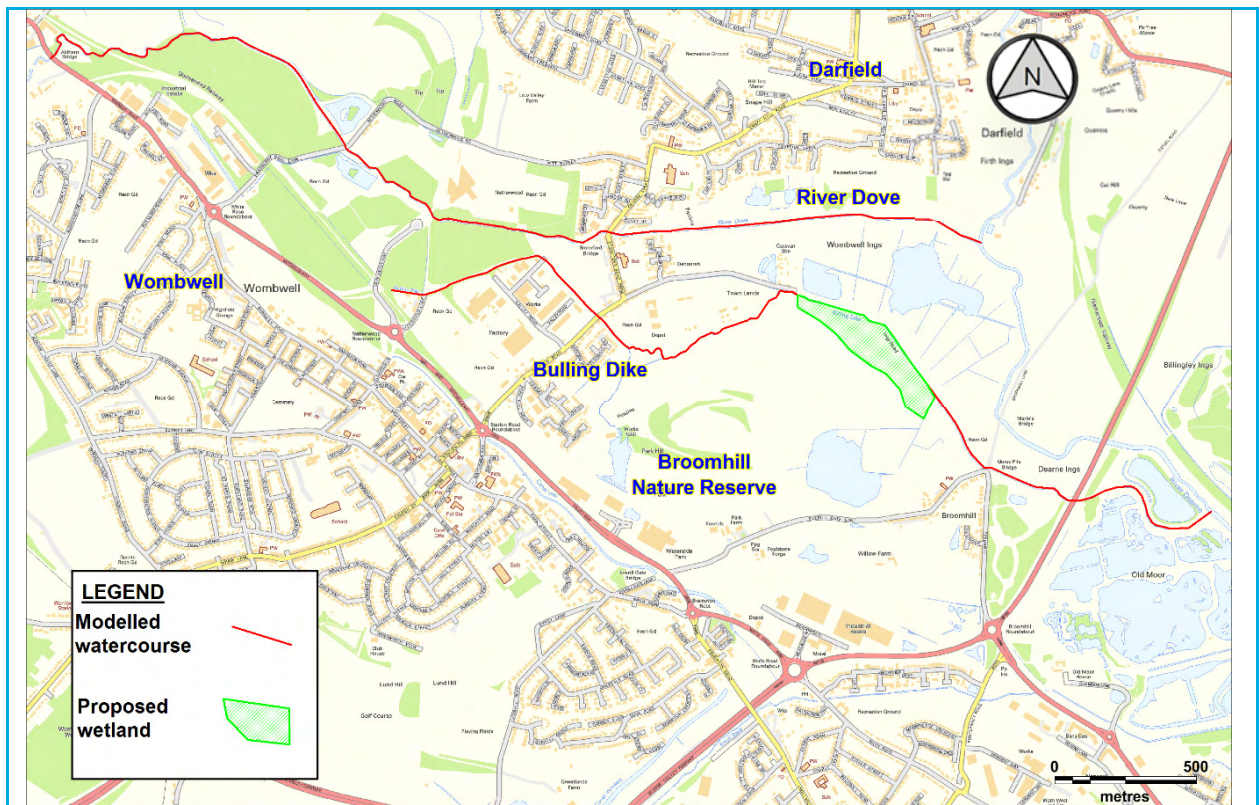
1. Introduction

The Garganey Trust is proposing to create new wetland habitats on existing agricultural land adjacent to Bulling Dike between Wombwell Ings and Broomhill Flash in the Dearne Valley (Figure 1-1). Bulling Dike flows from west to east from Wombwell to its confluence to the Dearne. Although Bulling Dike is not connected to the River Dove during normal flow conditions, during flood conditions, water flows over the right hand bank of the River Dove into Bulling Dike. Therefore, both the River Dove and Bulling Dike have been considered in this analysis.

1.1 Aim of modelling

The aim of the modelling undertaken for this project is primarily to quantify the flood risk benefit created by the proposed wetland and using this information to gain Grant in Aid funding from the Environment Agency for the scheme.

Figure 1-1: Overview of study site



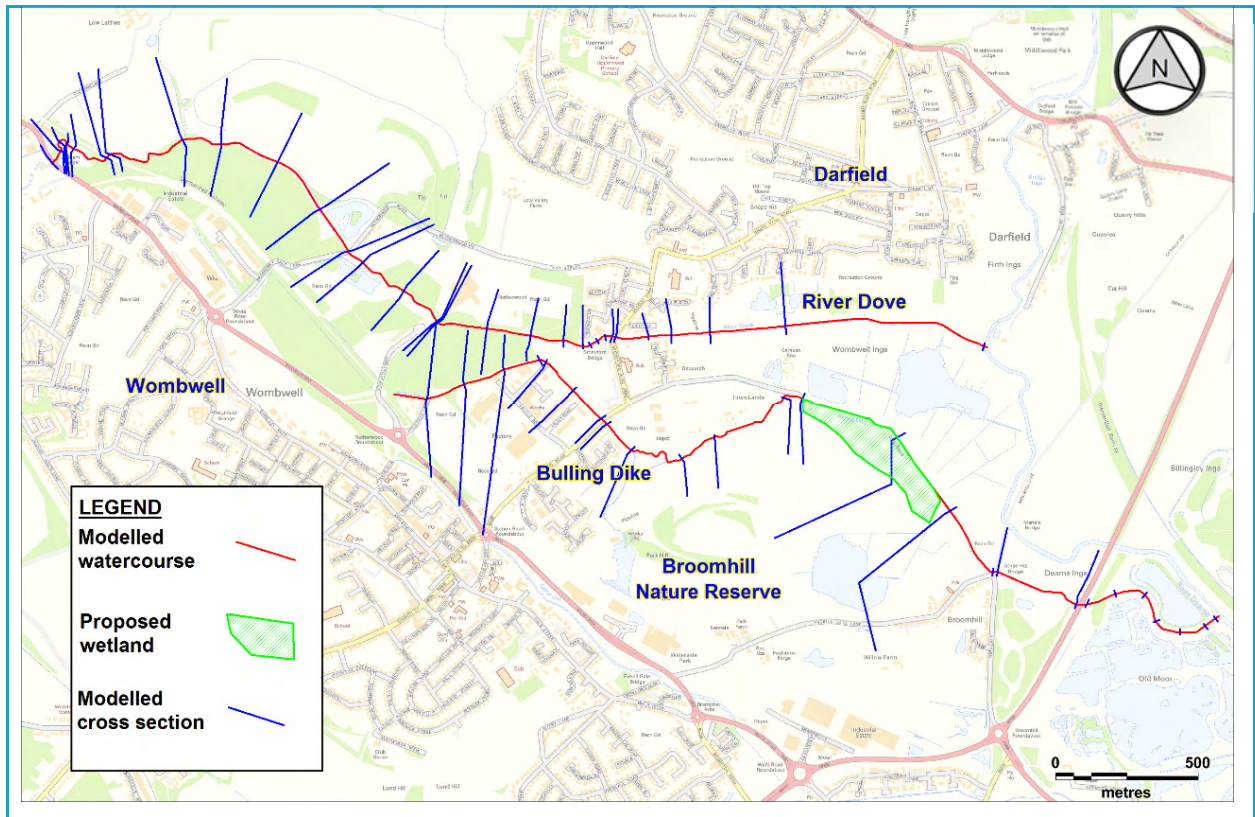
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1.2 Previous work

The River Dove and Bulling Dike were modelled in detail in 2009 by JBA (for Jacobs), with further optioneering work undertaken in 2011. The modelling was undertaken in 1D ISIS, with the floodplains modelled using a combination of extended sections and reservoir units (Figure 1-2).

This model has been reviewed as part of this study and the findings presented in Chapter 2. This review highlighted the areas of the model which will need to be updated to ensure that the model is suitable to meet the aim of this project.

Figure 1-2: Overview of study site



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1.3 Report structure

This document is split into the following sections:

Modelling approach – Provides details of the available data and provides an overview of the modelling approach adopted.

Model overview – Summarises the schematisation of the model.

Structures – Provides a summary of new structures added to the model, any changes to existing structures and the results of the check survey.

Model modifications for scenario runs – Provides details of channel and topographic modifications which have been made in the model for the post change model runs.

Sensitivity testing – Provides details of the sensitivity testing that has been undertaken on the model.

Model performance - Provides details of key tests and indicators of healthy model performance

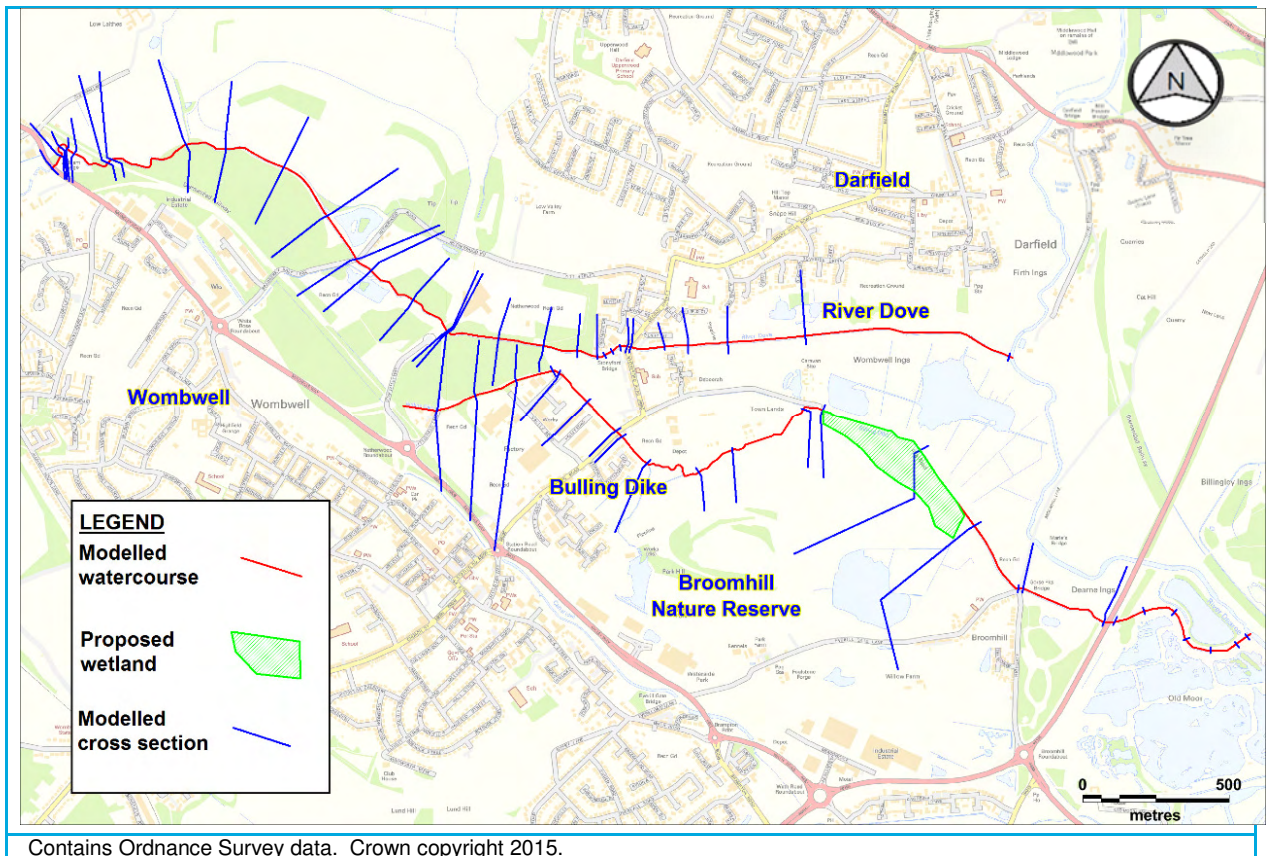
Model runs – Provides details of the design runs carried out for this study

2. Review of Existing Model

2.1 Existing model

The existing 2009 model area covers the River Dove and Bulling Dike up to their downstream confluences with the River Dearne (Figure 2-1).

Figure 2-1: Area covered by existing model



2.2 Existing model - review

The model provided by the Agency was reviewed prior to its use within the study. The review has focussed on the study reach of the River Dove and Bulling Dike. A summary of the model review findings are presented in Table 2-1.

Table 2-1: Summary of model review findings		
Study Floodplain	Site	<p>The floodplain in this area was modelled using extended cross sections. This is a reasonable approach for a broad scale flood modelling study, however, it will provide limited information on local flow patterns or inundation depths on the floodplain.</p> <p>The spacing between cross sections within the model representing this area are very wide. The addition of surveyed cross sections would provide a better representation of the hydraulics associated to the channel adjacent to the proposed wetland habitat.</p>
Upstream floodplain		<p>The floodplain in this area was also modelled using extended cross sections or storage areas. This is a reasonable approach for a broad scale flood modelling</p>