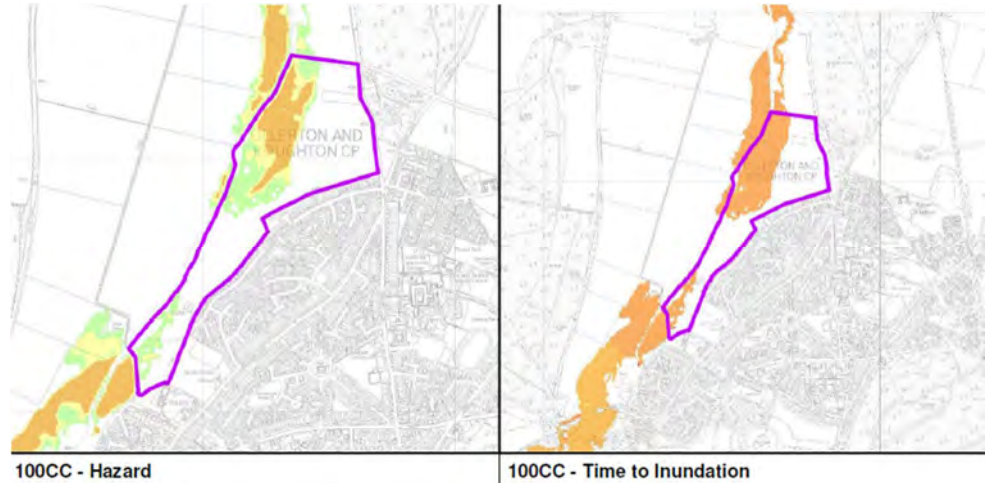

Appendix I Modelling Reports

Newark Strategic Flood Risk Assessment Hazard Mapping

Newark & Sherwood District Council

Aid
Aviation
Commercial
Communications and Technology
Defence
Education
Energy and Natural Resources
Government
Healthcare
Industrial
Legal and Finance
Rail
Residential
Retail
Roads and Bridges
Sports and Leisure
Urban Regeneration
Water and Waste



PROJECT DESCRIPTION

Newark and Sherwood District Council commissioned WSP to produce flood hazard and time to inundation mapping to inform the council Strategic Flood Risk Assessment (SFRA). The proposed development site for over 900 new houses (37.75ha) in Ollerton and Boughton, required flood modelling to produce the flood hazard and time to inundation mapping.

WSP refined the existing Environment Agency model to represent fluvial flood risk from the River Maun through Ollerton and Boughton in detail. We converted the model into a linked hydrodynamic 1D-2D model using ISIS-TUFLOW flood modelling software.

WSP produced flood extent, depth, level, hazard and time to inundation mapping for inclusion in the SFRA. The SFRA recommends a sequential approach to developing the site directing land uses with higher vulnerability to flooding away from areas at highest risk.

To enable strategic decision making, WSP followed PPS25 climate change requirements to quantify the potential flood risk to the site for the lifetime of the proposed development.

WSP implemented an innovative way of mapping the time to peak inundation, linking the flood times to flood warning trigger levels at the nearby flood warning telemetry sites. We have recommended flood warning trigger levels are reviewed if the site is developed.

Key Facts

Date:
March 2012

Sources of Flooding:
Fluvial

Software:
ISIS-TUFLOW

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TECHNICAL INFORMATION

Data & Survey

- No new survey.
- WSP obtained the existing 1D ISIS Environment Agency model of the River Maun, developed by JBA in 2007. Provided under licence in January 2012.
- LiDAR data covering the area and watercourse and structure survey supplied by the Environment Agency in January 2012.
- Flood warning trigger levels supplied by the Environment Agency in January 2012.

Hydrology & Boundary Conditions

- No new hydrological assessment.
- WSP have used the same inflows and downstream boundaries as the Environment Agency 2007 model.

Hydraulic Modelling

- Around the area of interest WSP have converted the 1D ISIS model to a linked 1D-2D ISIS-TUFLOW model.
- The WSP 1D-2D ISIS-TUFLOW model upstream extent is node 17215.236 (at NGR 463722, 366675 upstream of Ollerton STW and downstream at node 8629.172 (at NGR 466461, 372335 downstream of the confluence with River Meden).
- Outside of the area of interest the 1D ISIS model has been kept to ensure consistency in the flood routing and boundary conditions.
- Software versions
 - ISIS: 3.5
 - TUFLOW: 2010-10-AF-iSP-w32
- A small farm track bridge upstream of the development site that was not included in the Environment Agency 2007 model has been included in the 1D ISIS model.

- 1D-2D boundary modelled as an HX line with bank crest levels taken from 1D ISIS model cross section data.
- 2D TUFLOW model parameters:
 - Grid cell size: 7.5m
 - Roughness data: Buildings (1.0), Roads (0.025), Grass (0.040) and Woodlands (0.1)

Flood Mitigation & Management

- Modelling of possible flood mitigation measures is beyond the scope of this work.

Calibration, Validation & Accuracy

- As the model is based on the calibrated Environment Agency model no new calibration was undertaken of the 1D-2D model.
- Model results were compared to previous model results at Whitewater Bridge gauge and found to be fairly consistent with only a 70mm difference.
- Sensitivity testing was not undertaken as part of the study.
- Detailed review of 1D-2D boundary conditions at the location of the development site has highlighted that the model can be further refined through detailed site topographic survey and long section survey of the bank crest heights.
- Indicative model performance for the 1 in 100 year model scenario:
 - Run time: 42 hours
 - Time step: 2 seconds for both 1D and 2D
 - Convergence at peak: Good
 - Convergence throughout: Good
 - Mass balance: Good

Mapping, GIS & Analysis

- Flood model outputs processed in Mapinfo Vertical Mapper.

Outputs Available

- Model runs: 1 in 25, 1 in 100, 1 in 100 (PPS25 climate change) & 1 in 1,000.
- Flood hazard, extent, level, depth and velocity mapping produced.
- ISIS and TUFLOW model files available for future use.
- The Environment Agency modelled the 1 in 25 annual probability flood event, for the approved 2007 River Maun model. This was used to define the functional floodplain (Flood Zone 3b). WSP have therefore used this approved methodology

from the 2007 model for defining the functional floodplain.

Suitable Uses

- The model is suitable for defining Flood Zones, flood hazard, depth and time to inundation for strategic level decision making and development planning.
- Further refinement of the model is required for use in site specific flood risk assessment and to inform development masterplanning.

