Environment Agency

Harnham Flood Defence Scheme
Flood Risk Assessment
September 2006

Halcrow Group Limited

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Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Approved by
1	0	Planning application	04/09/06	RC

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1 Introduction

The aim of this assessment is to report on the impact on flood risk resulting from the proposed flood defence scheme for Harnham, Salisbury. The assessment accompanies a planning application for the scheme submitted to Salisbury District Council in September 2006.

2 Existing Situation

2.1 Background to flooding problem in Harnham

There is a history of flooding in Harnham from the River Nadder. Following flooding in 1960 the Avon & Dorset River Board constructed a flood bank from Gypsy Lane to the eastern end of the Middle Street Meadow, refer to Figure 1. In the 1960's and 1970's more properties were constructed at Harnham and Churchfields Industrial Estate was built on the left bank of the Nadder. Most of this development was in the flood plain of the River Nadder.

Following further flooding in 1979 and 1990 the National Rivers Authority (predecessor of the Environment Agency) constructed a flood bank at Waldrons Farm. The flood defences protected Harnham during the large flood events in 1995 and 2000.

2.2 Need for the Scheme

Recent analysis of flood flows and flood levels in the River Nadder has indicated that the existing defences will provide protection against floods with a 1 in 35 (3%) chance of occurring in any year. Government guidance recommends that urban areas have a minimum standard of protection against floods of 1 in 50 (2%) chance in any year.

Currently, in a flood event with a 1 in 200 (0.5%) chance of occurring per year, the existing defences would be overtopped and up to 35 hectares and 364 residential and 8 commercial properties, mainly between Netherhampton Road and the River Nadder, would be at risk, refer to Figure 1. The depth of flooding at some properties would be in excess of 1m.

Inspections of the existing defences carried out by the Environment Agency in 2005 showed that some 85m of the of the 1960's defences are in poor condition, in particular the sheet piled flood bank at Gypsy Lane. The piles are leaning towards the river and are badly corroded. There is a significant risk that they could fail and the bank behind would no longer be supported. Failure of this bank would increase the risk of flooding to 1 in 5 (20%) chance in any year.

There has also been flooding in Middle Street from the Harnham Brook when the brook is unable to discharge freely to the River Nadder due to high river levels.

The brook receives surface water drainage from the area and is fed by a channel upstream of Waldrons Farm. Flow in to the brook is controlled by a hydrobrake in the flood bank at Waldrons Farm.

There has been further flooding from an open channel to the rear of Constable Way. This channel receives flow from the main surface water drain from Churchfields Industrial Estate. The channel backs up and floods when levels in the River Nadder are high.

3 Flood Defence Works

The proposed flood defence scheme will protect Harnham from a flood with a 1 in 200 (0.5%) chance of occurring per year. The flood defence works are shown on Figure 2 and comprise:

- 555m of existing flood bank raised by up to 0.8m;
- 560m of new flood bank up to 1.5m high;
- 120m of replacement sheet piled bank;
- 240m of brick and masonry faced flood walls 1-2m high;
- a pumping station to control water levels in channels inside the defences.

The works are described in more detail in the drawings and design statement submitted with the planning application.

4 Analysis

The assessment of current flood risk and the design defence levels for the proposed flood defence scheme have been based on results from an ISIS hydraulic model. The model includes the River Avon catchment (River Nadder, Wylye, Avon and Bourne) around Salisbury and was developed by Halcrow Group Ltd for investigations into a Salisbury Flood Defence Scheme[1].

4.1 Hydrology

The flood flows used in the hydraulic modelling are the Environment Agency's preferred flood frequency estimates for the catchment. The flows are taken from the work undertaken by Halcrow Group Ltd for the Environment Agency in reviewing the flood estimation for the catchment.

[1] Salisbury Flood Defence Scheme Status Report May 2002 Halcrow Group Ltd

The peak flood flows used are summarised in Table 4.1.

Table 4.1 – Catchment Hydrology

Estimted Flood Peak (Cumecs)				
Return Period (Years)	River Nadder @ Wilton	River Wylye @ S. Newton	River Avon @ Amesbury	River Bourne @ Laverstock
2	16.9	12.8	11.5	2.1
5	22.4	17.2	15.0	3.5
10	26.8	20.6	17.8	4.4
20	32.1	24.7	21.1	5.5
30	35.5	27.0	23.3	6.3
50	40.0	30.3	26.1	7.4
100	47.7	35.7	30.9	9.4
200	56.9	42.1	36.6	14.9

It was assumed for the modelling at Harnham that the flood peaks of the Nadder and the Wylye would coincide.

4.2 Hydraulic Modelling

The ISIS model has previously been calibrated and verified (reference 1 above) and so was re-run with the latest flood flow estimates without modification for the existing situation.

The model was modified to reflect the changes for the proposed flood defence scheme. This involved raising existing flood banks, setting back the flood bank at Middle Street Meadow and including new defences.

Flood levels for the existing and post scheme conditions are presented in Appendix A along with a cross section location plan.

4.3 Drainage inside the Defences

The Harnham Brook and the channel to the rear of Constable Way will continue to drain surface water inside the defences during flood events. The new pumping station will take flow from the two channels when they are unable to discharge freely to the River Nadder. It will discharge to the river outside the defences. The channels will be isolated from the river by means of flood walls and flap valves.

A manual penstock will be fitted to the hydrobrake structure at Waldrons Farm to allow the Harnham Brook to be isolated during flood events. The Churchfields surface water outfall will be moved to discharge outside the new defences.

5 Pre and Post Scheme Water Levels

5.1 Summary of Results

The results of the comparison of the flood levels in the existing and post scheme conditions are summarised below.

Return Period (years)	Results
1 in 30	No increases in water level up- or downstream of scheme. Increase in water level of up to 10mm immediately upstream of existing weir at Old Mill Hotel.
1 in 50	296 properties protected from flooding. Increase in water level of up to 10mm for 700m upstream of scheme. No increases in water level downstream of scheme. Reduction in water level of up to 90mm around Middle Street Meadow. Increase in water level of up to 20mm immediately upstream of existing weir at Old Mill Hotel.
1 in 100	328 propertied protected from flooding. No increases in water level up- or downstream of scheme. Reduction in water level of up to 50mm around Middle Street Meadow.
1 in 200	372 properties protected from flooding. Increase in water level of up to 20mm for 700m upstream of scheme. No increases in water level downstream of scheme. Increase in water level of up to 40mm around Gypsy Lane and Waldrons Farm

5.2 Discussion of Results

The proposed flood defence scheme will have very little impact on flood levels outside of the immediate area of the scheme.

The modelling does suggests an increase in water levels upstream of the scheme of up to 20mm at some flows. Given the length that this effect extends over and the complicated nature of the river channels and structures in the area, it is most likely

that this small increase is due to modelling effects rather than a backwater effect from the scheme.

At 1 in 200 year flows the modelling shows an increase in water level of some 40mm around Gypsy Lane and Waldrons Farm. This is due to the confining effect of the proposed defences in an area where in the existing situation water would spill over the defences. There is no increase in flood risk due to this effect because the left bank ground levels are much higher than the flood level and the right bank is defended by the proposed scheme.

The reductions in water level around Middle Street Meadow are due to the set back flood bank at the meadow providing greater out of bank capacity at a very restricted river section.

A comparison of flow velocities was also carried out for the 1 in 100 year flow. This indicated that there will be some minor increases in velocity (up to 0.15m/s) at peak flow around the Middle Street Meadow. This is not considered significant in terms of channel stability.

6 Conclusions

The proposed flood defence scheme at Harnham will reduce flood risk from a 1 in 35 (3%) chance per year to less than a 1 in 200 (0.5%) chance per year for over 370 properties.

The scheme will not have any impact on flood risk upstream or downstream of Harnham.

The arrangements to control drainage inside the new defences will reduce the risk of flooding from surface water.

Appendix A

Hydraulic Modelling Results