

Environment Agency

Harnham Flood Defence Scheme

Design Statement

September 2006

Halcrow Group Limited

Halcrow Group Limited
Ash House Sowton Exeter EX2 7LB
Tel +44 (0)1392 444252 Fax +44 (0)1392 444301
www.halcrow.com

Environment Agency

Harnham Flood Defence Scheme

Design Statement

Contents Amendment Record

This report has been issued and amended as follows:

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

Contents

1	Introduction	1
1.1	<i>Background to Harnham Flood Defence Scheme</i>	1
1.2	<i>Overview of Design Statement</i>	1
2	Flood Defence Requirement	1
2.1	<i>Background to flooding problem in Harnham</i>	1
2.2	<i>Need for the Scheme</i>	2
2.3	<i>Objectives of the Scheme</i>	2
2.4	<i>Business Case</i>	3
3	Summary of Proposals	4
3.1	<i>Introduction</i>	4
3.2	<i>Scheme Rationale</i>	4
3.3	<i>Waldrons Farm</i>	4
3.4	<i>Gypsy Lane</i>	4
3.5	<i>Nadder Bank and Brook House</i>	5
3.6	<i>Middle Street Meadow</i>	5
3.7	<i>Old Mill Gardens</i>	6
3.8	<i>Old Mill Hotel</i>	7
3.9	<i>Town Path</i>	7
3.10	<i>Recreation Ground</i>	8
3.11	<i>Pumping Station</i>	10
3.12	<i>Environmental Issues</i>	10
4	Consultation and Feedback	11
4.1	<i>Consultation Approach</i>	11
5	Conclusion	11

1 Introduction

1.1 *Background to Harnham Flood Defence Scheme*

Harnham is a residential area south west of Salisbury, developed on the right bank flood plain of the River Nadder. In addition to housing there are two well used and much valued recreation areas ; Middle Street Meadow and Harnham Recreation Ground.

The Environment Agency has identified that Harnham has a standard of protection against flooding which is below the national minimum standard for an urban area. Halcrow Group Ltd were commissioned by the Environment Agency to carry out a study to look at the current and future flood risk from the River Nadder then identify solutions to provide an improved standard of protection. The outcome of this study has been the production of a preferred option to improve existing and create new flood defences to provide protection against a flood which has a 1 in 200 (0.5%) chance of occurring in any year.

1.2 *Overview of Design Statement*

This design statement accompanies the planning application for the Harnham Flood Defence Scheme. It provides additional information on the selection of the preferred option and the design constraints which have been considered. It briefly discusses alternative options that were considered and the reasons why they were rejected.

2 Flood Defence Requirement

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. 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.

Inspections of the existing defences carried out by the Environment Agency showed that some of the 1960 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.

If a 1 in 200 (0.5%) chance flood happened the existing defences would be overtopped and flood water would find its way round the ends of the existing defences. Up to 35 hectares and 364 residential and 8 commercial properties mainly between Netherhampton Road and the River Nadder would be flooded. The A3094 Netherhampton Road would be impassable and access to a further 50 properties would be affected.

The combination of the flood risk at Harnham, the number of properties that could be flooded and the poor condition of the existing defences led the Environment Agency to investigate the problems in more detail.

2.3

Objectives of the Scheme

The stated objectives for the flood defence scheme are:

- reduce the flood risk to the optimum economic level;
- maximise the sustainability of the scheme;
- optimise use of Environment Agency asset and incident management resources;
- enhance the built and natural environment;

- minimise adverse environmental impacts;
- minimise construction, maintenance and public health and safety risks.

2.4

Business Case

The Harnham Flood Defence Scheme is being promoted and funded by the Environment Agency using its powers under Section 165 of the Water Resources Act 1991. In order for a scheme to secure funding it has to have a sound business case and be of sufficient priority compared to others nationally. This is demonstrated through a feasibility study.

The feasibility study looked at a number of options for flood defence in Harnham which included doing nothing (and letting the existing defences deteriorate further), continuing the existing maintenance regime, improving the raised defences and strategic options such as upstream flood storage which would benefit the whole of Salisbury.

The options were considered in terms of their cost, the number of properties they would protect, the damage to property that they would prevent, their impact on the environment (including people) and their technical viability.

Flood flows for the rivers in Salisbury have been calculated using industry best practice methods from years of recorded river flow data. The flows were used in a computer model of the Salisbury rivers to calculate the level that the water will rise to in different flood events. To ensure that the results the model provides are as accurate as possible, they have been checked against known floods and the model amended accordingly.

Extensive environmental, ground and archaeological investigations have been carried out along with consultation with local residents and statutory bodies to ensure that the full consideration has been given to all aspects of each option.

Based on all this information the preferred option for Harnham is to improve existing defences and construct new defences to provide protection against floods having a 1 in 200 (0.5%) chance of occurring in any year. The defences will be designed so that they can be raised in the future to take account of the expected increase in flood risk due to climate change. Section 3 of this report describes the works required to achieve this standard in more detail. A flood risk assessment has been produced to accompany the planning application which demonstrates that the preferred option does not increase flood risk elsewhere.

3 Summary of Proposals

3.1 *Introduction*

This section describes the proposed works and explains why the proposed alignment and type of defences has been chosen. It is recommended that it is read while looking at the scheme drawings submitted to support the planning application. The descriptions concentrate on the key features of the defences and do not go into the details of finishes, fencing and landscaping etc which can be found on the drawings.

3.2 *Scheme Rationale*

The proposed scheme will create a defence 'ring' from higher ground between Netherhampton Road and Waldrons Farm to higher ground on the south side of the Recreation Ground adjacent to Harnham Road. The defences will reduce the flood risk to some 372 properties.

3.3 *Waldrons Farm*

This is the upstream extent of the works. The existing bank at Waldrons Farm needs raising by up to 0.5m and to enable the bank to be maintained safely the crest width needs to be increased by 1m to 5m. Wherever possible this has been achieved without needing to widen the base of the bank by making the side slopes steeper. However, on the eastern boundary this has not been possible and the bank will encroach by 3m into the adjoining field. The ditch which runs along the bottom of the bank in the field will be moved into the field and will be re-connected to the existing drainage system.

At the northern end of the bank there is a concrete structure in which there is a device which restricts flow into the Harnham Brook during flood events. No work needs to be done to the flow restrictor but the top of this structure will be raised by 0.4m. To allow the Harnham Brook to be isolated during flood events a new penstock will be fitted to the outlet of the structure and access to operate the penstock will be created.

3.4 *Gypsy Lane*

As discussed in section 2.2 the sheet piles at Gypsy Lane are at the end of their design life. There is not enough space between the river and the access track to construct an earth embankment so 120m of new steel sheet piles will be installed

on the river side of the existing piles. Where there is more space between the River Nadder and Harnham Brook the existing flood bank will be raised.

To maintain the privacy of the neighbouring property the bank will stop approximately 2m from the boundary with Nadder Bank and a stone faced masonry wall with an irregular coping will continue the defence. This will prevent people from being able to walk along the bank or being able to see into the property next door.

3.5

Nadder Bank and Brook House

A 40m long stone faced reinforced concrete wall will be constructed in the gardens of Nadder Bank and Brook House. The proposals have been developed in consultation with the landowners to ensure that the defences have minimal long term impact on the enjoyment of their gardens. The proposals incorporate steps, planting areas, access ramps and reinstatement of existing features.

3.6

Middle Street Meadow

At the western end of Middle Street Meadow 125m of existing flood bank along the river's edge will be raised. The crest of the bank needs to be 2m wide and the side slopes of this bank cannot be steeper than 1(horizontal) in 2.5(vertical). This means that the bottom of the bank will extend up to 2m into the Middle Street Meadow.

Adjacent to the football pitch the alignment of the flood bank will change and 300m of new bank will be constructed further away from the river's edge. Most of the existing flood bank on the rivers edge will be removed. The purpose of this is to increase the area available for the water in big flood events and return some of the flood plain to the river. This area will be further improved by recreating a section of the watermeadow system. An additional environmental enhancement will be the creation of a new pond and wetland area. This will provide new habitats for insects, amphibians and other species. The outfall from the surface water drain from the Churchfields Industrial Estate will be moved from the ditch behind Constable Way to the new pond. This will reduce the flood risk to Constable Way and the pond will act as a filter to reduce the risk of pollution from the drain entering the river.

The new bank will not affect the football pitch which can continue to be used both during and after the construction works. The alignment of the bank has been

chosen so that the bank is as far from the properties at Constable Way as possible to avoid overlooking.

The new bank will tie in to the existing flood bank at the eastern end of the meadow. To maintain the privacy of the neighbouring property the bank will stop approximately 2m from the boundary and a stone faced masonry wall with an irregular coping will continue the defence. This will prevent people from being able to walk along the bank or being able to see into the property next door. To construct these works existing vegetation near the boundary will be cleared but to maintain the privacy of Old Mill Gardens a new planting scheme will be proposed and a 1.8m high close boarded fence will be erected.

Ramps will be provided at numerous points along the bank to enable access onto the crest and over the bank. The whole meadow will be accessible to the public on completion of the works.

Other bank alignments in the meadow were considered. An alignment along the southern boundary would have returned the maximum amount of the meadow to useable flood plain but the bank would have to be higher because the ground level is generally lower, access into the meadow would have been obstructed and there would have been significant problems with overlooking adjacent properties. An alignment along the river's edge would have removed any problems with overlooking adjacent property but no useable flood plain would have been created and there would have been no opportunity for environmental enhancements.

3.7

Old Mill Gardens

A 50m long stone faced reinforced concrete wall is proposed through the gardens of the 3 properties at Old Mill Gardens. We have consulted with the landowners to come up with a solution which will enable them to continue to make use of their gardens and enjoy the views to Salisbury Cathedral. The proposals incorporate flood gates which need to be shut only during flood events.

An alternative defence alignment was considered. This took the defences behind the Old Mill Gardens along the bank of the open channel, then tied into defences in the Old Mill Hotel via a ramp and floodgate across the access to Old Mill Gardens. This had the advantage of being away from the gardens and was preferred by the landowners. However it was not pursued as there were a number of disadvantages including:

- Old Mill Gardens remain at risk of flooding in events having a 1 in 40 year (2.5%) chance every year.
- Access to Old Mill Gardens would be impossible when the flood gate was closed. This situation could last for a number of days and would be extremely hazardous for the residents if they needed emergency assistance, as ambulances and fire engines would not be able to get through.
- Ground levels behind Old Mill Gardens are lower and walls would need to be 2m above ground level rather than 0.9m on the river side of the houses. The increased height has considerable impacts on the size of the foundations that would be required and the associated disruption during construction.
- There would be disruption and a negative visual impact on 3 additional properties at Constable Way as well as to Old Mill Gardens who would still be affected by the ramp, floodgate and wall.

3.8

Old Mill Hotel

A brick and flint faced reinforced concrete wall will be constructed along the boundary with 3 Old Mill Gardens. To construct this wall the existing yew hedge and bay tree will need to be removed. Privacy would be maintained to 3 Old Mill Gardens by installing a wooden close boarded fence on top of the defence wall to a height of 1.8m above ground level. A planting scheme in the garden of the hotel will be agreed.

The wall will then cross the open channel between the Old Mill Hotel and Kingfishers and run along the edge of the drain on the Kingfishers boundary. A pipe will be installed behind the wall to carry flows from the channel drain to a new pumping station (see section 3.11) when high river levels prevent it from discharging directly to the River Nadder.

3.9

Town Path

The brick faced reinforced concrete wall will continue along the bank of the Harnham Brook. Town Path between the Three Crowns public house and the Old Mill Hotel would be raised so that the flood defence level is achieved at the access into the car park where it would tie in to the wall along Harnham Brook. This is the only place where the flood defence can cross Town Path whilst maintaining all the vehicular and pedestrian accesses. The ramps up to the flood defence level will have a slope of 1(vertical) in 20 (horizontal) which would allow pedestrian, cycle and disabled access. The ramp to the ford across the River Nadder will be

steepened to 1(vertical) in 10 (horizontal) which is suitable for vehicular and pedestrian access. The bridge across the Harnham Brook into the Three Crowns pub will be replaced to accommodate the raised ground levels on Town Path. The paving and handrailing around the Old Mill Hotel will be replaced to enhance the appearance of the area.

Pedestrian access into the Recreation Ground will be maintained but will be moved to align with the bank in the Recreation Ground. A new vehicular access into the Recreation Ground will be created opposite the Three Crowns but a locked gate will ensure that this is only used by authorised personnel. This new route will provide access for the Environment Agency to operate and maintain the pumping station in the Recreation Ground (see section 3.11).

The proposed defence alignment necessitates the loss of the four poplar trees on the boundary of the Recreation Ground and Town Path. Various alternatives to the arrangement of works in this area have been considered but in order to maintain the function of the scheme all would result in the loss of the trees. We have received advice that removal of two of the trees would affect the root zone of the other two and could make them unstable.

3.10

Recreation Ground

The defence in the Recreation Ground takes the form of a flood bank set back from the river. The bank has variable side slopes and meanders through the Recreation Ground to try and blend it in to the existing contours. The bank runs into the boundary between 3 and 4 Mallard Close. A brick faced flood wall will tie the defence into high ground in Mallard Close. A low flood wall will be required in the rear garden of 5 Mallard Close and small amount of local ground raising will be required adjacent to the cricket pavilion to tie into the high ground. This is the downstream extent of the flood defence scheme.

The alignment of the defence in the Recreation Ground has been subject to considerable thought and a number of options have been rejected before arriving at the current proposal.

The banks have been set back from the river as this means that they can be lower, as the ground levels slope up from the rivers edge, and will therefore take up less space in the Recreation Ground. Setting the banks bank also means that they will be not be affected by any long term bank erosion and will allow the river to have

the maximum amount of space for flood flows. The construction of banks away from the rivers edge is also safer.

The potential for tying the bank into perceived higher ground at Mallard Close through the existing pedestrian access adjacent to St Georges Close was investigated. However survey information indicated that ground levels were not higher than the flood defence level. Putting defences on the Lower Street side of Mallard Close was not considered further as this would leave a number of properties at risk of flooding and would make access to the properties extremely difficult.

Residents of Mallard Close have expressed concern that the proposed alignment of the bank will create problems with anti social behaviour. There is a fear that the bank will be used by cyclists and the area between the bank and the Mallard Close boundary will become a meeting place as it will be partially shielded from view. There is also an issue over the perceived loss of privacy from people standing on the bank and looking into properties. With this in mind alternative alignments in the Mallard Close area were considered.

The first moved the bank away from the northern boundary with Mallard Close with the defence continuing between the cricket pitch and Mallard Close to tie in to high ground at the pavilion. The advantages of this option were that it moved the bank away from the properties and provided a defence which was easy for the Environment Agency to inspect and maintain. The disadvantages were that there are a number of mature trees that would need to be removed or would be at risk from the construction works, there would be an increase in the height and length of the defence and the bank would be more intrusive in the Recreation Ground.

The second alternative moved the bank closer to the boundaries or into the gardens of Mallard Close and Melbourne / Westmead. The advantages to this are that the ground levels are significantly higher closer to the properties meaning that defences needed to be only a few hundred millimetres high. The visual impact in the Recreation Ground would be reduced and there would be no hidden areas or walls for balls to be kicked against. However the disadvantages were that this option temporarily disrupted a larger number of gardens and residents and the defences would be more difficult for the Environment Agency to inspect and maintain.

As the alternative options were discounted thought has been given to reducing the likelihood of any potential impacts problems associated with the flood bank. To avoid the loss of privacy the bank alignment has been pulled as far from the properties as reasonable while balancing the desire to retain as much flat open space in the Recreation Ground as possible. The bank in this location will be approximately 1m high which is not considered to be high enough to hide people and bank and area behind will be accessible to all members of the public. A previously proposed wall tying into Mallard Close will now be faced with an earth mound and planted with blackthorn. This will prevent people from walking along the bank and looking or climbing into gardens. This will also prevent the wall from having balls kicked at it. Fencing will be agreed with the residents concerned.

3.11

Pumping Station

An underground pumping station will be constructed to pump flows from the Harnham Brook and the channel behind Constable Way when they cannot flow directly into the River Nadder because of high river levels. Flap valves will be installed on the discharges from these two watercourses to stop water from the River Nadder backing up the drains and causing flooding.

Water will be taken from the Harnham Brook near the Three Crowns and will flow through a pipe under Town Path into the underground pumping station. There will then be a pipe beneath the Recreation Ground to carry flow from the pumping station to the River Nadder. The outlet will be via a brick headwall constructed 40m upstream of the existing Wessex Water outfall.

The pumping station will be underground but will require an above ground electricity sub-station and kiosk for the control panel.

3.12

Environmental Issues

Environmental considerations have been taken into account throughout the design process. The Environmental Statement accompanying the planning application details the impacts of the scheme, positive and negative, temporary and permanent, on the local environment. It considers not just flora, fauna and pollution but also landscape, people and cultural heritage and explains how we will ensure that there is no long term damage to the existing environment from the scheme. It also describes environmental enhancements associated with the scheme.

4 Consultation and Feedback

4.1 *Consultation Approach*

A public exhibition was held in July 2005 at which details of the flood risk in Harnham and possible flood defence options were presented. At that time no decision had been reached regarding the preferred option or defence alignments. The exhibition was well attended and the discussions with attendees and the questionnaires completed indicated that the majority view from local people was that they would like something done to reduce flood risk in Harnham.

Following the exhibition the options were appraised in detail and further consultation undertaken with local residents, groups and statutory consultees. Through this process and that described in section 2.4, the preferred option was developed. The preferred option was presented at a further public exhibition in March 2006 where the response to the proposals was generally favourable. The detail of the preferred option has been discussed with individual landowners and where possible the design amended to meet their concerns, however it is recognised that we have not been able to resolve all objections to the scheme.

In addition to the various departments of the Environment Agency many external bodies such as English Nature, English Heritage, Salisbury District Council and local environmental groups have an interest in the scheme. In addition to informal consultation with individuals from key bodies, a draft Environmental Statement was produced in February 2006 and circulated to stakeholders for comment. A full list of the consultees and their responses can be found in the Environmental Statement accompanying this application.

5 Conclusion

This design statement provides the background to the decisions that have been taken to arrive at the preferred option for the Harnham Flood Defence Scheme which has been submitted for planning approval.

It has been identified that the current standard of protection to over 350 properties in Harnham is below the recommended national minimum standard for urban areas. A scheme which will increase the standard of flood defence to 1 in 200 years (ie will protect against floods with a 0.5% chance of occurring each year) has been identified as the most favourable option.

The alignment and form of the flood defence scheme has been arrived at taking into account, reduction in flood risk to property, the impact on the environment and local residents, use of existing defences, making space for water, safety, and existing land use. We believe that the proposals presented in the planning application strike a balance between all these issues and that the flood defence scheme will prove a long term benefit to Harnham.