



WEST OXFORDSHIRE
DISTRICT COUNCIL

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Parish Flood Report: **Northmoor**

May 2008



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1.0 INTRODUCTION

On the 20th July 2007 large parts of the South of England were subjected to intensive storms. The scale and speed of the rainfall was unprecedented and took most communities by surprise causing widespread flooding of highways and property. On this occasion, unlike previous storms / flooding experienced, this impacted on many properties that had never been affected before, due to much of the flooding coming in the form of rain water run off from land.

A swathe of the district was particularly badly affected by the massive storms, which commenced in the morning and subsided in the evening. During the following days further disruption occurred due to rising river levels. At RAF Brize Norton, the records show that over 125 mm (5 inches) of rain fell in 12 hours, and this is a record going back over 100 years. Not only that, but the period from May to July had been the wettest on record since 1903 and meant that the ground was saturated and unable to absorb any more water.

On the 10th October 2007, the District Council's Cabinet considered a report and approved additional resources in order that a review of the affected areas could be carried out and further reports be prepared for the Council's considerations.

1.1 Purpose of the report

In response to requests from both the Parish and Town Councils and the general public West Oxfordshire District Council has produced a number of reports that identify each individual cause of flooding within the Parish / Town, what work is being carried out by external agencies (EA, Thames Water etc); what the potential options are for future mitigation - and who might be best placed to fund such schemes. The reports themselves reflect the series of water systems that all played a part in the flooding experienced in July 2007 and will help all the organisations involved understand the need to sequence their activities.

This report has been prepared by a qualified Engineer in consultation with the key external agencies and seeks to explore the main reason behind why the floods happened in July 2007 and give an overview of the event itself. It will also provide an understanding of the different roles and levels of responsibility for the agencies involved.

This report should be used to make sure that all the agencies involved with flood prevention – like the Environment Agency, Thames Water, Oxfordshire County Council, Town / Parish Councils and private land owners – work in true partnership for the good of everyone in the local community.

A key outcome of the reports is that residents are given a broad overview of the complex linkages between the different organisations involved and also the range of options available.

1.2 Roles and responsibilities

One of West Oxfordshire District Councils key ongoing roles is to continue to lobby National agencies / Government on behalf of the residents and businesses of the district to secure funding and/or additional resources to assist with flood prevention and other relevant activities. The Council will also work closely with other agencies and organisations in order to highlight the local issues and actions identified in the report.

The legal responsibility for dealing with flooding lies with different agencies and is complex, so below is a simplified summary.

Environment Agency (EA) – permissive powers¹ for main rivers

Oxfordshire County Council (OCC) – Responsible for adopted highways and highway drainage.

Thames Water (TW) – Responsible for adopted foul and surface water sewers.

West Oxfordshire District Council (WODC) – duties as a riparian² land owner, and permissive powers¹ under Land Drainage Act 1991, Public Health Act 1936, Highways Act 1980 and Environmental Protection Act 1990.

Private land owners - duties as a riparian land owner.

1.3 Consultation and consent

The key organisations mentioned above are currently carrying out their own investigations, but operate independently of each other, have different methods of prioritisation and different funding criteria. The District Council has consulted with these agencies together with Parish Councils, Town Councils and individual property owners in order to prepare this report.

It is recognised that the majority of the options proposed in this report require further investigations / feasibility studies and / or consultation before they are carried out. Therefore these options may not be appropriate in every case when full costings, environmental, landscaping, biodiversity, built environment and historic factors are fully considered.

When considering protection against future flooding, it must be emphasised that the risk and impact of flooding can be mitigated against but in some cases not fully removed.

1.4 Response to this report

The options section of this report highlights the potential areas of work / activities under the responsible agency, for example the Environment Agency, West Oxfordshire District Council etc. If you have any specific questions relating to these activities please contact the relevant agency using the contact details provided at the top of the chart.

If you have any general questions please contact your Parish / Town Council who have been a key contributor to the production of the report and have agreed to act as the first point of contact.

The Council is also planning to hold a series of ‘road shows’ in the Parish areas where representatives from all the relevant areas will be available to answer any questions local residents have as well as provide more information on ways residents may help themselves.

¹ Permissive powers are when an organisation may choose whether or not to exercise their powers. I.e. they are NOT under a duty. In making this choice account must be taken of any factors required by the legislation, plus for example how urgent, how necessary they are, cost, likely result, etc.

² Riparian owners are responsible for the maintenance of any watercourse within or adjacent to the boundaries of their property.

1.5 Legal

No part of this report is to be reproduced, copied or used by any third party without the prior express written consent of WODC in its absolute discretion. All those reading this report acknowledge that any conditions, warranties or other terms implied by statute or common law are excluded to the fullest extent permitted by law. Without limiting the scope of the foregoing, West Oxfordshire District Council does not give any warranty, representation or undertaking as to the efficacy or usefulness of the information contained within this report, nor that any advice contained within this report will produce satisfactory results if followed. West Oxfordshire District Council hereby excludes liability to the fullest extent permitted by law for any reliance placed in this report by third parties.

2.0 DISTRICT COUNCIL'S ACHIEVEMENTS OVER THE PAST 12 MONTHS

Ditch Clearance

- 1731 Linear metres WODC owned ditches cleared overall
- 1923 Linear metres Privately owned ditches cleared overall
- Overall 2.27 miles of ditches have been cleared

Flood Grants

- 1137 WODC Flood Grants totalling £284,250 given out overall
 - 57 (£14,250) for Northmoor
- 40 Red Cross Flood Grants totalling £80,929 administered by WODC overall
 - 4 (£12,400) for Northmoor
- 301 Hardship Grants totalling £155,050 given out overall

Reports

- Interim Flooding Report published October 2007
- 12 Parish Flood Reports completed by June 2008, 1 report for Northmoor

Actions from the Council's Interim Report published in January 2008

- The table below provides a summary of some of the completed actions identified in the report

Bronze command procedure to be updated to recognise the need for ensuring shift rotas are in place in the early stages of an emergency
Consider producing a revised warning system that identifies a higher category of risk that is only issued in exceptional circumstances
The emergency plan specifically addresses the need to keep in regular contact with elected members
That in future emergency situations District Councils ensure that they have a representative present at Silver Command from the start of the emergency to act as a conduit for information between Silver Command and the District Councils
The council should encourage all residents residing in the flood plain and in areas at risk of flooding to sign up to the EA Flood Alert system.
Provide clear information to residents and businesses about what type of waste we can collect and how it will be collected
Explanations to residents of our need for bulky waste to be placed on the roadside for collection
Commence a review of the mapping of the many thousands of privately owned ditches and culverts, and ensure they are kept clear and well maintained in accordance with the new policy (2 TOR 3)
Lobby central government for a single agency to take control of all land drainage issues
WODC continues to act in a coordination capacity with key external agencies
Continue to liaise with EA to ensure that procedures relating to planning consultations are robust. Seminar being arranged to take place early in 2008 to progress this
Progress the Strategic Flood Risk Assessment
Consider producing a revised warning system that identifies a higher category of risk that is only issued in exceptional circumstances
Approaches to be made to the EA and Metrological Office with regard to improving their predictive capability
During emergency events, have an external media person (BBC) in Bronze Command
Purchase digital TVs to assist with reviewing weather, local and national news to assist emergency management

3.0 EXECUTIVE SUMMARY

Following the flooding events of July 2007, West Oxfordshire District Council (WODC) has responded to requests from both Town and Parish Councils to aid the coordination of all the agencies and bodies that were undertaking their own investigations into the floods through the production of Parish Flood Reports.

This document is the Parish Flood Report for Northmoor and has been prepared by the Council's Engineering team. It pulls together information from external agencies and individual property owners and seeks to identify the causes of flooding during July 2007 and potential mitigating solutions.

This report recognises the statutory duties of WODC to maintain and enhance the biodiversity, protect local habitats in the UK Biodiversity Action Plan, protect specially protected species, conserve and enhance the character and appearance of Conservation areas and protect or maintain listed buildings.

Northmoor is a rural parish of 316 Hectares (780 Acres), including the communities of Bablock Hythe, Northmoor and Moreton, bounded by the River Thames and the River Windrush. Visual walkover surveys have been undertaken of the flooded areas and properties. Meetings have been held with affected residents and the Parish Council. The number of Flare Reports and Applications for Grant Aid was also been investigated.

Northmoor flooding has been assessed in two separate areas (see section 5.1) comprising Bablock Hythe (Area 1) and Northmoor Village (Area 2).

Bablock Hythe (Area 1) suffered extensive damage with 47 mobile homes extensively flooded and 1 completely demolished. Flooding was noted as originating from three different sources comprising of river water backing up the boundary ditch from the River Thames, excessive uncontrolled localised surface water run-off and a breach in the flood bank and ditch between Moreton and Bablock Hythe.

Four properties flooded in Northmoor Village (Area 2) which could be attributed to one or a combination of the following factors: Inadequate maintenance of the River Thames and River Windrush tributaries running to the south of the village, poor management of downstream run-off and the overloading of the two village pumping stations.

Five properties flooded in Moreton Village (Area 3) which were attributable to overflowing from Newbridge Cut and Northmoor New Cut, cutting off Moreton Lane to the North of Moreton.

Flooding problems and options, including description of works and how each public and private body is affected, effectiveness of each solution, affects on adjacent land and cost, are included in Section 5 and 6.

Conclusions and recommendations, including maintenance and flood defence improvement schemes and programme, are shown in Section 7.

Some of the recommendations directly affect flood zones and environmentally sensitive areas such as important wildlife sites, listed buildings and Tree Preservation Orders.

4.0 SURVEY

4.1 Description of Area

Northmoor Parish is approximately 316 Hectares (780 acres) in size comprising the communities of Thameside Caravan Park at Bablock Hythe, Northmoor village and 2 farms. Thameside Caravan Park is owned by "Greenwood Parks" of Chichester, Sussex.

The parish is rural in nature forming part of the catchment area for the River Thames and River Windrush. The junction of the River Thames and the River Windrush lies within the Parish. The River Thames forms the eastern boundary and the River Windrush the western.

There are 5 farms within the Parish (Pinnocks Farm, Rectory Farm, Watkins Farm, Lower Farm and Church Farm) forming part of the River Thames and River Windrush flood plains. Stonehenge Farm is not a working farm. There are numerous listed buildings located within the Parish.

4.2 Survey Method

Several visual walk-over surveys of the parish have been undertaken including Thameside Caravan Park, Northmoor village and fields to the south. A number of tributaries to the River Thames and the River Windrush have been inspected and Northmoor Lock surveyed.

See Appendix I – Photographs.

4.3 Meetings

A meeting was held on 22 November 2007 with the Parish Council Chairman (Robert Florey) and Clerk (Michael Ryan) to discuss the flooding problems of Northmoor Parish.

At the meeting a site inspection was undertaken of the River Thames and the River Windrush tributaries crossing to the south of Northmoor village. From discussions the following was noted:

- During the flooding, fallen trees which had not been removed by the EA, created blockages to some of the River Windrush tributaries.
- The EA maintenance gangs no longer visit the area and when questioned state that it is the responsibility of the riparian owner to maintain ditches.
- The Clarks Farm Pumping Station and the Red Lion Pumping Station no longer work effectively during high intensity storms and during the floods surcharged into the village.
- Flooding in Northmoor is mainly from the River Windrush.

Additionally WODC attended the Northmoor Parish Council Meeting on 9 April 2008 and the following actions discussed:

- WODC to consider whether the planning application made by Hanson Aggregates for mineral abstraction at Stonehenge Farm is relevant for inclusion in the report.
- Flooding of properties in Moreton to be included in the report.
- WODC to provide details of EA contact.
- Northmoor Parish Council requested that they be able to review the draft Flood Defence Report prior to its issue (this is to be arranged in early May 2008).

Owners of properties that flooded in July 2007 were also contacted and details of the conversations are included in the table below.

Locations	When	Problems/ Issues
Properties at Bablock Hythe Caravan Park	27/11/07	<ul style="list-style-type: none"> • Whole Caravan Park flooded in July 2007 and a number of caravans were affected. • One caravan was demolished completely and is being rebuilt. • Four caravans are currently being raised by 300mm as a pre-requisite for re-insurance.
Properties at Northmoor Village	26/11/07	<ul style="list-style-type: none"> • Water came out of foul manholes and couldn't get away. • Thames Water has admitted that the pumping stations in the village were unable to cope with the increased flows in sewage that arrived from the combined sewers running through the village, during the heavy rainfall of July 2007. • The open watercourse, crossing the front gardens of properties fronting Standlake Road, flooded and water entered a number of properties. • The open watercourse has not been maintained for 2/3 years. • Damage to properties included new plastering and flooring.

4.4 Grant Aid

The District Council has distributed a range of financial support to the residents of district in the form of;

- Emergency Flood Relief Grant Aid of £250
- 'Hardship' Grants
- Red Cross Grants

There have been 51 applications for Grant Aid from Northmoor, Thameside Caravan Park presented 47 applications of the total received for the area. Many locations have been surveyed to verify the claim. All claimants have been given a sum of £250 towards Emergency Aid. This equates to 14.4% of the total number of properties affected in West Oxfordshire due to the events of July 2007.

Whilst the Emergency Flood Relief Grant Aid was not paid to industrial and commercial properties, the Council did provide advice and support to local business, affected by the flooding, on funding available from Business Link and other organisations.

4.5 Gravel Abstraction

The residents of Northmoor village have expressed their concerns that the EA has not opposed the proposals submitted recently to Oxfordshire County Council by Hanson Aggregates for gravel abstraction at Stonehenge Farm. Residents are concerned that quarrying would have a serious effect on the confluence of the River Thames and the River Windrush and this would add to the flooding problems experienced in the area.

The opposition is being led by Outrage (Oxfordshire Upper Thames Residents Against Gravel Extraction) who believe that following quarrying activities problems would be caused in the local hydrology with peak flows coinciding from the River Windrush and the River Thames. Also there would be the imposition into the flood zone of long earth mounds. The Campaign to Protect rural England states that the development would have a detrimental effect on the local countryside and WODC highlight that little hydrological modelling has been undertaken to date by the company.

5.0 PROBLEMS AND CAUSES

5.1 Location Maps

Appendix 2 contains:

- A location plan showing areas in Northmoor Parish where properties flooded in July 2007 and where owners have made claims for grant assistance.
- A map showing:
 - Parish boundary
 - Environment Agency enained watercourses
 - 0.1% annual probability and 1% annual probability of flooding occurring (previously referred to as 1:100 & 1:1,000 year storms)

5.2 Area 1 – Bablock Hythe

Forty-seven caravans were flooded in July 2007. One caravan has since been demolished and four caravans are being raised in level by 300mm as insurance pre-requisite.

There are no recorded flooding events prior to July 2007.

We have assumed the cause of flooding to be the following:

5.2.1 River Thames

Following the period of heavy rain in July 2007 the level of the River Thames was noted to rise significantly. It was recorded that this rise in river level caused water to back up along the caravan park ditch located adjacent to the northern boundary and to the west. Also it was recorded that this rise in water level flooded the Caravan Park and drowned the surface water ditch outfall. It was observed that the watercourse ceased to function and flood water levels were recorded as 300mm above the level of the Caravan Park.

5.2.2 Surface water

Surface water ran off the Caravan Park and adjacent agricultural land to the north and west and flooded the Caravan Park northern boundary watercourse. Lack of maintenance and park users using the ditch as a receptacle for garden and household rubbish increases the flooding risk by blocking the free flow of water.

5.2.3 Moreton to Bablock Hythe Flood Bank and Ditch

Water from the River Thames flooded the Caravan Park through an 8 metre wide breach, which has either occurred naturally or has been artificially created, in the Moreton to Bablock Hythe flood bank and ditch (This facility was built by Thames Conservancy to the west of the River Thames). Flood water having breached the flood bank utilised the ditch to convey water inland in contrast to its correct function of collecting flood water and discharging it out into the river.

5.3 Area 2 – Northmoor Village

Four houses flooded in July 2007.

Serious flooding was recorded in the village in 1947.

We have assumed the cause of flooding to be one or a combination of the following:

5.3.1 Lack of river / tributary maintenance

Insufficient maintenance is undertaken for the River Thames and River Windrush tributaries, flowing to the south of the village, and the River Windrush.

5.3.2 Lack of catchment run-off management

Upstream flooding problems in Northmoor village are caused by ineffective management of downstream run-off.

5.3.3 Pumping station

The two pumping stations in the village become overloaded and are unable to cope with peak volumes of surface water arriving from the village combined sewers during peak storm periods.

5.4 Area 3 – Moreton Village

Five properties flooded in the July 2007.

From discussions with informed local residents, flooding comprised overflowing from Newbridge Cut, cutting off Moreton Lane to the east of the “Rose Revived” Public House, followed by overflowing from Northmoor New Cut, cutting off Moreton Lane to the north of Moreton.

The hydrology of Moreton is comprises complex inter-action at the River Windrush delta between Newbridge Cut, Northmoor New Cut and Enmained watercourses.

6.0 OPTIONS

The following table shows the possible options available for flood alleviation schemes throughout the Parish, and their potential effectiveness, as assessed by the District Council Engineers. The areas affected by flooding within the Parish have been given unique area numbers, i.e. Area I. Several options for flood alleviation projects are identified for each area as “Actions” or “Options”.

Many of these options will require further detailed investigation along with the agreement of the responsible landowner, identification of budget and a cost benefit analysis to be carried out before they could be implemented.

Some of the options shown are also mutually exclusive, that is if one option is carried out then another will not be necessary, to find if this is the case for an option, please look at the detailed description in the Conclusions and Recommendations Section ([7.0](#)).

If you require further information regarding a particular option, please contact the agency that would be responsible for implementation of the proposal, where this has been shown, using the contact information at the top of the column. If no contact details are shown, there may be a private landowner responsible. If this is the case the District Council will ensure that private landowners are made aware of their responsibilities.

West Oxfordshire District Council

Parish Flood Defence Report – Options summary

Northmoor Parish

May 2008

Option ref	Problem overview	Description of work required					Key issues			Comments
		Environment Agency	Oxfordshire County Council	Thames Water	WODC	Private/ Riparian	Effectiveness	Effects on adjacent land	Cost	
	Options									
		For queries Tel 08708 506 506 or email enquiries@environment-agency.gov.uk	For queries Tel: 0845 310 1111 or e-mail northernarea@oxfordshire.gov.uk	For queries Tel: 08459 200800	For queries Tel: 01993 861000 or e-mail enquiries@westoxon.gov.uk	Northmoor Parish Council Northmoor.clerk@virgin.net				
Area 1 – Bablock Hythe										
	Following periods of heavy rain the water level in the River Thames rises and drowns the northern caravan site boundary ditch and surface water outfall. River water floods the caravan park. Additionally surface water runs off the caravan park and adjacent agricultural land to the north and the west adding to the caravan park flooding. Lack of maintenance and park users using the ditch as a receptacle for garden refuse adds to the flooding problem.									
A	Raise level of all caravans to provide 1 in 75 year flood protection. Access, services and utility connections to be adjusted to suit. Work to be carried out immediately at a cost of £10k approx per caravan (as advised by contractor currently undertaking this work for 4 caravans).	EA to assist private owners to agree the correct height of elevation for each caravan.			WODC to co-ordinate works with this proposal.	"Greenwood Parks", the free holder of the caravan park, to agree provision of full funding. Greenwood Parks response required.	This scheme to provide 1 in 75 year protection. Vehicular access to the caravans will not be possible.	This will not cause or exacerbate flooding in other areas. Flood compensation works will not be required.	Design Costs = £10K Capital Costs = £200K to £500K	
B	Clear out caravan park northern Enmained boundary ditch and de-vegetate to provide a free flow path and flood protection for low level flood events. Residents to be advised not to use the ditch as a refuse tip. This work should be carried out immediately.	EA to undertake Enmained ditch clearance, to provide a free flow path and flood protection for low level flood events, ASAP (For details of Enmained ditches see attached drawing). EA to contact farmer north of caravan park (Mr Ireland) to agree access and tipping arrangements.			WODC to co-ordinate works with this proposal.	Farmer (Mr Ireland) to the north of the ditch to agree access and tipping arrangements with the EA.	This will provide a level of protection against property flooding caused by ditch blockages.	This will not excessively cause or exacerbate flooding in other areas despite tipping in the flood plain.	Design Costs = £0.5K Capital Costs = Up to £5K	
C	Provide four additional gullies at entrance to caravan park to prevent flooding.		OCC to provide four additional gullies at entrance to the caravan park within next 12 months. OCC have agreed to undertake this work.		WODC to co-ordinate actions of OCC with users of caravan park.		This will ease flooding of the caravan park by ensuring highway run-off does not enter.	This will not cause or exacerbate flooding in other areas.	Design Costs = £0.5K Capital Costs = up to £5k.	

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D	Flood protection bund to be provided to corral the whole site. New access and egress to be provided over the bund and utilities through the bund.	EA to provide a flood protection bund to corral the whole site. EA to provide flood compensation works as required. EA advise that COBA would make this scheme low priority.			New access and egress to be provided over the bund and utilities through the bund.		Caravans would be protected but EA COBA makes this scheme low priority.	Construction of the bund will require flood compensation works elsewhere. This could be provided by lowering the river bank level and extending the flood plain between Northmoor Lock and Bablock Hythe.	Design Costs = £5K Capital Costs = £20K to £50K.	
E	Sluice gate to be provided to control water levels and flow in the Enmained ditch at the northern caravan site boundary. Sluice to be fully open during storm events and manually lowered 24 hours post the event if the river levels rise excessively. Requires Park Manager and EA to monitor Thames flood level and operate sluice accordingly.	EA to provide a sluice gate to control water levels and flow in the Enmained ditch at the northern caravan site boundary. Sluice to be fully open during storm events and manually lowered 24 hours post the event if the river levels rise excessively. Requires EA/ Park Manager to operate sluice accordingly.			WODC to co-ordinate works with this proposal.	Park Manager to monitor Thames flood levels in conjunction with the EA and operate sluice gate accordingly. Low cost option that could be implemented within the next 12 months. Farmer & Greenwood Parks comments required.			Design Costs = £0.5K Capital Costs = up to £5k	
F	Swale (SUD) and balancing pond to be constructed in adjacent field to the north of the park with a control structure to regulate outflow.	EA to construct a balancing pond at the junction of two Enmained ditches in the field to the north of the caravan park with a control structure to regulate outflow.			WODC to co-ordinate works with this proposal.	EA to negotiate land acquisition, with farmer to the north of the caravan park (Mr Ireland), to construct a balancing pond.	Balancing pond to be designed for a 1:100 year return period. This option only controls flow upstream of the caravan park.	Adjacent field required to construct balancing pond.	Design Costs = £10K Capital Costs = £50K to £100K	
G	Northern Enmained boundary ditch to the caravan park to be diverted to cross the field 50m to the north. This new ditch would intercept water from the west and require an alternative outfall into the River Thames. When flooding occurs adjacent caravans would be protected as remote from the flooding source.	Northern Enmained boundary ditch to the caravan park to be diverted to cross the field 50m to the north. This new ditch would intercept water from the west and require an alternative outfall into the River Thames.			WODC to co-ordinate works with this proposal.	EA to negotiate land, with farmer to the north of the caravan park (Mr Ireland), to construct the ditch diversion.	This option reduces the risk of site flooding caused by rising river levels.	New ditch required in field to the north of the caravan park.	Design Costs = £2K Capital Costs = £20K to £50K	
H	Repair breach in Moreton to Bablock Hythe bank and ditch. Provide a control outfall into the River	EA to construct a sluice gate/ non-return valve from the			WODC to co-ordinate works with this proposal.		This option prevents rising		Design Costs = £2K	

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	Thames through the construction of a sluice gate/non-return valve. This will prevent water backing up from the River Thames and flooding the caravan park.	Enmained Moreton to Bablock Hythe ditch into the River Thames. This will prevent water backing up from the river flooding the caravan park.					water levels in the River Thames flooding the caravan park. Surface water discharge is limited however if the non-return valve is closed.		Capital Costs = £5K to £20K	
Area 2 – Northmoor village										
	Following periods of heavy rain properties flood in Northmoor village. This is caused by any or a combination of the following problems: (i) Inadequate maintenance to the River Windrush and tributaries. (ii) Ineffective control of downstream sluice gates. (iii) Excessive surface water reaching the combined sewer running through the village. (iv) The village pumping stations becoming overloaded.									
A	Maintain Enmained watercourse that runs through the front gardens of properties in Northmoor village. Ditch to be cleared out, de-vegetated, dredged, trees cut down, culverts enlarged. Work to be carried out from "Wayside" to Pinnocks Farm. Ensure a regular maintenance strategy is devised and maintenance undertaken at regular intervals e.g. every year.	EA to maintain Enmained watercourse that runs through the front gardens of properties in Northmoor village. Watercourse to be cleared out, de-vegetated, dredged, trees cut down, culverts enlarged. Work to be carried out from "Wayside" to Pinnocks Farm. Ensure a regular maintenance strategy is devised and maintenance undertaken at regular intervals e.g. every year.			WODC to co-ordinate works with this proposal.	Private riparian owners to co-operate with EA during watercourse clearance and culvert enlargement works.	This scheme will ease flooding in the village by allowing water to escape more quickly.	This will not cause or exacerbate flooding in other areas.	Design Costs = £2K Capital Costs = £5K to £20K	
B	River Windrush Enmained tributaries, south of Northmoor village, to have sluice gates operated correctly in times of heavy rainfall. Sluice gates should be set to allow flood meadows to flood.	EA to ensure that River Windrush Enmained tributary sluice gates, south of Northmoor village, are operated correctly in times of heavy rainfall. Sluice gates should be set to allow flood meadows to flood.			WODC to co-ordinate works with this proposal.	Downstream River Windrush tributary riparian owners to co-operate with the EA.	If a flooding control strategy is adopted and employed this scheme will be very effective in times of peak rainfall.	Downstream land is flooded to ease flooding in the village.	Design Costs = £0.5K Capital Costs = up to £5k	

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C	Investigate all properties in Northmoor village to ensure all roof, yard and highway drainage connects to the village bisecting watercourse and not the combined sewer running through the village. Excessive water is currently reaching and overloading the village pumping stations (Red Lion, Clarks Farm) in times of peak rainfall.			Thames Water to investigate all properties in Northmoor village to ensure all roof, yard and highway drainage connects to the village bisecting watercourse and not the combined sewer running through the village. Thames Water to make adjustments to each property as required.	WODC to co-ordinate works with this proposal.	Access to undertake drainage modification works required.	This scheme should totally remove risk of foul sewage flooding into people's properties. The combined sewer will become a foul sewer only.	This will not cause or exacerbate flooding in other areas.	Design Costs = £2K Capital Costs = £5K to £20K	
Area 3 – Moreton village										
	Following periods of heavy rain properties flood in Moreton village. This is caused by the overflowing of Newbridge Cut and Northmoor New Cut. Both Newbridge Cut and Northmoor New Cut are Enmained watercourses and form part of the River Windrush delta at its confluence with the River Thames.									
A	Undertake a full flood zone modelling study, including effect of gravel abstraction, of the Windrush delta including Newbridge Cut and Northmoor New Cut. Prepare flood control options from the Study conclusions drawn.	EA to undertake a full flood zone modelling study, including effect of gravel abstraction, of the Windrush delta including Newbridge Cut and Northmoor New Cut. Prepare flood control options from the Study conclusions drawn.			WODC to liaise with EA regarding this proposal.	Hanson's in conjunction with the EA to prepare a satisfactory flood defence solution with regard to their proposed quarrying operation	Robust flood defence improvement options can be drawn from the Flood Model.	Report to review effect of gravel abstraction on the flood plain.	Study Costs = up to £5k	This is complex issue which requires further investigation before decision can be made.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Area 1 – Bablock Hythe

7.1.1 Maintenance

The following on-going maintenance is recommended:

- The ditches entering the caravan site at the northern and western boundaries are enmained ditches and the responsibility of the EA. Ditches to be cleared out by the EA ASAP.
- Residents are to be encouraged not to tip refuse (garden and household) into the adjacent watercourse.
- Separate maintenance strategies are to be developed by the EA if Solution E (Sluice Gate), Solution F (Balancing Pond) or Solution G (Ditch Diversion) is to be implemented.

7.1.2 Flood defence improvement schemes

The following flood defence improvement schemes are recommended:

Immediate (under 1 year)

- Option C - OCC to provide 4 gullies at entrance to the Caravan Park. This has been agreed with Wayne Barker of OCC.
- Option H – EA to repair the breach in the Moreton to Bablock Hythe flood bank and ditch (which is Enmained) and construct a sluice gate or non-return valve outfall into the River Thames.

Mid-Term (under 1-2 years)

- Option A – Greenwood Parks to raise level of caravans. Level to be ascertained by the EA.
- Option E – EA to provide a sluice gate to control the ditch out / inflow.

7.2 Area 2 - Northmoor Village

7.2.1 Maintenance

The following on-going maintenance is recommended:

- The Enmained watercourse that runs across the frontage of properties in Northmoor village is to be cleared out once per year by the EA.
- The River Thames and River Windrush tributaries running south of Northmoor village are to be kept free from fallen trees and debris by the farmer or land owner.
- The sluice gates on the River Thames, River Windrush, tributaries and Enmained watercourses to be repaired and serviced by the EA.

7.2.2 Flood Defence Improvement Schemes

The following flood defence improvement schemes are recommended:

Immediate (under 1 year)

- Option A – EA to clear the Enmained watercourse that crosses the front gardens of properties in Northmoor village (see attached photographs).
- Option B – EA to ensure correct use of sluice gates with downstream riparian owners to prevent village from flooding.

Mid-Term (under 1-2 years)

- Option C – Thames Water to redirect all private properties surface water flow to adjacent watercourse to convert combined sewer into foul only.

7.3 Area 3 – Moreton Village

Immediate (under 1 year)

- Option A – Undertake a full flood plain modelling study, including effect of gravel abstraction, of the Windrush delta including Newbridge Cut and Northmoor New Cut. Prepare flood control options from the Study conclusions drawn.

Appendix I: Photos



Area 1 – Bablock Hythe

Caravan at Thameside Caravan Park demolished as a consequence of severe flood damage



Area 1 – Bablock Hythe

Thameside Caravan Park northern boundary ditch to be cleared out



Area I – Bablock Hythe
Thameside Caravan Park undergoing flood improvement works



Area I – Bablock Hythe
Caravan at Thameside Caravan Park jacked up by 300mm



Area 1 – Bablock Hythe

Flooded caravan at Thameside Caravan Park to be raised by 300mm



Area 1 – Bablock Hythe

Caravan at Thameside Caravan Park jacked up by 300mm



Area I – Bablock Hythe

Entrance to Thameside Caravan Park showing locations where road gully improvements required



Area I – Bablock Hythe

Entrance to Thameside Caravan Park showing locations where road gully improvements required



Area 2 – Northmoor Village

River tributaries south of Northmoor village requiring improved management to assist village run-off



Area 2 – Northmoor Village

River tributaries south of Northmoor village requiring improved management to assist village run-off



Area 2 – Northmoor Village

Sluice gate between River and adjacent watercourse to be repaired and maintained regularly



Area 2 – Northmoor Village

River Windrush south of Northmoor village



Area 2 – Northmoor Village
Overgrown village brookcourse at Pinnocks Farm requiring cleaning out



Area 2 – Northmoor Village
Overgrown village brookcourse at “The Patch” requiring cleaning out



Area 2 – Northmoor Village
Village brookcourse requiring upsizing of crossing culverts



Area 2 – Northmoor Village
Choked village brookcourse culvert to be cleared out and culvert upsized



Area 2 – Northmoor Village
Overgrown village brookcourse requiring cleaning out and ditch re-profiled



Area 2 – Northmoor Village
Choked village brookcourse at "Waylands" requiring cleaning out and ditch re-profiled



Area 3 – Moreton



Area 3 – Moreton



Area 3 – Moreton (Rose Revived PH)



Area 3 – Moreton (Gravel Poster)



Area 3 – Moreton



Area 3 – Moreton