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EAST HUNSBURY

COMMUNITY FLOOD RISK AND MITIGATION INVESTIGATION

&

COMMUNITY DRAINAGE MAINTENANCE PLAN

Project: Northamptonshire Pathfinder 3

Client: Emergency Planning Team
West Northamptonshire Council
One Angel Square
Angel Street
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Prepared by: David Smith Associates

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REVISION SCHEDULE

East Hunsbury

Community Flood Risk and Mitigation Investigation

Community Drainage Maintenance Plan

David Smith Associates Reference : 20/37831/EAS

Rev	Date	Details	Author	Checked	Approved
01	30/08/22	Draft report.	Bob Turrell (David Smith Associates)	Kathryn Chinn (Partnerships and Strategic Overview, Environment Agency)	Simon Bowers (Assistant Director, Assets and Environment, WNC)
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03	19/04/23	FRMA comments incorporated.	Bob Turrell (David Smith Associates)	Kathryn Chinn (Partnerships and Strategic Overview, Environment Agency)	Simon Bowers (Assistant Director, Assets and Environment, WNC)

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APPENDICES

1. INTRODUCTION

1.1 Pathfinder 3 Project

1.1.1 East Hunsbury has successfully applied to be part of the Pathfinder 3 Community Flood Resilience Project run by West Northamptonshire Council (WNC) and North Northamptonshire Council (NNC). The project aims to assist community-led improvements in resilience and preparedness for communities who are at risk of surface water flooding.

1.1.2 The project is funded by the Anglian Northern Regional Flood and Coastal Committee and builds on the Pathfinder 2 scheme, which worked with 30 communities over the past three years.

1.1.3 The community will benefit from a flood survey undertaken by civil engineers, training for flood wardens and support in developing community action plans and longer term solutions. The project will also help communities to increase their understanding and preparedness for all emergency situations such as extreme weather and power cuts. There will be community events to keep you up to date with the project and to discuss the findings from the survey. In return, the community of East Hunsbury will need to identify community members to be flood wardens and assist the council in organising and promoting these events.

1.1.4 There will be opportunities to bring together all community organisations under the Pathfinder 3 banner, as existing local groups have the knowledge and contacts to be able to support one another in any emergency situation. Colleagues from Northamptonshire Police, Northamptonshire Fire & Rescue Service, the Environment Agency, Local Councils, and other key partners are also committed to supporting the scheme and community engagement events.

1.2 Community Flood Risk & Drainage Maintenance Report

1.2.1 David Smith Associates have been commissioned by WNC to prepare this report which brings together findings from various investigations which include:

- A review of existing mapping and data-sets provided by WNC, such as flood mapping, local authority asset maps, geological maps and flood report history;

- A visual walkover survey of large areas of the community and the overall catchment. This survey is carried out on foot with the aim of inspecting the main ditches, watercourses, pipes, culverts, and other flood related assets in the surface water catchment area. These features are added to a map of the community together with a photographic record.
- The extent of investigation and survey work was limited to the immediate surface water catchment area affecting the community. The walkover survey was limited to one day and generally did not deviate from the public highway and rights of way.

1.2.2 The report is structured in the following way:

- Section 2 ‘East Hunsbury’

  This broadly describes the various types of drainage system present in the community and problems that can arise with them that could lead to flood risk. The main responsibilities are defined and gaps in information are noted.

- Section 3 ‘Main Recommendations’

  This establishes the main principles for reducing flood risk in the community.

- Section 4 ‘Flooding History’

  This lists the history of flood reports for the community that is held on record at WNC. The Community Flood Warden is encouraged to expand on this list to provide a broader picture of flooding in the community. This helps to identify vulnerable areas and properties which can advise the Community Emergency Plan. It can also help to prioritise potential action areas for future investigations and work.

  It is recommended that any flooding events not included on this list should be reported retrospectively to WNC via the Flood Toolkit.

  https://www.floodtoolkit.com/emergency/report-flood/

- Sections 5 & 6 ‘ Types of Drainage System and Generic Inspection and Maintenance Schedules’

  This section introduces the various types of drainage system that can be found in the community. It aims to describe the main features and how they can be maintained in good working order. These sections do not try to apportion ownership or maintenance responsibilities as this will vary on a case by case basis.

- Section 7 ‘Specific Investigations and Maintenance’

  Based on the limited investigations carried out as part of the Pathfinder 3 project, specific areas are identified in the community for further work that could reduce flood risk. These are loosely listed in priority order. The list is not exhaustive, and the community may be aware of other important work areas that are not listed.

  In the first instance, the Flood Warden and local community can review the recommendations and determine which, if any, could be moved forward with the support of the community, landowners, Parish Council and other local authorities.

  Some works are likely to require funding from external sources. A leaflet is available on the Flood Toolkit which can help identify sources of funding.

  https://www.floodtoolkit.com/wp-content/uploads/2017/03/7.Funding-flood-alleviation.pdf

- Sections 8 & 9 list useful contacts and web links for the community to use.

- Appendix A ‘Catchment Plan’

  This map shows the overall surface water catchment area for the community, which is then split into sub-catchments at a more local level. The lines on the map denote the ridge lines of the ground. These are the high points (the ‘top of the hill) where surface water will flow down to the lower areas.

  The map can help to split a community into manageable chunks. It can help in understanding the wider area that surface water can flow from to create watercourses. This can then help when considering what options there may be over the wider catchment to reduce flood risk.

- Appendix B ‘Investigation Plan’

  This again shows the catchment areas, and also shows the main watercourses in the community. Ditches and assumed pipe/culvert locations have been added to the plans following the community walkover survey.

  Many ditches and pipes have not been recorded on maps before, so this is a good starting point for the community to continue to add further information.

  A traffic light system has been used to denote the condition of the ditch/watercourse at the time of the survey. This can help to identify where maintenance work is needed.

- Appendix C ‘Maintenance Plan’

  Local Authority asset records have been added to this plan. This includes road gullies, bridges, public sewers, main rivers etc.

  This can help the community to understand which authority is responsible for different parts of the drainage systems in the area. Any drainage systems in the community which are not shown on the plans are possibly privately owned and will require the community to take steps to establish ownership and maintenance responsibilities.

  The areas recommended for specific investigations and maintenance in Section 7 are highlighted on this plan as a numbered yellow star.

- Appendix D ‘Flood Risk Mapping’

  Flood Risk Mapping is available on-line via the Flood Toolkit:

  https://www.floodtoolkit.com/risk/

  or the Government Long Term Flood Risk Map

  https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

  There are separate maps for two types of flooding.

  Fluvial flooding is the risk of flooding from rivers or the sea. This is generally modelled for Main Rivers only and aims to reflect how water levels can rise into the natural flood plain.

  Pluvial flooding is the risk of flooding from surface water. This aims to show the approximate pathways surface water will take as it accumulates from the tops of hills to low points.

  The flood risk maps can help to identify vulnerable areas that can be included in the Community Emergency Plan.

- Appendix E ‘Photographs’

  Photographs of drainage systems were taken during the community walkover survey. These are included to help the community identify and locate these on the ground. They record the condition of the drainage system at a particular moment in time, and this can be used to monitor any changes going forward.

  The map indicates the approximate location of the photograph.

2. EAST HUNSBURY

2.1 Location

2.1.1 East Hunsbury is located in the south of Northampton. It comprises residential areas of Merefield, Blacky More and Collingtree Park.

2.1.2 The area is bounded by the A45 London Road at the east, A5076 Mere Way at the north, Towcester Road and the London Northwestern Railway at the west, and Wootton Brook at the south.

2.1.3 The residential areas comprise housing, schools and other municipal buildings, a supermarket and numerous parks. A golf club is located partly on the north side of Wootton Brook.

2.2 Watercourses and Drainage Systems

Catchments

2.2.1 The Catchment Plan in Appendix A shows the approximate sub-catchment areas that feed the watercourses and drainage systems.

2.2.2 The surface water catchment area is almost completely self-contained within the East Hunsbury area. The general topography falls from north to south, with Mere Way being the top of the hill.

2.2.3 Wootton Brook originates approximately 10km to the east at Salcey Forest and Yardley Chase.

Watercourses

2.2.4 Wootton Brook flows east to west through the valley of the East Hunsbury catchment. It flows into the area via the A45 London Road bridge at the east. It becomes a series of artificial online lakes as part of the golf club. The depth of water in the lakes is controlled by occasional weirs. There are numerous footbridges across the watercourse channels between the lakes.

2.2.5 After flowing under Windingbrook Road bridge, the channel of Wootton Brook becomes more linear, with offline lakes and more footbridges. The brook continues west under the railway and Towcester Road. It then continues west and north, through West Hunsbury and Hunsbury Meadows, before joining the River Nene south of Upton.

2.2.6 Wootton Brook is classified as a Main River. Main Rivers are those shown on the Statutory Main River Maps held by the Environment Agency. Whilst the Environment Agency has permissive powers to carry out works of maintenance and improvement to manage flood risk on these rivers, Riparian (private) ownership and maintenance responsibilities are still applicable.

2.2.7 All other watercourses in and around East Hunsbury are Ordinary Watercourses in Riparian (private) ownership. They are normally the responsibility of the owner of the adjoining land, even when they are culverted. These Ordinary Watercourses take the form of minor streams, ditches or buried pipes. They receive the natural run-off from the surrounding land and run-off from roads and buildings. Occasionally the Highway Authority have maintenance responsibilities for structures where watercourses cross under the public highway, but not always.

2.2.8 Three significant watercourses are identified through the residential areas of East Hunsbury. The first flows northeast to southwest through the Penn Valley Park area of Merefield. It is generally an open watercourse until it enters a culvert at Hilldrop Road. The precise route of the culvert is not recorded, but is believed to flow south down Hilldrop Road before turning west on Rowtree Road. This issues to sections of open watercourse north of Collingcroft Close before being culverted again to turn south to Wootton Brook.It is then culverted to the southwest for almost 100 metres. It issues south of Swallow Close, 20 metres north of where it flows into Wootton Brook.

2.2.9 The second watercourse flows north to south from Blacky More, through the middle of Collingtree Park. It is an open watercourse flowing south from Rowtree Road and under the east end of Augusta Avenue, before it joins Wootton Brook.

2.2.10 The third significant watercourse originates from the valley of Grange Wood Park. This enters a culvert at the south end of the park, near Lapwing Close. The precise route of the culvert is not recorded, but is believed to flow south through Swallow Close to an open channel 20m north of Wootton Brook.

2.2.11 Culverts under Penvale Road and Augusta Avenue are recorded as Highway structures maintainable at public expense. No plans or ownership records for culverts from Grange Wood Park or Hilldop Road were available. Determining the ownership and responsibilities for these systems is considered a priority going forward.

2.2.12 There is evidence of other minor watercourses relating to localised valleys through the residential area. Open watercourse outfalls flowing into Wootton Brook are noted south of the west end of Augusta Avenue, and south of Chaffinch Close.

Public Sewers (Anglian Water Services)

2.2.13 Anglian Water foul and surface water public sewers are recorded throughout the developed areas of East Hunsbury. Surface water sewers receive rainfall runoff from private roofs and paved areas, and the public highway. Foul water sewers are a separate network which receives foul wastewater from sanitary appliances.

2.2.14 The sewer networks are generally located in public areas. Most of the networks follow natural ground levels/valleys, flowing south through residential areas, increasing in size and capacity. Surface water sewers outfall at Wootton Brook, or at Augusta Avenue watercourse. Foul water sewers join a trunk sewer that flows west on the north side of Wootton Brook.

2.2.15 There are some areas where no surface water public sewers are recorded, such as Fleetwind Drive and Penn Gardens. There may be areas where drainage networks were not adopted by AWS following construction by a developer, or where record maps require updating.

2.2.16 Since October 2011 under the 'Private Sewer Transfer Regulations', private drainage systems that were connected to a public sewer on 1st July 2011, were transferred to AWS in specific circumstances. There are likely to be many private drainage systems in East Hunsbury which have been transferred to AWS under these regulations, but which are not yet recorded.

Highway Drainage

2.2.17 Roads and footways within the public highway are generally drained by road gullies. In East Hunsbury, these are likely to be connected to the AWS surface water sewer network.

2.2.18 Road gullies are normally provided to drain normal rainfall runoff from the public highway close to the system only. There is normally no allowance for additional flow from private property or cumulative exceedance flows from higher areas of the catchment.

2.2.19 .The Highway Authority have a responsibility to maintain road gullies and their connection pipes for the purposes of draining the Highway only. They do not necessarily own or maintain the drainage systems or watercourses that the gullies are connected to.

Other Drainage/Structures

2.2.20 Culverts beneath railways are owned and maintained by Network Rail.

2.2.21 Individual property owners are responsible for their drainage systems. These can comprise of roof gutters and downpipes, gullies/channels for external areas, and any buried pipework that serves their own property only.

2.3 Potential Flood Risks

2.3.1 The main risk of flooding in East Hunsbury is surface water (pluvial) flooding. This is generally caused by heavy, prolonged rainfall beyond the limited capacity of drainage systems and culverts. This causes drainage systems to become less effective at collecting and conveying rainwater. This leads to uncontrolled overland flood flows. These uncontrolled flows generally follow historic natural valley formations. This can cause flooding to properties where they have been constructed in the historic natural flow path of water.

2.3.2 There is also a risk of river (fluvial) flooding from Wootton Brook. This is caused by the river becoming deeper due to rainfall and exceeding the channel capacity. Properties constructed in low lying areas near to the river can be affected. River flooding can occur with a delayed response to the initial rainfall event, as surface water and ground water enters the river channel from the much larger catchment area.

2.3.3 Watercourses through East Hunsbury are culverted as they pass under roads or other development. Each culvert and structure on the watercourse system introduces a point with a limited capacity for water flow. They can be susceptible to blockage during heavy rainfall events, or due to lack of maintenance. Inparticular where debris grilles are installed over pipes, which can quickly become blocked.

2.3.4 Roads can channel the flow of water quickly to low points where vulnerable properties could be affected. It is important to try to drain water off the road and into watercourses or drainage systems where the water can be managed.

3. MAIN RECOMMENDATIONS

3.1 Optimising Water Flow

3.1.1 The intention is to establish the exact locations, routes and purpose of all historic and newer drainage systems. The ownership, condition and effectiveness of these systems can then be assessed and consideration given to a programme of community-led inspection, routine maintenance and possible improvement works.

3.1.2 These works will provide the best chance for water to flow through the community, staying within watercourses and drainage systems instead of overtopping onto roads and vulnerable areas.

3.1.3 Following initial maintenance, key parts of the drainage systems can be readily inspected and cleared routinely and when weather warnings are received.

3.2 Slowing the Flow

3.2.1 Various Natural Flood Management techniques can be used to slow the flow of water into and through watercourses, and to provide areas of temporary storage of water in safe areas higher in the catchment.

3.2.2 These can include the creation of wetlands and holding basins, areas of vegetation/woodland, and land and soil management.

3.2.3 This recommendation would also include measures to create managed overland flood flow routes. These can be created to encourage excess flood water to flow away from vulnerable areas.

3.3 Becoming Resilient

3.3.1 Having a Community Flood Warden and agreeing a Community Emergency and Flood Plan are key to being prepared for a flood event. This can reduce the risk to the community and limit the damage caused by flooding.

3.3.2 Ongoing actions include regular inspection, maintenance and reporting of issues with watercourses and drainage systems.

3.3.3 Actions to take before, during and after a flood can also be made clear to all members of the community, with specific roles to help minimise the impacts of flooding.

3.3.4 Property Level Resilience measures can help to protect individual properties from the worst impacts of flooding.

4. FLOODING HISTORY

4.1.1 Basic details of flooding and impacts provided by community representatives and WNC records.

Date	Description
Unknown date	2 properties on Marlowe Close flooded following prolonged rainfall.
2004	South entrance to Hunsbury Hill railway tunnel flooded.
2005	At least 1 property on Lichfield Drive flooded.
16/06/2007	3 properties on Lichfield Drive flooded due to weather conditions. Mere Way flooded.
August 2012	Runoff from Grange Wood Park flooded Rowtree Road.
03/03/2016	Wootton Brook flooded golf course.
09/03/2016	Flooding to open area near Spyglass Hill.
April 2018	Reports of flooding issues at culverted watercourse under Augusta Avenue, due to maintenance issues.

27/05/2018	Surface water flooding across the county caused by intense heavy rainfall. Footway in Penvale Park washed away by surface water runoff. Flooding to Mere Way Fire Station. 2 properties on Swallow Close flooded by runoff from Grange Wood Park. 4 properties on Marlowe Close flooded by runoff from Penvale Park. 5 properties on Lichfield Drive flooded by runoff from Penvale Park. 2 properties on Avebury Way flooded by exceedance of drains on Avebury Way and Clannell Road. 12 properties on Thames Road flooded by runoff from higher ground. 6 properties on Downsway flooded by runoff from Rowtree Road 6 properties on Augusta Avenue flooded, from exceedance of the watercourse or by runoff from higher ground. 1 property on Crofters Close flooded by runoff from higher ground. Flooding to Hilldrop Road at junction with Lichfield Drive. Flooding to areas of Wootton Park School. Flood Incident Investigations were carried out by the Lead Local Flood Authority following flooding in East Hunsbury in May 2018. These can be found at: https://www.floodtoolkit.com/wp-content/uploads/2019/11/18_30625_Crofter-Augusta-Turnberry_Rev04_311019.pdf https://www.floodtoolkit.com/wp-content/uploads/2019/09/18_30621_East-Hunsbury_Rev04_090819.pdf https://www.floodtoolkit.com/wp-content/uploads/2019/07/18_31130_Thames-Road_Rev04_240719.pdf

5. TYPES OF DRAINAGE SYSTEM

5.1 Ditches and Natural Watercourses

5.1.1 Description of Ditches and Watercourses

For the purposes of this report, the following broad distinctions are made:

- Streams and rivers are generally natural and follow ancient pathways through the landscape formed by ground levels and geology. Hereafter referred to as ‘natural watercourses’.
- Ditches are generally man made and have been cut for hundreds of years to improve the drainage of parcels of land as it has been developed out of its natural state. They often follow land boundaries such as fence and hedge lines and roads. Hereafter referred to as ‘ditches’.

Ditches and natural watercourses are the main elements for the natural drainage of rainwater from the land. They collect rainwater from all areas of the land and convey it eventually to the ocean. They are the eventual outfall for most surface water sewerage systems, and for treated foul waste water.

When they are well maintained and operating as intended they can be very effective at collecting, storing and conveying rainwater in a safe way, however they are not always designed for severe rainfall events. This can reduce the amount of surface water flowing off areas of land putting homes and businesses at risk of flooding.

Good land management and drainage helps farmers to maintain optimum soil conditions for growing crops, and to improve the health and safety of livestock.

Some ditches are cut very flat so that they store rainwater for long periods of time, which helps the main watercourses and rivers to cope with heavy rain.

Ditches and watercourses are important habitats for wildlife and are attractive to look at. There must always be a balance between maintenance for drainage purposes and retaining the bio-diversity of these features. A controlled amount of vegetation can help to slow water flow and clean polluted water.

Silt and debris can accumulate in ditches and natural watercourses, sometimes reducing the carrying capacity. This material can rot down like compost, accumulate and change the profile of the watercourse, therefore the hydrodynamics.

The original lines of old ditches can often be identified by a combination of assumptions and evidence. For example, a hedge line at the low point of a natural valley with localised soft decomposed material would be a clear sign of a historic ditch that is no longer maintained. A lost ditch of this type may have been slowly filling with silt and debris for many decades.

It is important to re-establish historic ditches to help the management of land drainage over the wider area.

5.1.2 Maintenance of Ditches and Watercourses

There are three main aspects to ditch and natural watercourse maintenance.

1. Keep growth of vegetation under control

   To allow water to flow freely and make inspections easier.

   - When trimming vegetation it is important to consider any impact on biodiversity. Mowing of banks around ditches should be minimised during the animal breeding season of March to mid-July.
   - Some trees may have tree protection orders (TPOs) on them so if in doubt check with your local planning authority.
   - It is recommended to cut only up to just above the water level on one side of the watercourse, leaving the fringe of the bank uncut, thereby maintaining some habitat as well as enabling a free flow of water in the ditch.
   - Cuttings from any clearance work should be removed from the channel to avoid it causing blockages downstream. Putting removed material too close to the top of the bank can lead to it falling back in during times of flooding.
   - It's worth noting that you don't always have to remove all vegetation to allow water to flow. In fact keeping some vegetation can be beneficial for wildlife and to prevent erosion.

2. Remove loose debris, litter, grass cuttings, rubble, fallen trees etc.

   To allow water to flow freely and make inspections easier.

   - Remove any physical obstructions such as large rocks, rubble, fallen trees and branches and other waste materials (litter, grass cuttings etc) so that water can flow freely.
   - All non-organic waste should be completely removed off site and disposed of in an appropriate manner.
   - Any green waste resulting from the maintenance of ditches can be left a safe distance from the bank for a few days to allow any organisms to move back into the watercourse, after which the green waste should be removed so it doesn't wash back into the watercourse.
   - Ensure that any disturbed debris does not end up flowing downstream and causing problems for other landowners.
   - Do not store anything alongside the watercourse which may interfere with maintenance, affect the stability of the bank or get washed into the channel.

3. Remove excess silt

To restore the original size and shape of the ditch or watercourse.

- Make an assessment of the original depth and shape of the ditch or watercourse, or determine what would be sufficient to allow the proper flow of water.
- Particular attention should be given to the shape of a ditch or watercourse adjacent to any structure where it flows into a pipe or culvert. This is so that water can flow unobstructed into the pipe or culvert.
- Silt should be removed along the length of the ditch to ensure water can flow, without obstruction, in the right direction.
- If there are any pipes into or out of the ditch you should remove silt to 150mm below the bottom of the pipe(s).
- Where possible, try to maintain the original slope and cross section of the ditch when de-silting. If the slope of the ditch is altered it can change the flow pattern, cause erosion or increase flood risk either upstream or downstream.
- As long as the silt is non–hazardous you can put it on the bank of the watercourse temporarily. Depositing silt on top of the banks of the watercourse allows for any organisms to move back into the ditch. After a few days the excavated material should be permanently removed.
- It is essential that this material does not then block any other ditches or nearby roads, or stop water draining into the ditch if it would normally do so (e.g. from higher ground into the ditch).
- The silt must be deposited as close as possible to where it was dredged from either on the bank of the waters from where it was taken or on land directly next to the watercourse. This may require and depends upon consents and permissions, local land use, toxin probability and machinery used.

  If you think that the material may be hazardous – for instance if it contains oils or other waste – please see guidance online for methods of disposal

  https://www.gov.uk/government/collections/waste-exemptions-disposing-of-waste

  or contact the Environment Agency for advice.

5.1.3 Risks of Maintenance Work

When undertaking works within or adjacent to a watercourse, landowners must assess their works to ensure that they can be undertaken without putting themselves or others at any kind of risk. Due to the range of risks posed by both open and culverted watercourses, landowners should assess this on a case-by-case basis.

If the person that is to carry out the work is unsure of the risks, their abilities or any other aspect of the task, professional help and guidance should be sought.

In particular you should consider the risks posed by working:

- in deep silt or mud.
- on slippery banks near water.
- in/near deep or fast flowing water.
- near roads.

- with plant or machinery.
- around culverts and enclosed spaces.
- cutting down or working near trees.
- Weil's disease (flu like symptoms) or Lyme's disease (rash).

If in any doubt you should always seek advice.

You should always make sure you follow these rules to help protect your health:

- Wear protective clothing such as gloves.
- Cover any open wounds such as cuts and scratches with waterproof plasters.
- Carefully clean any cuts or scratches obtained during the work near water.
- Wash thoroughly and as soon as possible if you have entered the water.
- See a doctor if you start to feel unwell after working near water. This includes flu like symptoms and fever or a rash.

5.1.4 Looking After Wildlife

Ditches can form very important habitats and may contain important species of flora and fauna that are protected under the Wildlife and Countryside Act 1981. There may be invasive species which are controlled by the Environment Agency and Natural England. It is illegal to trap, remove or kill some invasive fauna, if in doubt seek professional advice.

There may be protected species, including native crayfish, water voles, great crested newts, nesting birds and bats. If you think that the area you are considering maintaining may contain protected species, please seek further advice before proceeding.

Various methods for reducing the impact of maintenance works on the environment are suggested in the next two sections below, such as using hand tools to clear obstructions to the flow of water, rather than completely removing vegetation from the ditch using machinery.

Through careful maintenance planning alternate stretches of a watercourse can be worked on each year. This ensures there is always a healthy vegetated area where wildlife disturbed by maintenance can migrate to. It must be remembered however, that there must always be a clear free flow of water at all times.

5.1.5 Timing and Frequency of Maintenance

For all watercourses it is good practice to develop a program that sets out how often you will carry out maintenance works. Most watercourses require annual maintenance to some degree and the best time to undertake works is in mid-Autumn in preparation for increased winter flows.

Ensure that you undertake the majority of your clearance works after the vegetation has begun to die back in late September/October. At this time of year, there is also less likely to be wildlife nesting or breeding in or near ditches.

You should try to carry out the works when the water level is at its lowest i.e. when there has been little rainfall.

Plan your maintenance to ensure that stretches of habitat are left intact, for example by trimming alternate banks or lengths of ditch each year. This ensures that there is always a healthily vegetated area where wildlife disturbed by maintenance can move to without being forced to leave the ditches.

If protected species have been recorded in your ditches you must ensure their habitats are not adversely affected.

Trash / weed screens and grilles should regularly be checked all year round, but, especially at times of anticipated high flow.

Debris in ditches should be removed as soon as it possible after it is observed, and disposed of appropriately.

In culverted watercourses, your program should inspect the culvert for blockages or signs of collapse. If such problems are identified before a total obstruction to the watercourse occurs, it reduces the likelihood of flooding incidents. Many drainage companies will undertake jet cleaning or camera surveys within culverts, or you can rod the culverts to check for blockages.

5.1.6 Using the Right Tools

This depends on the scale of the watercourse and the extent of works required. For smaller landowners, maintenance of watercourses is generally best achieved using hand tools, such as saws, spades and shovels, as this is less destructive to habitats, vegetation and the bed of the watercourse.

It is better to undertake frequent, minor works to clear obstructions with small tools, rather than to infrequently remove all vegetation and silt from the bed and banks of a watercourse with heavy equipment.

It is also better to maintain alternate areas at different times rather than removing all vegetation on a length of watercourse in one visit.

Regular minor works will leave healthy vegetation along the bed and banks of the watercourse. This is of importance to the water quality and the wildlife that lives in the watercourse. Of course, if the watercourse has not been maintained for a long time then there may be no option but to undertake major works.

Machinery can clear large stretches of open ditch quickly. If using such machinery, the sensitivity of the watercourse must be considered and maintenance should be planned to ensure stretches of habitat are left intact (potentially by strimming alternate banks or lengths of a watercourse each year).

For culverted watercourses, specialist tools may be needed to jet clean or rod the culvert to clear blockages or to carry out inspections using camera surveys. For culverts or open watercourses many landowners will appoint drainage companies/contractors to carry out maintenance, and it is recommended that landowners who choose to do this always obtain a range of quotes in an attempt to achieve best value.

5.1.7 Staying Legal

Whenever carrying out maintenance to ditches, the landowner must ensure that the works they undertake are legal.

A general rule of thumb is to avoid undertaking heavy works during the period from March to September inclusive. If protected species have been recorded in your ditches, you must ensure their habitats are not adversely affected in any way.

General maintenance of a ditch is unlikely to break the law, but if you wish to alter the ditch in any way, or build near it, you are likely to require permission from the Environment Agency, West Northamptonshire Council, the IDB and the relevant landowners.

Many farmers take part in Countryside Stewardship Schemes, which set clear rules for the maintenance of watercourses, including ditches. If these rules are not adhered to, landowners risk breaking the rules of such agreements and may be penalised.

5.2 Culverted Ditches and Natural Watercourses

5.2.1 Description of Culverted Ditches and Natural Watercourses

Sometimes ditches and natural watercourses are put into underground pipes or culverts, hereafter called ‘culverts’.

This is often so that houses and roads can be built over the top of watercourses.

At the entrance and exit to a culvert there is normally a headwall structure that the pipe is built into.

Sometimes culvert entrances and exits have protective grilles to prevent large debris entering the culvert and causing blockages. On larger culverts these may be in place to prevent animals or people entering the culvert.

5.2.2 Maintenance of Culverted Ditches and Natural Watercourses

As detailed in the ‘Piped Drainage Systems and Manholes’ in Section 5.3, culverts are prone to blockage and collapse. They can build up with silt and debris with no easy way to inspect them.

Specialist equipment is needed to inspect, clean and repair culverts.

Where the ditch or natural watercourse enters a culvert, there is normally a headwall structure with the culvert built in. The bed level of the ditch or watercourse should be maintained at a level that minimises silt and debris being carried into the culvert.

It is good practice to line the bed and banks of a watercourse with cobbles or concrete next to a headwall. This is to reduce the amount of vegetation around the entrance to the culvert, allowing easy inspection and maintenance. If a new construction or major repair is required consent will be needed.

5.2.3 Debris Grilles at Culverted Ditches and Natural Watercourses

Entrance grilles are very good at what they do and therefore can accumulate debris very quickly. They need to be inspected and cleared regularly especially following leaf fall in autumn and during periods of heavy rainfall.

The design of grilles must be agreed with the Bedford Group of Drainage Boards or Environment Agency and permission given prior to installation, as poorly designed grilles can cause an obstruction themselves.

5.3 Piped Drainage Systems and Manholes

5.3.1 Description of Piped Drainage Systems and Manholes

Modern drainage systems for buildings and paved areas collect and convey rain water and foul water.

Rain water is collected by roof gutters, gullies and slot drains. It is usually taken to soakaways, watercourses or a main sewer.

Foul water is usually a fully sealed system collecting water from sanitary appliances in buildings. It is then usually taken to a main public sewer and sewage treatment works. Some properties have their own small treatment system or septic tank.

Once foul water or rainwater is collected, it flows in underground pipes which are usually plastic, clay or concrete.

When other pipes join the main pipe run, or when a pipe changes direction, a manhole inspection chamber is often built.

Manholes are provided to allow inspection of the underground pipework at junctions and changes of direction, and to allow access to long lengths of underground pipes.

Sometimes one pipe will join another at a junction with no manhole. These types of connection are difficult to locate and maintain.

5.3.2 Maintenance of Piped Drainage Systems and Manholes

The main aspects for maintaining a piped drainage system without blockages are:

1. Identifying the routes of pipework between collection points and manhole chambers.

   Using a hosepipe and drain tracing dye, and recording the findings on a plan.

2. Ensuring as little silt and debris as possible enters the underground system.

   Roof gutters, gully pots and slot drains kept clean, only flush dissolvable paper down the toilet and try not to wash fat and food waste down the sink.

   Do not sweep mud and debris into drains.

3. Regularly flush the system with water and monitor the flow out of gully pots and through manhole chambers.

   Any build-up of water which drains away very slowly could indicate a blockage.

   Water disappearing and not flowing to the next manhole could mean the pipe in between manholes is displaced or broken.

5.3.3 Opening a Manhole Cover

There are numerous risks associated with lifting manhole covers and these should all be assessed before proceeding with any work of this kind. A specialist should be employed if there is any doubt or cause for concern.

Manholes should never be entered, even if there are steps provided. You should not open manhole covers owned by the Water Authority or Highway Authority without permission. Do not open manhole covers or gully gratings in the public highway without permission.

Manhole covers come in various shapes and sizes and can be difficult to loosen and lift. A heavy duty screwdriver and crowbar can be used to clear soil and vegetation from around the cover and the key slots. The cover can start to be prised open with these tools.

Manhole keys can then be used to lift the cover from its frame and place it to one side while inspections of the base of the manhole are made from ground level.

It is good practice to sweep any excess soil and debris out of the frame, cut away any grass and soil around the frame, and use a hose to wash down the inside of the manhole before replacing the cover.

5.3.4 Main Failures of Pipes

Pipes can become blocked with silt and debris. This can be mud and stones from roads and driveways, moss from roofs, sticks and leaves.

Blockages that occur in foul sewer systems are often caused by paper, fat, and items that should not be flushed down toilets or put down the sink which build up and cause blockages.

Pipes can move when the ground around them is too soft, they can also be crushed and or collapse. This can cause blockages and could result in water flowing into the soil around the pipes causing dampness and subsidence, which are potentially damaging to buildings. Tree roots can also move pipes and grow into them causing blockages.

5.3.5 Repairing Failures to Pipes

Minor blockages can often be removed using drain cleaning rods with a hose pipe to wash away debris. More serious blockages would need a specialist team with high pressure jetting equipment.

The specialists can look at the inside of underground pipes using a system of cameras and lights. These are pushed up a pipe or driven on a small wheeled robot. The images are viewed on a TV screen and can be made into a DVD. Their report will identify blockages and broken sections of pipes and give recommendations for repair.

The same specialists can sometimes repair collapsed or broken pipes by using patching and lining systems. They can remotely cut tree roots in a pipe.

Often the only way to fix seriously damaged and blocked pipework is to dig down and replace it entirely.

5.4 Road Gullies

5.4.1 Description of Road Gullies

There are various types of gully that drain water from the road and footway surface.

They are normally a square iron grating flush with the road at the bottom of the kerb.

Kerb Offlet gullies are a type of kerb with holes in it, which allows water to flow sideways from the road into a gully pot underneath.

Underneath the main iron grating of a gully is a large pot which collects a lot of the silt and stones that are washed from the road surface. A pipe leads out from the pot which goes to a main drainage system or soakaway.

The outlet pipe from most road gullies has a 'trap' arrangement similar to the u-bend of a toilet. This arrangement prevents any smells from a main sewer coming out, and also helps to keep oil from the road surface in the gully pot.

The main drainage system that a row of road gullies connects to is usually an underground pipe/main sewer, a roadside ditch or a stream/river.

5.4.2 Maintenance of Road Gullies

There are five main aspects to road gully maintenance. Do not open manhole covers or gully grating in the public highway without permission.

1. The road surface and kerb line should be relatively clean.

   To prevent silt, stones, leaves and other debris being washed towards gullies.

   To ensure gullies do not get 'lost' beneath large amounts of silt.

2. The gully grating should be clean and free of debris. Hinges operational and rust free.

   To allow water to enter the gully pot, and to allow simple access.

3. The gully pot should be cleared of silt and debris regularly. All silt and oily water should be removed and disposed of in a managed way.

   To provide maximum silt storage capacity.

   To prevent oils and silt being washed into the outlet pipe and main drainage system causing blockages or pollution.

4. The trap and outlet pipe should be clear and in good repair.

   To allow water to flow out of the gully pot towards a main drainage system.

5. The man drainage system should be clear.

   Ready to receive water from gullies.

5.5 Verge Grips

5.5.1 Description of Verge Grips

In rural areas many roads do not have kerbs or footways. To the side of the road is a grass verge, roadside ditch and hedgerow.

To drain water from the road surface, cuts are made through the grass verge so that water can flow off the road and into a ditch or wide area of verge. These are called Verge Grips.

They serve exactly the same purpose as road gullies and can often take much more surface water from the road while being less susceptible to blockages.

Some verge grips are lined with concrete to stop grass and soil growing over them. This can be considered at critical locations that receive a lot of surface water, or where soil and vegetation are particularly difficult to attend to.

5.5.2 Maintenance of Verge Grips

There are four main aspects to verge grip maintenance.

1. The road surface should be relatively clean.

   To prevent silt, stones, leaves and other debris being washed towards verge grips.

2. The verge grip should be slightly lower than the road surface.

   To allow water to flow off the road into it. When soil and grass builds up to road level this will stop water being able to flow off the road.

3. There should be an easy passage of water from the edge of the road to the ditch.

   Soil and grass can build up along the verge grip. Larger bushes and tree branches can also block flow.

4. The receiving ditch should be well maintained and able to accept the flow of water from a verge grip.

   So that water collected by the verge grip can discharge into it.

5.6 Storage Ponds

5.6.1 Description of Storage Ponds

New development often leads to green fields being built on. This replaces the natural grass, soil and trees with concrete, asphalt and building roofs. This changes the surface water regime within a catchment area.

Rain water normally soaks into the ground to some extent, and flows from the land relatively slowly. This reduces the speed and volume of water entering the natural watercourse.

When a development paves over natural land and introduces buildings, the rainwater is often collected into a drainage system which discharges at a very fast flow rate into a public sewer and ultimately a natural watercourse. All of the rainwater is collected and conveyed by the drainage system with no measures to slow it down or allow it to soak into the ground.

Storage Ponds are one example of how rainwater from a development can be stored on a site to slow down the flow rate and give an opportunity for water to soak into the ground, which helps to replicate the original ‘greenfield’ flow.

Water enters the storage pond via the inlet pipe at a fast flow rate from the drainage system. The outlet from the pond is often a reduced diameter pipe or a flow control valve. This means more water is coming into the pond than can be let out and the pond starts to fill.

The pond will eventually empty, but at a much slower flow rate which is more in keeping with the flow rate from the natural, undeveloped site.

Wet ponds are lined, or constructed in clay soils. These permanently hold a quantity of water but have deep banks to allow extra storage above the normal water level.

Dry ponds are constructed in naturally porous soils. They will normally be empty basins, sometimes with a damp, boggy base. When dry ponds fill up during rainfall, the intention is for them to allow as much water as possible to soak back into the ground.

The inlet and outlet pipes in a pond will normally have a headwall or concrete lining around them. This reduces the amount of vegetation that will grow around them for easier inspection and maintenance.

Outlet flow controls are often housed in a separate manhole near to the outlet pipe.

5.6.2 Maintenance of Storage Ponds

Many storage ponds have well defined ownership and maintenance responsibilities. It is recommended that communities establish what arrangements are already in place through discussions with land owners and local authorities.

This will help to understand what maintenance is required on a case by case basis.The community can then make inspections and encourage the owners to improve maintenance where it is lacking or implement an enhanced maintenance regime with the owners agreement.

There are four main aspects to storage pond maintenance, which are almost the same as those for natural watercourse maintenance.

1. Keep growth of vegetation under control, particularly at inlet/outlet pipes.

   Refer to 3.1.2 Maintenance of Ditches and Watercourses.

2. Remove loose debris, litter, grass cuttings, rubble, fallen trees etc.

   Refer to 3.1.2 Maintenance of Ditches and Watercourses.

3. Remove excess silt.

   Refer to 3.1.2 Maintenance of Ditches and Watercourses.

4. Ensure all inlet/outlet pipework and flow control equipment is in satisfactory condition.

   To allow water to flow freely and make inspections easier.

   Refer to 3.3.2 Maintenance of Piped Drainage Systems and Manholes.

   This may require specialist services such as a CCTV survey team.

   In a worst case situation, headwalls and pipework may need to be rebuilt.

5.7 Information Resources

5.7.1 There is a vast amount of information on the online Flood Toolkit, particularly relating to these matters. Please refer to the following documents for more information:

- Advice on maintaining and clearing ditches: http://www.floodtoolkit.com/pdfs/2%20Ditch%20Clearance/2.Flooding-Ditch-clearance.pdf
- Advice on maintaining and managing a watercourse: http://www.floodtoolkit.com/pdfs/4%20Watercourse%20Management/4.Flooding-Watercourse-Management.pdf
- Advice on the Water Framework Directive: http://www.floodtoolkit.com/pdfs/5%20Water%20Framework%20Directive%20Benefits%20and%20Environment/5.Flood-related-benefits-of-the-water-framework-directive.pdf
- Advice on riparian ownership and flood risk: http://www.floodtoolkit.com/pdfs/15%20Riparian%20Responsibilities/15.Riparian-responsibilities.pdf
- Advice on carrying out works on a bank or watercourse and flood defence consenting: http://www.floodtoolkit.com/pdfs/16%20Consenting/16.Consenting.pdf
- Advice on using agricultural land to reduce flooding: http://www.floodtoolkit.com/pdfs/17%20Using%20Agricultural%20Land%20for%20Attenuation/17.Using-Agricultural%20Land-for-Attenuation.pdf
- Advice on the role communities and parish councils can have in managing flood risk: http://www.floodtoolkit.com/pdfs/19%20Role%20of%20Parish%20Councils%20and%20Communities/19.Roles-of-parish-councils-and-communities.pdf
- Advice on how communities can work together to reduce flood risk: http://www.floodtoolkit.com/pdfs/27-Together-we-can-reduce-flood-risk/27-Together-we-can-reduce-flood-risk.pdf

6. GENERIC INSPECTION & MAINTENANCE SCHEDULES

The following pages provide schedules of the type of identification, inspection and maintenance that can be carried out to the various types of drainage systems, and frequencies for doing this.

These can be used to plan a community wide programme of inspection and maintenance.

6.1 Natural Watercourses

Maintenance Tasks	Frequency	What to look for	What can be done
Identification	Ongoing	Ordnance Survey plans indicate most natural watercourses of a certain size. The Maintenance Plan indicates some other sections of watercourse which have been identified during site inspections. Specific features such as large trees, structures along the watercourses and means of access can be identified on the ground. Specific locations to go to on a regular basis to inspect watercourses can be identified. Confirm ownership and maintenance responsibilities. Confirm which sections of watercourse are Main River or Ordinary Watercourse as these have different consenting systems through the Environment Agency or IDB.	Use Maintenance Plan to assist in location and ownership. Add any other specific details to the Maintenance Plan. Share any new information with the Councils' Flood & Water Management team.
Inspection and monitoring	Monthly, but increase or reduce frequency based on experience. When a Flood Alert or other Weather Warning is received Following heavy rainfall Increase frequency in autumn/winter	Excessive amounts of vegetation (e.g. trees, weeds, reeds, grass). This may be affecting the flow of water, or making it very difficult to inspect and monitor. Excessive amounts of debris (litter, grass cuttings, fallen trees and branches, large rocks and rubble). Excess silt on the bed and banks of the watercourse, particularly at any structures and pipes.	Record the locations and types of faults and report to the owner of the watercourse. Consider maintenance work detailed in the following rows.
Vegetation removal	Yearly After vegetation die back in late September/October and throughout mid-Autumn.	Excessive amounts of vegetation (e.g. trees, weeds, reeds, grass). This may be affecting the flow of water, or making it very difficult to inspect and monitor.	Keep growth of vegetation under control, outside of bird nesting seasons. Follow the guidance in the section 5.1 for these activities.
Silt and large debris removal	As required	Excessive amounts of debris (litter, grass cuttings, fallen trees and branches, large rocks and rubble). Excess silt and stones on the bed and banks of the watercourse, particularly at any structures and pipes.	Remove physical obstructions so that water can flow freely. Remove silt along the length of the watercourse to ensure water flows properly in the right direction. Remove silt to below the bottom of any pipes. Follow the guidance in the section 5.1 for these activities.
Maintain slope and cross section of watercourse	As required	Build up of soil or vegetation causing substantial narrowing or deviation of original watercourse.	Cut bed and banks of watercourse back to the original slope and cross section. Follow the guidance in the section 5.1 for these activities.

6.2 Ditches

Maintenance Tasks	Frequency	What to look for	What can be done
Identification	Ongoing	The Maintenance Plan indicates lengths of ditches which have been identified during site inspections. Specific features such as large trees, structures along the ditch and means of access can be identified on the ground. Specific locations to go to on a regular basis to inspect ditches can be identified. Confirm ownership and maintenance responsibilities. This is often the adjacent landowner and not Northamptonshire Highways. Consider any areas that might be an historic ditch which has become filled in over many decades. Consider any locations that regularly flood that would benefit from concrete lining next to headwalls to reduce vegetation growth. West Northamptonshire Council, Highways and the IDB should be contacted in respect of specifications and carrying out work of this type.	Use Maintenance Plan to assist in location and ownership. Add any other specific details to the Maintenance Plan. Share any new information with the Councils' Flood & Water Management team.
Inspection and monitoring	Monthly, but increase or reduce frequency based on experience. When a Flood Alert or other Weather Warning is received Following heavy rainfall Increase frequency in autumn/winter	Excessive amounts of vegetation (e.g. trees, weeds, reeds, grass). This may be affecting the flow of water, or making it very difficult to inspect and monitor. Excessive amounts of debris (litter, grass cuttings, fallen trees and branches, large rocks and rubble). Excess silt on the bed and banks of the ditch, particularly at any structures and pipes. Anything preventing water from easily flowing into a ditch, such as a build up of earth or vegetation.	Record the locations and types of faults and report to the owner of the ditch.
Vegetation removal	Yearly After vegetation die back in late September/October and throughout mid-Autumn.	Excessive amounts of vegetation (e.g. trees, weeds, reeds, grass). This may be affecting the flow of water, or making it very difficult to inspect and monitor.	Keep growth of vegetation under control, outside of bird nesting seasons Follow the guidance in the section 5.1 for these activities.
Silt and large debris removal	As required	Excessive amounts of debris (litter, grass cuttings, fallen trees and branches, large rocks and rubble). Excess silt and stones on the bed and banks of the ditch, particularly at any structures and pipes.	Remove physical obstructions so that water can flow freely. Remove silt along the length of the ditch to ensure water flows properly in the right direction. Remove silt to below the bottom of any pipes. Follow the guidance in the section 5.1 for these activities.
Reinstate historic ditches.	As required	Evidence of an historic ditch system that has become filled in over many decades. In some cases this is indicated on the Maintenance Plan.	Cut banks and bed of a ditch back to the original slope and cross section. The LLFA and the IDB should be contacted before work is carried out. Locate existing, or provide new, headwalls and connecting pipework to other ditches and drainage systems. The LLFA and the IDB should be contacted before this work is carried out. Follow the guidance in the section 5.1 for these activities.

6.3 Piped Drainage Systems and Manholes

Maintenance Tasks	Frequency	What to look for	What can be done
Identification	Ongoing	Location of surface features, such as gullies, rain water pipes, manhole covers. How does each surface feature connect? Can underground pipe routes be traced?	Use Maintenance Plan to assist in location. Trace pipe routes with drain tracing dye. Employ a company to use specialist equipment to jet through pipes, carry out a camera survey and use other tracing techniques to identify the exact pipe route. Add locations of drainage systems to Maintenance Plan. Try to ascertain ownership e.g. Water Authority sewer, Highway drain, private drainage. Share information on drainage systems with property owners. Share any new information with the Councils' Flood & Water Management team.
Inspection and monitoring	Monthly When a Flood Alert or other Weather Warning is received Following heavy rainfall Increase frequency in autumn/winter	High water levels in manhole chambers which could mean a pipe is blocked. Water bubbling out of manhole covers during heavy rain. Road gullies, rainwater pipes, slot drains not flowing or emptying.	Record locations of faults and advise drainage system owners. Keep roof gutters, gullies and slot drains clear of leaves, silt and debris. DO NOT open gullies on the public highway, inform the Highway Authority via Street Doctor/Fix My Street
Litter/debris removal	6 Monthly Increase frequency based on monitoring Increase frequency in autumn/winter	Leaves, litter and debris in and around the pond and the inlets/outlet pipe-work.	Leaves, litter and debris can be collected and disposed of in an appropriate way.
Flush through drainage system	Yearly	Particular drainage systems that build up with silt or other debris on a regular basis.	Drain rods can be used on a regular basis to keep pipework and manholes running clear. Gully pots and channel drains can be cleared of silt and leaves manually. DO NOT open gullies on the public highway, inform the Highway Authority via Street Doctor/Fix My Street
Jetting/Camera Survey	As required	Ongoing drainage problems which are likely to be as a result of blockages or other failures in the pipe and manhole system.	Drain rods can be used to try to clear domestic drains. Employ a company to use specialist equipment to jet through pipes and carry out a camera survey to identify any repairs that may be needed.
Drainage repairs	As required	Evidence of failures from visual inspection or camera survey.	Follow recommendations of camera survey specialist. Remote repairs such as lining, patching and root cutting. Full reconstruction of drainage system.

6.4 Road Gullies

Maintenance Tasks	Frequency	What to look for	What can be done
Identification	Ongoing	Location and type of road gully. Ditch or underground drainage system that gully outfalls to. Broken or dangerous gully gratings.	Use Maintenance Plan to assist in location. Add details of outfall pipework to Maintenance Plan. Give reference numbers to individual road gullies. Share any new information with the Councils' Flood & Water Management team.
Inspection and monitoring	Monthly When a Flood Alert or other Weather Warning is received Following heavy rainfall Increase frequency in autumn/winter	Leaves, silt and debris along the edge of the road and across gully grating. High level of silt visible in top of gully, or use a rod to feel depth of silt. Standing water around gully during rain. Water flowing over gully or water bubbling out of gully during rain. Consider any areas where additional gullies would be beneficial.	Record gully locations and faults and report to Street Doctor/Fix My Street if Highway gully.
Litter/debris removal	6 Monthly Increase frequency based on monitoring Increase frequency in autumn/winter	As Inspections and Monitoring above.	Record gully locations and faults and report to Street Doctor/Fix My Street if Highway gully. Leaves, litter and debris can be collected and disposed of in an appropriate way.
Silt removal	Yearly Increase frequency based on monitoring	As Inspections and Monitoring above.	Record gully locations and faults and report to Street Doctor/Fix My Street if Highway gully. Silt can be dug out of gully pots and disposed of in an appropriate way. DO NOT open gullies on the public highway, inform the Highway Authority via Street Doctor/Fix My Street
Jetting or Rodding	As required	As Inspections and Monitoring above.	Record gully locations and faults and report to Street Doctor/Fix My Street if Highway gully. Outlet pipes can be jetted or rodded to ensure they are free flowing. A CCTV camera survey can be carried out to identify any other faults. DO NOT open gullies on the public highway, inform the Highway Authority via Street Doctor/Fix My Street

6.5 Verge Grips

Maintenance Tasks	Frequency	What to look for	What can be done
Identification	Ongoing	Location and type of verge grip. Ditch that verge grip outfalls to. Broken concrete verge grip. Clarify ambiguous verge grip locations.	Use Maintenance Plan to assist in location. Add locations of verge grips to Maintenance Plan. Give reference numbers to individual verge grips. Share any new information with the Councils' Flood & Water Management team.
Inspection and monitoring	Monthly When a Flood Alert or other Weather Warning is received Following heavy rainfall Increase frequency in autumn/winter	Leaves, silt and debris along the edge of the road and through the verge grip channel. Grass or other vegetation preventing easy run-off of surface water during rain. Level of verge grip the same or higher than road surface, preventing run-off. Continued regular issues with specific verge grips that would benefit from concrete lining or enlargement. Consider any areas where additional verge grips would be beneficial.	Record verge grip locations and faults and report to Street Doctor/Fix My Street if in the Public Highway. Discuss the possibility of additional verge grips with the Highway Authority.
Litter/debris removal	6 Monthly Increase frequency based on monitoring Increase frequency in autumn/winter	Leaves, litter and debris at the road edge and in the verge grip channel.	Leaves, litter and debris can be collected and disposed of in an appropriate way.
Vegetation clearing	Yearly Increase frequency in summer To be determined following monitoring	Very long grass or other vegetation at the road edge and in the verge grip channel.	Record verge grip locations and faults and report to Street Doctor/Fix My Street if in Public Highway. Grass and other vegetation can be cut with a strimmer or mower. All material to be disposed of in an appropriate way.
Silt removal	Yearly To be determined following monitoring	Excessive amounts of silt at the road edge and in the verge grip channel meaning water cannot flow off the road and through the verge grip.	Record verge grip locations and faults and report to Street Doctor/Fix My Street if in Public Highway. Verge grip can be dug out manually to improve the flow of surface water off the road and through the channel. All material to be disposed of in an appropriate manner.

6.6 Storage Ponds

Maintenance Tasks	Frequency	What to look for	What can be done
Identification	Ongoing	Location and type of storage pond. The purpose of the pond, such as a specific development or drainage system that it serves. The location and type of inlet and outlet pipes and other structures and flow control devices. Access and inspection arrangements and any equipment needed.	Use Maintenance Plan to assist in location. Add locations of ponds and associated pipework to the Maintenance Plan. Try to ascertain ownership e.g. Water Authority, Highway Authority, land owner. Obtain a copy of any existing maintenance plans. Obtain reports, drawings or calculations to show how the pond is supposed to function in heavy rainfall. Share any new information with the Councils' Flood & Water Management team.
Inspection and monitoring	Monthly, but increase or reduce frequency based on experience. When a Flood Alert or other Weather Warning is received Following heavy rainfall Increase frequency in autumn/winter	Excessive amounts of vegetation (e.g. trees, weeds, reeds, grass). This may be affecting the flow of water, or making it very difficult to inspect and monitor. Excessive amounts of debris (litter, grass cuttings, fallen trees and branches, large rocks and rubble). Excess silt on the bed and banks of the pond, particularly at any structures and pipes.	Record the locations and types of faults and report to the owner of the pond.
Vegetation removal	Yearly After vegetation die back in late September/October and throughout mid-Autumn.	Excessive amounts of vegetation (e.g. trees, weeds, reeds, grass). This may be affecting the flow of water, or making it very difficult to inspect and monitor.	Keep growth of vegetation under control, outside of bird nesting seasons Follow the guidance in the relevant section of this report for these activities.
Silt and large debris removal	Yearly	Excessive amounts of debris (litter, grass cuttings, fallen trees and branches, large rocks and rubble). Excess silt and stones on the bed and banks of the pond, particularly at any structures and pipes.	Remove physical obstructions so that water can flow freely and no storage volume is lost. Remove silt from the bed of the pond at inlets and outlets. Clear any specific silt trap chambers or micro-pools. Follow the guidance in the relevant section of this report for these activities.
Maintain slope and cross section of pond	As required	Build up of soil or vegetation causing substantial narrowing of pond, reducing its storage capacity.	Cut bed and banks of pond back to the original slope and cross section. Follow the guidance in the relevant section of this report for these activities.

7. SPECIFIC INVESTIGATIONS & MAINTENANCE

Carrying out full investigations and maintenance of all drainage systems in the East Hunsbury is an ongoing project with multiple responsible parties and funding streams.

Most drainage systems in the area have clearly identified ownership and maintenance responsibilities. Resources and prioritising of work by the responsible owner can often be a factor in some areas receiving more attention than others.

The Parish Council and Flood Warden can take the first steps in engaging with owners of drainage systems to discuss an ongoing programme of maintenance work.

Most communities have people with skills and equipment that could be engaged on a voluntary basis, or for negotiated terms.

This section details specific areas of East Hunsbury which are considered priority areas, and where small amounts of funding or community resources could be put to meaningful use in the short term.

Each area is highlighted on the Maintenance Plan in Appendix C by a yellow star with a number corresponding to the sub-sections below. eg Section 7.1 = 

7.1 Clearance Works to Main Watercourses

There are some points along the three main watercourses where clearance of excessive vegetation, silt and debris could improve water flow. This is a major programme of work, but smaller areas could be carried out at different times to spread resources. The ultimate responsibility for maintenance of this type of watercourse sits with the Riparian (private) landowner.

With the permission of land owners, a detailed inspection of the open sections of watercourses is recommended. This will identify the main areas that could benefit from clearance work.

The inspection will identify a priority order of work so that this can be phased with available time and financial resources.

It may be possible for some works to be carried out by the community with basic tools.

Specialist teams with the correct equipment and work procedures are likely to be required for all but the most minor of clearance work. This would include:

- Reducing the spread of larger trees and bushes.
- Removal of significant volumes of silt and debris requiring mechanical excavators
- Repairs to structures such as privately-owned bridges (some road bridges are maintained by the Highway Authority).

It is recommended that clearance starts from the downstream end of watercourses, with attention paid to the following areas:

- East end of Augusta Avenue, from Rowtree Road to Wootton Brook.
- West end of Augusta Avenue, the final stretch of open watercourse flowing to Wootton Brook.
- Sections of open watercourse on the east and west side of Penvale Road near Thames Road
- The open watercourse through Penvale Park.
- Sections of open watercourse north of Collingcroft Close. To include the final stretch of watercourse flowing to Wootton Brook at the southwest of Collingcroft Close.
- The final stretch of watercourse flowing to Wootton Brook south of Swallow Close.
- Wootton Brook, with appropriate coordination and permits from the Environment Agency.

This major programme of work on the watercourses should result in simpler inspection and routine light maintenance taking place in future.

Cost: Selection of tools for the community in a 'Flood Store', eg rakes, shovels, chainsaws, strimmers, rubble bags, personal protective equipment

- £500

Specialists to undertake larger sections of work

- Allow £500 -£1000 per day

7.2 Localised Clearance of Ditches and Smaller Watercourses

There are specific priority areas that could benefit from localised ditch and watercourse clearance. This would involve clearing excessive vegetation and clearing silt and debris for just a few metres around pipes and headwalls, and at debris grilles. This would allow the pipes to be easily inspected and kept clear in future.

Particular areas that could benefit from this localised work include:

- Two culverts under Penvale Road, west of Thames Road.
- Culvert Entrance at Hilldrop Road, at the west end of Penvale Park.
- Inlet and outlet structures on sections of open watercourse north of Collingtree Close.
- Inlet headwall at south end of Grange Wood Park.

- Weirs and footbridges on Wootton Brook, with appropriate coordination and permits from the Environment Agency..

Cost: Selection of tools for the community in a ‘Flood Store’, eg rakes, shovels, chainsaws, strimmers, rubble bags, personal protective equipment

- £500

Specialists to undertake larger sections of work

- Allow £500 -£1000 per day

7.3 Survey of Buried Pipework

A specialist contractor can attempt to clear and CCTV survey buried pipe sections of private drainage systems in and around East Hunsbury.

This helps to identify exactly where pipes are located and what repairs might be required.

Any work to Anglian Water sewers or Highway Authority drainage systems is not allowed without permission.

A ‘dye survey’ and ‘Radar Sonde’ survey can sometimes be sufficient where pipes are running well.

Coloured dye is shaken into the water at the upstream end of a pipe, and traced at various points downstream to understand how pipework is linked.

A Sonde is a small unit that emits a signal to a receiver at ground level. The Sonde is pushed through the pipe and its location marked at ground level at regular intervals.

To fully understand the pipe system, a camera can be pushed through. This gives a full picture of the condition of the pipe and can identify where ‘blind’ connections are made into the side of a pipe from other sources.

The above survey work can be accompanied by high pressure jetting where possible but can be limited by types of blockage or failure that might be present in buried pipes, for example:

- Large solid blockage, rock, concrete;
- Excessive roots in pipe that cannot be cut remotely;
- Excessive silting of pipe along many metres;
- Major settlement/displacement of sections of pipe so that remote equipment cannot be pushed through;
- Completely collapsed/broken pipes.

Specific areas are recommended for a survey of buried pipework. These include:

- Culvert from Penvale Park, assumed to continue south under Hilldrop Road.
- Culverts downstream of sections of open channel north of Collingcroft Close.
- Culvert from Grange Wood Park, assumed to continue south under areas of Swallow Close.
- Large private properties, such as Wootton Hall, supermarket, schools etc. So that the drainage systems in these areas are understood, particularly how they connect to the wider network of public sewers and/or watercourses.

Cost: Tools and dye for basic surveying

- Up to £200

Specialist Drainage Survey Team

- Allow £750 per day.

7.4 Road Gullies and Verge Grip Drains

Gullies and verge grip drains should be maintained so that surface water from the roads can flow readily into the ditches, watercourses or pipes.

Much of this work is the responsibility of the Highway Authority, and work by individuals should not be undertaken on the public highway without permission and agreed traffic management.

There are no formal verge grip drains shown on asset plans, but there may be opportunities to introduce these, where safe to do so, to help to manage flood water on the public highway.

The community may be able to carry out light maintenance to ensure gully gratings are kept clear of leaves and debris. Again, permission from the Highway Authority would be required for these works.

Cost: Selection of tools for the community in a ‘Flood Store’, eg rakes, shovels, chainsaws, strimmers, rubble bags, personal protective equipment

- £500

7.5 Assessment of Flood Water Management Options

Various options could be viable over the wider catchment to slow the flow of water into watercourses and sewers, or manage flood flows in other ways. One principle of Natural Flood Management is to hold water higher in the catchment away from vulnerable areas at low points in the community. Water can be held in soil or on vegetation, or in newly created wetlands or storage ponds.

Another strategy is to form pathways to create overland flood flow routes free of obstructions, and away from vulnerable areas.

Engagement with land owners and other stakeholders is essential at an early stage for all options.

Specialists can assess the catchment and draw up a shortlist of potential options that can be taken forward.

Different solutions lend themselves to different catchment types, taking into account land use, contours, willingness of land owners and cost. Often existing features, such as watercourses and flat areas of land, can be adapted slightly to maximise the potential for holding water in heavy rainfall events.

Creating shallow channels, or introducing earth bunds or walls, can help to define an overland flood flow route to help control heavy water flows across the ground. Removing or adapting significant obstacles such as walls and fences can allow flood water to flow over ground without significantly increasing in depth at dwellings. Slight alterations to kerb heights on roads can help to manage the location where flood water will start to overtop from the carriageway.

Physical measures put in place to manage water flow will need regular inspection and maintenance which needs to be included in the overall cost.

Topographical Surveys would be required to allow detailed options to be designed and engineering drawings developed.

Specific areas that could be assessed further for natural flood management options are:

- For the overall catchment of Wootton Brook, the RAIN Project (Resilience And Innovation Northants) is part of the Flood and Coastal Resilience Innovation Programme. It is led by the Environment Agency with numerous local partners including West Northants Council. It will work at catchment, community and property level to equip communities with the tools and support they need to improve their resilience to extreme weather. This will include exploring opportunities for Natural Flood Management in the Wootton Brook catchment. Further information is available at: https://engageenvironmentagency.uk.engagementhq.com/wno023-rain
- Penvale Park and Grange Wood Park. Structures and earthworks in proximity to the watercourses could allow a volume of water to be held temporarily in extreme events.

- Parklands or other areas of public open space could present the best space and opportunities to manage excess water.
- At areas such as Downsway, Thames Road, Grangewood and Swallow Close as examples, relatively dense residential areas are located through the base of shallow natural valleys.

  Surface water will always try to follow these historic low points in drainage exceedance events. A coordinated approach would be required between residents to make adaptations to gardens and boundaries to allow excess flood water to flow through safely and unimpeded in extreme events. This would reduce the risk of water deepening at any particular point, or of water being directed towards doorway thresholds.

  The coordinated approach is required to ensure that changes made at one property do not adversely impact another property, and this may need to be led by the Parish Council a formal community group.
- At the north of Laneside Hollow, raised earth bunds in areas of public open space could help to protect residential properties and force flood water to flow towards a watercourse.
- At Rowtree Road, north of Swallow Close, the wide grass verge could be converted to a sunken storage basin instead of a raised earth mound subject to constraints.
- At the same location, kerbs and verge levels on the south side of the road could be raised or lowered to encourage water to overflow at safe locations, such as the easement strip to the east.

Cost: Engagement with landowners and other stakeholders

- Free

Specialists to assess catchment and shortlist options

- Allow £500-750 per day, potentially several days or weeks work depending on extent and accuracy.

Topographical Surveys and Engineering Design

- Allow £500-750 per day, again potentially several days or weeks depending on extent.

Implementation of measures on the ground

- Variable – options such as woodland creation could be undertaken by the community or other volunteers.
- Adaptations to fences, walls and ground levels in gardens could be undertaken by private property owners.
- Options requiring earthworks or new structures are likely to require cost comparison amongst various Contractors and are likely to be in the tens of thousands.

7.6 Flood Resilience Measures

Many measures to reduce flooding from drainage systems and watercourses are costly and can take many years of planning and implementation.

Options can be considered that focus on communities preparing for, and being more resilient to, existing levels of flooding. A Community Emergency Plan is invaluable for the community to be able to take the correct action.

Barricades and diversionary signing can be used to close roads, subject to discussions and permissions from the Highway Authority and Emergency Services.

Items subject to damage in external areas can be relocated when weather warnings are received. The flood maps and local eye-witness experience can help to define the potential extent of the floodplain, and the use of these areas can be adapted so that they can readily flood and recede with minimal impact to people or property.

A ‘Flood Store’ can house various tools, equipment and signs to help the community manage a flood event and reduce the impacts. Full details of what to consider for a flood store, and potential costs can be found at How to….Get a Community Flood Store.

Where buildings are at risk of flooding internally, permanent and temporary measures can be taken to try to keep the water out. These could include flood barriers and flood doors, flood proof air-bricks and non-return valves on drains.

Alternatively, the building could be designed to allow flood water in, but with minimal impact and clean up afterwards. Typical measures include tiled floors, electrics and valuables at high level, synthetic doors and skirting boards.

Further details can be found at How to Protect Your Home.

8. USEFUL CONTACTS

West Northamptonshire Council

Highways:

Tel: Street Doctor (Highways) 0300 126 1000

Website: https://fixmystreet.northamptonshire.gov.uk/

Email: highways.ncc@westnorthants.gov.uk

Emergency Planning:

Tel: 0300 1261012 (office hours)

Website: http://www.northamptonshire.gov.uk/emergencies

Email: emergencyplanning1.ncc@northnorthants.gov.uk

Flood and Water Management Team:

Tel: 01604 366014 (Mon-Fri, 9am - 5pm)

Email: floodandwater@northamptonshire.gov.uk

Environment Agency

General Tel: 03708 506 506 (Mon-Fri 8-6) Call charges apply.

Incident Hotline: 0800 807060 (24 hrs)

Floodline: 0345 988 1188

Website: https://www.gov.uk/government/organisations/environment-agency

Email: enquiries@environment-agency.gov.uk

Anglian Water

Emergency Tel: 03457 145145 (select option 1)

Website:

http://www.anglianwater.co.uk/household/water-recycling-services/sewers-and-drains.aspx

East Hunsbury Parish Council

Website: https://www.easthunsburyparishcouncil.gov.uk/

Email: clerk@easthunsburyparishcouncil.gov.uk

The Flood Toolkit "Who is responsible" page:

http://www.floodtoolkit.com/contacts/

9. USEFUL LINKS

Highways Act 1980:

http://www.legislation.gov.uk/ukpga/1980/66/contents

Water Resources Act 1991:

http://www.legislation.gov.uk/ukpga/1991/57/contents

Land Drainage Act 1991:

http://www.legislation.gov.uk/ukpga/1991/59/contents

Guidance on Owning a Watercourse Your responsibilities and rules to follow for watercourses on or near your property, and permissions you need to do work around them

https://www.gov.uk/guidance/owning-a-watercourse

EA - Prepare your Property for Flooding:

How to reduce flood damage Flood protection products and services

https://www.gov.uk/government/publications/prepare-your-property-for-flooding

Private Sewer Transfer

https://www.water.org.uk/wp-content/uploads/2019/03/Private-Sewer-Transfer-Water-UK-Template.pdf

Lead Local Flood Authority Web Pages:

http://www.floodtoolkit.com/

Northamptonshire Local Flood Risk Management Strategy:

https://www.floodtoolkit.com/wp-content/uploads/2017/11/Northamptonshire-LFRMS-Report-November-2017-Final-1.pdf

Flood and Water Management Act 2010

http://www.legislation.gov.uk/ukpga/2010/29/contents

DISCLAIMER

This report has been prepared to provide context and information to support communities in their own flood resilience plans and should not be used for any other purpose.

Features identified in this report in relation to flooding are based on a single limited inspection in dry weather conditions. Inspections were carried out from public rights of way and open access land only.

The findings of the report are based on a subjective assessment of the information available by those undertaking the investigation and therefore may not include all relevant information. As such it should not be considered as a definitive assessment of all factors that may trigger or contribute to flooding.

The relevant responsible body or persons for property or drainage features has not been identified or considered.

Any recommendations will be for the relevant responsible body or persons to assess in terms of resource implications, priority and cost/benefit analysis of the proposal. Moving forward, these may be included in the Action Plan linked to the Local Flood Risk Management Strategy or in the relevant risk management authority's future work programmes as appropriate.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by David Smith Associates and West Northamptonshire Council when preparing this report, including, but not limited to those key assumptions noted in the Report, including reliance on information provided by others.

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The implications for producing this report and any consequences of blight have been considered. The process of gaining insurance for a property and/or purchasing/selling a property and any flooding issues identified are considered a separate and legally binding process placed upon property owners and this is independent of and does not relate to the Council highlighting flooding to properties at a street level.

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APPENDIX A

Catchment Plan

CATCHMENT PLAN

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MAIN CATCHMENT AREAS

SUB CATCHMENT AREAS

THIS PLAN INDICATES THE RIDGE LINES (HIGHEST POINT) OF EACH CATCHMENT AREA. SURFACE WATER WILL FLOW NATURALLY FROM THE RIDGE LINES TO WATERCOURSES AND DRAINAGE SYSTEMS AT LOW POINTS.

APPENDIX B

Investigation Plan

RIDGE LINES (HIGHEST POINT) OF EACH CATCHMENT AREA

NATURAL SURFACE WATER FLOW ACROSS THE CATCHMENT

OPEN WATERCOURSES INDICATED ON ORDNANCE SURVEY MAPPING

OPEN WATERCOURSES / DITCHES OBSERVED ON THE GROUND OR ASSUMED HISTORIC ROUTE

ASSUMED ROUTE OF CULVERT/PIPE. EXACT ROUTE AND CONDITION OF CULVERT AND LOCATION OF ACCESS POINTS TO BE DETERMINED

TRAFFIC LIGHT SYSTEM FOR CONDITION OF DITCHES / WATERCOURSES:

RED: MAINTENANCE LONG OVERDUE

AMBER: MAINTENANCE RECOMMENDED SOON

GREEN: SATISFACTORY SUBJECT TO REGULAR INSPECTIONS

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INVESTIGATION PLAN

APPENDIX C

Maintenance Plan

ANGLIAN WATER SURFACE WATER SEWER

ANGLIAN WATER FOUL WATER SEWER

OTHER ANGLIAN WATER SEWER COMBINED/DIVERFLOW ETC)

ANGLIAN WATER OUTFALLS/TREATMENT PLANTS/PUMPING STATIONS ETC.

NORTHAMPTONSHIRE HIGHWAYS ROAD GULLIES

NORTHAMPTONSHIRE HIGHWAYS OTHER ASSET - BRIDGE/CULVERT ETC.

OTHER ASSET - LABELLED

MAIN RIVER

OPEN WATERCOURSES INDICATED ON ORDNANCE SURVEY MAPPING

OPEN WATERCOURSES / DITCHES OBSERVED ON THE GROUND OR ASSUMED HISTORIC ROUTE

ASSUMED ROUTE OF CULVERT/PIPE. EXACT ROUTE AND CONDITION OF CULVERT AND LOCATION OF ACCESS POINTS TO BE DETERMINED

SPECIFIC MAINTENANCE AREA DISCUSSED IN ACCOMPANYING REPORT

NETWORK RAIL ASSET

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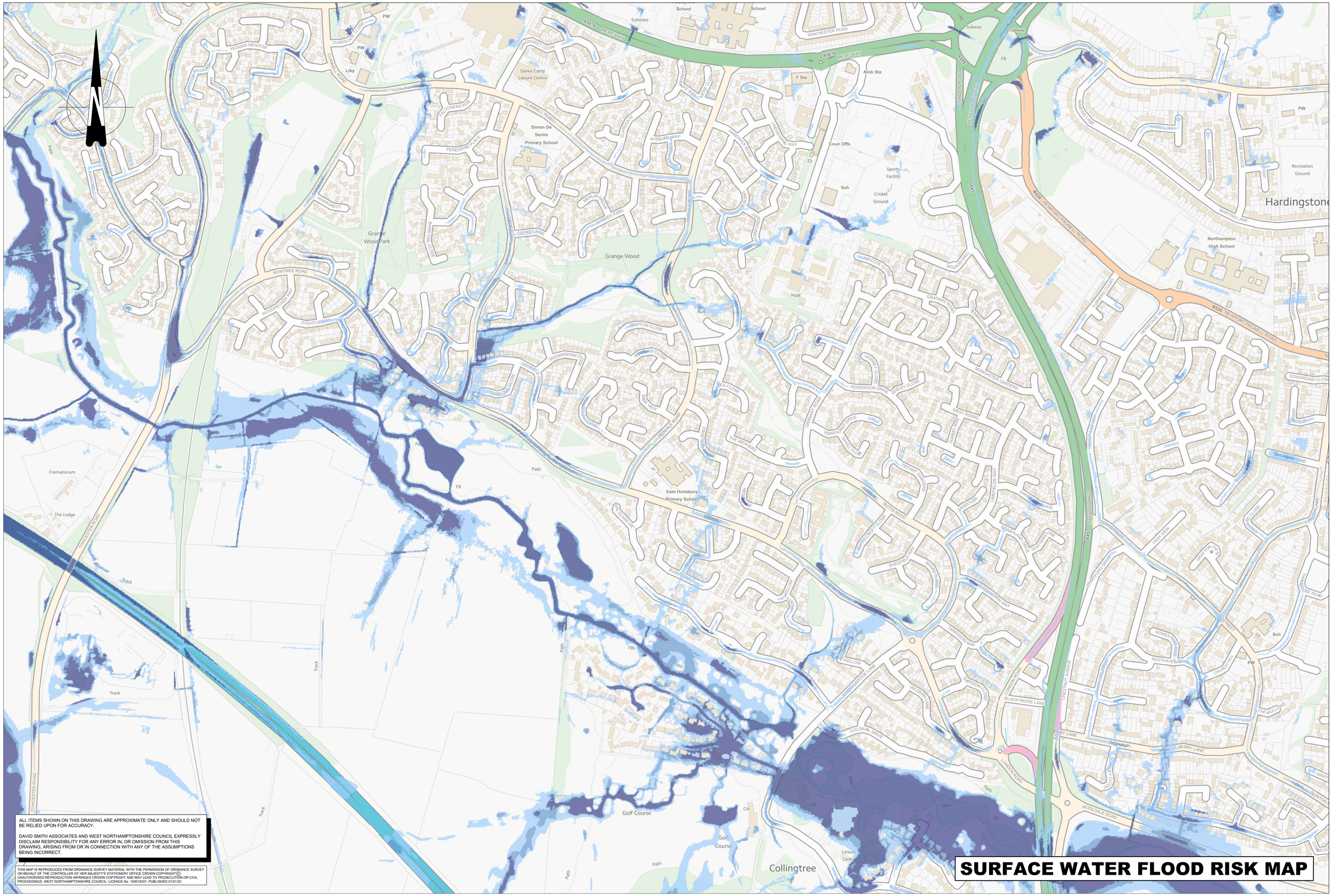
MAINTENANCE PLAN

APPENDIX D

Flood Risk Mapping



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SURFACE WATER FLOOD RISK MAP

FLUVIAL FLOOD RISK MAP

KEY:

- AREAS BENEFITING FROM FLOOD DEFENCES
- FLOOD ZONE 3
- FLOOD ZONE 2
- FLOOD ZONE 1
- FLOOD DEFENCE
- MAIN RIVER
- FLOOD STORAGE AREA

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APPENDIX E

Photographs

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PHOTOGRAPH LOCATIONS

01 – Pipe south of Rowtree Road

02 – Surface water sewer outfalls to watercourse south of Rowtree Road.

03 – Surface water sewer outfall to watercourse south of Rowtree Road.

04 – Watercourse between Rowtree Road and Augusta Avenue.

05 – Surface water sewer outfall to watercourse between Rowtree Road and Augusta Avenue.

06 – Surface water sewer outfall to watercourse between Rowtree Road and Augusta Avenue.

07 – Watercourse between Rowtree Road and Augusta Avenue.

08 – Watercourse culvert under Augusta Avenue – upstream.

09 – Watercourse culvert under Augusta Avenue – upstream.

10 – Watercourse culvert under Augusta Avenue – downstream.

11 – Outfall pipe to watercourse, east of Penvale Road.

12 – Watercourse culvert under Penvale Road – upstream.

13 – Watercourse culvert under Penvale Road – downstream.

14 – Watercourse downstream (west) of Penvale Road.

15 – Footbridge across watercourse west of Penvale Road.

16 – Footbridge across watercourse west of Penvale Road.

17 – Watercourse west of Penvale Road.

18 – Outfall to watercourse west of Penvale Road.

19 – Piped section of watercourse through Penvale Park.

20 – Watercourse through Penvale Park.

21 – Watercourse through Penvale Park.

22 – Watercourse culvert under Hilldrop Road.

23 – Outfall pipe to ditch on Hilldrop Road.

24 – Watercourse culvert under Rowtree Road.

25 – Surface water sewer outfall south of Swallow Close.

26 – Surface water sewer outfall south of Swallow Close.

27 – Surface water sewer outfall south of Swallow Close.

Appendix F

Environment Agency Standard Notice

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