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Marlow Surface Water Management Plan

Preliminary Risk Assessment

Final

November 2013

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1 Introduction

1.1 Introduction to a Surface Water Management Plan

Under the Flood & Water Management Act 2010[1], Buckinghamshire County Council (BCC) is the Lead Local Flood Authority (LLFA) with responsibility for management of local flood risk in Marlow. BCC works in partnership with Wycombe District Council (WDC), Marlow Town Council, the Environment Agency (EA), Thames Water (TW) and others. Local flooding can be caused by:

- intense rainfall before it enters a watercourse or sewer (pluvial flooding although often referred to as surface water flooding);
- high groundwater levels (groundwater flooding);
- exceedance of the capacity of the sewer network (sewer flooding); and
- out of bank flow from (typically) small watercourses which are not designated by the Environment Agency as 'Main River' (fluvial flooding from ordinary watercourses).

Therefore, whilst widely known as *Surface Water* Management Plans (SWMPs), they are increasingly seen as tools for the LLFA to manage all forms of "local flooding" in an area, and are considered as such in this case. However, the commonly used term SWMP will be retained. Flooding from Main Rivers (and the Sea) continues to be managed by the Environment Agency and is not within the scope of this SWMP study. However, interactions with the River Thames have been considered. It is emphasised that the term "local flood risk" means flooding from sources other than Main Rivers. The term is best understood in the context of, for example, fluvial flooding from the River Thames (Main River) - whilst flooding from this source may be experienced locally, it is not a "local" flood source.

The purpose of a Surface Water Management Plan (SWMP) study is to identify sustainable responses to manage surface water flooding and to prepare an Action Plan. The Action Plan and supporting material provide an evidence base for future decisions and funding applications for putting the recommendations into practice.

BCC commissioned Jacobs to undertake Stage 1 of a SWMP for Marlow. The work in this report therefore represents only the first *Preparation* stage of a SWMP as defined by the Defra guidance[2].

In Buckinghamshire, SWMPs have previously been prepared for Chesham and High Wycombe. Through gathering a range of evidence, these have provided benefits including the following:

- Greater understanding of the flooding mechanisms in the key risk locations, detailed modelling and mapping and a list of site specific and policy options to improve surface water management
- Stronger partnership working, including the EA funding a subsequent modelling study to investigate blockage scenarios for the Vale Brook culvert

[1] http://www.legislation.gov.uk/ukpga/2010/29/contents
[2] Defra (2010) Surface Water Management Plan Technical Guidance. March 2010. Available at: https://www.gov.uk/government/publications/surface-water-management-plan-technical-guidance

- Evidence to support successful funding applications to implement site specific options in Chesham and West Wycombe

Chesham and High Wycombe were identified by Defra as the likely highest risk locations in Buckinghamshire and therefore SWMPs for these areas were prioritised. However, due to evidence of past flooding and predictions of future risk, preparation of a SWMP for Marlow will support ongoing improvements in management of local flooding across the county.

This report constitutes Phase 1 (Preparation) of the SWMP, with proposals for Phase 2 (Detailed Assessment) having been developed separately following review of this Preliminary Risk Assessment report by the SWMP Partnership.

1.2 The Study Area and Links to Main River Flooding

The primary urban area of Marlow covers 5.1km^2 with Marlow Bottom covering a further 1.5 km^2 (Figure 1.1[3]). This SWMP has considered local flooding within these areas (referred to collectively simply as 'Marlow'), in addition to hydrological contributions flowing into these areas from the wider catchment.

Marlow has approximately 1.5km of the River Thames in the study area, and 12% (0.8km^2) of its land lies in EA Flood Zone 3a[4]. The town is at risk of flooding from the Main River Thames. In January 2003, Marlow experienced the worst fluvial flooding in 30 years (according to local residents), when the River Thames overtopped and there was further flooding in 2006, 2007, 2008 and 2009. Flooding from Main Rivers continues to be managed by the EA and, in general, is not considered further in this SWMP study. However, interactions between local flood sources and the River Thames are important to ensure a holistic and integrated approach to flood risk management and are therefore considered.

Flooding from non-Main River (termed 'ordinary') watercourses is within the scope of this SWMP. In Marlow, the EA Detailed River Network data shows only one length of ordinary watercourse (the Newt Ditch) originating in eastern Marlow and flowing under the A404 into the Westhorpe area.

1.3 Local Flood Risk Management Partnership

BCC, as the LLFA for Buckinghamshire, is the lead partner for this Marlow SWMP. However, in order to coordinate delivery of flood risk management responsibilities across Marlow, the following Partners are being invited to input to the SWMP:

- Wycombe District Council
- Marlow Town Council
- Environment Agency
- Thames Water
- Elected Members
- Local volunteer groups

An initial meeting to discuss local flood risk in the area was held on 11 September in Marlow and this report has subsequently been updated. The notes of the meeting are provided in Appendix E.

[3] More detailed mapping of Marlow is provided in Appendix B
[4] Land assessed as having a 1 in 100 (1%) or greater annual probability of river flooding or 1 in 200 (0.5%) or greater annual probability of sea flooding in any one year

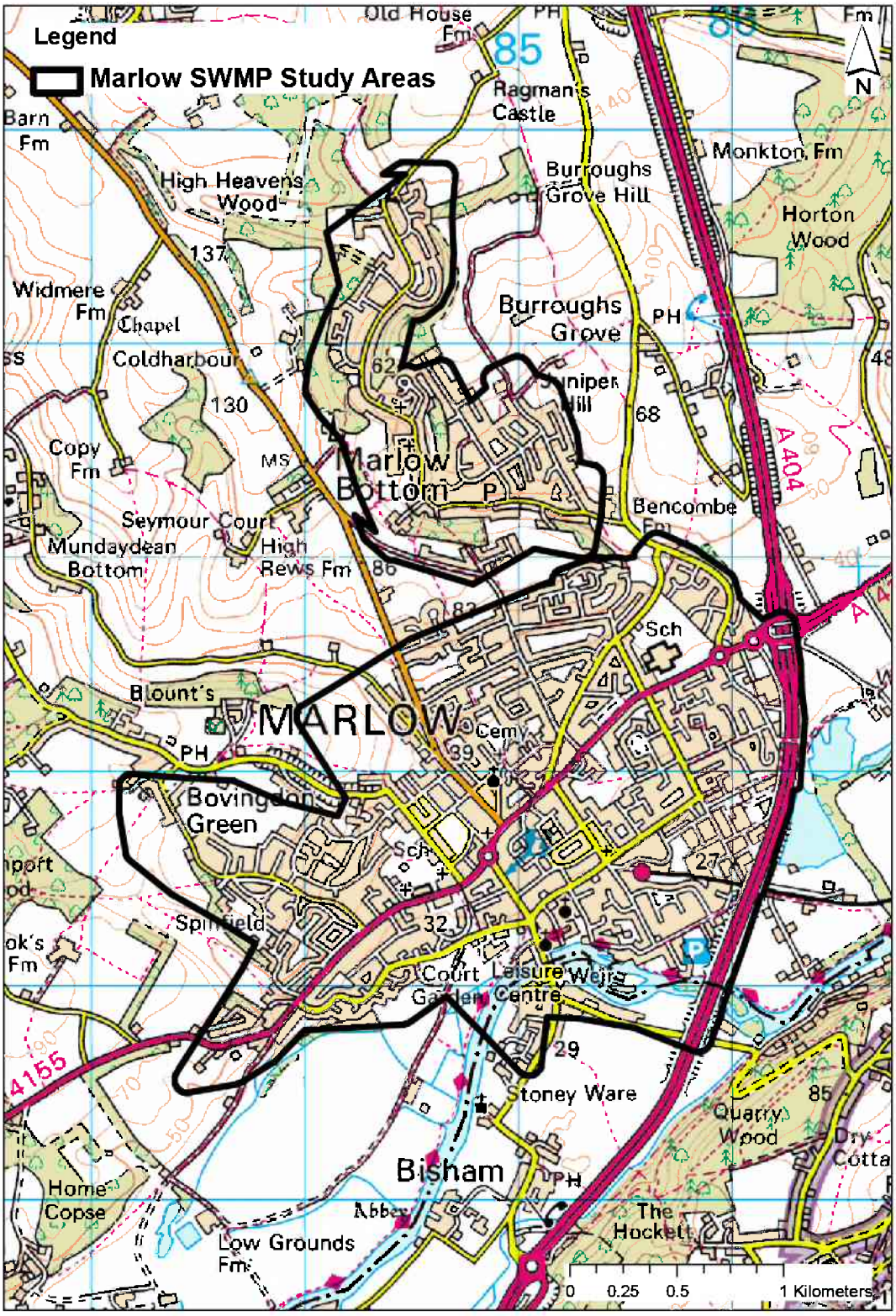


Figure 1.1 Location map showing the approximate extents of the Marlow SWMP study area

2 Data for Local Flood Risk Management

2.1 Collation of Available Data

Data were collated from the SWMP Partners and the data are catalogued in Tables 2.1 to 2.3.

Table 2.1 Data provided by Buckinghamshire County Council

Data received	Details	Notes
Wycombe Council Strategic Flood Risk Assessment	Final Report April 2008[5]	Housing commitment sites are listed in the SFRA
Buckinghamshire Preliminary Flood Risk Assessment	Final Report June 2011[6]	Contains records of past flooding from various sources
Topographic data	LiDAR data and 5m composite data covering the study area	Composite of EA 1m 2009 data and 5m data either from Infoterra LiDAR or NextMAP IfSAR
Geological Information	1:625 000 scale solid and drift layers	

Table 2.2 Data provided by the Environment Agency

Data received	Details	Notes
River Thames Catchment Flood Management Plan	December 2009[7]	
Detailed River Network	Guidance 2010	
Fluvial Flood Zones	National Flood Zones 2 and 3a February 2013	
Flood Map for Surface Water (FMfSW)	November 2010[8]	The PFRA identified the FMfSW as the best available information to represent local flooding in Marlow (Locally Agreed Surface Water Information)
Technical note on modelling undertaken to support the Marlow Flood Alleviation Scheme	Halcrow Internal Report Revised 2010[9]	

Table 2.3 Data provided by Thames Water

Data received	Details
Sewer Network Plan	GIS data supplied March 2013
DG5 sewer flooding records	Postcode data supplied June 2013

[5] Jacobs (2008) Wycombe District Council Strategic Flood Risk Assessment. Final Report. April 2008
[6] Jacobs (2011) Buckinghamshire Preliminary Flood Risk Assessment. May 2011
[7] Environment Agency (2009) River Thames Catchment Flood Management Plan. Summary Report. December 2009
[8] Environment Agency (2010) What is the Flood Map for Surface Water. Guidance for Local Resilience Forums, Regional Resilience Teams, Local Planning Authorities and Lead Local Flood Authorities v1 November 2010
[9] Halcrow (2010) Marlow Flood Alleviation Scheme Technical Note. Internal Document

In addition to the above, the following data have been used:

- Jacobs Groundwater Emergence Maps (taken from Jacobs (2004) Groundwater Flooding Scoping Study (LDS23). Final Report. May 2004.)
- River Thames levels at Marlow Lock: http://www.environment-agency.gov.uk/homeandleisure/floods/riverlevels/riverstation.aspx?StationId=7396&RegionId=9&AreaId=21&CatchmentId=139

2.2 Note on Topographic Data

As illustrated in Figure 2.1, the EA has 1m LiDAR data covering south-eastern Marlow. There is no LiDAR coverage to the north west. To produce the natural flow paths in this SWMP, many of which originate from the Chalk valleys to the north west, additional topographic data was used to complete the coverage. BCC made available the EA's 2010 Composite DTM which has national coverage at 5m resolution. Although the source of the data for northern Marlow is unclear, it is likely to be a composite of Infoterra LiDAR (1m or 2m) and InterMap Technologies NEXTMap Britain IfSAR data[10]. Figure 2.2 shows the same 1m LiDAR data coverage for a smaller area which includes the extent of the Newt Ditch catchment. Although there is data for the majority of the anticipated catchment, some areas to the north and west have no data. Consultation with the EA Geomatics team suggests that high resolution LiDAR (i.e. 0.25cm) could be provided for 6km^2 of Marlow for approximately £10k.

Figure 2.1 EA 1m LiDAR data coverage in the Marlow area

[10] Environment Agency (2010) What is the FMfSW. Guidance for Local Resilience Forums, Regional Resilience Teams, Local Planning Authorities and Lead Local Flood Authorities v1 November 2010

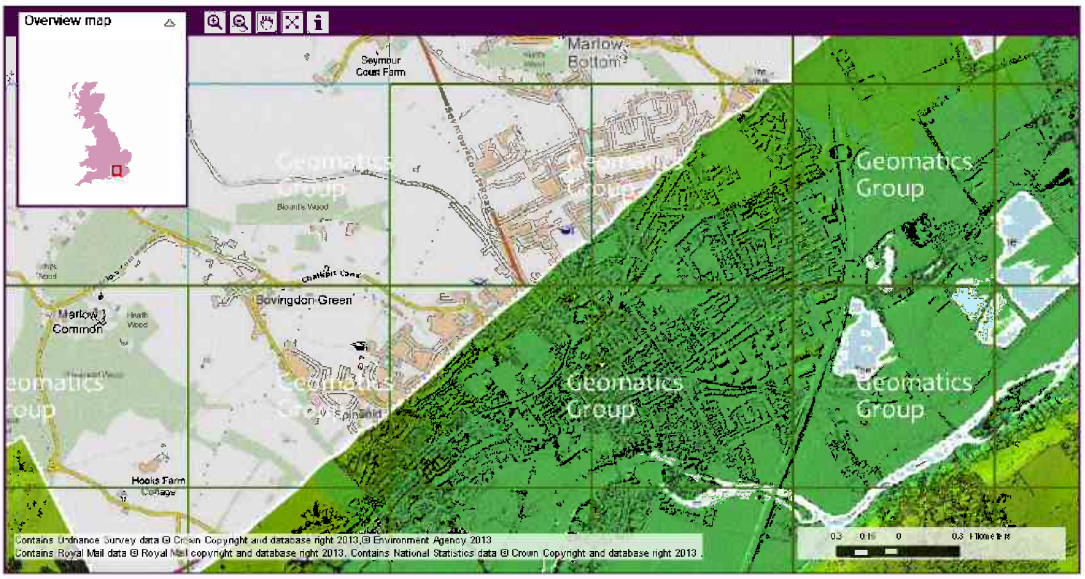


Figure 2.2 EA 1m LiDAR data coverage of Marlow urban area

2.3 Collection of Historic Flood Data

A flood history questionnaire was distributed to 250 properties in areas of Marlow with either a high theoretical risk of flooding from local sources, or a suspected history of flooding. The questionnaire sought to record incidents of flooding which may not have been documented elsewhere. It was also used to corroborate the flood risk areas identified by the national flood risk mapping and during site inspections. Ninety responses were received in total. A copy of the questionnaire can be found in Appendix D.

3 Marlow Catchment Characteristics

3.1 Introduction

Marlow is one of the principal urban areas in Wycombe District which lies in south-west Buckinghamshire. The topography of the District is dominated by the Chiltern Hills, which run in a south-west to north-easterly direction across the district, to the north of Marlow's main urban area. The Chiltern Hills are formed of Cretaceous Chalk, whereas the lowland floodplain of the River Thames (including Marlow to the south of the A4155) is characterised by River Terrace Deposits such as sands and gravels. The River Thames forms the southern extent of Marlow's urban area. No defined tributaries flow through the urban area of Marlow to the Thames, with the nearest upstream tributary, the Hamble Brook, entering the Thames near Mill End. However, a number of typically dry Chalk valleys slope from the north west down towards Marlow, the principal ones being:

- To the west of the Forty Green area, crossing the junction of Pound Lane and Henley Road
- Broadly following Mundaydean Lane and entering Marlow along Dean Street
- Between Marlow Bottom and the junction of the A404 and A4155

The Thames CFMP main report[11] places Marlow within the Sandford to Cookham policy unit. The following is a summary of this *towns and villages in open floodplain* policy unit which is focussed on fluvial flooding:

- The Thames can take a long time to rise and fall which can provide good opportunity for warning but can lead to potentially long-duration flooding.
- Flood risk in the area is likely to be sensitive to climate change. Indeed, the EA recognises that it may need to take further action to keep pace with climate change.
- The urban environment will need to adapt to make space for water.
- New development in particular will need to take flood risk into account.

3.2 Local Flooding in Marlow

The Buckinghamshire Preliminary Flood Risk Assessment[12], based on the numbers of properties at risk according to the EA Flood Map for Surface Water (FMfSW), identified four high priority risk areas. These are Aylesbury, High Wycombe, Amersham/Chesham and Marlow. Based on the FMfSW, there could be approximately 1,900 residential properties at risk of local flooding in Marlow, in addition to 450 non-residential and a number of critical services.

Anecdotal evidence indicates that flooding of roads and properties adjacent to the River Thames may occur via the floodplain gravels, even when the River Thames is still in-bank. The following is an extract from the EA Marlow FAS Newsletter[13]:

[11] Thames Catchment Flood Management Plan (CFMP) Summary Report, The Environment Agency, December 2009
[12] http://www.transportforbucks.net/Flooding/Flood-Risk-Assessment.aspx
[13] Environment Agency (2009) Newsletter: Marlow Flood Alleviation Scheme. Pound Lane, Firview Close and Gossmore Lane Areas. June 2009

The areas of Pound Lane, in the south west of Marlow, and Firview Close / Gossmore Lane to the east are low-lying and experience river and groundwater flooding. The area has a history of flood related problems including poor highway drainage, flooding of properties from the River Thames and flooding of gardens and property as result of the high water table.

Although records of past flooding across Wycombe District are not comprehensive, the map from the PFRA identifies a number of recorded incidents of groundwater flooding in Marlow. Wycombe District Council identified 30 properties which flooded from groundwater sources during the wet winter of 2000/1. These properties were located on Marlow Road (including an incident of sewer flooding), Maple Rise, Dedmere Road, Dedmere Court (including an incident of basement flooding), Henley Road and in Pound Lane, Pound Crescent and Bream Close. In February 2009, extensive flooding affected roads in southern Buckinghamshire (including Marlow) following heavy rain and a sustained period of high groundwater levels, as reported in the Buckinghamshire Advertiser and the Bucks Free Press. Marlow Town Council has reported that properties in the following roads have either suffered or been threatened by surface water flooding: Firview Close, Riverwood Drive, Gossmore Close, Gossmore Lane, Gossmore Walk, Lock Road, Riverpark Drive, Hyde Green and Meadow Close.

Table 3.1 summarises the available information on local flooding in Marlow, in chronological order of the flood events since 2000. Further detail is provided in the relevant sections of Chapter 4, alongside observations from site inspections and a summary of responses to the flood history questionnaires.

3.3 Climate Change

Already, we are experiencing trends in our weather patterns which are consistent with changes predicted by global climate models. These broadly state that, for the UK, we will experience warmer and wetter winters, hotter and drier summers, sea level rise and more severe weather. For example, the temperature in central England has risen by about 1°C since the 1970s, all regions of the UK have experienced an increase in the amount of winter rain that falls in heavy downpours and sea levels around the UK have risen by about 1mm a year over the 20th century[14]. Seasonal rainfall is variable and some of the changes might reflect natural variation. However, past emissions of greenhouse gasses mean some climate change is inevitable in the next 20-30 years, although action now could reduce the amount of change we experience. If emissions follow a medium future scenario, UKCP09 projected changes for the broad area around Marlow by the 2050s relative to the recent past are:

- Winter precipitation increases of around 15%
- Precipitation on the wettest day in winter up by around 15%
- Peak river flows in a typical catchment likely to increase between 8 and 18%

Wetter winters and more of this rain falling in wet spells may increase river flooding. More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers. Rising river levels may also increase local flood risk away from the River Thames because of interactions with drains, sewers and smaller watercourses.

[14] Defra (2009) Adapting to climate change. UK Climate Projections. June 2009

Table 3.1 History of local flooding in Marlow

Date	Location	Notes	Type of flooding	Information source
Winter 2000/1	Unknown	30 properties	Groundwater	Wycombe District Council
	Internal flooding recorded at some properties on: Marlow Road, Maple Rise, Quarrydale Road		Unknown	Wycombe District Council
	Claremont Road, Glade Road, The Causeway, Dedmere Road, Gossmore Lane, Firview Close, The Croft, Garnet Court, Pike Close, Pound Crescent		Various sources	This SWMP questionnaire
New Year 2003	SE Marlow	Worst in 30 years according to local residents	Fluvial	SFRA
	Internal flooding recorded at some properties on: Bream Close, Garnet Court, Dedmere Court, Dedmere Road, Henley Road, Pound Crescent, Pound Lane			Wycombe District Council
	Claremont Road, Glade Road, The Causeway, Dedmere Road, Gossmore Lane, Gossmore Close, River Park Drive, Hyde Green, The Croft, Garnet Court, Pound Lane, Pound Crescent		Various sources	This SWMP questionnaire
2006	Beaumont Rise, Dedmere Road, Mill Road, Newtown Road, Pound Lane, Spinfield Lane		Fluvial (or coincides with a fluvial event)	SFRA
	Dean Street, Victoria Road		Drain	SFRA
Autumn 2006	Claremont Road, The Causeway, Station Road, Dedmere Road, Firview Close, The Croft, Pound Lane		Various sources	This SWMP questionnaire

2007	Cambridge Road, Chapel Street, Claremont Road, Dean Street, Dedmere Road, Foxes Piece, Garnet Court, Glade Road, Gossmore Lane, Gypsy Lane, Harwood Road, Henley Road, High Street, Hillside Road, Institute Road, Little Marlow Road, Lock Road, Maple Rise, Newtown Road, Oak Tree Road, Peacock Road, Pound Lane, Seymour Court Road, South Place, Southview Road, Spinners Walk, St Peter Street, Station Road, Templars Place, The Croft, West Street, Wycombe Street, Badgers Way, Marlow Bottom Road		Fluvial (or coincides with a fluvial event)	SFRA
	Green Verges, Henley Road, Hillside Road, Maple Rise, Newfield Gardens, Pound Lane, Marlow Bottom Road		Drain	SFRA
	Internal flooding: Garnet Court, Pound Lane			Wycombe District Council
	Higginson Park		"Heavy storms"	SFRA
July 2007	Claremont Road, Glade Road, Fieldhouse Lane, The Causeway, Dedmere Road, Gossmore Lane, Lock Road, Firview Close, The Croft, Garnet Court, Pound Lane, Chapel Street		Likely to be predominantly groundwater, surface water and fluvial	This SWMP questionnaire
2008	Seymour Park Road Moyleen Rise, Mundaydean Lane		Drain Fluvial (or coincides with a fluvial event)	SFRA SFRA

2009	River Thames, Marlow Lock, upstream water level	Typical river level range 0.06 metres and 0.45 metres. 0.78 metres on 13/02/2009. Extensive flooding affected roads in southern Buckinghamshire (including Marlow) following heavy rain and a sustained period of high groundwater levels	Fluvial and groundwater	EA website River levels Buckinghamshire Advertiser and the Bucks Free Press
Feb 2009	High Street, Claremont Road, The Causeway, Dedmere Road, Gossmore Lane, Firview Close, The Croft, Pound Lane, Chapel Street		Various sources	This SWMP questionnaire
December 2012	Quarrydale Drive, Gossmore Lane, Gossmore Close, Firview Close, The Croft, Garnet Court, Pound Lane	Upstream water level at Marlow Lock reached 0.88 metres on 27/12/2012	Likely to be predominantly groundwater and fluvial, with some surface water flooding	This SWMP questionnaire EA website River Levels

3.4 Proposed or Allocated Development Sites

The amended 2007 Local Plan for Wycombe District highlights strategic housing commitments in Portlands (Marlow Town Centre) and Great Marlow School (Wycombe Road). Flood risk assessments associated with the planning application process were not available on the Wycombe District planning portal for either development. Both of these areas are proposed for predominantly residential development and are not highlighted in the national mapping or natural flowpath mapping as being particularly susceptible to local flooding. However, both areas lie within zones of potential groundwater emergence.

3.5 Marlow Flood Alleviation Scheme

A proposed flood alleviation scheme would benefit 287 properties in areas of Marlow which are at risk of fluvial and groundwater flooding. These properties, which do not currently benefit from any protection, would be protected up to a 1% (1 in 100) AEP fluvial flood event on the River Thames. The scheme received planning permission in 2010 but has yet to secure all the necessary funding to go ahead. There are three parts to the scheme in three different locations; Pound Lane, Lower Pound Lane and Gossmore Lane as shown in Figure 3.1, Figure 3.2 and Figure 3.3.

The proposed scheme is to reduce the risk of fluvial flooding in the Pound Lane and Firview Close / Gossmore Lane areas to a 1% (1 in 100) chance in any year, by installing permanent fluvial flood defences and temporary groundwater flood protection by portable electric submersible pumps installed during periods of high groundwater levels. It is anticipated that the groundwater pumps will be used to manage groundwater levels approximately once every ten years or so, for a period of several days to two weeks.

Lower Pound Lane area

- In addition to flood defence works, flood water storage areas will be provided on part of Marlow Sports Club and on agricultural land on Lower Pound Lane. Approximately 11ha of compensatory flood storage area will be excavated on the northern edge of Lower Pound Lane. This area will be landscaped to provide new wildlife areas comprising scrapes and meadow grassland. These will consist of lowered areas to store flood water from the River Thames, to ensure that flooding is not made worse downstream as a result of the scheme.

Pound Lane area

- Fluvial flood defences are proposed to consist of a continuous flood wall and bund.
- Eight groundwater pumping wells, and temporarily inserted pumps, will pump groundwater when rising levels threaten to cause flooding. Four of the wells will be in the vicinity of the flood wall and the remaining four located adjacent to Pound Lane along the northern edge of the Sports Club Field. The four pumps adjacent to the flood wall will discharge directly over the top of the wall by an outlet pipe fixed to the top of the wall during use. The four pumps adjacent to Pound Lane will discharge using buried pipes leading to a reinforced grass discharge pad in a lowered area to the west of the proposed recreation facility.

Gossmore Lane area

- Three flood-gates, an earthwork flood bund and a brick-clad reinforced concrete wall, raised level of the football pitch and a concrete wall in a drainage ditch alongside the playing field to prevent flood water backing up the ditch.

- Eight groundwater pumping wells with space at the top for a pump to be inserted (to pump groundwater when rising groundwater levels threaten to cause flooding). Six of the wells are to be along Gossmore Lane, with two further south, on either side of the playing field. All the pumps will discharge via buried pipes to outlets on the river-ward side of the flood defences.

The modelling to support the Marlow FAS feasibility studies was completed by 2007, with further modelling to support detailed design summarised in a technical note in 2010[15]. The feasibility study models were based on Reach 1 (Hurley Weir to Cookham Weir) of the Environment Agency Lower Thames hydraulic model which was revised in 2005[16]. The 1D ISIS models used photogrammetry data which provided complete coverage of the study area, although this was shown to be generally between 0.1 and 0.2m lower than LiDAR data subsequently available.

The EA model was extended for the base case Marlow model to include more detail in low lying residential areas around Pound Lane, as well as representation of the General Canal which flows between Pound Lane and under Pound Lane Bridge towards the River Thames. Further changes to the schematisation of the models were made to represent the 'with scheme' situation.

Therefore, the available modelling for Marlow focuses on the River Thames and its floodplain as was required to support the FAS, and represents all features in 1D. The modelling does not represent local flooding in terms of 2D overland flow arising from surface water runoff (intense rainfall events) or groundwater inflows from the floodplain gravels or Chalk hills surrounding Marlow. There is no representation of buildings or other urban features, or the sewer or highway drainage networks. More detailed modelling for the urban area of Marlow focussing on local flooding mechanisms would need to consider some of these aspects whilst including some representation of flooding from the River Thames to study interactions.

Figure 3.4 shows the areas of Marlow which could be at risk of fluvial (1% AEP flood from the River Thames) and surface water (0.5% AEP) flooding. The FAS proposes to protect approximately 17.3ha of land currently in Flood Zone 3 around Firview Close and 9.8ha of land currently in Flood Zone 3 around Pound Lane. The Firview Close area shows little local flood risk according to the Flood Map for Surface Water. However, the Pound Lane area is shown at risk of both local and fluvial flooding. With the groundwater pumps proposed in the Pound Lane area, the FAS could reduce local flood risk in this area. Nonetheless, there are many other significant areas of local flood risk in Marlow which are unlikely to benefit.

3.6 Marlow Sewers and Drainage Networks

Marlow is served by Thames Water Utilities foul and small lengths of surface water sewers; there are virtually no lengths of combined sewers. Surface water sewer coverage is limited to the following areas (i) between Newtown Road and Parkway, (ii) east end of Pound Lane.

Thames Water provided details of incidents of internal and external property flooding which has been caused by hydraulic overload of the sewer network. The number of recorded incidents is mapped by postcode area in Figure 3.5. There are no recorded internal or external flooding incidents which have occurred more frequently than

[15] Halcrow (2010) Marlow Flood Alleviation Scheme Technical Note. Internal Document.
[16] Jacobs (2007) Lower Thames Flood Risk Mapping Project Hurley to Teddington Reach. Hydraulic Modelling Report. Issue 5.1. November 2007

once in 20 years in Marlow Bottom, or the area between Seymour Court and Wycombe Roads. To the west of the High Street, 3 properties have been flooded externally once in 10 years, and one property has been flooded internally at least once in 20 years. The highest number of recorded sewer flooding incidents has been in the area to the east of the High Street and to the south of the A4155. Here, 5 properties have recorded internal sewer flooding, and 5 have recorded external flooding, at least once in 20 years. Two further properties have recorded external flooding twice in 20 years. Thames Water is aware that, due to the proximity to the River Thames, infiltration of groundwater and inundation of the sewer network is a potential risk in these areas. Indeed, when groundwater levels were near their peak around February 2013, Thames Water provided tanker support for the Riverwoods pumping station in the Little Marlow catchment to manage flows. The additional flow was likely to have been a combination of misconnections (surface water in the sewer), infiltration (groundwater) and inundation (river / overland flow). Thames Water does not have any improvement schemes programmed for this current AMP period to 2015.

Surface water drainage in Marlow is predominantly achieved by highway and private drainage, with the highway drainage being the responsibility of Transport for Buckinghamshire (TfB). The following key points were noted at a meeting held with the Local Area Technicians for TfB:

- The majority of Marlow is served by soakaways. There are estimated to be over 300 across the main urban area. Key areas draining to soakaway are the estates between Seymour Court Road and Little Marlow Road, the estates between Little Marlow Road and Dedmere Road, the Globe Park and Pound Lane. Many of these soakaways, particularly south of the A4155 where the land is flatter, are shallow and suffer from poor infiltration due to high groundwater levels.

- The High Street, Mill Road and Lock Road drain to the River Thames. In addition to the soakaways, Pound Lane is served by the only pumped system in Marlow, with 3 satellite pumps discharging ultimately via a larger pump to the River Thames. This system is automatically activated when water levels rise, and this is particularly connected with high levels in the River Thames.

- The largest piped drainage network collects runoff from Seymour Court Road, Little Marlow Road and broadly from the junction of these roads through to Dedmere Road, where it discharges into the Newt Ditch ordinary watercourse. This ditch has a small open section, otherwise it is culverted in an approximately 0.9m diameter pipe between the end of Dedmere Road and the open section, and then under the A404 to the outfall into a ditch system (termed as the 'ski pit') on the east side of the A404. The section of pipe between the end of Dedmere Road and the open section (not shown on Appendix B map since it is not in the EA Detailed River Network) is known to be half full of silt, with excessive root growth which cannot be cleared by jetting. The large catchment draining through this culvert in its current poor condition is suspected by the highway engineers to be the greatest local flood risk in Marlow, after flooding from the River Thames.

- TfB has a number of paper and scanned plans showing sections of the drainage network. However, the information on these plans can often be supplemented by knowledge of the engineers themselves. The plans often provide pipe sizes, but not invert levels. There are no comprehensive records of any riparian ownership although some local arrangements for maintenance exist. Maintenance of the soakways and drainage network is currently undertaken on a reactive basis.

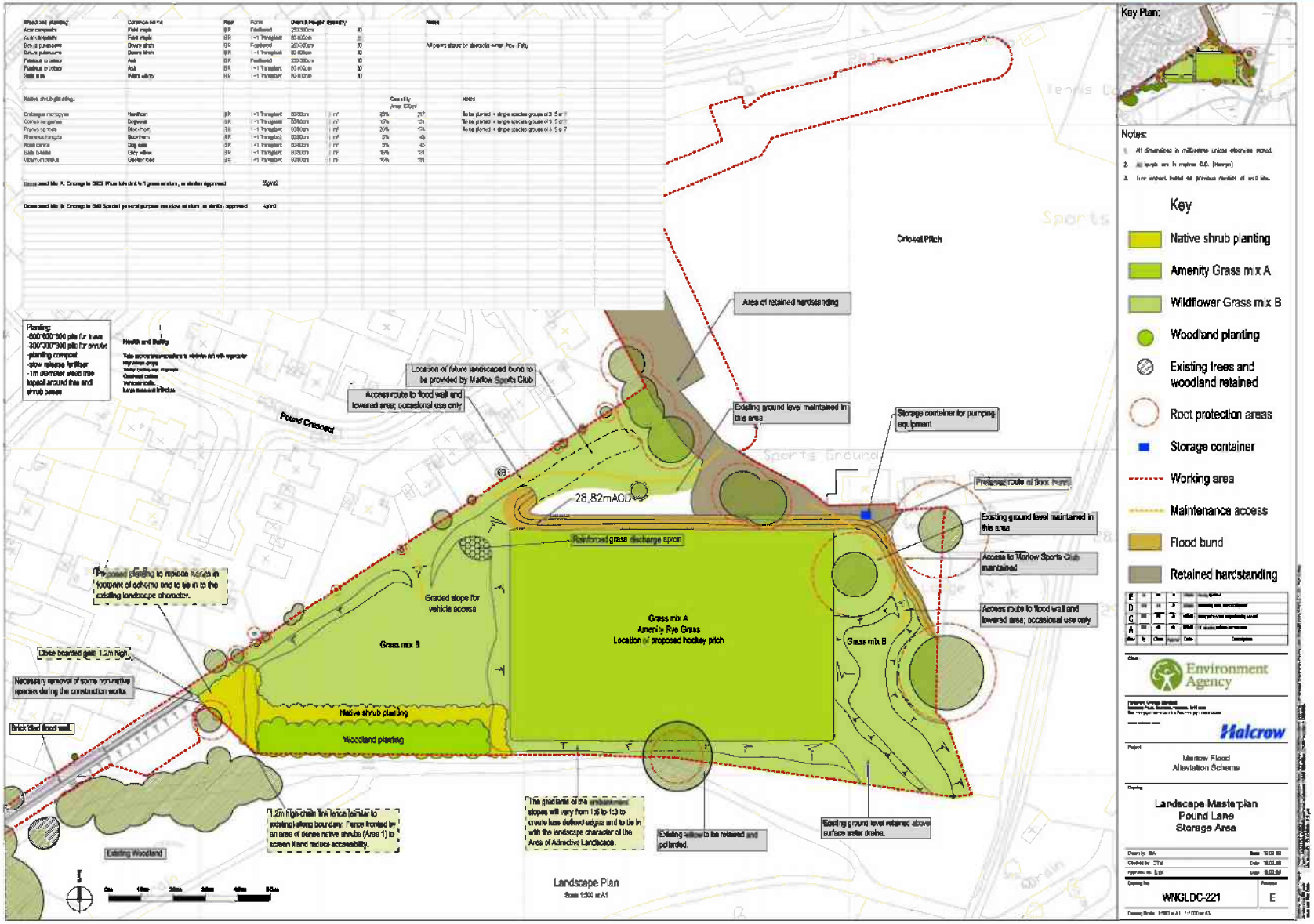


Figure 3.1 Marlow FAS Pound Lane Area

Figure 3.2 Marlow FAS Lower Pound Lane Area

Figure 3.3 Marlow FAS Gossmore Lane Area

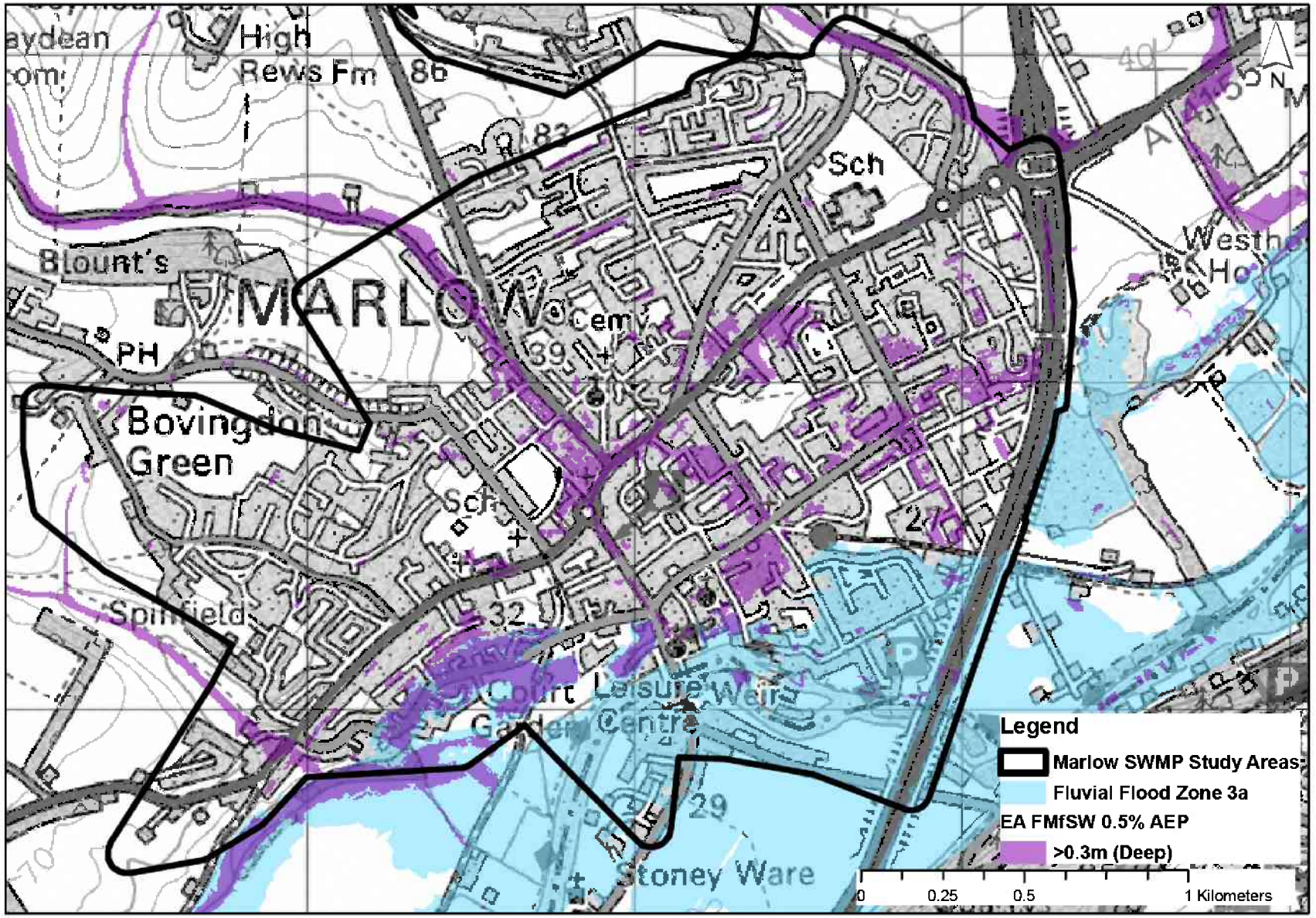


Figure 3.4 Areas at risk from a 1% AEP fluvial and 0.5% AEP surface water flood

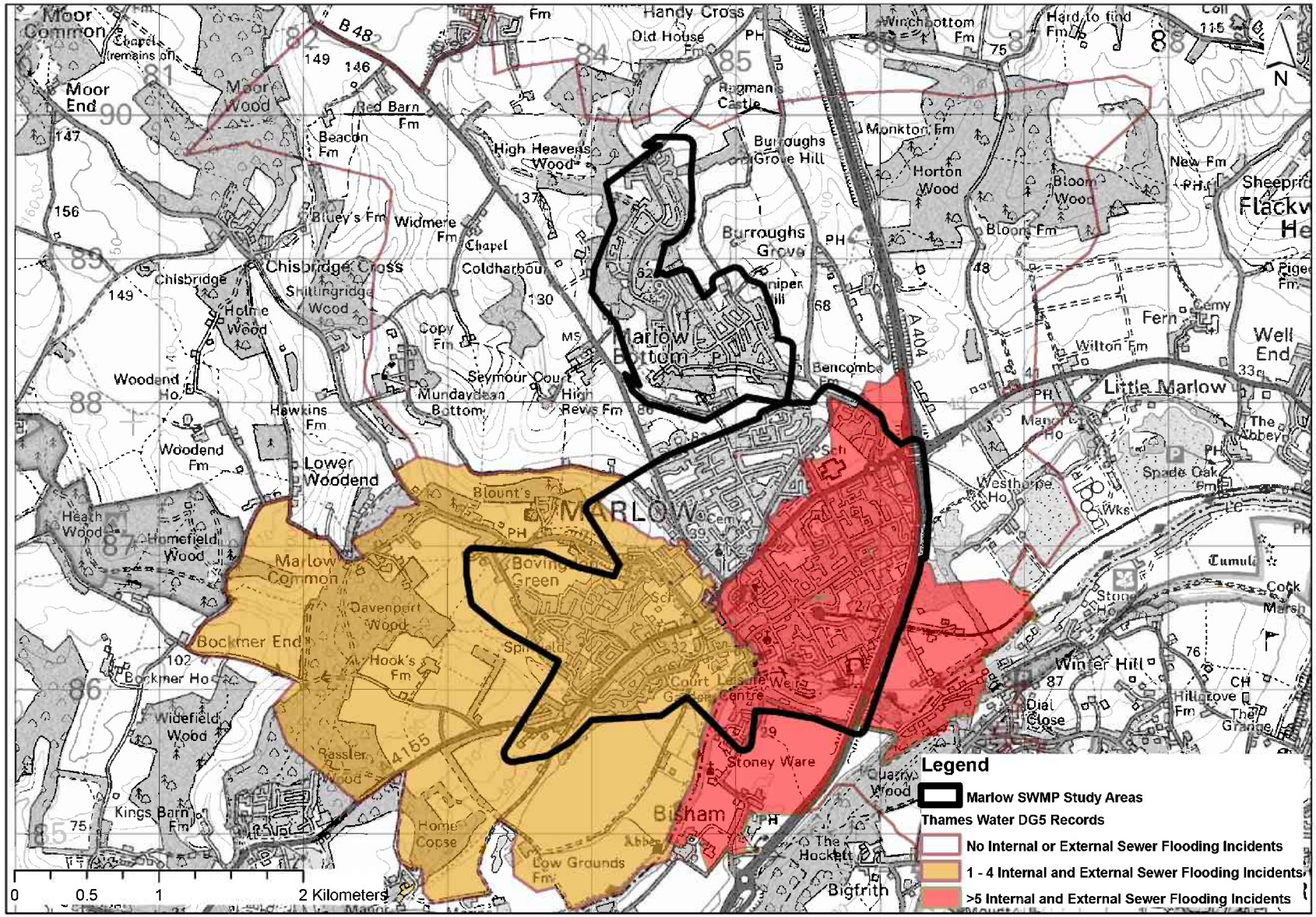


Figure 3.5 Postcode areas where internal and external property sewer flooding is recorded on Thames Water DG5 database

3.7 Flood Warning

The EA Floodline Warnings Direct service is available to properties within the areas highlighted in Figure 3.6. These warnings are based on rising levels in the River Thames which could lead to fluvial flooding. However, given that groundwater levels can rise within the floodplain gravels to cause flooding of properties and low lying areas prior to any fluvial flooding, these warnings may be relevant for local flooding. Outside the zone shown in Figure 3.6, no warning service for flooding of any source is available to the public.

The Met Office and the EA jointly operate a Flood Forecasting Centre which provides Flood Guidance Statements to emergency responders, including BCC. The Flood Guidance Statements report the risk of all types of flooding – coastal, tidal, river, groundwater and surface water flooding. The likelihood of a flood is described as very low (<20%), low (20-40%), medium (40-60%) and high (60% or greater). These four likelihood levels map onto a flood risk matrix which considers recent weather conditions, rainfall forecasts, knowledge of catchment conditions within counties, detailed flood forecast models for the coast and flood flows for rivers are evaluated, seasonal factors and the combined effect of river flow and high tides. In light of this, flood risk levels are produced of very low, low, medium and high.

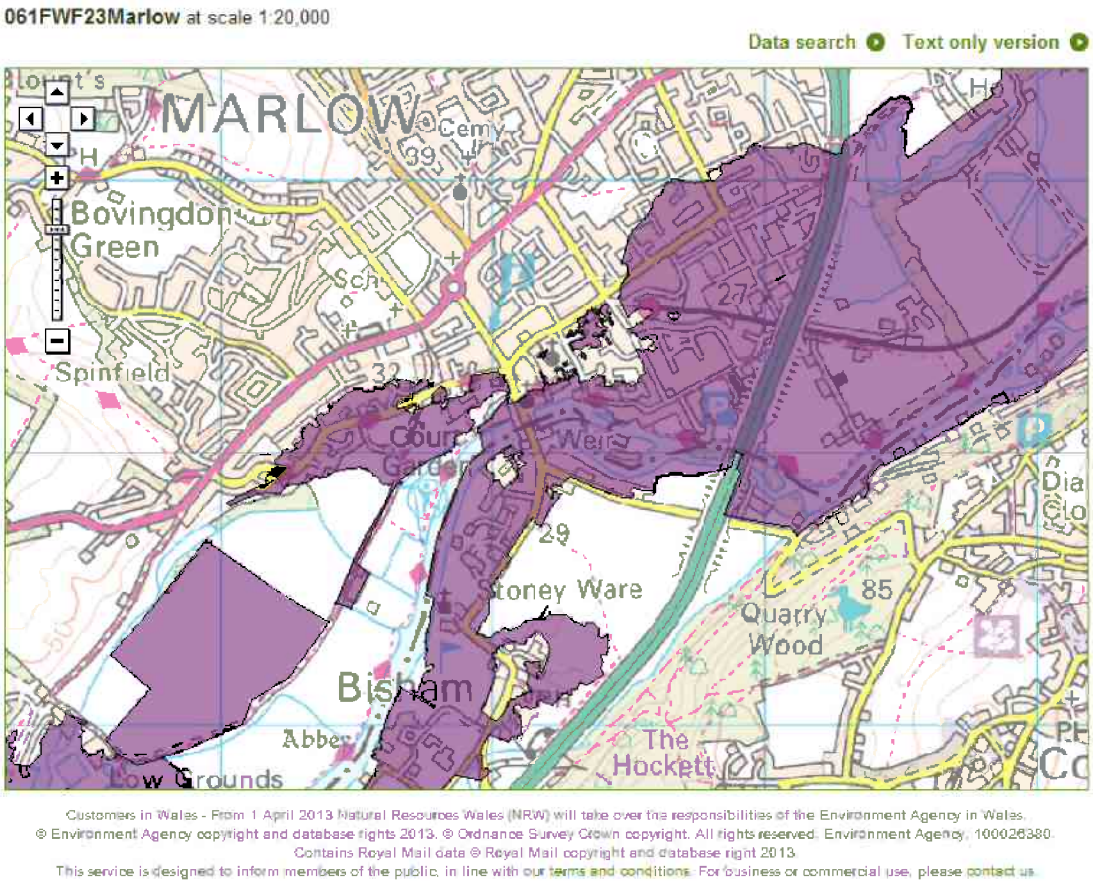


Figure 3.6 Areas of Marlow covered by the EA fluvial flood warning service

4 Observations from Site Inspections

4.1 Introduction

Site walkovers of Marlow were conducted on 6 and 20 March 2013. The locations visited were selected from a desk-based review of the composite maps shown in Appendix A, as well as consideration of other evidence of past flooding. Key areas of investigation which are referred to in Section 4.2 to Section 4.10 are highlighted in Appendix B. The inspections enabled an initial broad assessment to be made of areas that may be susceptible to local flooding. They also provided valuable verification of mapping and an initial idea of some of the measures that might be possible to reduce the risk of surface water flooding.

The preliminary risk assessment for each location visited is based on a simple scoring system to rate the perceived overall level of local flood risk at that location. The scoring assesses a number of characteristics including water depth and velocity, type of land use and number of properties at risk including critical infrastructure, rate of inundation and doorway threshold levels. An initial assessment is also made of potential risk to life. The Risk Assessment Matrix which has been applied is shown in Figure 4.1.

The results of the preliminary risk assessment are reported in the next sections. (Further detail is provided in the spread sheet in Appendix C.) These also present a summary of the known occurrences and mechanisms of flooding across the area. Evidence has been collated from the various sources listed in Section 2. The evidence has been collated to identify the locations in the area with the *highest* risk of *local* flooding. Locations which are known to be *primarily* at risk of flooding from the River Thames are not included unless there are likely to be interactions between flood sources (see Section 1.2).

Attribute	Hazard Level	Very Low	Low	Moderate	High	Very High
Sensitivity of Land Use	Description	Open areas that can be flooded without significant consequence.	Parkland, open ground or farmland where flooding would have some consequence.	Suburban residential / commercial / retail / industrial areas where flooding would have moderate consequence.	Central urban or town centre residential / commercial / retail / industrial areas where flooding would have high consequence.	Critical infrastructure present. Critical transportation links present. Basement flats present.
	Score	0	1	2	3	4
Depth of Flooding	Description	<0.2m	0.2m to 0.5m	0.5m to 1m	1m to 2m	>2m
	Score	0	1	2	3	4
Extent of Flooded Area and Properties at Risk	Description	Localised <0.1ha No properties potentially at risk	Localised <0.1ha 1 property potentially at risk	Moderate (up to 1ha) Up to 10 properties potentially at risk	Extensive (up to 10ha) Up to 100 properties potentially at risk	Widespread (>10ha) More than 100 properties potentially at risk.
	Score	0	0	1	2	3
Flowpath feeds topographic depression ?	Description	No or Flowpath only.	Yes. Depth <0.5m	Yes. Depth 0.5-1m	Yes. Depth 1-2m	Yes. Depth >2m
	Score	0	0	1	2	3
Velocity of Flow	Description	Still Water (generally flat terrain). Any depth.	Velocity up to 0.5m/s (generally gently sloping terrain) and Depth less than 0.5m.	Velocity 0.5 -1m/s (generally moderately sloping terrain) and Depth less than 0.5m.	Velocity more than 1m/s (generally steeply sloping terrain) and Depth less than 0.5m.	Velocity more than 1m/s (generally steeply sloping terrain) and Depth more than 0.5m.
	Score	0	1	2	3	4
Doorway Threshold Levels	Description	Most above 0.2m above ground level	Most above 0.2m but some 0m to 0.2m above ground level	Most 0m to 0.2m above ground level	Most at ground level. Some below ground level.	Most below ground level
	Score	0	1	2	3	4
Total Score		0 to 2	3 to 4	5 to 7	8 to 10	>10
Overall Preliminary Risk Rating		Not Significant	Low	Moderate	High	Severe

Figure 4.1 Preliminary hazard assessment matrix used in the site inspections

4.2 Marlow Bottom

The settlement of Marlow Bottom lies up a dry Chalk valley which the FMfSW indicated could channel water south eastwards towards the junction of the A4155 and A404. Inspection confirmed that the valley has no visible signs of a watercourse. It is likely that in a high magnitude rainfall event, or with high groundwater levels, the road would become the channel for water for much of the route, with properties on either side of the road being vulnerable to flooding where they are lower than the road or have low thresholds.

At the upper end of the valley, there are approximately 10 residential properties at risk. In the middle section, a mix of commercial, retail and residential properties are at risk, totalling around 10. Adjacent to the junction of Hill Farm Road is a sheltered housing complex which could be at risk in extreme events as the properties have low thresholds and as bungalows are particularly vulnerable in the event of any flooding. At the southern end of the valley (between junctions of Hill Farm Road and Wycombe Road), runoff would be likely to flow into the field on the south side of Marlow Bottom road where there is substantial space below road level for the water to pond. There is a small pond by the road here which could attenuate some water at first. There is a substantial level difference between the low spot in this field and the road. Based on site observation, it appears unlikely that, other than in extreme events, flow from Marlow Bottom once in the field would continue on down towards Stapleton Close (The Scrubs) as shown in the national mapping. Nonetheless, two low-set properties at the end of Stapleton Close could be at risk of flooding from surface water from the rear, as well as a large electricity substation nearby. The outflow route for this water could not be observed due to access restrictions, but is likely to be a culvert under the A404.

Initial inspection suggested that there may be some open space to provide attenuation storage along this flowpath:

- Open ground at the top end of Marlow Bottom, although this is towards the top of the catchment and its benefit may be limited.
- A woodland (Munces Wood) on the eastern side of the road is a natural depression into which runoff on the road (or in highway drainage) could be routed if needed.
- The field to the south of Marlow Bottom road between the junctions of Hill Farm Road and Wycombe Road, although it is likely to fulfil this function already.

The Marlow Bottom area north of the junction with Wycombe Road was given an overall preliminary hazard assessment rating of moderate. Further down, towards Stapleton Close, the preliminary hazard assessment rating is high because there is a large electricity substation (which constitutes critical infrastructure) in the field behind Stapleton Close on low lying ground which would be vulnerable to flooding if water were to come down to this point from Marlow Bottom. However, site inspections indicated that flows down from Marlow Bottom would be attenuated in the field close to the junction with Wycombe Road in all but the most extreme events and therefore the likelihood of runoff reaching this area is low. No flood history questionnaires were delivered in this area.

Potential water storage location in Munces Wood at the side of Marlow Bottom Road

Potential water storage in the field beside the junction of Marlow Bottom Road and Wycombe Road

Potential upstream storage area at the top end of Marlow Bottom Road

Some properties have low thresholds

Figure 4.2 Photographs of key features in the Marlow Bottom area

4.3 Mundaydean Lane

Lying to the northwest of Marlow town centre, this is a potentially significant valley along which runoff could flow towards the centre of the town. Similarly to Marlow Bottom, this is a dry Chalk valley with a road in the bottom which would likely channel the water past many of the sparse houses in the area. There are approximately ten residential properties which could be at risk in the event of a high magnitude rainfall event as they lie at or below the level of the road and have low thresholds. Several highway drainage gullies were observed during site inspections, but it is unclear where these lead and how much water these would remove from the road in the event of high intensity rainfall. There are a number of possibilities for upstream flood storage. On inspection, there are two or three possible locations for banks to be created in fields for water to be stored behind. Attenuation of runoff could be particularly important in this valley as the flowpath continues directly into the town centre roads of Dean Street and Chapel Street. The Mundaydean Lane area was given a preliminary hazard assessment rating of low, due in part to the low number of potential receptors. No flood history questionnaires were delivered in this area.

Smaller secondary site for potential upstream storage

Dry valley with potential for upstream storage

Figure 4.3 Photographs of key features in the Mundaydean Lane area

4.4 Seymour Court Road

Seymour Court Road is a large, straight, steep road with a catchment to the north and east. The road joins directly into Dean Street and Chapel Street. A road sign warning of flooding was observed during the site inspections, but no other information supporting a history of flooding at this location was found. According to the natural flow paths data in GIS, water would travel across Seymour Court Road and down into Berwick Road. The gradients observed onsite support this, but there is also a possibility that the water could stay on the road. If the water flowed down into Berwick Lane, several properties between Seymour Court Road and Berwick Road could be flooded. The Seymour Court Road area, around the junction with Seymour Park Road, was given a preliminary hazard assessment rating of moderate. No flood history questionnaires were delivered in this area.

4.5 Dean Street and Chapel Street

A large proportion of the properties in this town centre area are at risk of flooding from runoff which exceeds the capacity of the highway drainage as the land here flattens out and many properties have low or flat thresholds. Of particular note are the vulnerability of the police station which constitutes critical infrastructure, a row of listed cottages on Chapel Street with thresholds at road level and a public house at the end of Dean Street. Site inspections indicated that the majority of water would be most likely to travel south along Dean Street and then east along Chapel Street, travelling along the roads as opposed to the path shown on the natural flow paths map. In this case, water would then go on to pond in the Claremont Gardens/Lock Road area. However, it is possible that water could travel a diffuse path from Dean Street through properties to the High Street.

Out of approximately 30 questionnaires delivered along Chapel Street, 4 responses were received. The flood history survey conducted in conjunction with this SWMP revealed incidents of surface water flooding in the road in July 2007 and February 2009 due to the drainage network being overwhelmed, but no internal flooding was recorded by any respondent.

Options to reduce flood risk in this area include upstream storage (on Mundaydean Lane), improvements in the highway drainage and individual property protection which may include kerb or threshold raising or temporary flood guards. The Dean Street and Chapel Street area was given a preliminary hazard assessment rating of high.

Police Station on Dean Street (with low threshold)

Public house at the end of Dean Street with low threshold

Dean Street is a low and flat area

Chapel Street cottages have very low thresholds

Figure 4.4 Photographs of key features along Dean Street and Chapel Street

4.6 High Street

Historic Marlow town centre includes the High Street which is wide, with low profile kerbs. Almost all of the 100 or so shops along it have little or no rise from the pavement over their thresholds. These properties are at high risk of flooding from surface water and have a history of flooding previously. The High Street continues south to Marlow Bridge over the River Thames.

It is most likely that surface water runoff would arrive at the High Street from Dean Street by taking a diffuse path through properties rather than coming along Spittal Street, which is slightly higher than Chapel Street. The site inspections highlighted that low thresholds on properties on the High Street mean that they have a high potential vulnerability to water ingress even if the overall depth of water on the street was low. There is potential for water to be channelled down the road and into Higginson Park to relieve pressure on the High Street.

Out of approximately 20 questionnaires delivered along the High Street, 5 responses were received describing regular problems with excess surface water collecting outside properties and in the road, but no internal flooding.

Shops along Marlow High Street have very low thresholds

The gradient of Marlow High Street is fairly flat

Figure 4.5 Photographs of key features along Marlow High Street

Higginson Park is a recreational green space off the High Street between Pound Lane and the River Thames which houses a Leisure and Sports Centre with a theatre, swimming pool and tennis courts amongst other facilities and some small businesses including a café and a print and design company. There are also outdoor recreational facilities such as a skate park and children's play area. It is likely that surface water would pond at the end of the High Street close to the entrance to Higginson Park and in the park itself, which could flood some commercial properties with low thresholds. The High Street area was given a preliminary hazard assessment rating of severe, whilst Higginson Park (including the adjacent properties on the High Street) was given a preliminary hazard assessment rating of high.

4.7 Claremont Gardens, Glade Road and Station Road Area

Claremont Gardens is an area which was identified as a depression in which surface water could collect or groundwater flooding could pose a problem. This area is predominantly residential and the houses have low thresholds (0 to 0.2m) which would be vulnerable in the event of runoff exceeding the highway drainage capacity. Site inspections indicated that runoff from Dean Street is unlikely to flow onwards into the High Street as suggested by the natural flowpath mapping, since there is little opportunity for it to leave the road. If the exceedance flow remained on Dean Street, the levels suggest it would flow east into Chapel Street and then down towards Claremont Gardens. This area is also at fluvial flood risk during a 1 in 1000 year event and at risk of groundwater flooding through the fluvial gravels upon which it lies. The interactions of these different types of flooding could increase the risk of surface water flooding if the ground is already saturated or ponding from other sources, then surface water runoff could exacerbate the problem.

Out of approximately 55 questionnaires delivered in this area, 21 responses were received. Most residents on Claremont Gardens reported no issues, but some cited some excess surface water in the road. On Glade Road, residents reported flooding in July 2007 from overwhelmed road drains and excess surface water. On Station Road, residents cited some issues arising outside properties and in the road from the interactions of groundwater and surface water. One respondent stated that their house has been flooded internally on two occasions from surface water, in 1988 and 2006.

The area bordered by St Peter Street, Station Road and Lock Road[17] is a large shallow depression with a diameter of approximately 200 metres. In the relatively flat town centre of Marlow, this could collect surface water in a high magnitude rainfall event or be at risk of groundwater flooding. The area has over 100 properties which are mostly residential, with a few retail and commercial properties. Many have very low thresholds which are therefore vulnerable to local flood risk. Claremont Gardens/Glade Road/Station Road was given a preliminary hazard assessment rating of severe.

4.8 Lock Road to Gossmore Lane

The residential area around Gossmore Lane is flat and largely inside the 5% (1 in 20) AEP fluvial flood outline, defined as the functional floodplain in the Strategic Flood Risk Assessment. The geology is sand and gravel which has given rise to past incidents of groundwater flooding. Property thresholds are variable. Some properties were observed to have void spaces under the lower floor and/or large culverts under the road linking gardens which become natural flow routes during high groundwater levels or ponding of surface water. Other properties have been constructed at or below road level, with relatively low thresholds. Although flooding from the River Thames and flooding from groundwater even before the Thames flows out of bank are the greatest risk in this area, surface water could pond over a large area and put a number of properties at risk. The area was given a preliminary hazard assessment rating of high on the basis of flood risk from local sources, but it is noted that this rating would increase to severe if fluvial flooding was also considered. The efficiency of the proposed groundwater pumps will be crucial to minimising the residual local flood risk in this area, if the FAS is implemented.

Out of approximately 95 questionnaires delivered in this area, 31 responses were received. The flood history survey confirmed flooding problems in this area which are strongly linked to the fluvial regime of the River Thames. One resident specifically stated “our garden was flooded before the River Thames burst its banks”. Internal flooding was reported in properties on Gossmore Lane and Firview Close and there were reports of continual high groundwater levels and waterlogging. Highway drains close to the A404 were reported to be regularly overwhelmed and residents reported having paid for a tanker to remove surface water from Firview Close.

4.9 Dedmere Road to Parkway

The area around the junction of Dedmere and Newtown Roads is large, relatively flat and may even form a shallow depression in which surface water could collect or groundwater flooding could pose a problem. This area is predominantly residential with a large industrial estate (Globe Park) south of Savill Way. Residential properties have average level thresholds (approximately 0.2m). Surface water runoff could reach the area along a number of flowpaths from Little Marlow Road. The area was given a preliminary hazard assessment rating of severe.

One of the few piped highway drainage systems serving Marlow passes in culvert from the junction of Dedmere and Newtown Roads to outfall into the Newt Ditch Ordinary watercourse adjacent to The Croft (see Section 3.6). Exceedance of this ditch and/or culvert system could pose a severe flood risk to a number of properties in the area.

[17] The properties on Lock Road are considered in Section 4.8.

Out of approximately 20 questionnaires delivered in this area, 9 responses were received. Most residents in the area around Dedmere Road and the Newt Drain described high groundwater levels, excess surface water and overwhelmed drainage network causing flooding outside properties and in the roads. Particularly large events occurred in July 2007 and December 2012. Residents of The Croft are continually affected by the overflowing of Newt Drain. One property on Dedmere Road has flooded internally. Residents also described problems such as toilets backing up, which is associated with the sewer network being under capacity. This may be in part due to misconnections of surface water into the foul network or groundwater leaking into the foul network.

The Newt Ditch culvert at its outfall was observed to be heavily silted

Properties on The Croft have been affected by high levels in the Newt Ditch

The railway is raised only slightly above the level of roads to either side

Gossmore Lane slopes downwards from the railway line

Figure 4.6 Photographs of key features in the Dedmere Road area

There is a natural flowpath down Fieldhouse Lane from the Dedmere Road area (Newt Ditch) towards the railway line. During site inspections there was no evidence of drainage associated with the railway. The crest of the railway line was raised approximately 300mm above the road level[18] and with a shallow gradient, so any flooding on the road could inundate the railway line and continue on beyond it into Gossmore Lane where there is a history of flooding as discussed in Section 4.8.

4.10 Pound Lane

The residential area around Pound Lane is flat and largely inside the 5% (1 in 20) AEP fluvial flood outline, defined as the functional floodplain in the Strategic Flood Risk Assessment. However, the FMfSW suggests that there may also be a

[18] It was noted that the ballasted railway formation can readily pass flood water below the crest as it is far from impervious.

convergence of flowpaths which could pond at the lowest points. There is a natural shallow depression opposite Pike Close in which water could pond in an event which exceeds the capacity of the highway drainage. There are some open space areas in front of the houses which could potentially be modified to provide storage if required. This area will benefit from the Flood Alleviation Scheme if built, which would significantly reduce its risk of fluvial flooding from the Thames. However, it is not yet known if and when this may go ahead and what the residual flood risk would be. Pound Lane was given a preliminary hazard assessment rating of high on the basis of flood risk from local sources, but it is noted that this rating would increase to severe if fluvial flooding was also considered.

Out of approximately 30 questionnaires delivered in this area, 20 responses were received. The survey confirmed that the whole of the Pound Land area was badly affected by flooding in January/February 2003 and again in December 2012, with many other events also reported. Furthermore, two thirds of internal flooding reported in the survey occurred in this area, specifically on Pound Lane and Garnet Court. The flooding issues in this area arise from interactions of fluvial, groundwater, surface water and the drainage network and there are also problems with the foul sewer network backing up into houses.

5 Conclusions and Recommended Actions

Buckinghamshire County Council (BCC) is the Lead Local Flood Authority (LLFA) with responsibility for management of local flood risk in Marlow. BCC has worked in partnership with Wycombe District Council (WDC), Marlow Town Council, the Environment Agency (EA), Thames Water and others to produce this first preparation stage of a Surface Water Management Plan (SWMP) for Marlow. The primary aim of this first stage has been to collate available information in order to understand the flood risk and other related issues in Marlow. The wider aim of a full SWMP is to identify sustainable responses to manage surface water flooding and to prepare an Action Plan.

The following conclusions can be drawn from the desk-based review of available information and the subsequent site visits:

- In addition to the history of fluvial flooding from the River Thames (a Main River which continues to be managed by the Environment Agency), there have been some recorded incidents of flooding in Marlow caused by local sources. Internal property flooding resulting from excess surface water has been reported during high rainfall events and roads are also reported to have flooded at the same time.

  External flooding of gardens resulting from groundwater emergence has been reported; this is strongly linked to water levels in the River Thames as the residential areas at risk are situated on river gravels through which water can percolate relatively easily.

  Furthermore, as the surface water drainage system in Marlow discharges largely to soakaways there is the potential for surface water flood risk to be compounded by high groundwater levels. The overall risk of flooding occurring from interactions between fluvial, surface water and groundwater should be carefully considered, particularly with regard to future development.

- The topography, which is divided into two distinct areas, steep sided valleys to the north of Marlow and flat, low-lying terrain close to the River Thames, supports the national Flood Map for Surface Water identification of flowpaths travelling south towards the river and areas of particular risk in low spots and depressions.

- Site inspections based on available mapping suggest that there is generally a moderate to high hazard of local flooding across Marlow, with Dean Street, Chapel Street and High Street being severe hazard on the basis of the number of properties with low thresholds and their location on flowpaths from the valleys to the north of Marlow.

- Although few basements were observed in the study area, numerous properties – many which are listed - had low thresholds. Low thresholds were observed on old and new properties alike, as well as characteristically on retail and industrial properties. Although some properties have already had resistance or resilience measures fitted, further deployment of measures may be warranted. Furthermore, any future development should design property thresholds and access with adequate consideration of natural flow paths for surface runoff as well as depressions and low spots where surface water could pond.

- There is one ordinary watercourse in Marlow, called the Newt Ditch. It drains a catchment which nominally includes Seymour Court Road, Little Marlow Road and broadly from the junction of these roads through to Dedmere Road. This ditch has a small open section, otherwise it is culverted in an approximately 0.9m diameter pipe between the end of Dedmere Road and the open section, and then under the A404 to the outfall into a ditch system (termed as the 'ski pit') on the east side of the A404. The section of pipe between the end of Dedmere Road and the open section is known to be half full of silt, with excessive root growth which cannot be cleared by jetting.

- With the exception of the Newt Ditch catchment, and in Pound Lane where surface water is removed via a pumped system to the River Thames, the surface water drainage network in Marlow discharges to an estimated 300 soakaways.

- There are virtually no Thames Water surface water or combined sewers in Marlow. There are reported issues of the foul sewer network being under capacity and backing up into toilets in some properties. It is possible that there may be ingress of groundwater into the sewers, and some misconnections of surface water into the foul sewer network which could be compounding this problem.

- The Marlow Flood Alleviation Scheme (FAS) aims to protect properties in the Pound Lane and Gossmore Lane areas of Marlow up to a 1% (1 in 100) AEP fluvial flood event on the River Thames. A number of groundwater wells will be installed in these areas, but with pumps being fitted on a temporary basis when necessary to discharge groundwater back over the defences towards the River Thames. Although the detail of the pumps and their operation is not finalised, the practicalities of fitting the pumps, which may not have been used for some time and which would likely be of a substantial size/capacity to keep pace with the rising groundwater, should be carefully considered.

Based on the review of available evidence, consultation with SWMP Partners and site inspections, a plan for further work to better understand and manage local flood risk (specifically including detailed modelling of the surface water drainage system associated with the Newt Drain in the east of Marlow) is proposed in this Chapter.

Given the following justifications, further detailed assessment of local flood risk in Marlow through a full SWMP is recommended:

i. There is a demonstrable history of local flooding in Marlow, including the links with high levels in the River Thames.
ii. From national mapping largely verified by site inspection, there is a substantial predicted future risk of local flooding, particularly beyond the extent of fluvial flooding.
iii. The risk of flooding from the poor state of the Newt Ditch will increase with further deterioration of the asset condition, as well as predicted increases in flood risk with a changing climate.
iv. With the ongoing uncertainty regarding funding the Marlow Flood Alleviation Scheme, there is merit in seeking to reduce the existing local flood risk, as well as the anticipated residual risk once fluvial defences are constructed. If local flooding is demonstrated to be a significant risk when river levels are not high enough to cause property flooding, aspects of the FAS which address local flooding (e.g. borehole pumps) could possibly be advanced.

As stated in the Defra Guidance[19], the purpose of modelling in a SWMP is to understand the causes, probability and consequences of local flooding in a greater level of detail, and to test mitigation measures to reduce flood risk. Although the updated Flood Map for Surface Water can provide depth and velocity information, detailed modelling will provide the following additional benefits:

- Better understanding of the locations and mechanisms of flooding, especially in this complex situation where different sources (including surface water and groundwater) can occur together.
- Inclusion of the actual highway drainage system and the Newt Ditch which will be more representative than assumed drainage conditions used in the national mapping.
- Predictions of flood depth at individual receptors (e.g. properties) can provide a basis for the estimation of economic damages due to local flooding in the current situation. This provides an indication of the scale of mitigation measures which are likely to be cost beneficial.
- Models can be adjusted to represent potential mitigation options and therefore test their degree of benefit in reducing adverse consequences of flooding. Predicted depth of flooding can be used to estimate the 'with scheme' economic damages and, therefore, indicate the potential benefit-cost ratio.
- Results from models are a standard form of evidence to support applications for funding identified mitigation options.

Modelling can thus provide the evidence base to make decisions and inform the effectiveness of potential mitigation measures. The level of modelling effort should be proportional to the degree of flood risk and the complexities of the system. Rather than modelling the entire Marlow study area in detail, it is recommended that the greatest benefit will be achieved through modelling the catchment area of the Newt Ditch, including overland flow routes into this highway drainage catchment.

This recommendation is listed in Table 5.1 alongside other actions to improve local flood risk management in Marlow. These recommendations have been developed from the review of the available information, site inspection and consultation with SWMP Partners. The table provides the following information:

- **What:** The description of the action.
- **How:** The suggested approach to implementing the action.
- **Who:** The partner organisation(s) best placed to lead implementation.
- **When:** An indication of the timescales within which the action is suggested to be implemented:
  - Priority 1: A 'quick win' or action urgently required within 12 months
  - Priority 2: Consider now for implementation in the next 1-5 years

  This priority therefore balances the degree of flood risk with the likely required timescale for implementation.

The summary of flood history and these proposed actions were discussed at a SWMP Partnership meeting held in September 2013, following which this report was reviewed and finalised.

[19] Defra (2010) Surface Water Management Plan Technical Guidance. March 2010. Available at: http://www.defra.gov.uk/environment/flooding/manage/surfacewater/plans.htm

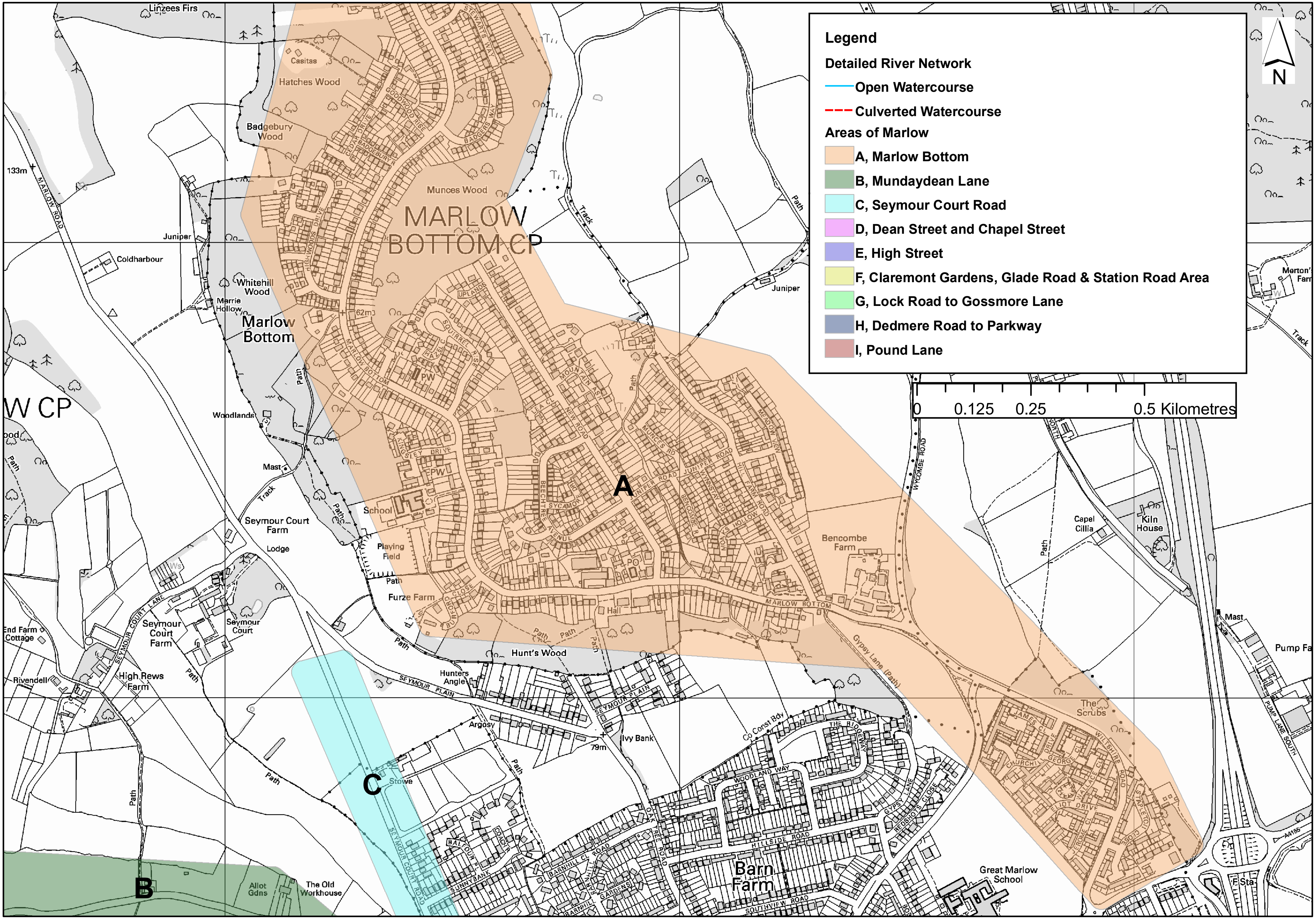
Table 5.1 Proposed actions for better understanding or improved management of local flooding

Action ('What?')	Priority Actions ('How?')	Primary Action Owners ('Who?')[1]	Priority ('When?')[2]
Electronically catalogue drainage assets Both in fulfilment of responsibilities under the Flood & Water Management Act 2010, and to improve practical flood risk management, the highway drainage assets in Marlow should be digitised and catalogued in an asset database as a matter of high priority. Paper records and engineer knowledge are in danger of being lost.	• Catalogue paper drainage asset records and engineer knowledge in an electronic asset database	• BCC	1
Regular maintenance of key highway soakaways BCC Highways should prioritise cyclic maintenance of key drainage infrastructure, particularly soakaways.	• Based on engineer knowledge, develop a prioritised maintenance plan for drainage infrastructure in Marlow.	• BCC	1
Investigate flood risk arising from Thames Water foul sewers TW should address flooding of properties already recorded on the DG5 register. Those reporting sewer flooding to the councils should be encouraged to also report it to TW so the reports can be entered on the DG5 register. Where investigations suggest sewer flooding is linked to fluvial and/or local flooding, TW should seek joint working with the EA and BCC, perhaps through submission of Partnership FDGiA funding applications.	• TW to compare flood history questionnaire responses with the DG5 register and encourage relevant responders to report sewer flooding to TW • TW to investigate causes of sewer flooding and discuss mitigation options with BCC	• TW	1
Local authorities and Thames Water to support retrofitting of property level protection There is the potential for improving resilience of properties in Marlow with low thresholds that are at risk of local flooding by installing property level protection measures. Thames Water could reduce the likelihood of sewer flooding in those properties identified in the flood history survey by e.g. installing anti-backflow valves on toilets in the affected properties.	• Consult with owners of properties who have reported flooding. • For those with a flood history that would consider fitting measures, lead an EA/Defra FDGiA application for funding	• BCC • TW	2
Undertake a full SWMP for Marlow, including detailed modelling of the Newt Ditch catchment The Newt Ditch and associated highway drainage serves a large area in Marlow (Seymour Court Road, Little Marlow Road and broadly from the junction of these roads through to Dedmere Road and the A404). This area has a history of local flooding and the drainage assets are understood to be in need of substantial improvement. Since it is not well understood where all the flows into this system originate from, there is scope to examine whether some could be attenuated upstream to reduce the burden of drainage improvements. Modelling would provide opportunity to develop technically feasible options, as well as evidence to support funding applications to improve the Newt Ditch drainage and Ordinary Watercourse system.	• Commission a full SWMP study	• BCC	2
Ensure full consideration of local flooding in final design of Flood Alleviation Scheme In light of the concerns raised by BCC Highways who will have responsibility for operating the temporary groundwater pumps, it is recommended that further consideration is given to the logistics of operating the groundwater pumps during high levels in the River Thames. Consideration could be given to installing permanent groundwater pumps. This would remove the need for the pumps to be portable and therefore remove any size/capacity restrictions. It would also reduce the burden on BCC Highways during a flood event.	• EA to evaluate options for installing permanent groundwater pumps as part of the FAS, in consultation with BCC Highways	• EA	2

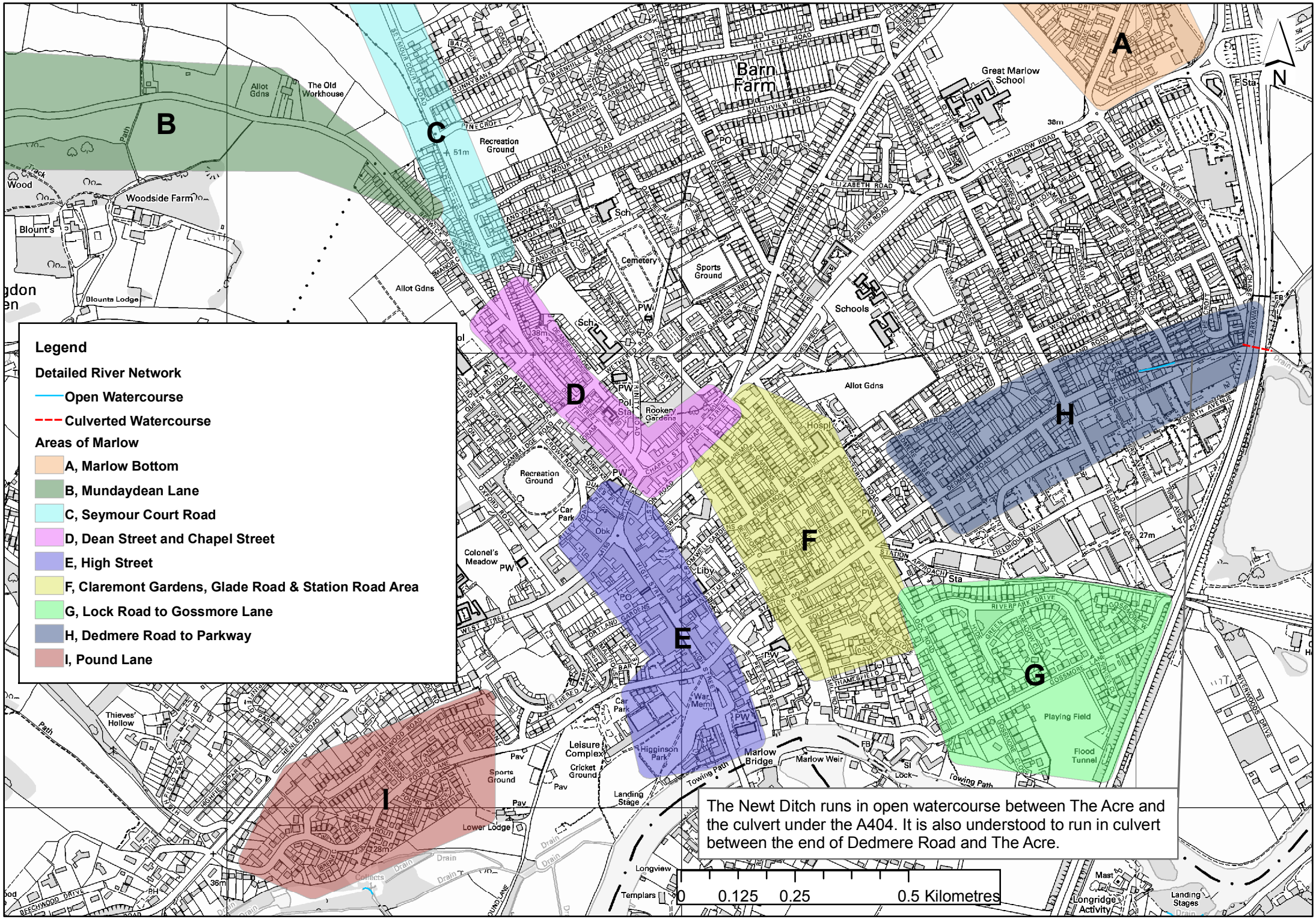
Notes: [1] EA – Environment Agency; BCC – Buckinghamshire County Council; WDC – Wycombe District Council; TW – Thames Water
[2] Priority 1: A 'quick win' or action urgently required within 12 months; Priority 2: Consider now for implementation in the next 1-5 years

Appendix A SWMP Preliminary Risk Assessment Maps

Appendix B Maps Showing Areas of Marlow



Legend
Detailed River Network
Open Watercourse
Culverted Watercourse
Areas of Marlow
A, Marlow Bottom
B, Mundaydean Lane
C, Seymour Court Road
D, Dean Street and Chapel Street
E, High Street
F, Claremont Gardens, Glade Road & Station Road Area
G, Lock Road to Gossmore Lane
H, Dedmere Road to Parkway
I, Pound Lane
0 0.125 0.25 0.5 Kilometres
N
MARLOW BOTTOM CP
Marlow Bottom
A
B
C
Barn Farm
Great Marlow School


Legend
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G, Lock Road to Gossmore Lane
H, Dedmere Road to Parkway
I, Pound Lane
A
B
C
D
E
F
G
H
I
The Newt Ditch runs in open watercourse between The Acre and the culvert under the A404. It is also understood to run in culvert between the end of Dedmere Road and The Acre.
0 0.125 0.25 0.5 Kilometres
N
Barn Farm
Great Marlow School
Recreation Ground
Cemetery
Sports Ground
Schools
Allot Gdns
The Old Workhouse
Woodside Farm
Blount's
Blounts Lodge
Rookery Gardens
Colonel's Meadow
Car Park
Leisure Complex
Cricket Ground
Higginson Park
War Mem
Marlow Bridge
Marlow Weir
Flood Tunnel
Playing Field
Thieves' Hollow
Lower Lodge
Landing Stage
Longview
Templars
Longridge Activity
Landing Stages

Appendix C Site Inspection Matrix

MARLOW SITE INSPECTIONS 6 MARCH 2013

Site No.	Location	Depression	Flowpath	Approx Extent and Estimated Properties at Risk	Approx Actual Depth Depression	Approx slope of flowpath	Approx width of flowpath	Outlet - watercourse / drainage / downstream flowpath	Observed surface flooding Incident?	GIS Mapping of Depressions and Flowpaths			National Mapping of Areas Susceptible to Surface Water Flooding		Critical Infrastructure	Average Doorway Threshold Levels	Possible Mitigation Measures for later consideration including possible Quick Win Measures	Land Use	Scoring Matrix for Preliminary Assessment of Surface Water Flood Risk								Potential Risk to Life based on observations?	
										Depression Defined?	Flowpath Defined?	Depression Average Depth	Susceptibility Identified?	Susceptibility Rating					Land Use Sensitivity Score	Depth	Extent and Number of Properties at Risk	Flowpath feeds Area?	Slope / Velocity	Dororway Thresholds	Total Score	Preliminary Pluvial Flood Risk Rating	High velocity flowpath with large contributing area?	Depression depth >1m or basement flats?
1	**Marlow Bottom (Squirrel Rise area)**	No	Yes 0.2-0.5m deep along road at times	10-15 residential and road	n/a	Moderate	20m	Highway Drainage	No	n/a	Yes	n/a	Yes	Deep	Electricity substation	0.2m	Property level protection and upstream storage	Residential	2	1	1	0	2	1	**7**	**Moderate**	No	No
2	**Marlow Bottom (Burford Close to Hill Farm Road)**	No	Yes 0.2-0.5m deep	35-40 residential and 20-25 shops and commercial units	n/a	Moderate	20m	Highway Drainage	No	n/a	Yes	n/a	Yes	Deep	No	0.2m (some shops 0.1m)	Property level protection and upstream storage	Residential and small commercial	2	1	1	0	1	1	**6**	**Moderate**	No	No
3	**Marlow Bottom (Bencombe Drive)**	No	Yes 0.2-0.5m deep	5-10 residential - flowpath through back garden but could come down Bencombe Drive	n/a	Moderate	10m	Highway Drainage	No	n/a	Yes	n/a	Yes	Deep	No	0.2m but below road level	Property level protection and upstream storage	Residential	2	1	1	0	2	1	**7**	**Moderate**	No	No
4	**Marlow Bottom (Stapleton Close)**	No	Yes 0.2-0.5m deep	c. 12 residential	n/a	Low	20-30m	Downstream valley - open fields	No	n/a	Yes	n/a	Yes	Deep	Large electricity substation in field	0.2m	Property level protection and upstream storage - culverts in field under duel carriageway may need investigation	Residential	4	1	1	0	1	1	**8**	**High**	No	No
5	**Mundaydean Lane**	No	Yes 0.2-0.5m deep	c.10 residential spread out	n/a	Moderate to low	5-20m	Highway Drainage	No	n/a	Yes	n/a	Yes	Deep	Thames Water pumping station	0.2m	Property level protection and upstream storage	Rural and residential	1	1	1	0	1	0	**4**	**Low**	No	No
6	**Seymour Court Road**	No	Yes	Approx. 10	n/a	Steep	5-10m	Highway Drainage	No historical records but "Flood" sign observed during site inspection	n/a	Flowpaths defined east to west crossing Seymour Court Road	n/a	Yes	Shallow	No	0-0.2m	Ensure highway drainage is sufficient to manage water on the highway	Residential	2	0	1	1	1	2	7	**Moderate**	No	No
7	**Dean Street and Chapel Street**	No	Yes, 0.2 deep	>20 residential and >10 retail and commercial units	n/a	Low	5-10m	Highway Drainage	Yes	n/a	Yes	n/a	Yes	Deep	Police Station and Telephone Exchange	0-0.2m	Property level protection and upstream storage	Residential, commercial and retail	4	1	2	1	0	2	**10**	**High**	No	No
8	**High Street (Spittal Street - Station Road)**	No	Yes 0.2-0.5m deep	>100 retail and commercial	n/a	Low	10m	River Thames	No	n/a	Yes	n/a	Yes	Deep	No	0	Property level protection and upstream storage	Commercial and retail	3	1	2	1	1	3	**11**	**Severe**	No	No
9	**High Street (Higginson Park)**	Yes	Yes	>10	0.5 - 1 m	Low	n/a	River Thames	No	n/a	Yes	n/a	Yes	Deep	No	0.2m	Property level protection	Recreational	3	2	1	1	0	2	**9**	**High**	No	No
10	**Claremont Gardens, Glade Road and Station Road Area**	Yes	Yes	>100 residential	0.5 - 1 m	Low	5-10m	River Thames	Yes	n/a	Yes	n/a	Yes	Deep	No	0-0.2m	Property level protection	Residential	3	2	3	1	0	2	**11**	**Severe**	No	No

MARLOW SITE INSPECTIONS 6 MARCH 2013

Site No.	Location	Depression	Flowpath	Approx Extent and Estimated Properties at Risk	Approx Actual Depth Depression	Approx slope of flowpath	Approx width of flowpath	Outlet - watercourse / drainage / downstream flowpath	Observed surface flooding Incident?	GIS Mapping of Depressions and Flowpaths			National Mapping of Areas Susceptible to Surface Water Flooding		Critical Infrastructure	Average Doorway Threshold Levels	Possible Mitigation Measures for later consideration including possible Quick Win Measures	Land Use	Scoring Matrix for Preliminary Assessment of Surface Water Flood Risk								Potential Risk to Life based on observations?	
										Depression Defined?	Flowpath Defined?	Depression Average Depth	Susceptibility Identified?	Susceptibility Rating					Land Use Sensitivity Score	Depth	Extent and Number of Properties at Risk	Flowpath feeds Area?	Slope / Velocity	Doronway Thresholds	Total Score	Preliminary Pluvial Flood Risk Rating	High velocity flowpath with large contributing area?	Depression depth >1m or basement flats?
11	**Lock Road to Gossmore Lane**	No	Yes	Up to 100 properties	n/a	Low	5-10m	Highway drains / River Thames	Yes	n/a	Yes	n/a	Yes	Deep	No	>0.2	Sufficient highway drainage (soakaways) and property level protection	Residential	2	2	3	1	0	1	**9**	**High**	No	No
13	**Dedmere Road to Parkway**	No	Yes	Up to 30 properties	n/a	Low	5-10m	Newt Ditch	No previous records before this SWMP	n/a	Yes	n/a	Yes	Deep	No	Generally >0.2m and some basements	Maintenance of Newt Ditch drainage system	Residential and commercial	4	2	3	1	0	1	11	**Severe**	No	**Yes**
12	**Pound Lane**	Yes	Yes	Depends whether whole estate or small area opposite Pike Close. Assuming a small area - 2/3 houses	Shallow <0.5m	Low	5m	Highway drains	Yes	n/a	Yes	n/a	Yes	Deep	No	>0.2	Property level protection - sandbags visible at one property, but likely for fluvial	Residential	2	2	3	1	0	1	**9**	**High**	No	No

Appendix D Flood History Questionnaire

Communities &
Built Environment

Buckinghamshire County Council
Place Service
Planning, Advisory and Compliance Service
New County Offices, Walton Street
Aylesbury, Buckinghamshire HP20 1UY

Place Service
Service Director: John Lamb

Telephone 0845 3708090
www.buckscc.gov.uk

May 2013

Dear Resident,

Improved Surface Water Flood Management in Marlow

Buckinghamshire County Council (BCC), in partnership with Wycombe District Council (WDC), the Environment Agency, and others are working to reduce the risk of surface water and groundwater flooding in Marlow. We are now in the process of identifying how best to manage the risk of flooding using sustainable methods. From our initial investigations it is evident that flooding in Marlow can be caused by intense rainfall before it enters drain networks or the River Thames, water flowing over the ground resulting from high groundwater levels or the capacity of the sewer network being exceeded. In order to understand surface water flooding in Marlow more fully, we need to collect further evidence of past flooding.

Please note that this study of surface water flooding in Marlow for BCC and WDC is separate from the Environment Agency's Flood Alleviation Scheme to reduce the risk of fluvial flooding from the River Thames (as happened in 2003, for example) and any consultation process associated with that scheme. However, the EA and BCC are working together to be aware of the likely interactions and the need for a joined-up approach.

Understanding Any Experiences of Flooding You May Have Had

This letter is being distributed to properties at a number of locations within Marlow. If you have been unfortunate enough to suffer flooding from surface water or groundwater sources (or are not sure what the exact source was) and are able to provide us with some basic information about this, then we would be keen to hear from you. Also, if you have not experienced any flooding then this is also useful information to ensure we focus resources on the highest priority areas. Either way, please contact us in one of the ways stated below. We have included a short questionnaire which you can return to us in the pre-paid envelope provided.

Please note that no information provided to the councils will be passed to insurance companies or be used in any way which will negatively affect insurance premiums.

What Will Happen Next?

Over the next few months, we will analyse all of the information on past flooding and predictions of future flooding and review the impacts on the Marlow area. This may result in the proposal of various schemes to reduce the risk of flooding and prioritise a number of actions for further consideration. At this point, we will consult stakeholders and the public to develop and discuss the options for better managing the flood risk in Marlow in the future.

How to contact us?

If you are able to provide any information, please can you reply by the 21st June 2013.

Telephone: 01296 387637
Email: floodmanagement@buckscc.gov.uk
Post: Flood Risk Management
Buckinghamshire County Council
Floor 9
County Hall
Aylesbury
Bucks
HP20 1UY

Yours faithfully

Lee Stevens
Principal Flood Risk Officer

Marlow Flood History Questionnaire

Location and Contact Details	
Address (including postcode)	
How long have you lived in, worked at or been familiar with this location?	

General Situation	
Please describe any recurrent local drainage problems	□ None or □ details provided:

Details of Any Flooding	
Property	Has the above property or surrounding land suffered flooding? □ Yes – flooding inside the property □ Yes – flooding outside the property (e.g. garden, driveway or garage) □ Yes – flooding in the road □ No – no flooding has occurred
Dates	Please provide dates of flooding if known. Some notable periods of heavy rainfall in Marlow are provided as possibilities. □ Winter 2000-2001 □ January-March 2003 □ Autumn 2006 □ July 2007 □ February 2009 Other [Please give details]:
Please indicate the type of flooding suffered	□ River, stream or ditch overtopping its banks □ Water emerging from the ground generally □ Surface water runoff (e.g. from roads, hillsides) □ Sewer capacity exceeded (e.g. backing-up of sewage in toilet) □ Do not know □ Other [please provide details]
Depth of water	Estimated depth of flood water:
Please describe any action taken to prevent or reduce flooding	□ None taken or □ details provided:

Marlow Flood History Questionnaire

Further Details and Contact	
Do you have any photographs which you would be prepared to share?	□ Yes or □ no [If yes, please provide details]
Name and contact number if willing to be contacted further	
Any additional information you wish to share	

Please return this completed questionnaire by June 21st in the envelope provided to:

Flood Risk Management
Buckinghamshire County Council
Floor 9
County Hall
Aylesbury
Bucks
HP20 1UY

Please contact the Bucks Flood Risk Officer with any queries:

Telephone: 01296 387637
Email: floodmanagement@buckscc.gov.uk

Appendix E Notes from Marlow SWMP Meeting

JACOBS

Meeting Notes

1180 Eskdale Road, Winnersh,
Wokingham, UK
RG41 5TU
+44.(0)118.9467000 Fax +44.(0)118.9467001

Meeting Location	Seymour Room, Court Garden, Pound Lane, Marlow, Bucks, SL7 2AG	**Client**	Bucks County Council
Meeting Date/Time	11th September 2013 9.30am - 11.00am	**Project**	Buckingham and Marlow SWMP
Subject	Marlow SWMP	**Project No.**	B1279843
Participants	Cllr Ruth Vigor-Hedderly (*County Cllr*) (RVH) Dr David Cobby (*Jacobs*) (DC) Dr Alexia Rogers-Wright (*Jacobs*) (ARW) Anne-Claire Loftus (*Bucks County Council*) (ACL) Brian Rodgers (*Wycombe District Council*) (BR) Nicky McHugh (*Thames Water*) (NM) Annie Jones (*Marlow Town Council*) (AJ) Cllr David Watson (*County Cllr*) (DW) Cllr Richard Scott (*County Cllr*) (RS) John Parfitt (*Highways Agency*) (JP) Hannah Tankard (*National Flood Forum*) (HT)	**Notes Prepared By**	ARW & DC
		File	Marlow SWMP Meeting Minutes.doc

Apologies:
Sophie Williamson (*Bucks County Council*)
Louise Guy (*Environment Agency*)
Stuart Young (*Bucks County Council*)
Rob Sumner (*Bucks County Council*)

Notes	Action
1. Introduction DC outlined BCC's responsibility for flood risk in Marlow relating to surface water, groundwater and ordinary watercourses. This meeting is a partnership meeting in which BCC take the lead, the District Council support and other agencies (EA, Highways Agency, Thames Water) cooperate and facilitate the management of local flood risk.	
2. Presentation of draft SWMP DC presented findings of the scoping study. The following comments were made:	
JP: Does the railway have any drainage associated with it?	Jacobs to investigate railways drainage
BR: The source of flooding events in Marlow was: 2006 – high intensity storm 2007 – River Thames 2008 – heavy rainfall 2009 – River Thames and groundwater	Jacobs to check this has been fully incorporated into the flood history section of the report.
RVH: How significant is the effect of using new materials for road surfacing	

(which may be less porous/permeable)? Materials being used should be monitored. DC: There is also an issue associated with the resurfacing of roads because often the previous layer is not fully scraped off and therefore the level of the road builds up which reduces the capacity of the road to store water. RS: Stated that he has never observed flooding at Marlow Bottom and considers the risk to be relatively low compared to the rest of the town. No one was aware of any flood on Seymour Court Road, despite the observed 'Flood' sign. BR mentioned possible past flooding of the Sainsbury's local. RS: mentioned regular winter flooding (with accompanying ice) on Glade road and Victoria road. JP & RS: Both stated that in their opinion the Dean Street/Chapel Street area does not necessarily warrant a severe hazard rating since there has been no internal flooding. Presence of older properties without flood protection could be explained by up-creep of road surface, by possible lessening of sewer capacity and by climate change which is increasing rainfall intensity RS highlighted the issue of water ponding in the road outside Burgers Café at the end of the High Street.	ACL to bring issues of surfacing materials and best practice to the attention of the flood and highways teams
3. Roundtable Discussion RVH invited contributions and feedback on the presentation and draft SWMP report. The following issues were discussed: <u>Highways Agency's ditch beside Firview Close.</u> • RS & DW reiterated residents' concerns. • JP & BR reassured the group that they are fully aware of the issues and that they have a plan in place to communicate with residents about the maintenance of the ditch. <u>Newt Ditch</u> DC & BR stated that it is known that the Newt Ditch is in a poor state of repair. General discussion around how best to address the issue: • Residents are already being flooded • Risk is likely to increase due to increasing number of high intensity rainfall events and further deterioration of culvert • Potential for replacement of collapsed sections of culvert <u>Globe Park Industrial Estate (south of Newt Drain)</u> DW stated that this area had flooded around 20 years ago. <u>Development proposals</u> • Great Marlow School (Wycombe Road) development almost complete • Portlands (Marlow Town Centre) development has not started	Jacobs to review hazards ratings across Marlow BR and JP to progress plan

Mapping of drainage assets • BR & DC: There is no accurate mapping of the surface water drainage network in Marlow • DW: This is important information to have in order to inform prioritisation of assets. • RVH also stated the lack of mapping and continuity of knowledge is a big issue, particularly with the coming of SAB next year and the need to guide developers. • DC & ARW: Stated the plans which are underway to extract this information from the Local Areas Technicians and digitise it. • JP stated that as directed by the National Audit Office, the Highways Agency have recently surveyed and mapped all of their drainage assets. Groundwater level monitoring BR: there are no boreholes in Marlow as it is river terrace deposits, so there is little potential to monitor the groundwater levels closely. **4. Next steps** There was agreement from all parties that the group supported the recommendations put forward by Jacobs in the draft SWMP report, and the following considerations were raised: Soakaway maintenance BR: Soakaways cannot be maintained using normal gully jetting machines, they must be dug out. Budgets and resources • RVH offered to pursue this. • ACL requested assistance from Jacobs to estimate the amount of officer time required to drive the recommendations forward. Public participation • BR: information given by residents not always accurate (possibly because of insurance implications), so members may need to assist with obtaining information. • AJ raised the question of how the outcomes of this report would be conveyed to residents • HT offered support from NFF • DC suggested that a communications strategy be drawn up with the agreement of all partners. Next meeting RVH would like to arrange a second SWMP Partnership meeting for January, but it has yet to be decided exactly who would participate and what the focus of the meeting would be. A public meeting could be held in November 2013 with sufficient support.	JP to share these results with BCC and Jacobs RVH to discuss budgets and resources with John Rippon, Business Manager at BCC Jacobs to assist with estimating officer time required HT to give AJ information about the Marlow FAG