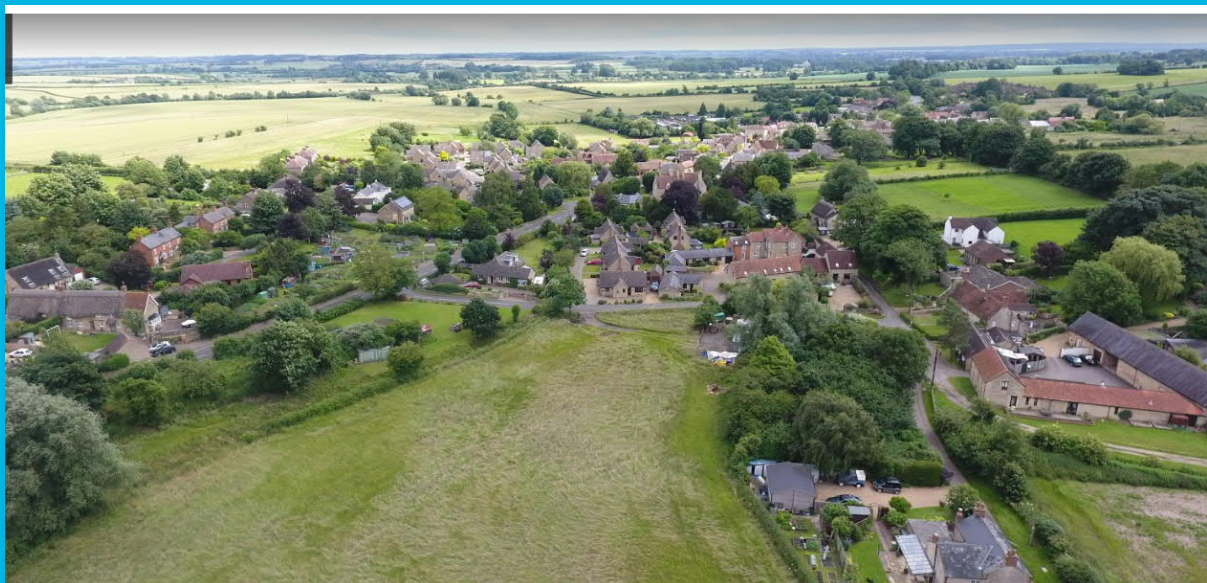


Flood Investigation Report

Stoke Goldington – 27th May 2018 Flood Event

Milton Keynes Council

December 2018



Quality information

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Foreword

One of the roles of Milton Keynes Council as the Lead Local Flood Authority (LLFA) is to undertake investigations into flooding incidents if they consider it necessary or appropriate.

The investigation will:

- Identify and explain the likely cause(s) of flooding;
- Identify which authorities, communities and individuals have relevant flood risk management powers and responsibilities in respect of the flooding incident;
- Provide recommendations for each of those authorities, communities and individuals; and
- Outline whether those authorities, communities or individuals have or will exercise their powers or responsibilities in response to the flooding incident.

The investigation cannot:

- Resolve the flooding issues or provide designed solutions; or
- Force authorities, communities or individuals to undertake any of the recommended actions.

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Executive Summary

This Flood Investigation Report (FIR) has been completed by AECOM on behalf of Milton Keynes Council (MKC) under its duties as a Lead Local Flood Authority (LLFA) in accordance with Section 19 of the Flood and Water Management Act 2010 (F&WMA).

Statutory Context

Section 19 of the F&WMA states that on becoming aware of a flood in its area, the LLFA must, to the extent that it considers it necessary or appropriate, undertake an investigation in order to identify the relevant flood risk management authorities and which flood risk management functions have been, or should be taken in response to the flood. Where an authority carries out an investigation it must publish the results and notify the relevant risk management authorities.

MKC are currently drafting a Flood Investigation Policy which will identify the criteria to be applied to future flooding incidents to determine if the need for a Section 19 flood investigation is required.

Flooding Incident

MKC determined that it was necessary to complete a formal investigation into the flood incident at Stoke Goldington that occurred on Sunday 27th May 2018 which resulted in the reported internal flooding of 35 properties within the village.

Cause of Flooding

The flooding that occurred in many areas of Stoke Goldington was caused by significant rainfall over a very short period of time, estimated to be a 1 in 819 year return period (equivalent to 0.12% chance of flooding each year). The surface water drainage systems in the village were unable to collect and convey surface water and land drainage effectively. This resulted in excess surface water flowing overland following natural contours and flow paths, to low points around a number of private residential properties.

Main Findings

This Flood Investigation Report concludes that the capacity within the drainage network in Stoke Goldington was unable to accommodate the surface water and land drainage volumes experienced during the significant rainfall event on the 27th May 2018. Peak flows from several watercourses, occurred at similar times, and overwhelmed the culvert network resulting in significant overland flow.

Multiple Risk Management Authorities (RMA's) have been identified as having roles and responsibilities in relation to flood risk management, and whilst some recommendations have been made, it has to be noted that these recommendations would not have alleviated the flooding experienced on 27th May 2018 due to the extremity of the event.

1. Introduction

Lead Local Flood Authority Investigation

Section 19 of the Flood and Water Management Act (F&WMA) states:

1. On becoming aware of a flood in its area, a Lead Local Flood Authority must, to the extent that it considers it necessary or appropriate, investigate: -
 - a. Which risk management authorities have relevant flood risk management functions, and
 - b. Whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.
2. Where an authority carries out an investigation under subsection 1 it must: -
 - a. Publish the results of its investigation, and
 - b. Notify any relevant risk management authorities

Milton Keynes Council (MKC), as Lead Local Flood Authority (LLFA) for the Borough of Milton Keynes, are currently developing a draft flood investigations policy to define the thresholds for triggering the need for a Section 19 investigation to be undertaken for a reported flood incident within the Borough.

Flooding Incident – 27th May 2018

MKC determined that it was necessary to complete a formal investigation into the flood incident at Stoke Goldington that occurred on Sunday 27 May 2018 which resulted in the internal flooding¹ of approximately 35 properties within the village. Several additional properties were reported to have experienced flooding within the curtilage (external areas), including gardens, driveways and garages.

AECOM undertook a joint site visit with MKC on 27th June 2018; as part of this visit some residents in the affected areas provided anecdotal information regarding this flooding incident, as well as previous flooding incidents.

Site Location

Stoke Goldington is a village in the county of Buckinghamshire, located to the north of Milton Keynes City, as seen in Figure 1-1. The nearest main river is the River Great Ouse (indicated by the arrows on Figure 1-1), which is located approximately 1 mile to the south east of Stoke Goldington.

The village has several small watercourses, which flow in a mixture of open channel and culverted sections, before eventually outfalling into the River Great Ouse. The watercourses through the village also accommodate land drainage from the surrounding rural areas. The village also has multiple springs.

The Milton Keynes Surface Water Management Plan (SWMP)² (2016), identifies that “*the village is situated on relatively impermeable Upper Lias Clay whereas higher land to the*

¹ **Definition of internal flooding:** A situation in which a building (commercial or residential) has been flooded internally, i.e. water has crossed the threshold and entered the building. This includes:

- Basements and ground level floors of the building;
- Garages/outbuildings if they are integral to the main occupied building. Garages adjacent or separate from the main occupied building are not included;
- Occupied static caravans and park homes. Tents are not included.

(Definition given in Milton Keynes Council draft flood investigations policy)

² Milton Keynes SWMP, AECOM, April 2016

north and west of the village is generally situated upon boulder clay and limestone respectively. The clay soils act as impermeable surfaces when saturated, or baked, leading to a high percentage of runoff which flows towards the village due to the slope of the fields. The limestone geology to the west can retain significant volumes of rainfall. During an extended period of heavy rainfall this water can be released as natural springs on the local hillsides at the interface of the limestone and clay geology and contribute to flooding”.

There is an identified risk of fluvial flooding associated with the watercourses flowing through the village, as seen in Appendix A, with several areas adjacent within Flood Zone 3, , which is equivalent to greater than 1% chance of flooding each year. A large proportion of the village is identified at high risk of surface water flooding, equivalent to greater than 3.33% chance of flooding each year, with additional areas also at medium risk (equivalent to between 1% and 3.33% chance of flooding each year). The flood risk is shown in Appendix B, where it can be seen to follow the general alignment of the watercourses.

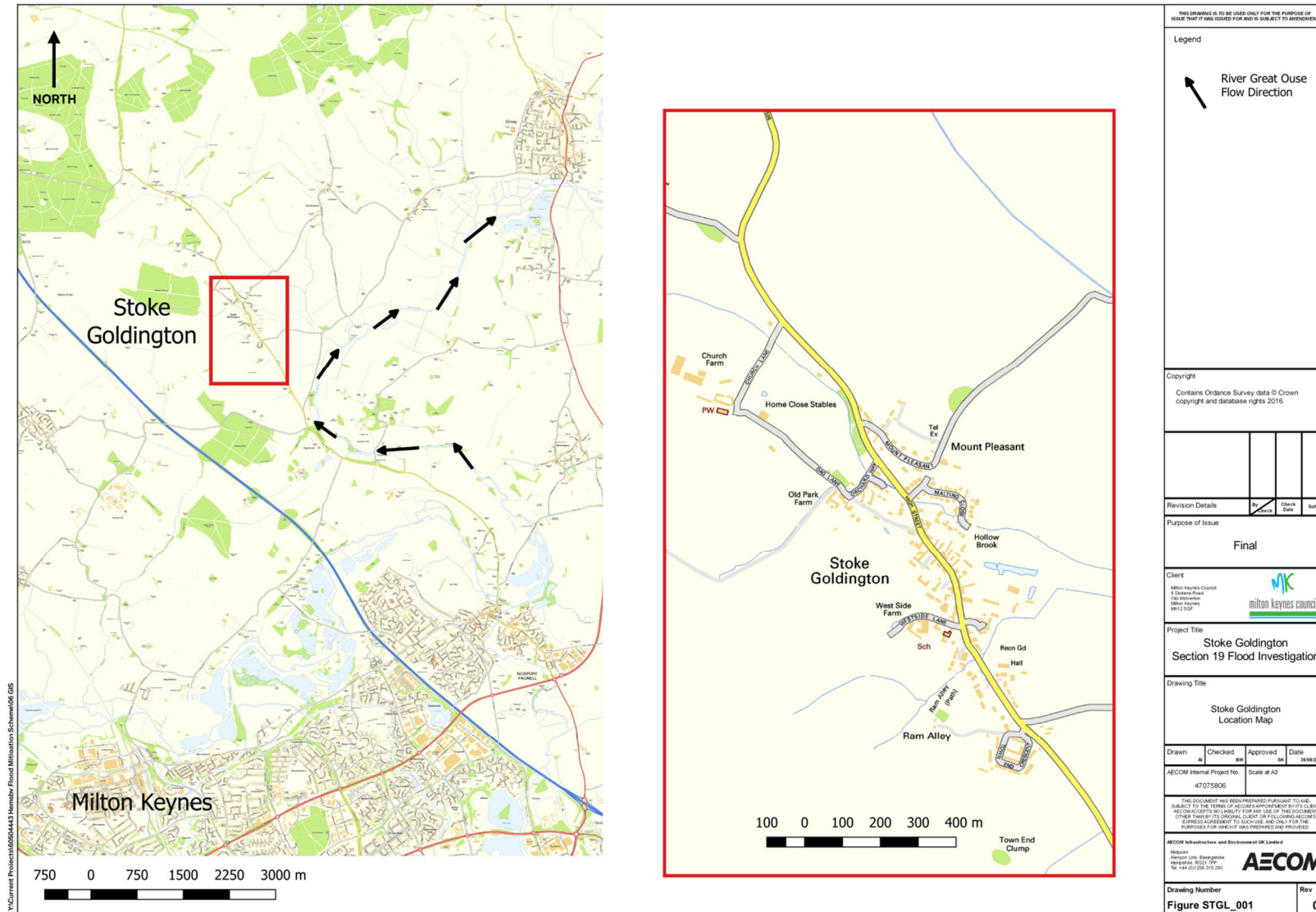


Figure 1-1: Location of Stoke Goldington

Drainage Systems

There are understood to be five small watercourses flowing through Stoke Goldington, two of which merge north of Orchard Way before entering a culvert under the High Street and flowing out to the south east of the village, where they discharge into the River Great Ouse. These watercourses provide the drainage system for the village.

Stoke Goldington suffers from overland runoff due to its location in a topographic low point. The majority of the village is between 60-70mAOD, whilst the surrounding hills are greater than 80mAOD increasing to approximately 130mAOD, as shown in Figure 1-2.

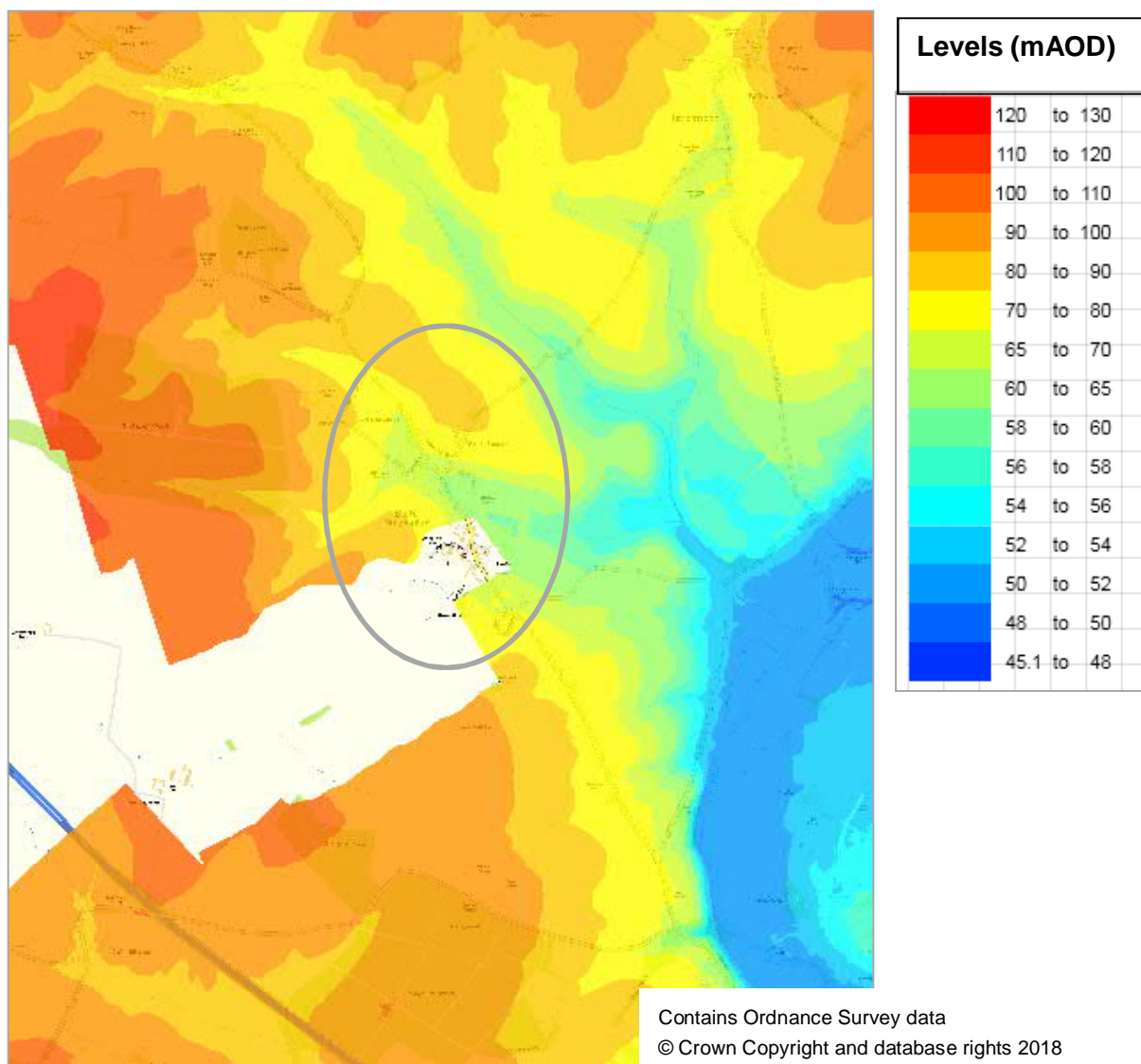


Figure 1-2: LiDAR of Stoke Goldington (circled) and surrounding area

Surface water runoff from the fields surrounding the village to the north west drain into a network of ditches and watercourses which subsequently flow towards the village due to the local topography. The total contributing catchment area is approximately 3.8km² and is shown in Figure 1-3.

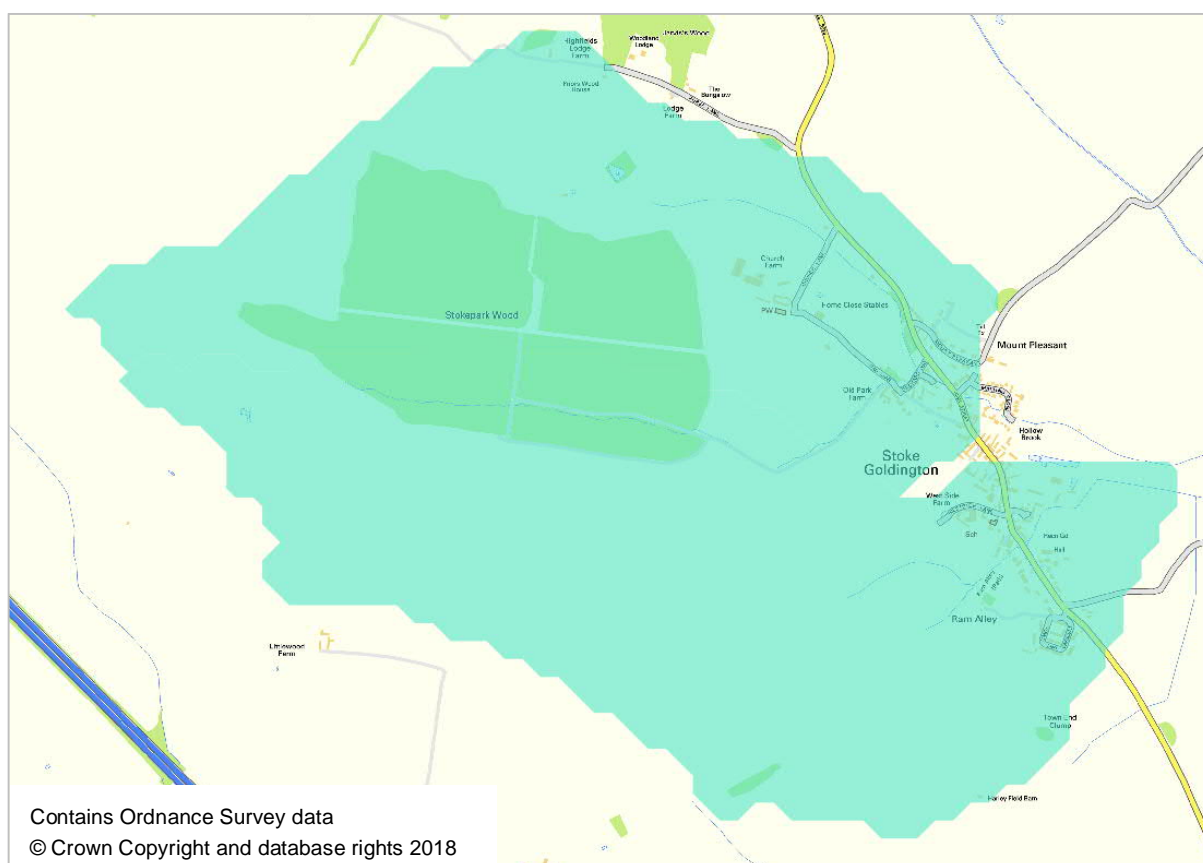


Figure 1-3: Catchment area of watercourses in Stoke Goldington

Surface water runoff from the public road network and private areas, such as roofs and driveways, are believed to discharge into the watercourse network within the village. There are only two public surface water sewers within the village which are located within Malting Close.

MKC have undertaken a number of capital and maintenance drainage works in Stoke Goldington since 2007, including clearing ditches, construction of flood defences and cleaning gullies. A chronological record of these works is provided in Appendix C, and the main capital works are summarised below:

- Downstream channel re-engineered to straighten alignment beside playing field to improve the watercourse discharge downstream of the village
- French drain and “cattle grid” installed rear of 16 Town End Crescent
- Flood attenuation bund construction in field west of Town End Crescent to enhance localised protection
- Flood attenuation bund constructed in Ram Alley field to act as a wet/dry storage basin during storm type events
- Flood attenuation bund constructed in West Side Farm field to act as a wet/dry storage basin and redirect flow into Ram Alley storage areas during storm events
- New storm water highways drainage system installed West Side lane to capture surface water rainfall and direct into a piped system in a controlled manner
- 3 no. flood attenuation storage cells construction off Old Park Farm track to accommodate surface water runoff from catchment in order to allow a controlled discharge into the existing watercourse
- Flood attenuation wet/dry storage basin and bund constructed in field adjacent to Old Park Farm track to capture surface water runoff during storm type events
- Flood attenuation bund and wet/dry basin constructed on Church Farm north of Stoke Park wood to accommodate storm water runoff affecting the catchment north of the village

- Stoke Park wood track improved to direct water from woodland into ditch

The locations of the implemented works are shown in Figure 1-4. The flood risk management structures are subject to inspection by MKC following heavy rainfall and flood events to check for any signs of structural damage or build-up of debris on any inlet features.

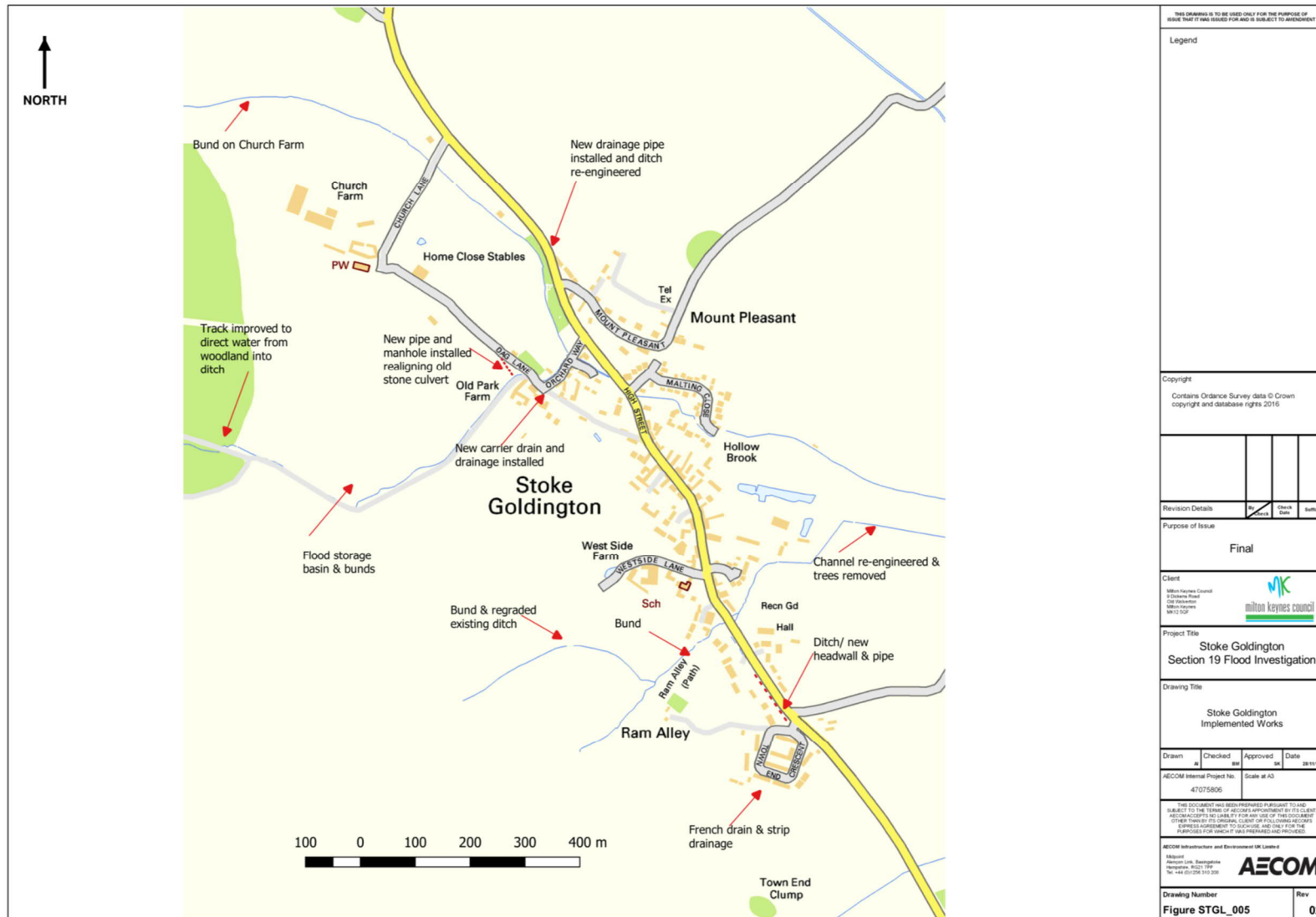


Figure 1-4: Approximate location of implemented flood risk management works following the 2007 flood events

2. Flooding History

Previous Flood Incidents in Stoke Goldington

Stoke Goldington experienced flooding on 4th June and 2nd July 2007. Following these two flooding incidents, a Flood Investigation Report³ was completed to identify the potential causes. This report identified the impacts of these two events. The June event affected predominantly the southern end of the village, whilst the July event affected both the northern and southern ends of the village. Thirty one properties in total were reported to have experienced internal flooding during these two events, with an additional seven properties suspected to have experienced internal flooding but not confirmed. Hydraulic analysis undertaken showed that the flooding was due to a combination of surface water runoff from higher ground surrounding the village and insufficient capacity within the open channel and culvert drainage network that runs through the village. The FIR also provided recommendations for flood risk management works that could be taken forward to reduce the likelihood of flooding within the village.

Prior to these events there had been flooding reported to have been experienced in the 1880s, 1968, 1973, 1980, 1984 and 2002 with recorded flood levels in various locations in the village including Orchard Way, High Street, Maltings Close and Ram Alley. Since the 2007 flood events it was reported to MKC that localised flooding occurred in 2016 and 2017 during rainfall events.

³ Flood Investigation Report, WSP, January 2008

3. 27th May 2018 Flood Event

Rainfall Analysis

The Met Office states the average monthly rainfall for Moulton Park in Northampton (the nearest climate station to Stoke Goldington, located approximately 15 miles to the north-west) is 54.4mm in May and 54.9mm in June⁴.

A rainfall gauge at Grange Farm, to the north of Stoke Goldington recorded the rainfall rates outlined in Table 1⁵, totalling approximately 32mm depth on 27th May 2018.

Table 1: Grange Farm rainfall gauge recordings 27th May 2018

Date/Time	Rainfall rate (mm/hr)
27/5/18 19:50	6.6
27/5/18 20:00	14.5
27/5/18 20:10	17.0
27/5/18 20:20	20.3
27/5/18 20:30	22.9
27/5/18 20:40	26.9
27/5/18 20:50	26.9
27/5/18 21:00	19.3
27/5/18 21:10	16.8
27/5/18 21:20	13.5
27/5/18 21:30	9.9

Rainfall gauges at Olney, to the north east of Stoke Goldington, showed approximately 23mm depth of rainfall between 8pm and 9pm on the 27th May 2018^{6,7}.

Analysis provided to MKC by Meniscus using radar rainfall for the Stoke Goldington area estimated the depth of rainfall as 97mm over 90 minutes on the evening of 27th May 2018. This rainfall event was quantified by Meniscus, using FEH99 calculations, as being a 1 in 819 year return period (equivalent to 0.12% chance of flooding each year), which far exceeded the capacity of the drainage network.

Areas of Flooding and Impacts

Of the approximately 230 properties within the village, 35 were reported to have experienced internal flooding to varying depths, with many of the residents required to move out for

⁴ Data from climate station, <https://www.metoffice.gov.uk/public/weather/climate/gcr2mpnb6> Accessed July 2018

⁵ Data from rainfall gauge, <https://www.metoffice.gov.uk/observations/details/20180527sx9a9y5njye6txmxyyb96scuar> Accessed July 2018

⁶ Rainfall gauge, <http://www.gaugemap.co.uk/#!/Map/Summary/12572/7980/2018-05-27/2018-05-28> Accessed July 2018

⁷ Rainfall gauge, <https://www.metoffice.gov.uk/observations/details/20180527xc6rxe5b7ye6txmpyyb96sk6ze> Accessed July 2018

extended periods of time whilst damage was repaired. Photos taken during the event can be seen in Figures 3-1 to 3-4.



Figure 3-1: View down Orchard Way from junction with Dag Lane (Source: local resident)



Figure 3-2: View north east from junction of Orchard Way and Dag Lane (Source: local resident)



Figure 3-3: View of overwhelmed watercourse adjacent to property boundary on far side of road (Source: local resident)



Figure 3-4: View of High Street looking north (Source: local resident)

To inform the review of the 27th May 2018 flood event, AECOM undertook a joint site visit with MKC on 27th June 2018; as part of this visit some residents in the affected areas provided anecdotal information regarding the flooding incident, as well as previous flooding incidents. A summary of the findings from the site visit can be seen in Figure 3-5.

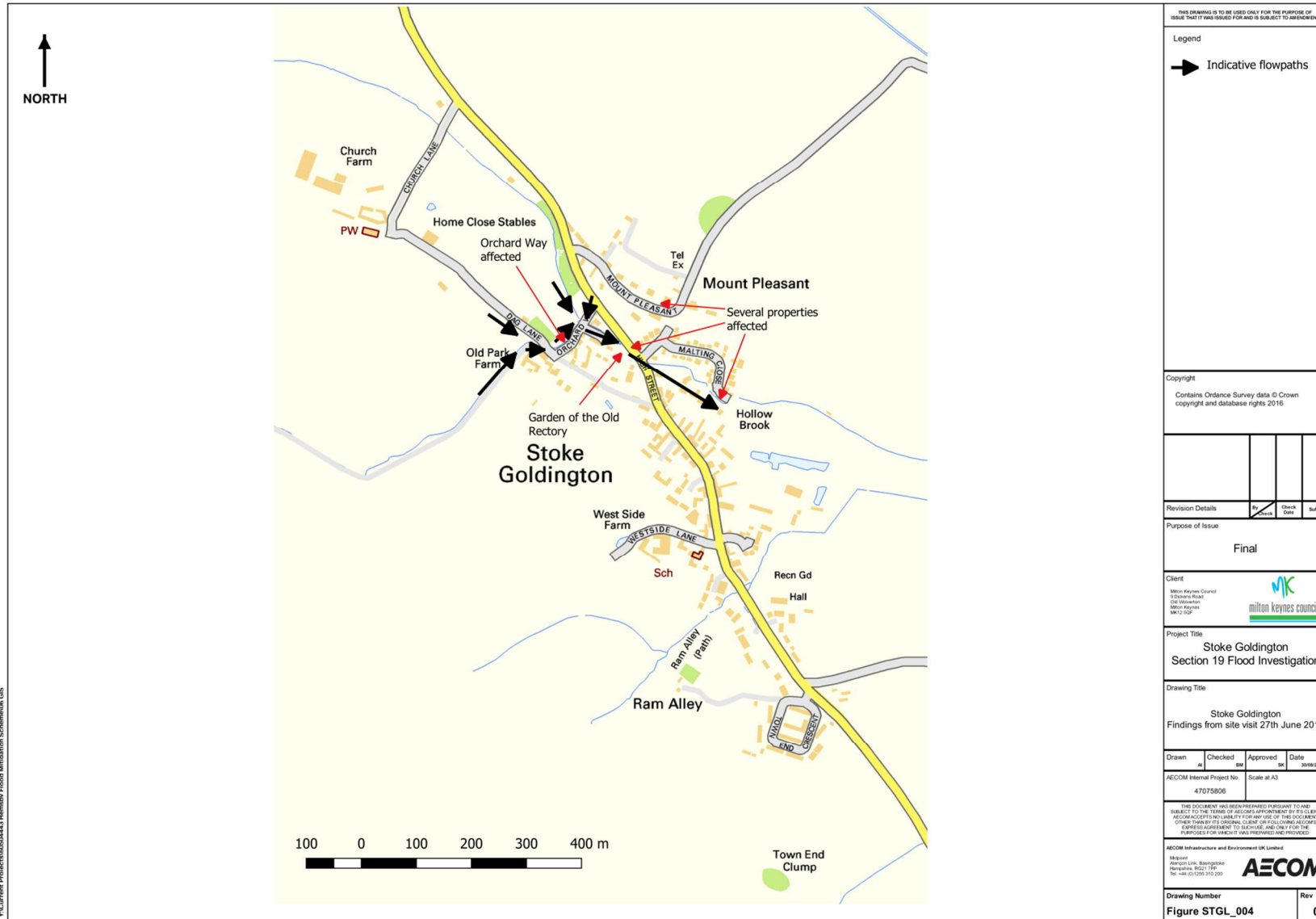


Figure 3-5: Findings from Site Visit on 27th June 2018

Within Town End Crescent, there were several reported incidents of flooding. A number of these were within the centre of this area, in a topographical low point positioned between two highway gullies. One of the flooded properties on the edge of this postcode area is likely to be attributable to runoff from adjacent fields, which slope towards this area.

During the flood event that occurred in 2007, multiple properties along the southern area of the High Street experienced flooding. During the site visit undertaken on 27th June 2018, it was observed that there was a ditch in place on the south west side of the High Street, immediately north of Town End Crescent. The upstream sections of this appeared in good condition (see Figure 3-6). The part of the ditch further downstream is noticeably older and is likely to have been part of the original alignment of the water course (see Figure 3-7).

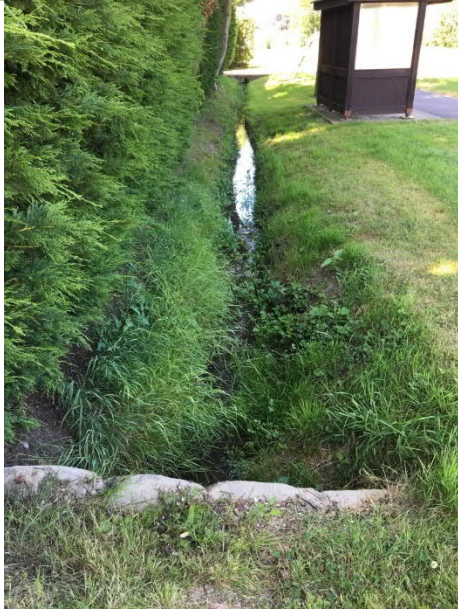


Figure 3-6: Looking downstream along the newer section of ditch from the upstream end (photo taken 27/6/18)

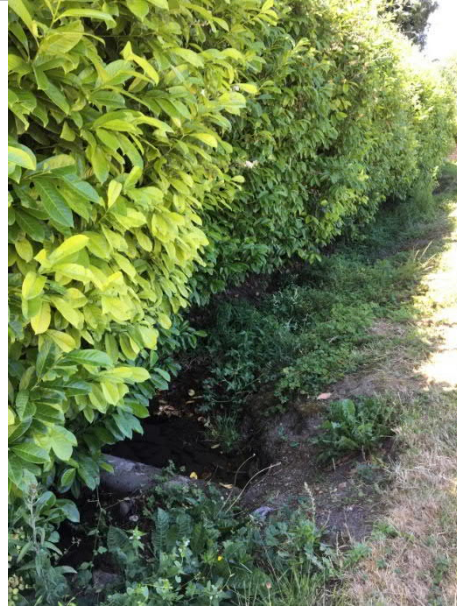


Figure 3-7: Older section of ditch with service crossings (photo taken 27/6/18)

This open channel becomes culverted for a short distance underneath the High Street before becoming an open channel again along the boundary of the field adjacent to the Village Hall. This open channel is overgrown and thus its potential capacity and ability for conveyance is reduced (see Figure 3-8). A small outfall was seen on the west side of this channel which is understood to be the culvert outfall from the stream adjacent to Ram Alley.

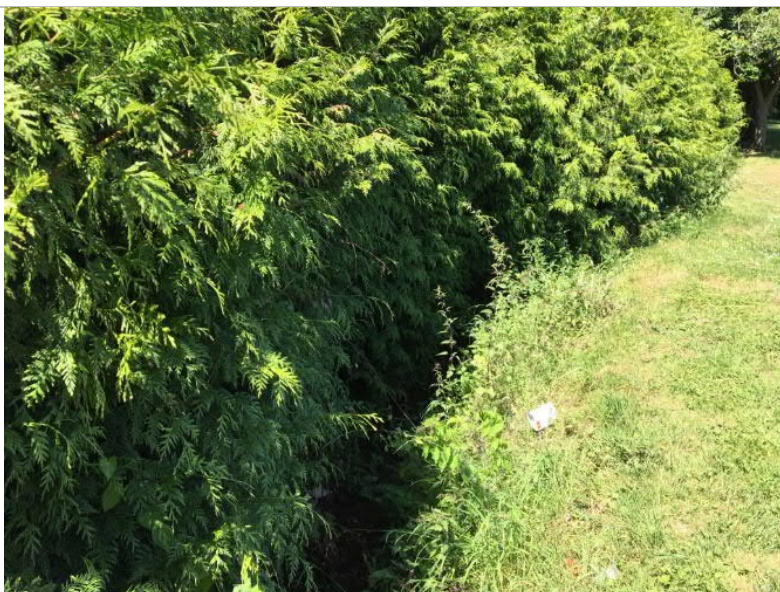


Figure 3-8: Vegetated channel along boundary of field adjacent to Village Hall (photo taken 27/6/18)

The northern area of the village was reported to have experienced internal depths of water greater than 1 metre.

Properties in Dag Lane were affected with the flow path running past the properties towards Orchard Way. The culvert inlet in this area was quickly overwhelmed, resulting in the water within the watercourse immediately upstream to come out of the channel creating a flow path along the road. The culverted watercourse in this location consists of multiple turns which slow the flow of water.

Properties in Orchard Way were affected by flow paths from multiple directions; the watercourse through Dag Lane, the watercourse from the north, the culverted watercourse creating flow from the north west across fields to the south of the Church of Saint Peter and along Dag Lane and flow from the High Street. The two watercourses converge before being culverted under the road heading towards the High Street. The capacity of this culvert is exceeded during intense storms causing water to back up and flow overland. The predominant flow path then becomes overland, affecting the majority of the properties in Orchard Way to varying depths. These properties had also been known to have flooded in 2007, although not to the same magnitude. Having exited these properties the flow path continues towards the High Street. It was reported by residents that the solid boundary wall around the grounds of the Old Rectory temporarily prevented the water from flowing towards High Street, but the build-up of water pressure against the wall eventually caused it to collapse during the flood event.

The watercourse in Orchard Way is subject to routine annual maintenance by MKC, although residents note that it is overgrown a considerable amount of the year. The kerb gullies on Orchard Way drain directly into the watercourse. When the watercourse is at capacity, flaps on the gullies mean that water from the channel is restricted from re-entering the road via the road drainage.

A flow path along Dag Lane (culverted watercourse and runoff from the fields to the south of the Church of Saint Peter) was identified from local resident video footage of Dag Lane during the 27th May 2018 flood event which indicated that there was a substantial flow along the road towards the direction of Orchard Way. This flow path was further evidenced by photos taken of the field to the south of the Church of Saint Peter following the flood event (see Figure 3-12). This flow path was not identified in the flood investigation undertaken for

Stoke Goldington following the 2007 flood events and therefore no works were proposed to manage the runoff from this location.



Figure 3-9: Evidence of flowpath in field to the south of the Church of Saint Peter (Source: local resident)

Several properties in the High Street experienced flooding, from the overland flow which then continued on to Malting Close. Properties in Malting Close flooded in 2007 but it was reported to have been not as significant as the 27th May 2018 event. Whilst the watercourse at the front of properties was at bank level, it was reported by several residents that it didn't overflow. The properties instead flooded as a result of a flow path through the back gardens from the direction of High Street. Water continued through several houses before re-joining the watercourse to the east of Malting Close, where it was reported that water was close to the top of the bank. Residents reported that the field adjacent to the watercourse to the east of Malting Close was flooded.

Some properties that had not experienced flooding in the 2007 events but were affected in the 2018 event are in Mount Pleasant. During the site visit on 27th June 2018, it was highlighted by residents that there had been a flow path through the garden of a property on the north side of the road. This flow had then accumulated on the road, before flowing into a number of other properties as a result of a drop kerb. It is understood that in previous events, the water has remained in the road, contained by the kerb.

It was reported by residents that the flood water took several hours to recede from the village following the onset of flooding.

Following the flooding events of 2007, a number of flood risk management measures were implemented within the village (see MKC chronological record of capital and maintenance works in Appendix C). One of these was a bund in a field adjacent to Ram Alley (constructed in 2014), designed to provide a flood storage area with limited discharge rate downstream through a small culvert. The bund was located and visually inspected during the site visit on the 27th June 2018. On this date there was minimal flow in the culvert through the bund, however, it was evident that scour was occurring at the outlet, which is likely to occur during higher flows. Local resident photographs indicate that this bund functioned as designed and held back water during the rainfall event on the 27th May 2018.

Another flood risk management measure implemented was a flood storage area upstream of Dag Lane, comprising 3 consecutive bunded storage areas. This area was visually inspected during the site visit on the 27th June 2018 (see Figure 3-10). On this date the storage areas

were seen to be vegetated. It was possible to identify one of the storage ponds which appeared to be an offline storage area with a separate inlet from the watercourse that would function to divert flow into the pond when the water level in the watercourse increased. Due to the vegetation growth it was not possible to identify the other storage areas which were understood to have been installed. It is identified in the MKC record of drainage works that the bunds were damaged by heavy vehicle crossing prior to 2018 which had reduced the flood capability of these measures. MKC have designed a capital maintenance scheme to reinstate the damaged sections of the bunds which will be implemented in 2019. These works will implement three new concrete grass crete vehicle crossing points making them more robust to withstand heavy vehicle use.



Figure 3-10: Vegetated Flood Storage Area upstream of Dag Lane (photo taken 27/6/18)

Summary of residents survey

MKC distributed a post flooding survey in September 2018 to approximately 250 properties within Stoke Goldington and 75 completed responses were received. The information provided from residents about the flood event was reviewed and found to corroborate with the narrative provided in the section above. In addition to information regarding the flood event, some concerns in relation to maintenance of drainage features were raised which can be summarised in the following points:

- Many drains/gullies seen to be in poor condition/partially blocked and therefore reduced capacity
- Debris observed within open channels
- Flood defences overgrown

Summary of Impacts and Findings

The flooding that occurred in Stoke Goldington was caused by an extreme rainfall event (estimated to be a 1 in 819 year return period) which occurred over 90 minutes on the evening of Sunday 27th May 2018. The drainage system was unable to cope with the excessive surface water runoff generated from the surrounding sloped fields. It was reported to take several hours from the onset of flooding, to the point that the majority of the water had dissipated.

The flood risk management measures identified in the FIR (WSP, 2008) within the areas of Ram Alley, Stoke Park Pond, Stoke Park Track, Town End Crescent and West Side Farm

were implemented by MKC. These measures included bunds to store water on areas of higher land upstream of the village, culvert and channel clearing works and new drains in some locations.

Comparison of the properties affected by the 2007 events and those affected by the 27th May 2018 event indicates that the Ram Alley storage bund has had a localised positive impact, with there being less properties flooded during the 27th May 2018 event around the junction of Ram Alley and the High Street. The flood storage area upstream of Dag Lane does not appear to have had any marked impact, with the same properties shown to have been flooded in both the 2007 events and the 27th May 2018 event. However, a considerable flow path of runoff from the area to the south of the Church of Saint Peter was identified during the 27th May 2018 flood event.

4. Rights and Responsibilities

This section considers the rights and responsibilities of the various RMA's in relation to flood risk management. As previously indicated this rainfall event was extreme and therefore it can be seen that the implementation of all the following would not have prevented the flooding.

Communities and Residents

It is the responsibility of householders and businesses to:

- Protect their property (through property level resilience and resistance measures)
- Maintain a proper flow of water in any watercourse running through their land

Milton Keynes Council

MKC as the LLFA has a responsibility to investigate flood incidents under Section 19 of the F&WMA.

MKC are also responsible for:

- Ensuring drainage of surface water from local highways and residential streets (excluding private roads)
- Maintaining the road drains on minor roads, including kerbs, road gullies, ditches and the pipe network which connects to the Anglian Water Services sewers
- Developing and implementing an emergency plan, contingency plan and business continuity plan
- Ensuring flood risk is considered in the Local Plan
- Making decisions on planning applications which may be at risk of flooding or increase flooding elsewhere
- Consenting any works to ordinary watercourses (i.e. streams, ditches) which may affect the flow or storage of water outside the Bedford Group of Drainage Boards (BGDB) Drainage District
- Managing flood risk from ordinary watercourses that are not within an Internal Drainage Board (IDB) district
- Maintaining Council owned assets such as drainage ditches, gullies, trash screens and culverts, which have a role in flood risk management
- Statutory consultee (as the LLFA) for major planning applications with surface water drainage implications

Highway Authority (Milton Keynes Council)

As a Highway Authority, MKC is required by the Highways Act 1980⁸ to ensure that all local highways are drained of surface water and where necessary maintain highway drainage systems.

⁸ Communities and Local Government (2012) National Planning Policy Framework <http://www.communities.gov.uk/documents/planningandbuilding/pdf/2116950>

Environment Agency

The Environment Agency are responsible for:

- Managing flood risk from main rivers (e.g. River Great Ouse and River Ouzel), reservoirs, estuaries and the sea
- Providing a strategic overview for all sources of flooding
- Regulation of third party works on main rivers
- Regulation of works in, over, under and within 8m of the top bank of main rivers

Land Owners and Developers

Riparian owners are responsible for:

- Maintaining the banks and beds of the watercourses, including trees and shrubs growing on the banks, and any flood defences that exist on it
- Clearing litter from the watercourses and banks, even if it did not come from their land
- Maintaining and clearing any structures on their stretch of watercourses including culverts, weirs and mill gates from obstructions (natural or otherwise) so the normal flow of water is not impeded
- Accepting the natural flow from the upstream neighbour and transferring it downstream without obstruction, pollution or diversion
- Applying to MKC for formal consent to carry out any works within any ordinary watercourses, or to notify MKC of any works adjacent to any ordinary watercourses outside BGDB Drainage District
- Applying to the Environment Agency for formal consent to carry out any works in, over, under or within 8 metres of a main river
- Applying to Buckingham and River Ouzel Internal Drainage Board for formal consent to carry out any works within 8 metres of any watercourse in the Drainage District.

5. Recommendations

Overview

Listed below are a number of recommended actions resulting from this formal Flood Investigation Report.

It is important to note that it is for the relevant responsible body or persons to assess each recommendation in terms of the legal obligation, resource implications, priority and cost/benefit analysis of undertaking such action.

The recommendations may be included within the Action Plan linked to the Milton Keynes Local Flood Risk Management Strategy (2016) or in the relevant risk management authority's future work programmes, as appropriate.

Communities and Residents

These recommendations are for the Parish Council, any Community Groups and affected residents.

Nominate a Community Flood Warden to help coordinate the following:

- Produce an overall plan of the catchment area which can be used to plan a strategy of ownership, maintenance and improvements of the existing drainage system. This can form the basis of a Community Flood Plan, which should include as a minimum:
 - Identification of any historic routes of drainage from the various catchment areas of the village, which could be reinstated or improved.
 - Identification of riparian ownership and responsibilities for drainage systems, including ditches, culverted watercourses and open watercourse sections.
 - Identify any land uses within the catchment that may unduly affect the normal flow of surface water.
- Prepare Household Emergency Plans for any vulnerable properties in the village.
- Regularly inspect ditches and culverts in the area of flood risk. Report blockages or other issues to the land owner and the LLFA.
- Explore options for property level resistance and resilience and, where possible, implement any recommendations.
- Explore community wide solutions (e.g. attenuation areas, overland flow routes)
- Continue to report flood incidents to the LLFA. Endeavour to obtain as much evidence of flood events as possible, such as photographic and video evidence.
- Request that land owners inspect and maintain or clear any flood related assets including ditches and watercourses in order to reduce the risk of flooding in the community.

Lead Local Flood Authority (LLFA)

It is recommended that MKC:

- Work with the Emergency Planning Team and the Environment Agency to support the Community Flood Warden.

- Work with the Emergency Planning Team, the Environment Agency and other flood management authorities to support the community in the production and implementation of a Community Flood Plan and provide advice to residents to how to explore options for property level protection.
- Inform those affected, and any owners of drainage systems and watercourses within the overall surface water catchment area, once this investigation report has been published reminding them of their legal responsibilities.

Highway Authority (Milton Keynes Council)

It is recommended that the Highway Authorities:

- Undertake regular highway drainage cleansing throughout Stoke Goldington. The timing and frequency of this work should be determined in conjunction with the Parish Council and residents, taking into consideration any limitations as a result of wildlife legislation.
- Assess the capacity of their assets and identify any areas with insufficient capacity for draining runoff from the highway. Where this leads to flood risk to properties, improvement works should be considered.
- Work with the community and LLFA to clarify ownership and maintenance responsibilities for drainage systems and watercourses, particularly where they are located within or near to the highway, or effective highway drainage is dependent on them being operational.

Environment Agency (EA)

It is recommended that the EA work with the MKC Emergency Planning Team and the LLFA to support the community and the Community Flood Warden.

Land Owners and Developers

It is recommended that land owners:

- Undertake regular inspection and maintenance of their drainage systems in accordance with a defined maintenance regime.
- Identify and develop a detailed plan of their assets to share with the LLFA, other flood risk management authorities and their community.
- Assess the capacity of their drainage systems and identify any areas with insufficient capacity for the collection, conveyance, storage and disposal of surface water. Where this could lead to runoff to the public highway or to private properties, improvement works should be considered.

It is recommended that developers:

- Work with MKC to ensure all development is completed in accordance with approved plans and documents, and planning policy. Suitable mitigation will need to be identified to manage the risk of flooding to the development itself and it needs to be demonstrated that proposals will not increase flood risk to third parties and, where possible, developments should contribute to reducing offsite flooding.

6. Disclaimer

This report has been prepared as part of Milton Keynes Council's responsibilities under the Flood and Water Management Act 2010. It is intended to provide context and information and should not be used for any other purpose.

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 have triggered or contributed to the flood event.

Any recommended actions outlined in this Flood Investigation Report 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 programme as appropriate.

The opinions, conclusions and any recommendations in this report are based on assumptions made by AECOM and Milton Keynes Council when preparing this report, including reliance on information provided by others.

AECOM and Milton Keynes Council expressly disclaim responsibility for any error in, or omissions from, this report arising from or in connection with any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the time of preparation and AECOM and Milton Keynes Council expressly disclaim responsibility for any error in, or omission from, this report arising from or in connections with those opinions, conclusions and any recommendations.

The implications for producing Flood Investigation Reports 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.

AECOM and Milton Keynes Council do not accept any liability for the use of this report or its contents by any third party.


7. Acronyms

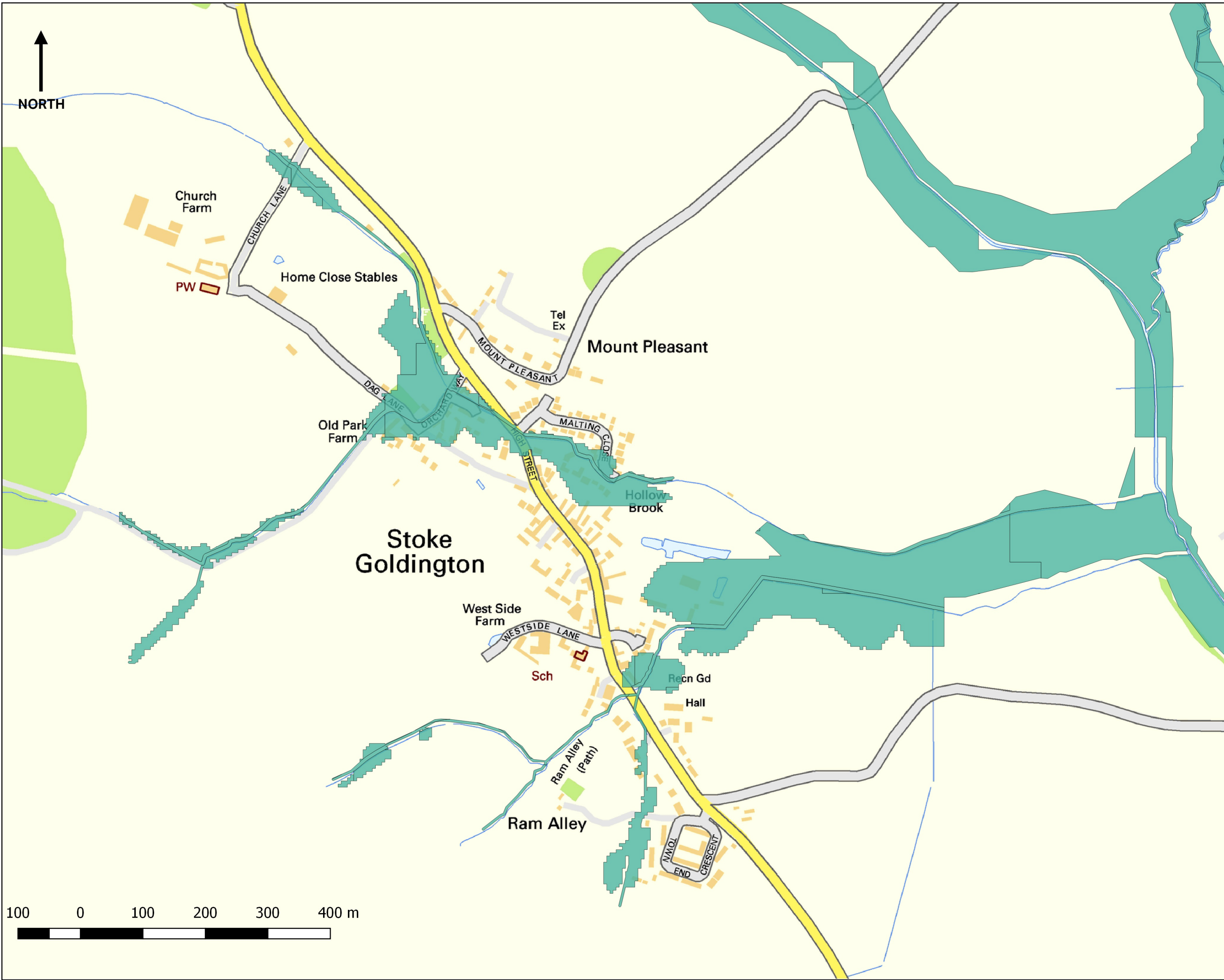
ABD	Areas Benefiting from Defences
AWS	Anglian Water Services
BGDB	Bedford Group of Drainage Boards
EA	Environment Agency
F&WMA	Flood and Water Management Act 2010
FIR	Flood Investigation Report
IDB	Internal Drainage Board
LLFA	Lead Local Flood Authority
MKC	Milton Keynes Council
RMA	Risk Management Authorities
SOP	Standard of Protection

Appendix A – Risk of Flooding from Rivers and Sea

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

Legend

 Areas with greater than 1% chance of flooding each year from rivers



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Revision Details	By	Check	Date	Suffix

Purpose of Issue
Final

Client
 Milton Keynes Council
 8 Dickens Road
 Old Worton
 Milton Keynes
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Project Title
**Stoke Goldington
 Section 19 Flood Investigation**

Drawing Title
**Stoke Goldington
 Fluvial Flood Map**

Drawn	Checked	Approved	Date
AI	BM	SK	30/09/2018

AECOM Internal Project No. 47075806
 Scale at A3

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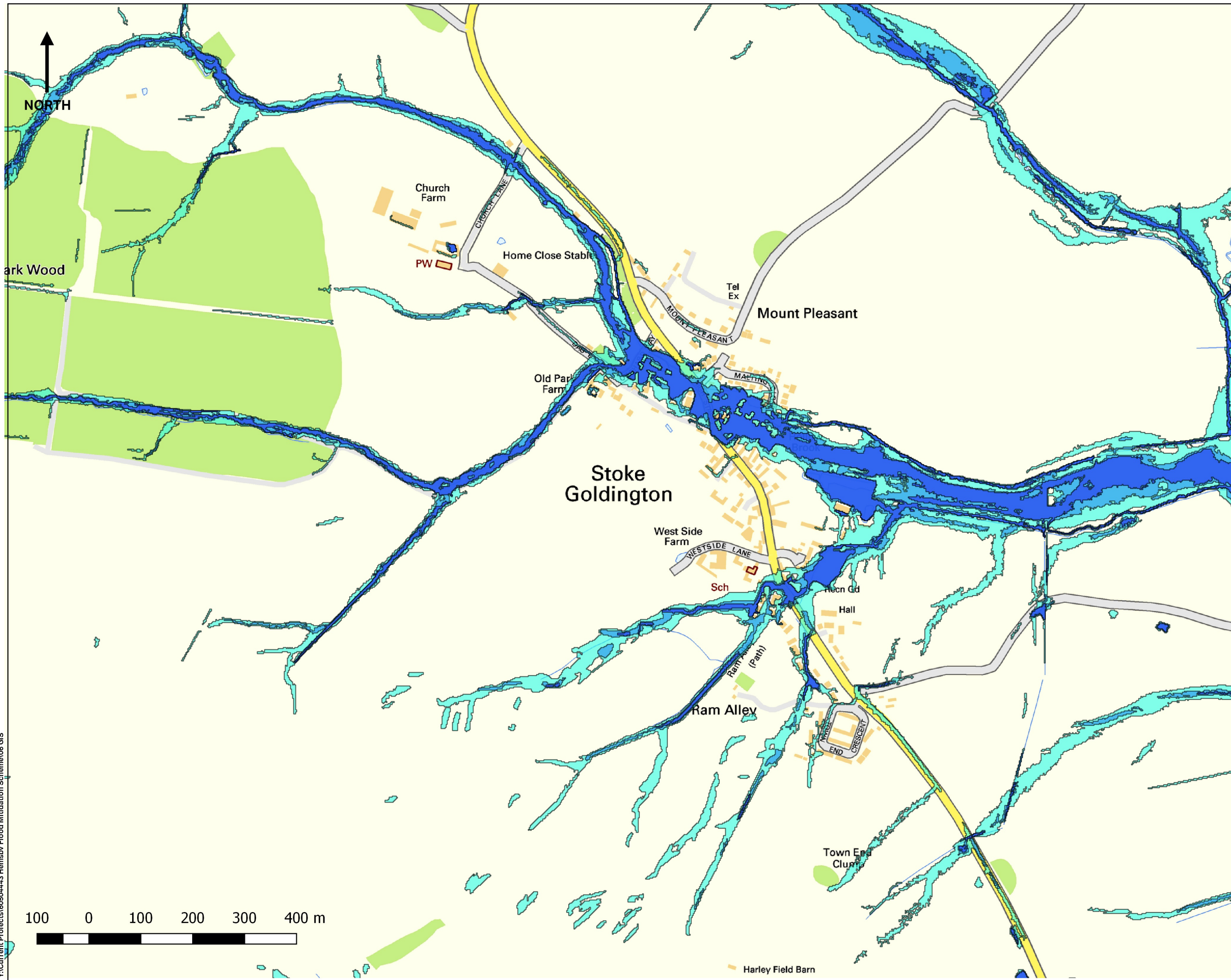
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Drawing Number **Figure STGL_002** Rev **01**

Y:\Current Projects\60504443 Hemsby Flood Mitigation Scheme\06 GIS

Appendix B – Risk of Flooding from Surface Water



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

Legend

- High Risk - Greater than 3.3% chance of surface water flooding each year
- Medium Risk - Between 1% and 3.3% chance of surface water flooding each year
- Low Risk - Between 0.1% and 1% chance of surface water flooding each year

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 Contains Surface water flood risk data from Environment Agency 2018

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Revision Details	By	Check	Date	Suffix
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Purpose of Issue
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Client
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 9 Dickens Road
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Project Title
Stoke Goldington
 Section 19 Flood Investigation

Drawing Title
Stoke Goldington
 Surface Water Flood Map

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Drawing Number **Figure STGL_003** Rev **01**

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Appendix C – MKC Record of Capital and Maintenance Drainage Works undertaken within Stoke Goldington

STOKE GOLDINGTON

JOB NUMBER	YEAR	ROAD LOCATION OF WORKS	WORKS	DATE COMPLETED
2007				
51911	2007	HIGH STREET	RECUT DITCH AND RE ALIGNMENT OF DITCH ALONG SIDE PLAY FIELD AND TO REAR OF PROPERTIES ALSO TO REMOVE FALL TREES IN BROOK THAT HAD RESTRICTED WATER FLOW OUT OF VILLAGE	30/11/2007
2008				
58485	2008	HIGH STREET	RECONSTRUCT VEHICLE CROSSING BY VILLAGE HALL AND CLEAN AND RECUT DITCH	10/03/2008
2012				
156248	2012	WESTSIDE LANE	INSTALL NEW DRAINAGE SYSTEM TO INSTALL NEW GULLIES AND CARRIER SYSTEM AND ASSOCIATED WORKS IN WEST SIDE LANE	01/03/2012
156523	2012	MOUNT PLEASANT	INSTALL NEW DRAINAGE DITCH ON HIGH STREET ADJACENT TO MOUNT PLEASANT THE EAST SIDE OF ROAD TO WATER COURSE ON WEST SIDE WITH NEW GULLY INSTALLATIONS IN ROAD ALSO INSTALL NEW CONCRETE SANDBAG HEADWALLS	01/03/2012
2014				
211779	2014	DAG LANE	FLOOD DEFENCES CONSTRUCTION VARIOUS LOCATIONS ACROSS STOKE GOLDINGTON	04/03/2014
219770	2014	RAM ALLEY	PIPE DITCH WITH PRE CAST HEAD WALL AND CONSTRUCT ATTENUATION BUNDS OVER TRACK AS PART OF THE FLOOD DEFENCE S	26/09/2014
2015				
247983	2015	ORCHARD WAY	CLEAR PLANT GROWTH FROM CHANNALISED WATER COURSE AS PART OF ROUTINE CLEANING	14/10/2015
242041	2015	EAKLEYS LANES	ADDITIONAL ROUTINE GULLY CLEAN OF GULLIES FROM HEAVY RAIN FALL	26/02/2015
245713	2015	EAKLEYS LANES	ADDITIONAL ROUTINE GULLY CLEAN OF GULLIES FROM HEAVY RAIN FALL	19/05/2015
2016				
152497	2016	HIGH STREET	FLOOD ATTENUATION WORKS IN VARIOUS SITES FROM 2011 AND COMPLETED 22/09/2016 WORKING WITH JOHN HILL CHURCH FARM	22/09/2016
268186	2016	ORCHARD WAY	CLEAR PLANT GROWTH FROM CHANNALISED WATER COURSE AS PART OF ROUTINE CLEANING	07/10/2016
264694	2016	DAG LANE	CLEAR SILT DEBRIS FROM TRACK AND GRIPS FROM OLD FARM TRACK NEAR STOKE PARK WOODS	14/09/2016
264692	2016	DAG LANE	REMOVE ANY SELF SEED TREES FROM ATTENUATION POND AT TOP OF OLD FARM PARK TRACK	12/09/2016

					INSPECTION IS CARRIED OUT AFTER HEAVY RAIN FALL OR END OF YEAR AFTER LEAF FALL TO CHECK INLETS AND OUT LETS OF FLOOD DEFENCES OR FROM ENQUIRIES FROM RINGWAY INSPECTORS		
					2018		
307611	2018	DAG LANE			TO CARRY OUT SURVEY ON FLOOD DEFENCES AT END OF DAG LANE FOLLOWING HEAVY RAIN FALL AND ALSO RECENT HEAVY VEHICLE CROSSING OVER THE CLAY BUNDS FROM RECENT UNKNOW ACTIVITY THAT HAS REDUCED THE INTEGRITY OF THE CLAY BUND FLOOD CAPABLITY . THIS IS TO DESIGN THREE NEW CONCRETE GRASS CRETE VEHICLE CROSSING POINTS WITH ALSO WORKING WITH LAND OWNER. THIS AHS BEEN COSTED AND REQUIRE CAPITAL FUNDING		23/04/2018
329477	2018	ORCHARD WAY			CLEAR PLANT GROWTH FROM CHANNALISED WATER COURSE AS PART OF ROUTINE CLEANING		DUE TO BE CARRIED OUT THIS MONTH
331138	2018	DAG LANE			HAND CLEAN ACO CHANNEL OUTSIDE HOUSE 2 , HAVE ALSO TALKED TO THE RESIDENT TO EXPLAIN THIS NEEDS PARTNERSHIP WORKING AS ITS HIS SMALL GRAVEL DRIVE WAY FOR HIS VEHICLE MIGRATING FROM HIS DRIVEWAY TO THE ACO CHANNELS AND REDUCING THE FLOW OF HEAVY RAIN FALL. ASKED THE RESIDENT TO HELP BY REDUCING THE STONE TRAVEL BY CLEANING THE FOOTWAY TO STOP THIS STONE MIGRATION		DUE TO BE CARRIED OUT THIS MONTH
					ADDITIONAL GULLY GLEANING FOLLOWING INSPECTION 6TH APRIL 2018		ADDITIONAL SPOT GULLY CLEANING IN STOKE GOLDINGTON
					INSPECTION IS CARRIED OUT AFTER HEAVY RAIN FALL OR END OF YEAR AFTER LEAF FALL TO CHECK INLETS AND OUT LETS OF FLOOD DEFENCES OR FROM ENQUIRIES FROM RINGWAY INSPECTORS		
					2019		
327206	2019	DAG LANE			INSTALL THREE NEW CONCRETE BUNDS IN TRACK		DUE SPRING/SUMMER 2019
	2019	ORCHARD WAY			CLEAR PLANT GROWTH FROM CHANNALISED WATER COURSE AS PART OF ROUTINE CLEANING		ON GOING EVERY YEAR

