SANDFORD LANE FLOOD INVESTIGATION REPORT

JANUARY 2016

APRIL 2016

WSP | PARSONS BRINCKERHOFF

SANDFORD LANE FLOOD INVESTIGATION REPORT

JANUARY 2016

Wokingham Borough Council

April 2016

WSP | Parsons Brinckerhoff
Mountbatten House
Basing View
Basingstoke
RG21 4HJ

Tel: +44(0) 1256 318 800
Fax: +44 (0) 1256 318 700
www.wspgroup.com
www.pbworld.com

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

1.1 BACKGROUND

1.1.1 The winter of 2015/16 brought significant wet weather for many parts of the UK, with the country dominated by a very unsettled regime of low pressure and frequent active depressions and fronts. This remarkable winter brought severe flooding in December from record-rainfall totals in many parts of the country; rainfall totals in the south-east were 126% above the average annual rainfall totals for 1981 to 2010. The exceptionally wet weather experienced in December also resulted in localised flooding occurring in many parts of the UK in the first week of January as a result of the saturated ground conditions. Winter 2015/16 was the second-wettest winter for the UK since 1910, with only winter 2013/14 wetter[1].

1.1.2 In the West Thames area, rainfall levels throughout winter 2015/16 were higher than the long term average. In December, rainfall levels were normal for the majority of the month, however heavy rain on 30 December resulted in 10 flood alerts being issued with nine rivers with above normal levels[2]. In January, the majority of the rain fell in the first ten days of the month, with the two wettest days occurring on the third and tenth days of the month. The rivers in the area responded quickly to this rainfall and 52 flood alerts were issued in the first 12 days of 2016[3].

1.1.3 Groundwater levels in December 2015 and January 2016 were recorded as normal within the vicinity of Wokingham Borough[4].

1.2 SOURCE OF INFORMATION

WOKINGHAM BOROUGH COUNCIL HIGHWAY MAINTENANCE OFFICERS

1.2.1 This report was prepared with the assistance and co-operation of Wokingham Borough Council officers.

1.2.2 The Council's Highway Maintenance officers are responsible for inspecting and maintaining highway infrastructure in the borough. These officers visited Sandford Lane on a number of occasions during January 2016. The information they collected during these visits and their existing knowledge of the Borough has contributed to the preparation of this report. With their knowledge of the Borough and their experience during the emergency period, they were able to highlight the key problem areas and offer potential solutions.

1.3 LIMITATIONS

1.3.1 It should be noted that much of the following record has depended upon anecdotal evidence from Wokingham Borough Council Officers and potential solutions at this stage have been based upon site observations only. Prior to taking any recommendations forward, a feasibility study should be

[1] Met Office (2016) January 2016 Weather Summary, available at http://www.metoffice.gov.uk/climate/uk/summaries/2016/january, accessed March 2016
[2] Environment Agency (2015) December 2015 Monthly Water Situation Report
[3] Environment Agency (2016) January 2016 Monthly Water Situation Report
[4] Environment Agency (2015) December 2015 Monthly Water Situation Report and Environment Agency (2016) January 2016 Monthly Water Situation Report

undertaken to verify the cause and effect of the flooding and the viability and consequences of solutions.

1.3.2 The information contained in this document has been compiled for the benefit of Wokingham Borough Council drainage engineers only and to provide information to the affected community. Wokingham Borough Council does not accept any liability for any inaccuracies in the information contained in this document.

2 SANDFORD LANE

2.1 BACKGROUND

2.1.1 Sandford Lane is located in the north of Wokingham Borough, within the parish of Woodley. Woodley town centre is located approximately 1.75km to the west and the villages of Twyford, Hurst and Winnersh are 2.5km to the north-east, 1.5km to the east and 1.9km to the south respectively.

2.1.2 The National Grid Reference (NGR) for Sandford Lane is (478273, 172904) and the nearest post code RG5 4TB. Sandford Lane is surrounded by a number of large lakes and open land, which form Dinton Pastures Country Park. The A329(M) is located approximately 1.2km to the south of the lane and the M4 is approximately 3.5km to the east.

2.1.3 The topography of Sandford Lane and the surrounding area is predominantly flat, with minor local undulations associated with the banks of the lakes. Sandford Lane is at its lowest between the River Loddon and Emm Brook, and rises away from the watercourses to the west and east, respectively.

2.1.4 Both the River Loddon and Emm Brook are designated as Main River within the vicinity of Sandford Lane. Six lakes are located to the south of Sandford Lane; White Swan Lake, Black Swan Lake; Sandford Lake; Heron's Water; Mungell's Pond and Middle Marsh and one to the north; Lavell's Lake. A network of unnamed ordinary watercourses flow between the lakes and roadside ditches run either side of Sandford Lane. Figure 01/101 in Appendix A1 illustrates the location of each of these water bodies.

2.2 JANUARY 2016 FLOOD EVENT

2.2.1 The significant rainfall experienced in Wokingham and the surrounding area during December and the first week of January resulted in the River Loddon and the Emm Brook bursting their banks, within the vicinity of Dinton Pastures Country Park. Water from the rivers spilled into the system of lakes and drainage ditches within the Country Park and in turn resulted in the flooding of Sandford Lane between 10 and 13 January 2016.

2.2.2 The first section of Sandford Lane to experience flooding was immediately to the west of the Emm Brook Bridge (refer to Figure 01/102 in Appendix A2). Here water spilled out of the roadside ditch and flooded this section of the highway to a depth of approximately 50mm for the first time on 10 January.

2.2.3 The roadside ditch drains into the Emm Brook immediately upstream of the bridge. The bridge is a brick arch bridge, with two culverts for the water to flow through. The water level in the Emm Brook was observed to be above the soffit height of the culverts on the 10 January, causing the water in the channel to back-up and flow upstream along the roadside drainage ditch. Water also flowed into the roadside drainage ditch from the ditches in the Country Park, which ultimately discharge into the roadside ditch. As the flood event progressed, the water in Sandford Lake overtopped the lake banks and flowed into the ditch, contributing to the flood water on the highway.

2.2.4 Both the southern and northern roadside ditches are approximately 500mm deep, with relatively steep banks that are primarily bare, with interspersed areas of low-grade vegetation. The ditches were reported to be clear from significant debris during the flood event.

2.2.5 The next sections of Sandford Lane to flood were the central section and a section adjacent to the Black Bridge (refer to Figure 01/102 in Appendix A2). In the central section, water again flowed

out of the roadside ditch in this location to flood the highway. In the area adjacent to the Black Bridge, water flowed directly out of Sandford Lake onto the highway.

2.2.6 At the peak of the flooding, the flood water on the highway between these two bridges ranged from approximately 50mm to 300mm deep. The area between the River Loddon Bridge (refer to Figure 01/102 in Appendix A2) and Black Bridge also flooded during the January event, with flood water on this section of the highway approximately 600mm deep.

2.2.7 The flood water was initially flowing across the road from south to north at a relatively low speed. The water then became stationery after a few hours and remained stationary until the 13 January, when it started to drain away.

2.2.8 The flood water remained on the highway during the 11, 12 and 13 January and the highway was closed for the duration of the event. The road was re-opened on the 14 January, after the flood water had drained from the highway.

2.2.9 Historically, Sandford Lane floods between 6 and 8 times each year. At the time of writing the highway had flooded 4 times since the beginning of 2016, including the significant flooding in January which resulted in the temporary closure of the road. In the past, the longest period for which the road had to be closed due to flooding has been 1 week.

2.2.10 In the past, the area of the road to the west of the River Loddon Bridge has also flooded; however the property located along this part of Sandford Lane has never experienced external or internal flooding. Similarly, the area to the east of the Emm Brook Bridge has never historically flooded.

2.2.11 The flooding experienced in the vicinity of Sandford Lane is understood to result from increases in the volume of water in the River Loddon and Emm Brook within the wider catchment and is not thought to be a result of physical constraints on the flow of water within the vicinity of Sandford Lane.

2.2.12 Figure 01/102 in Appendix A2 illustrates the approximate flood extents and overland flow routes through Dinton Pastures Country Park and Sandford Lane during the early part of January 2016.

3 FLOOD RISK MANAGEMENT ROLES, RESPONSIBILITIES AND RESPONSES

3.1 WOKINGHAM BOROUGH COUNCIL

ROLE AND RESPONSIBILITIES

3.1.1 Wokingham Borough Council, as the Lead Local Flood Authority (LLFA), is responsible for taking the lead on managing flood risk from local sources. This includes surface water, groundwater and ordinary watercourses, including where an interaction between various sources results in river flooding. Under the Flood and Water Management Act 2010 the Council, as LLFA, has a duty to investigate and publish reports on flood events (to the extent it considers necessary) and to compile and maintain a register of structures and features that have a significant effect on flood risk. It also has responsibility for consenting on third party works to ordinary watercourses.

3.1.2 The Council also has other related roles in planning and development control, public health, emergency planning and highway drainage.

3.1.3 Wokingham Borough Council is also the Highway Authority and has the following powers and duties:

- maintain highways, including ensuring that highway drainage systems are clear and that blockages on the highway are cleared;
- deliver works that they consider necessary to protect the highway from flooding, either on the highway itself or on land which has been acquired by the Highway Authority in the exercising of highway acquisition powers; and
- divert parts of watercourses or carry out any other works on any form of watercourse if it is necessary for the construction, improvement or alteration of the highway or provides a new means of access to any premises from the highway.

RESPONSE

WOKINGHAM BOROUGH COUNCIL HIGHWAYS RESPONSE

3.1.4 Wokingham Borough Council officers closed Sandford Lane on 11 January 2016 and monitored the road closure twice a day until it was reopened on 14 January 2016.

3.1.5 Wokingham Borough Council officers also undertook works to clear debris from the flood water during the event that could have blocked the drainage channels and prevented water flowing away from the area.

3.1.6 Once the flood water had drained from the highway, Wokingham Borough Council officers swept the highway to remove flood debris and silt.

3.2 ENVIRONMENT AGENCY

ROLE AND RESPONSIBILITIES

3.2.1 The Environment Agency is responsible for providing a national strategic overview of flooding from all sources (including rivers, surface water and groundwater). The Environment Agency is also responsible for managing flood risk from Main Rivers.

3.2.2 The Environment Agency has a key role in providing flood warnings to the public and in protecting and improving the natural environment.

3.2.3 The Environment Agency has permissive powers to reduce flood risk by undertaking work on Main Rivers and flood defence structures.

RESPONSE

3.2.4 Sandford Lane is located within the Lower River Loddon Environment Agency Flood Alert Area. The Environment Agency has not yet confirmed whether a flood alert was issued for the area in January 2016.

3.2.5 Within the vicinity of Sandford Lane, the only area located within an Environment Agency Flood Warning area is to the north-west of the River Loddon Bridge; the area of Sandford Lane that flooded during the January 2016 flood event is not within a Flood Warning Area. The Environment Agency did not issue a flood warning for this area in January 2016; the last time a flood warning was issued for this section of the River Loddon was in February 2014.

3.2.6 Wokingham Borough Council has not been made aware of any action taken by the Environment Agency during the January 2016 flood event.

3.3 THAMES WATER

ROLE AND RESPONSIBILITIES

3.3.1 Thames Water has responsibility for the public foul and surface water sewer systems in its ownership. Thames Water is also responsible for treating sewage from its foul network and to empty and dispose of the contents of their sewers. The Water Company has a general duty (under Section 94 of the Water Industry Act 1991) to provide, extend and improve public sewer systems, ensuring they are 'effectually drained'.

3.3.2 Thames Water must also maintain a register of flooding from sewers. The register records information which is used to apply for investment funds from Ofwat to undertake improvements or repairs. Investment is agreed with Ofwat on a five year cycle referred to as Asset Management Periods (AMP). The current AMP runs from 2015-2020.

RESPONSE

3.3.3 Wokingham Borough Council has not been made aware of any action taken by Thames Water during the January 2016 flood event. It is assumed that no action was taken by Thames Water as the flood event did not result from or impact on their sewer network.

3.4 RIPARIAN LANDOWNERS

ROLE AND RESPONSIBILITIES

3.4.1 Landowners whose property is adjacent to a river, a stream or a ditch are likely to be 'riparian owners' of the water body. Riparian owners have a responsibility to maintain the bed and banks of any watercourse within or adjacent to their property, in most cases even if that watercourse is adjacent to a highway, and to ensure there are no obstructions to the natural flow of water.

RESPONSE

3.4.2 The riparian landowner for the River Loddon and Emm Brook within the vicinity of Sandford Lane is Wokingham Borough Council, whose response to the flood event is detailed in the preceding section.

4 RECOMMENDATIONS

4.1.1 In order to reduce the risk of flooding of Sandford Lane the following measures should be considered. These recommendations are grouped according to the relevant Risk Management Authority responsible for their delivery.

4.2 WOKINGHAM BOROUGH COUNCIL

FLOOD ALLEVIATION SCHEMES

4.2.1 It may be possible to alleviate the flooding on Sandford Lane by raising the highway by approximately 300-400mm. This option would only be possible if the works do not exacerbate flood risk in other areas. For any flood alleviation scheme, the cost of the works should be compared with the benefit that will potentially be provided to determine whether such works are feasible. Given the lack of properties at risk of flooding within the vicinity of Sandford Lane and the alternative vehicular routes provided by the A3032 and Reading Road between Woodley and Hurst, the cost of raising the road is not thought to justify the benefit in this location.

4.2.2 It may be also be possible to alleviate the flooding on Sandford Lane by constructing a bund between the road and Sandford Lake to prevent flood water flowing onto the highway. This option would only be possible if the works do not exacerbate flood risk in other areas. For any flood alleviation scheme, the cost of the works should be compared with the benefit that will potentially be provided to determine whether such works are feasible. Given the lack of properties at risk of flooding within the vicinity of Sandford Lane and the alternative vehicular routes provided by the A3032 and Reading Road between Woodley and Hurst, the cost of providing a bund is not thought to justify the benefit in this location.

HIGHWAY DRAINAGE SYSTEM

4.2.3 The roadside ditches along Sandford Lane need to be regularly maintained to ensure they remain free from excess silt build up and vegetation. Wokingham Borough Council should continue to regularly maintain these ditches.

4.2.4 Wokingham Borough Council should continue to provide and develop drainage cleansing services on a risk management basis in accordance with the Code of Practice for Highway Maintenance Management 'Well Maintained Roads', July 2005. The schedule of works should continue to be shared with the general public via the Council's website.

WATERCOURSES

4.2.5 There are a number of bridge structures associated with the River Loddon and Emm Brook within the vicinity of Sandford Lane that need to be regularly maintained to ensure they do not increase the risk of flooding in this area. Wokingham Borough Council should liaise with the Environment Agency and landowners, where relevant, to ensure adequate maintenance is undertaken in relation to these structures.

4.3 ENVIRONMENT AGENCY

4.3.1 Alleviating the flood risk to Sandford Lane from the River Loddon and Emm Brook Main Rivers would require investment in a capital works scheme by the Environment Agency. As there are no properties affected by flooding on Sandford Lane, a capital works scheme in this location is highly unlikely to be economically viable and would not therefore qualify for National Government funding. National Government funding for Flood Risk Alleviation Works is allocated on a prioritisation basis, which reflects the economic benefits that can be provided by a scheme over its lifetime. This funding mechanism is designed to maximise the economic return (measured as future flood losses avoided) for the minimum possible cost (measured as capital expenditure necessary to achieve the avoidance of future losses). This approach for Main Rivers normally favours schemes designed to address large scale flood risk issues to hundreds of properties; however smaller schemes with a favourable cost benefit ratio can also be delivered under this mechanism.

GLOSSARY OF TERMS AND CONDITIONS

- **Climate Change:** a long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. Climate change may be limited to a specific region, or may occur across the whole planet.
- **Culverts:** pipelines usually of a fairly large diameter (450mm or greater) which convey surface water through a catchment to outfall to a river or other major watercourse. Culverts were mostly formed by piping natural watercourses. Maintenance is generally the responsibility of riparian owner except where culverts pass beneath highways, where responsibility passes to Wokingham Borough Council.
- **Ditches:** channels usually man made, cut for the purpose of conveying surface water runoff to streams and rivers. Maintenance is typically the responsibility of the riparian landowner.
- **Drains:** pipelines which convey foul sewage or surface water runoff from a single property. A drain is still a drain, even if it passes outside of a property boundary, until it joins a sewer. Maintenance is the responsibility of the property owner.
- **Groundwater flooding**: groundwater flooding occurs when water levels in the ground rise above the ground surface. Groundwater flooding occurs after long periods of rainfall and can last for several weeks or even months. The area's most at risk are often low-lying areas where the water table is more likely to be at a shallow depth in relation to the ground surface. The Environment Agency monitor groundwater levels in some locations in England and are able to provide groundwater flood alerts in some areas. Groundwater flooding is not a common occurrence in Wokingham Borough.
- **Floodplain:** this is a natural feature and is defined as an area of land along the course of a river valley that has historically been the subject of flooding. Floodplain extents are detailed on statutory definitive maps published by the Environment Agency.
- **Highway Drains:** pipelines which convey surface water runoff from the public highway only. Highway drains discharge to public sewers, watercourses and rivers. Maintenance is the responsibility of Wokingham Borough Council.
- **Highway flooding**: highway flooding is caused by heavy rainfall which, coupled with blocked drains, gullies or roadside ditches, causes water to pond within the highway.
- **Main River:** usually larger streams and rivers, but also include smaller watercourses of strategic drainage importance. A main river is defined as a watercourse shown as such on a main river map, and can include any structure or appliance for controlling or regulating flow or water in, into or out of a main river. The Environment Agency's powers to carry out flood defence works apply to main rivers only. Main rivers are designated by Defra.
- **Ordinary watercourses:** any other river, stream, ditch, cut, sluice, dyke or non-public sewer which is not a Main River.
- **Private sewers:** any sewers which are not public sewers. Maintenance is the responsibility jointly of the property owners/beneficiaries.
- **Public sewers:** sewers which have been adopted as public sewers or were in use before 1st October 1937. Maintenance is the responsibility of Thames Water.
- **Riparian landowners:** under common law riparian landowners are responsible for the maintenance of any watercourse within or adjacent to the boundary of their property. Where a watercourse is sited between two or more property boundaries each owner may be equally responsible. A riparian owner is responsible for the maintenance of the bank and bed to avoid any obstruction of flow in the watercourse.

- **River Flooding:** river flooding, also known as fluvial flooding, occurs when a river channel cannot accommodate the volume of water flowing into it, causing water to burst its banks onto the surrounding land or floodplains. These events normally follow an extended period of heavy rainfall and can usually be forecasted by the Environment Agency in liaison with the Met Office.
- **Sewers:** pipelines which convey foul sewage or surface water runoff from more than one property. Sewers may be either public or private.
- **Sewer flooding**: sewer flooding occurs when a sewer network cannot cope with the volume of water entering it or when the pipes within the network become blocked. Due to the age of much of the sewer network it is also possible for groundwater to enter into it and surcharge its capacity.
- **Surface water flooding**: surface water flooding, also known as pluvial flooding or flash flooding, occurs when heavy rainfall generates runoff which flows over the ground and ponds in low lying areas. This type of flooding is usually short lived and associated with heavy downpours of rain. Surface water flooding is made much worse when the ground is already saturated and little rainfall can infiltrate. Often there is limited advance notice of surface water flooding; however, weather forecasts from the Met Office can give an indication of the flood risk.

Appendix A

FIGURES

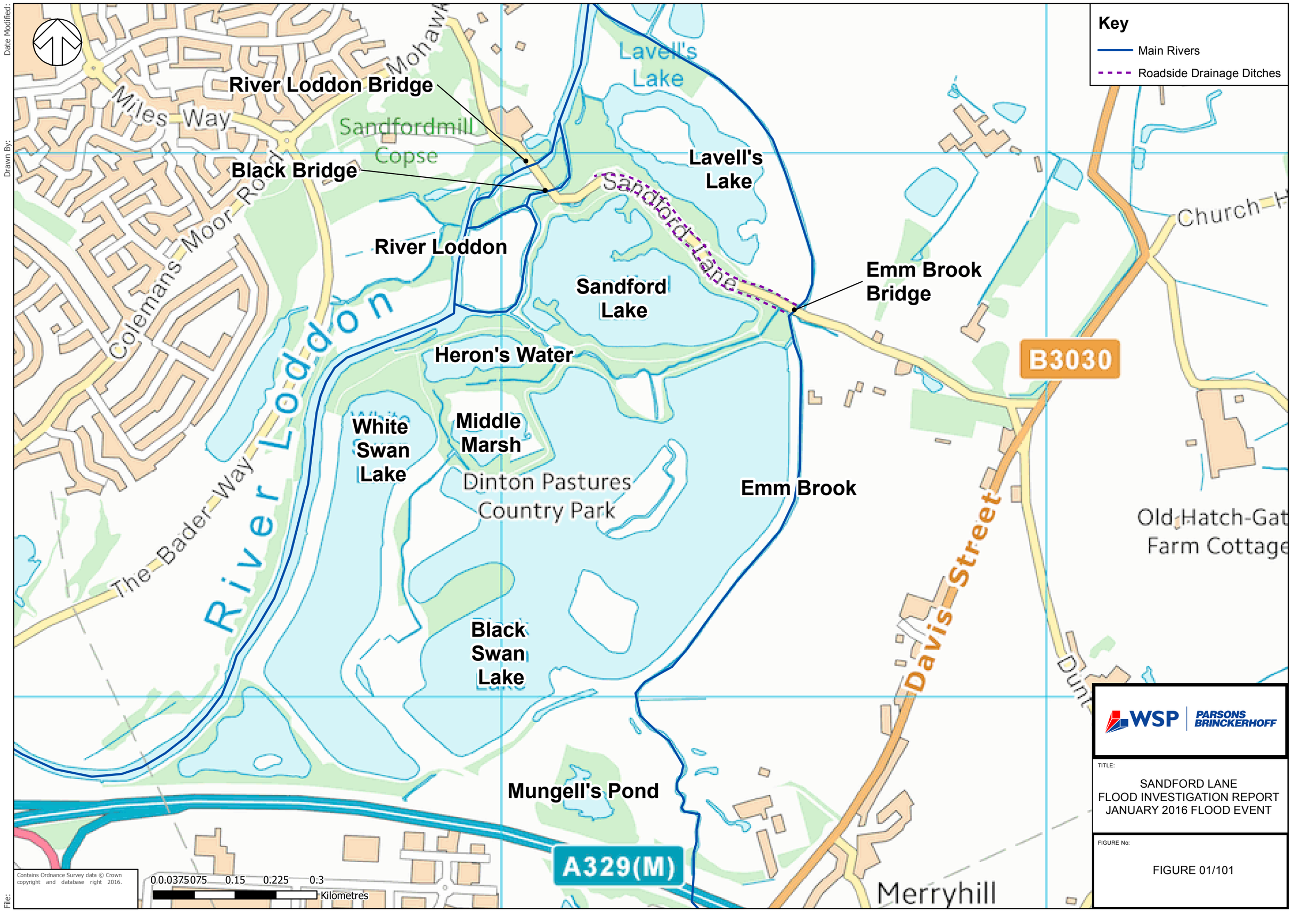
APPENDIX A-1

SANDFORD LANE – DRAWING NO. 01/101

Date Modified:

Drawn By:

File:



WSP | PARSONS BRINCKERHOFF

TITLE:

SANDFORD LANE
FLOOD INVESTIGATION REPORT
JANUARY 2016 FLOOD EVENT

FIGURE No:

FIGURE 01/101

APPENDIX A-2

SANDFORD LANE – DRAWING NO. 01/102

Date Modified:

Drawn By:

File:

Final section of the road to flood

River Loddon Bridge

Black Bridge

The water level in Sandford Lake was approximately 500mm lower than the level of the footpath / road

Evidence of channels having been cut into the roadside verge to enable water to drain from the road into the ditches in this section of the road

The water level in Lavell's Lake was approximately 500mm lower than the level of the footpath / road

First section of the road to flood

Emm Brook Bridge

Lavell's Lake

Sandford Lake

Copse

Key

- Main Rivers
- Roadside Drainage Ditches
- Confirmed Flood Extent
- Anticipated Flood Extent
- Direction of Flow

0 0.015 0.03 0.06 0.09 0.12 Kilometres

WSP | PARSONS BRINCKERHOFF

TITLE:

SANDFORD LANE
FLOOD INVESTIGATION REPORT
JANUARY 2016 FLOOD EVENT

FIGURE No:

FIGURE 01/102