Kent County Council

Flood Investigation Report

Location of Investigation: **Sittingbourne**

Date of incident: **15 August 2020**

This document has been prepared by Kent County Council Flood and Water Management Team as the Lead Local Flood Authority under Section 19 of the Flood and Water Management Act 2010, with the assistance of:

- Kent County Council
- Swale Borough Council

The findings in this report are based on the information available to KCC at the time of preparing the report. KCC expressly disclaim responsibility for any error in or omission from this report. KCC does not accept any liability for the use of this report or its contents by any third party.

This report can be found here where more information can be found about the requirements and trigger for a Section 19 investigation and the roles and responsibilities of Risk Management Authorities.

For further information or to provide comments, please contact us at flood@kent.gov.uk

Summary of event

On 15 August 2020 heavy rainfall was experienced in Sittingbourne as the result of an intensive localised storm. A total of 40.8mm of rain was recorded in a 45-minute period at Sittingbourne during the storm. The average rainfall for August in Kent is 56.3mm.

Many of the areas affected during this flood were affected during the 2018 flood. Further information about the flooding in 2018 can be found within the report *Flood Investigations – Flooding affecting the Swale area on 29 May 2018,* the report can be found at: *https://www.kent.gov.uk/__data/assets/pdf_file/0012/106023/Flooding-report-affecting-the-Swale-area-of-Kent-on-29-May-2018.pdf*.

Following the flooding in August 2020 further flood events have been reported at Snipeshill on the 24 October and 14 November 2020.

The map in Figure 1 indicates the areas affected and this is summarised in Table 1 below.

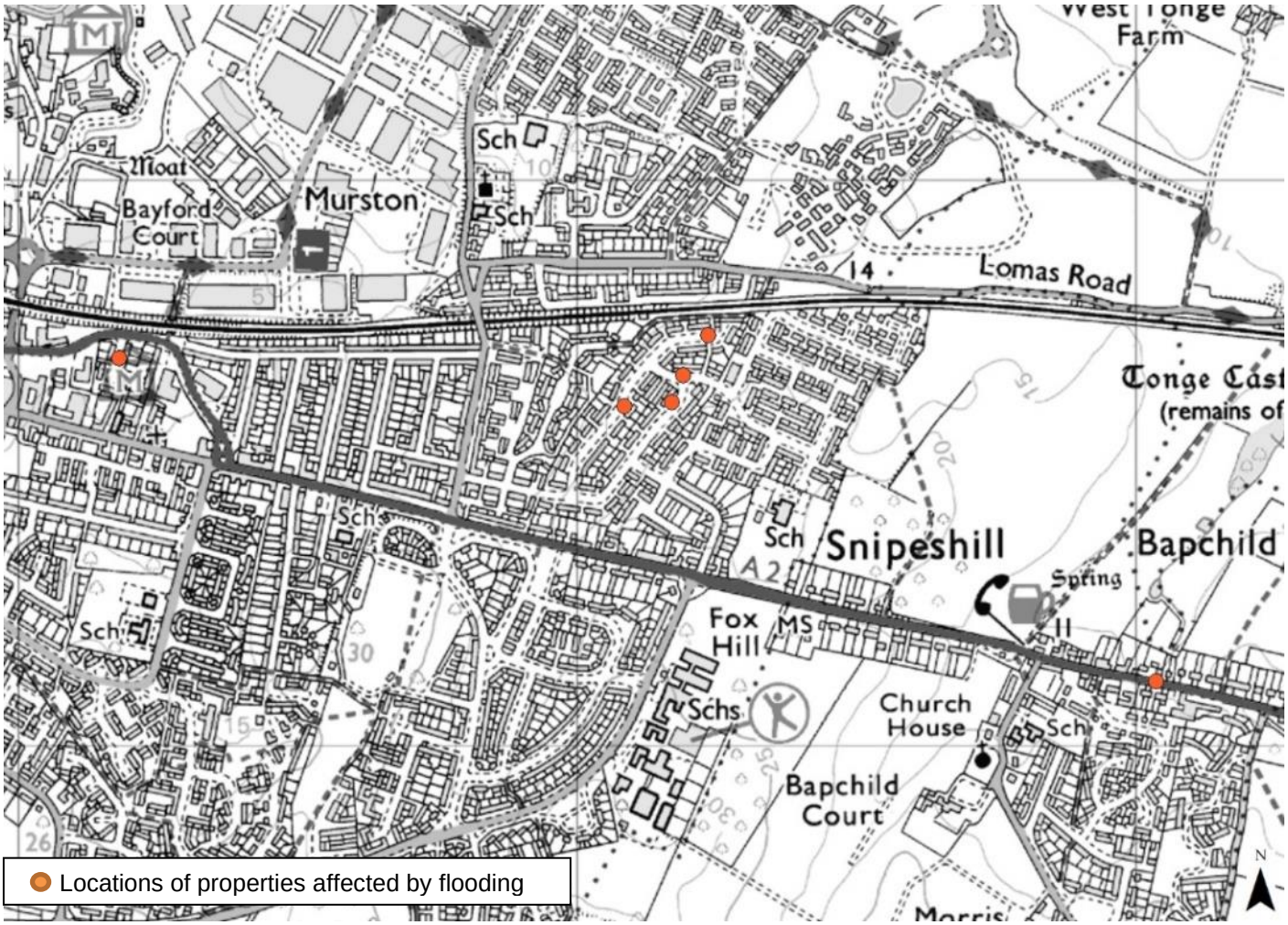

Figure 1 *Map of properties affected by flooding*

Table 1 *Locations of properties affected by flooding*

Location	Details of flooding	Source of Report
Lansdown Road	Internal flooding of four properties	KCC Highways, Swale BC, KFRS
Coombe Drive	Internal and external flooding to 5 properties and external flooding at two properties	KCC Highways, Swale BC, KFRS
Woodberry Drive	One property internally flooded	KCC Highways, Swale BC
Lime Grove	Internal flooding to 2 properties	KCC Highways
The Street, Bapchild	Internal flooding of one property external flooding at 2 properties	KCC Highways

Site Location, Topography and Flood Risk

The topography in Sittingbourne is characterised by several dry valley features which fall towards the marshes to the north of the town.

The Snipeshill area sits around a dry valley that forms near Highsted to the south and falls in a north-easterly direction towards the marshes at East Hall. Sittingbourne town centre sits within another dry valley that forms near Tunstall to the south and falls in a northerly direction towards Milton Creek. Another dry valley that flows from the south west of the village of Bapchild towards Tonge passes over The Street at Bapchild. Surface water is naturally channelled along the bottoms of these valley features.

The national surface water flood map provided by the Environment Agency long term flood risk information website (https://flood-warning-information.service.gov.uk/long-term-flood-risk) shows these valley features to be at a medium to high risk of surface water flooding. Medium risk means that these areas have a chance of flooding of 3.3% or greater and high risk means a 1% chance or greater in any one year. An extract from the surface water flood map is shown in Figure 2. It should be noted that all information shown by this mapping, particularly the likelihood of surface water flooding, is a general indicator of an area's flood risk, it is not suitable for identifying whether an individual property will flood.

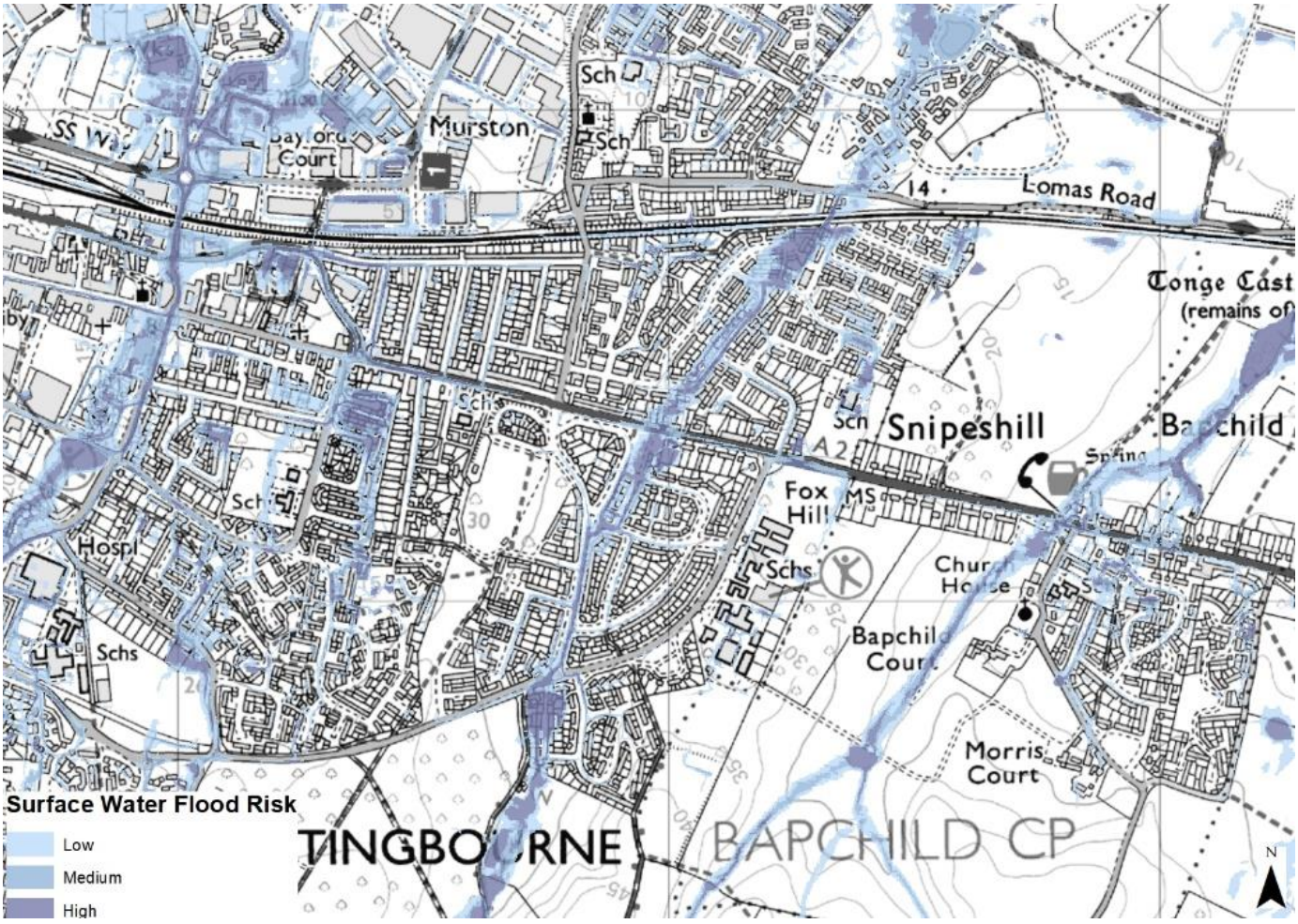

Figure 2. Environment Agency Surface Water Flood Risk Map

Rainfall

Rain Gauge	Sittingbourne STW TBR

Rainfall	40.8mm
Annual Exceedance Probability	0.64%
	1 in 157-year return period

Rainfall around the county is recorded by a series of rain gauges operated by the Environment Agency.

To assess the rarity of the rainfall that fell the Flood Estimation Handbook[1] (FEH) Event Rarity Calculator to gain an Annual Exceedance Probability (AEP), which is the likelihood of rainfall of this depth or more falling in a year. For instance, a rainfall event with an AEP of 1% means that rainfall of this depth or greater would only be expected on average once in 100 years, or 10 times in 1,000 years.

Rain Gauge	Rainfall	Time Period
Eastchurch	5.57mm	Daily total
Motney Hill	6.35mm	Daily total
Sittingbourne	40.8mm	13.30 – 14.15

The rain fall recorded at the Sittingbourne rain gauge shows the localised nature of the rainfall. The nearest rain gauges to Sittingbourne, located at Eastchurch to the north east and Motney Hill to the north west received a fraction of the rainfall throughout the day compared to the rainfall received in Sittingbourne. During the 45-minute period of rainfall 19.6mm of this fell within a 15-minute period.

Drainage System Details

Sittingbourne is drained by soakaways that collect surface water and discharge into the ground and surface water sewers that collect surface water and convey it towards Milton Creek.

Highway run-off is discharged via soakaways on Woodberry Drive, Coombe Drive and Lansdown Road. Soakaways rely on the natural permeability of the underlying rock for the water to soak into. They are usually made by digging large manholes that are lined with perforated concrete rings or open jointed brickwork. The manhole provides storage for water as it seeps through the perforations in the chamber into the surrounding Chalk bedrock over a period of 24 to 48 hours, ready to accept a subsequent storm. Prolonged very heavy rainfall or multiple heavy rainfall events within a short period can overwhelm the storage available in these soakaways and result in surface water flooding occurring. The volume of water stored in a soakaway for highway drainage purposes is likely to have been based on the volume of run-off from a storm with a 20% probability of occurring in any one year (a ‘1 in 5 year’ event). This was a standard approach for the time of their construction. Individual soakaways serve relatively small areas of between two and six road gullies. As such they will form a series of smaller discrete drainage systems rather than one for the whole area.

At Lime Grove the highway drainage is discharged via the surface water sewer network operated by Southern Water. Southern Water do not have available information on the condition of the surface water sewers in the Lime Grove area, however these sewers were built at a time when the design standard was for a 1 in 30-year storm event, and sewers experiencing rainfall events higher than this are likely to be overwhelmed.

Surface water which collects on The Street in Bapchild is drained by highway soakaways.

[1] FEH is the standard tool in the UK to estimate rainfall return periods. It is used by the Environment Agency and all professional hydrologists to estimate rainfall and rainfall return periods.

Flood History

Flooding has been reported to KCC on previous occasions in Sittingbourne in November 2009, January 2011, January 2014, March 2014, and August 2018. On these occasions the flooding has been the result of blocked drains resulting in the road flooding and entering properties, which sit at a lower level than the road.

However, in May 2018 Sittingbourne experienced a 1 in 55.2-year event which overwhelmed the drainage system and caused surface water to collect in the lowest points and enter property.

Flooding Description

On 15 August, the first reports of flooding received by Kent County Council were from Coombe Drive at 15:33, the caller reported that flooding had reached a depth to enter properties with another resident reporting flooding at 15.52.

KCC Highways requested that Kent Fire and Rescue Service attend Coombe Drive and Lansdowne Road at 16.40 and for sandbags to be provided from the highways depot. A KCC Highways officer arrived on site at 17.40 with an emergency planning officer from Swale arriving shortly after to offer welfare support to flooded residents. A tanker arrived on site at 19.10 to assist with controlling flood water on the highway and remained on site until midnight.

KFRS responded to emergency calls at Lansdown Road and Coombe Drive. On arrival at Lansdowne Road the water had subsided, at Coombe Drive KFRS pumped water from two internally flooded properties.

Flood waters were reported on St Michaels Road and Crown Quay Lane and manholes on the main surface water sewer are reported to have been overflowing near Lime Grove.

Flooding Mechanism

The flooding on the 15 August 2020 was the result of intense rainfall. The volume of surface water that accumulated in a short period overwhelmed the drainage network, the soakaways quickly became full from the surface water that was experienced at Coombe Drive, Woodberry Drive and Lansdown Road and The Street. Once the capacity of the drainage was exceeded, runoff collected in topographical low points leading to flooding.

The urban area of Sittingbourne has a high proportion of impermeable areas, run-off from roofs, hard-standing and the highways will have contributed to the overland flow-pathways which naturally drain along the dry valley features.

At Lime Grove, surface water overwhelmed the surface water sewer. As Lime Grove is a low point in the area surface water collected here and rose to a level that flooded properties.

Flooding Response

After the incident recovery activities included the inspection and cleansing of gullies and soakaways on Coombe Drive, Lansdown Road and Woodberry Drive by KCC. Gully cleansing records from after the event show that of the 24 gullies on Woodberry Drive 3 were found to be full. These are not located in the area that flooded, they are found at the junction of Woodberry Drive and Elm Grove. Inspection of the soakaways which drain this area have not identified any significant defects.

Blockages in the drainage network are not considered a significant contributor to flooding in 15 August 2020. At Coombe Drive and Lansdowne Road the drainage system had been cleansed in the week before the flooding occurred. Water on the highway drained away once the rainfall had ceased, indicating drainage systems are in operational order, but overwhelmed in this event. KCC highways engineers attended Lime Grove in the days following the flooding but found no evidence of issue with the drainage. Replacement Sandbags and floodsaxs were provided to residents at Coombe Drive and The Street Bapchild, following the flood event.

Southern Water have not provided details of any response to the flooding at Lime Grove.

Conclusion and Future Actions

A heavy rainstorm of a 1 in 157-year return period occurred in Sittingbourne on the 15 August, the rainfall occurred within a 45-minute period which led to extensive flooding.

The intensive nature of the event caused significant overland flows from the urban catchment which resulted in flooding as water collected in the topographical low points. As the volume of water increased the highway drainage systems and the surface water sewer systems became overwhelmed resulting in flooding to properties.

Storms of this severity are likely to overwhelm drainage which is not designed for rainfall of this intensity. Flood water drained away once rainfall had ceased indicating that the drainage systems are in operational order.

Southern Water do not have information on the condition of the sewers within the Lime Grove area and it is not possible to comment on the options or opportunities to reduce the risk of flooding, however due to the return being significantly over 1 in 30 years its likely this was the cause of the surface water sewer being overwhelmed.

KCC Highways are commissioning consultant engineers to review the options for improving drainage on Landowne Road and Coombe Drive.

KCC's Flood and Water Management team will commissioned consultant engineers to develop a SuDS and landscaping proposal for the greenspace adjacent to Canterbury Road. The commission will assess options for water storage on the site and associated landscaping which can reduce flood risk and improve the open space.

It should be noted that improvements must be cost-beneficial, that is. the costs of delivering them must be outweighed by the benefits they provide. Any improvements made are unlikely to completely eliminate the risk of surface water flooding - all measures can be overwhelmed by an event of sufficient extremity.