

Tameside MBC

Flood & Water Management Act 2010

Section 19 Investigation Report

Wild Bank Hill Flood Event

21st November 2016



April 2017

Cover; River Tame, Park Road, Stalybridge

Document History and Status

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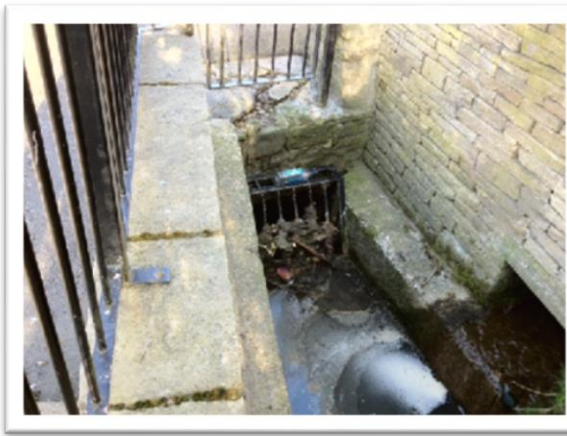
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Glossary – 1 Acronyms / Initials

AGMA	Association of Greater Manchester Authorities
EA	Environment Agency
GiA	Flood Defence Grant in Aid
GIS	Geographic Information System
HE	Highways England
LLFA	Lead Local Flood Authority
RMA	Risk Management Authority
TMBC	Tameside Metropolitan Council
UU	United Utilities (the local sewerage undertaker)

Glossary – 2 General

Assets	Structures, or a system of structures used to provide drainage infrastructure and / or manage flood risk
Catchment	An area that supplies a river with water (rainwater, snow, etc.) – the area of land where the rainfall drains to a single watercourse
Culvert	A covered channel or pipe to direct the flow of water
Flood	The temporary covering by water of land not normally covered with water
Flood Defence Grant in Aid	Funding made available (subject to approved) by the Environment Agency for reducing flood risk
Groundwater	Water that is in the ground, this is usually referring to water in the saturated zone below the water table
Groundwater Flooding	Flooding which occurs as a result of groundwater rising above the surface.
Hyrad	HY drological RAD ar - An advanced weather radar display system, providing real-time receipt of radar and other hydro-meteorological images
Inlet Structure	Purpose built structures to allow the flow of a watercourse to enter a piped system. Examples below:



Lead Local Flood Authority	An upper tier local authority with particular responsibilities under the Flood and Water Management Act 2010
Main River	A watercourse shown as such on the 'Main River' Map, and for which the Environment Agency has certain responsibilities and powers
Ordinary Watercourse	A watercourse that does not form part of a main river

Public Sewer	A sewer which is the responsibility of a sewerage undertaker. Within the Tameside area, this is United Utilities
Recovery	The process of rebuilding, restoring and rehabilitating the community after an incident such as a flood
Reservoir	A natural or artificial lake where water is collected and stored until needed. Some reservoirs in areas such as Tameside were initially built for industry and are no longer serving their original purpose but may have other benefits such as amenity or nature conservation
Return Period	An estimate of the average interval of time between a rainfall event of a certain intensity or size.
Risk	The significance of a potential event in terms of likelihood and consequences
Risk Management Authorities	Organisations that have a key role in flood and coastal erosion risk management as defined by the Flood and Water Management Act (2010). These are the Environment Agency, lead local flood authorities, district councils where there is no unitary authority, internal drainage boards, water companies, and highways authorities.
River (Fluvial) Flooding	Occurs when the water level in a channel overwhelm the capacity of the channel
Sewer Flooding	Flooding caused by wastewater discharge from sewers
Surface Water (Pluvial) Flooding	Flooding from rainwater (including snow and other precipitation) which has not entered a watercourse, drainage system or public sewer
Watercourse	Rivers, streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows

1. Introduction

1.1 Summary of Events

Localised flooding occurred following intense rainfall on November 21st 2016. The east of Tameside was the worst affected. Properties in Hollingworth, Mossley and Stalybridge were flooded internally and externally and three roads were impassable and closed for a period of time: Huddersfield Road, Stalybridge, Turner Lane, Ashton-under-Lyne and Underwood Road, Hyde.

Six key flooding sites were recorded, all being located around areas centred on Wild Bank Hill.

- Demesne Drive area, Stalybridge
- Highfield Gardens area, Hollingworth
- Huddersfield Road, Stalybridge
- Micklehurst Road, Mossley
- Tame Close, Stalybridge
- Town Centre area, Stalybridge

The intensity of the rainfall on Wild Bank Hill resulted in a large volume of surface water runoff. This, in turn, led to a number of inlet structures being unable to cope with the amount of water and debris during this weather event. This caused localised flooding to a number of areas with 80 properties being affected.

1.2 Purpose and Scope of this Report

The flooding event of 21st November 2016 affected a large number of properties and critical infrastructure; it is classed as a 'significant' event under Tameside Metropolitan Borough Council (TMBC) Local Flood Risk Management Strategy and therefore a detailed investigation has been carried out.

The aim of this report is to identify properties affected by the 21st November 2016 event, investigate the source / cause and impact.

1.3 Legislative Background

Section 19 Investigations – Flood and Water Management Act 2010

The Act places a number of duties on Lead Local Flood Authorities (LLFAs) in relation to local flood risk management, one of which is to record and investigate flooding incidents within their area.

Section 19 states –

- 1) *On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers 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 investigations, and
 - b) Notify any relevant risk management authorities

1.4 Risk Management Authorities (RMAs)

The following organisations are defined as Risk Management Authorities (RMAs) under the Act and have the following flood risk management functions:

Flood Source	Environment Agency	Lead Local Flood Authority (Tameside MBC)	Water Company (United Utilities)	Highway Authority (Highways England – Motorways & Trunk Roads)
Main River*	X			
Ordinary Watercourse*		X		
Highway Surface Water		X		X
Surface Water from other sources		X		X
Groundwater Flooding		X		
Water Supply Infrastructure			X	

* Main rivers have been designated as such by the Environment Agency and tend to be major rivers or rivers with a high flood risk. Ordinary watercourses; any other streams not classed as Main River.

Partnership meetings are arranged and attended by AGMA, EA, UU and TMBC on a bi-monthly basis to discuss specific issues and ongoing matters relating to flood risk across the borough.

1.4.1 Environment Agency (EA)

The Environment Agency has a strategic overview of all sources of flooding and coastal erosion (as defined in the Act). It is also responsible for flood and coastal erosion risk management on main rivers and the coast, regulating reservoir safety and working in partnership with the Meteorological (Met) Office to provide flood forecasts and warnings.

For details and guidance on what to do before during and after the floods see –

<https://www.gov.uk/government/publications/flooding-what-to-do-before-during-and-after-a-flood>

1.4.2 Tameside Metropolitan Borough Council (TMBC)

TMBC has a joint risk management role both in the capacity of highways authority and as Lead Local Flood Authority (LLFA). As a highway authority, TMBC has a duty under the Highways Act 1980 to manage highways that are maintainable at public expense, including highway drainage. As LLFA, TMBC has a number of duties and powers as laid out in the Act including the duty to investigate flooding.

TMBC also take an overseeing role to ensure that RMAs and landowners are fulfilling their responsibilities.

1.4.3 Water Companies

Water companies are responsible for public sewers as defined under The Water Industry Act 1991 and Private Sewers Legislation 2011. They are also responsible for the storage and supply of fresh water to residents and businesses.

1.4.4 Highways England

Highways England has responsibility as highways authority for motorways and trunk roads throughout Tameside.

1.4.5 Riparian Landlords and Residents

Riparian landowners are owners of land adjoining or containing a watercourse. They have certain rights/responsibilities, including the maintenance of watercourses and assets within their ownership to ensure flood risks are not increased upstream, through or downstream of their land.

A free detailed guide can be accessed from:

<https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities>

Residents who are concerned they may be at risk of flooding should take appropriate action to protect themselves and their property. These actions include registering to receive flood warnings, obtaining a personal supply of sandbags and moving valuable items to higher ground. They also include more resilient and permanent measures such as water resistant doors, air brick covers, floodgates and raised electrical sockets and the fitting of non-return valves on pipes.

Further information can be found at –

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

2. Overview of Flooding Events

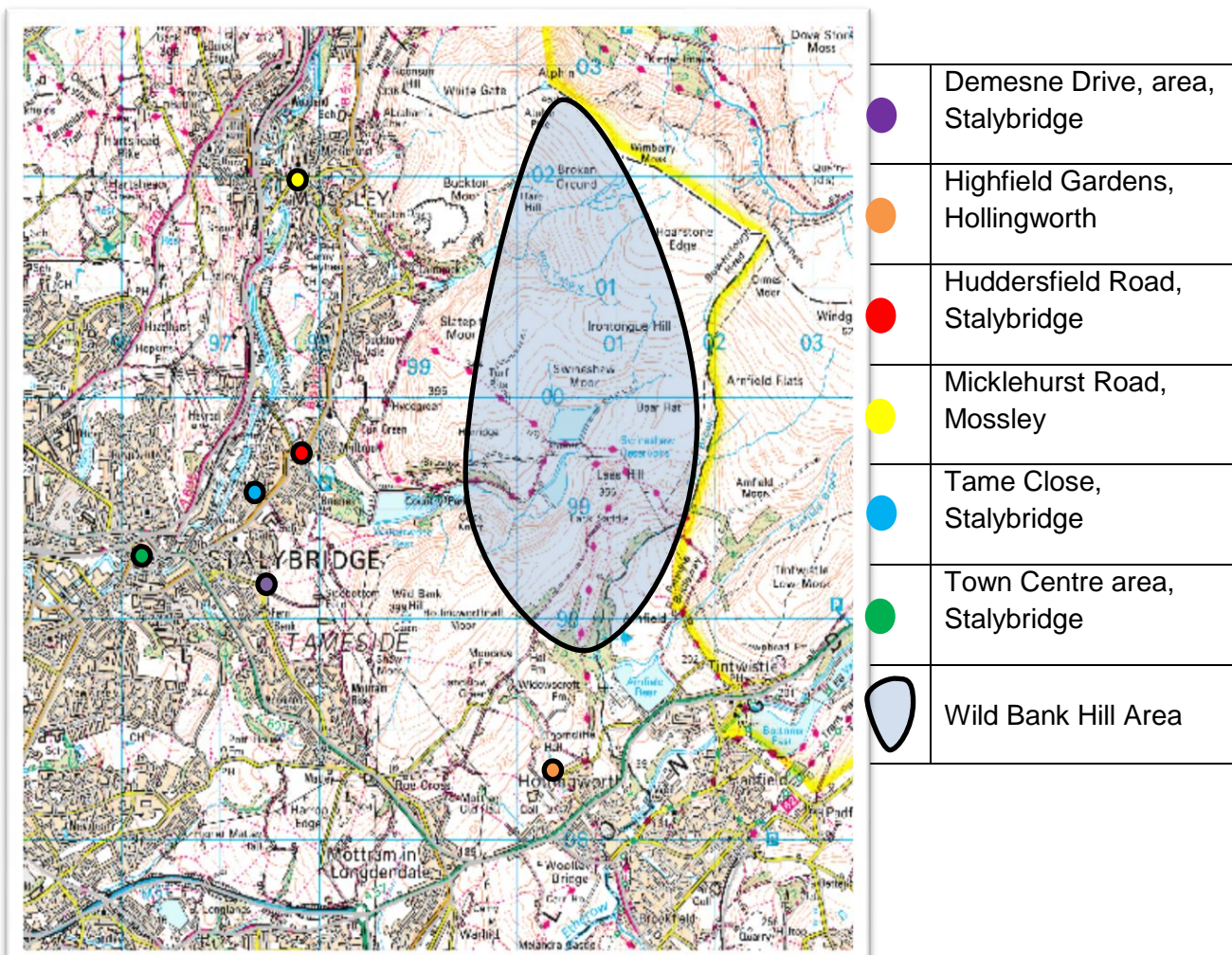
2.1 Property Impacts

A storm event occurred during the late afternoon and evening of 21st November 2016, causing flooding in various areas across the east of Tameside.

This report will focus on the six key flooding locations, all of which were located around areas centred on Wild Bank Hill.

- Demesne Drive area, Stalybridge
- Highfield Gardens area, Hollingworth
- Huddersfield Road, Stalybridge
- Micklehurst Road, Mossley
- Tame Close, Stalybridge
- Town Centre area, Stalybridge

The plan below shows the general locations of properties affected following the flooding event of 21st November 2016 and the location of Wild Bank Hill. These numbers were confirmed by the EA, however, the numbers may be higher given locations where residents were unavailable or flooding was not reported.



The locations of individual properties reported to have flooded have not been identified in this report for reasons of confidentiality.

Location	No. Properties Flooded Internally and Externally	No. Properties Flooded Externally Only
Demesne Drive area, Stalybridge	21	5
Highfield Gardens area, Hollingworth	8	8
Huddersfield Road, Stalybridge	2	0
Micklehurst Road, Mossley	17	10
Tame Close, Stalybridge	5	0
Town Centre area, Stalybridge	4	0
Total	57	23

2.2 Conditions on 21st November 2016

Overview

The following information has been used to help provide an overview of conditions that led to flooding.

- Rainfall data collected by the EA/Met Office
- 'Hyrad' imagery supplied by the EA
- River level data supplied by the EA

Rainfall Data

There are two rainfall gauges that recorded data for this event, Greenfield Sewage Works, Oldham and Arnfield Reservoir. These rain gauges are 'Tipping Bucket Gauges' which can record at 15 minute intervals.

The data from the 21st November 2016 –

The gauge at Greenfield sewage works recorded that in a 24 hour period from 00:00 21st November, until 00:00 22nd November 2016, 52mm of rain fell, with 41mm of that rainfall falling in a 12 hour period. However, it should be noted that the gauge

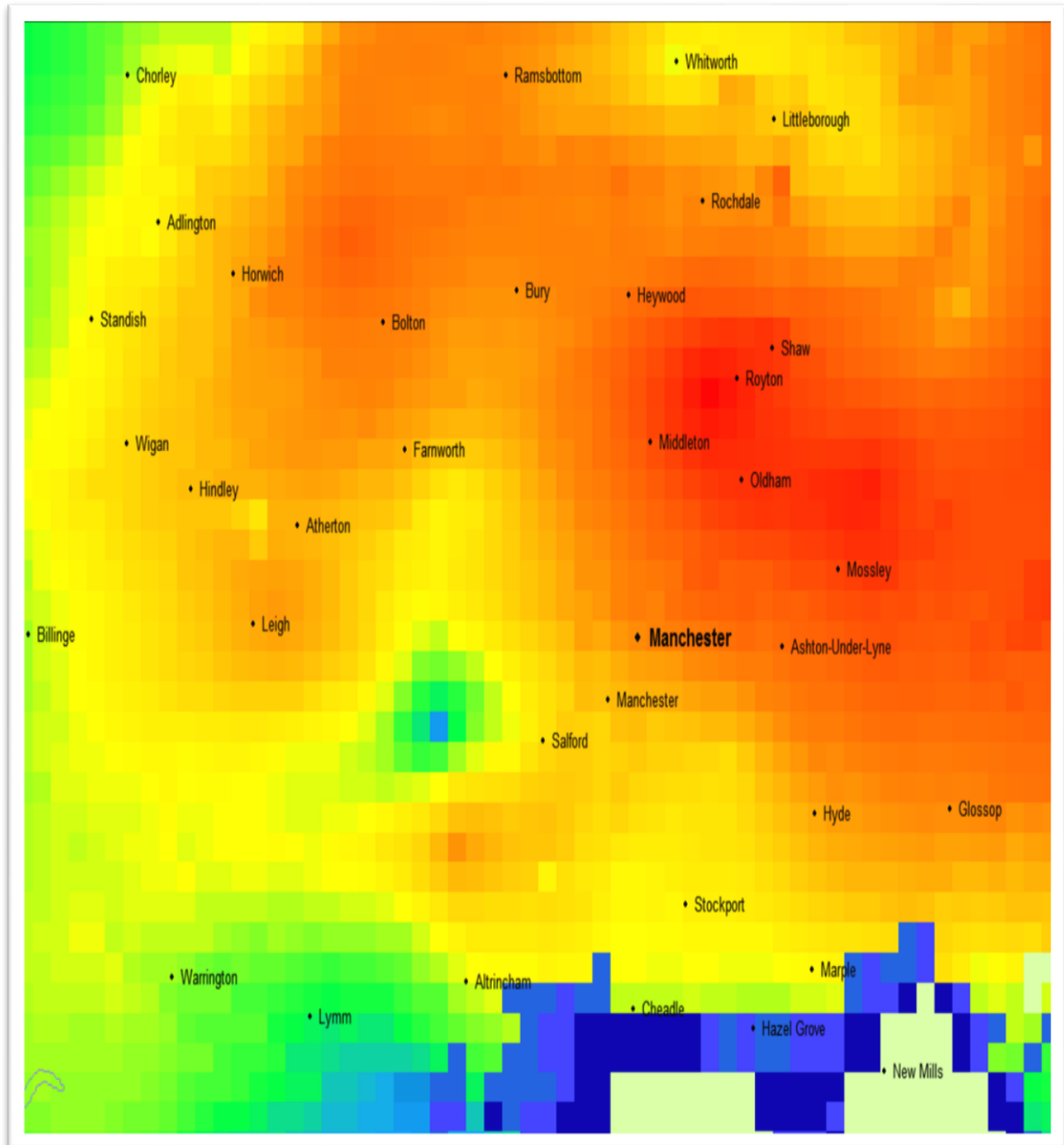
is situated away from the centre of the rainfall on Wild Bank Hill, so can only be used as a guide.

Similarly, the rain gauge at Arnfield reservoir shows 15mm rainfall across the same 24 hour period. However, this data has been marked as cautionary by the EA as it has not been certified. Additionally, the figures collected are for a 24 hour period and do not reflect the intensity of the rainfall on the afternoon of 21st November 2016.

Hyrad Imagery

The Hyrad images shows that the intensity of the rainfall was centred on the east of the borough –

Greater Manchester 17:30 21st November 2016

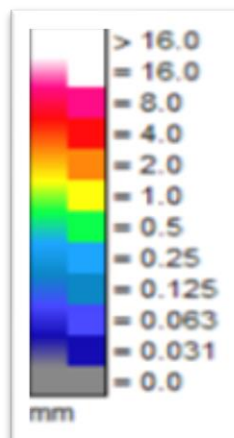


The Hyrad image below shows the intensity of rainfall across Stalybridge and Mossley.

East Tameside 17:30 21st November 2016



Rainfall (mm/hour)

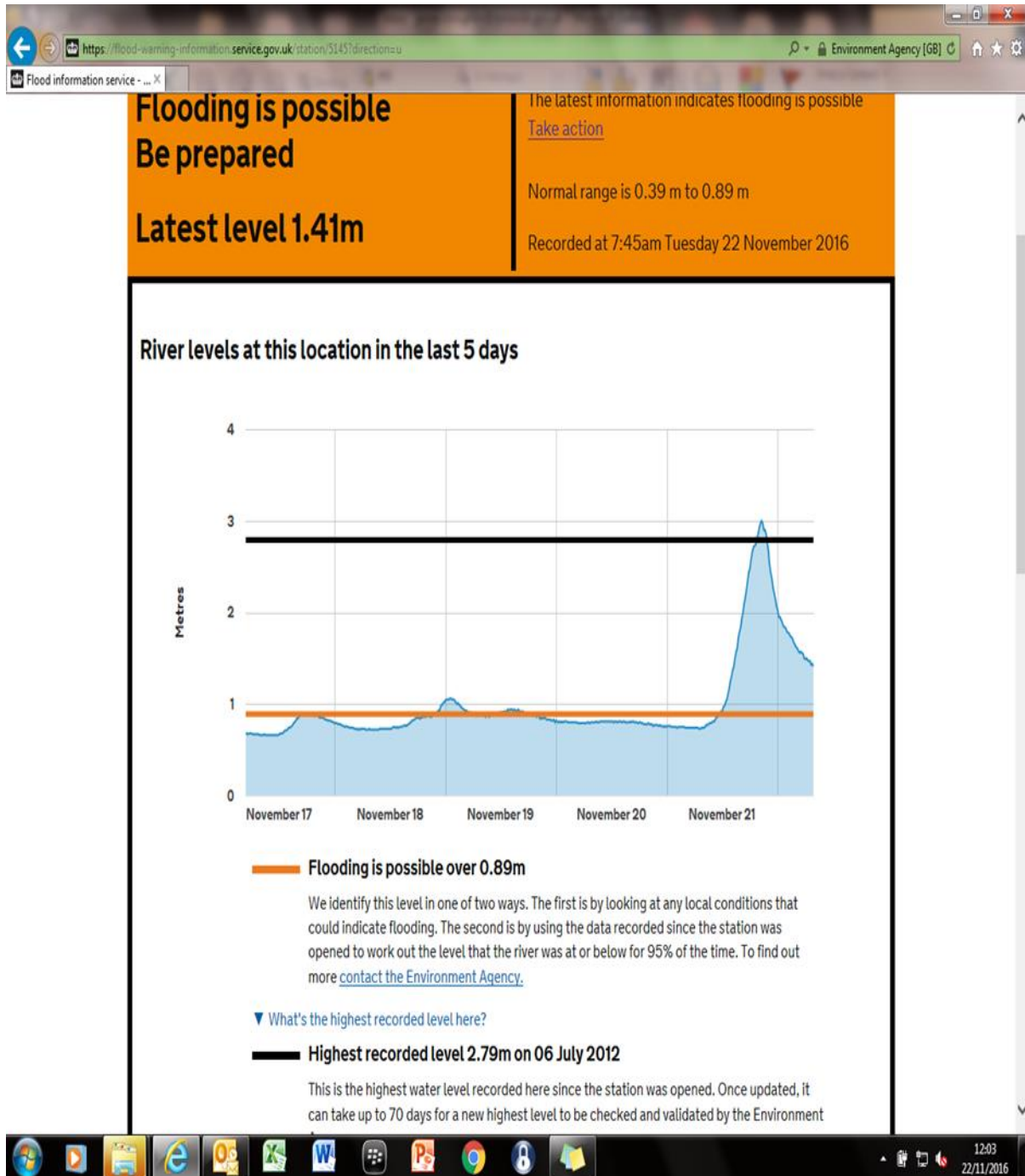


River Level Records

There are two monitoring locations in the vicinity, Waggon Road, Mossley and Tame Street, Stalybridge, which record river level data.

On the 21st November 2016, a peak level of 3.011m was recorded at 20.30 at Waggon Road, Mossley. This had quickly risen from 0.783m at 08.30 the same day.

Screen shot Waggon Road River Tame monitoring site, 17th – 22nd November 2016



At Tame Street, Stalybridge the river level rose from 0.67m at 08.30 on 21st November 2016 to a peak recording of 2.4m, recorded between 20.30 and 22.00.

2.3 Environment Agency Flood Alerts

Flood alerts and warnings from the EA are based on the severity of flooding expected with regards to rivers and coasts (see in the table below).

Flood Alert areas generally cover large areas (river catchment). Flood Warning areas are usually more detailed and broken down into specific locations.

Flood Warning Code	What It Means	When It's Used
Flood Alert	Flooding is possible. Be prepared.	Two hours to two days in advance of flooding.
Flood Warning	Flooding is expected. Immediate action required.	Half an hour to one day in advance of flooding.
Severe Flood Warning	Severe flooding. Danger to life.	When flooding poses a significant threat to life.

On the 21st November 2016, no flood warnings were issued for the Tameside area.

Some flood alerts were issued for the Middle Mersey and the River Etherow at Woolley Bridge.

Further information can be found at:

<https://www.gov.uk/government/publications/flood-warnings-what-they-are-and-what-to-do>

The EA will be targeting residents and businesses in flood affected areas to raise awareness of the flood alert system, with a view to increase the uptake of local residents signed up to receive warnings.

3 Detailed Locations

3.1 Demesne Drive area, Stalybridge

3.1.1 Site Overview and Flooding Impacts

Demesne Drive is located in Stalybridge, east Tameside with Hollingworth/ Broadbottom to the south east and Mossley to the north. Stocks Brook runs off Fern Bank and the moorland of Wild Bank Hill, behind Mottram Old Road and into an inlet structure to the rear of 109-115 Demesne Drive, Stalybridge.

A total of 21 properties were flooded internally, with four sets of residents displaced. Additionally, five properties were externally flooded. Residents were affected on Demesne Drive, Hawke Street, Honeysuckle Drive, Lindsay Street and Oxford Street.

3.1.2 RMA Responses

The following information has been collected regarding the RMA responses both during and following the November 2016 flooding event in the Demesne Drive area. However, the list is not necessarily comprehensive and may not cover all actions taken by the RMAs.

Prior to the flood event

TMBC –
inlet structure was cleared on 21st November 2016 prior to the flood event.

During the flood event

TMBC –
Emergency Call out attending and diverted part of flows into highway drainage system as the culvert inlet was assessed as being too dangerous to access during the flood.

Following the flood event

TMBC –
clean up (including cleaning highway drainage system and road sweeping)

TMBC -
cleared inlet structure grating to allow more flow through main culvert

TMBC/EA/UU -
organised Drop-in session at Stalybridge Civic Hall for affected residents

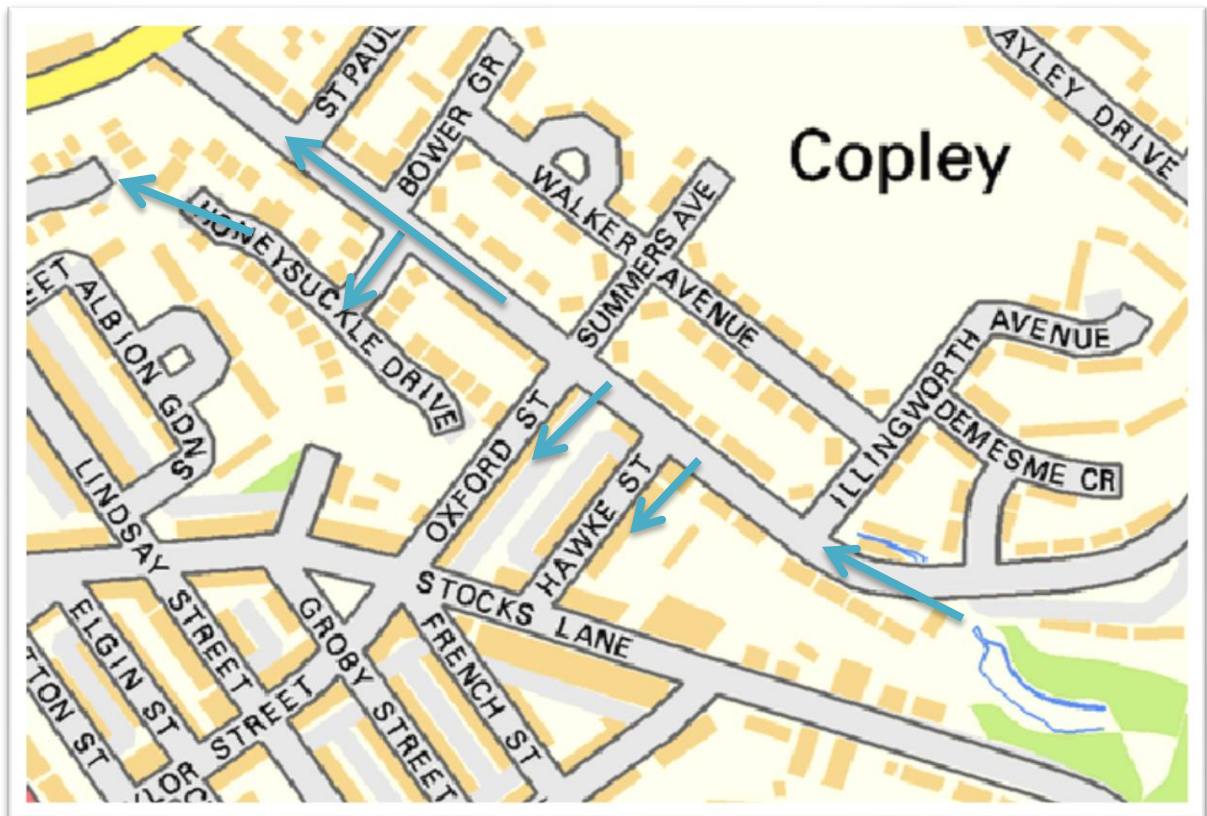
TMBC -
commissioned S19 report

TMBC/EA -
commenced GiA and future works discussions

TMBC -
met and discussed with staff from riparian owners with regards to drainage assets on the Stocks Brook for which they are responsible. Following our discussions they cleared the area around the brook course inlet and removed a large volume of sediment and debris from the brook between Demesne Close and Illingworth Avenue

TMBC -
enlarged the drainage openings along Demesne Drive to help to intercept rainfall and channel flows to the sewer system

EA/TMBC/UU
continue to liaise regarding this and other sites.



Plan showing flow of water

3.1.3 Recommended Actions

See Risk Management Authority recommended actions on page 29.

3.2 Highfield Gardens area, Hollingworth

3.2.1 Site Overview and Flooding Impacts

Highfield Gardens is situated south of Market Street, Hollingworth and Arrowscroft Way is to the rear of Highfield Gardens, on the outskirts of Tameside, near to the Derbyshire border. An unnamed watercourse runs off the hillside north of Thorncliffe Wood. It is culverted in sections and open in sections. It flows through Thorncliffe Wood, behind properties on Wood Street, under Market Street and to Highfield Gardens, it is then culverted until it outfalls at the side of a property on Arrowscroft Way. It is then culverted again until it outfalls into the River Etherow.

A total of 16 properties experienced flooding, with eight internally affected. Two residents were displaced on Arrowscroft Way. Properties on Thorncliffe Wood, Wood Street, Market Street and Highfield Gardens were affected.

An inlet structure to the rear of properties on Thorncliffe Wood was overwhelmed due to the amount of water flowing from the hillside. This brought debris with it, which in turn blocked the inlet grating and water surcharged to the surface and then along Wood Street before crossing Market Street and into Highfield Gardens.

3.2.2 RMA Responses

The following information has been collected regarding the RMA responses both during and following the November 2016 flooding event in the Highfield Gardens, area. However, the list is not necessarily comprehensive and may not cover all actions taken by the RMAs.

During the flood event

TMBC –
was not made aware of the incident until 22nd November 2016

Following the flood event

TMBC –
clean up (including cleaning highway drainage system and road sweeping)

HE-
on-site 22nd November 2017 to clean trunk road highway drainage

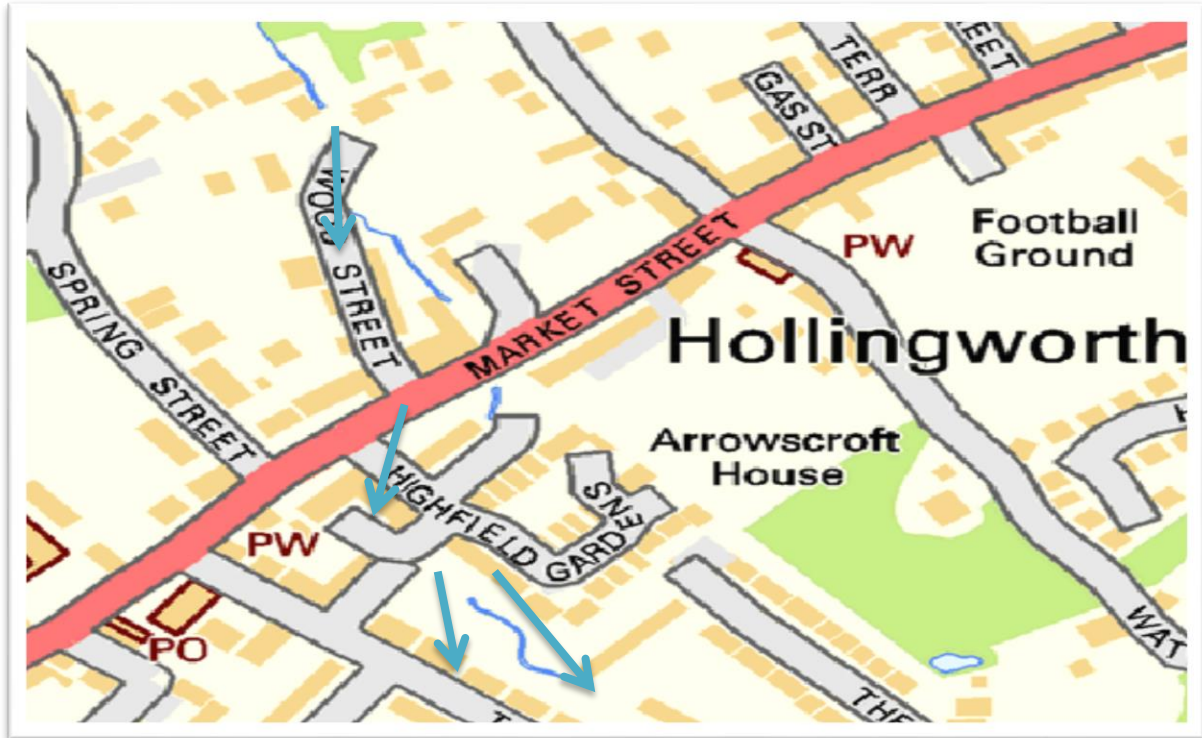
TMBC –
cleared inlet structure grating to allow more flow to enter culvert

TMBC/EA/UU -
organised Drop-in session at Stalybridge Civic Hall for affected residents

TMBC –
commissioned S19 report

TMBC/EA –
commenced GiA and future works discussions

EA/TMBC/UU
continue to liaise regarding this and other sites.



Plan showing flow of water

3.2.3 Recommended Actions

See Risk Management Authority recommended actions on page 29.

3.3 Huddersfield Road, Stalybridge

3.3.1 Site Overview and Flooding Impacts

Huddersfield Road is part of Tameside's 'Key Route Network'; it connects Stalybridge to Mossley and continues through the borough towards Oldham. The flooding incident took place at Huddersfield Road's junction with Grove Road, an area known locally as 'Ditchcroft'.

A line of reservoirs; Higher Swineshaw, Lower Swineshaw, Brushes and Walkerwood, run east to west to supply clean water. These reservoirs are owned and maintained by United Utilities Group plc.

West of the Walkerwood reservoir, a culverted stream runs under the Brushes Valley, part of the Stalybridge Country Park.

A culvert screen below Walkerwood Reservoir became blocked with debris following the heavy rainfall of the 21st November 2016. The water level increased and flowed over the parkland and onto Huddersfield Road. The properties are situated in a natural low point. Water washed through the houses, washing away a resident's drive and external boundary walls. UU cleared the inlet structure on the morning of the expected rainfall, then again within 48 hours of the event.

A total of two properties were flooded internally, both properties had extensive damage and residents were displaced as a result.

3.3.2. RMA Responses

The following information has been collected regarding the RMA responses both during and following the November 2016 flooding event on Huddersfield Road, however, the list is not necessarily comprehensive and may not cover all actions taken by the RMAs.

During the flood event

Emergency Services -
on site and evacuated residents

TMBC –
Call out operatives attended and closed roads

Following the flood event

TMBC –
met with UU to discuss flooding mechanism

TMBC -
clean up (including cleaning highway drainage system and road sweeping)

TMBC –

cleared inlet structure grating to allow more flow through main culvert and less into overflow system

TMBC/EA/UU -
organised Drop-in session at Stalybridge Civic Hall for affected residents

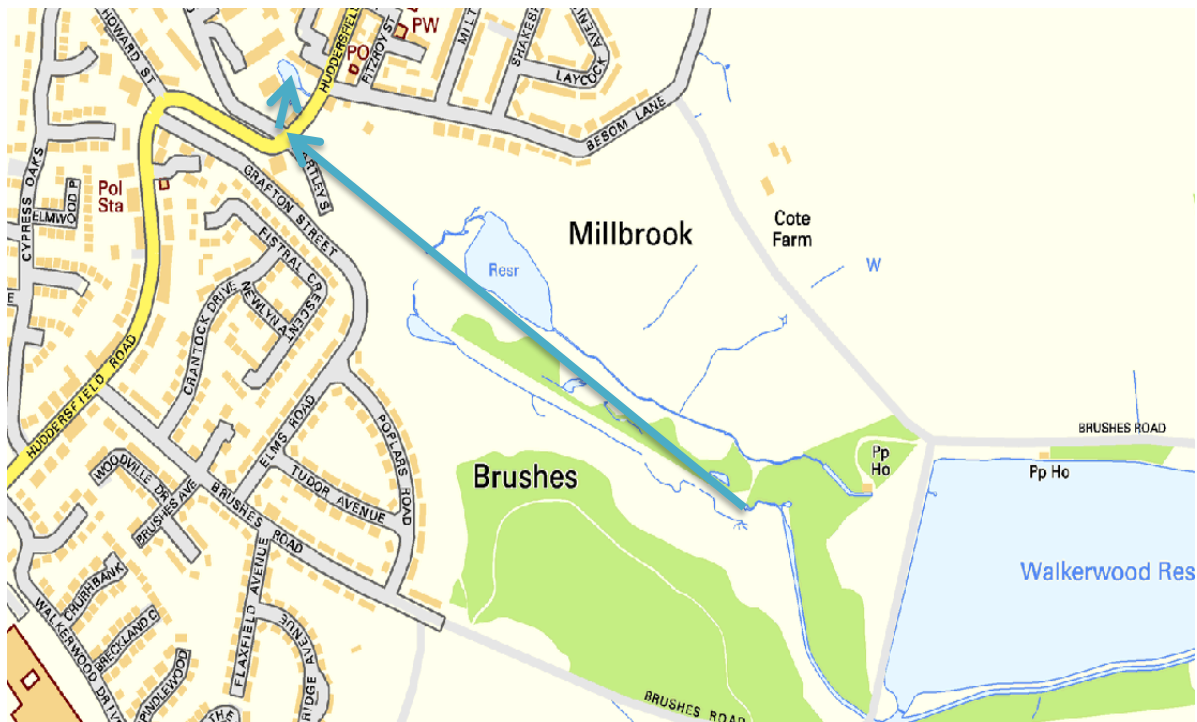
TMBC –
commissioned S19 report

TMBC/EA -
commenced GiA and future works discussions

EA/TMBC/UU
continue to liaise regarding this and other sites

TMBC –
installed temporary traffic lights with one lane remaining closed – building works

UU –
cleared inlet structure screen



3.3.3 Recommended Actions

See Risk Management Authority recommended actions on page 29.

3.4. Micklehurst Road, Mossley

3.4.1. Site Overview and Flooding Impacts

Micklehurst Road is situated in Mossley, located between Greenfield to the north and Stalybridge to the south. Staley Brook meets Micklehurst Brook and then flows parallel with Micklehurst Road in a westerly direction until it outfalls into the River Tame. The point at which the two streams meet has been classified as Main River by the EA and a large inlet structure and primary screen has been installed to both the top and bottom inlets. There is a reservoir to the rear of properties numbered 9-27 Micklehurst Road, which acts as an overflow system should the top inlet structure become blocked.

A total of 17 properties were reported to have flooded on Micklehurst Road and within the surrounding area on November 21st 2016. On Micklehurst Road, two residents were displaced following internal flooding and a further 15 properties also reported internal flooding. Properties were also flooded on Station Road and Waggon Road. A further 10 properties reported external flooding, including homes on Croft Row, Staley Road and Bottom Fold.

There were a number of issues identified which led to flooding in this area including;

- an inlet structure to the rear of properties on Earnshaw Close was overwhelmed and blocked due to the volume of water, and the debris within the flow.
- the intense flow in the Staley Brook resulted in the flow from the Micklehurst Brook, which joins the Staley Brook, being restricted. This in turn resulted in the Micklehurst Brook surcharging.
- the overflow reservoir near to 9-27 Micklehurst Road saw levels rise quickly with the additional flow and breached the banking at the rear of properties on Micklehurst Road.
- in addition, the overflow inlet structure for the reservoir was also overwhelmed with the flow of water and debris.

3.4.2. RMA Responses

The following information has been collected regarding the RMA responses both during and following the November 2016 flooding event on Micklehurst Road. However, the list is not necessarily comprehensive and may not cover all actions taken by the RMAs.

Prior to flood event

TMBC –
inlet structure was cleared on 21st November 2016, prior to the flood event

During the flood event

EA –

on site to assess impact and speak to residents

TMBC –

Call out officers attending and diverted flows of water into highway drainage system - culvert inlet was assessed as too dangerous to commence clearing during the flood event

Following the flood event

TMBC –

clean up (including cleaning highway drainage system and road sweeping)

TMBC –

cleared inlet structure grating to allow more flow through main culvert and less into overflow system

TMBC/EA/UU organised Drop in session at Stalybridge Civic Hall for affected residents

TMBC –

commissioned S19 report

EA/TMBC –

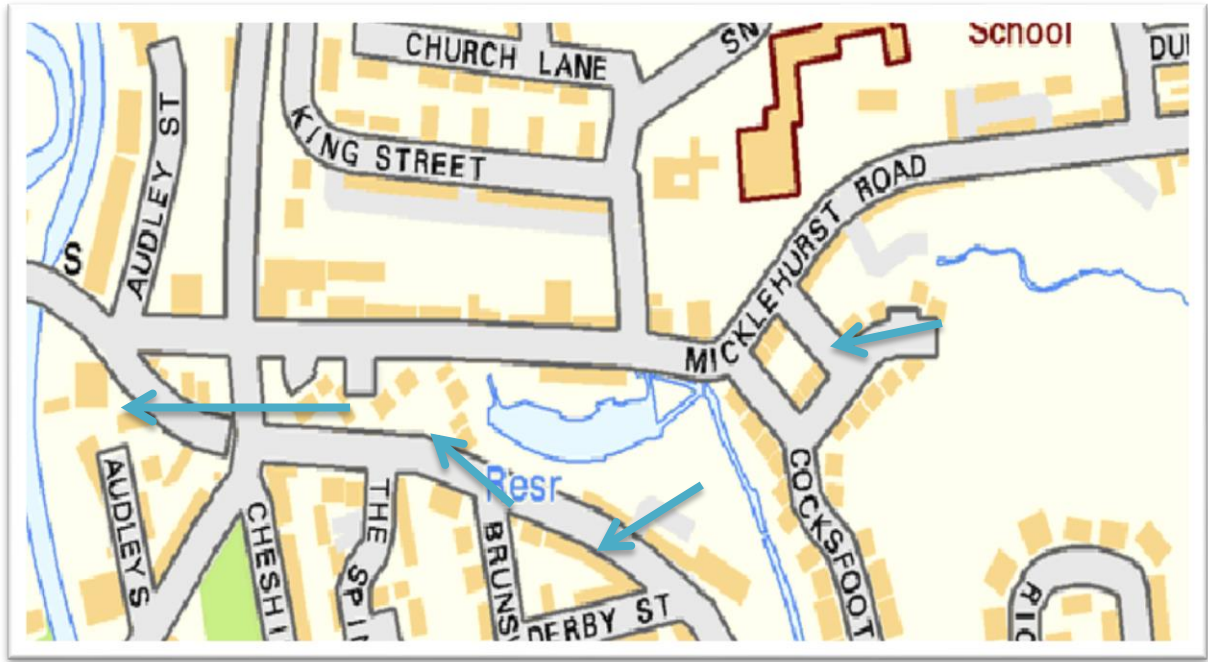
undertook extensive clearing / removal of debris from screen system

TMBC/EA –

commenced GiA and future works discussions

EA/TMBC/UU

continue to liaise regarding this and other sites



Plan showing flow of water

3.4.3 Recommended Actions

See Risk Management Authority recommended actions on page 29.

3.5. Tame Close, Stalybridge

3.5.1 Site Overview and Flooding Impacts

Tame Close is a cul-de-sac situated off Staley Hall Road, which is off Huddersfield Road, opposite to Copley High School, Stalybridge.

In total, five properties were flooded internally, with the occupants of one residential property being displaced. Surface water fell onto the nearby field, which, due to the topography, accumulated and flowed into the rear garden of a property on Tame Close then onto other properties. In addition to this, it is believed that surface water flows from Brushes Road and off the hillside continued onto the field to the rear of Tame Close and added to the issue.

3.5.2 Risk Management Authority Responses

The following information has been collected regarding the RMA responses both during and following the November 2016 flooding event on Tame Close. However, the list is not necessarily comprehensive and may not cover all actions taken by the RMAs.

During the flood event

TMBC –
not made aware of the issues on Tame Close until the following day

Following the flood event

TMBC –
clean up (including cleaning highway drainage system and road sweeping)

TMBC/EA/UU
organised Drop in session at Stalybridge Civic Hall for affected residents

TMBC –
commissioned S19 report

TMBC –
to liaise with landowner regarding adjoining field

EA/TMBC/UU -
continue to liaise regarding this and other sites



Plan showing flow of water

3.5.3 Recommended Actions

See Risk Management Authority recommended actions on page 29.

3.6. Town Centre Area, Stalybridge

3.6.1. Site Overview and Flooding Impacts

Stalybridge is located between Ashton-under-Lyne to the west and Hollingworth to the east. The River Tame runs directly through the town centre and most associated highway drainage connects into the river.

In total, four commercial properties were flooded internally following the heavy rainfall of 21st November 2016, three on Melbourne Street and one on Trinity Street, as the flow of water from Gallowsclough Road and Demesne Drive combined and then continued over highways, into the town centre.

The mechanism for flooding in Stalybridge Town Centre was a knock-on effect of flood waters from Mottram Road and Huddersfield Road combining and flowing over ground towards the River Tame in the town centre.

3.6.2. RMA Responses

The following information has been collected regarding the RMA responses both during and following the November 2016 flooding event in Stalybridge Town Centre. However, the list is not necessarily comprehensive and may not cover all actions taken by the RMAs.

During the flood event

TMBC –
Call out officers attended.

Greater Manchester Fire and Rescue Services -
attended and pumped the water into the river

TMBC –
road sweepers attended to clear leaf debris from the gully tops

Following the flood event

TMBC –
clean up (including cleaning highway drainage system and road sweeping)

TMBC –
cleared upstream inlet structure gratings to allow more flow through main culverts

TMBC/EA/UU –
organised Drop in session at Stalybridge Civic Hall for affected residents

TMBC –
commissioned S19 report



Plan showing flow of water

3.6.3 Recommended Actions

See Risk Management Authority recommended actions on page 29.

4. Infrastructure Impacts

Additionally, the following locations were also impacted –

4.1 Mottram Old Road, Stalybridge

Three properties on Mottram Old Road reported internal flooding on 21st November 2016. A blockage at the inlet structure for an unnamed watercourse under Mottram Old Road caused the watercourse to back up onto Mottram Old Road.

The blockage has since been cleared from the inlet by TMBC and the inlet has been added to our list of critical structures to be maintained more frequently and prior to forecast heavy rainfall.

4.2. Road Closures

Road Closure	Reason	Reopened
Huddersfield Road, Stalybridge	Surface water flooding	Temporary traffic signals in place - ongoing
Turner Lane, Ashton-under-Lyne	Blocked highway drainage	22 nd November 2016
Underwood Road, Hattersley	Blocked inlet structure, which in turn blocked highway drainage	22 nd November 2016

4.3 Albion Mill, Wednesough Green, Hollingworth

An inlet structure to the rear of Albion Mill became overwhelmed due to the flow from an unnamed watercourse. Surface water flowed into the parking area associated to Albion Mill, causing some water damage to vehicles. Tameside MBC has investigated this incident with a view to designating this inlet structure as a critical asset.

4.4 High Level and Other Routes

In addition to the locations discussed above, a number of routes were also affected that resulted in the requirement for immediate work, or closures pending funding becoming available for remediation works.

These included;

Hobson Moor Road / Dewsnap Lane, Stalybridge - Bridlepath

Gallowsclough Road, Stalybridge – Emergency carriageway resurfacing undertaken.

Grafton Street to Hartley Street, Stalybridge – footpath closed pending resurfacing.

Millbrow, Alt Hill Road to Dean Terrace, Ashton – Emergency carriageway repairs.

Section of the Tameside Trail 'Longdendale 04', Longdendale

Wheatfield to Reservoir Road, Stalybridge - Public footpath works

The cost of restoring these routes is estimated at c£500,000+. Enquiries have been made to the Department for Transport, and to date no funding has been confirmed with regards to this flood event.

5. Risk Management Authority Recommended Actions

Risk Management Authority	Recommended Action
Tameside MBC (Highways Department)	Continue to maintain efficient operation of non-trunk road highway drains
Highways England	Continue to maintain efficient operation of trunk road highway drains
Tameside MBC (Lead Local Flood Authority)	<p>Determine if 'Designation' of existing inlet structures is appropriate.</p> <p>In partnership with Environment Agency, determine GiA bid for future funding with regards to modernising and enlarging the inlet structures</p>
United Utilities	<p>Continue to maintain efficient operation of surface water and combined sewers as necessary</p> <p>Review maintenance regime for UU culvert gratings.</p>
Environment Agency	<p>Continue to ensure that 'main river' watercourses are suitably maintained</p> <p>Review trigger levels for Flood Alerts in this area</p>
Property Owners	<p>Register for flood alerts</p> <p>Consider Property Level Protection</p>

6. Conclusion

This report has been produced to document the findings of the Section 19 Investigation into the 21st November 2016 floods in Tameside. The main aims are to identify affected communities, determine why they were affected and to recommend actions to each RMA.

Since the event, there have been a number of meetings between technical officers from TMBC, United Utilities, the Environment Agency, also representatives of the Association of Greater Manchester Authorities (AGMA).

These meetings have added to the understanding of the weather event and its consequences with a view to help determine the scale and scope, and funding options to help increase resilience against any future weather extremes.

Intense rainfall fell on Wild Bank Hill over a short period during the afternoon and early evening of 21st November 2016. This intense rainfall in turn flowed off Wild Bank Hill causing localised flooding at a number of locations in the east of the borough. This affected a total of 80 properties across Hollingworth, Stalybridge and Mossley with roads closed in Ashton-under-Lyne, Stalybridge and Hattersley.

The key drivers for the 21st November 2016 flood event are considered to be –

- Intense rainfall within a short period of time in east Tameside and the local topography in the vicinity of Wild Bank Hill
- Inlet structures becoming overwhelmed and/or blocked as a result of the water volumes and debris wash-off.

Based on the analysis of the flooding events made in this report, actions have been recommended to each Risk Management Authority. The delivery of these actions will be dependent on the availability of funding and other RMA priorities.

7. Commitment

Whilst the elimination of future flood events and impacts cannot be guaranteed, Tameside MBC and other risk management authorities remain fully committed to ensuring that risks are minimised and resilience is enhanced wherever possible.

Regular RMA Partnership Meetings will be held to review progress and support individual and collective actions with respect to issues identified.