Section 19 Flood Investigation Report for Castle Point

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The Amendment Record below records the history and issue status of this document.

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Flood and Water Management Act 2010 Section 19 – Local Authorities: Investigations

This flood investigation has been prepared by BMT on behalf of Essex County Council as a Lead Local Flood Authority, which has a responsibility to record and report flood incidents as detailed within Section 19 of the Flood and Water Management Act 2010:

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 result of its investigation, and
   b) notify any relevant Risk Management Authorities.

Flood and Water Management Act (2010)

Contents

Introduction

This Section 19 report has been prepared by BMT on behalf of Essex County Council (ECC) as the Lead Local Flood Authority (LLFA) to investigate the flooding incident within Castle Point Borough on the 20th October 2021.

Background

The Flood and Water Management Act 2010 (the Act) and the Flood Risk Regulations in 2009 have established unitary and upper tier local authorities as LLFAs. Section 19 of the Act gives LLFAs the duty to investigate a flood event when considered appropriate and to record details of the responsible Risk Management Authority (RMA) and if any actions have been taken. This was commenced in April 2011. ECC is the LLFA for Castle Point and surrounding areas within Essex.

Before the commencement of the Section 19, the Environment Agency (EA) has investigated major flood events by assembling a Flood Reconnaissance Team. This has involved investigating flooding from all sources and involved recording the information on the Flood Reconnaissance Information System (FRIS) database. The majority of local authorities currently investigate minor flood events and land drainage issues where properties have been affected from surface water, ordinary watercourses, groundwater or where there are recurring problems. Surface water on the highways is investigated by the relevant Highway Authority.

As a Lead Local Flood Authority (LLFA), ECC is responsible for leading and coordinating the flood risk management within the County. This includes assessing and managing the risk of flooding from all sources, including surface water runoff, groundwater and ordinary watercourses,and their interactions.

Incidents of flooding in Essex County are investigated if they meet the following criteria:

- The internal flooding of a property on more than one occasion
  OR
- The internal flooding of five properties during a single flood incident
  AND
- If the source of the incident or who is responsible is unknown.

Risk Management Responsibilities

Table 1.1 indicates the responsibility areas of the parties involved in managing flood risk from different sources nationally. The LLFA for Castle Point follows this.

Table 1.1 RMA Responsibility Areas

Flood Source	Environment Agency	Lead Local Flood Authority	Water & Sewerage Company	Highways Authority
Main River	✓			
The Sea	✓			
Surface Water		✓		
Surface Water ***on or coming from the highway***				✓
Sewer Flooding			✓	
Ordinary Watercourse		✓		

Groundwater	✓			
Reservoirs	✓			

NB. Essex County Council is the LLFA for the local planning authority (LPA) administrative area of Castle Point. Anglian Water is the Water and Sewerage Company for Castle Point.

Key roles and responsibilities of the RMA and stakeholders within these areas are set out in table 1.2.

Table 1.2 RMA and Stakeholder Responsibilities

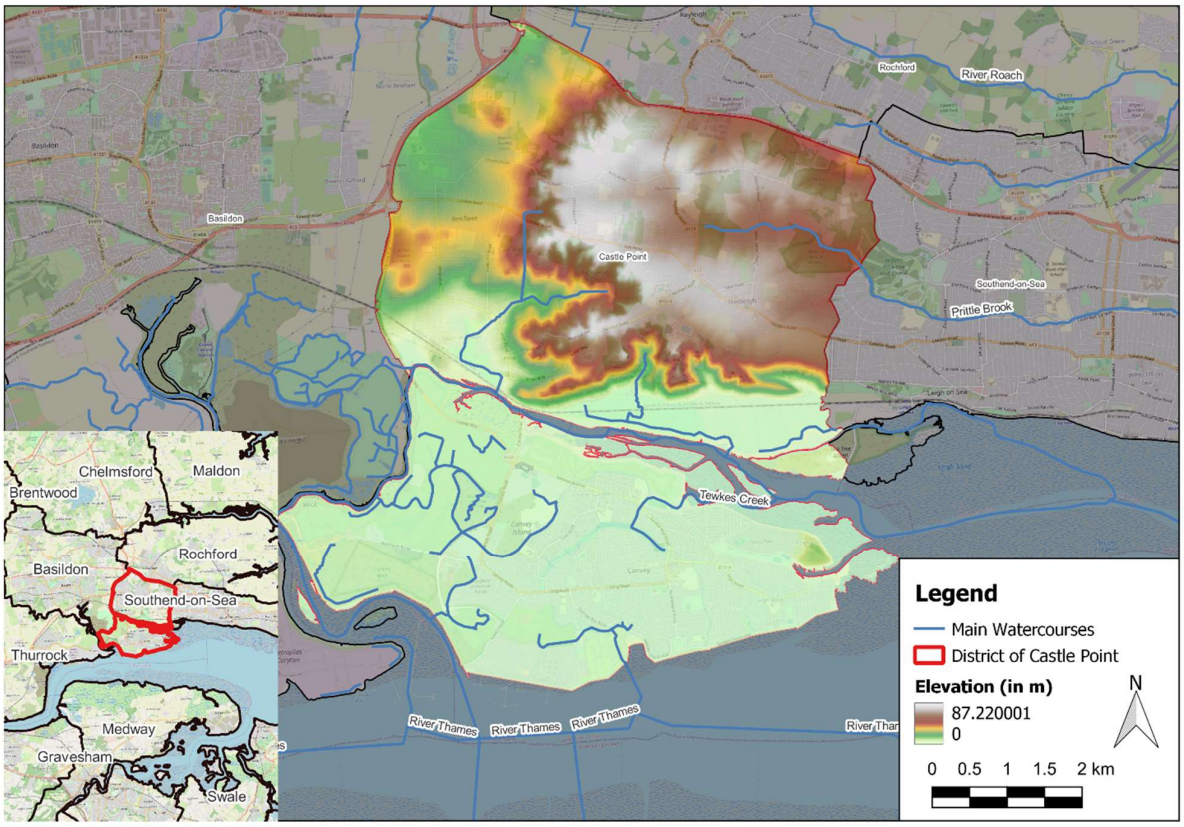
Risk Management Authority	Responsibilities
LLFA	• To ensure that the owners of land on which a culvert, watercourse or drainage system are present are aware of their responsibility to keep the feature clear and functioning effectively. • Facilitate sharing of information and collaboration between RMAs and the local community. • Consider using enforcement powers under Section 25 of the Land Drainage Act 1991 should landowners fail to maintain watercourses effectively. • Consider using enforcement powers under Section 24 of the Land Drainage Act 1991 should landowners fail to apply for consent to pipe a watercourse. • Record and inspect any significant drainage features identified on the site as part of the Flood Risk Asset Register required under Section 21 of the Flood and Water Management Act 2010.
Castle Point Borough Council	• Support the LLFA in raising awareness of riparian landowner responsibilities. • Continue to share information held on drainage layouts with all RMAs. • Continue to support local communities utilising available resources including LLFA grants such as for Property Flood Resilience (PFR). • Manage flood risk from Ordinary Watercourses as required under Section 14A Land Drainage Act 1991. • To ensure sustainable drainage measures on all new development to prevent increase in flood risk in line with National Planning Policy Framework.
Riparian Landowners	• Ensure that watercourses or culverts on, or adjacent to, their land are kept clear and free flowing. • Provide information to the LLFA on surface water drainage systems which may contribute to/from local infrastructure.
Residents / Business Owners	• Take measures to protect themselves and their property when flooding is imminent. The affected properties could install PFR using the grant issued by ECC. • Document and photograph flood incidents where possible, report flooding to CPBC or the LLFA.
Essex Highways	• Consider use of powers under Section 100 of The Highways Act 1980 to prevent surface water flowing onto the public highway and/or to properly drain the highway. • Continue to work in partnership with other RMAs, providing information and comments and funding when appropriate and to support hydraulic modelling work, the recommendations of which should address/consider the flood risk on the public highway. • Inspect and clear highway drainage in the area on a regular basis to reduce flood risk specifically those assets in the Warren Chase area of Thundersley including the junction with the A13. Any condition, rooting or blockage issues should be prioritised to ensure the network can operate at full capacity to minimise the risk of flooding.

	• Consider improvements to the highway drainage system, either by installing additional drainage infrastructure or improving the capacity of existing infrastructure.
Anglian Water	• Check and clear the adopted sections of sewer where necessary and where appropriate add to a planned preventative maintenance regime to reduce flood risk. • Inspect assets after the flood event to ensure no damage has been caused. • Look to reduce flood risk to those properties on their flood risk register.

Location

Castle Point is a low-lying district located on the border of Essex and shares a border with the districts of Basildon and Thurrock to the West, Rochford to the North and Southend-on-Sea to the East. It lies at the mouth of Hadleigh Ray and on the River Thames estuary and is therefore subject to tidal flooding mechanisms as well as fluvial and surface water.

Figure 1.1 Map of the Watercourses and elevation profile of Castle Point



Location of Critical Drainage Areas in Castle Point

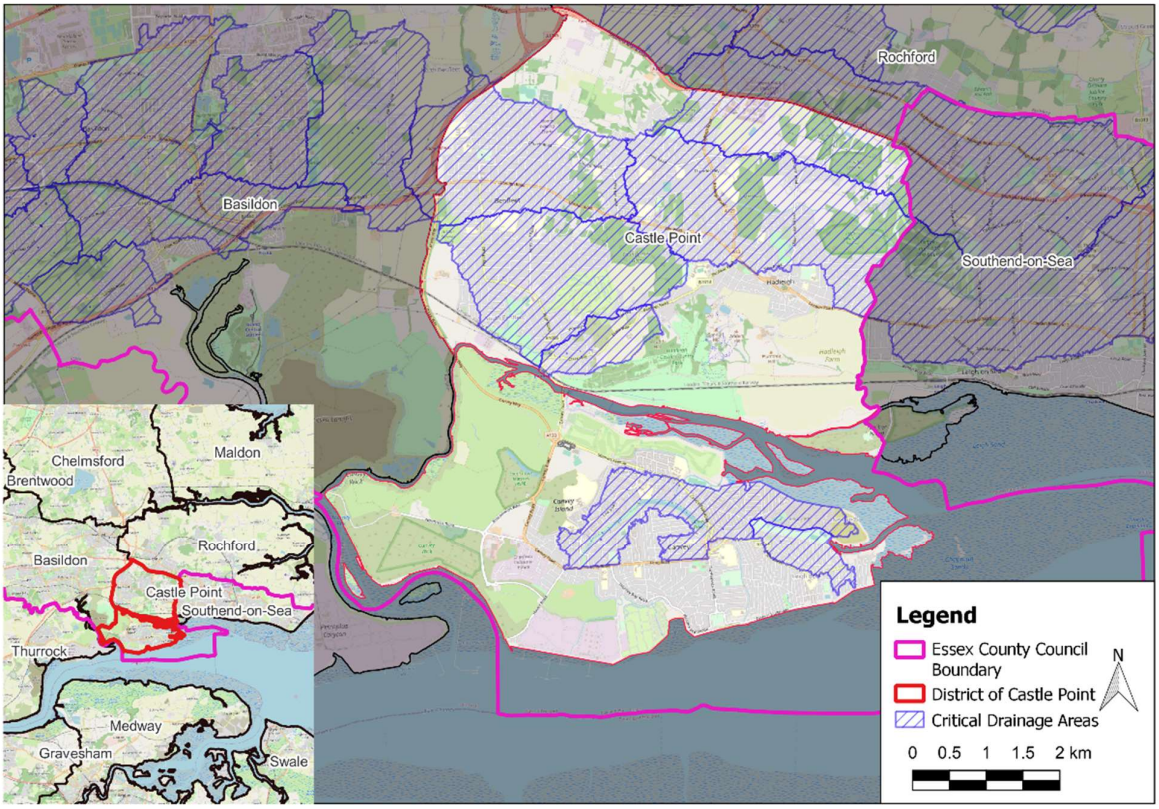
Using the Surface Water Management Plans ECC conducted over South Essex in April 2012, which examines flood sources including:

- Surface water drains,
- Groundwater, and

- Small watercourses

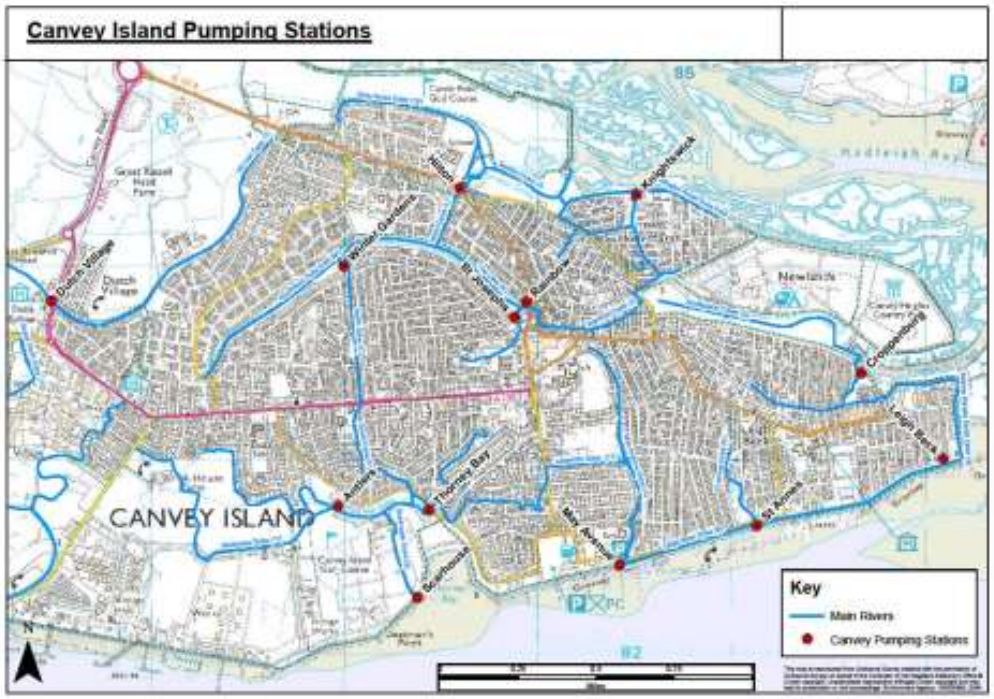
Several Critical Drainage Areas (CDA) have been identified across the County and within Castle Point (Figure 1.2).

Figure 1.2 Map of Critical Drainage Areas within Castle Point



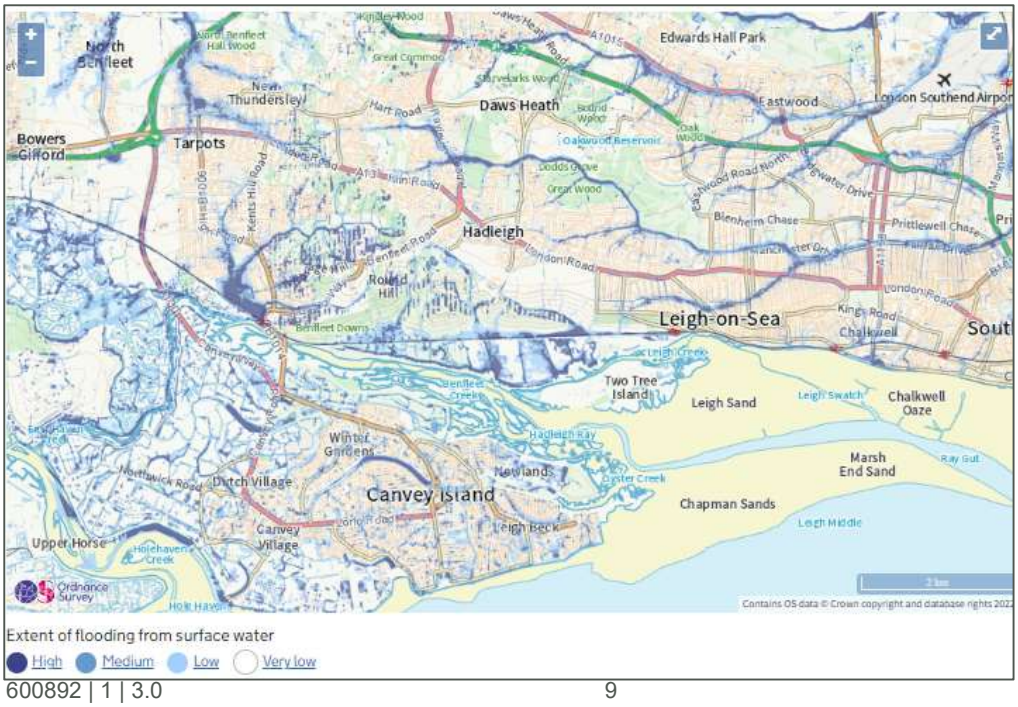
There are 8 pumping stations around Canvey Island that are designed to pump flood water out and direct them to the sea, since the area is an identified hot spot for flooding, (Figure 1.3). Additionally, a further 5 pumping stations are located to stop the water from stagnating in dry weather. Water can be moved between North and South of the Island through dykes and this can be useful when a pumping station is overwhelmed with water or should it have a malfunction. There is the possibility that these can become blocked from errant material, and adversely impacting the watercourse. Further information on the drainage network in the area covering Benfleet and Hadleigh has not been made available by Anglian Water and has therefore not been possible to summarise here.

Figure 1.3 Map of Canvey Island Pumping Stations



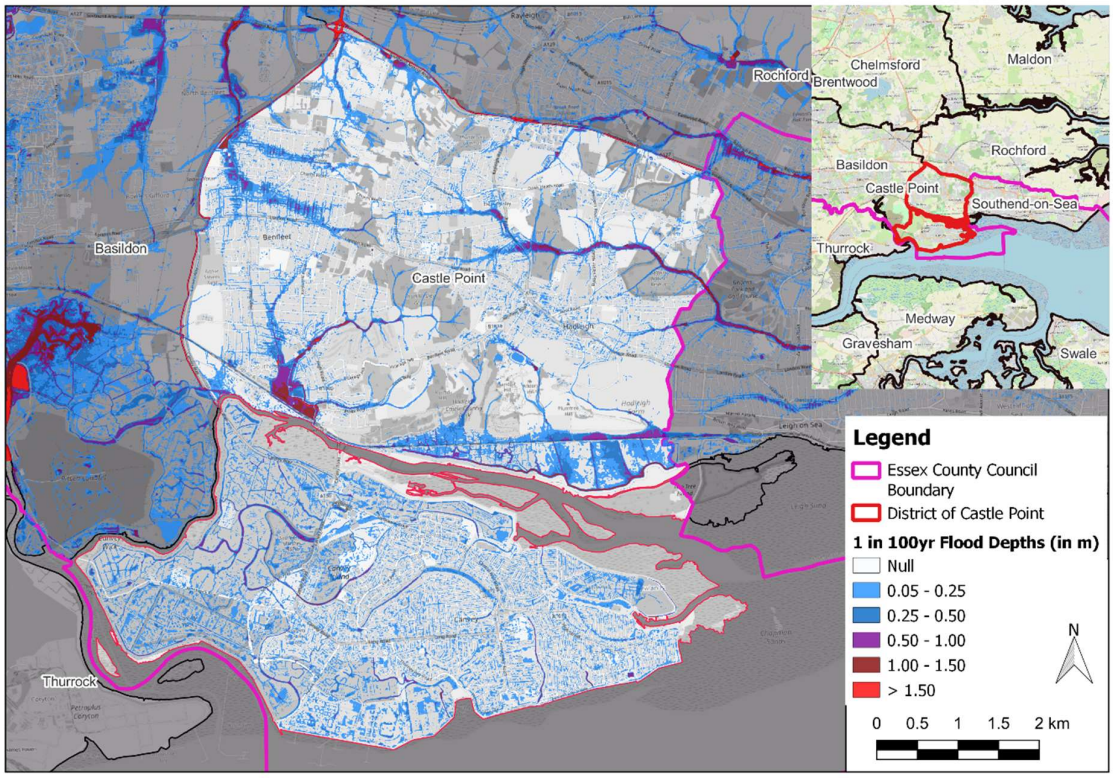
Castle Point is urbanised, especially on Canvey Island which is at high risk of flooding as seen on the nationally derived flood map from the EA (Figure 1.4).

Figure 1.4 EA National Surface Water Flood Risk Mapping



Detailed surface water hydraulic modelling was carried out for the South Essex area covering Benfleet and Hadleigh, in 2016. This modelling was carried out to update the South Essex Surface Water Management Plan and used the best available datasets and modelling methodologies available at the time, using the hydraulic modelling software TUFLOW. This modelling was simulated for five rainfall scenarios: 10% Annual Exceedance Probability (AEP), 5% AEP, 1.33% AEP, 1% AEP (Figure 1.5) and 0.5% AEP. Additional simulations were also carried out for the 1% AEP plus 20% and 40% climate change allowances for rainfall scenarios. This detailed surface water modelling carried out corroborates the EA national mapping, with greater accuracy and reliability.

Figure 1.5 Predicted surface water flood depths in the 1% AEP rainfall event



Historic Flood Incidents in the Area

Castle Point has two distinct areas: Benfleet/Hadleigh and Canvey Island. There are few historical flood events in Benfleet, however on the 14th of September 1968, there was a period of intense rainfall when over 150mm of rainfall fell over some parts of Essex causing widespread flooding in the Benfleet area. Historically, Canvey Island was a marsh and drainage of the estuary began in the 17th Century. Due to its low-lying topography and its proximity to the sea, it is subject to tidal influences. 'The Great Flood' occurred on the 31 January 1953, where over 60 people died, and many buildings were damaged. It was caused by an extreme extratropical cyclone that coincided with high spring tides which peaked at 3.35m above the average sea level and waves of over 4.9m were recorded. There were additionally no flood warning systems and the sea defences, where existed, were in a bad state of repair. Today, there is a sea wall that offers protection to the island and to avoid a repeat of 1953. As there are no hills on Canvey, drainage of water, especially flood water is very difficult. Since 2011, there have been 24 Flood Investigation Reports which originated from repeated and persistent flooding experienced by Essex residents. On the 20th of July 2014, a 1 in 316-year flood event occurred and caused somewhere between 600 & 1000 properties to be flooded. The cause of this flooding was multiple, ranging from temporary failure of the pumping stations and blockages of gullies as well as the sheer magnitude of rainfall. There has not been any more history of surface water flooding within the Borough made available for this report.

Flood Incident, Extent, and Impact

Storm Aurore came from France on the 20th October 2021 and swept over the east coast of England. It started at around 20:00 and lasted until 01:15 on the 21st October 2021. In total, over 50mm of rain fell across Benfleet captured by Benfleet Barrier gauge station and caused significant flooding within the Borough. There were many incidents where the gullies were unable to cope with the sheer magnitude of flooding and there is evidence of blockages within the gullies exacerbating the flooding. Canvey Island also experienced some flooding but was more significant in Benfleet. This event did, however, coincide with high tides, but the Environment Agency closed 17 flood gates prior to the event and a further 3 were closed afterwards.

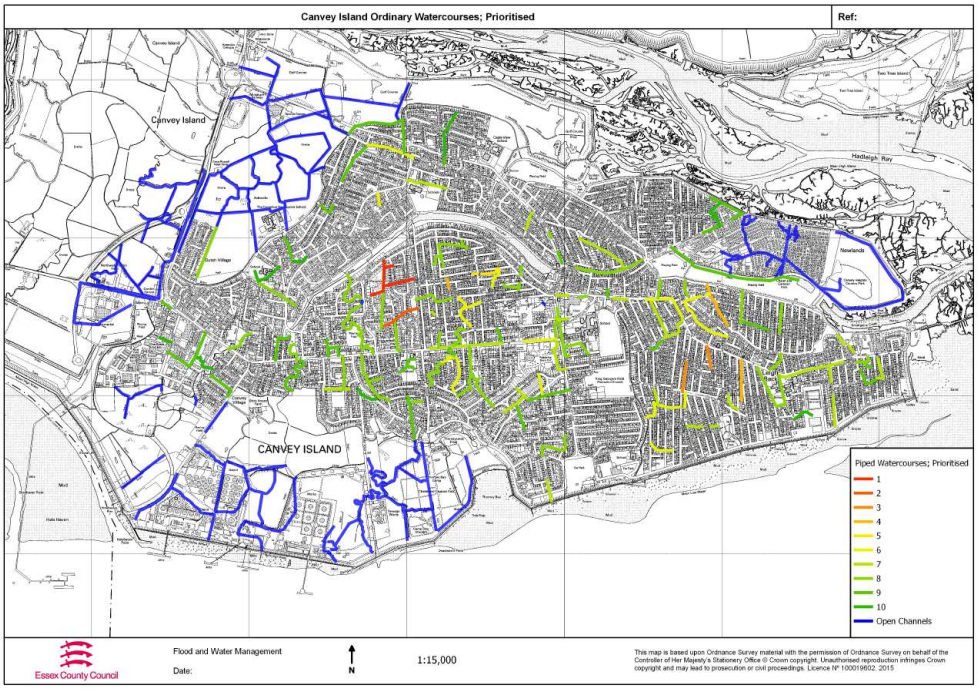
Evidence collected for Investigation

Pre event

Data within this section refers to information available in the lead up to the event on 21st October 2021. Anglian Water have been contacted by both BMT and ECC to provide further information on the flooding incident, however information from Anglian Water has not been provided to support this Section 19 report.

Essex County Council

Figure 1.6 Map of the Ordinary Watercourses with (focus on Canvey island due to lack of information and available for Benfleet and Hadleigh).

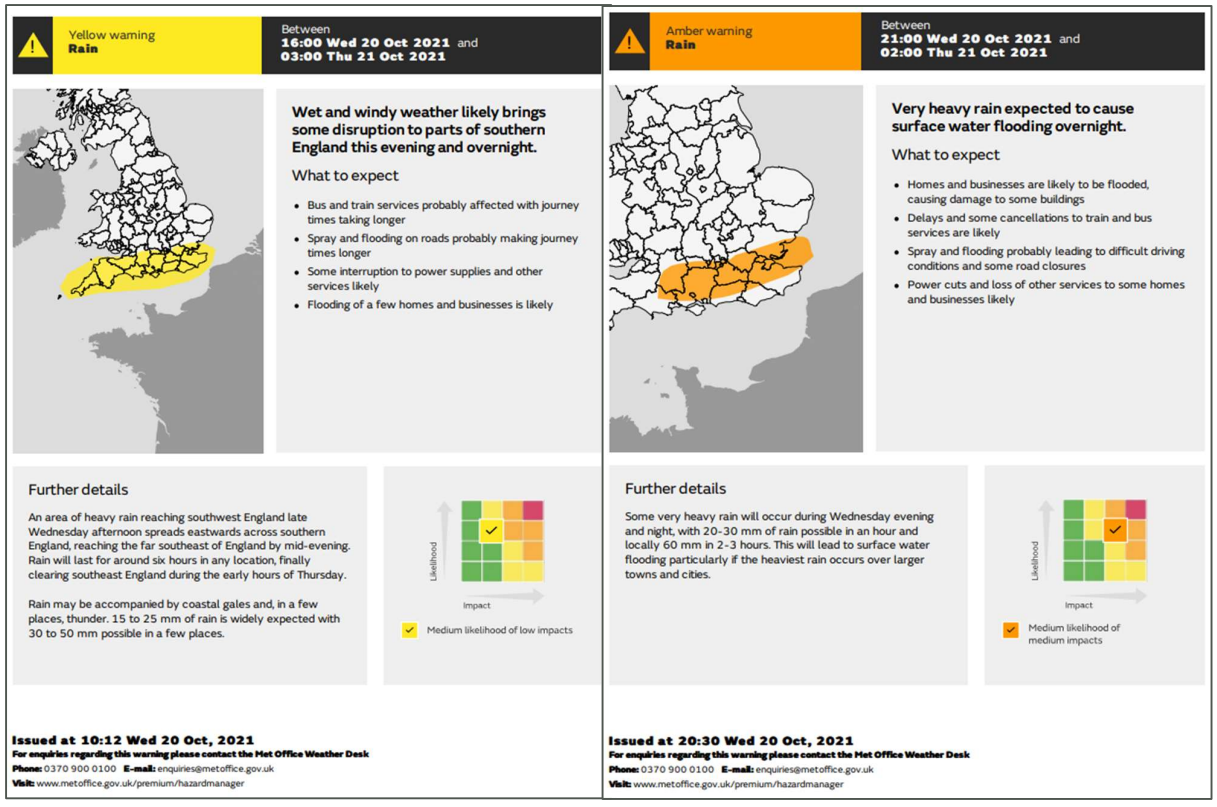


Canvey Island has a complex connected web of piped watercourses designed to help transfer water from the surface to the sea. Furthermore, priority is given to the watercourses closest to the main river channels to ensure conveyance of water is optimised during a rainfall event (Figure 1.6). Corresponding information for Benfleet and Hadleigh has not been provided by Anglian Water.

Met Office

The Met Office is the UK's official weather service, with a responsibility for issuing weather warnings in advance of severe weather events. Extracts from the Met Office are shown below. Two warnings were issued on the 20th October 2021. The initial warning was issued at 10:12 and the second at 20:30. (Figure 1.7). The forecast on Wednesday morning was for 35mm of rainfall, but much higher rainfall was experienced. The amber warning on Thursday was more accurate, which anticipated 20-30mm in 1 hour over Benfleet and up to 60mm over 3 hours.

Figure 1.7 Met Office Flood Warning on the 20th October 2021



It can be seen from the statements that there would be a likelihood of very heavy rain with the potential to cause surface water flooding to homes and business to the South Essex area, as well as other areas in the South and South-East of England.

Environment Agency

The EA issued 3 fluvial flood warnings on the 20th October 2021, however none for Castle Point. The EA also issued a flood alert at 10:24 on the 21st October 2021 from Leigh on Sea to and including Hadleigh Marshes and Two Tree Island which was removed at 17:49 on the same day.

The EA also closed tidal floodgates across their Thameside catchment area ahead of the following tides:

- 21/10/2021 00:30 – 4 floodgates
- 21/10/2021 13:00 – 13 floodgates
- 22/12/2021 01:00 – 3 floodgates

During Event

Data discussed within this section refers to occurrences during the event of 20th October 2021. It should be noted that Anglian Water have been approached for information relating to the drainage network during the event, however this has not been provided and has therefore not been covered within this section.

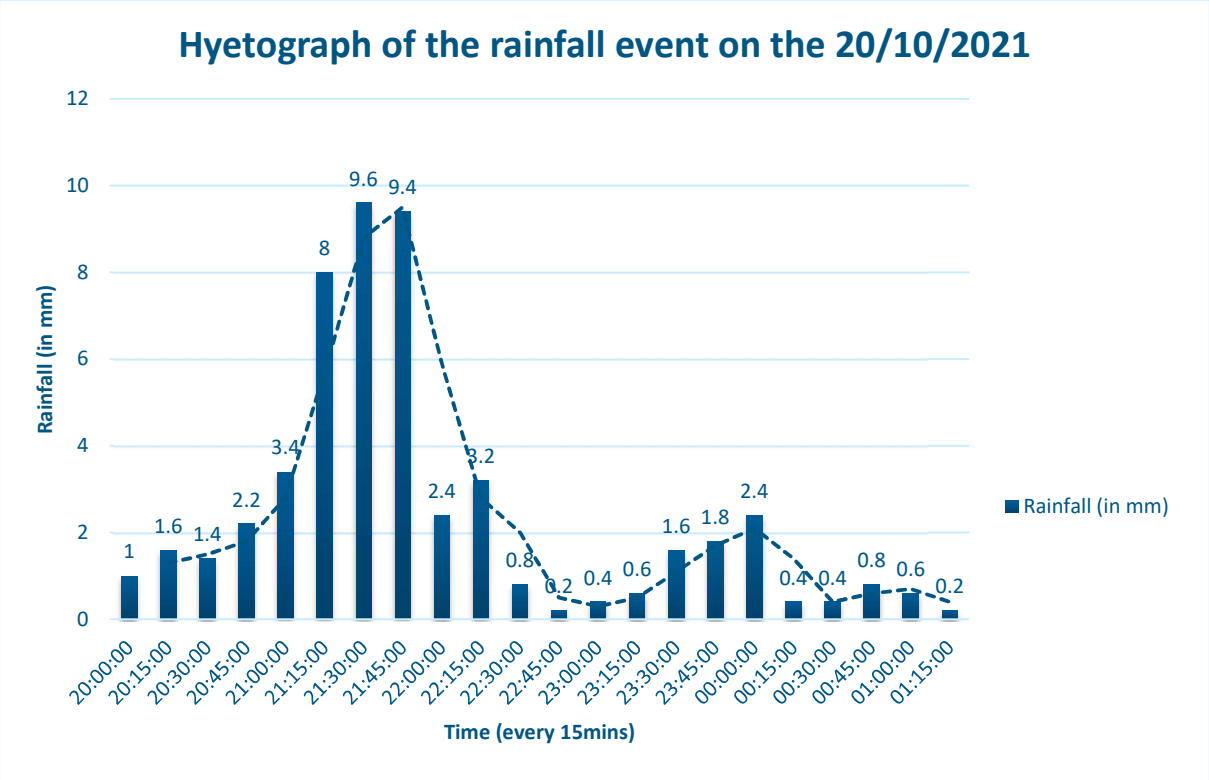
Environment Agency

The EA's local virtual incident room was open full time from 18:00 Wednesday on the 20th October 2021 until 17:00 Thursday with between 3 and 4 duty officers. In preparation for the forecasted high tides, the EA had doubled their normal standby field teams. This meant they had a 4 field team members providing 24/7 cover for their Thameside catchment area, with a further 12 team members on standby elsewhere in Essex which could have been deployed to Thameside if required to. However, this resource was not required. Furthermore, they had 2 of their Field MEICA team members on 24/7 standby. They deployed between 2 and 4 of their team members from approximately 19:00 20th October 2021 until approximately 04:30 on the 21st October 2021 and 1 of their MEICA team members. They were predominantly based on Canvey Island monitoring their pumping stations. They also liaised with Essex Fire & Rescue service to support their temporary pumping operations and to share details they had received from the public regarding potential for actual flooding. They did not deploy their team to the Benfleet area (except for manning their Benfleet tidal barrier at the aforementioned times)

Environment Agency Rainfall Data

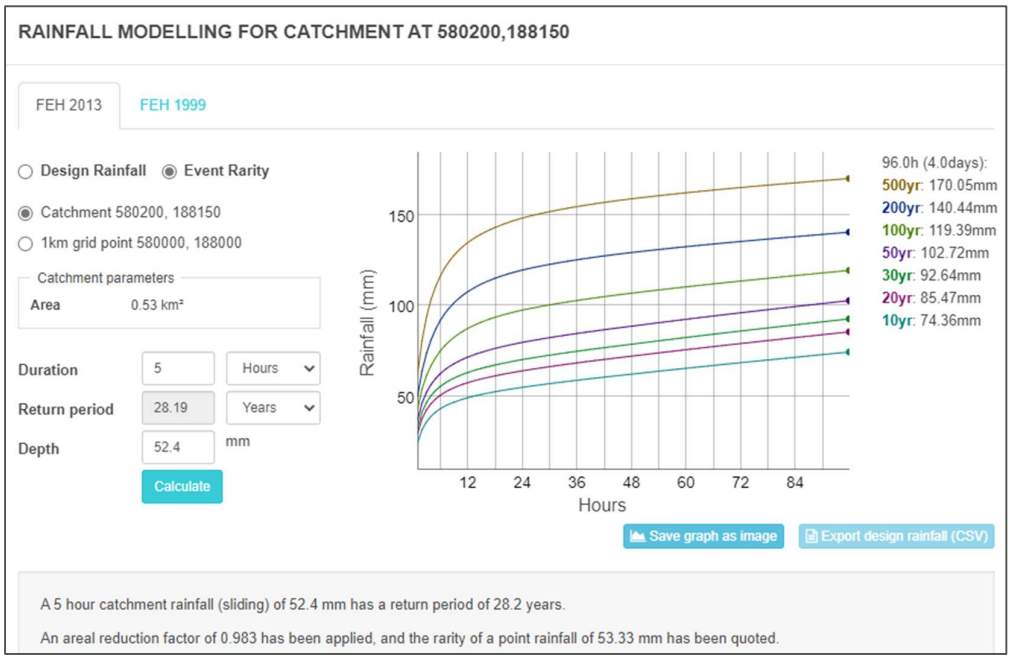
The Benfleet barrier rainfall gauge captured 52.4mm of rainfall over the course of the rainfall event between 20:00 on the 20th October 2021 and 01:15 on the 21st October 2021. The hyetograph in Figure 1.8 indicates the depth of rainfall that occurred during the event, with each bar representing the depth of rainfall recorded by the rain gauge within a 15-minute interval. The hyetographs shows that the period of greatest intensity rain was between 21:30 and 21:45 on the 20th October when 9.6mm of rain fell in the 15 minute interval.

Figure 1.8 Hyetograph of the rainfall event on the 20/10/2021



The rainfall event on the 20th October 2021 corresponds to a Return Period (RP) of 28.2 years as described by the Flood Estimation Handbook method as implemented in the FEH Web Service (Figure 1.9).

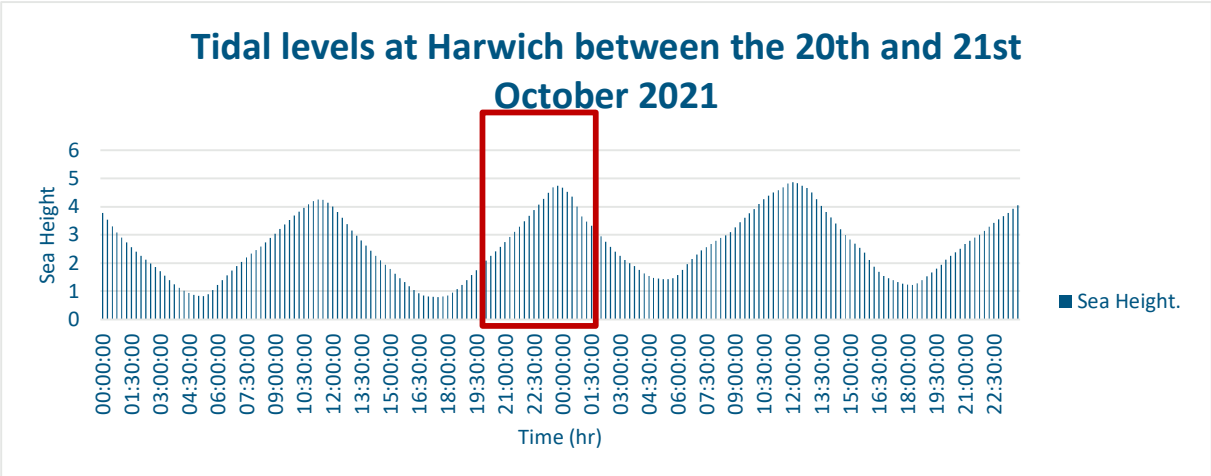
Figure 1.9 Return Period of the Rainfall event on the 20th October 2021 at Benfleet



British Oceanographic Data Centre (BODC)

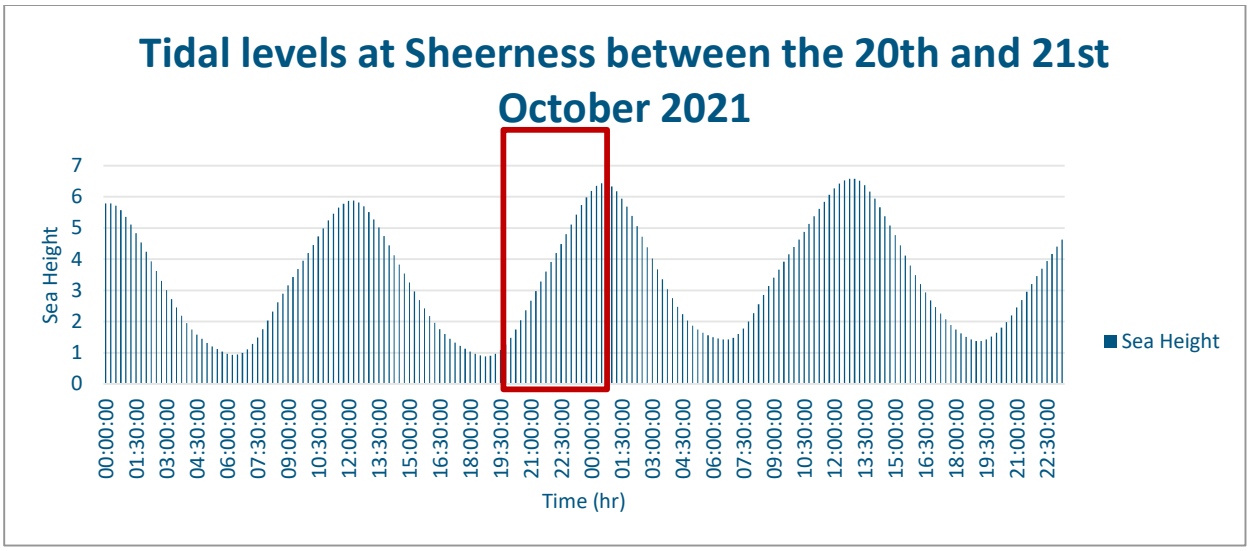
BODC recorded tidal data from the two closest tidal gauges at Harwich and Sheerness show tidal highs of between 2.08m and 4.74m during the event. (Figure 1.10). *Contains public sector information licensed under the Open Government Licence v3.0.*

Figure 1.10 Graph of the tidal gauge data on the 20th October to 21st October 2021 at Harwich



BODC recorded tidal data from Sheerness gauge show tidal highs of between 1.47m and 6.42m during the event. (Figure 1.11)

Figure 1.11 Graph of the tidal gauge data on the 20th of October to 21st October 2021 at Sheerness



Properties flooded

A list of identified properties have been compiled here (Table 1.3). This was created by cross-referencing locations reported to be flooded from Castle Point Borough Council, Essex Highways and ECC. Of particular importance is the underpass below Benfleet station as this road forms one of the main arteries in and out of Canvey Island (Figure 1.12). This is understood to have flooded due to failure of the pumping system, causing gridlock to the local area and buses were diverted for several hours.

Figure 1.12 Image of the flooding under the railway bridge at Benfleet Station

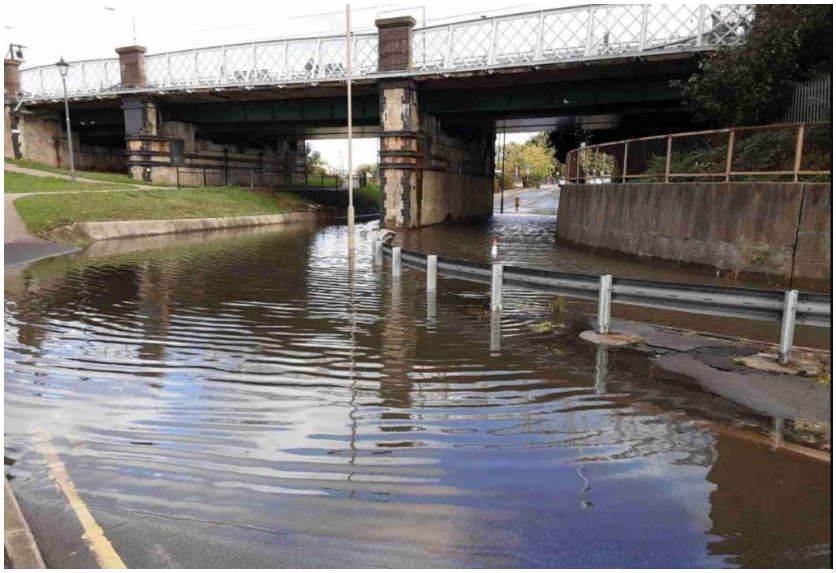
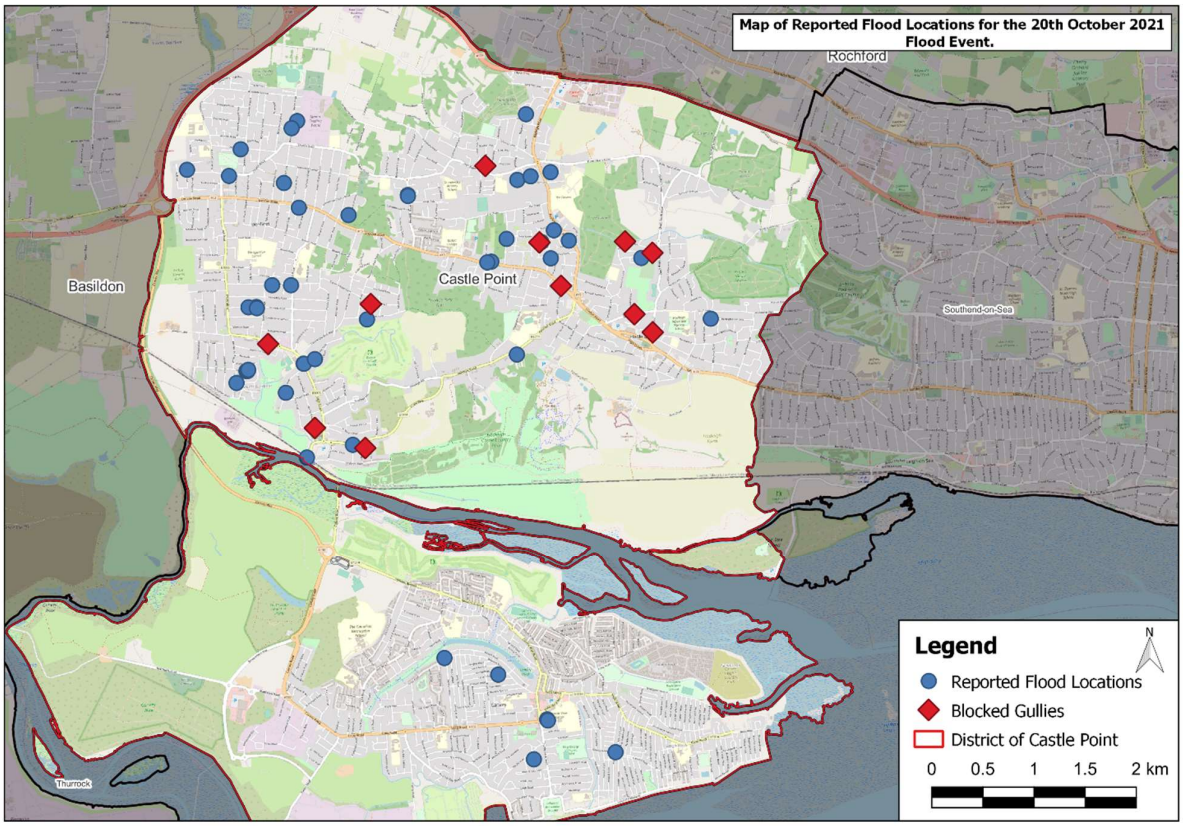


Table 1.3 Table of Flooded Roads and Properties

Roads and Properties affected
5, The Avenue, Canvey
50, Queensmere
44, Albert Road, Benfleet
72, Oakfields, Benfleet
39, Parkfields, Benfleet
8, Letzen Road, Canvey
54, Oakfield Road
33, Danesfield,
35, Danesfield SS7 5EE
37, Danesfield
10, Tollgate, Benfleet SS73UX
32, Underhill Road
6 Overton Drive
11, Swallow Drive
1 Crescent Road
76 Essex Way
8 The Oaks
13 The Oaks
37, Queensmere
74 Oakfields
290 London Road
292 London Road
17 Greenleas
53 Broomfield
29 Rhoda Road North
47 Kingshaws, Thundersley
139 Kiln Road
151 Rayleigh Road
3 Oak Road Canvey
59 Sandown
84 Denham Road
133 Kiln Road

Roads and Properties affected
12 Church Road
44 Kenneth Road
46 Kenneth Road (possibly 52 also)
Pizza Hut 225 High Road Benfleet
221 High Road Benfleet
5a Shrewsbury Drive
1 Oak Road
28 Rectory Road
339 High Road
270-276 Kiln Road
39 Queensmere Road
8 Queensmere Road
14 Alderleys
Junction of Manor Road and the Sorrels
14 Dalwood gardens
Benfleet Station Bridge
38 Westwood gardens
2-9 Hall Farm close
35 Manor Road
91 New Road
20 Fernlea Road
41B Brook Road
9 Eastleigh Road
175 Kents Hill Road
154 Manor Road
73 Burlington Gardens
153 Benfleet Road
89 Clifton Avenue

Figure 1.13 Map of Reported Flood Locations



The map of reported flood locations is not exhaustive of locations reported to have flooded, as some locations missed accurate geospatial information. Furthermore, there may be more flood locations, that have not been reported out of concern that the value of their property will decrease, or their insurance premium will rise. Blocked gullies were reported by both ECC and the Highway Agency and were verified independently in many cases by Highway Engineering Teams and Highway Asset Data Teams. Blocked gullies affected flooding on:

- Kiln Road,
- New Road,
- Rectory Road,
- Dalwood Gardens,
- Westwood Gardens,
- Fernlea Road,
- Eastleigh Road,
- Queensmere Road,
- Alderleys
- High Road,
- Hall Farm Close

Fire and Rescue Service (FIRE)

Following the amber weather warning from the Met Office, FIRE teams dealt with over 100 weather related incidents on the night of 20th October 2021. Many incidents required attendance of the FIRE teams to lead passengers to safety after vehicles becoming stuck in flood water as well as incidents involving internal flooding. FIRE reported significant flooding on Canvey Island. FIRE teams diverted floodwater

away from houses in Oakfield Road, Benfleet at 23:06 on the 20th October 2021. FIRE teams also prevented floodwater from entering a house at 23:28 on the 20th October 2021 in The Oaks, Benfleet, where they used a poly boom which acted like a wall to divert water away from the area. Furthermore, FIRE teams attended Canvey water pump for 3.5hrs at 12:07 on the 21st October 2021 working with the Environment Agency in Sommes Avenue using pumps to divert floodwater. FIRE reported attending 18 incidents in total in Benfleet between the 20th and 21st October 2021. The incidents occurred on the following roads;

- Benfleet Road
- Eversley Road
- Greenleas
- Hart Road
- High Road
- London Road
- Merrivale
- Oakfield Road
- Queensmere
- Rayleigh Road
- Rhoda Road North
- Saxon Way
- Shrewsbury Drive
- The Oaks

Summary of Accounts from Communities Affected

Several residents have raised concerns that flooding has been a recurring issue, especially around Saxon Way where overland water from the adjacent park flowed onto the street. Inadequate drainage was suspected to be the cause where the drains get regularly blocked from cut grass from the park, this is however a designated reservoir and therefore designed to hold and manage water. A further resident of London Road mentioned having called the Fire Brigade, but they did not respond, and they dealt with the damage themselves as did their elderly neighbours. Several residents also explained issues surrounding insurance unable to pay claims relating to flooding. A further resident who called up the Fire Brigade behind the Sorrells confirmed their house was the only house in their street that flooded, but that their house shared a fence with the trading estate, where it is alleged that blocked drains exacerbated overland flooding in and around that road. They mentioned having had to lift the lids of all the manholes around their property to prevent further flooding. However, it is worth noting that these are accounts from residents only and have therefore not always been possible to verify. Overall, it was reported that the community may have been unprepared for an event of this scale.

Post event

Data discussed within this section refers to information relating to after the event of 20th October 2021.

Essex Highways

There was evidence of blocked debris in pipework near Coombe Wood on Rhoda Road North and is likely to have exacerbated the flooding, especially around Downer Road area. Essex Highways also attended the clean-up of the following roads:

Table 1.4 Roads that were reported to have been attended by Essex Highways as part of the clean up operation

Roads affected
339 High Road
270-276 Kiln Road
39 Queensmere Road
8 Queensmere Road
14 Alderleys
Junction of Manor Road and the Sorrels
14 Dalwood Gardens
Benfleet Station Bridge
38 Westwood Gardens
2-9 Hall Farm Close
35 Manor Road
91 New Road
20 Fernlea Road
28 Rectory Road

Anglian Water

Anglian Water sent teams out to investigate flooding in 3 separate properties in Langdon Road and Daws Heath Road. Properties were noted to have flooded in rear gardens. They were all due to the sewage system being overwhelmed by surface water. Furthermore, Anglian Water attended blockages on Falcon Road and Eastwood Road.

Anglian Water have been contacted by both BMT and ECC to provide further information on the flooding incident, however information from Anglian Water has not been provided. The information requested, but not received, included:

- Anglian Water drainage network information, such as the network layout, pipe sizes, whether the system is separate or combined, if the system is tide locked etc.
- Information relating to how the system coped during the event such as if manholes were surcharged.
- Drainage network maintenance and clearing schedule in the area,
- Reports of properties and streets flooded in the area,
- Any anecdotal of evidence of flooding, descriptions of flooding mechanism and its impacts.
- Information relating to the clean up after the event.

News articles

The Echo News reported on flooding in Castle Point and corroborated that over 50mm of rainfall fell in Benfleet recorded by the EA. It reported that Canvey Island saw significant amount of flooding. It reported

that Firefighters from Basildon and Maldon used pumps to divert water away from several houses in Oakfield Road, Benfleet as well as from Canvey Island.

Mail plus reported on Storm Aurore leaving some areas underwater and stated Essex FIRE service received more than 120 calls by 2:30am regarding flood related incidents. It also warned of potential coastal and fluvial flood risk along the east coast the following days.

Metro news also corroborated that Essex FIRE service received more than 120 calls by 2:30am regarding flood related incidents. It also warned of more unsettled weather following the event.

Likely Cause of Flood Incident

The data collected and reviewed within this Section 19 report indicates that the flooding observed was a result of the significant amount rainfall that fell over the Benfleet and Hadleigh area within a very short space of time, therefore defined as surface water flooding.

Areas which have a large urban profile can have the potential to exacerbate existing surface water flood events as these tend to be 'flashy' and can overwhelm the drainage systems. Castle Point by nature is a largely urban area which has implications for increased surface water run-off. However, it should be noted that in line with national planning policy, developments are required to manage and attenuate surface water on site through the use of SuDS and other drainage features to mimic the natural processes of the catchment and match, and in some cases provide significant betterment, to the pre-existing condition.

Furthermore, there were reports of blockages in drains around several roads listed within this report which led to an increase of overland flow resulting in flooding. There has been limited information provided for this report on the Highway gully locations and where they drain to, and it is therefore difficult to draw any strong conclusions. It is possible that due to high tides, the surface water drainage network was tide locked, and therefore unable to drain out efficiently. However, due to the lack of data provided by Anglian Water, this has not been possible to confirm.

One of the eight pumps designed to transfer water around Canvey Island was temporarily out of action which may have exacerbated the flooding.

The rainfall event on the 20th October 2021 was noted to be a 1 in 28-year event by the flood estimation handbook (FEH) method. The urban drainage system would typically be designed to manage rainfall intensities up to 1 in 30-year rainfall event for more recent drainage systems, with older systems potentially providing a lower standard of service, but this was exacerbated by the urban nature of the catchment, where local drainage assets may have insufficient capacity to manager surface water from recent storm events effectively as well as blocked drains and a failed pump.

Conclusions

Heavy localised rainfall occurred on the 20th October generating flash flooding in Benfleet and Hadleigh and some localised flooding on Canvey Island. In total, over 50mm of rainfall as measured between 8pm on the 20th October and 1:15am on the 21st October. 32.8mm of rain was measured between 9pm and 10pm, which is likely to have overwhelmed the drainage system and resulted in flooding.

This event coincided with high tides, which might have caused an increase in flooding as a result of surcharging gullies by blocking the conveyance of overland flow through the drainage system and possibly due to tide locking within the Anglian Water drainage network, however this has not been possible to confirm.

Lack of maintenance is unlikely to be a significant contributor to the flooding, however Anglian Water has not responded to queries regarding this event and valuable information relating to the drainage capacity and conditions of the network has been omitted. Further details might be added to this Section 19 report upon receipt of more accurate information from Anglian Water.

This event was reported to be a 1-in 28-year flood event by the FEH estimation tools and the likelihood of an event of similar magnitude to occur in the future is predicted to increase with climate change.

Recommended Actions

Recommended actions are included herein to help the RMAs to work collaboratively and reduce likely impacts of future flood events (Table 1.5). ECC as the LLFA has a responsibility to coordinate the management of flood risk across the County and will monitor and support the completion of the necessary actions in a timely manner where resources allow

Table 1.5 Table of Recommended Actions

RMA	Recommended Action	Timescale
Essex Highways	Undertake review of gully clearance and operations.	6 Months
Essex Highways	Continue to work closely with ECC Flood Team through the day-to-day contact by the Asset Management Team and through attendance by the Asset Management Team at Flood Partnership Board meetings and Executive Officers Flood Group meetings.	Ongoing
LLFA	Review in to existing Local Flood Risk Management Strategy and Surface Water Management Plan including existing hydraulic modelling, and update where necessary, with a particular focus on increasing risk due to climate change. Focus should be given to key infrastructure such as Benfleet Railway Station.	Ongoing
LLFA	Calibration of existing hydraulic modelling to the latest flooding event to ensure modelling accuracy and reliability.	1 Year
LLFA	Explore potential for flood alleviation measures within the County and Benfleet/Hadleigh area, including but not limited to SuDS, attenuation measures, Natural flood management and Property Flood Resilience, seeking funding through appropriate sources where applicable.	1 Year
LLFA / EA	Encourage residents to sign up to the Environment Agency flood warning alerts via the EA website.	6 Months
Anglian Water	Consider and review need for further sustainable water management measurements, and where not possible to upgrade the existing drainage network including the possible need for a separate stormwater network in key areas, or provide additional storage for the tide lock scenario.	1 Year
LLFA / Anglian Water	Encourage collaboration between RMAs and Anglian Water to ensure flood incident records are obtained and shared appropriately.	3 Months
LLFA / LPA	Continue to work with RMAs to ensure all new development complies with Local and National Planning Policy and Technical Standards, including seeking strategic opportunities for betterment beyond the planning requirements, to alleviate surface water flood risk, such as storm water attenuation, SuDS etc.	Ongoing

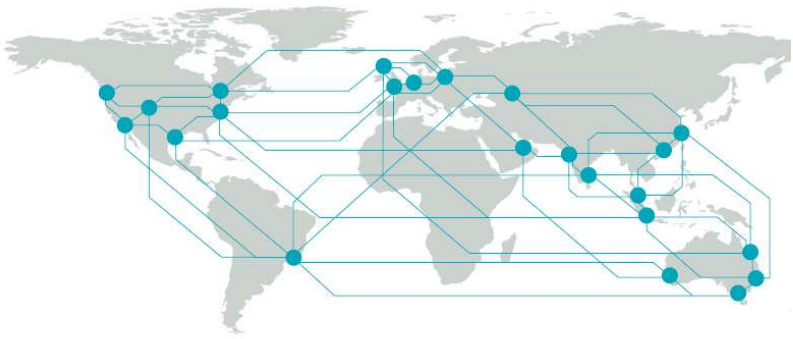
LLFA	Engage with National Flood Forum and other local flood action groups.	Ongoing
All RMAs	Review of procedure for obtaining accurate number and location of properties flooded during flood events to enable accurate recording of data, including encouragement of residents to report when their properties flood.	6 Months

Next Steps

The recommendations outlined within this report will be followed up by ECC as LLFA on a regular basis, to ensure the actions are carried out. This will be carried out in partnership with other RMAs named along with Local Communities, where relevant, to manage and mitigate ongoing surface water flood risk across the County.

Further liaison with Anglian Water will be caried out to ensure the significant gaps in data made available for this report are collected and can be assessed to ensure the Flood Investigation is comprehensive and maximise its value to Essex County Council and to the communities affected.

It is recognised that to address the complex issue of flood risk, multiple actions and approaches are required. For the recommendations to be effective, flood risk should be a key priority in all decision making across the County.



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