Public

West Sussex County Council
S19 Flood Investigation

Storm Kathleen - Littlehampton, April 2024

UK0029462.4168

April 2025

West Sussex County Council

S19 FLOOD INVESTIGATIONS

Storm Kathleen, April 2024

REPORT (VERSION1) PUBLIC

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EXECUTIVE SUMMARY

WSP UK Ltd. was commissioned by West Sussex County Council (WSCC), as the Lead Local Flood Authority (LLFA), to conduct a Section 19 Flood Investigation following flooding that occurred after Storm Kathleen, in April 2024. The area that experienced the most significant flooding, and therefore is investigated within this report, was Rope Walk, Littlehampton.

The flooding occurred late at night on the 8th of April 2024, and into the early morning of the 9th of April 2024, following Storm Kathleen and Storm Pierrick. Most of the flooding subsided with the ensuing low tide.

Rope Walk was affected by external flooding across the whole of the site, with flood depths varying but reaching a maximum of approximately 1.5m in places. Internal flooding affected commercial and residential properties on the east side of Rope Walk, with approximately 20 residential properties experiencing flood depths of approximately 500mm.

WSP has completed an investigation into the causes, mechanisms, consequences, and responses associated with the 2024 flood event. This has involved discussions with affected residents & business owners, site visits to the flooded areas, analysis of hydrology data, consultation with risk management authorities, and the review of photographic evidence.

The analysis of data from the National Network of Regional Coastal Monitoring Programmes confirmed that extreme high tides were experienced along the south coast of England at the time of flooding in Littlehampton. This caused the River Arun to overtop its defences adjacent to Rope Walk, and the sea to overtop defences at Climping Beach, both of which contributed towards flooding at Rope Walk.

The recommendations made at the end of this report range from property flood resilience measures to investigation into the viability of flood defence works along the River Arun. A series of location-specific recommendations has been produced which are intended to help mitigate against the impact of future flooding at Rope Walk.

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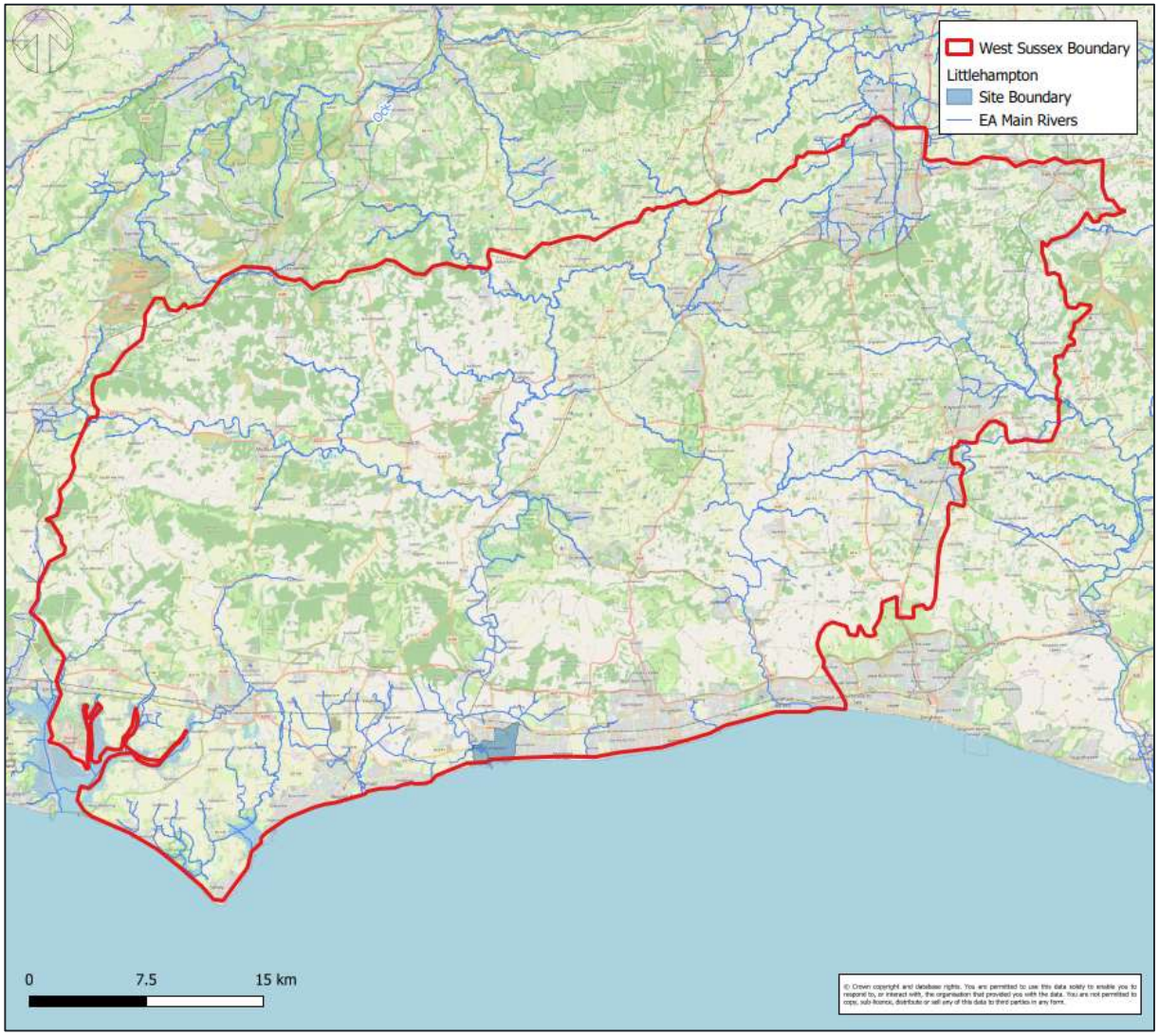
1 INTRODUCTION

1.1 BACKGROUND

1.1.1. WSP has been commissioned by West Sussex County Council to conduct a Section 19 Flood Investigation following flooding which was reported in Littlehampton in April 2024. Storm Kathleen occurred on the 6th of April until the 7th of April, resulting in widespread flooding. The flooding led to road closures and internal and external property flooding to residents and businesses.

1.1.2. The location under investigation is shown in Figure 1-1.

Figure 1-1 - Investigated Locations in West Sussex



1.1.3. West Sussex County Council has a responsibility under the Flood and Water Management Act 2010 (FWMA 2010) to undertake flooding investigations. Specifically, Section 19 states that:

'*1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate—*

a) *which risk management authorities have relevant flood risk management functions, and*

b) *whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.*

2) Where an authority carries out an investigation under subsection (1) it must—

a) *publish the results of its investigation, and*

b) *notify any relevant risk management authorities.*'

1.1.4. Table 1-1 and the figures in Appendix A show the location that was reported to West Sussex County Council as having experienced flooding caused by Storm Kathleen, and the number of properties that were affected.

Table 1-1 - Summary of Flooding in Littlehampton

Flood Location	Residential Properties Internally Flooded	Business Properties Internally Flooded	Road Closures
The Rope Walk development	~20	~16	2 – Rope Walk & Ferry Road

1.2 REPORT REQUIREMENTS

1.2.1. West Sussex County Council's 2013 Local Flood Risk Management Strategy states that:

- *"The* [section 19] *investigation must set out which risk management authority should lead the review, establish the reasons for the flood, and whether the response was appropriate. If flooding has occurred to more than ten properties in one incident, then a full investigation will be triggered. Depending on the circumstances of smaller flooding events, an initial investigation may still be required for flooding of less than ten properties."*

1.2.2. Due to the severity of the 2024 flood event, the threshold for a full section 19 Flood Investigation was triggered.

1.3 SITE VISITS

1.3.1. WSP staff carried out a site visit to Littlehampton on the 16th of October 2024 in the company of Arun District Council officers, residents & business owners, and members of the Rope Walk Flood Action Group, specifically visiting Rope Walk and Climping Beach.

1.3.2. The site visit was completed to assist in the identification and mapping of flooding sources, causes, flow routes, and consequences.

1.3.3. Photographs from the visit are provided in Appendix B.

1.4 LIMITATIONS

1.4.1. The information contained in this document has been compiled for the benefit of West Sussex County Council officers and contractors, Arun District Council, Parish Councils, Southern Water and the affected community.

1.4.2. It should be noted that much of the following record is dependent upon accounts of the flood events from West Sussex County Council officers, Arun District Council officers, residents, and business owners. Prior to taking any recommendations forward, a feasibility study should be undertaken to confirm the viability of any interventions.

2 FLOOD RISK MANAGEMENT ROLES AND RESPONSIBILITIES IN WEST SUSSEX

2.1 WEST SUSSEX COUNTY COUNCIL

2.1.1. Under the FWMA 2010, West Sussex County Council, as the Lead Local Flood Authority (LLFA):

- has a duty to coordinate the management of flood risk from local sources. This includes surface water, groundwater and ordinary watercourses;
- has a duty to investigate and publish reports on flood events (to the extent it considers it necessary);
- is responsible for compiling and maintaining a register of structures and features that have a significant effect on flood risk; and
- has responsibility for consenting and enforcement works to and adjacent to ordinary watercourses for works that obstruct flow, or affect an obstruction to flow, or works that affect the volume of water entering the watercourse.

2.1.2. West Sussex County 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.

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

2.1.4. West Sussex County Council have a Resilience and Emergencies Team that carries out statutory duties under the Civil Contingencies Act 2004. The team are members of the Sussex Resilience Forum (SRF) and under Part 1 of the Flood Plan, have the following roles and responsibilities:

Table 2-1 - West Sussex County Council Roles and Responsibilities within Sussex Flood Forum.

Pre-planning	• Contribute to applicable SRF emergency response plans as listed in Plan Concept section. • Manage own response plans. • May lead in development of surface water management plans. • Lead preliminary flood risk assessment.
Response During a Flood	• Alert voluntary organisations. • Maintain highway systems as appropriate. • Coordinate local authority response where more than one District / Borough is affected.

	• Initiate communication and activation of multi-agency. • Support rest centre arrangements. • Provide public heath advise as required.
Recovery / Post Event	• Lead recovery phase following widespread event. • Coordinate strategic level response where two or more Districts / Boroughs are affected. • Identify lessons to be addressed.

Source: Chichester District Council

2.2 ARUN DISTRICT COUNCIL

2.2.1. If a major flood event occurs in Arun, Arun District Council may be required to operate its Emergency Plan. Examples of what this may involve includes:

- working with the police, fire and rescue services, West Sussex County Council, Health organisations and the Environment Agency to co-ordinate responses;
- providing local advice to the public;
- setting up rest centres for people evacuated from their homes and arranging temporary shelters or accommodation.

2.2.2. Arun District Council, as the local authority, have land drainage byelaws which apply to works in, under or within 3m of an ordinary watercourse. The byelaws relate to the following:

- Main River and ordinary watercourse power,
- Roadside ditches,
- Riparian owners,
- Land drainage powers of Local Authorities,
- Enforcement action by Local Authorities,
- Environment Agency consent approvals,
- Biodiversity and ditch clearance, and
- Fences and access.

2.2.3. Refer to https://www.arun.gov.uk/byelaws for further information.

2.2.4. Under the Coast Protection Act 1949, Arun District Council as the coast protection authority, have the following powers:

- *'the power to carry out coast protection work, whether within or outside their area, as may appear to them to be necessary or expedient for the protection of any land in their area;*
- *may carry out coast protection work inside or outside the authority's area if Conditions 1 and 2 are satisfied:*
  - *Condition 1: The authority thinks the work desirable having regard to the national flood and coastal erosion risk management strategies under sections 7 and 8 of the Flood and Water Management Act 2010.*
  - *Condition 2: The purpose of the work is to manage a coastal erosion risk, within the meaning of Part 1 of the Flood and Water Management Act 2010, in the authority's area.*

- *may enter into an agreement with any other person for the carrying out by that person or by the authority, on such terms as to payment or otherwise as may be specified in the agreement, of any coast protection work which the authority have power to carry out under this Part of this Act;*
- *may acquire, whether by way of purchase, feu, lease or exchange, any land, whether within or outside their area, being land –*

    a) required by them for the purpose of carrying out thereon any coast protection work which they have power to carry out under this Part of this Act, or
    b) for the protection of which they propose to carry out any such work as aforesaid, not being work of maintenance or repair.'

2.3 ENVIRONMENT AGENCY

2.3.1. The Environment Agency has a duty to provide a national strategic overview of flooding. The Environment Agency is also responsible for managing flood risk from Main Rivers, reservoirs, estuaries, and the sea.

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

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

2.4 SOUTHERN WATER

2.4.1. Southern Water has responsibility for the public foul and surface water sewer systems in its ownership. Southern 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 the areas they serve are 'effectually drained'.

2.4.2. Southern Water must also maintain a register of flooding from sewers (DG5 register). The register records information which is used to apply for investment funds from Ofwat to undertake improvements or repairs to the foul and surface water networks. Investment is agreed with Ofwat on a five-year cycle referred to as an Asset Management Period (AMP). The current AMP runs from 2020-2025.

2.5 RIPARIAN OWNERS

2.5.1. Landowners are known as a 'Riparian Owner' if there is a watercourse within or adjacent to the property boundary. A watercourse can be any stream or water flowing in a defined channel or through an underground pipe or culvert. 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.

2.6 PROPERTY OWNERS

2.6.1. Responsibility for protecting property from flooding lies in the first instance with the property owner. Property owners whose home or business premises are in areas known to be at risk of flooding should consider making their own flood defence preparations. Property owners also have a

common law duty to mitigate their losses during a flood event, but without increasing the damage to neighbouring properties.

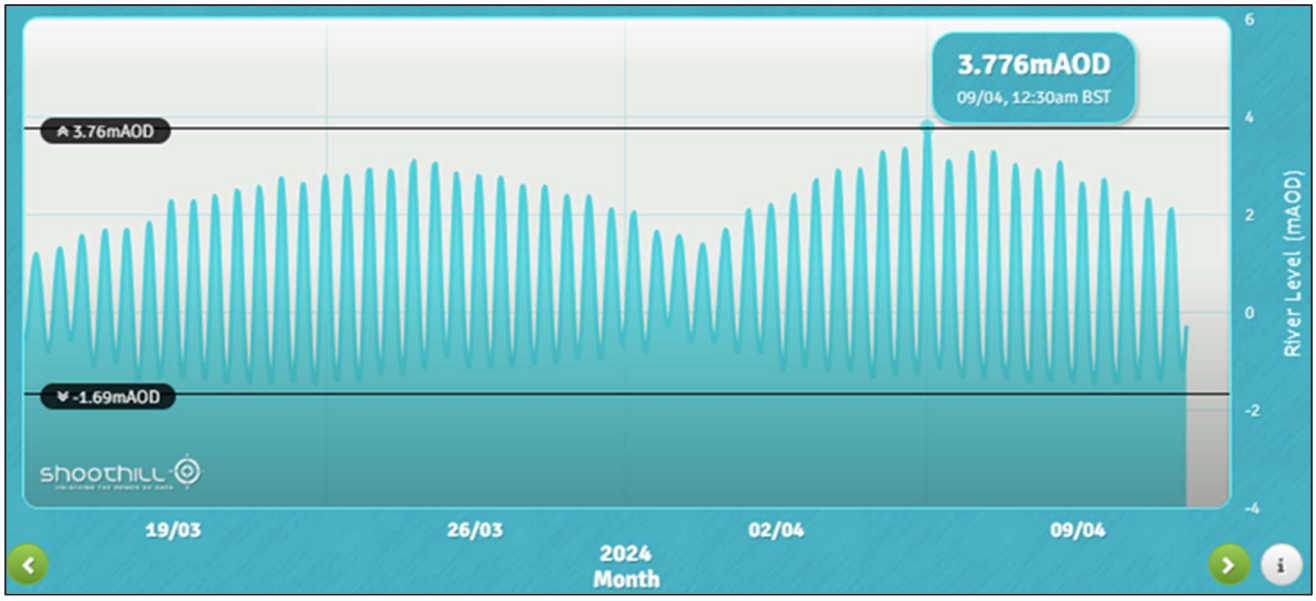
3 HYDROLOGY

3.1.1. On the 6th of April 2024, Storm Kathleen passed over the UK. Its deep area of low pressure resulted in windspeeds of 50 to 60 mph in the west of the country. Storm Kathleen was closely followed by Storm Pierrick – named by Météo-France, the French national weather service – which hit the south coast of England on the 8th – 9th April, with windspeeds of 65 mph along with torrential rain.

3.1.2. The Environment Agency (EA) stated that high tides along with gale force winds from Storm Pierrick caused "*potentially record high tides across the south coast*".

3.1.3. A review of the tidal data confirmed that high spring tides were experienced at the time of Storm Pierrick. Figure 3-1 uses data obtained from a gauge on the River Arun in Littlehampton. This gauge records a tidal level, measured from mean sea level rather than from the riverbed. The gauge recorded a peak tide level of 3.776m Above Ordnance Datum (AOD) at 00:30 on the 9th of April. According to the River Levels website (https://riverlevels.uk/arun-littlehampton), this level is 0.7 m higher than the peak of the typical range seen 90 percent of the time since records began in 1992. Furthermore, the highest level ever recorded at this gauge is 3.8 m AOD, meaning the event of the 8th – 9th April 2024 is one of the most severe the river gauge has experienced on record.

Figure 3-1 - The recorded river level at the tidal gauge on the River Arun in Littlehampton. It indicates a peak river level of 3.776 mAOD at 00:30 on the 9th of April 2024 (Obtained from Shoothill GaugeMap)



3.1.4. It is important to note that there is limited information available regarding the reliability of the river gauge. The gauge is owned, operated, and maintained by the Environment Agency, but the River Levels website states that no quality control is applied to its raw data. Therefore, caution should be applied when interpreting the data.

4 FLOOD INVESTIGATION

4.1 OVERVIEW

4.1.1. This section of the Flood Investigation Report (FIR) provides an assessment of the information received for the locations that experienced flooding; a review of the sources of flooding; the effect on the local area; and the response and / or actions preceding, during and following the flood events by the relevant flood risk management authorities.

4.1.2. Following the flood events, consultation with local residents in the form of a questionnaire was undertaken. However, no responses were received that are relevant to Rope Walk, Littlehampton.

4.1.3. Consultation was also undertaken with flood risk management authorities including the Environment Agency, Southern Water, Arun District Council, and West Sussex County Council. Refer to Appendix D for copies of this correspondence.

4.2 INTRODUCTION & PREVIOUS FLOODING

4.2.1. Littlehampton is a coastal town located in the south of West Sussex and falls under Arun District Council. During the 2024 flood event Rope Walk was significantly affected by flooding and is therefore investigated within this report. Rope Walk is occupied by housing and industrial units and is located on the west bank of the River Arun, in the west of Littlehampton. Refer to Figure 4-1.

4.2.2. Rope Walk Ditch flows along the back of properties on the west of Rope Walk and joins Ryebank Rife prior to discharging into the River Arun at low tide.

4.2.3. According to the Environment Agency's recorded flood outlines and historic flood map, Rope Walk has not flooded previously. However, residents of Rope Walk reported that Ferry Road had flooded several times before, often creating an access issue for residents at Rope Walk.

Figure 4-1 - Littlehampton Location Map

4.3 2024 FLOODING

4.3.1. From interviews with residents and business owners at Rope Walk, it is understood that flooding began just before midnight on the 8th of April 2024. The flooding occurred two days after Storm Kathleen, which caused heavy rainfall, and during Storm Pierrick, which caused a strong tidal surge.

4.3.2. Tidal floodwater overtopped the defences along the west bank of the River Arun adjacent to, and causing direct flooding of, Rope Walk, and seawater overtopped the coastal defences at Climping beach, which is located approximately 800m to the south of Rope Walk, causing flooding and inundation of the ditch network draining Rope Walk.

4.3.3. It was reported that groundwater flooding also occurred during the flood event. Business owners remarked that groundwater flooding occurred approximately two hours after high tide and caused internal flood depths of approximately 50mm. However, the primary source of flooding was from tidal sources.

4.3.4. In the flood warning sent by the Environment Agency on the 8th of April, a morning high tide of 6.75m Chart Datum (CD) was predicted but the actual high tide was 7.1m CD. This caused floodwaters to

overtop the River Arun defences, and demountable flood barriers installed after the 2012 flood event. Residents reported that flooding ingress was rapid and started before high tide, but it also subsided quickly.

4.3.5. External flooding occurred across the whole of Rope Walk. During WSP's site visit to Rope Walk, it was reported that approximately 20 residential properties along the east side of Rope Walk were flooded internally to depths of approximately 500mm. Commercial properties along the east side of Rope Walk also experienced similar internal flood depths. Residential properties on the west side of Rope Walk experienced external flooding but no internal flooding. Peak flood depths across Rope Walk in general were reported to be approximately 1.5m.

4.3.6. An emergency evacuation was carried out through the night by the fire brigade and other emergency services (refer to Figure 4-2). Due to flooding on Ferry Road, residents of Rope Walk were evacuated using the footbridge that crosses the River Arun. This was complicated due to nighttime conditions and the lack of light after a substation at the end of Rope Walk was flooded out. Flooding also put an SSE pumping station in Rope Walk out of service.

Figure 4-2 - Flooding at Rope Walk

(Source: https://www.sussexexpress.co.uk/news/storm-kathleen-flooding-chaos-in-sussex-after-river-arun-bursts-its-banks-and-holiday-park-evacuated-4584019 (online))

4.3.7. Both flooding from Climping Beach and the River Arun occurred in areas identified as Flood Zone 3, as indicated on the Environment Agency's Flood Map for Planning (refer to Appendix E). When considering flood defences, the Environment Agency's long-term flood maps report that most of the flooded area is at a high risk of flooding from rivers and seas; however, a small section in the north of Rope Walk is classed as a medium risk. Refer to Appendix A, which details the locations of the flooded areas.

5 CAUSES

5.1 INTRODUCTION

5.1.1. Storm Kathleen and Storm Pierrick were the most significant causes of the 2024 flood event but other factors contributed.

5.2 STORM KATHLEEN & STORM PIERRICK

5.2.1. Storm Kathleen was the 11th Met Office named storm of the 2023/24 storm season and occurred on the 6th and 7th of April 2024. The storm caused a period of prolonged heavy rainfall and high winds. Furthermore, on approximately the 8th and 9th of April the French named storm, Storm Pierrick, caused further strong winds, large waves, and coincided with one of the highest tides of the year. This caused the River Arun to overtop its banks and defences in several places along its west bank, and flood into Rope Walk.

5.3 DITCH DRAINAGE NETWORK

5.3.1. In April 2024, Rope Walk Ditch and Ryebank Rife both filled with floodwater from the River Arun overtopping and coastal overtopping at Climping Beach. This meant the ditches could not effectively convey floodwater away from Rope Walk. In addition, Rope Walk Ditch discharges into the Ryebank Rife which discharges into the River Arun. Ryebank Rife can only discharge into the River Arun once the tide has sufficiently receded, meaning floodwater could not be discharged until the tidal surge had passed.

5.3.2. Members of Arun District Council and local residents reported that Rope Walk Ditch and Ryebank Rife experience a lack of maintenance, as was also observed during WSP's site visit. During the 2024 flood event, the amount of vegetation and debris within the ditch system contributed to a reduction in the conveyance of floodwater away from Rope Walk and into the River Arun.

5.4 FLOOD DEFENCES/ASSETS

Climping Beach

5.4.1. Rope Walk is located north of Climping Beach and West Beach, which are managed by the Environment Agency. The beach defences are comprised of shingle, with the addition of groynes and concrete blocks at Climping Beach which are in a varying state of maintenance.

5.4.2. During WSP's site visit to Littlehampton, it was reported that shingle beach coastal defences at Climping Beach have degraded over recent years (refer to Figure 5-1). Furthermore, old defences were deemed unsafe and were removed in recent years. These included timber groynes and concrete structures which originally formed part of the car park. Residents believe there has been an increase in flooding since.

5.4.3. The design standard for the current Climping Beach defences provides an approximate 1 in 20 to 1 in 50 level of protection. Consultation with the Environment Agency has confirmed that the beach is managed in accordance with the Arun to Pagham strategy which recommends a reactive patch & repair approach to maintenance of the beach and structures. Prior to Storm Kathleen and Storm Pierrick, 250m^3 of shingle was recycled in December 2023.

5.4.4. During the 2024 flood event, the weakened coastal defences were overtopped and seawater flooded into agricultural land behind. This caused backing up of water in the ditch and rife system which in turn contributed to the flooding to Rope Walk and Ferry Road.

5.4.5. The Environment Agency confirmed that immediately prior to Storm Kathleen and Storm Pierrick, most of the beach was a 'condition 3 – fair', with the section to the west of WSP's study area being a 'condition 4 – poor'. The Agency's inspector commented that the beach berm, "*is uneven with movement of shingle due to wave attack and vehicle movement creating deep ruts. Crest is very narrow and uneven, with loss of crest suggesting movement of shingle by waves*". The Environment Agency also remarked that, "*the defence is not uniform in condition along its length due to the need for access to be allowed at the Bread Lane byway and access track at Mill Lane. The standard of protection along the frontage ranged between 1 in 50 to 1 in 1 at the gaps in the defence*" prior to the flood event.

Figure 5-1 - Eroded Coastal Defences at Climping Beach (taken 9th April 2024)

5.4.6. *Source: https://youtu.be/uVf-8vjlJ4c (online)*

5.5 RIVER ARUN

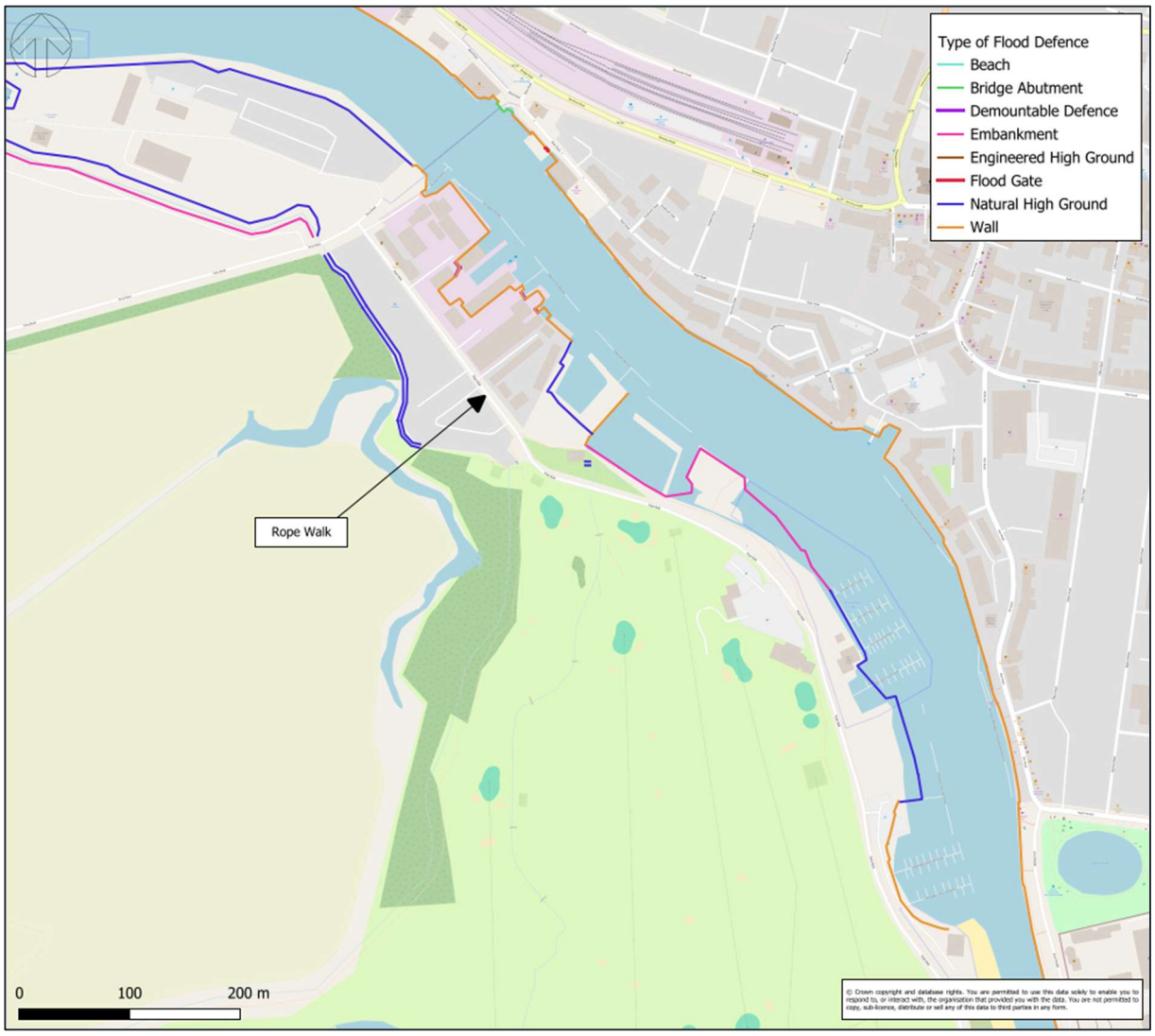
5.5.1. The area affected by flooding during the 2024 flood event is located on the west bank of the River Arun. The east bank of the River Arun benefits from a 3.94m AOD engineered defence that was constructed as an Environment Agency scheme. The west bank of the River Arun also has a flood wall; however, defence construction, condition, and levels vary along Rope Walk, only providing protection up to a level of approximately 3.23m AOD. Refer to Figure 5-2 below.

5.5.2. During WSP's site visit to Littlehampton, it was noted that there was a small gap in the flood defences just south of Rope Walk. This is located between wall and embankment defence types and may have contributed to the early stages of flooding that occurred before high tide. Furthermore, it is noted that the embankment defence (approximately 85m south of Rope Walk) only provides defence

up to a level of approximately 2.26m AOD in some areas, creating a vulnerability to flooding during tidal surges.

5.5.3. During WSP's site visit to Littlehampton, it was reported that demountable flood barriers were installed by the Environment Agency between commercial units on the east side of Rope Walk following the 2012 flood event. These were designed to provide a defence level of approximately 3.6m AOD; however, it was observed that their condition is currently sub-optimal.

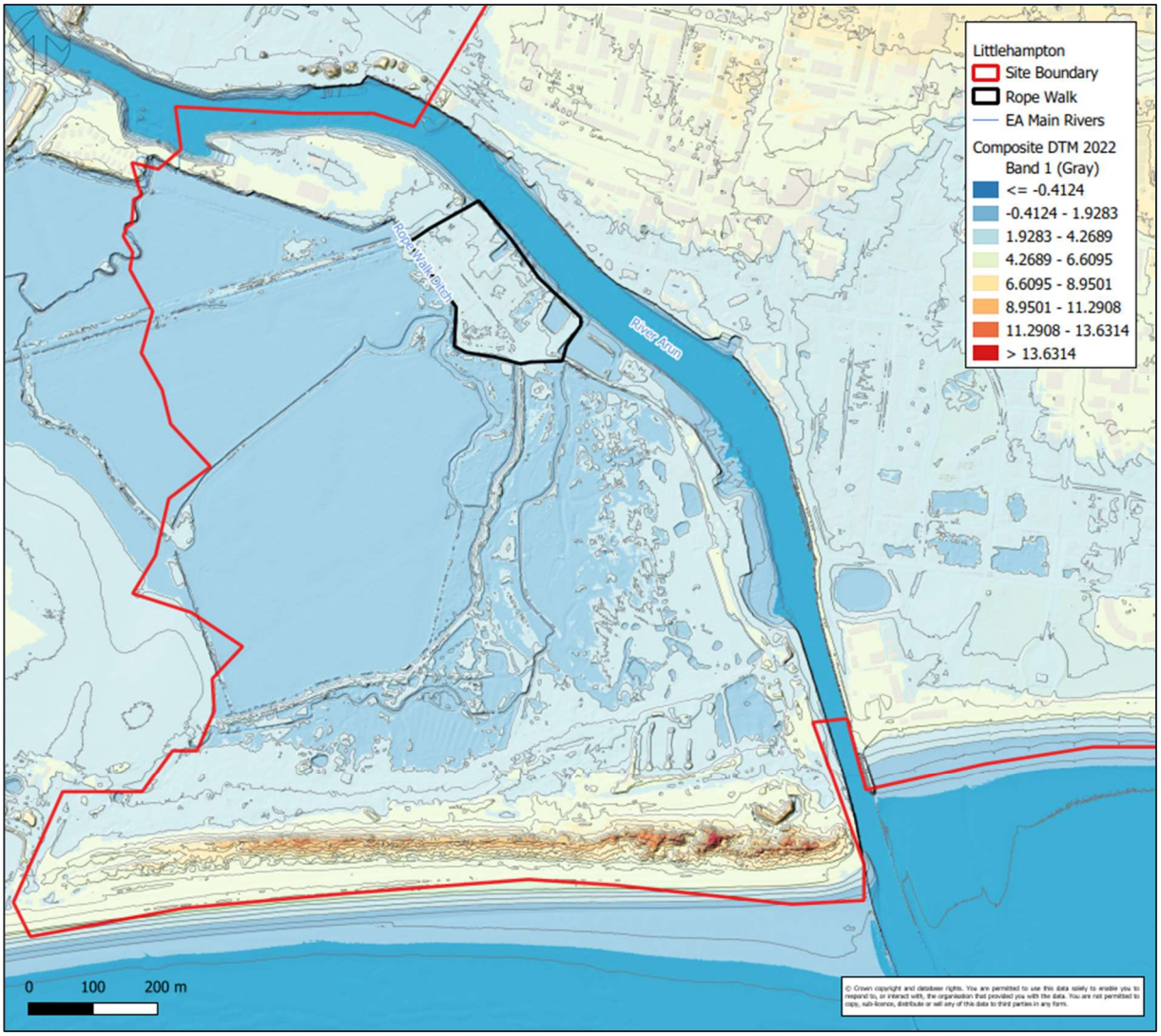
Figure 5-2 - Littlehampton Flood Defence Assets



5.6 TOPOGRAPHY

5.6.1. During WSP's site visit to Littlehampton interviewees noted that Rope Walk is topographically lower in comparison to high tide river levels in the River Arun. This is confirmed by Lidar mapping, as shown in Figure 5-3 below. It is also noted that land to the west and south of Rope Walk is lower lying than Rope Walk, which may have contributed to a higher velocity of floodwater as it flowed through Rope Walk to the lower lying land.

Figure 5-3 - Littlehampton Topographic Map



6 RISK MANAGEMENT AUTHORITIES

6.1 ARUN DISTRICT COUNCIL

6.1.1. Consultation with Arun District Council has confirmed that officers of the council attended the affected area on the 10th of April 2024. Furthermore, Arun District Council (ADC) set up a rest centre at The Wave leisure centre, located approximately 1.2 miles east of Rope Walk, in response to the flood event. Two skips were provided by the council once floodwaters had receded, to support with the clean-up following the event.

6.2 ENVIRONMENT AGENCY

6.2.1. Flooding during Storm Kathleen was reported to the Environment Agency and in response the Agency engaged with local authorities on several different incidents.

6.2.2. The following flood alerts were in place during the 2024 flood event:

- Climping seafront – In force: 06/04/2024 11:15 until 13/04/2024 11:33
- Lower Arun – In force: 08/04/2024 13:05 until 09/04/2024 15:40
- Tidal areas of Littlehampton Rope Walk – In force: 08/04/2024 13:43 until 13/04/2024 11:33

6.2.3. The following flood warning was in place during the 2024 flood event:

- Littlehampton Rope Walk – In force: 08/04/2024 13:45 until 10/04/2024 16:47

6.2.4. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Arun. Therefore, there are no plans to carry out improvement works to the River Arun.

6.2.5. The Environment Agency has confirmed that after the flood event, 1000m³ of shingle was recycled at Climping Beach in May to June 2024.

6.3 WEST SUSSEX COUNTY COUNCIL

6.3.1. Apart from commissioning WSP to carry out this s19 Flood Investigation, West Sussex County Council has confirmed that their team attended sites where highway flooding was reported.

6.3.2. West Sussex County Council also has an active community fund called Operation Watershed which exists to provide grants to communities to reduce the risks and impacts of flooding.

7 RECOMMENDATIONS

7.1.1. Prior to taking any recommendations forward, a feasibility study should be undertaken to confirm the viability of any interventions.

7.2 LOCAL RESIDENTS / BUSINESS OWNERS

7.2.1. Residents and business owners affected by flooding may benefit from property flood resilience measures, such as flood doors, waterproof airbricks, hard flooring, non-return valves that can be fitted to drains and placing electrical sockets at an elevated level.

7.2.2. During WSP's site visit to Littlehampton, it was noted that some business owners have already begun installing flood measures along the River Arun frontage. These measures would be worthy of further investigation to determine their effectiveness, and to ensure that flood risk is not exacerbated elsewhere.

7.2.3. Residents along the west side of Rope Walk who are riparian owners of Rope Walk Ditch could undertake works to ensure that the ditch is well maintained and allows free passage of water during flood events. This could include clearance of vegetation and the removal of bridge support features from the channel to reduce the risk of blockages from forming.

7.2.4. Business owners could consider contacting the Environment Agency to request that it inspects the demountable flood barriers that were installed following the 2012 floods, and ensure they are not damaged and function as designed. This is specifically relevant following the 2024 flood event where it was reported that floodwater overtopped the barriers.

7.2.5. It is also recommended that the Rope Walk Flood Action Group could review their existing Flood Action Plan and update it where necessary, publishing the plan to residents and business owners in Rope Walk. The group could then provide education and communication to local residents and business owners on the following:

- How to monitor river levels and flows.
- How to sign up to the Environment Agency flood alerts and warnings.
- How to report concerns to the relevant flood risk management authorities.
- Guidance on effective property flood resilience.
- What to do and when, in preparation for a flood.
- Where to find support following a flood event.

7.2.6. For further information on flooding, residents should refer to the following link: https://www.westsussex.gov.uk/roads-and-travel/maintaining-roads-verges-and-pavements/road-maintenance/flooding-drainage-and-gullies/

7.3 ENVIRONMENT AGENCY

7.3.1. It is noted that following Storm Kathleen, the Environment Agency replenished shingle at Climping Beach. Therefore, one recommendation of this report is the continued inspection and maintenance of the Environment Agency's coastal defences at Climping Beach to maintain an acceptable level of protection to Rope Walk and Ferry Road from coastal flooding. This area of frontage could be highlighted as a priority, and arrangements could be made for pre-emptive inspections on receipt of forecasts of heavy rain or tidal surges. This will also prevent the infilling of the ditch that runs behind the coastal defences at Climping Beach from shingle that has been washed over during storms.

7.3.2. The Environment Agency could consider the feasibility of constructing more formal flood defences along the west bank of the River Arun. This may involve the removal of any damaged existing defences and the construction of a raised wall to increase resilience at Rope Walk from tidal sources. This would require consultation between the Environment Agency, West Sussex County Council, and local landowners, and further investigation to ensure flood risk is not increased elsewhere.

7.3.3. Consultation with the Environment Agency has confirmed that a combination of water level and nearshore wave height predictions are used to trigger flood alerts and warnings. At Climping Beach, a water level and half nearshore wave height exceeding 3.5m triggers a flood alert, and 4.2m triggers a flood warning. The Environment Agency could consider lowering these trigger values to better represent the vulnerability of the flood defences along the west bank of the River Arun and at Climping Beach. This would allow more time for preparation and evacuation for those at risk of flooding.

7.3.4. Another issue that was reported during WSP's visit to Littlehampton is the lack of ditch maintenance in relation to Ryebank Rife and Rope Walk Ditch. The Environment Agency could provide information to riparian owners on their responsibilities and encourage regular maintenance of Rope Walk Ditch. Additionally, opportunities to improve the capacity of Ryebank Rife and Rope Walk Ditch could be identified, such as clearing debris and vegetation. If a maintenance schedule is in place, the Environment Agency could review it, and where appropriate, increase the frequency of inspections.

7.4 SSE

7.4.1. SSE could consider the implementation of flood resilience measures to improve the resilience of the substation located at the end of Rope Walk to flooding during subsequent storm events.

7.5 WEST SUSSEX COUNTY COUNCIL

7.5.1. West Sussex County Council could consider promoting the uptake of flood wardens and support the Rope Walk Flood Action Group in expanding its membership. This could be further supported by Arun District Council and Climping Parish Council.

7.5.2. It is acknowledged that the design standard of existing highway drainage is likely to be lower than the rainfall event recorded and that it will also not be designed to cope with floodwaters. However, it is recommended that West Sussex County Council could review the current highway drainage maintenance schedule and, where appropriate, increase the frequency of inspections. Alternatively, the assets in Rope Walk could be marked as a priority, and arrangements could be made for pre-emptive inspections on receipt of forecasts of heavy rain.

7.6 ENVIRONMENT AGENCY, WEST SUSSEX COUNTY COUNCIL & ARUN DISTRICT COUNCIL

7.6.1. A final recommendation is that the Environment Agency, West Sussex County Council, and Arun District Council could form a multi-agency partnership to develop and agree a strategy and Action Plan; identifying actions and responsibilities for maintaining / upgrading flood defences and considering other measures that will best protect this area from similar events in the future.

8 CONCLUSIONS

8.1.1. WSP was commissioned by West Sussex County Council to conduct a Section 19 Flood Investigation following flooding which was reported in Rope Walk, Littlehampton. West Sussex County Council has a responsibility under the Flood and Water Management Act 2010 (FWMA 2010) to undertake flooding investigations. Specifically, Section 19 states that:

'1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate—

a) which risk management authorities have relevant flood risk management functions, and
b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.

2) Where an authority carries out an investigation under subsection (1) it must—

a) publish the results of its investigation, and
b) notify any relevant risk management authorities.'

8.1.2. The flooding occurred late at night on the 8th of April 2024, and into the early morning of the 9th of April 2024, following Storm Kathleen and Storm Pierrick. Most of the flooding subsided with the ensuing low tide. The flooding led to road closures and internal and external flooding to residential and commercial properties.

8.1.3. This report identifies the various Risk Management Agencies that have roles and responsibilities associated with flood risk and summaries the activities carried out by those agencies at the time of, and following the flood.

8.1.4. The report also includes the findings of an analysis of data from the National Network of Regional Coastal Monitoring Programmes. The analysis confirmed that extreme high tides were experienced along the south coast of England at the time of flooding in Littlehampton. This caused the River Arun to come out of bank and the sea to overtop defences at Climping Beach which led to flooding at Rope Walk.

8.1.5. Site visits were undertaken by WSP and representatives of Arun District Council, and members of the public were consulted on details of what happened during the flood.

8.1.6. Causes of the flooding have been determined with the key cause appearing to be overtopping of the flood defences along the west bank of the River Arun. The overtopping of coastal defences at Climping Beach is believed to have exacerbated the flooding across Rope Walk.

8.1.7. A series of recommendations have been made for residents, business owners, the Environment Agency, and West Sussex County Council and Arun District Council to consider, to reduce the risk of a similar event occurring again.

Appendix A

2024 FLOODED AREAS

Appendix B

PHOTOS

Photo 1 – Climping Beach Seafront taken following Storm Kathleen (Source: https://youtu.be/uVf-8vjIJ4c)

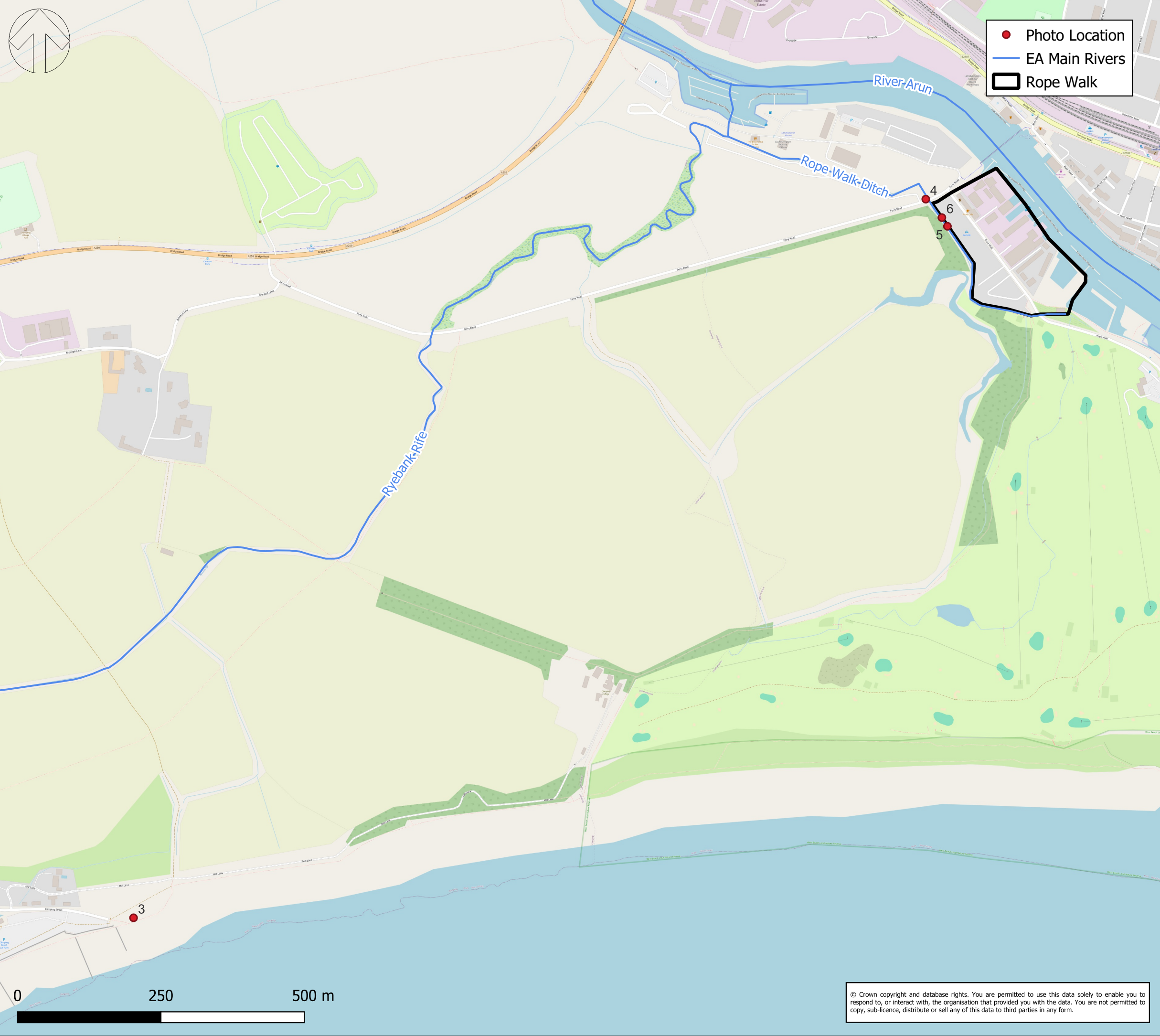
Photo 2 – Rope Walk during the April 2024 flood event (Source: https://www.sussexexpress.co.uk/news/storm-kathleen-flooding-chaos-in-sussex-after-river-arun-bursts-its-banks-and-holiday-park-evacuated-4584019)

Photo 3 – Climping Beach Seafront taken 16/10/2024

Photo 4 – Rope Walk Ditch taken 16/10/2024

Photo 5 – Rope Walk Ditch taken 16/10/2024

Photo 6 – Rope Walk Ditch taken 16/10/2024



Appendix C

HYDROLOGY ANALYSIS

TECHNICAL NOTE 1

DATE:	01 December 2024	**CONFIDENTIALITY:**	Public
SUBJECT:	Storm Kathleen Overview		
PROJECT:	West Sussex County Council s19 Investigation	**AUTHOR:**	E. Goodridge
CHECKED:	L. Davey	**APPROVED:**	M. Quinnell

STORM KATHLEEN OVERVIEW

On the 6th of April 2024, Storm Kathleen passed over the UK. Its deep area of low pressure resulted in windspeeds of 50 to 60 mph in the West of the country[1]. Storm Kathleen was closely followed by Storm Pierrick – named by Météo-France, the French national weather service – which hit the south coast of England on the 8th – 9th April, with winds of 65 mph along with torrential rain[2].

The Environment Agency (EA) stated that high tides along with gale force winds from Storm Pierrick caused "potentially record high tides across the south coast"[2].

This Section assesses the tide levels associated with Storm Pierrick that occurred between the 8th – 9th April 2024. In West Sussex it affected Rope Walk in Littlehampton.

TIDE ANALYSIS

Tidal Gauge Data

The tide levels have been analysed from three different gauges, one from River Levels[3] and two from the National Network of Regional Coastal Monitoring Programmes (NNRCMP)[4]:

- River Arun at Littlehampton[3] (xy: 502694,101825): located approximately 0.3 km southeast of Rope Walk;
- Arun Platform[5] (xy: 506459, 97797): located approximately 5 km from the mouth of the River Arun; and,
- Brighton[6] (xy: 533873,103077): located approximately 52 km east of Medmerry.

See Figure 1 for the location of the tidal gauges.

[1] https://www.metoffice.gov.uk/about-us/news-and-media/media-centre/weather-and-climate-news/2024/storm-kathleen-to-bring-strong-winds
[2] https://www.bbc.co.uk/news/uk-england-somerset-68782917
[3] https://riverlevels.uk/arun-littlehampton
[4] https://coastalmonitoring.org/realtimedata/
[5] https://coastalmonitoring.org/realtimedata/?chart=86&tab=tides
[6] https://coastalmonitoring.org/realtimedata/?chart=88&tab=tides

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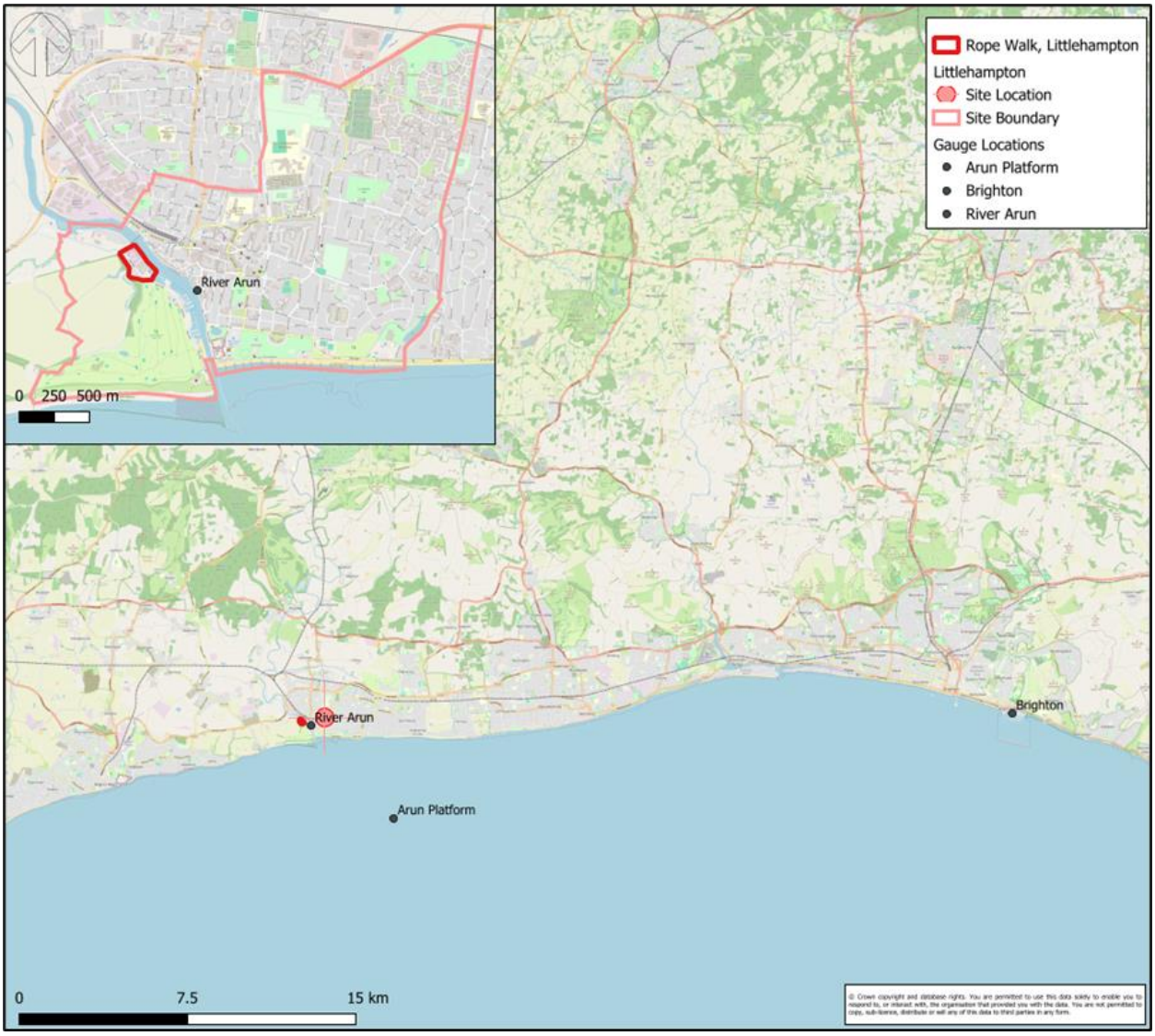

Figure 1- Location of the gauges used for analysis.

A review of the tidal data confirmed that high spring tides were experienced at the time of Storm Pierrick. Figure 2 uses data obtained from the gauge on the River Arun in Littlehampton[7]. This gauge records a tidal level, measured from mean sea level rather than from the riverbed. The gauge recorded a peak tide level of 3.8 mAOD at 00:30 on the 9th of April. According to the River Levels website, this level is 0.7 m higher than the peak of the typical range seen 90 percent of the time since records began in 1992. Furthermore, the

[7] https://www.gaugemap.co.uk/ - !Detail/1842/1953/2024-04-06/2024-04-12

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highest level ever recorded at this gauge is 3.8 mAOD, meaning the event of the 8th – 9th April 2024 is one of the most severe the river gauge has experienced on record.

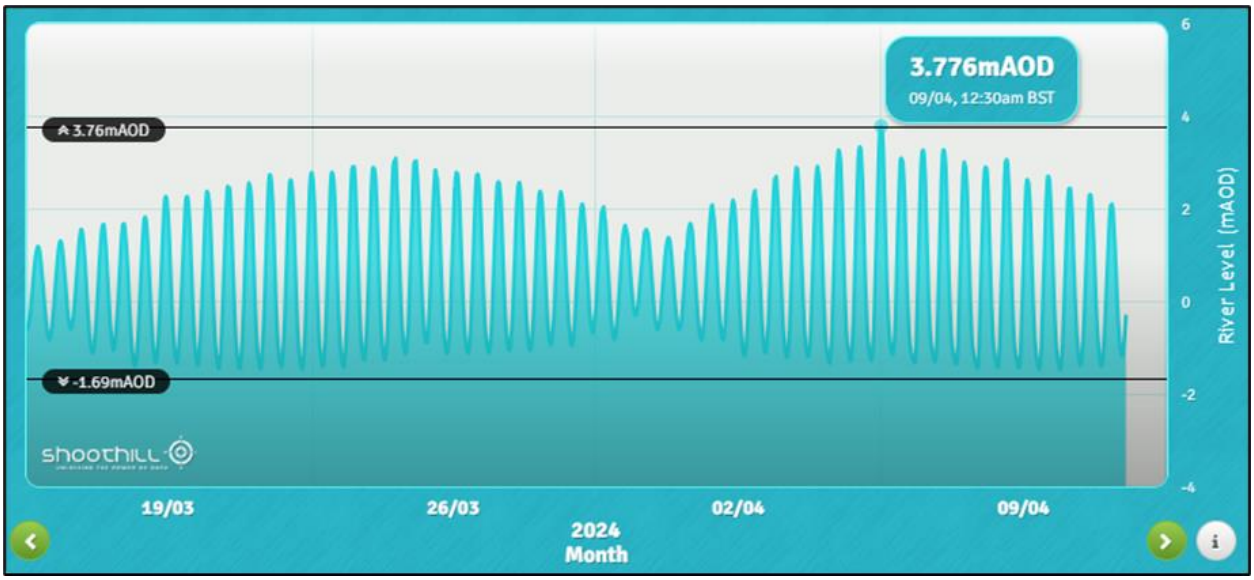

Figure 2 - The recorded river level at the tidal gauge on the River Arun in Littlehampton. It indicates a peak river level of 3.776 mAOD at 00:30 on the 9th of April 2024. Obtained from Shoothill GaugeMap[7].

However, it is important to note that there is limited information available regarding the reliability of the river gauge. The gauge is owned, operated, and maintained by the Environment Agency, but the River Levels[3] website states that no quality control is applied to its raw data. Therefore, caution should be applied when interpreting the data.

The Arun Platform gauge[4] had no usable data between the 8th and 9th and was therefore discarded.

Tidal data from the NNRCMP Brighton gauge[6], approximately 32 km east of Rope Walk, was compared to the tide levels experienced at Littlehampton. At the Brighton gauge, tide levels between the 5th – 11th April peaked to 4.2 mAOD at 23:10 on the 8th of April (see Figure 3). The Brighton gauge also experienced a peak in residual tide of 0.84 m at 21:50 on the 8th of April. Residual tide describes how much the experienced tide differs from the predicted tide. The peak residual tide of 0.84 m means that the recorded tide level is 0.84 m higher than astronomically predicted due to the low-pressure atmospheric conditions associated with Storm Pierrick. The residual tide remains high throughout the early hours of the 9th of April.

TECHNICAL NOTE 1

DATE:	01 December 2024	**CONFIDENTIALITY:**	Public
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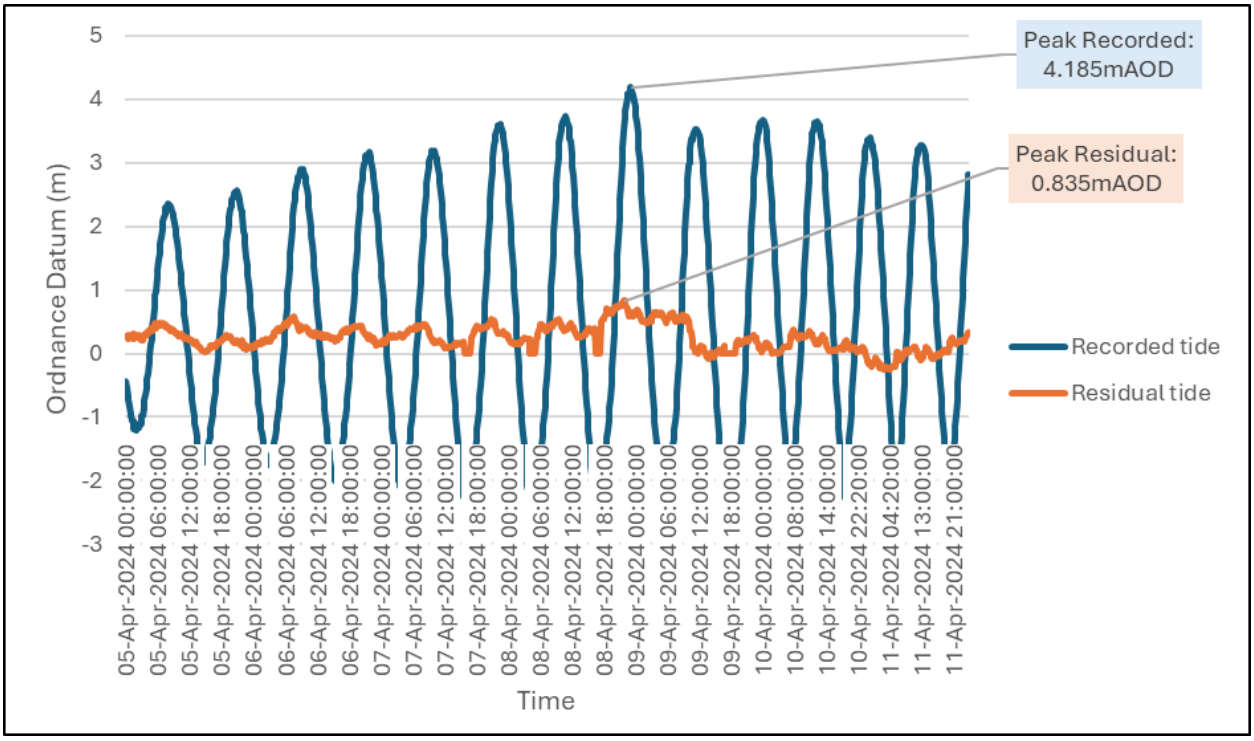

Figure 3- The recorded and residual tides from the Brighton gauge obtained from the NNRCMP for the period between 00:00 5th April to 23:50 11th April 2024.

A skew tide is the difference between the maximum observed sea level and the maximum predicted tide regardless of their timing during the tidal cycle. Data from the NNRCMP Brighton gauge[6] shows that during the storm event the skew surge was 0.65m. A skew surge this significant is largely uncommon.

It is important to note that storm surges do vary along the coast. As the Brighton gauge is located 32km to the east of the subject site, the tide levels experienced at Brighton are not representative of those seen at the River Arun gauge and cannot be directly compared. Nevertheless, the data offers a clear indication of the conditions experienced at the time of the flooding events at Rope Walk.

Coastal Flood Boundary Data

The Environment Agency has a Coastal Flood Boundary Dataset[8] that details the predicted extreme peak sea levels of annual exceedance probability ranging from 1:1 to 1:10,000, at points located approximately every 2km along the open coast. For this analysis, data from three individual points along the coast located near Littlehampton and near Brighton were reviewed. The predicted extreme sea levels at these points were averaged to obtain an estimated sea level at Littlehampton and Brighton associated with the various

[8] https://environment.data.gov.uk/explore/84a5c7c0-d465-11e4-b0bd-f0def148f590?download=true

return periods. This has been compared to peak high tides experienced at the gauge locations to obtain an approximate event return period. The results are shown in Figure 4.

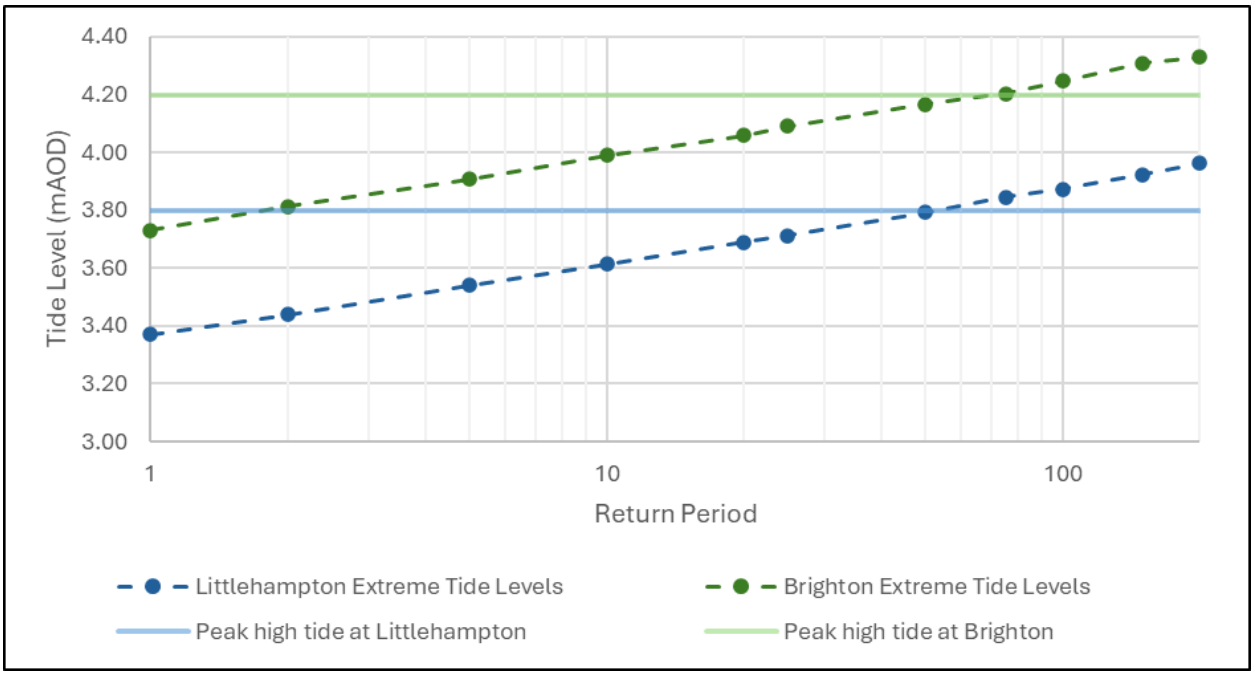

Figure 4- Comparison of recorded peak high tide at Littlehampton (blue) and Brighton (green) against the average extreme water level return periods for both locations obtained from the Environment Agency dataset.

Figure 4 demonstrates that the peak high tide of 3.8 mAOD experienced at Littlehampton is estimated equivalent to a predicted return period of a 1-in-50-year tide along the coast at Littlehampton. It is important to recognise that the gauge at Littlehampton is inland, so the return periods predicted by the EA coastal dataset are not fully representative of those experienced at the gauge location or at Rope Walk.

A similar situation occurred in Brighton where the recorded high tide of 4.19 mAOD is equivalent to a 1-in-75-year tide along the coast at this location.

It is important to note that the sea level data is estimated based on tidal analysis and statistical models and thus has multiple sources of uncertainty. At the River Arun location, the recorded peak high tide level of 3.8mAOD falls within the confidence intervals for a range of return periods from the 1-in-25-year to the 1-in-100-year.

Appendix D

CONSULTATION CORRESPONDENCE

Appendix D.1

ENVIRONMENT AGENCY

[redacted]

From: SSD Enquiries <SSDEnquiries@environment-agency.gov.uk>
Sent: 16 December 2024 13:28
To: [redacted]
Subject: SSD386162HF (was SSD378391DP) - West Sussex s19 Flood Investigation Enquiry

Filed: -1
Filed Location: C:\Users\uklet002\Documents\WSCC S19\SC\241216 132751 - SSD Enquiries - SSD386162HF (was SSD378391DP) - West Sussex s19 Fl.msg
Filed Location Folder: C:\Users\uklet002\Documents\WSCC S19\SC

Dear [redacted],

Thank you for your email dated 19 November 2024.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

We have logged this under the reference SSD386162HF, please quote this for any further correspondence about this topic.

Please find below our responses to your enquiries:

- *Defence type*
  Shingle Beach.

- *Maintenance / replenishment programme*
  The beach is managed in line with the Arun to Pagham strategy which recommended a reactive patch and repair approach to maintenance of the Beach and structures, whilst acknowledging that at some point in the future the costs of maintaining the Beach are likely to rise above what the Environment Agency can justify spending under Government Rules. We have no fixed programme for shingle replenishment, shingle is recycled locally from Littlehampton Harbour to the frontage when available and resources and funding allows.

- *When were the defences last replenished?*
  Prior to the Storm Kathleen/Pierrick, 250m3 was recycled in December 2023, following the storm 1000m3 was recycled in May/June 2024.

- *Design Standard of protection*
  This is ~1 in 20 to 1 in 50 in accordance with the risk.

- *Condition of the defences immediately prior to Storm Kathleen / Storm Pierrick*
  The majority of the beach was a condition 3 – fair, however prior to the April storms the section to the west of your study area was a condition 4. Our inspector commented that the Berm "is uneven with movement of shingle due to wave attack and vehicle movement creating deep ruts. Crest is very narrow and uneven, with loss of crest suggesting movement of shingle by waves."

- *Standard of protection at the time of the Storm Kathleen / Storm Pierrick*
  The defence is not uniform in condition along its length due to the need for access to be allowed at the Bread Lane byway and access track at Mill Lane. The SOP along the frontage ranged between 1 in 50 to 1 in 1 at the gaps in the defence.

- *What triggers / thresholds does the Environment Agency use to warn of flooding?*

We use a combination of water level and nearshore wave height predictions, as triggers for issuing Flood Alerts and Flood Warnings along the Climping coastline.
Specifically, the triggers were a combination of Water level and half nearshore wave height exceeding 3.5 m for a Flood Alert, and 4.2 m for a Flood Warning.

- *Were these systems working effectively at the time of the flooding?*
  Yes – we were given forecast information to assess conditions (please note, forecasts are not always perfect), and the Flood Warning System used to distribute the messages was operational.
  A Flood Warning was in force for Climping between 8 and 10 April 2024.

Please refer to the Open Government Licence which explains the permitted use of this information.

Rights of appeal: If you are not satisfied you can contact us within 2 calendar months to ask for our decision to be reviewed. We shall review our response to your request and give you our decision in writing within 40 working days.

If you are still not satisfied following this, you can raise a concern with the Information Commissioner, who is the statutory regulator for Freedom of Information and the Environmental Information Regulations. The contact details are:

Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF Tel: 303 123 1113 Website: http://ico.org.uk

Kind regards,

Helen Fozard
Senior Enquiries Officer
Customers & Engagement Team
Solent and South Downs Area
Environment Agency | Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD
ssdenquiries@environment-agency.gov.uk
National Customer Contact Centre : 03708 506 506

From: [redacted]
Sent: 19 November 2024 10:08
To: SSD Enquiries <SSDEnquiries@environment-agency.gov.uk>
Cc: [redacted]
Subject: RE: SSD378391DP: 240802/JH02 West Sussex s19 Flood Investigation Enquiry

Good morning Dorah,

We are hoping for further information regarding the EA coastal defences at Climping Beach following reports of coastal overtopping contributing to the flooding experienced in Littlehampton after Storm Kathleen. I have attached a plan showing the specific location that we are interested in for clarity. Can you please confirm the following:

- Defence type
- Maintenance / replenishment programme

- When were the defences last replenished?
- Design Standard of protection
- Condition of the defences immediately prior to Storm Kathleen / Storm Pierrick
- Standard of protection at the time of the Storm Kathleen / Storm Pierrick
- What triggers / thresholds does the Environment Agency use to warn of flooding?
- Were these systems working effectively at the time of the flooding?

Many thanks,

[redacted]
Graduate Consultant – Water Risk Management
BSc (Hons)
She/her

WSP in the UK
Matrix House, Basing View
Basingstoke
RG21 4FF

[redacted]
Graduate Consultant – Water Risk Management
BSc (Hons)
She/her

WSP in the UK
Matrix House, Basing View
Basingstoke
RG21 4FF

From: SSD Enquiries <SSDEnquiries@environment-agency.gov.uk>
Sent: Monday, September 2, 2024 4:19 PM
To: [redacted]
Subject: SSD370808DP: 240802/JH02 West Sussex s19 Flood Investigation Enquiry

Dear [redacted],

Thank you for your enquiry.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. We have logged this under the reference SSD370808DP, please quote this for any further correspondence about this topic.

Please see our responses to your queries below.

Due to the size of your request, we have tried to answer your queries whilst mainly focussing in on specific rivers that had more notable instances of flooding and engagement, rather than all the catchments that were initially listed. However, if there is any further information on these events that you feel we may have missed, or that you have additional questions about, please do just let us know.

Please could the Environment Agency provide the following information, where available:

1. Details of any **fl**ood defences in the area that might in**fl**uence **fl**ooding at the site / surrounding area.
   DEFRA Data Services Platform is a system that allows bodies such as West Sussex County Council to access various datasets, including those relating to our flood defences. This information can be accessed using the following link: AIMS Spatial Flood Defences (inc. standardised attributes)
2. Details of river **fl**ows during the above dates, speci**fi**cally for the above listed watercourses where relevant at each site.
   Due to the technical teams workload we have not yet received a response to this question. We will be in contact with you again shortly as soon as we have this data available to share.
3. Details of **fl**uvial **fl**ood return periods for the above storms.
   This is not information that we hold for the rivers listed above, for any of the above named storms.
4. Details of any **fl**ood warnings in place during the above dates.
   Please see the below Flood Alerts/Warnings issued for the period of Storm Ciaran:

Message Name	Message Type	Issued	Removed
Aldingbourne and Barnham Rifes	Flood Alert	25/10/2023 06:43	27/11/2023 16:11
Climping Seafront	Flood Alert	26/10/2023 22:29	04/11/2023 17:22

Lower Arun	Flood Alert	27/10/2023 18:13	07/11/2023 16:36
Climping	Flood Warning	27/10/2023 23:42	03/11/2023 17:39
Tidal areas of Littlehampton Rope Walk	Flood Alert	27/10/2023 23:42	03/11/2023 17:29
Selsey Bill to Elmer	Flood Alert	27/10/2023 23:43	03/11/2023 17:37
Arundel on the River Arun	Flood Warning	27/10/2023 23:43	07/11/2023 16:31
Bersted on the Aldingbourne Rife	Flood Warning	28/10/2023 03:13	19/11/2023 10:50
Black Ditch	Flood Alert	29/10/2023 02:13	07/11/2023 16:36
Felpham on the Aldingbourne Rife	Flood Warning	02/11/2023 03:58	11/11/2023 11:27

Please see the below Flood Alerts/Warnings issued for the periods of Storm Kathleen (6-7 April 2024) and Storm Pierrick (9 April 2024**):**

Message Name	Message Type	Issued	Removed
Climping seafront	Flood Alert	06/04/2024 11:15	13/04/2024 11:33
Thorney Island to Bracklesham	Flood Alert	07/04/2024 13:42	13/04/2024 11:33
Coastal areas of Medmerry	Flood Alert	08/04/2024 13:05	13/04/2024 11:33
Selsey Bill to Elmer	Flood Alert	08/04/2024 13:05	09/04/2024 15:40
Lower Arun	Flood Alert	08/04/2024 13:05	09/04/2024 15:40
Tidal areas of Littlehampton Rope Walk	Flood Alert	08/04/2024 13:43	13/04/2024 11:33
Climping	Flood Warning	08/04/2024 13:45	10/04/2024 17:27
Littlehampton Rope Walk	Flood Warning	08/04/2024 13:45	10/04/2024 16:47
East Wittering and Bracklesham coast	Flood Warning	09/04/2024 11:11	10/04/2024 16:51
Medmerry	Flood Warning	09/04/2024 11:15	10/04/2024 16:40

5. Details of any historic **fl**ooding associated with the above watercourses.
You can also download historical flood event records from the Defra Data Services Platform, using the following link: https://environment.data.gov.uk/dataset/8c75e700-d465-11e4-8b5b-f0def148f590

Furthermore, please could the Environment Agency answer the following questions:

1. Was the **fl**ooding that occurred during Storms Ciaran and Kathleen reported to the Environment Agency?
If the answer to the above question is yes, how did the Environment Agency respond to the incidents?
We were informed of flooding during both Storm Ciarán and Kathleen. We engaged with local authorities around a number of different incidents on both of these occasions. For example, during April 2024 we engaged with the community of Rope Walk in Littlehampton following the collapse of part of a sea wall at this site, before taking part in an in-person meeting on 10th May 2024 to discuss future proposed changes to the line of defence in that community.

We also engaged with communities and public bodies around flooding that occurred in the days surrounding Storm Ciarán in the Aldingbourne catchment. The Environment Agency has since taken part in the Arun Flood Forum and provided advice and support to members of the community. During the flooding event we also deployed two contingency pumps at Felpham to provide resilience if our existing pumps were to go out of operation or the power supply were to be impacted.

If you would like any further details on our response to either of these events, in respect of any other watercourses, please let do us know. However, we cannot be certain that all flooding that occurred across West Sussex during these events was reported to us.

3. Are there any known issues / constraints associated with the rivers listed above in terms of capacity?
   We do not have any awareness of issues or constraints in terms of capacity, for any of the above-named rivers, in relation to Storms Ciaran or Kathleen. However, the Aldingbourne Rife has a particular set of issues relating to it being a very low-lying catchment. The flat nature of this area means that flood water takes a long time to drain out to sea, following any large rainfall event.

4. Are there any plans to carry out improvement works to the rivers within the local vicinity?
   The Environment Agency actively monitor weather radars and our operational staff proactively clear debris screens in order to help keep rivers flowing freely. We also have a regular maintenance schedule for our Operations team across Sussex, which we carry out using the permissive powers we have to maintain watercourses designated as Main Rivers.

   You can view further information regarding our planned maintenance activities and capital schemes using the Asset Management Service, which can be accessed using the following link: Asset Information and Maintenance Programme (data.gov.uk)

Please refer to the Open Government Licence which explains the permitted use of this information.

Rights of appeal: If you are not satisfied you can contact us within 2 calendar months to ask for our decision to be reviewed. We shall review our response to your request and give you our decision in writing within 40 working days.

If you are still not satisfied following this, you can raise a concern with the Information Commissioner, who is the statutory regulator for Freedom of Information and the Environmental Information Regulations. The contact details are:
Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF
Tel: 303 123 1113
Website: http://ico.org.uk

Kind regards,

Dorah Phiri
Customers & Engagement Team
Solent and South Downs Area
Environment Agency | Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD
ssdenquiries@environment-agency.gov.uk
National Customer Contact Centre : 03708 506 506

From: [redacted]
Sent: Thursday, August 1, 2024 11:12 AM
To: Enquiries, Unit <enquiries@environment-agency.gov.uk>

Cc: [redacted]
Subject: 240802/JH02 West Sussex s19 Flood Investigation Enquiry

Dear Sir / Madam,

We have been instructed by our client, West Sussex County Council, to carry out an investigation of flooding that occurred at the below sites during Storms Ciaran and Kathleen:

Storm Ciaran, November 2023:

- **Yapton** (*Ryebank Rife, Yapton Rife, Bilsham Ditch*)
- **Bognor Regis** (*Aldingbourne Rife, Lidsey Rife, North Bersted Ditch*)
- **Shripney** (*Shripney Manor Ditch*)
- **Littlehampton** (*River Arun, Black Ditch, Eels Springs Ditch, Wick Farm Ditch, Ryebank Rife, Rope Walk Ditch, Rustington Stream*)

Storm Kathleen, April 2024:

- **Earnley** (*Easton Rife and Branch, Earnley Rife*)
- **Bracklesham** (*Earnley Rife*)
- **Littlehampton** (*see above*)

We are writing to request the Environment Agency provide any flood defence data and information with respect to the above sites.

Please could the Environment Agency provide the following information, where available:

1. Details of any flood defences in the area that might influence flooding at the site / surrounding area.
2. Details of river flows during the above dates, specifically for the above listed watercourses where relevant at each site.
3. Details of fluvial flood return periods for the above storms.
4. Details of any flood warnings in place during the above dates.
5. Details of any historic flooding associated with the above watercourses.

Furthermore, please could the Environment Agency answer the following questions:

1. Was the flooding that occurred during Storms Ciaran and Kathleen reported to the Environment Agency?
2. If the answer to the above question is yes, how did the Environment Agency respond to the incidents?
3. Are there any known issues / constraints associated with the rivers listed above in terms of capacity?
4. Are there any plans to carry out improvement works to the rivers within the local vicinity?

We trust the above is clear, however, should you have any queries or require any further information from WSP to be able to answer the above queries, please do not hesitate to get in contact.

Kind regards,

[redacted]
Graduate Consultant – Water Risk Management
BSc (Hons)
She/her

WSP in the UK
Matrix House, Basing View
Basingstoke
RG21 4FF

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Appendix D.2

SOUTHERN WATER

from Southern Water

[redacted]

Date

2nd September 2024

Contact

Tel 0330 303 0368

Dear [redacted]

The Environmental Information Regulations 2004
Request for Information
EIR reference 2823

Thank you for your request for information which we received on 2nd August 2024. We have dealt with your request under The Environmental Information Regulations 2004 (EIR 2004). This letter provides the response to your request, as follows:

We have been instructed by our client, West Sussex County Council, to carry out an investigation of flooding that occurred at the below sites during Storms Ciaran and Kathleen:

Storm Ciaran, November 2023:

- ***Yapton*** *(Ryebank Rife, Yapton Rife, Bilsham Ditch)*
- ***Bognor Regis*** *(Aldingbourne Rife, Lidsey Rife, North Bersted Ditch)*
- ***Shripney*** *(Shripney Manor Ditch)*
- ***Littlehampton*** *(River Arun, Black Ditch, Eels Springs Ditch, Wick Farm Ditch, Ryebank Rife, Rope Walk Ditch, Rustington Stream)*

Storm Kathleen, April 2024:

- ***Earnley*** *(Easton Rife and Branch, Earnley Rife)*
- ***Bracklesham*** *(Earnley Rife)*
- ***Littlehampton*** *(see above)*

We can confirm that Southern Water does not hold information of the type you have requested as follows:

Under the Regulations Southern Water does not have to provide you with a copy of this information if one of the exceptions in the Regulations applies. In this case Southern Water considers that the exception Regulation 12(4)(a) of the EIR applies as we do not hold the information you have requested. Therefore, we are unable to provide you with this information.

To clarify, Southern Water are not responsible for the management of these assets. The responsibilty of the above assets is the the Environment Agency (EA) and any enquiry relating to them should be directed to the EA.

We are entitled to make a reasonable charge for information provided under the Regulations. Details of our charging scheme can be found on our website: https://www.southernwater.co.uk/water-for-life/protecting-the-environment/environmental-information. In this case we have decided to waive our charge.

If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Internal review requests should be submitted within forty working days of the date of receipt of this response and should be addressed to Head of Legal, Southern Water Services Ltd, Southern House, Yeoman Road, Worthing, West Sussex BN13 3NX or you can email EIR.Internal.Review@southernwater.co.uk.

If you are dissatisfied with the outcome of the internal review, you can apply, without charge, to the Information Commissioner, who will consider whether Southern Water has complied with its obligations under the Regulations, and can require Southern Water to remedy any problems. You can find out more about how to do this, and about the Regulations in general, on the Information Commissioner's website at: www.ico.org.uk. Complaints to the Information Commissioner can be made via the "report a concern" section of the Information Commissioner's website.

Please do not hesitate to contact us if you have any queries.

Yours sincerely

EIR Officer

Appendix E

ENVIRONMENT AGENCY FLOOD MAPS

Site Location

CLOSEST MAIN RIVER

Rope Walk Ditch

DISTANCE BETWEEN SITE AND CLOSEST MAIN RIVER

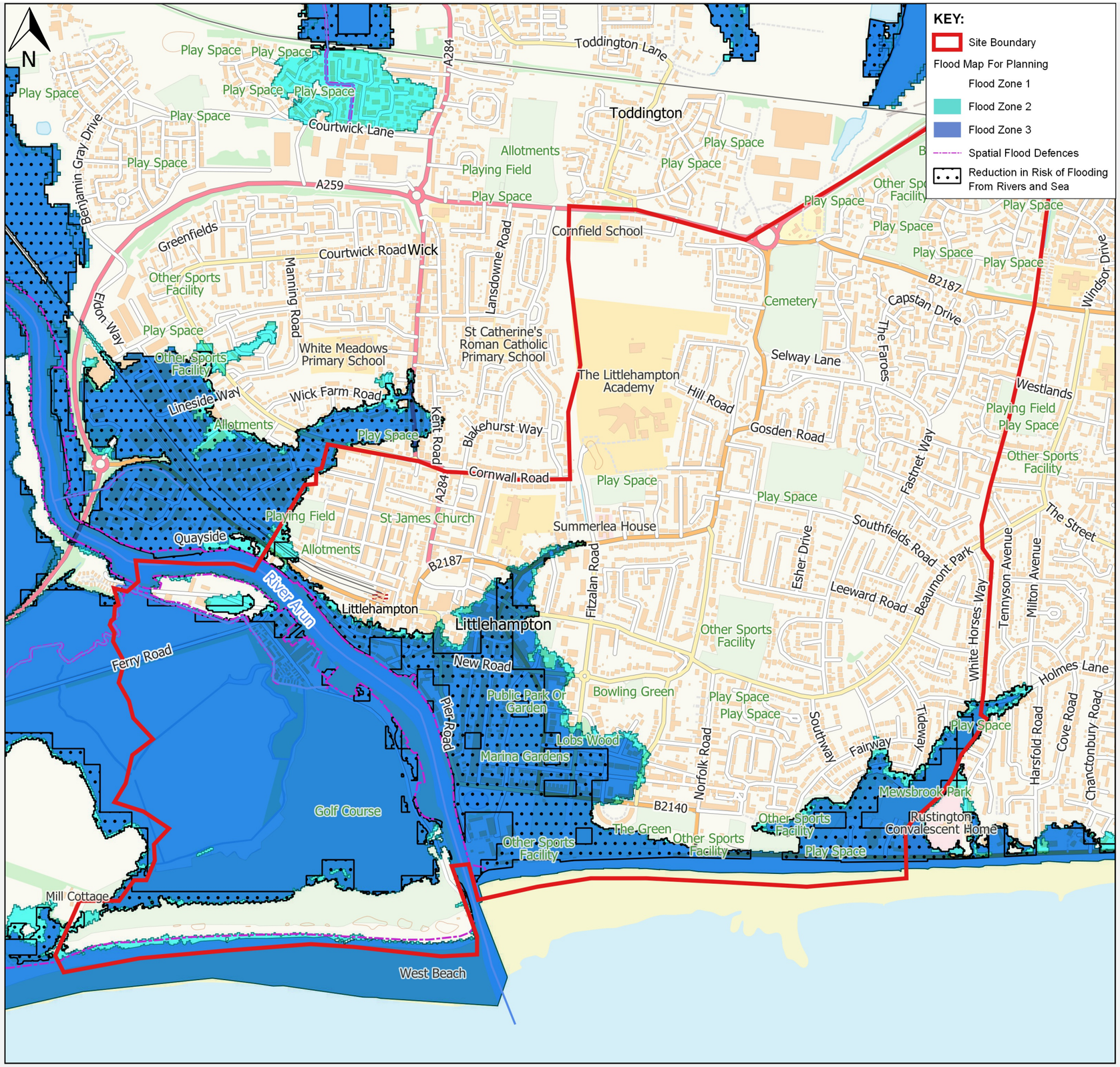
0m

Flood Map for Planning

Flood zone maps are modelled using local and national river and sea data. This information provides an indication of the likelihood of flooding and is intended for planning use only.

- **Flood Zone 1 -** Land having a less than 1 in 1,000 annual probability (0.1% AEP) of river or sea flooding - all land outside Zones 2 and 3).
- **Flood Zone 2 -** Land having between a 1 in 100 and 1 in 1,000 annual probability (0.1% - 1.0% AEP) of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability (0.1% - 0.5% AEP) of sea flooding.
- **Flood Zone 3 -** Land having a 1 in 100 or greater annual probability (>1.0% AEP) of river flooding; or Land having a 1 in 200 or greater annual probability (>0.5% AEP) of sea flooding.

Reduction in Risk of Flooding from Rivers and Sea due to Defences -Reduction in Risk of Flooding from Rivers and Sea due to Defences is a spatial dataset that indicates where areas have reduced flood risk from rivers and sea due to the presence of flood defences. The dataset has been created to help initiate conversations about the impact our flood defences have on the risk of flooding from the rivers and sea,and as a prompt to find out more about the flood defences in a particular area of interest. It does not replace any local, more detailed information.



This data is indicative only and reference should always be made to the legal documentation. It should be noted that amendments to the datasets are made frequently and that the information may change.

Risk of Flooding from Rivers and Sea

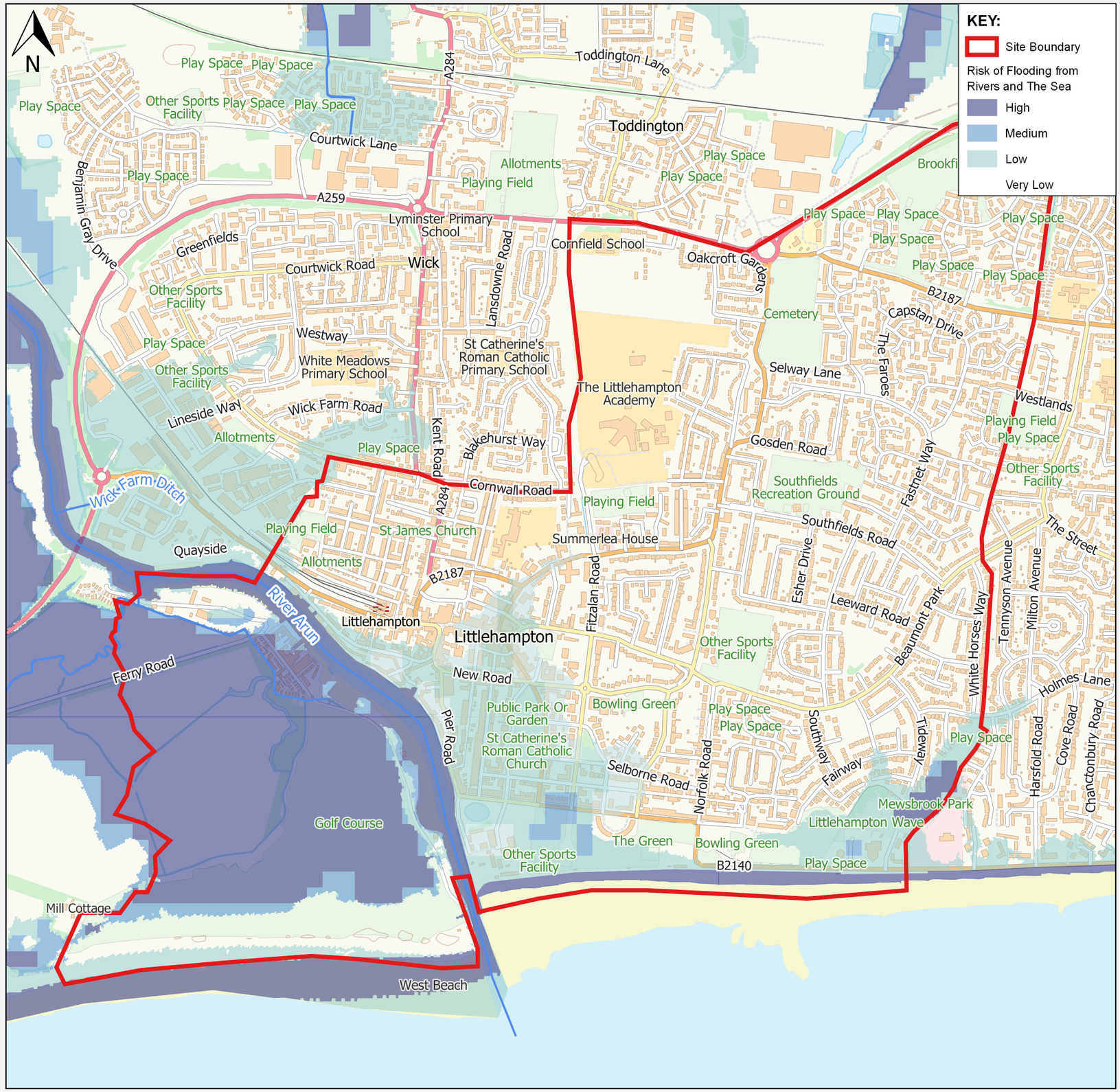
This map takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

High Risk - Land having a 1 in 30 or greater annual probability (>3.3% AEP) of flooding from rivers or the sea.

Medium Risk - Land having between a 1 in 30 and a 1 in 100 annual probability (1.0% - 3.3%) of flooding from rivers or the sea.

Low Risk - Land having between a 1 in 100 and a 1 in 1000 annual probability (0.1% - 1.0%) of flooding from rivers or the sea.

Very Low Risk - Land having a less than 1 in 1,000 annual probability (0.1% AEP) of flooding from rivers or the sea.



This data is indicative only and reference should always be made to the legal documentation. It should be noted that amendments to the datasets are made frequently and that the information may change.

Risk of Flooding from Surface Water

Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

High Risk - Land having a 1 in 30 or greater annual probability (>3.3% AEP) of flooding from surface water.

Medium Risk - Land having between a 1 in 30 and a 1 in 100 annual probability (1.0% - 3.3%) of flooding from surface water.

Low Risk - Land having between a 1 in 100 and a 1 in 1000 annual probability (0.1% - 1.0%) of flooding from surface water.

Very Low Risk - Land having a less than 1 in 1,000 annual probability (0.1% AEP) of flooding from surface water.

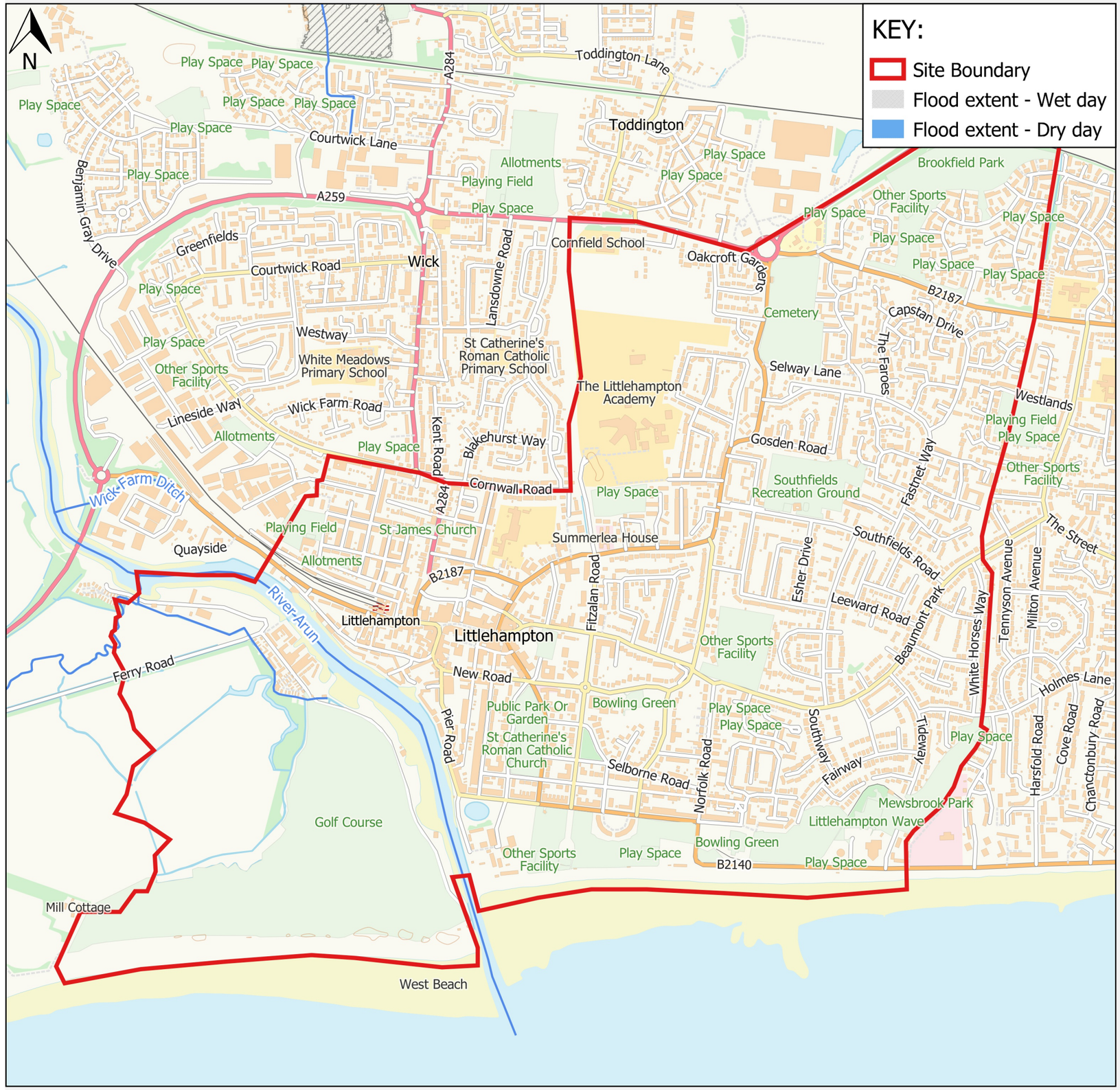
Risk of Flooding from Reservoirs

The Risk of Flooding from Reservoirs (wet day) layer shows the individual flood extents for all large raised reservoirs in the event that they were to fail and release the water held on a "wet day" when local rivers had already overflowed their banks.

It represents a prediction of a credible worst-case scenario, however it's unlikely that any actual flood would be this large. The data gives no indication of likelihood or probability of reservoir flooding.

The Risk of Flooding from Reservoirs (dry day) shows flood extents for all large raised reservoirs in the event that they were to fail and release the water held on a "dry day" when local rivers are at normal levels.

These national datasets are "indicative" not "definitive". Definitive information can only be provided by individual local authorities and you should refer directly to their information for all purposes that require the most up to date and complete dataset.



This data is indicative only and reference should always be made to the legal documentation. It should be noted that amendments to the datasets are made frequently and that the information may change.

Previous Flooding

RECORDED FLOOD OUTLINES
Recorded Flood Outlines shows all records of historic flooding from rivers, the sea, groundwater and surface water. The absence of coverage by Recorded Flood Outlines for an area does not mean that the area has never flooded, only that there are currently no records of flooding in this area. It is also possible that the pattern of flooding in this area has changed and that this area would now flood or not flood under different circumstances. The Recorded Flood Outlines take into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding. It includes flood extents that may have been affected by overtopping, breaches or blockages. Any flood extents shown do not necessarily indicate that properties were flooded internally.

HISTORIC FLOOD MAP
The Historic Flooding shows the maximum extent of individual Recorded Flood Outlines from river, the sea and groundwater springs that meet a set criteria. It shows areas of land that has previously been subject to flooding. This excludes flooding from surface water, except in areas where it is impossible to determine whether the source is fluvial or surface water, but the dominant source is fluvial. If an area is not covered by the Historic Flood Map it does not mean that the area has never flooded, only that the EA do not currently have records of flooding in this area that meet the criteria for inclusion. It is also possible that the pattern of flooding in this area has changed and that this area would now flood or not flood under different circumstances. Outlines that don't meet these criteria are stored in the Recorded Flood Outlines dataset. The Historic Flood Map takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding. It will include flood extents that may have been affected by overtopping, breaches or blockages. Flooding is shown to the land and does not necessarily indicate that properties were flooded internally.

If an area is not covered by these layers, it does not mean that the area has never flooded, only that there are not currently records of flooding in the area.

This data is indicative only and reference should always be made to the legal documentation. It should be noted that amendments to the datasets are made frequently and that the information may change.

Flood Alert and Warning Areas

FLOOD ALERT AREAS

Flood Alert Areas are areas where it is possible for flooding to occur from rivers, sea and in some location's groundwater. A single Flood Alert Area may cover the floodplain within the Flood Warning Service Limit of multiple catchments of similar characteristics containing a number of Flood Warning Areas. A Flood Alert Area may also match that of a corresponding Flood Warning Area and warn for the possibility of flooding in that area. In some coastal locations a Flood Alert may be issued for spray or overtopping and be defined by a stretch of coastline. Practical and administrative factors may also influence the exact extent of a Flood Alert Area. A Flood Alert is issued to warn people of the possibility of flooding and encourage them to be alert stay vigilant and make early / low impact preparations for flooding. Flood Alerts are issued earlier than Flood Warnings to provide advance notice of the possibility of flooding and may be issued when there is less confidence that flooding will occur in a Food Warning Area.

FLOOD WARNING AREAS

Flood Warning Areas are areas where flooding is expected to occur and where a Flood Warning Service is provided. Areas generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater. Specifically, Flood Warning Areas define locations within the Flood Warning Service Limit that represent a discrete community at risk of flooding. The purpose of Flood Warnings is to alert people that flooding is expected, and they should take action to protect themselves and their property. Flood Warnings are issued when flooding is expected to occur, Severe Flood Warnings are issued to similar areas when there is a danger to life or widespread disruption is expected.

If an area is not covered by these layers, it does not mean that the area has never flooded, only that there are not currently records of flooding in the area.

This data is indicative only and reference should always be made to the legal documentation. It should be noted that amendments to the datasets are made frequently and that the information may change.

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