Public

West Sussex County Council
S19 Flood Investigations

Storm Kathleen – Medmerry & Bracklesham, April 2024

UK0029462.4168

April 2025

West Sussex County Council

S19 FLOOD INVESTIGATIONS

Storm Kathleen, April 2024

REPORT (ISSUE 1) 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 across the region after Storm Kathleen in April 2024. The areas that experienced the most severe flooding, and which are therefore investigated within this report, were in Bracklesham and Medmerry.

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.

Bracklesham Caravan & Boat Club and Medmerry Cove Seaside Park were both flooded to varying degrees. Bracklesham Caravan & Boat Club experienced external flooding across most of the site, and internal flooding to several club buildings. Medmerry Cove Seaside Park experienced external flooding across the whole site and internal flooding to approximately 233 chalets. Both sites were flooded because of seawater overtopping the coastal defences at Medmerry West Beach.

WSP has completed an investigation into the causes, mechanisms, consequences, and responses associated with the April 2024 flood event. This has involved discussions with affected members of the public, site visits to the flooded locations, analysis of hydrology data, consultation with risk management authorities, and a review of photographic evidence.

The report also includes the findings of an analysis of tidal gauges from the Environment Agency and 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 at Medmerry and Bracklesham. These conditions caused overtopping of the coastal defences at Medmerry West Beach which led to flooding at Bracklesham Caravan & Boat Club and Medmerry Cove Seaside Park.

The information obtained from this investigation has led to a series of recommendations being made to reduce the risk of a similar event happening in the future. These range from property flood resilience measures to consideration of privately funded flood defence schemes, to replenishment and / or upgrade of the existing coastal defences.

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1 INTRODUCTION

1.1 BACKGROUND

1.1.1. WSP was commissioned by West Sussex County Council (WSCC) to conduct a Section 19 Flood Investigation following flooding which was reported in Earnley and Bracklesham in April 2024. The flooding occurred during Storm Kathleen which lasted from the 6th - 7th of April. The subjects of this report are two holiday parks, Bracklesham Caravan & Boat Club and Medmerry Cove Seaside Park, that were affected by the event. Refer to Figure 1-1 and Figure 1-2 below for their locations.

Figure 1-1 - Investigated Locations in West Sussex

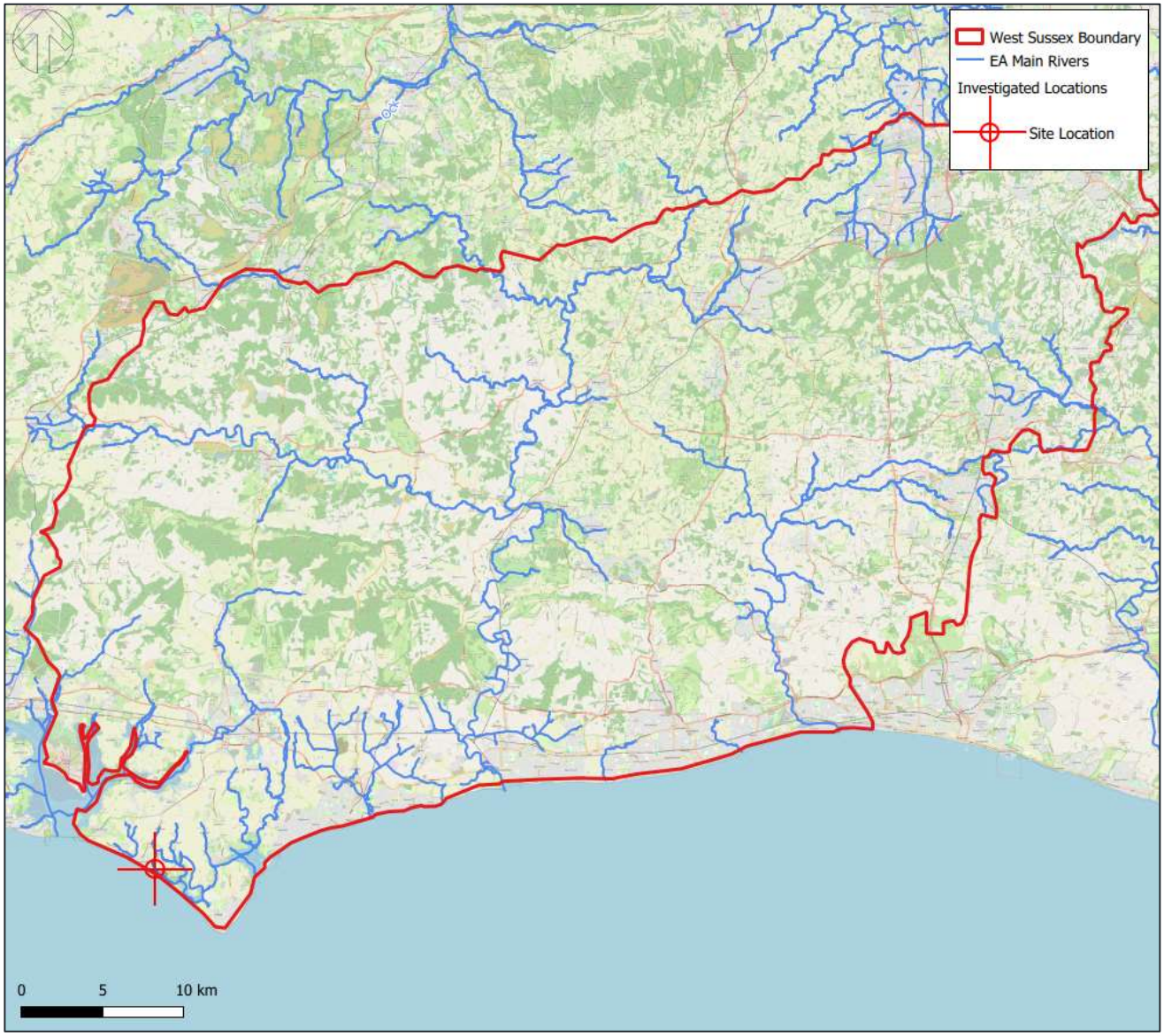


Figure 1-2 - Investigated Locations (Detailed)

**Refer to Table 1-1 for location details.*

1.1.2. West Sussex County Council has a responsibility under the Flood and Water Management Act 2010 (FWMA 2010) to undertake flood 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.*'

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

Table 1-1 – Flooded locations and number of properties affected

	Flood Location	Holiday Homes Externally Flooded	Holiday Homes Internally Flooded
1	Bracklesham Caravan & Boat Club	~276	0
2	Medmerry Cove Seaside Park	~268	~233

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 need for a full section 19 Flood Investigation was triggered.

1.3 SITE VISITS

1.3.1. WSP staff carried out site visits in the company of Chichester District Council officers and a Coastal Partners representative to each affected area on the following dates:

- Bracklesham Caravan & Boat Club – 03/10/2024
- Medmerry Cove Seaside Park – 02/10/2024

1.3.2. Site visits were completed to assist in the identification and mapping of flooding sources, causes, flow routes, and consequences.

1.3.3. Photographs from these site visits and the flood event 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, Chichester District Council, Coastal Partners, Parish Councils, 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 as given by West Sussex County Council officers, Chichester District Council officers, Coastal Partners, 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):

- is responsible for coordinating 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. West Sussex County Council has a Resilience and Emergencies Team that carries out statutory duties under the Civil Contingencies Act 2004. The team is a member of the Sussex Resilience Forum (SRF) and under Part 1 of their Flood Plan, has 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 CHICHESTER DISTRICT COUNCIL

2.2.1. If a major flood event occurs in Chichester, Chichester 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;
- dealing with road closures and disruption to social services in association with West Sussex County Council.

2.2.2. Under the Coast Protection Act 1949, Chichester District Council as the coast protection authority, has 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 is responsible for providing 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 Asset Management Periods (AMP). The current AMP runs from 2020-2025.

2.5 RIPARIAN LANDOWNERS

2.5.1. Landowners whose property is adjacent to a river, a stream or a ditch are likely to be 'riparian owners'. 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 winds 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. Tidal gauges from the EA and the National Network of Regional Coastal Monitoring Programmes (NNRCMP) were analysed and confirmed that extreme high tides were experienced along the south coast of England at the time of flooding at Medmerry and Bracklesham. Detailed analysis of the gauge data is shown in Appendix C.

3.1.4. Wave height data from the National Network of Regional Coastal Monitoring Programmes (NNRCMP) were analysed and are demonstrated in Appendix C. Although tide levels cannot directly be added to offshore wave heights to give an accurate height of the sea level against coastal defences at Medmerry West Beach, it is likely that the higher significant wave height experienced combined with a high spring tide level resulted in sea water overtopping the defences at Medmerry. When the above factors are considered, it is estimated the event had a return period equivalent to 1 in 100-year.

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 this flood event.

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

4.2 BRACKLESHAM CARAVAN & BOAT CLUB

INTRODUCTION & PREVIOUS FLOODING

4.2.1. Bracklesham Caravan & Boat Club is located in the east of Bracklesham and on the west bank of the Earnley Rife, as shown in Figure 4-1. Bracklesham is a coastal town, located in the south-west of West Sussex and falls within the boundary of Chichester District Council.

4.2.2. Topographically, Bracklesham Caravan & Boat Club is low lying in comparison to the rest of Bracklesham and sits behind sea defences managed by the Environment Agency. The defences include a clay-cored shingle bund with a ditch running along the inland toe of the bund to take any overtopping flows east and into the Earnley Rife. The defences continue to the east and the Medmerry Nature Reserve (refer to Figure 5-3 below).

4.2.3. The Earnley Rife flows from north to south and is located immediately east of Bracklesham Caravan & Boat Club. Past the club it flows south-east towards the Medmerry Nature Reserve before being conveyed via a culvert through rock armour defences and to sea.

4.2.4. During WSP's site visit to Bracklesham Caravan & Boat Club, it was reported that the site previously flooded in 2012 because of a blockage in Earnley Rife. Approximately 50 caravans were damaged internally and / or lost. Compensation was received from the Environment Agency. The site is also known to occasionally flood following heavy rainfall. However, flood depths are not considered to be significant.

Figure 4-1 - Bracklesham Caravan & Boat Club Location Plan

2024 FLOODING

4.2.5. From interviews with employees at Bracklesham Caravan & Boat Club, it is understood that the flooding occurred at approximately 1am on the morning of the 9th of April 2024. The flooding occurred a few days after Storm Kathleen, which caused heavy rainfall, and during Storm Pierrick, which caused a strong tidal surge. The main source of flooding is understood to have been sea water which overtopped the Environment Agency's coastal defences at Medmerry and flooded land behind the defences, including the Earnley Rife. This caused flows in the Earnley Rife to back up and come out of bank adjacent to the club.

4.2.6. Employees at the club also reported waves overtopping the Chichester District Council sea defences and flooding East Bracklesham Drive to the west. Floodwater is reported to have then flowed east along East Bracklesham Drive and through the Bywaves development which borders the club, and from there into the club itself. The entrance to Bracklesham Caravan & Boat Club is low lying and filled up with floodwater, some of which then flowed through the entrance.

4.2.7. Employees also reported coastal water flooding the site directly from south of the site, where seawater overtopped the coastal defences and flowed down an access ramp into the park.

4.2.8. Although it was reported that East Bracklesham Drive and Bywaves experienced external coastal flooding, no reports of internal flooding have been received, possibly due to the properties being built on higher ground than Bracklesham Caravan & Boat Club.

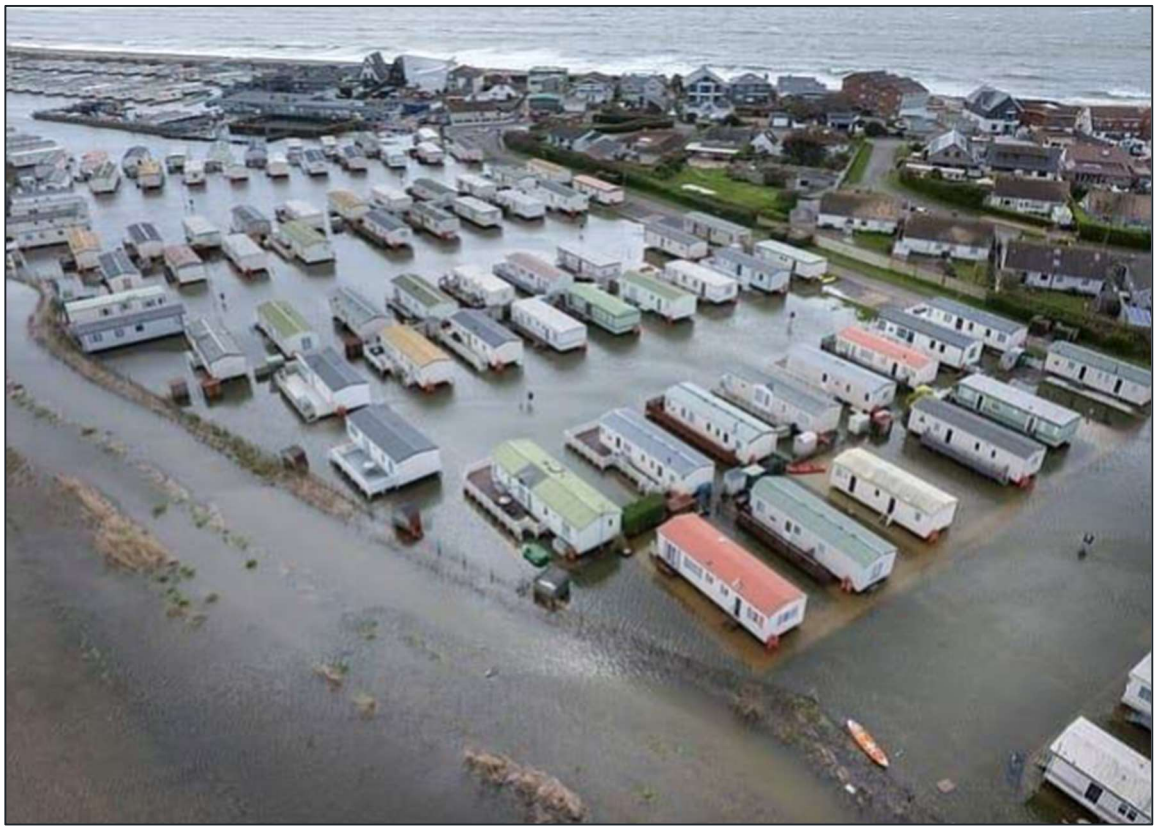
4.2.9. Once floodwater had entered the club, it flowed to the north of the site where ground levels are lowest. The maximum depth of flooding was approximately 1m in this part of the site. In other parts of the site, flood depths were approximately 400mm.

4.2.10. Internal flooding occurred to the site's club and meeting room. Floodwater also entered sheds and storage areas associated with individual caravans however no caravans experienced internal flooding. Approximately three cars were written off due to floodwater.

4.2.11. Immediately prior to the flood event, approximately 30 caravans were occupied. Some occupants chose to evacuate the site following receipt of a warning issued by the Met Office in the afternoon preceding the event. During the flood event itself, however, the club experienced a power cut and an overnight evacuation was not conducted because it was deemed unsafe, although some occupants were evacuated from the caravans to the club's office.

4.2.12. Employees reported that the fire brigade attended the club on the morning of the 9th of April to assist in evacuating the site in the daylight. They also reported that flooding occurred rapidly however it had subsided by the 10th of April 2024. Refer to Figure 4-2 below for an image of the flooding at the club.

Figure 4-2 - Flooding at Bracklesham Caravan & Boat Club (taken 09/04/2024)



Source: Bracklesham Caravan & Boat Club.

4.2.13. The flooding generally occurred in areas categorised as Flood Zone 3 as indicated on the Environment Agency's Flood Map for Planning (refer to Appendix E.1). The majority of Bracklesham Caravan & Boat Club is also shown as being in an area of high risk from flooding from rivers and

seas when coastal defences are considered. Refer to Appendix A, which details the locations of the flooded areas.

4.3 MEDMERRY COVE SEASIDE PARK

INTRODUCTION & PREVIOUS FLOODING

4.3.1. Medmerry Cove Seaside Park is located east of Bracklesham and is situated to the north of the Earnley Rife, as shown in Figure 4-3.

4.3.2. Topographically, Medmerry Cove Seaside Park is low lying and sits behind the Environment Agency's Sea defences. The Environment Agency's defences include a clay-cored shingle bund with wooden groynes.

4.3.3. The Earnley Rife flows south-east past the site and towards the Medmerry Nature Reserve before being conveyed via a culvert through rock armour defences and to sea. An ordinary watercourse also flows through the middle of Medmerry Cove Seaside Park and has a confluence with the Earnley Rife to the south of the park.

4.3.4. During WSP's site visit to the park, it was noted that the site previously flooded in 2012 because of a blockage in Earnley Rife. Furthermore, the pond in the middle of the park occasionally overflows after a period of heavy rainfall however flood depths are not considered to be significant.

Figure 4-3 - Medmerry Cove Seaside Park Location Plan

2024 FLOODING

4.3.5. From interviews conducted with employees at Medmerry Cove Seaside Park, it is understood that the flooding began at approximately 12:30am on the morning of the 9th of April 2024. It occurred a few days after Storm Kathleen, which caused heavy rainfall, and during Storm Pierrick, which caused a strong tidal surge.

4.3.6. Flooding occurred when seawater overtopped the Environment Agency's sea defences at Medmerry and flooded the land behind the defences. Floodwater first flooded Medmerry Nature Reserve and then flowed west, towards and onto Medmerry Cove Seaside Park. Employees at Medmerry Cove Seaside Park reported that flooding ingress was rapid however floodwater had subsided by the morning of 10th of April 2024.

4.3.7. Employees reported that of the 268 chalets at the park, approximately 233 were flooded internally. It was also reported that a substation failed, causing a loss of power to the site. Employees began moving guests to areas of higher ground soon after the flooding started until the coastguard arrived to support evacuation from the site at approximately 3am. Approximately 150 people were evacuated to the onsite pub initially. Eventually, approximately 230 people in total were evacuated offsite. The fire and ambulance services were also reportedly in attendance during the flood event, and one person was taken to hospital suffering from exposure. The site was fully evacuated by 6am on the 9th of April.

4.3.8. The whole of Medmerry Cove Seaside Park was flooded externally, causing approximately 150 cars to be written off. Flooding was deepest in the south of the park where floodwater was approximately 1.5m deep. Flood depths were approximately 1m across the middle of the park, reducing to zero in the very northern end of the site. Floodwater was made more dangerous due to debris carried along with it, including decking that had been dislodged from chalets across the site. Refer to Figure 4-4 for an image of the flooding that occurred at the park.

Figure 4-4 - Flooding at Medmerry Cove Seaside Park (taken 09/04/2024)

Source: Medmerry Cove Seaside Park.

4.3.9. The flooding generally occurred in areas categorised as Flood Zone 3 as indicated on the Environment Agency's Flood Map for Planning (refer to Appendix E.2). When coastal defences are considered, the majority of Medmerry Cove Seaside Park is located within an area of low risk of flooding from rivers and seas, excluding a small area of medium and high risk in the south of the park. Refer to Appendix A, which details the locations of the flooded areas.

5 CAUSES

5.1 INTRODUCTION

5.1.1. Overtopping of the sea defences located southeast of Medmerry Cove Seaside Park was the primary cause of the flooding that occurred in April 2024 in the Bracklesham / Medmerry area.

5.1.2. Bracklesham Caravan & Boat Club was indirectly flooded by seawater filling the Earnley Rife causing backing up and overtopping of the rife adjacent to the site. In comparison, Medmerry Cove Seaside Park was flooded directly by seawater overtopping the defences. The flooding occurred in the same period as Storm Kathleen and Storm Pierrick.

5.2 STORM KATHLEEN & STORM PIERRICK

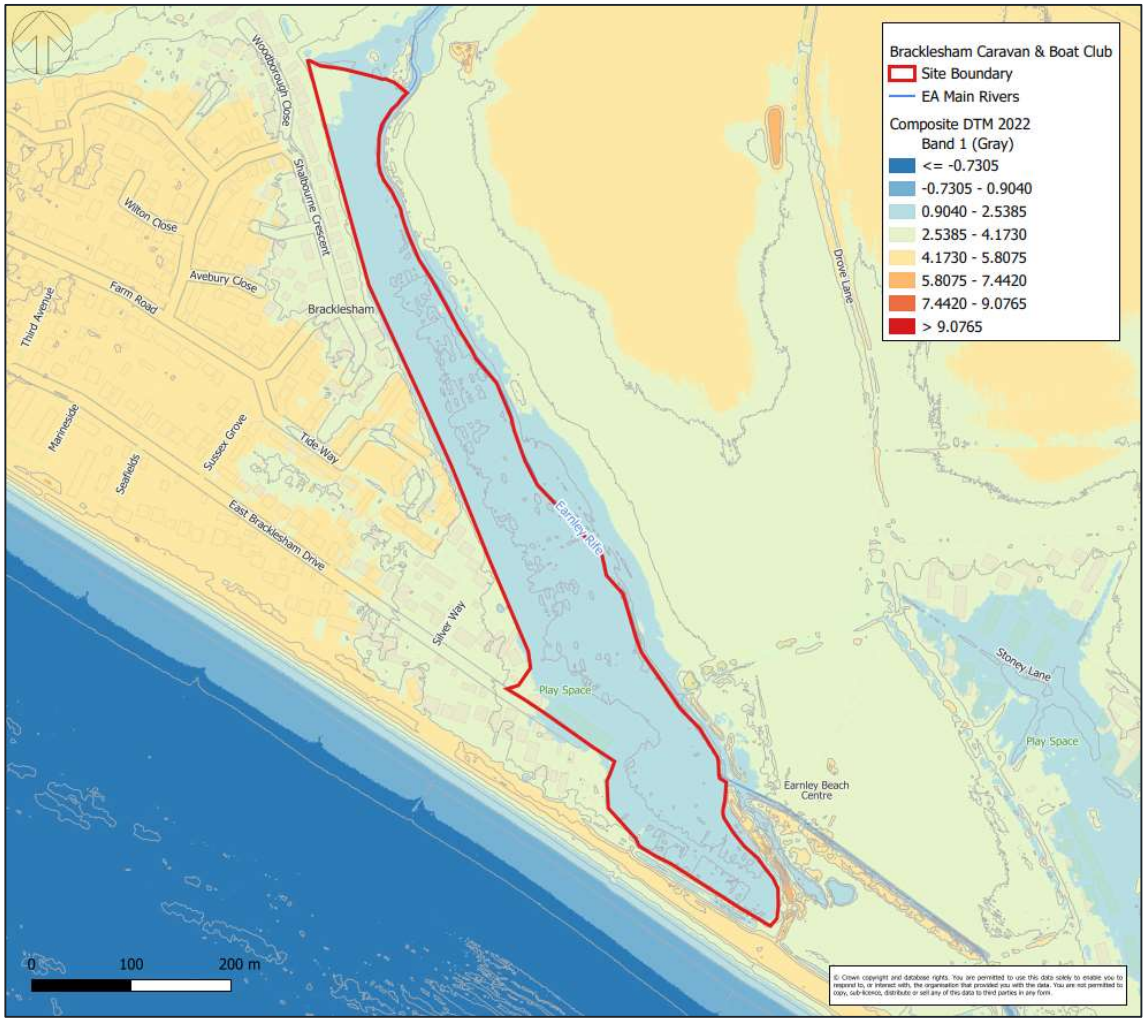
5.2.1. Storm Kathleen was the 11th Met Office named storm of the 2023 / 24 storm season and occurred on the 6th and 7th of April 2024. The storm caused a period of prolonged heavy rainfall and high winds. Furthermore, on the 8th and 9th of April the French named storm, Storm Pierrick, caused strong winds, large waves, and one of the highest tides of the year.

5.3 TOPOGRAPHY

5.3.1. During WSP's site visit to Bracklesham Caravan & Boat Club it was noted that there was minimal flow within the Earnley Rife. This was reported to frequently be the case, meaning that water may be restricted from draining out to sea.

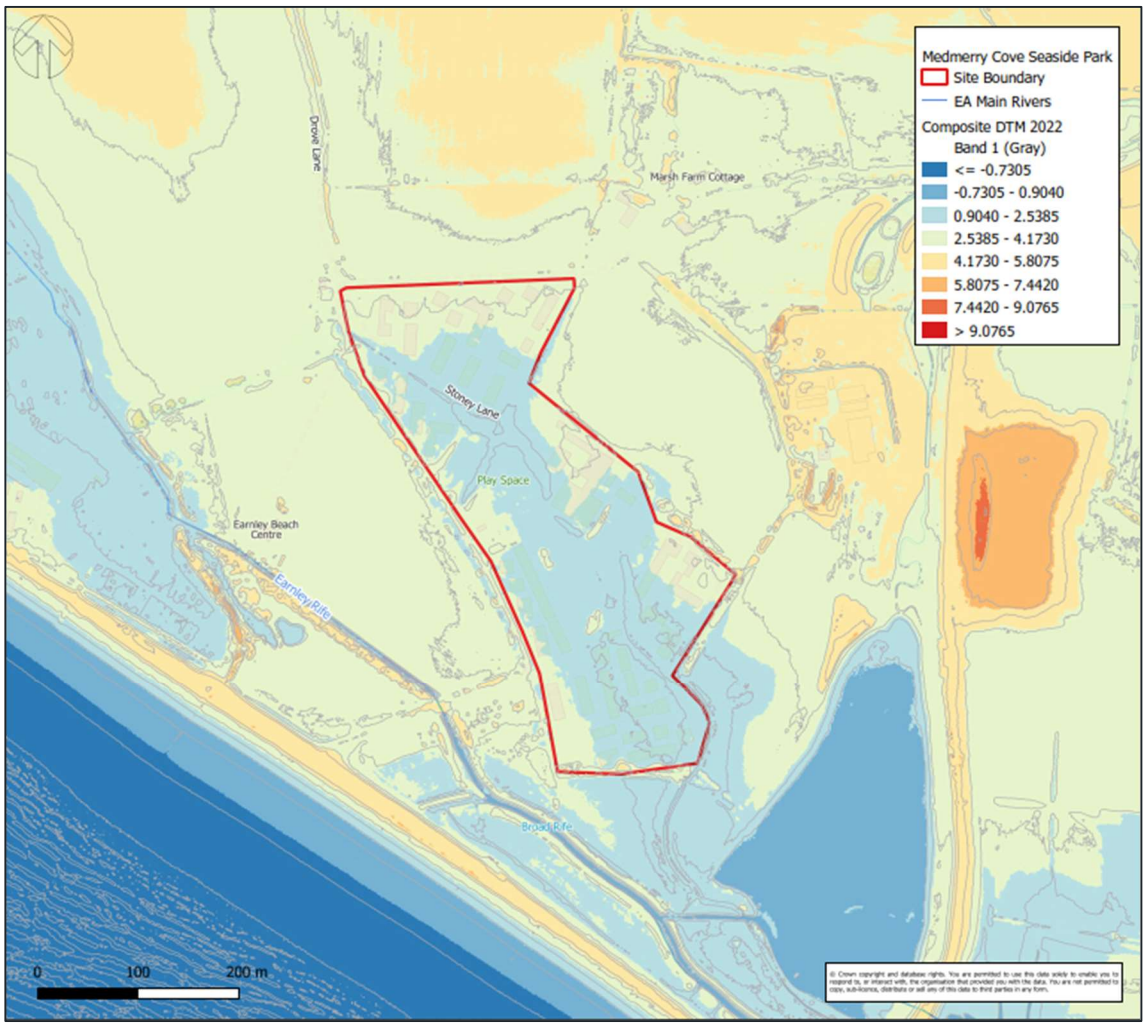
5.3.2. A review of LiDAR data (see Figure 5-1) shows that the club is situated in a topographically low spot. Land to the west and the east is set at a higher level such that when the rife floods it will gravitate to the site, as happened in April 2024.

Figure 5-1 - Bracklesham Caravan & Boat Club Topographic Plan



5.3.3. Medmerry Cove Seaside Park is also shown to be in a topographically low spot, as demonstrated in Figure 5-2. Fields to the east and west of Medmerry Cove Seaside Park are situated at a higher level which, in April 2024, caused seawater to channel directly into the park.

Figure 5-2 - Medmerry Cove Seaside Park Topographic Plan



5.4 SEA DEFENCES

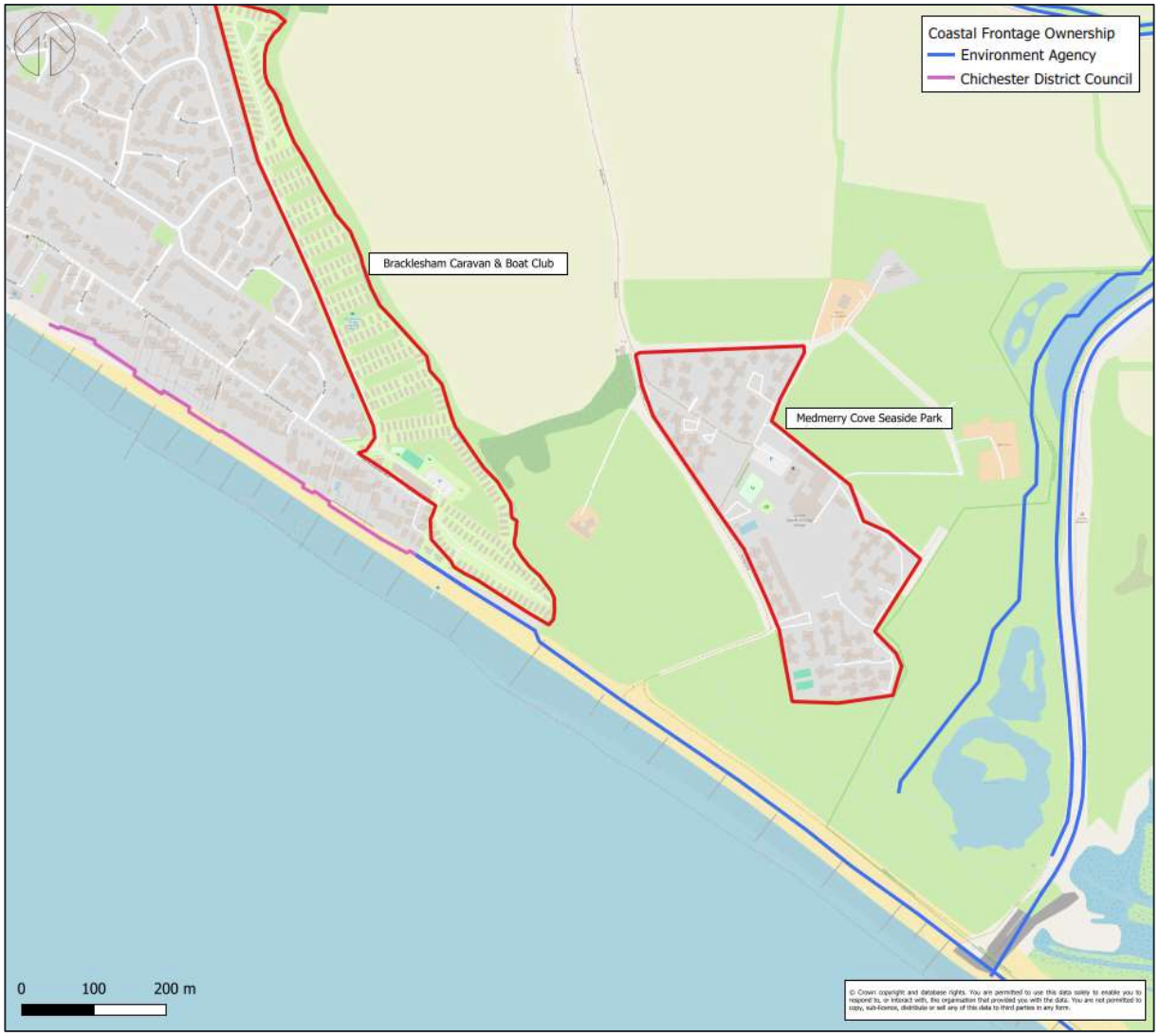
CHICHESTER DISTRICT COUNCIL DEFENCES

5.4.1. The coastal frontage to the south-west of Bracklesham Caravan & Boat Club is managed by Chichester District Council and Coastal Partners, as shown in Figure 5-3. The sea defence is formed by a built-up shingle beach in front of a concrete sea wall with groynes. Employees at Bracklesham Caravan & Boat Club reported witnessing waves overtop these defences in April 2024 and flood directly into the club and East Bracklesham Drive.

5.4.2. Chichester District Council has confirmed that sea defences levels at Bracklesham are at a height of 5.1m AOD and the Environment Agency has confirmed that tide levels reached 3.26m AOD. However, factors such as wave height mean that wave or spray overtopping may have occurred.

5.4.3. During WSP's site visit on the 3rd of October 2024, no damage to the defences was observed and it is understood they were in good condition at the time of the flood.

Figure 5-3 - Coastal Frontage Ownership



Source: Based on information from the Environment Agency and Chichester District Council.

ENVIRONMENT AGENCY COASTAL DEFENCES

5.4.4. The Environment Agency manages the sea defences from Bracklesham Caravan & Boat Club eastwards to the rock armour protecting the Medmerry Nature Reserve, as shown in Figure 5-3.

5.4.5. The Environment Agency applies the concept of managed realignment at Medmerry West Beach meaning that no formal maintenance or replenishment schedule is in place. Therefore, natural processes allow the beach to roll back. The Environment Agency has stated that the normal standard of protection for these defences is 1 in 1 year and this would have been the standard of protection prior to Storm Kathleen. However, they also stated that "*in reality, given the beach to the west with an engineered level of 5.2m AOD (the seaward side has grown a bit through natural processes) and the wrack line following the high tide in April 2024 following the large tide, we would estimate it to be between 1 in 20 to a 1 in 50 standard of protection against breach / flattening*".

5.4.6. Consultation with the Environment Agency confirmed that the defences at Medmerry West Beach were last replenished in 2020. Approximately 370m³ of shingle was deposited at the rear of the

defence in specific locations where the defence was becoming outflanked. Previously, in Autumn 2013, approximately 1200m² of shingle was deposited just outside of Medmerry West Beach following a breach in the main Medmerry scheme.

5.4.7. The Environment Agency confirmed that in Winter 2020/21 it identified that the beach had a sediment deficit. During the 2022 and 2023 winter seasons, the defences had narrowed because of shingle over-washing and rolling inland. In 2023 it was determined that importing in extra material could benefit the managed realignment and improve the efficiency of the defence. The Environment Agency deposited approximately 90-100 tonnes of shingle at the eastern end of the beach, however poor weather and tidal surges prevented the remainder of the works from taking place. This meant that approximately only 5% of the planned works were completed (total planned recharge = 1,800 tonnes).

5.4.8. A survey conducted on the 3rd of November 2023 showed the crest level at the eastern end ranged between 3.6m AOD and 4.6m AOD compared to a nominal level of 4.96m AOD. Furthermore, the crest level had been transported 18m inland at the eastern end and 5m inland at the western end. It is not clear if the trigger levels for flood alerts and warnings were reduced in consideration with the reduction in protection and coastal defence height. For comparison, peak tide level was recorded at 3.26m AOD and significant wave height was recorded at 2.96m AOD.

5.4.9. The strong tidal surge in April 2024 allowed seawater to overtop the defences at Medmerry West Beach, possibly causing further damage to them, and flood inland, inundating Medmerry Cove Seaside Park and the Earnley Rife which itself caused backing up of flows in the Earnley Rife which culminated in overtopping of the rife and flooding of Bracklesham Caravan & Boat Club.

5.4.10. Figure 5-4 below shows the condition of the defences on the morning of the 9th of April 2024, after the flood event. Figure 5-5 below shows the appearance of the defences at the time of WSP's site visit on 2nd October 2024.

Figure 5-4 - Environment Agency's Sea Defence at Medmerry (taken 09/04/2024)

Figure 5-5 - Environment Agency's Sea Defence at Medmerry (taken 02/10/2024 - note drop in crest level)

5.5 EARNLEY RIFE FLAP VALVE

5.5.1. During WSP's site visit to Bracklesham it was noted that one of the culverts conveying the Earnley Rife below an access track to the south of Medmerry Sea Cove Park had mounting points for a flap valve. This suggests that a flap valve was previously fixed to the headwall to prevent water backing up the Earnley Rife in the event of seawater inundating the rife further downstream. Refer to Figure 5-6. The reason for the absence of the flap valve is not known, however it could have contributed to the flooding of Bracklesham Caravan and Boat Club.

Figure 5-6 – Earnley Rife Culvert Location (note flap valve mountings on inset image)

6 RISK MANAGEMENT AUTHORITIES

6.1 CHICHESTER DISTRICT COUNCIL / COASTAL PARTNERS

6.1.1. Consultation with Chichester District Council and Coastal Partners has confirmed that they attended the affected areas on the 10th of April 2024. Furthermore, Chichester District Council set up a rest centre at Earnley Church to the north of Bracklesham Caravan and Boat Club in response to the flood event.

6.2 ENVIRONMENT AGENCY

6.2.1. Flooding during Storm Kathleen was reported to the Environment Agency and in response the Environment Agency engaged with local authorities in several locations; however, they have not confirmed if they visited the park or club.

6.2.2. Prior to the April 2024 flood event, the following flood alerts were in place:

- Thorney Island to Bracklesham – In force: 07/04/2024 13:42 until 13/04/2024 11:33
- Coastal areas of Medmerry – In force: 08/04/2024 13:05 until 13/04/2024 11:33

6.2.3. The following flood warnings were in place after the flooding had begun, at the following times in April 2024:

- East Wittering and Bracklesham Coast – In force: 09/04/2024 11:11 until 10/04/2024 16:51
- Medmerry – In force: 09/04/2024 11:15 until 10/04/2024 16:40

6.2.4. The Environment Agency has confirmed that they are not aware of any specific issues or constraints associated with the Earnley Rife. Therefore, it has no plans to carry out improvement works to it.

6.2.5. In response to the April 2024 flood event, local residents reported that the Environment Agency attended Medmerry West Beach to complete emergency works and rebuild sections of the breached coastal defence.

6.2.6. Consultation with the Environment Agency confirmed that plans were in place for shingle recycling in October and November of 2024 with approximately 3500m³ of shingle being imported to strengthen the coastal defences at Medmerry West Beach. However, at the time of writing, it is not known if this work has been undertaken.

6.2.7. During WSP's site visit to Bracklesham Caravan & Boat Club on 3rd October 2024, employees reported that the Environment Agency had recently undertaken works on the Earnley Rife. This is believed to have been vegetation cutting and possibly other forms of maintenance. It was also reported that the Environment Agency checked the flap valves on the rock armour at Medmerry after the flood event and these were noted to be functioning as normal.

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.

7 RECOMMENDATIONS

7.1 INTRODUCTION

7.1.1. The following sections include recommendations on the actions that could be taken by the owners of the Bracklesham Caravan & Boat Club & Medmerry Cove Seaside Park, Environment Agency, and other authorities to reduce the risk of further flooding, and the consequences of that flooding, from being experienced again.

7.1.2. 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/

7.2 BRACKLESHAM CARAVAN & BOAT CLUB & MEDMERRY COVE SEASIDE PARK

7.2.1. It is recommended that the operators of Bracklesham Caravan & Boat Club and Medmerry Cove Seaside Park should sign up to the Environment Agency's warning system, if not already the case, to receive flood alerts and warnings in advance of potential groundwater, fluvial, tidal and coastal flooding events. These alerts and warnings can then be relayed to site occupants and be used to inform the next steps of the club and park's emergency plans.

7.2.2. Both Bracklesham Caravan & Boat Club and Medmerry Cove Seaside Park could consider updating their emergency / flood evacuation plans based on lessons learnt from the April 2024 flood event.

7.2.3. Both sites could also consider implementing property flood resilience measures to permanent buildings across the site, for example the office and club buildings. This could include the use of flood doors, waterproof airbrick covers, non-return valves, and placing electrical sockets at higher levels.

7.2.4. Furthermore, both sites could consider developing their own flood defence schemes, similar to that seen at Seal Bay Resort to the east of Medmerry Nature Reserve. For Bracklesham Caravan & Boat Club, this could include the installation of a bund along the north-east boundary of the site to prevent overtopping from the rife, and floodwater flowing into the park. For Medmerry Cove Seaside Park, this could include the installation of a bund along the south-east boundary of the site to prevent tidal floodwater affecting the park. Both of these potential defence schemes would require further investigation to understand design requirements and to ensure flood risk to others would not be increased.

7.3 ENVIRONMENT AGENCY

7.3.1. The most significant recommendation of this report is that the Environment Agency could consider replenishing or upgrading their sea defences, increasing the full length of defence to a level matching or exceeding the adjoining CDC defences to the west, thereby increasing the level of protection currently afforded to both sites.

7.3.2. Furthermore, it is recommended that the Agency could investigate the reason for the removal of the flap valve that is believed to previously have been in place along the Earnley Rife (refer to Section 5.5). The Environment Agency could consider reinstating the flap valve to prevent surcharging of flows in the rife, as was seen in April 2024. Modelling may be required to ensure that mounting a

new flap valve would not increase flood risk to properties downstream of the valve, such as Medmerry Cove Seaside Park.

7.3.3. The Environment Agency could conduct a topographic and condition survey of the Earnley Rife to better understand the levels along the watercourse. This could lead to better maintenance of the rife and inform concepts for flood alleviation within its catchment.

7.3.4. Consultation with the Environment Agency has confirmed that a combination of water level and half nearshore wave height is used to trigger their flood alerts and warnings. A height exceeding 4m will trigger a flood alert and a height exceeding 5.2m will trigger a flood warning. The Environment Agency could consider lowering these trigger values to better represent the status of the coastal defences at Medmerry West Beach. This would allow more time for preparation and evacuation for those at risk of flooding.

7.4 ENVIRONMENT AGENCY, CHICHESTER DISTRICT COUNCIL & COASTAL PARTNERS

7.4.1. The Environment Agency could form a multiagency partnership with Chichester District Council and Coastal Partners. The partnership could be used to create a Beach Management Plan that covers Bracklesham to Selsey. The plan could include agreed monitoring and actions to be carried out by the Environment Agency and Chichester District Council to ensure the coastal frontage is maintained sufficiently and provides the correct standard of protection.

8 CONCLUSIONS

8.1 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 Bracklesham, West Sussex. 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. Bracklesham Caravan & Boat Club and Medmerry Cove Seaside Park were both flooded to varying extents.

8.1.3. This report identifies the various Risk Management Agencies that have roles and responsibilities associated with flood risk and summarises 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 tidal gauges from the Environment Agency and 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 at Medmerry and Bracklesham. These conditions caused overtopping of the coastal defences at Medmerry West Beach which led to flooding at Bracklesham Caravan & Boat Club and Medmerry Cove Seaside Park.

8.1.5. Site visits were undertaken by WSP and representatives of Chichester District Council and Coastal Partners, and members of the public were consulted for details of what happened at both locations during the flood.

8.1.6. Causes of the flooding at both sites have been determined with the key cause appearing to be overtopping of the sea defences at Medmerry West Beach and flooding of land behind the defences, including Medmerry Holiday Park, and the surcharging of Earnley Rife which led to flooding of Bracklesham Caravan and Boat Club. The lack of flood warning prior to the onset of flooding and the absence of a historic flap valve on the Earnley Rife, may have exacerbated the severity of flooding.

8.1.7. A series of recommendations have been made for the Club and Park, the Environment Agency, and West Sussex County Council, Chichester District Council and Coastal Partners to consider, to reduce the risk of a similar event occurring again.

Appendix A

2024 FLOODED AREAS

Appendix B

PHOTOS

Appendix B.1

BRACKLESHAM CARAVAN & BOAT CLUB

Photo 1 – Bracklesham Caravan & Boat Club

Photo 2 – Bracklesham Caravan & Boat Club

Photo 3 – Bracklesham Caravan & Boat Club

Photo 4 – Bracklesham Caravan & Boat Club

Photo 5 – Bracklesham Caravan & Boat Club

Photo 6 – Bracklesham Caravan & Boat Club

Appendix B.2

ENVIRONMENT AGENCY COASTAL FRONTAGE

Photo 1 – Environment Agency Coastal Frontage

Photo 2 – Environment Agency Coastal Frontage

Photo 3 – Environment Agency Coastal Frontage, 03/10/2024

Photo 4 – Environment Agency Coastal Frontage, 03/10/2024

Appendix B.3

MEDMERRY COVE SEASIDE PARK

Photo 1 – Medmerry Cove Seaside Park Photos

Photo 2 – Medmerry Cove Seaside Park Photos

Photo 3 – Medmerry Cove Seaside Park Photos

Photo 4 – Medmerry Cove Seaside Park Photos

Appendix C

HYDROLOGY

TECHNICAL NOTE 1

DATE:	28 January 2025	**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 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 the Medmerry Cove Seaside Park and Bracklesham Caravan and Boat Club.

TIDE ANALYSIS

Tidal Gauge Data

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

- Medmerry Tidal Gauge[3] (xy: 483719, 94083): located in Medmerry, approximately 2.2 km southeast of the Medmerry Cove Seaside Park;
- Brighton[5] (xy: 533873, 103077): located approximately 52 km east of Medmerry; and,
- Sandown Pier[6] (xy: 459965, 83835): located approximately 24 km west 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] Received from the Environment Agency via email dated 12 November 2024
[4] https://coastalmonitoring.org/realtimedata/
[5] https://coastalmonitoring.org/realtimedata/?chart=88&tab=tides
[6] https://coastalmonitoring.org/realtimedata/?chart=92&tab=tides

TECHNICAL NOTE 1

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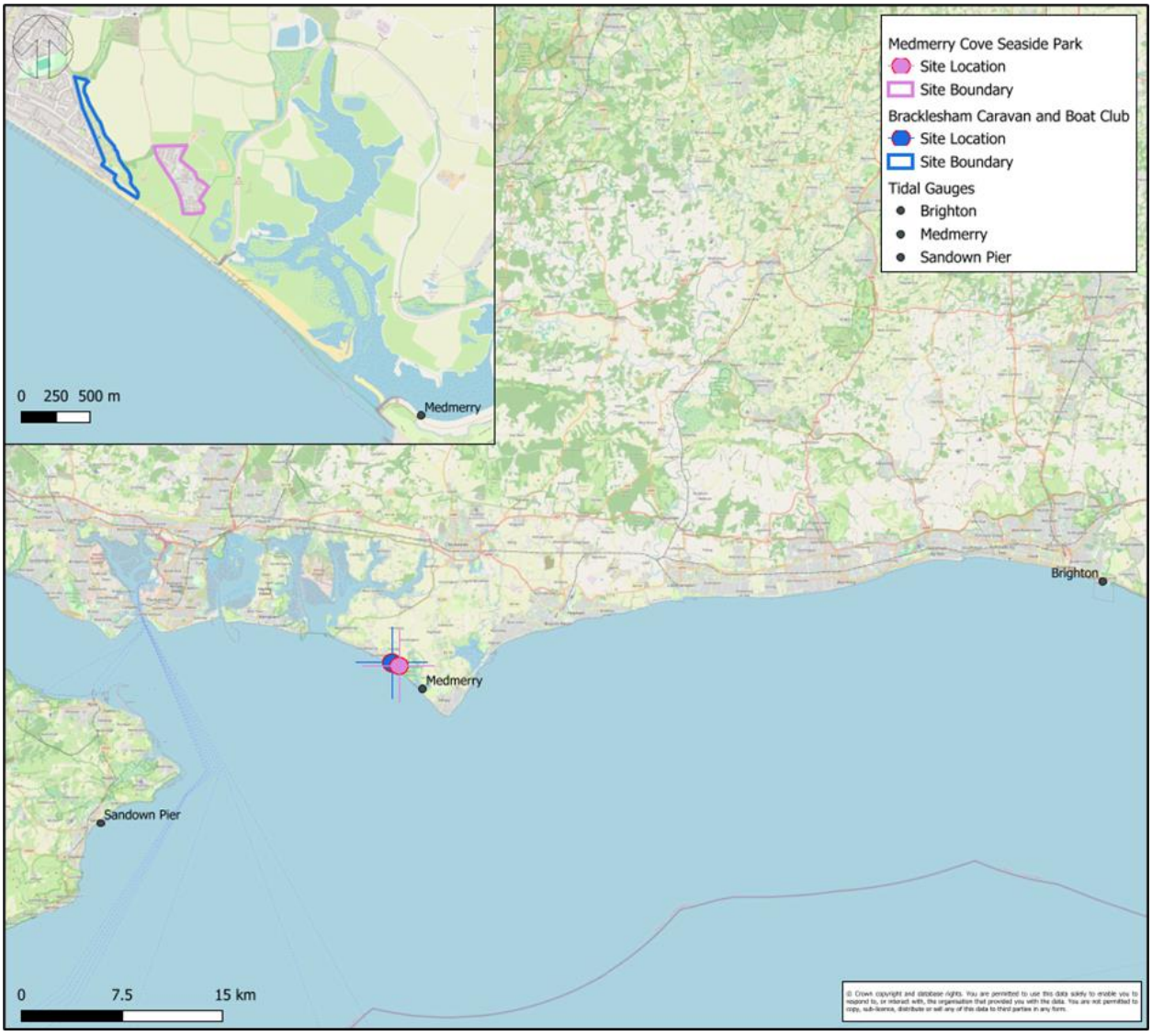

Figure 1 - Location of the gauges used for analysis.

A review of the tidal data confirmed that high spring tides were experienced at the time of Storm Pierrick. Figure 2 demonstrates that tide levels recorded at the Medmerry gauge from 00:00 5th April – 00:00 11th April peaked to 3.26 mAOD at 23:45 on the 8th of April. The Medmerry gauge is located relatively close to the subject site and thus provides a reasonably representative estimation of the likely levels experienced at the subject site. However, the accuracy of the data, as a comparison to levels at the subject site location, will be slightly limited because the gauge is located within the estuary, where tide levels are likely to vary slightly differently to those experienced directly on the coast.

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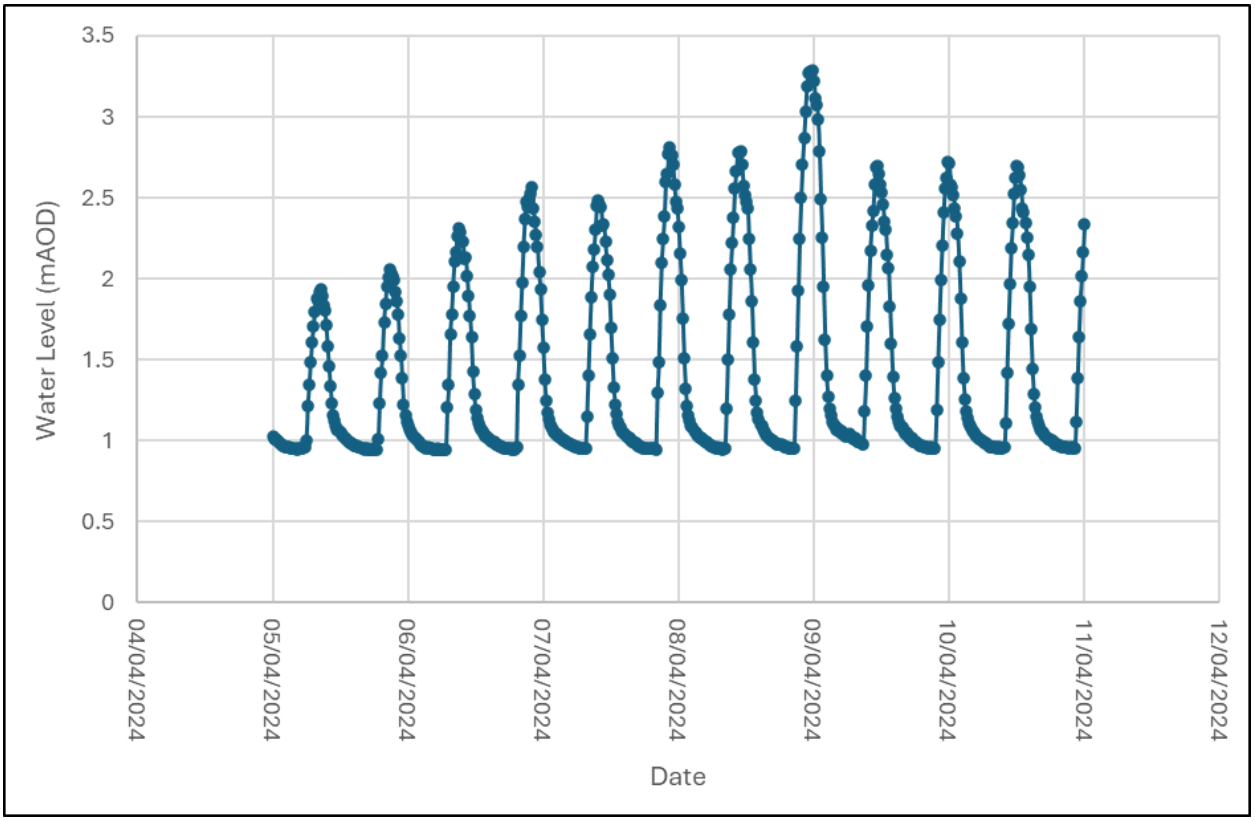

Figure 2 - Tide levels recorded by the Medmerry tidal gauge from 00:00 5th April to 00:00 11th April 2024.

Two gauges, available from the NNRCMP, located further away from the site, were reviewed to confirm the results visible at the Medmerry gauge. The gauge at Sandown Pier had no usable data between the 8th and 9th of April and was therefore discarded.

From the Brighton gauge, Figure 3 indicates a peak high tide of 4.19 mAOD at 23:10 on the 8th of April for the period between 5th April – 11th April 2024. 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

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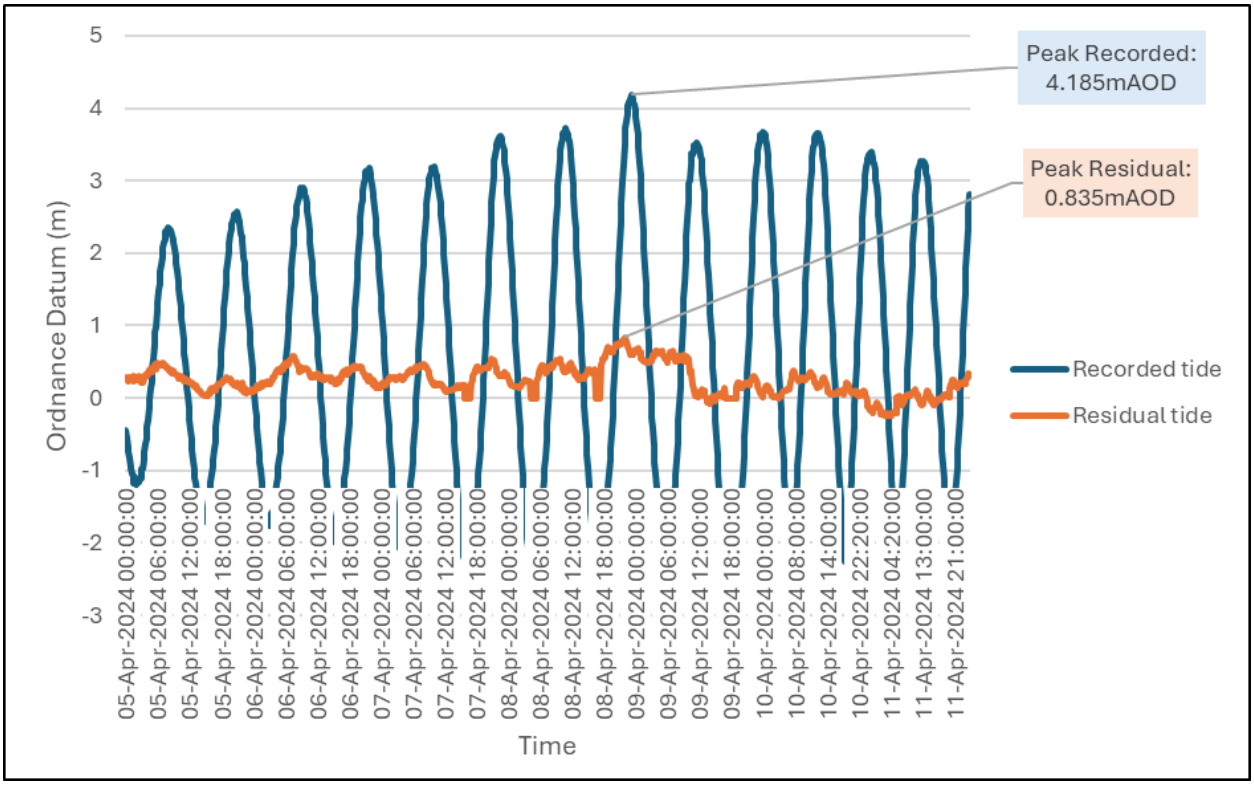

Figure 3 - The recorded and residual tides from the Brighton gauge obtained from the NNRCMP from 00:00 5th April to 23:50 11th April 2024.

It is important to note that storm surges do vary along the coast. As the Brighton gauge is located 52km to the east of the subject site, the tide levels experienced at Brighton are not representative of those seen at Medmerry and cannot be directly compared. Nevertheless, the data offers a clear indication of the conditions experienced at the time of the flooding events in Medmerry.

Coastal Flood Boundary Data

Along the coastline of the UK, the Environment Agency has a Coastal Flood Boundary Dataset[7] 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 Medmerry/Bracklesham and near Brighton were reviewed. The predicted extreme sea levels at these points were averaged to obtain an estimated sea level at Medmerry/Bracklesham and Brighton associated with the various return periods. This has been compared

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

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

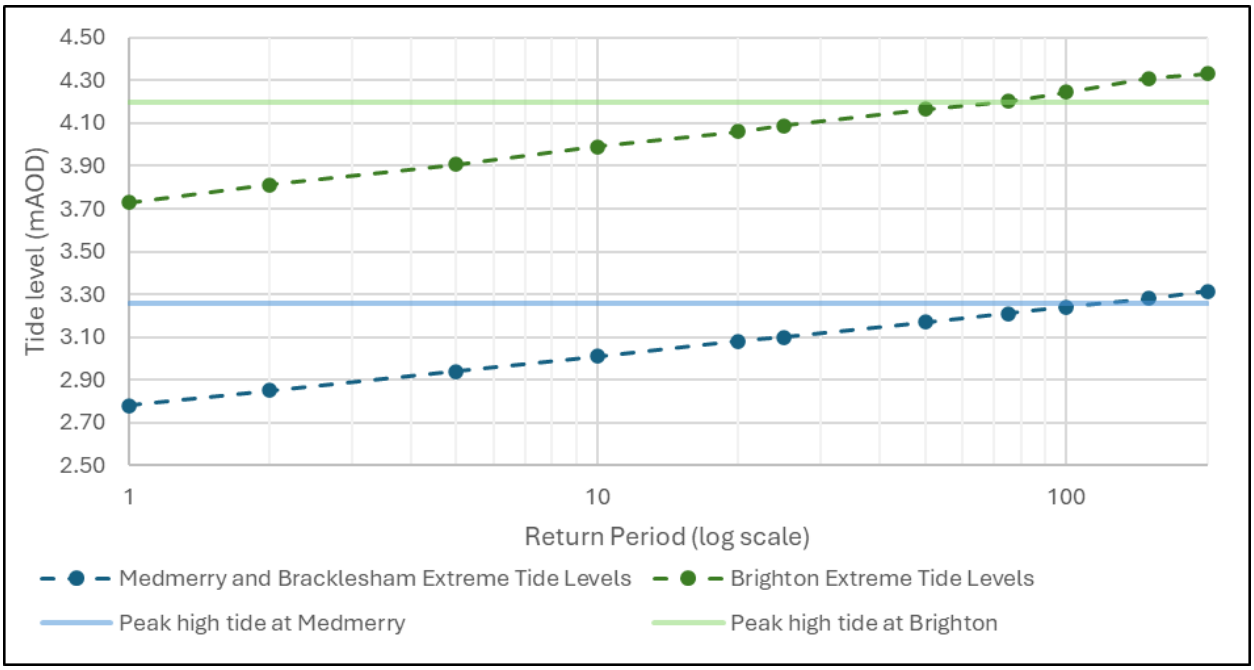

Figure 4 - Comparison of recorded peak high tide on 9th April at Medmerry (blue) and Brighton (green) against the extreme water level return periods obtained from the Environment Agency dataset.

Figure 4 demonstrates that the peak high tide of 3.26 mAOD experienced at Medmerry is estimated equivalent to a return period of a 1-in-100-year tide according to an average of the Environment Agency's Coastal Flood Boundary Dataset points along the coast at Medmerry and Bracklesham. Similarly, at Brighton, the experienced peak high tide of 4.19 mAOD is estimated equivalent to the average 1-in-75-year tide along the coast at Brighton.

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 Medmerry location, the recorded peak high tide level of 3. 2mAOD falls within the confidence intervals for a range of return periods from the 1-in-50-year to the 1-in-250-year.

WAVE HEIGHT ANALYSIS

Wave heights have been analysed using data from the National Network of Regional Coastal Monitoring Programmes (NNRCMP)[4]:

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- Bracklesham Bay gauge[8] (xy: 482143 , 092132): located approximately 3.38 km south of Medmerry Cove Seaside Park.

Figure 5 demonstrates that significant wave heights recorded at the Bracklesham Bay gauge on the 9th of April 2024, peaked to 2.96 mAOD at 06:30. These heights are below the storm alert threshold which is set at approximately 3.2 mAOD. The Bracklesham Bay gauge is located relatively close to the subject site and thus provides a reasonable representation of the wave heights experienced offshore. However, wave heights experienced offshore will not directly match the wave heights experienced at Medmerry West Beach due to factors such as seabed profile and water depth. Although tide levels cannot directly be added to wave heights offshore to give an accurate height of the sea level against coastal defences at Medmerry West Beach, it is likely that the higher significant wave height experienced combined with a high spring tide level resulted in sea water overtopping the defences at Medmerry.

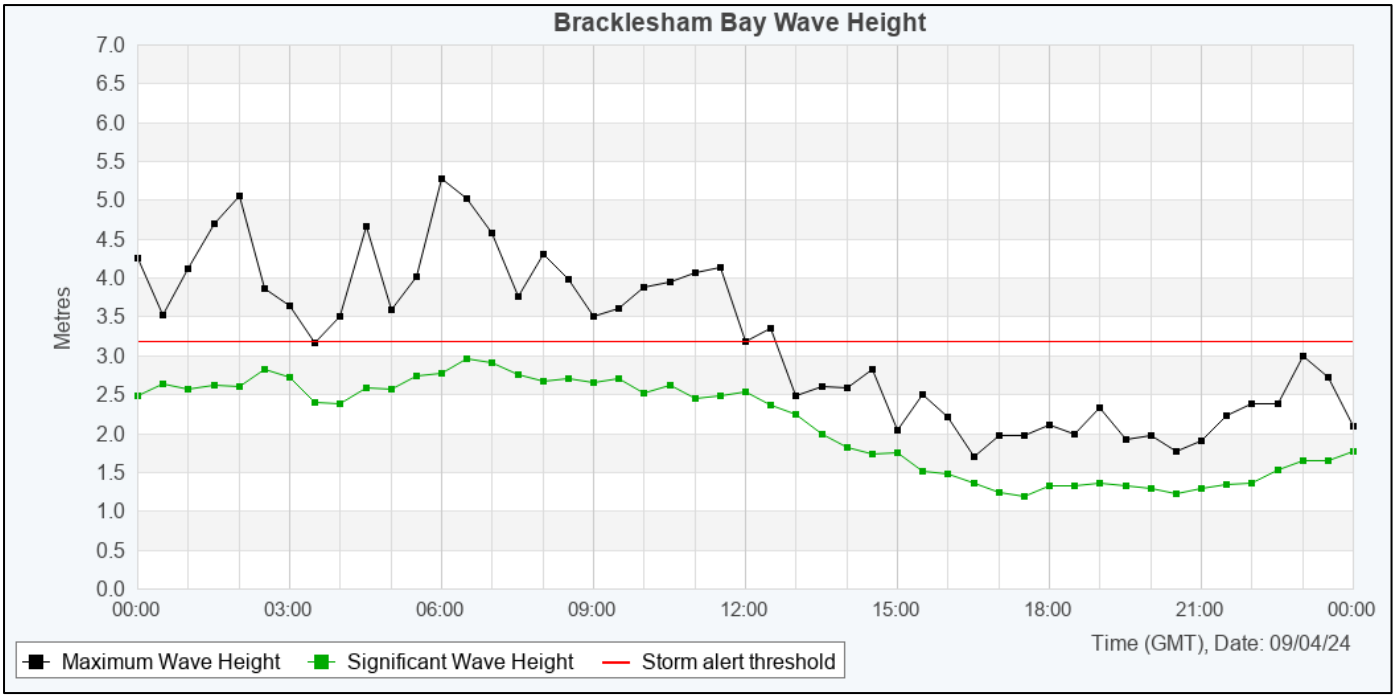


Figure 5 – Wave height recorded by the Bracklesham Bay gauge on the 9th April 2024.

[8] https://coastalmonitoring.org/realtimedata/?user_indate=09-04-2024&chart=67&tab=waves&disp_option=&datum=chart&range=day&submit=Go&website2=

Appendix D

CONSULTATION CORRESPONDENCE

Appendix D.1

ENVIRONMENT AGENCY

[redacted]

From: SSD Enquiries <SSDEnquiries@environment-agency.gov.uk>
Sent: 21 October 2024 09:55
To: [redacted]
Subject: SSD378391DP: 240802/JH02 West Sussex s19 Flood Investigation Enquiry

Dear [redacted],

Thank you for your email dated 30 September 2024.

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

We have logged this under the reference SSD378391DP, please quote this for any further correspondence about this topic.

We consulted our technical teams and here is our response

- **Defence type :**

  Shingle Beach with age expired timber groynes

- **Maintenance / replenishment programme:**

  The shoreline management plan policy for Medmerry West Beach is Managed Realignment. There is no formal programme of maintenance/replenishment of the beach, we are working with natural processes to allow the beach to roll back. We have addressed sediment deficit and outflanking pressure on the groynes since winter 2020/21. In 2023 we identified benefit in bringing some material to Medmerry West Beach to help facilitate this roll back and bolster the defence. This was to be sourced locally at Cakeham beach and delivered by our operations team however stormy weather meant tides did not drop sufficiently from the groynes for us to travel around safely and we had to move the team to incident response activities, so we did not bring in the material we had planned but approx. 90-100 t was placed at the eastern end. Further shingle recycling is planned for October/November 2024 where we plan to import up to 3500m3 to bolster the defence in the more landward position.

- **When were the defences last replenished?**

  In Autumn 2013 approx. 1200m^3 of shingle was deposited west of the western rock arm (just outside of West Beach) following the breach in the main Medmerry scheme. Since the breach the frontage has benefited from sediment coming from the realignment project to the east, but this has declined since 2020. In 2020 approx. 370m^3 shingle was deposited at the rear of the defence at specific locations where defences were becoming outflanked (i.e. behind the easternmost 3 groynes).

- **Normal Standard of protection ?**

  In our asset database (AIMS) it states a 1 in 1 standard of protection which covers the beach from the breach all the way to Bracklesham, however we believe this is misleading and incorrect. In reality, given the beach to the west with an engineered level of 5.2m AOD (the seaward side has grown a bit through natural processes) and the wrack line following the high tide in April 2024 following the large tide, we would estimate it to be between 1 in 20 to a 1 in 50 standard of protection against breach/ flattening. The nominal crest height was 4.96m AOD.

- **Condition of the defences immediately prior to Storm Kathleen / Storm Pierrick**

  Prior to the storm the defence width had narrowed over approx. 300m length and during the last two winters the defence had over-washed and rolled landwards towards at the eastern end of this section. Survey of 03-11-2023 shows a lowered crest over the eastern 250m ranging in level between 3.6m and 4.6m AOD with the crest 18m (eastern end) to 5m (western end) more landwards than in February 2022.

- **Standard of protection at the time of the Storm Kathleen / Storm Pierrick**

  Prior to the storm the standard of protection would have been a 1 in 1 with a crest height of 3.6m AOD at its lowest point. For information, Storm Cieran in November 2023 had a return period of 1 in 10 to 1 in 20 and saw some minor roll back, so this would seem a sensible value to use, however, this event was more a high wave height and low water level while April was high water level with small wave which was worse due to the lowered crest.

- **What warnings were issued of in advance of the flooding?**

*As provided previously (*see table at bottom of email chain*), the following messages were in force in advance of the flooding.*

Message Name	Message Type	Issued	Removed
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

- Wh**at 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 Bracklesham coastline.

Specifically, the triggers were: a combination of Water level and half nearshore wave height exceeding 4 m for a Flood Alert, and 5.2 m for a Flood Warning.

- **Were these systems working effectively at the time of the flooding?**

Yes – we were provided forecast information to assess conditions (note, forecasts are always imperfect), and the Flood Warning System used to distribute the messages was operational.

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

Hope we have answered your questions, please do not hesitate to contact us if you have any further questions.

Kind regards

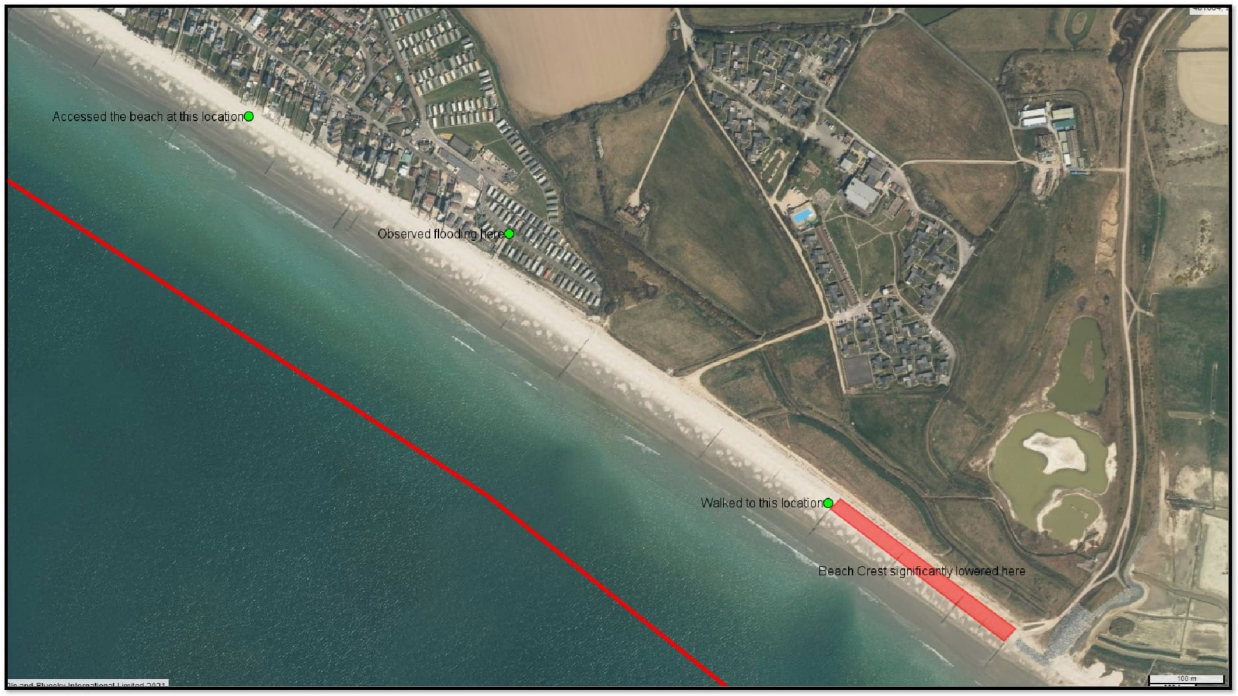
Dorah Phiri
Customers & Engagement Team
Solent and South Downs Area
Environment Agency | Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD
ssdenquiries@environment-agency.gov.uk
National Customer Contact Centre : 03708 506 506

Creating a better place for people and wildlife

From: [redacted]
Sent: 30 September 2024 15:30
To: SSD Enquiries <SSDEnquiries@environment-agency.gov.uk>
Cc: [redacted]
Subject: RE: SSD370808DP: 240802/JH02 West Sussex s19 Flood Investigation Enquiry

Dear Nath,

We are hoping for further information / details regarding the below points. I have attached a plan showing the specific section of sea front that we are interested in (area shaded as red) for clarity.



- Defence type

- Maintenance / replenishment programme
- When were the defences last replenished?
- Normal 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 warnings were issued of in advance of the flooding?
- What triggers / thresholds does the Environment Agency use to warn of flooding?
- Were these systems working effectively at the time of the flooding?

With regards to the site visits, I completely understand attendance may not be possible.

Kind regards,

[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 30, 2024 10:36 AM
To: [redacted]
Cc: [redacted]
Subject: RE: SSD370808DP: 240802/JH02 West Sussex s19 Flood Investigation Enquiry

Hello [redacted], thank you for your response. So that we can fulfil your request we require some more clarification as to the information you are seeking. Is there specific information regarding those storms that we have not already provided you that you wish to access?

With regards to your request for us to attend an in-person event, we will pass on this request to the relevant team, although given the short notice and our increased workloads at the moment responding to flood alerts/warnings it is likely we will not be able to attend.

We await to hear back with regards to clarifications from you on the information you are seeking.

Kindly,

Nath

Nath Bayley
Team Leader - 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

Creating a better place for people and wildlife

From: [redacted]
Sent: 30 September 2024 10:25
To: SSD Enquiries <SSDEnquiries@environment-agency.gov.uk>
Cc: [redacted]
Subject: RE: SSD370808DP: 240802/JH02 West Sussex s19 Flood Investigation Enquiry

Dear Dorah,

Thank you for your email and the provided information.

We have since been in discussions with members of Coastal Partners and Chichester District Council regarding Storm Kathleen/Pierrick and they have provided comments on the Environment Agency's Medmerry coastal defences and their condition prior to and during the storm. They also commented on flood warning processes in the lead up to, and during the storm. Are you able to provide any further information around this?

We will be visiting Earnley and Bracklesham on Wednesday 2nd October and Thursday 3rd October this week. I realise this is rather short notice but would like to give you the opportunity to attend these visits to provide further input. Could you let me know if this would be possible and I can provide further details?

Many thanks,

[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

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

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

Appendix E.1

BRACKLESHAM CARAVAN & BOAT CLUB

Site Location

CLOSEST MAIN RIVER

Earnley Rife

DISTANCE BETWEEN SITE AND CLOSEST MAIN RIVER

0m

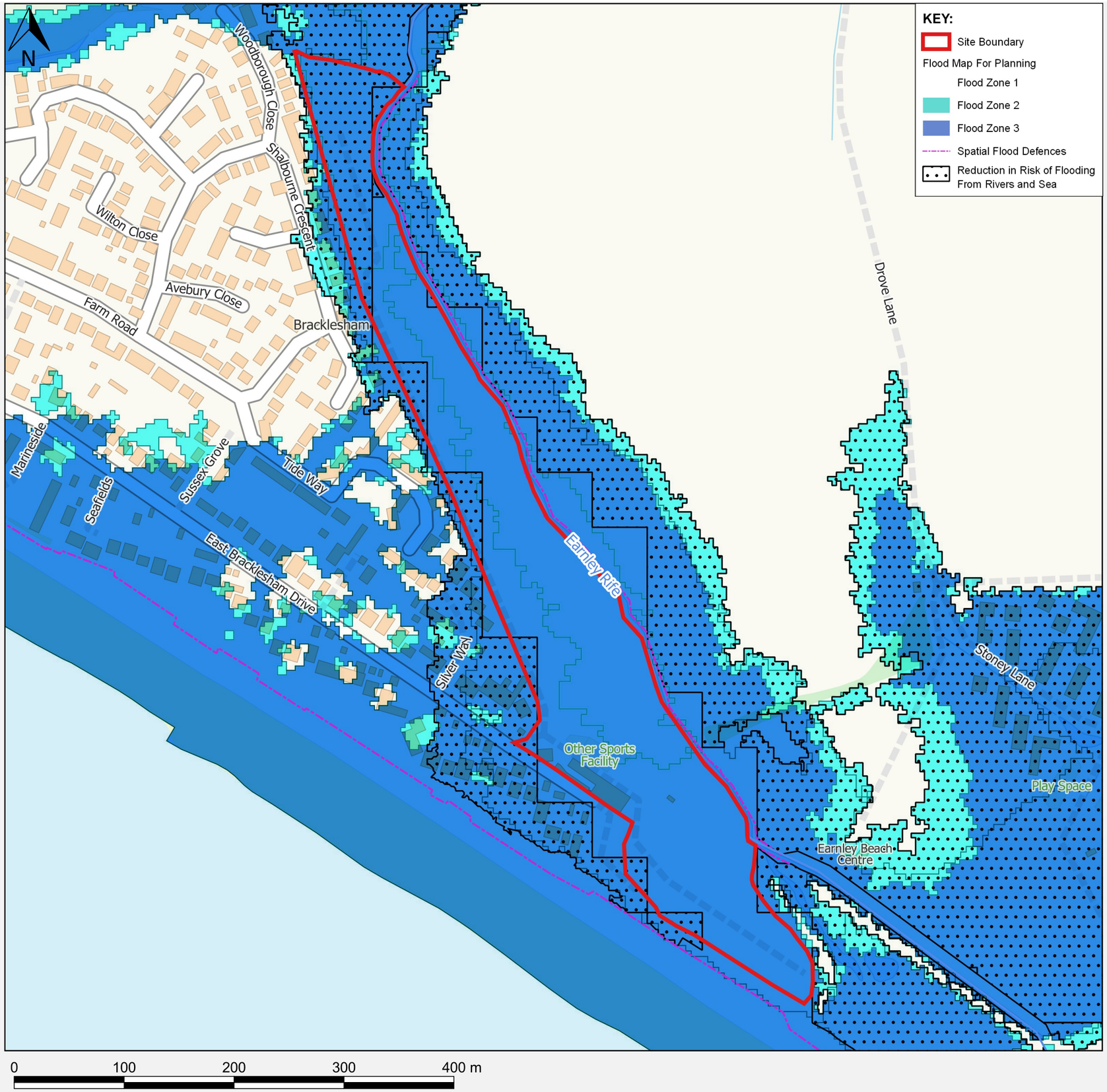
This data is indicative only and reference should always be made to the legal documentation. It should be noted that amendments to the datasets are made frequently and that the information may change.

Flood 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

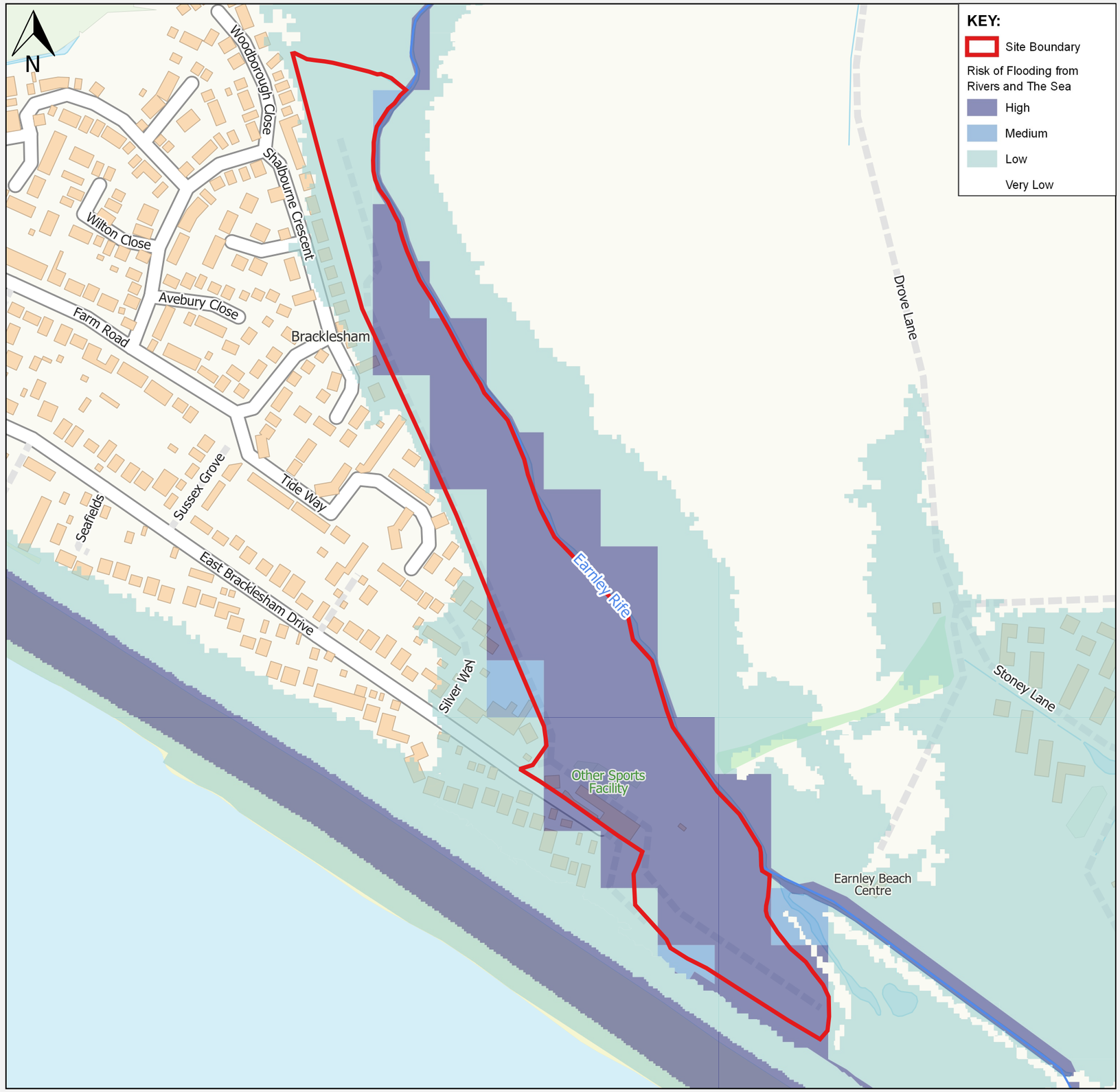
This map takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

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.



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.

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.

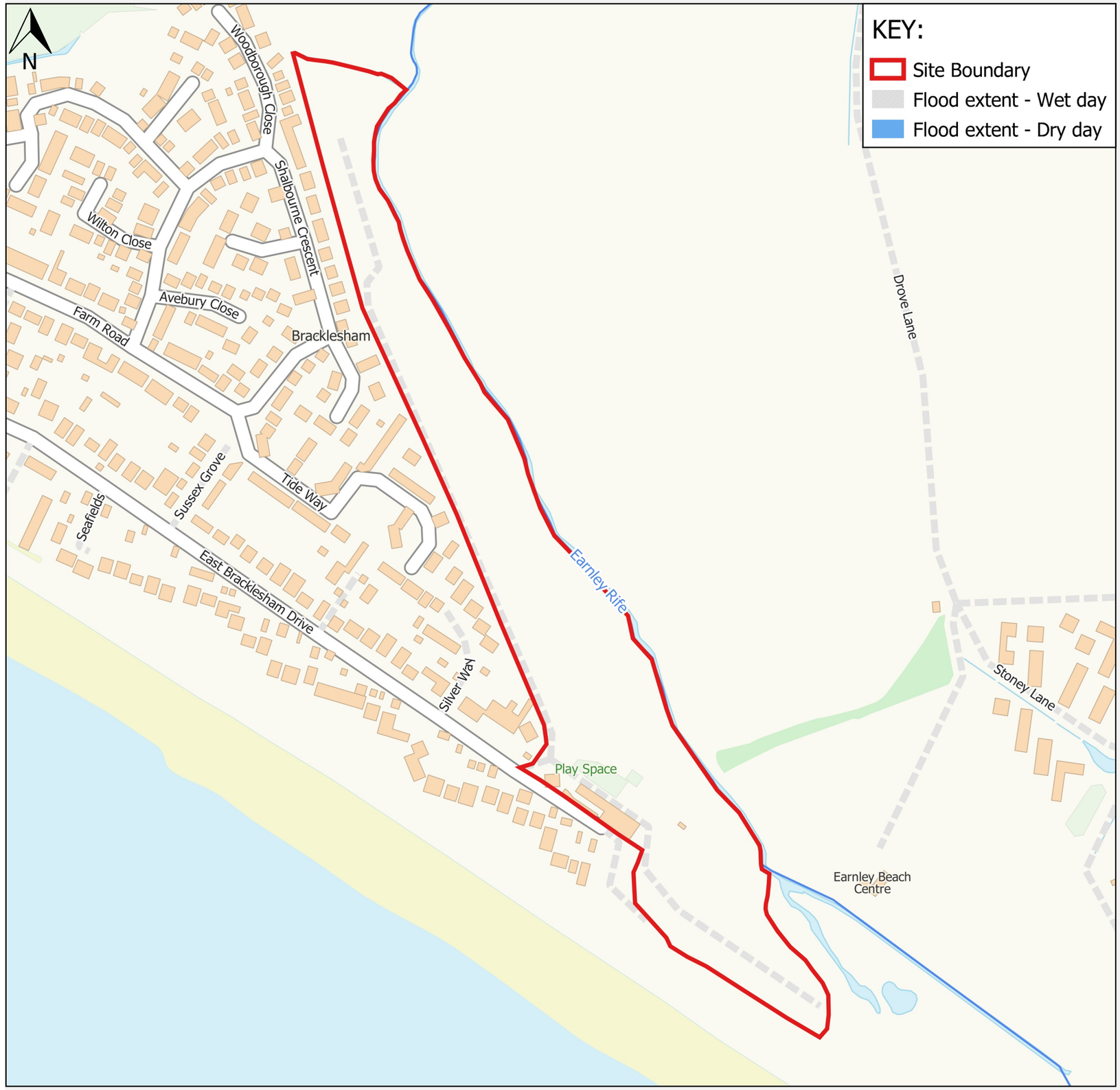
Risk of Flooding from Reservoirs

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.



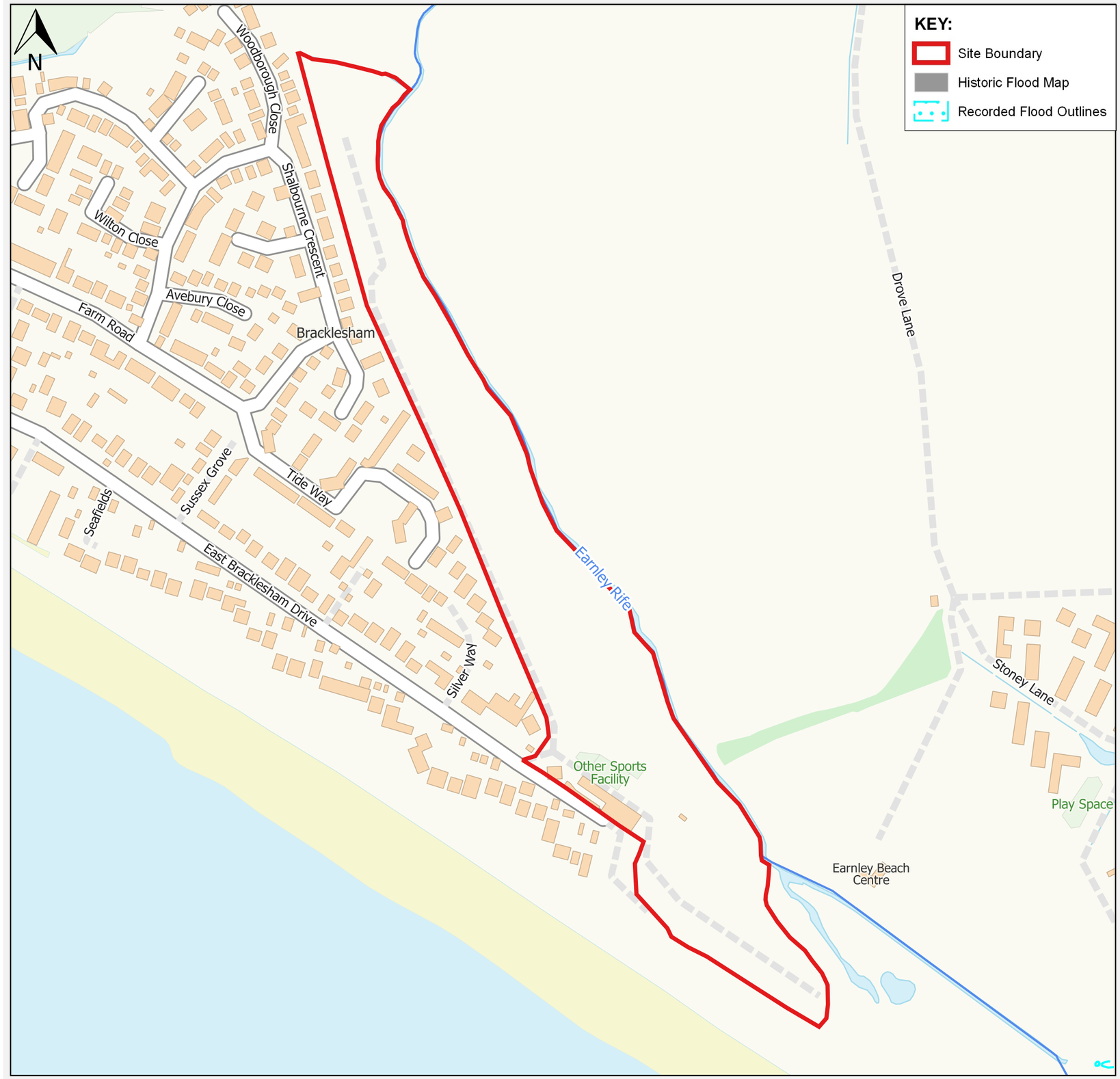
This data is indicative only and reference should always be made to the legal documentation. It should be noted that amendments to the datasets are made frequently and that the information may change.

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

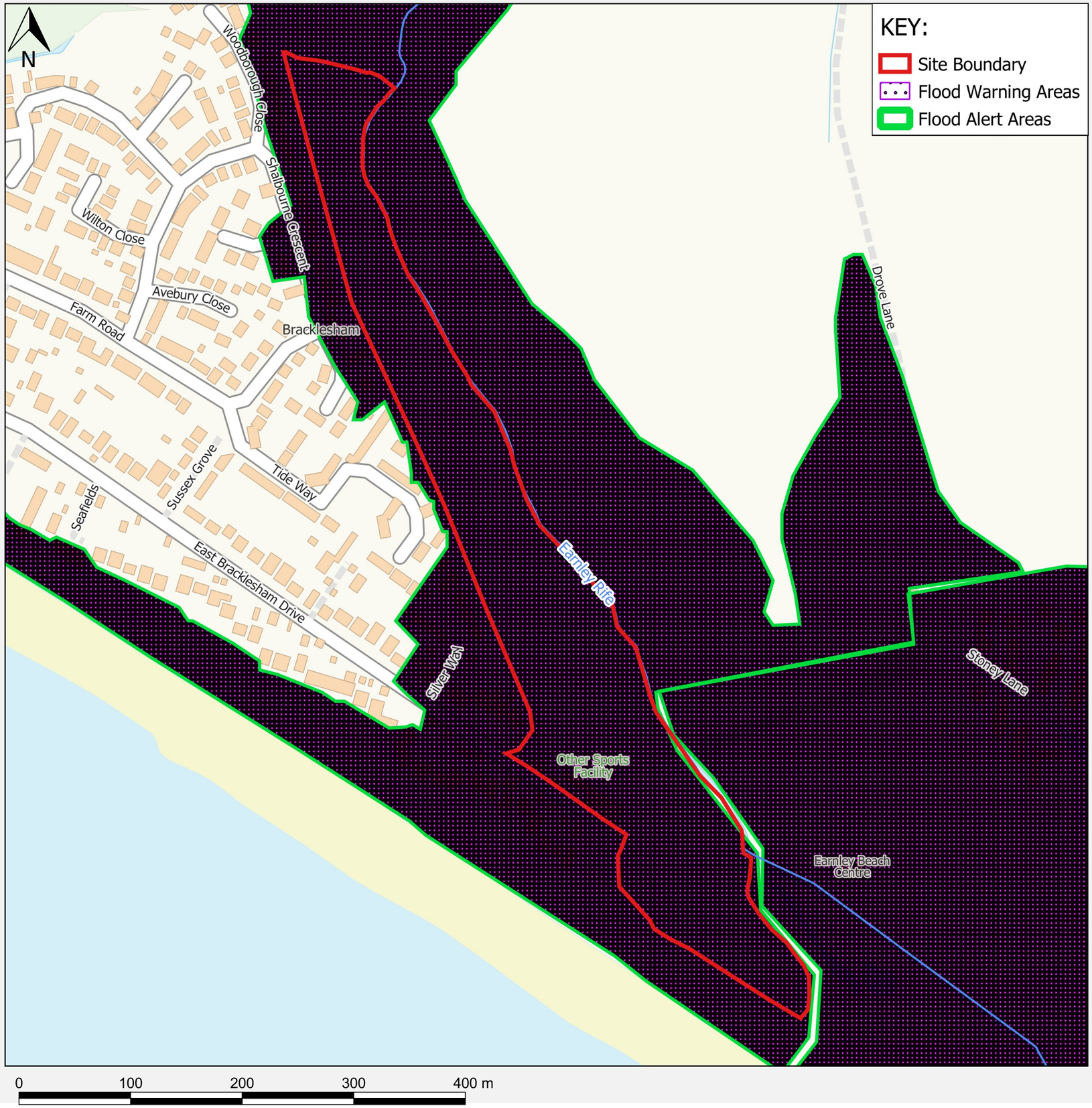
FLOOD ALERT AREAS

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.

Appendix E.2

MEDMERRY COVE SEASIDE PARK

Site Location

2

CLOSEST MAIN RIVER
Earnley Rife

DISTANCE BETWEEN SITE AND CLOSEST MAIN RIVER
52.9m

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 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.

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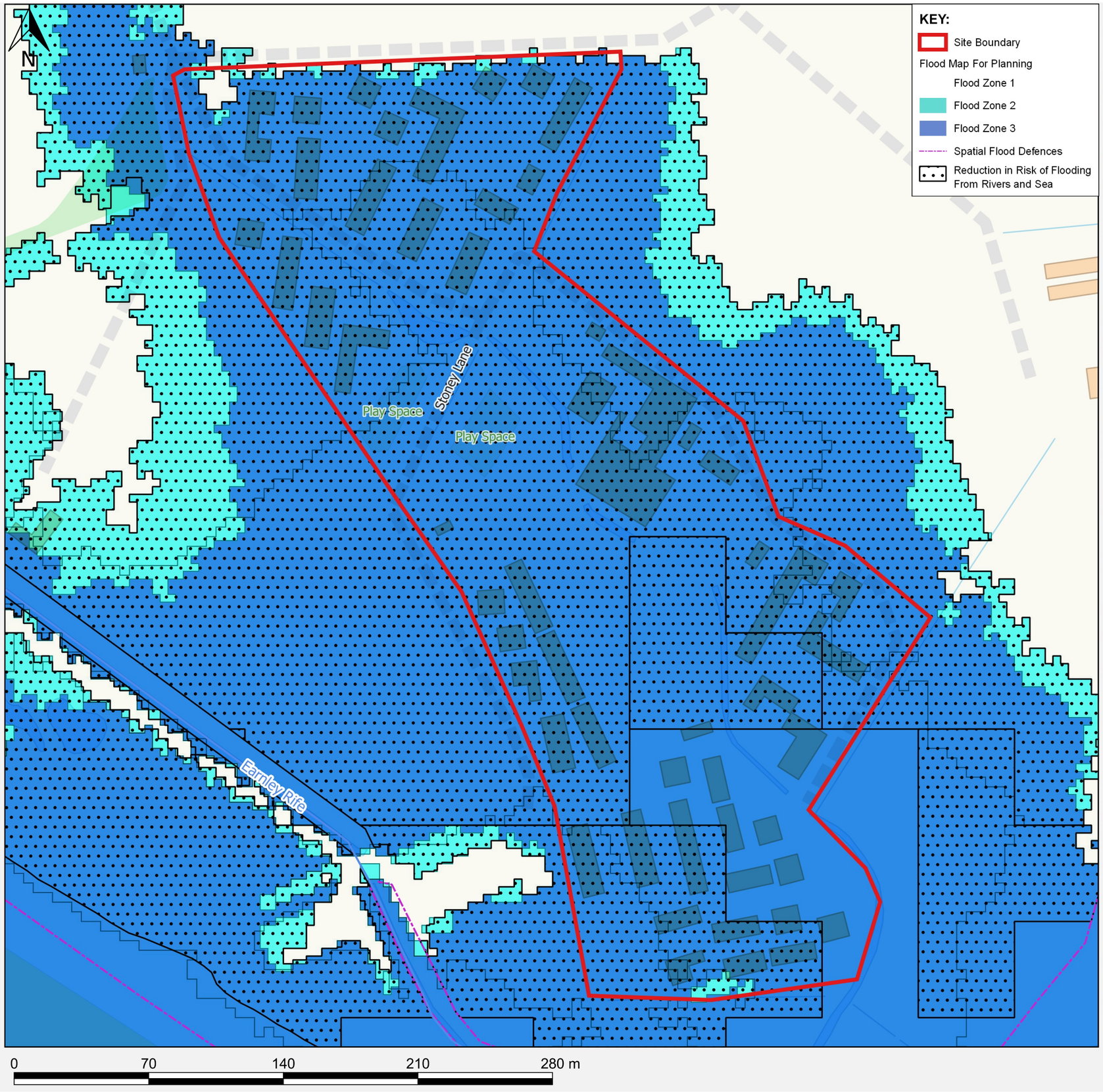

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Risk of Flooding from Rivers and Sea

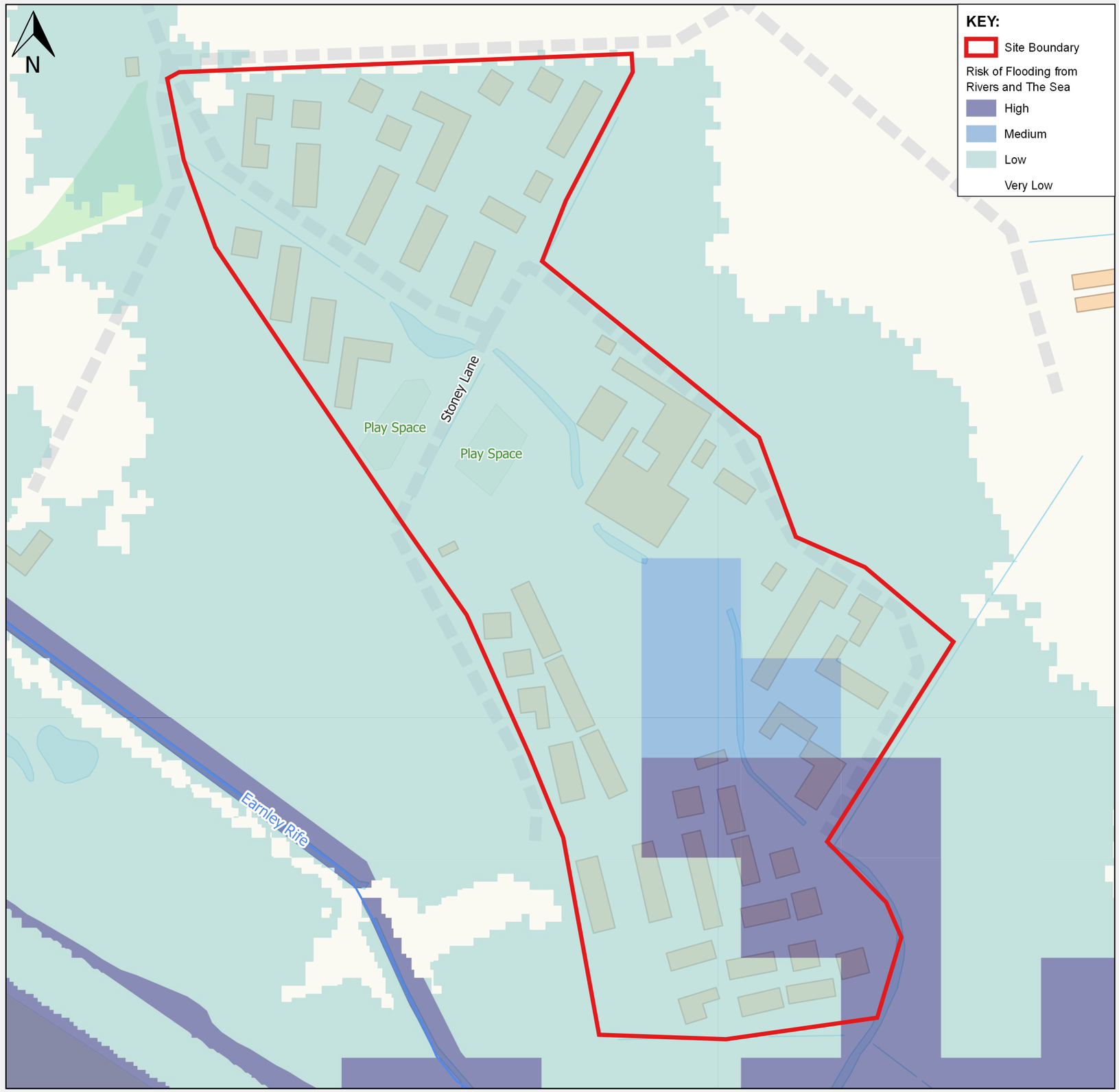
This map takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

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.

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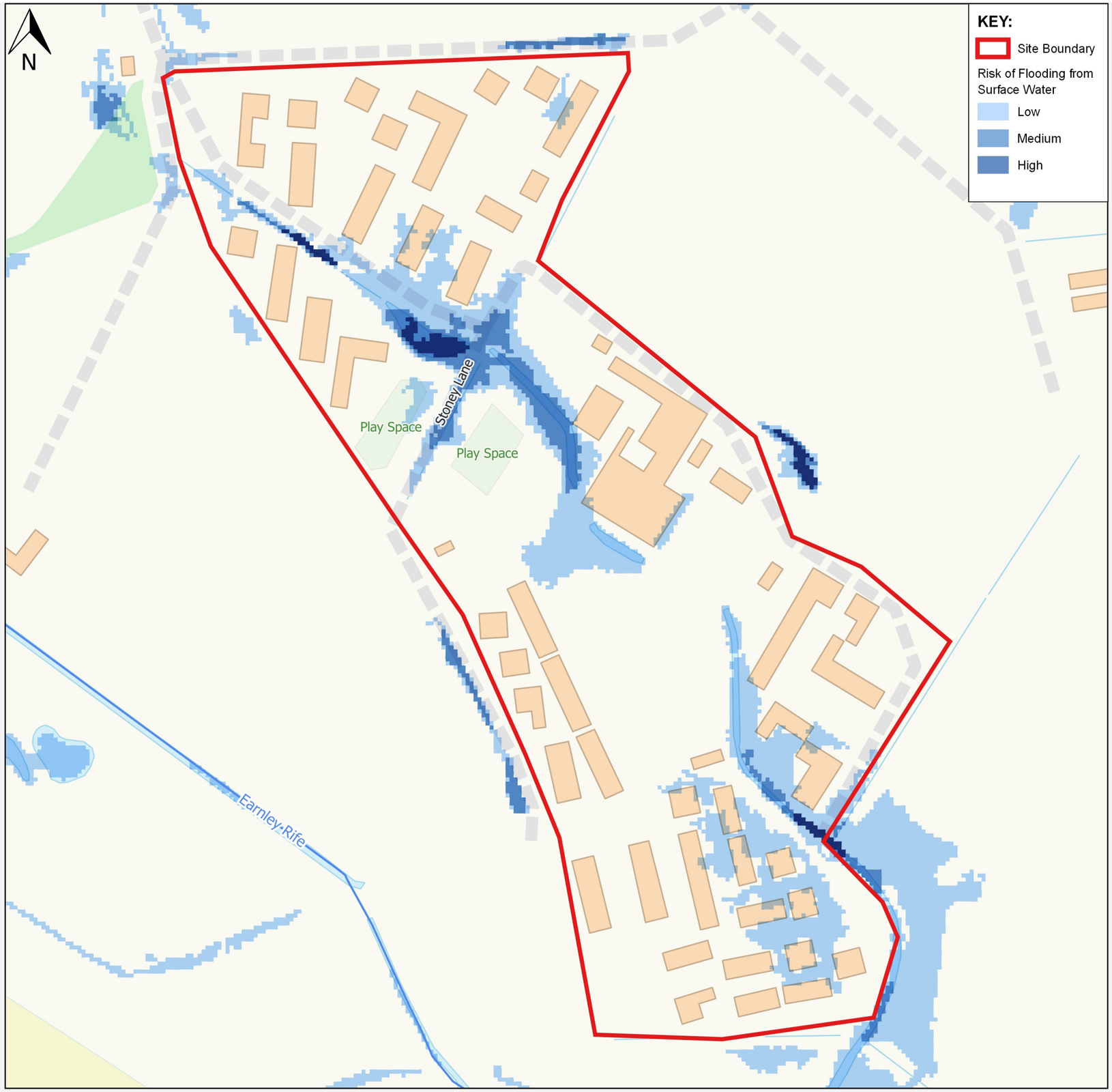
Low Risk - Land having between a 1 in 100 and a 1 in 1000 annual probability (0.1% - 1.0%) of flooding from surface water.

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



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.

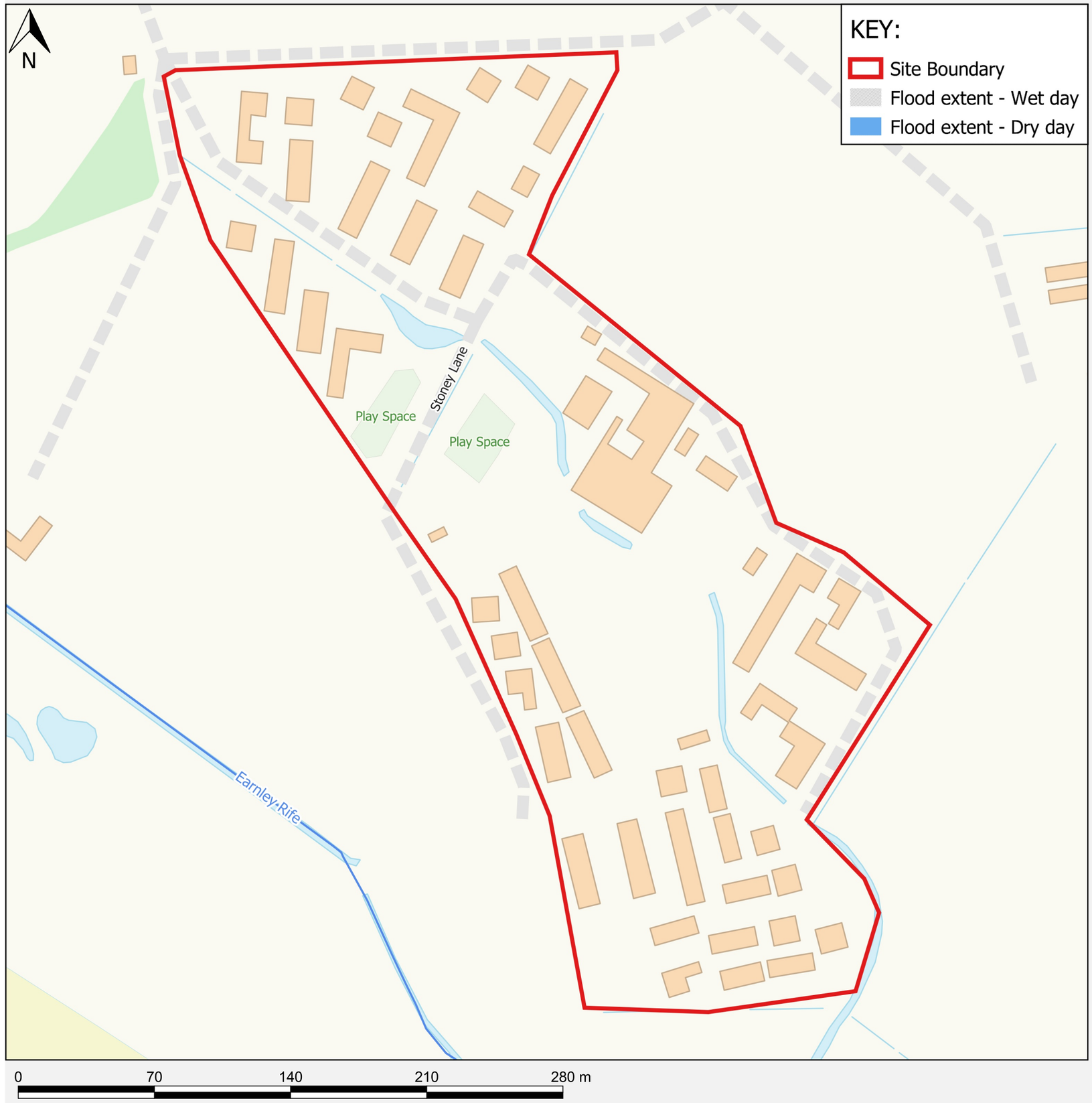
Risk of Flooding from Reservoirs

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.



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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

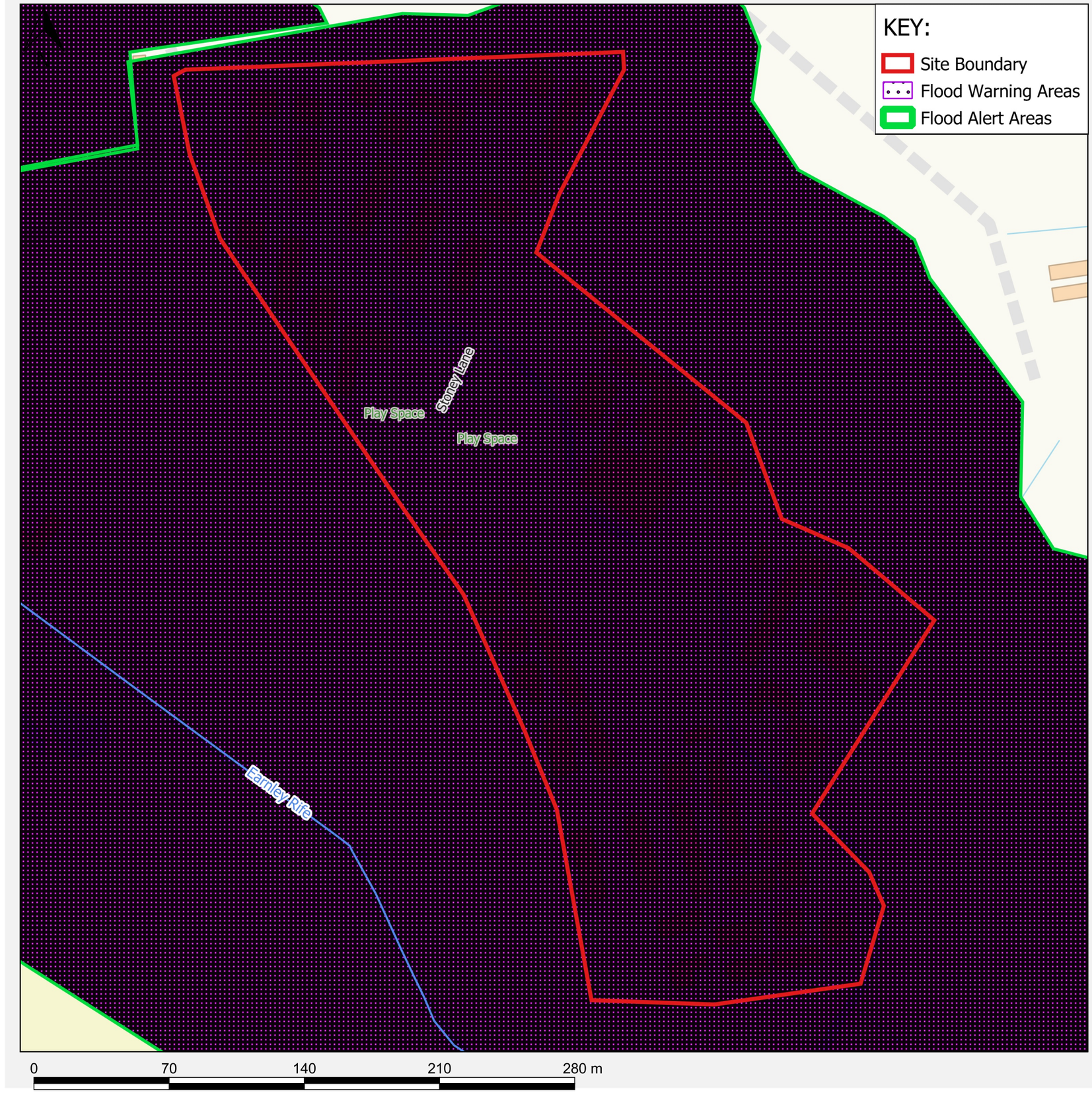
FLOOD ALERT AREAS

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.



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