



Flood Risk Assessment for Dolphin Quay, Queen Street,

Emsworth, Hants





Flood Risk Assessment for

**Dolphin Quay, Queen Street
Emsworth, Hants**

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1 Introduction

- 1.1 Instructions were received from Wilson House Developments to undertake a Flood Risk Assessment (FRA) for the redevelopment of Dolphin Quay to residential dwellings on land at Queen Street, Emsworth, Hants.
- 1.2 This assessment has been prepared by A P Traves BSc CEng MStructE MCIHT.
- 1.3 The client's attention is drawn to the conditions and limitations contained in Appendix D.

2 Development Description & Location

- 2.1 The development site comprises some 0.13 Ha of land at Queen Street, Emsworth, Hants (grid reference SU 751 190). The land is identified on J Brotherton & Partners drawing 13093 contained in Appendix A of this report.
- 2.2 The site is no longer in active use and previously comprised an antique shop a small business office and a boat builders yard.
- 2.3 It is proposed to develop the site for 9 residential dwellings inclusive of a community coastal defence wall on the site with contribution to and facilitation of the offsite elements of the proposed Queen Street coastal defence works scheme. The proposed layout is identified on PDP Architecture drawing 17811-SK102 rev F contained in Appendix A of this report.

3 Local Development Documents & Strategic Flood Risk Assessment

- 3.1 The Partnership for Urban South Hampshire (PUSH) Strategic Flood Risk Assessment (SFRA) has been reviewed (refer to appendix for local mapping) and this indicates the following.
- 3.2 SFRA map set 1A indicates the site (as currently undefended) is within tidal FZ3.
- 3.3 SFRA map set 1B indicates the site (as currently undefended) is within a moderate hazard zone.
- 3.4 SFRA map set 1C indicates the site is not (currently) in an area benefiting from flood defences.
- 3.5 SFRA map set 1D indicates the site is in an area where breach risk would need to be considered in the design of defences.
- 3.6 SFRA map set 1E indicates the site (as currently undefended) lies in 2115AD Climate change FZ3.
- 3.7 SFRA map set 1F1 indicates the site is not exposed to significant wave energy.

- 3.8 SFRA map set 1F2 indicates the site overlies medium permeability bedrock and is not in an historic groundwater flooding area.
- 3.9 SFRA map set 1F5 indicates no observed sewer flooding incidents at the site.
- 3.10 SFRA EA historic flood zone map set indicates that Queen Street in an historic flood zone. This is borne out as this section of Queen Street was flooded by the sea three times in Winter 2013-2014 due to the lack of defences at present.
- 3.11 Flood mapping data has also been reviewed from the EA website (refer to Appendix for local mapping). This indicates the following:
- 3.12 The EA mapping indicates the site is in FZ3 and abuts the free tidal waters of Chichester Harbour.
- 3.13 The EA mapping indicates the site (as currently undefended) is at high risk of flooding from the sea (> 3.3% AEP)
- 3.14 The EA mapping indicates the site is not in an area at risk of flooding from reservoirs.
- 3.15 The EA mapping indicates the site is at very low risk of surface water flooding (<0.1% AEP)
- 3.16 The EA mapping indicates the site is not in a Source Protection Zone SPZ.
- 3.17 The EA mapping indicates the site is not within a ground water or surface water risk area or safeguard zone for drinking water.

4 Catchment Flood Management & Shoreline Management Plans

- 4.1 The site is at an elevation of some 3m AOD and is currently undefended from tidal flooding. The North Solent Shoreline Management Plan- December 2010 (NSSMP) indicates the site falls in policy unit 5a16. Figures 16-18 of the NSSMP set out that for policy unit 5a16 a Hold The Line (HTL) policy applies for all three epochs of the 100 year NSSMP lifespan.
- 4.2 The NSSMP policies for unit 5a16 have been further investigated within EA Strategy Appraisal Report IMSO000556 Portchester Castle to Emsworth Coastal Flood and Erosion Risk Management Strategy-September 2012 (PERMS). Emsworth forms Reach 7 of this strategy. Table 7 of PERMS identifies 194 residential and 9 commercial properties currently at 0.5% AEP risk within Reach 7, rising to 389 residential and 11 commercial properties at 0.5% AEP risk with projected climate change impacts. It also identifies the poor current defence standard around Slipper Pond. The PERMS preferred Reach 7 Strategy is to improve defences to 1.3% AEP by year 10. This has subsequently been adopted into HBC policy.
- 4.3 At an early stage in considering the suitability for development pre-application consultation was made with the Eastern Solent Coastal Partnership (ESCP), of which HBC form part. ESCP confirmed that:
 - PERMS was adopted policy of both HBC (and Chichester DC on the opposite side of the channel)

- PERMS Reach 7 (Emsworth) work would not currently score high enough for it to become a national priority and secure Flood defence Grant in Aid (FDGiA) funding in whole. Therefore a significant external financial contribution is considered necessary to increase the score to a level which would secure FDGiA. Without this contribution the coast defence scheme is unlikely to go ahead.
- The developers proposal to construct defences on the application site and contribute to and facilitate a wider flood defence scheme for the Queen Street area of Reach 7 accords with the new Flood and Coastal Erosion Resilience Partnership Funding policy. The aims of this policy are to encourage greater partnership working between the authorities, sectors, communities and others that have an interest in tackling flooding and coastal erosion over the long-term, so that more coastal defence schemes can go ahead.

- 4.4 A pre-application meeting was held with HBC to scope the inter-relationships between current flood risk, delivery of coastal defence policies, habitable room levels, site context, scale and massing and the nature of development needed to facilitate this. In addition to this the developer has engaged with the Emsworth Flood Forum (River Ems) EFF(Ems); held a public exhibition to set out the principles and schematics for a Queen Street coastal defence scheme together with proposals on development form and appearance; and made presentation of the principles and schematics for a Queen Street coastal defence scheme together with revised proposals for the development form and appearance at the latest Emsworth Residents Association (ERA) meeting.
- 4.5 A copy of the Queen Street coastal defence concept notes and schematic presented at these events is contained in Appendix C. The need for a coastal defence scheme for Queen Street appeared to be generally well understood and accepted. It also appeared that the nature and location of the defences proposed in the concept notes and schematic was generally well received. A number of queries were fielded concerning the defensive standard and height of defences. It appeared that there was a preference for a managed adaptive approach to the amount of initially constructed climate change provision above ground, such that this could be easily raised in future, but would not warrant construction for 2114_{AD} 0.5% AEP tides + freeboard at the time of initial construction.
- 4.6 The Arun and Western Streams Catchment Flood Management Plan summary – December 2009 (CFMP) indicates the site falls within Policy sub-area 9 Chichester and Lower Chalk Streams. The CFMP states that Policy 4 is the preferred policy approach:
- *“Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change. This policy will tend to be applied where the risks are currently deemed to be appropriately managed, but where the risk of flooding is expected to significantly rise in the future. In this case we would need to do more in the future to contain what would otherwise be an increasing risk. Taking further action to reduce risk will require further appraisal to assess where there are socially and environmentally sustainable, technically viable and economically justified options”*
- 4.7 Overall the CFMP does not present any issues that would prohibit the development of this site with respect to flood issues provided the surface water drainage is based on SuDS principles.

5 Catchment Data

- 5.1 The site at the foot of the River Ems catchment. The River Ems is gauged at NRFA station 41015 (grid ref SU 755 073). The catchment above the station comprises some 58 km² and is characterised thus: The Ems - which is ephemeral over much of its length - is a Chalk stream draining the South Downs; Drift cover is minimal. A rural catchment with significant woodland and scattered settlements
- 5.2 BGS geology of Britain web map indicates the bedrock to the site to be Lambeth Group (Clay Silt and Sand) overlain Alluvium deposits.

6 Sewerage Authority Data

- 6.1 The site is connected to the public foul sewer network within Queen Street.
- 6.2 It is proposed to retain the existing connection.

7 Walkover Survey

- 7.1 A site reconnaissance was made on 23rd July 2013. The site is no longer in active use and previously comprised an antique shop a small business office and a boat builders yard.
- 7.2 The land at the site is relatively flat between 2.80 and 3.15m AOD and comprises various external hard stands and floor slabs to the buildings. The site affronts Queen Street to the North (2.8-2.9m AOD), Which then rises to in excess of 3.4mAOD just west of the site and remains at low elevation eastward to the junction with the A259. To the northern side of Queen Street are 8 residential properties, Lillywhites Garage and a number of commercial businesses operating from the Queen Street Mill business park. The site abuts The Lord Raglan PH immediately to the East and then 8 residential properties at Chequers Court beyond that. East of this is Slipper Pond (tidal). The southern and western site boundaries comprise the head of Dolphin Channel (tidal). To the far side of the channel is a public footpath with residential properties west of this.
- 7.3 Queen Street was flooded by surge tides three times over Winter 2013-2014 up to 3.1m AOD (compared to a 0.5% AEP tidal flood level of 3.4m AOD).
- 7.4 Photographs of the site and adjacent areas are contained in Appendix A and include photographs of Winter 2013-2014 flooding due to the current lack of coastal defence.

8 Source-Pathway-Receptor Assessments

- 8.1 The site is at an elevation of approximately 3m AOD and is currently undefended from tidal flooding. The site (as currently undefended) is therefore at risk of tidal flooding. The construction of the Queen Street coastal defence scheme would protect against tidal flooding.

- 8.2 The EA mapping contained on the PUSH SFRA website indicates that the site is governed by tidal flooding. Under high flow river (fluvial) conditions the site is only subject to flooding on high tides (tidal).
- 8.3 The site is not located in the vicinity of any reservoirs and EA flood risk from reservoirs mapping does not indicate any reservoir flood risk to the site.
- 8.4 The site is not in a location with sewer flooding incidents and is not considered to be at risk of sewer flooding.
- 8.5 The SFRA mapping does not indicate the site to be at risk of groundwater flooding.
- 8.6 The EA mapping indicates the site is not within a surface water flood risk area.
- 8.7 The critical flood source is tidal flooding. The design of the defences will be subject to Marine Management Organisation (MMO) consent/licencing and EA Flood Defence Consent requirements.
- 8.8 The new flood receptors of the development would be:
- new dwellings
 - residents in the dwellings
- 8.9 The proposed development and existing site classifications to Table 2 of NPPF Technical Guidance are as follows:
- | | |
|----------------------------|-----------------|
| • Existing commercial use | Less vulnerable |
| • Proposed residential use | More vulnerable |
- 8.10 The site (as undefended at present) is at present high flood risk. Construction of the Queen Street coastal defence scheme will reduce flood risk to below the 0.5% AEP threshold compatible with residential use. Partial implementation of the Queen Street coastal defence may expose the site to potential tidal flooding due to outflanking of the defences present at that time. However the development proposal includes no habitable use below 2114_{AD} 0.5% AEP + freeboard.

9 Flood Probability

- 9.1 The Environment Agency (EA) flood zones shown on the outputs and included in the Appendix represents current best estimates of zone 2 and zone 3 flooding as defined in Table 1 of the Technical Guidance to the National Planning Policy Framework. It does not take account of potential climate change impacts.

Zone 2	Medium Probability of tidal flooding (0.5%-0.1%)
Zone 3a	High Probability of tidal flooding (>1%)
Zone 3b	Functional Floodplain (>5% probability of flooding)

The flood map does not differentiate between zones 3a and 3b.

Zone 3b is only considered appropriate for water-compatible development.

Zone 3a is additionally considered appropriate for less vulnerable uses.

- 9.2 The site (undefended at present) is located in flood Zone 3 (high tidal risk <0.5%). The Queen Street coastal defence scheme would reduce flood probability to below 0.5% AEP.

10 Climate Change

- 10.1 Assuming a design life of 100 years, net sea level rise (Table 4 of NPPF Technical Guidance.) due to climate change would raise 0.5% AEP tidal flood levels from 3.4m AOD to 4.5m AOD in 2114_{AD}. Following the feedback from the public exhibition and meeting with ERA (paragraph 4.5 refers) it is considered that a managed adaptive approach to the proposed defence levels would be most appropriate. It is therefore proposed that defences should initially be constructed to a minimum crest level of 4.05m AOD but with inherent structural/hydraulic capacity to be extended up to 4.8m AOD in the future. 4.05m AOD represents the 2054_{AD} (40 years) of climate change 0.5% AEP tidal level + 300mm of freeboard. 4.05m AOD also allows that highway parapet height and pedestrian guarding heights relative to ground level can be met to provide a normal appearance.
- 10.2 Surface water drainage strategy is discussed in section 11. The site is currently 100% impermeably surfaced and the proposals include the introduction of some soft landscape areas which will reduce run-off volumes and flows inclusive of climate change effects.

11 Detailed Development Proposals & Surface Water Strategy

- 11.1 The key flood related levels for the development are:
- | | |
|--|-----------|
| • 2114 _{AD} 0.5% AEP tide level | 3.4m AOD |
| • 2054 _{AD} 0.5% AEP tide level | 3.75m AOD |
| • 2054 _{AD} 0.5% AEP tide level + 300mm freeboard | 4.05m AOD |
| • 2114 _{AD} 0.5% AEP tide level | 4.5m AOD |
| • 2114 _{AD} 0.5% AEP tide level + 300mm freeboard | 4.8m AOD |
- 11.2 Coastal defences on the site frontage to be designed for 4.8m AOD tidal level and constructed initially to a minimum crest level 4.05m AOD.(managed adaptive approach)
- 11.3 The developer will contribute to, and facilitate as far as he is reasonably able to, the construction and delivery of the offsite elements of the Queen Street coastal defence scheme. For consistency this should have a minimum crest height of 4.05m AOD and be capable of future adaption to 4.8m AOD. The appearance of the on site wall is set out in the Architectural drawings for the development. *(For TCPA S106 purposes it should be noted the Queen Street coastal defence scheme has no detailed design at present as parts of the design are inherently dependent upon the outcome of the LPA application for which this FRA has been prepared. The Dolphin Quay site is turn key to attaining the largest part of a complete and collective Queen Street community defence. In turn the proposed development needs to have sufficient value to generate the necessary funding. As set out in paragraph 4.3 a coastal defence scheme is unlikely to go ahead without private funding contribution [which includes funding for developing the detailed design])*
- 11.4 No habitable uses are proposed below 4.8m AOD. Uses below this are restricted to courtyard, garden and amenity space for parking, recreation, cycle storage and utility rooms. Resilient

forms of construction in accordance with DCLG guidance document 'Improving the Flood Performance of New Buildings-Flood Resilient Construction' will be used.

- 11.5 Properties owners shall initially be provided with and shall thereafter maintain and update a Flood Warning and Escape Plan (FWEP).
- 11.6 The proposed development gives a reduction in impermeable area and will generate less run-off. An underground storage tank will be provided to hold site run-off on occasions when the outfall is tide locked. The car park to the rear building will also be detailed with a pumping facility as part of the resilience measures to deal with recovery for residual risk events in excess of the required design flood event (0.5% AEP + freeboard).

12 Sequential & Exception Tests

- 12.1 The site (undefended at present) is classified as FZ3. Whilst in an undefended condition the site is at an unacceptable risk of flooding. Paragraph 100 of the NPPF however identifies that where development is necessary it should be '*safe without increasing flood risk elsewhere*'. This is supported by NPPF paragraph 99 "*When development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaption measures*". For this site FRA paragraph 4.3 demonstrates that ESCP/HBC acknowledge that development on the site is needed to enable delivery of Queen Street coastal defence scheme and this accords with local Flood and Coastal Erosion Resilience Partnership Funding policy. This scheme provides for 0.5% AEP + 300mm freeboard + adaptive management approach and the Exceptions Test has been applied.
- 12.2 As set out in Section 11:
 - On site defences will be initially constructed to 4.05m AOD (2054_{AD} 0.5% AEP + 300mm freeboard) with facility to adapt up to 4.8m AOD (2114_{AD} 0.5% AEP + 300mm freeboard)
 - Off site defences would initially be delivered to a minimum 4.05m AOD (2054_{AD} 0.5% AEP + 300mm freeboard) with facility to adapt up to 4.8m AOD (2114_{AD} 0.5% AEP + 300mm freeboard)
 - No habitable uses on site below 4.8m AOD. Resilient construction used below 4.8m AOD.
 - FWEP for each property in the proposed development.

In summary flood defence to 0.5% AEP + 300mm standard. In the event of a residual risk event in excess of the required design flood property FWEP plans will direct to controlled advance evacuation. As the flood mode is tidal this is forecastable in sufficient advance of the event to implement safe evacuation of a route less than 100m in length. In the event of a breach all habitable rooms are located above design flood level. Tidal flooding will be of relatively short duration (hours) and the habitable floors will provide safe refuge. The proposals therefore accord with the Exceptions Test.

13 Flood Risk Management Measures

- 13.1 The source pathway receptor assessment is contained in Chapter 8.
- 13.2 Paragraph 8.7 identifies that tidal flooding is the governing flood source. Section 11 sets out the flood risk management measures for the site. The design of the defences will be subject to Marine Management Organisation (MMO) consent/licencing and EA Flood Defence Consent requirements.
- 13.3 The surface water strategy betters the existing run-off regime. There will therefore be no adverse impact on flood flow rates outside the site.

14 Off Site Impacts

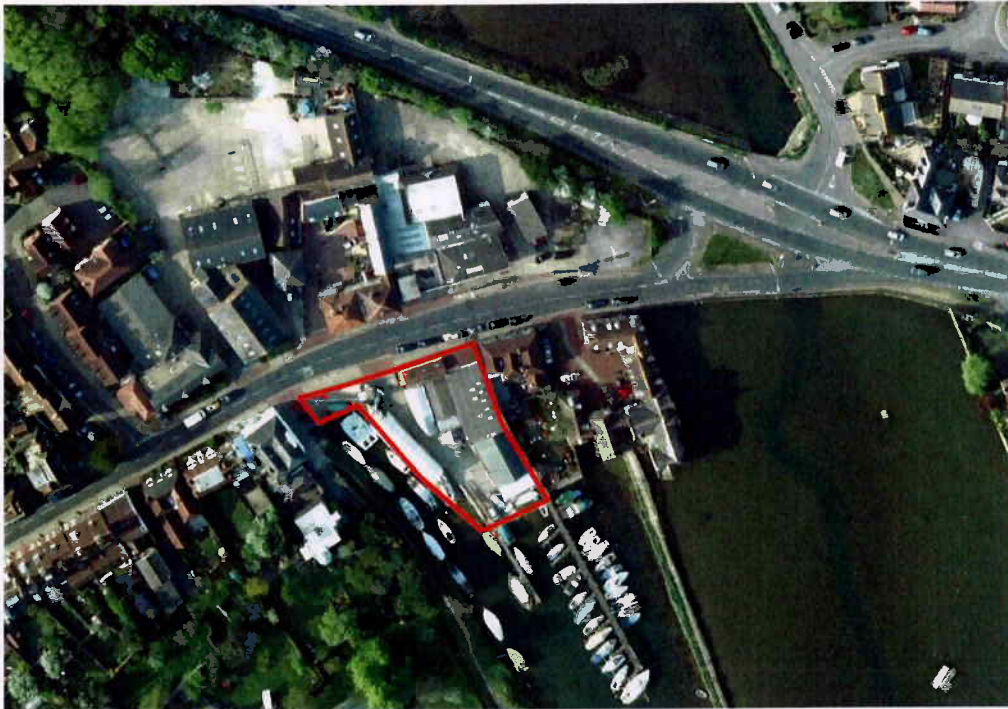
- 14.1 In addition to defending the application site the construction of the on site elements of the Queen Street coastal defence and the contribution to the off site elements of the Queen Street coastal defence will facilitate a reduction in flood risk to 0.5% AEP +300mm freeboard for the following:
- Residences at 1-8 at Chequers Court
 - Residences at 1-3 Spinnaker Place
 - Residences at 26, 28, 30, 31, 32 & 34 Queen Street
 - Commercial business at Lillywhites Garage
 - Commercial business at The Lord Raglan PH
 - Several commercial businesses at Queen Street Mill business park
 - Public access to the above along Queen Street
- Three of these properties also constitute important Heritage assets. The current tidal flood risk to these is >1% AEP and Queen Street was tidally flooded three times over the last Winter 2013-2014.
- 14.2 The surface water strategy betters the existing run-off regime. There will therefore be no adverse impact on flood flow rates outside the site.

15 Residual Risks

- 15.1 The proposed development and the Queen Street coastal defence scheme provides for flood events up to 1:200 year 2014_{AD} + 100 years of projected net sea level rise due to climate change (40 years + 300mm freeboard initially with adaptive management capacity up to 100 years + 300mm freeboard). The residual flood risk is therefore events in excess of 1:200 year 2114_{AD}.

APPENDIX A:

Existing & Proposed Site Layout



Aerial view on site.



View over northern end of site



View over southern end of site



Queen Street Coastal Defence Perimeter Wall #1

Refer to schematic in Appendix C for Wall/Gate/Ramp locations



Queen Street Coastal Defence Perimeter Wall #2



Queen Street Coastal Defence Perimeter Wall #3 location



Queen Street Coastal Defence Perimeter Gate/Ramp #4 location



Queen Street/A259 junction 3rd January 2014



Queen Street Coastal Defence Perimeter Gate/Ramp #5 location



Chequers Court 3rd January 2014



Chequers Court 3rd January 2014



Queen Street 3rd January 2014



Queen Street Coastal Defence Perimeter Wall #6



Lord Raglan PH garden 3rd January 2014



Queen Street 10 March 2008



Queen Street Coastal Defence Perimeter wall #7/Ramp #8 location



Queen Street Coastal Defence Perimeter Wall #7 location

APPENDIX B:

**SFRA Map Data
&
EA Data**

APPENDIX C:

Queen Street Coastal Defence Schematic & Notes

APPENDIX D:
Conditions & Limitations

OPUS**ENGINEER'S INSPECTION****CONDITIONS AND LIMITATIONS**

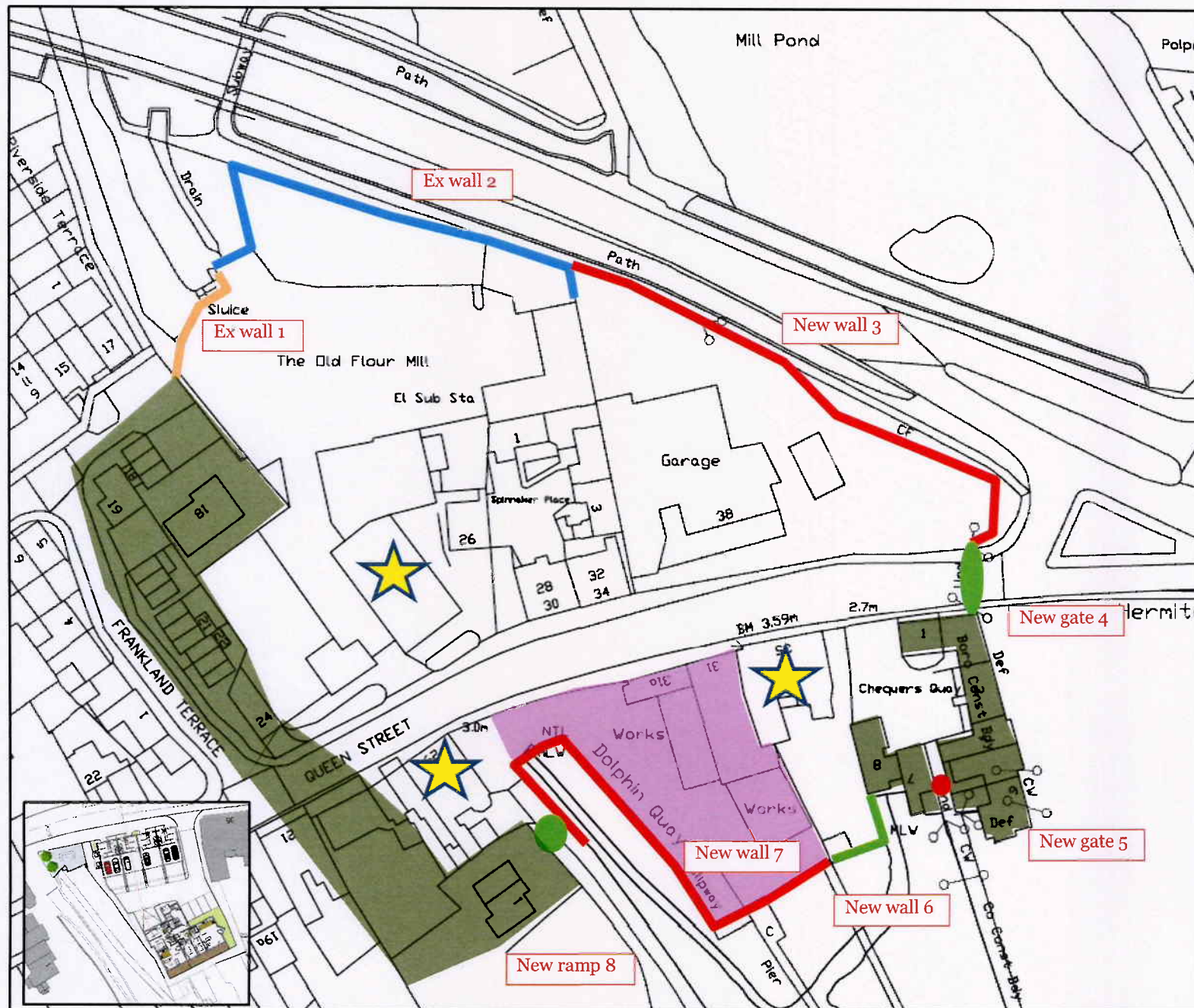
1. The report is a record of a visual inspection carried out by, or under the direction of a Chartered Structural Engineer and must not be misinterpreted as a Structural Survey such as would be carried out by a Chartered Surveyor. The report is not a Valuation Survey.
2. The inspection is strictly limited to the items requested and these will be detailed in Clause 1 of the report. No consideration will be given to any other aspects or parts of the building.
3. The report is confidential to the Client(s) stated in Clause 1 and has been prepared to their instructions for their own purposes only and it is not permitted to disclose this report to any other parties (except the Clients own Solicitors, Surveyors, Building Societies or Estate Agents) without the prior consent of Opus.
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5. No liability for the contents of this report is accepted to any parties other than the Client(s) stated in Clause 1.1. No parties other than the client stated in Clause 1.1 should rely upon this report.
6. Unless specifically stated otherwise:-
 - a) Trial holes will not be excavated prior to the preparation of the report and the depth and construction of the foundations and type of sub-soil will not be inspected.
 - b) All external observations will be carried out by eye from the ground level only. Internal inspection is made within the limits of ready accessibility and it is not normal practice to lift floor coverings or floor boards, remove fixtures, panels or plaster, or move heavy items of furniture or bulky goods or materials.
 - c) No inspection will be made of any roof voids, floor joists, wall cavities, drainage pipework or any other hidden or inaccessible parts.
 - d) No timbers will be checked for damp, rot, infestation by wood-boring insects or other defects.
 - e) It should not be construed that any parts of the construction comply with the requirements of the Building Regulations Act or standard practice either current or as current at the time of original construction. No enquiries to any Authorities will be made.
 - f) No testing or enquiries into the presence of or susceptibility to pollution, contamination, radiation, methane, radon or other gases or hazardous substances has been carried out.
7. Unless specifically stated otherwise in the report, any recommendations for works given in the report are outline only and are to be confirmed or modified as appropriate at detailed design stage.
8. Where trial holes are specifically included in our instructions the condition of the footing and the founding soil relates only to the point of excavation and does not necessarily confirm a continuation of the same conditions throughout the non-inspected areas of the structure. Whilst such trial pits will usually provide a reasonable indication as to the general state of the foundations and ground conditions, these cannot be determined with complete certainty.
9. Under the Construction (Design & Management) Regulations latest edition, the Client has obligations for ensuring Health and Safety arising from any construction work. If it is proposed to proceed with construction work based upon information or recommendations contained in this report, these regulations probably apply. Further details of any issues arising from our report or the Clients obligations generally are available on request.
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15 MAY 2014

HAMANT BOROUGH COUNCIL
DEVELOPMENT CONTROL

29 January 2014

DOLPHIN QUAY, QUEEN STREET, EMSWORTH

Defence concept notes:

At risk area is defined by 2115_{AD} flood outline shown on NSSMP policy unit diagram 5a16. This includes 3 important heritage sites and conservation area. The SMP unit policy is to hold the line for all 3 Epochs to 2105_{AD}. The key policy drivers for maintaining the line of defence will provide flood protection residential, community facilities/infrastructure, commercial properties and heritage and historically important sites. The NSSMP policy unit 5a16 has been further considered in the Portchester Castle to Emsworth Coastal Flood & Erosion Risk Management Strategy in which Emsworth is covered by Reach 7. This concludes that:

- the preferred option is to Improve defence to 1.3% by year 10
- External contribution required

This strategy has been accepted by the LPA and forms local policy.

The applicant seeks to redevelop Dolphin Quay for residential use and as part of the development would install frontage defences to that site. He would also be willing to contribute to a wider area defences, subject to cost viability. The level of contribution that could be accepted is fundamentally dictated by the value of residential development. Pre-application consultation with the LPA has indicated a desire to put a significant constraint on scale and massing of development. The proposed residential development would have no ground floor habitable space but use this for storage and parking. This however dictates habitable floor levels well above FZ3 2115_{AD} flood levels and consequently necessitates greater ridge heights etc.

The differing demands being placed upon the redevelopment lead to the following conclusion:

- Lower ground level parking bays at the southern end of the site
- This enables scale and massing considerations to be addressed
- This in turn enables a sufficient value to the development in terms of unit quantity and value
- This then enables a contribution to be made to wider defences
- Implementation of the wider defences will locally deliver adopted SMP and defence policy protecting existing residential, commercial and heritage assets

A concept layout for local defensive strategy is attached. The starred sites are important heritage assets and the brown shaded areas indicate existing defence by virtue of ground topography or existing elevated new build. Flood pathway is currently tidal overtopping from the south but similar pathways would develop from the East and North if only the southern frontage were defended.

EF1286 defence concept notes 140129

The other elements of a defensive perimeter are briefly outlined below:

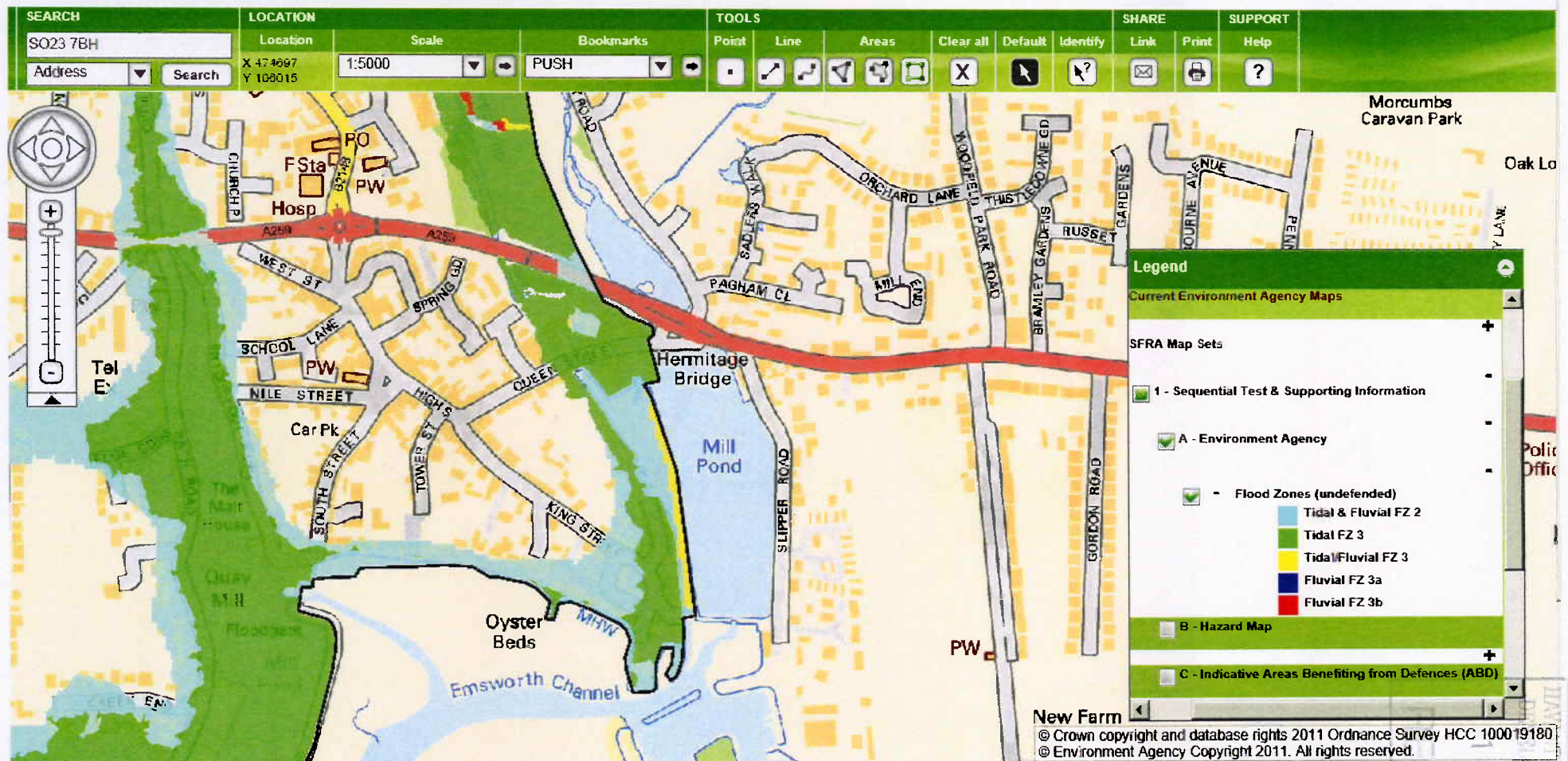
- Ex wall 1: Existing headwall behind trash screen needs investigation but may already be of suitable height to defend 1.3% AEP flood levels
- Ex wall 2: existing wall needs investigation. It is clearly of sufficient height but structural competence to resist 1.3% AEP flood levels needs investigation.
- Ex wall 3: A short boundary wall on level ground would be required to provide defence for 1.3%AEP flood levels.
- New gate 4: Either flood gate (similar to gates in Old Portsmouth) required or ramp highway up then down again at end of the street to provide passive defence to 1.3% AEP flood levels
- New gate 5: Either small pedestrian flood gate or ramp footway up then down again in passageway to provide passive defence to 1.3% AEP flood levels
- New wall 6: Infill gateway in existing boundary wall and provide stairs up from either side of the wall. Structural competence to resist 1.3% AEP flood levels needs investigation
- New wall 7: New wall construction as part of development site works. This would also need to wrap around the far side of the channel end for a short distance.
- New ramp 8: existing channel side footway to be ramped up and down to wall crest level to attain 1.3% AEP flood level.

A P Traves

for Opus International Consultants (UK) Ltd

Enc concept layout

PUSH Strategic Flood Risk Assessment

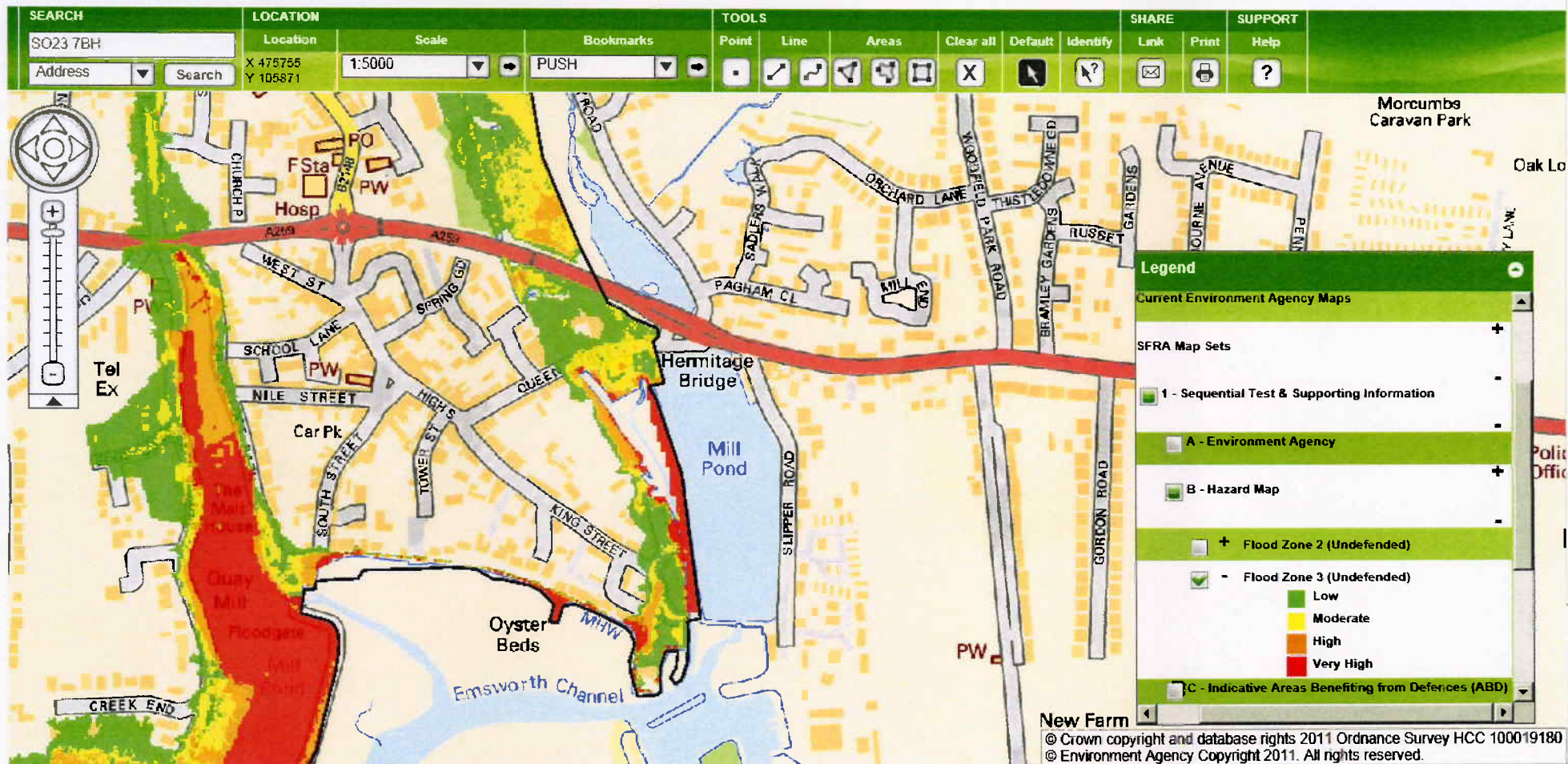


SFRA map set 1A

Flood Zones (undefended)

RECEIVED
 15 MAY 2014
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 PLANNING & CONTROL

PUSH Strategic Flood Risk Assessment



SFRA map set 1B

Flood Zone 3 (undefended) hazard map

SEARCH
 SQ23 7BH
 Address Search

LOCATION
 Location X 478178 Y 108421
 Scale 1:5000
 Bookmarks PUSH

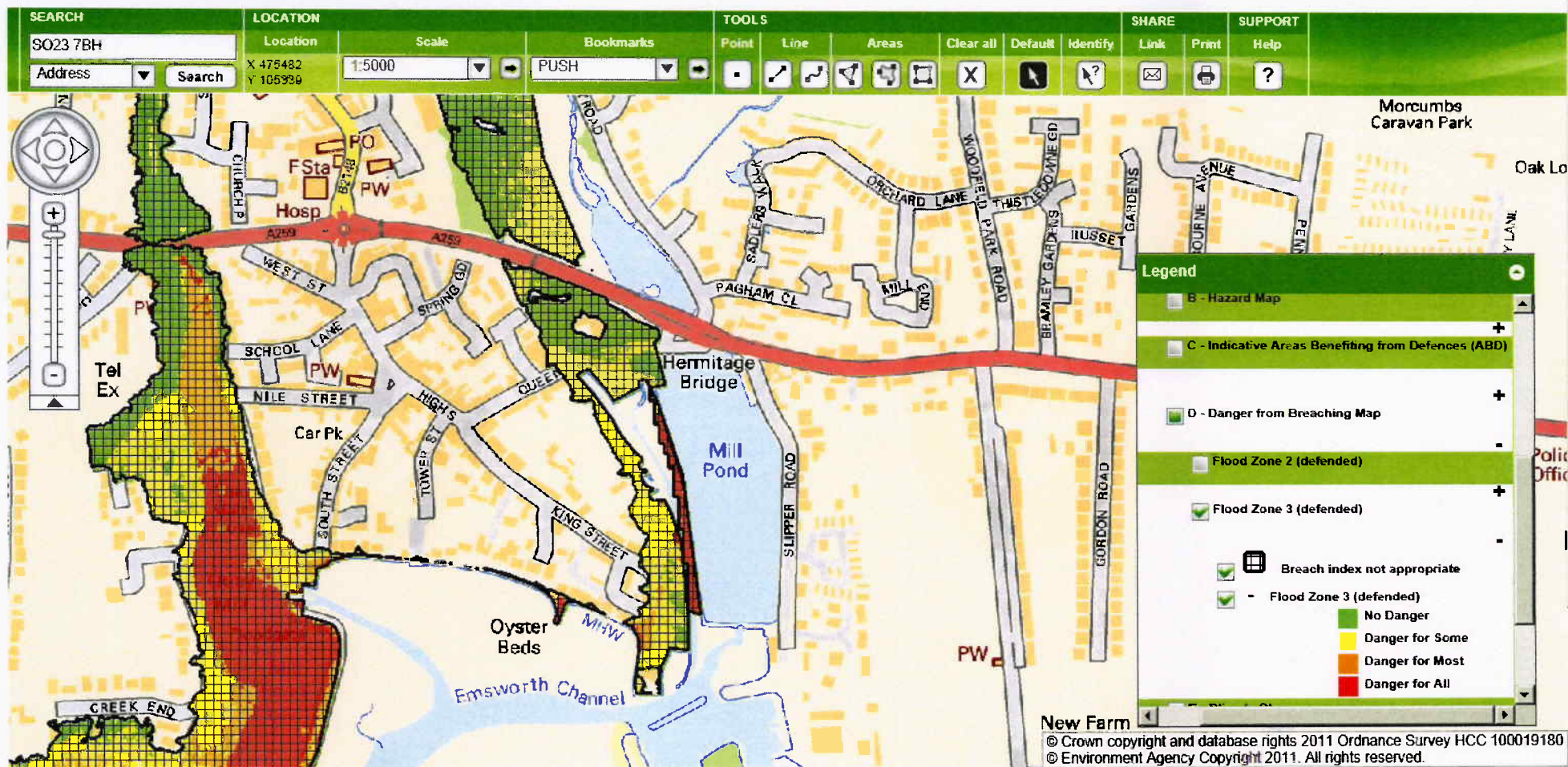
TOOLS
 Point Line Areas Clear all Default Identify Link Print Help

Legend
 1 - Sequential Test & Supporting Information
 A - Environment Agency
 B - Hazard Map
 C - Indicative Areas Benefiting from Defence
 FZ3 - Frontages Protected from Tides
 FZ3 - Indicative Areas Benefiting from Defence
 D - Danger from Breaching Map
 E - Climate Change
 F - Other Forms of Flooding

New Farm
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 © Environment Agency Copyright 2011. All rights reserved.

Areas Benefiting from Defences

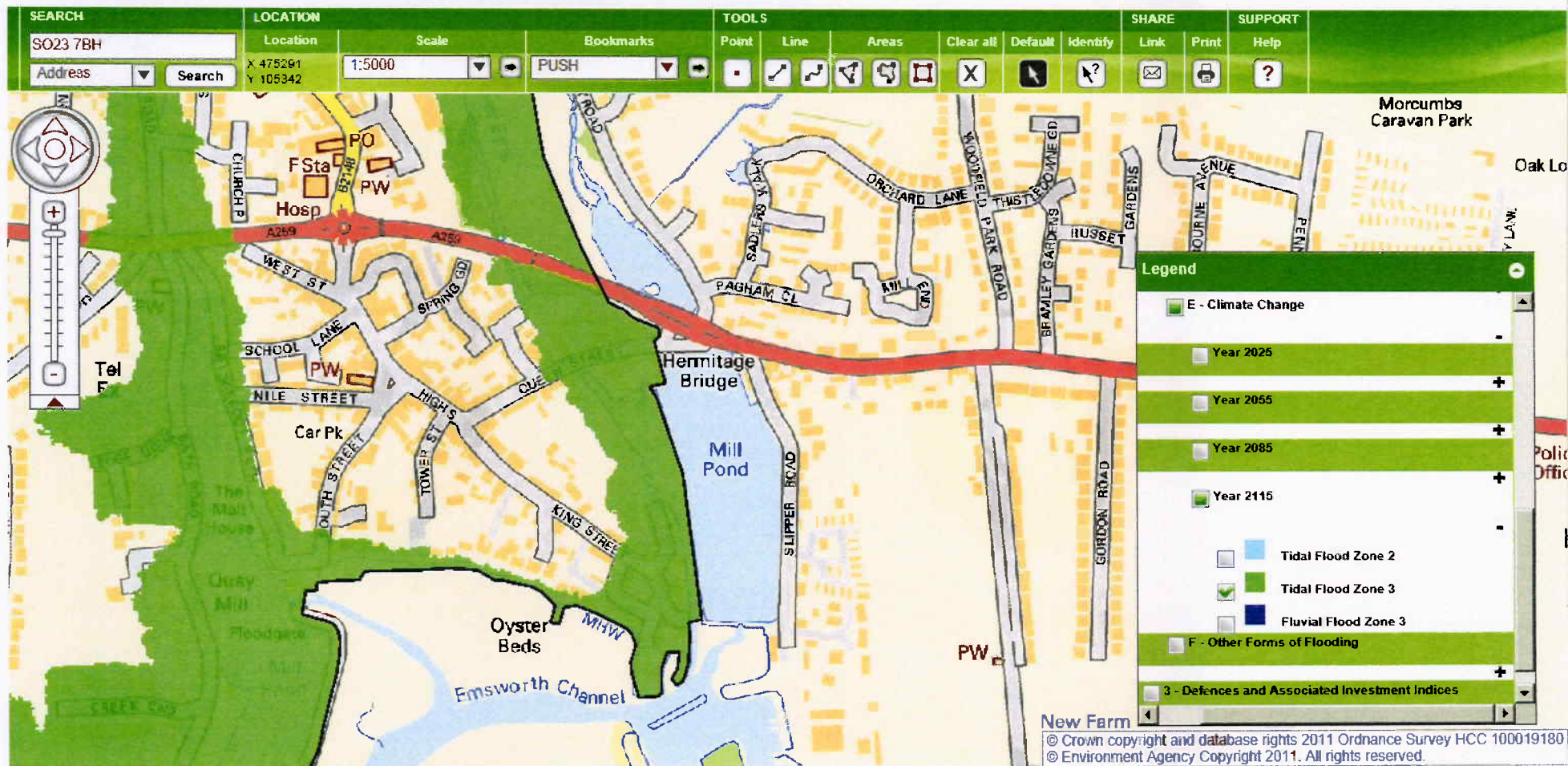
PUSH Strategic Flood Risk Assessment



SFRA map set 1D

Danger from Breaching Flood Zone 3

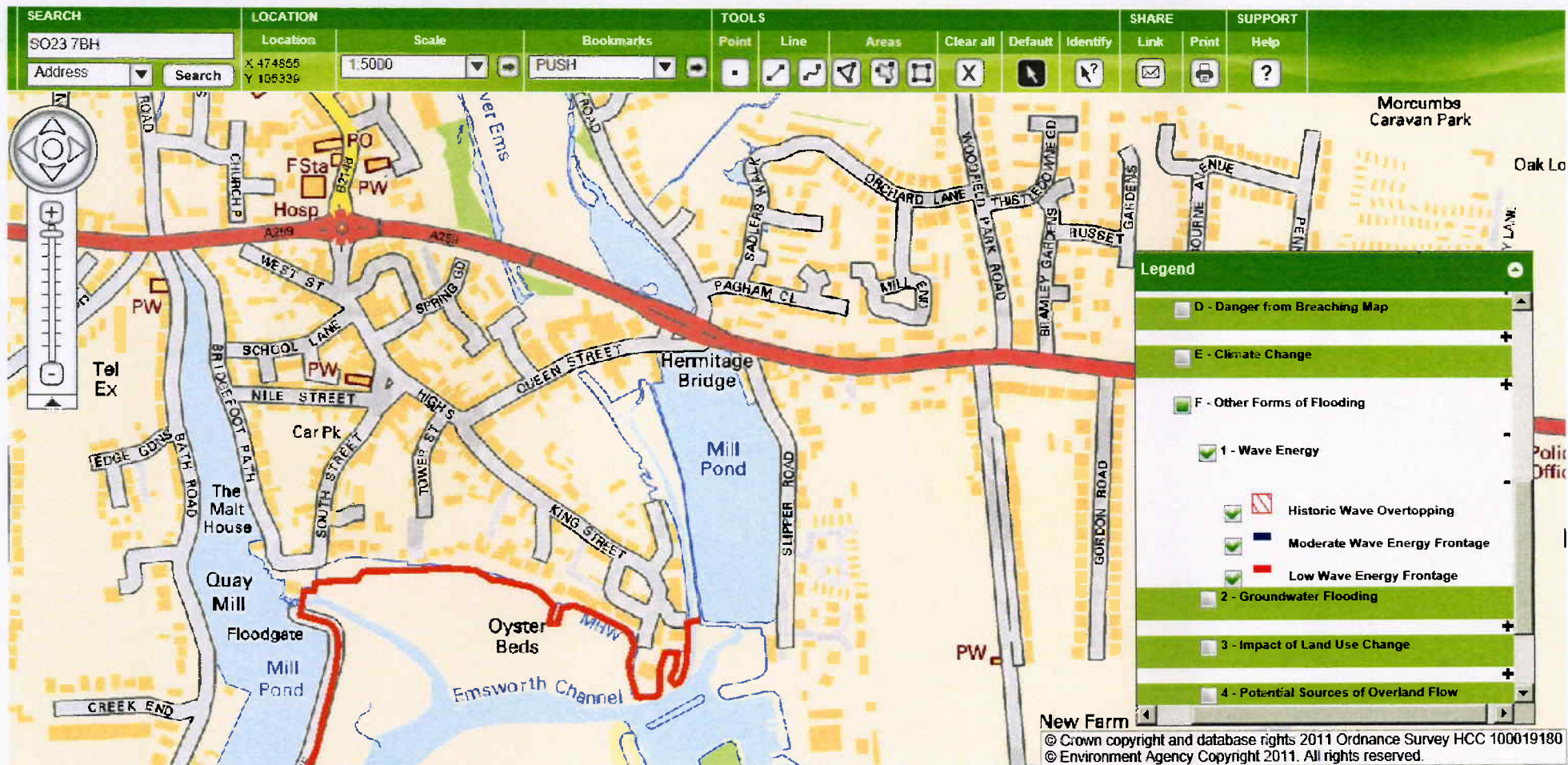
PUSH Strategic Flood Risk Assessment



SFRA map set 1E

Climate Change 2115_{AD} Flood Zone 3

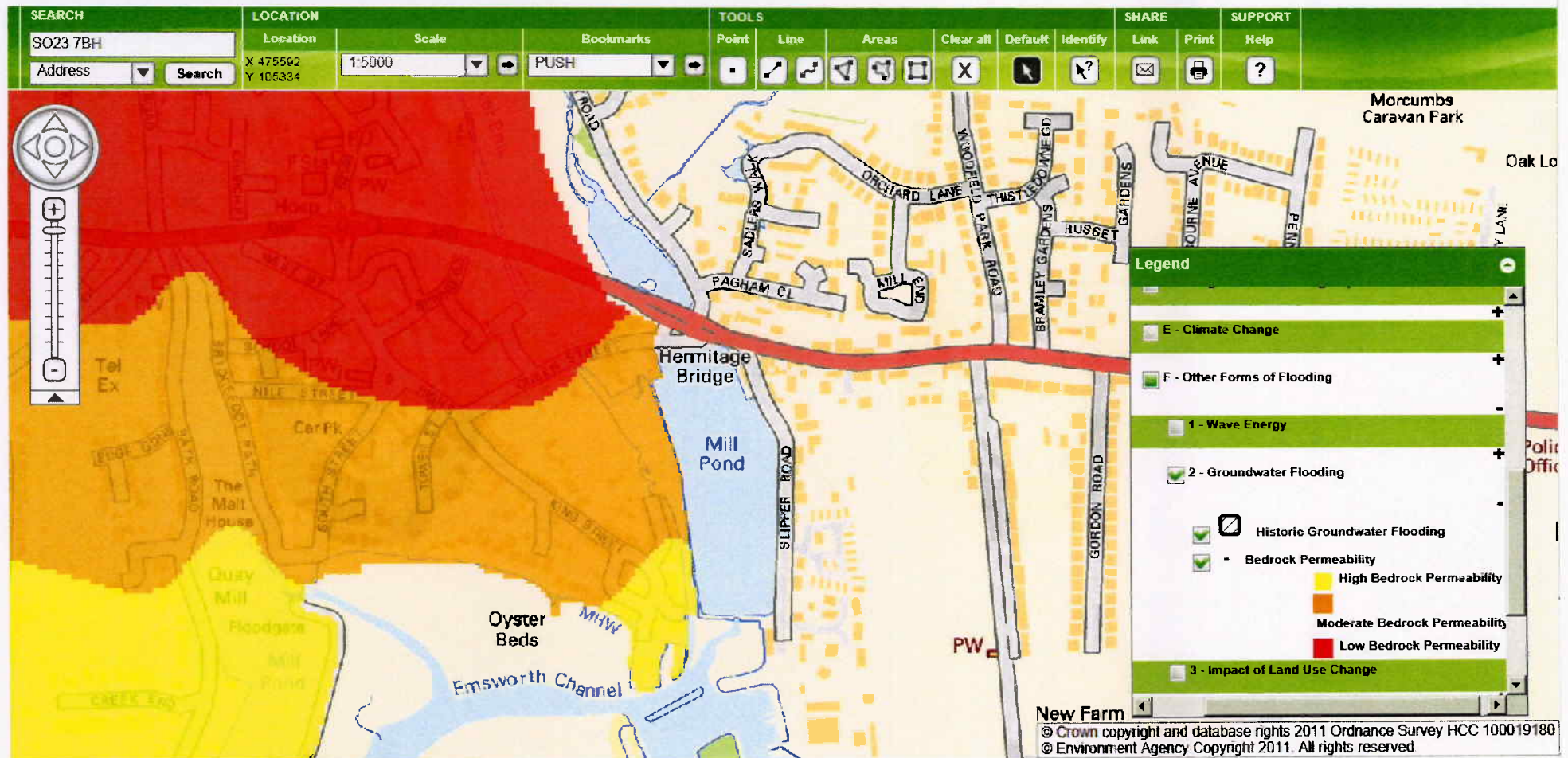
PUSH Strategic Flood Risk Assessment



SFRA map set 1F1

Wave Energy

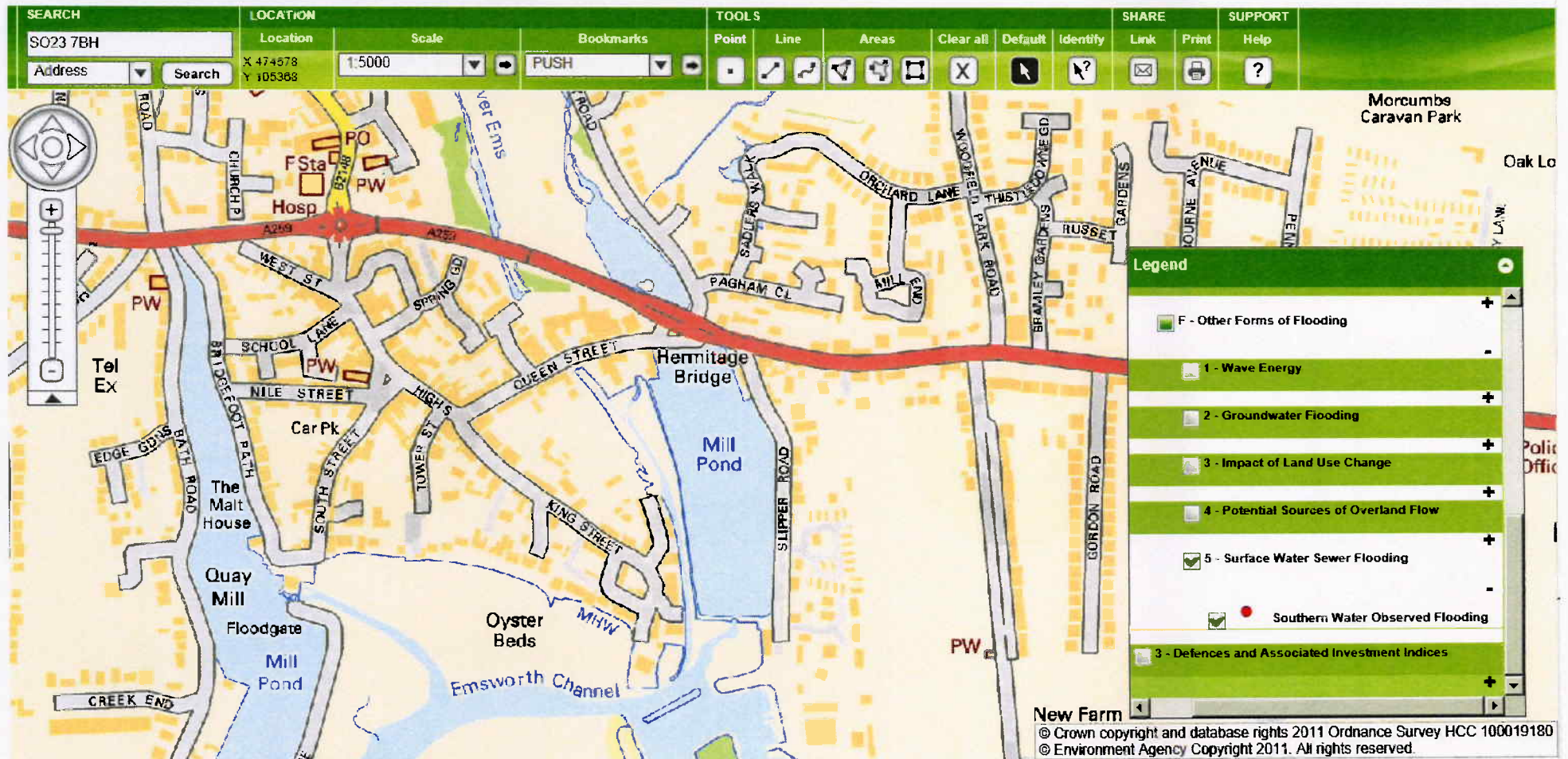
PUSH Strategic Flood Risk Assessment



SFRA map set 1F2

Groundwater Flooding & Bedrock Permeability

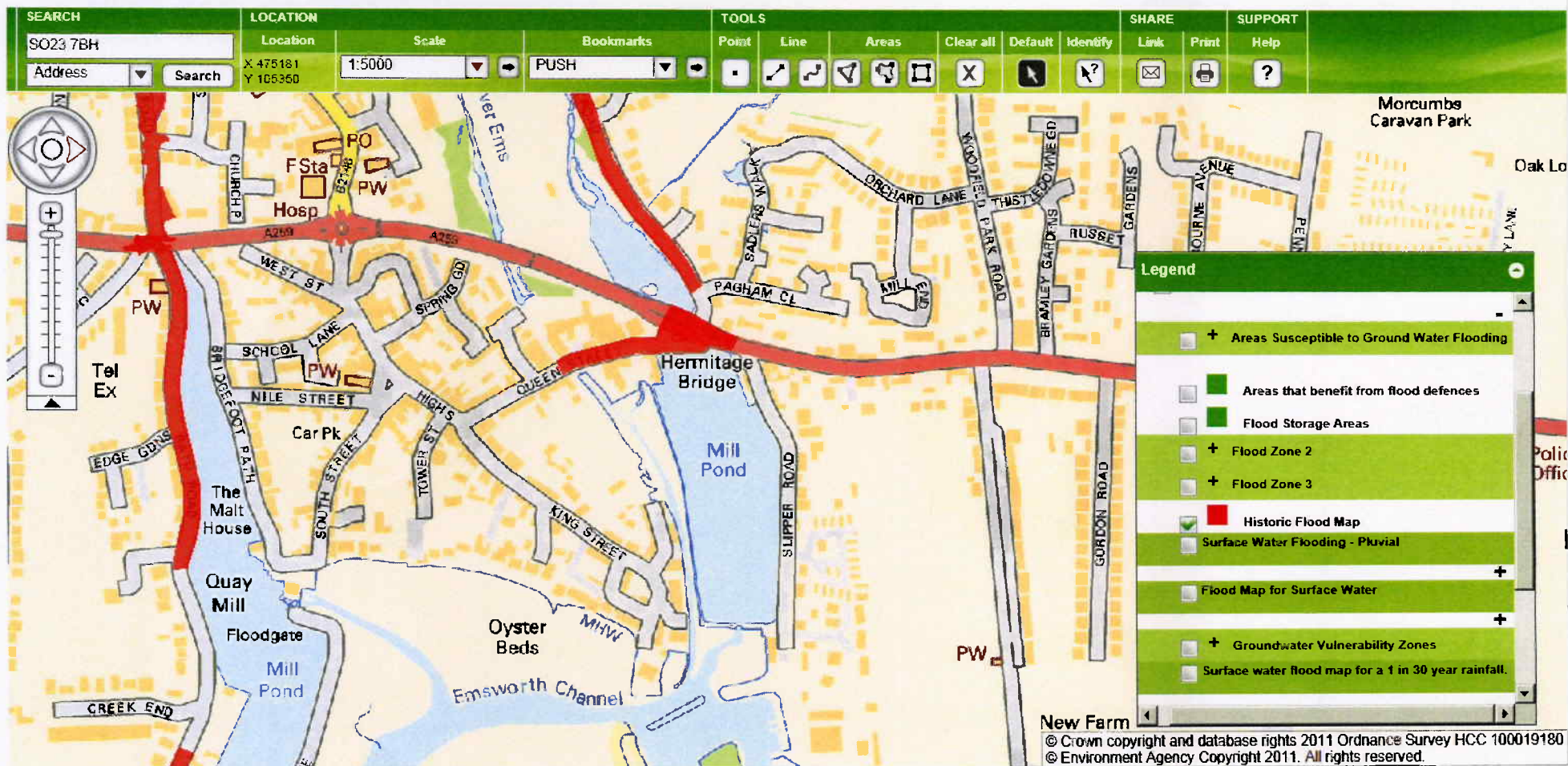
PUSH Strategic Flood Risk Assessment



SFRA map set 1F5

Observed Southern Water Sewer Flooding

PUSH Strategic Flood Risk Assessment



SFRA

Environment Agency Historic flood Map



We are interested in understanding why you use this

Enter a postcode or place name:

Emsworth, Hampshire



Other topics for this area...

Flood Map for Planning (Rivers and Sea)

Flood Map for Planning (Rivers and Sea)

Map legend

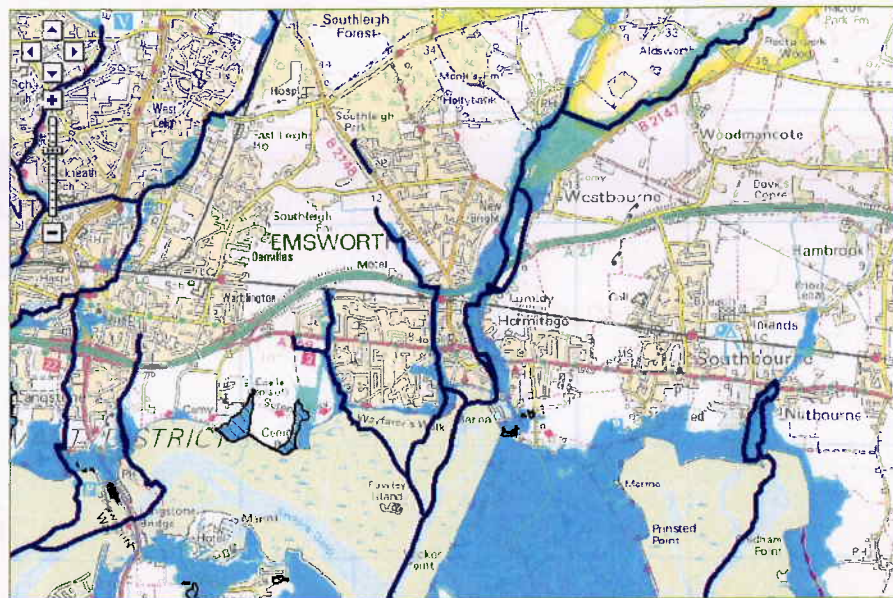
Click on the map to see what Flood Zone (National Planning Policy Guidance definitions) the proposed development is in.

☒ Flood Map for Planning (Rivers and Sea)

- Flood Zone 3
- Flood Zone 2
- Flood defences (Not all may be shown*)
- Areas benefiting from flood defences (Not all may be shown*)
- Main rivers

Emsworth, Hampshire at scale 1:40,000

Other maps Data search Text only version



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EA web map Local Main River Network



We are interested in understanding why you use this

Enter a postcode or place name:

Emsworth, Hampshire



Other topics for this area...

Flood Map for Planning (Rivers and Sea)

Flood Map for Planning (Rivers and Sea)

Map legend

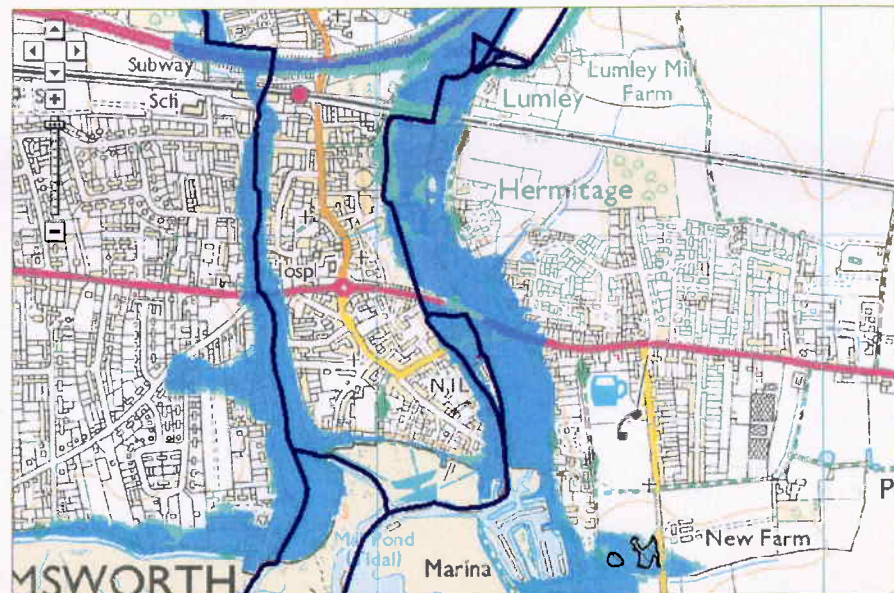
Click on the map to see what Flood Zone (National Planning Policy Guidance definitions) the proposed development is in.

☒ Flood Map for Planning (Rivers and Sea)

- Flood Zone 3
- Flood Zone 2
- Flood defences (Not all may be shown*)
- Areas benefiting from flood defences (Not all may be shown*)
- Main rivers

Emsworth, Hampshire at scale 1:10,000

Other maps Data search Text only version



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EA web map Flood Zones

Flood Zone definitions are set out in the National Planning Policy Guidance:

- * Flood Zone 1 - land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%)
- * Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year
- * Flood Zone 3 - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year

Note: These flood zones refer to the probability of river and sea flooding, ignoring the presence of defences.

Enter a postcode or place name:

Other topics for this area...

Go

Risk of Flooding from Rivers and Sea

[View other Interactive Maps](#)

Risk of Flooding from Rivers and Sea

River flooding happens when a river cannot cope with the amount of water draining into it from the surrounding land. Sea flooding happens when there are high tides and stormy conditions.

The shading on the map shows the risk of flooding from rivers and the sea in this particular area.

Click on the map for a more detailed explanation.

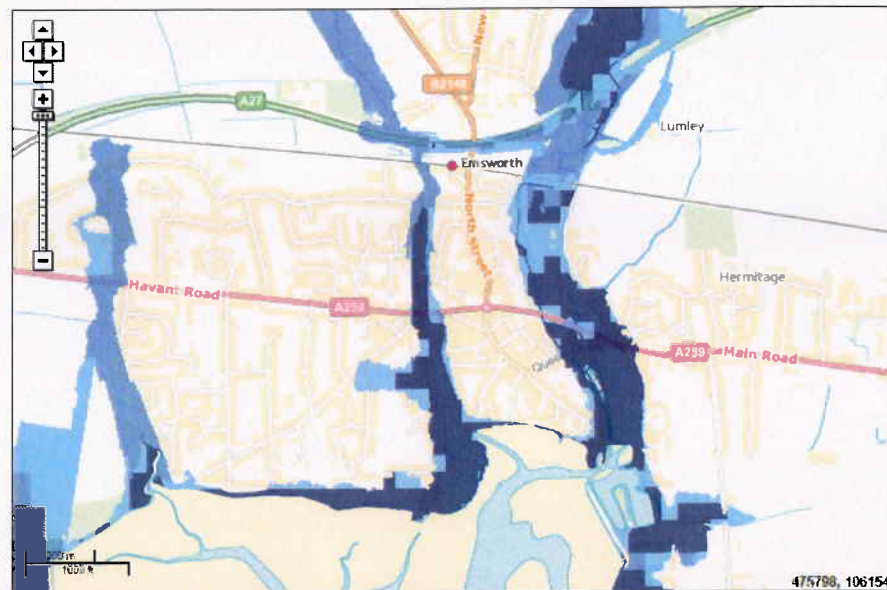
Map legend

☒ Risk of Flooding from Rivers and Sea

- High
- Medium
- Low
- Very Low

Map of Emsworth, Hampshire at scale 1:10,000

Data search



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EA web map Risk of Flooding from Rivers and the Sea

What does 'very low' mean?

Very low means that each year, this area has a chance of flooding of less than 1 in 1000 (0.1%).

What does 'low' mean?

Low means that each year, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).

What does 'medium' mean?

Medium means that each year, this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).

What does 'high' mean?

High means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%).

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

Enter a postcode or place name:

Other topics for this area...



Risk of Flooding from Reservoirs

[View other Interactive Maps](#)

Risk of Flooding from Reservoirs

Reservoir flooding is extremely unlikely to happen.

The shading on the map shows the area that could be flooded if a large reservoir were to fail and release the water it holds. A large reservoir is one that holds over 25,000 cubic metres of water, equivalent to approximately 10 Olympic sized swimming pools. Since this is a worst case scenario, it's unlikely that any actual flood would be this large.

Click on the shading to see details of reservoirs that could cause flooding in this area

Map legend

☒ Risk of Flooding from Reservoirs

☐ Maximum extent of flooding

Map of X: 474,817; Y: 105,918 at scale 1:10,000

[Data search](#)



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EA web map Risk of flooding from Reservoirs

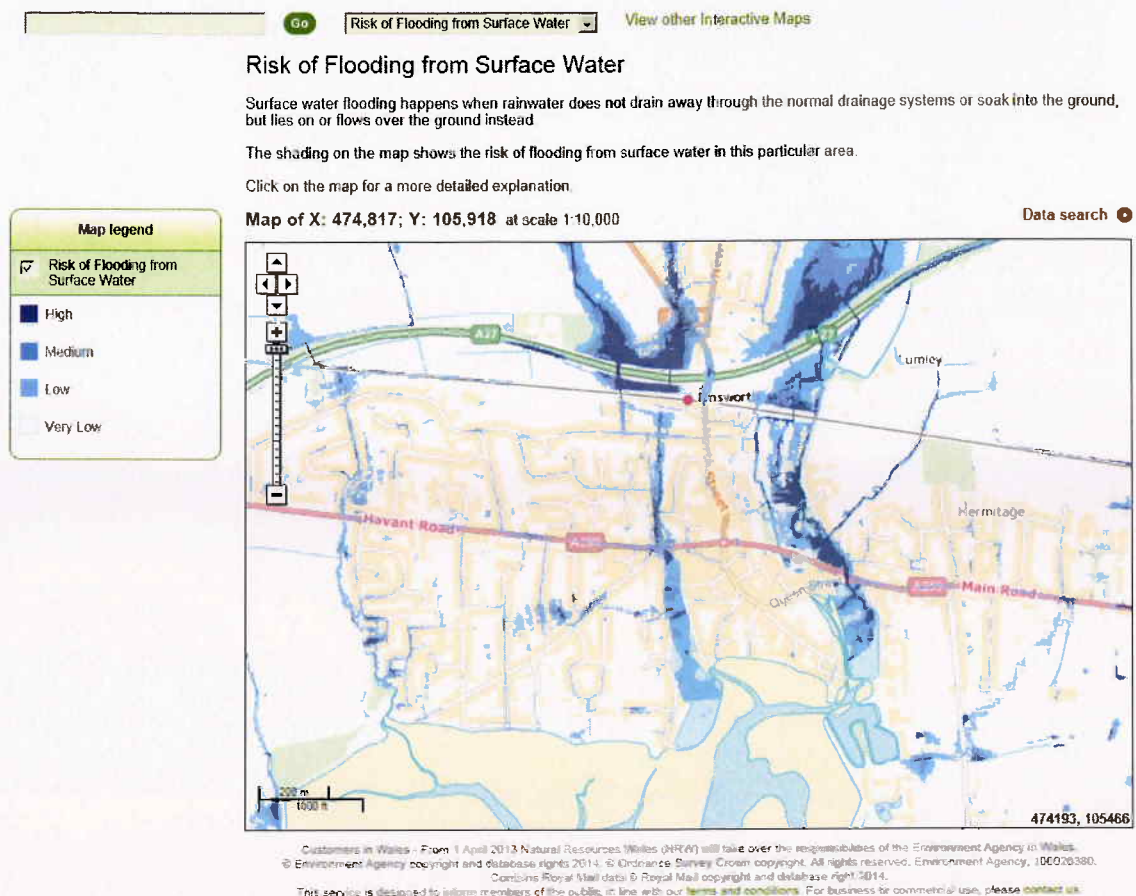
Where an extent is shown:

N/A for this site

Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, we ensure that reservoirs are inspected regularly and essential safety work is carried out.

However, in the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning. If you live or work in an area that could be affected, you should plan in advance what you would do in an emergency. You may need to evacuate immediately. Consider where you would go to safety, and be ready to follow the advice of emergency services.

To find out about local emergency plans, contact the local authority listed above. Be aware that they may not be able to give you any specific information immediately as developing reservoir emergency plans is a new responsibility.



EA web map Risk of flooding from surface water

What does 'very low' mean?

Very low means that each year, this area has a chance of flooding of less than 1 in 1000 (0.1%).

What does 'low' mean?

Low means that each year, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).

What does 'medium' mean?

Medium means that each year, this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%)

What does 'high' mean?

High means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%)

This type of flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm.

This is based on the best information we have available, such as ground levels and drainage.



We are interested in understanding why you use this

Enter a postcode or place name:

Other topics for this area...

Groundwater



Map legend

☒ Groundwater source protection zones ⓘ

- Inner zone (Zone 1)
- Outer zone (Zone 2)
- Total catchment (Zone 3)
- Special interest (Zone 4)

☒ Aquifer Maps - Superficial Deposits Designation ⓘ

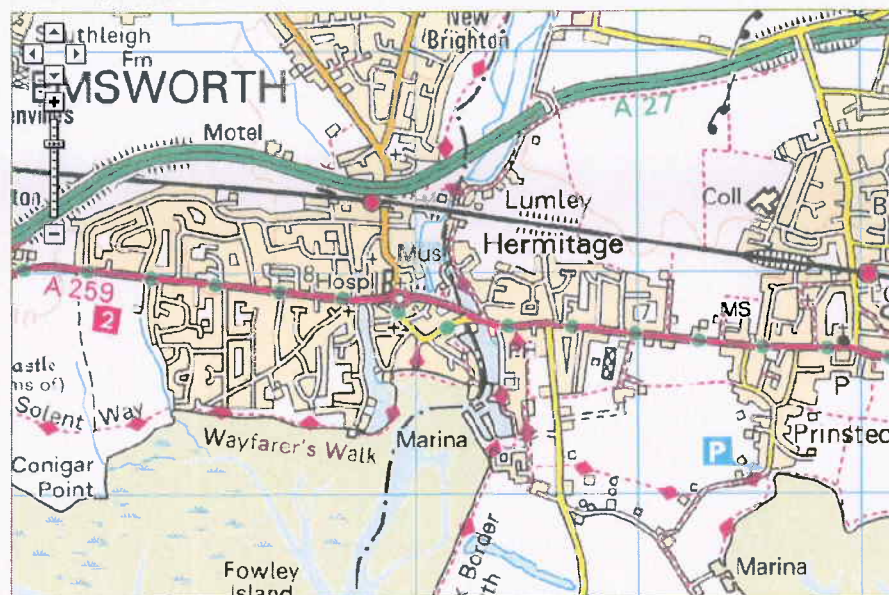
- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes and landfills)

☒ Aquifer Maps - Bedrock Designation ⓘ

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)

X: 475,177; Y: 105,852 at scale 1:20,000

Other maps ⓘ Data search ⓘ Text only version ⓘ



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EA web map Groundwater Source Protection Zones



We are interested in understanding why you use this

Enter a postcode or place name:

Other topics for this area...

Groundwater

Map legend

☐ Groundwater source protection zones ⓘ

- Inner zone (Zone 1)
- Outer zone (Zone 2)
- Total catchment (Zone 3)
- Special interest (Zone 4)

☐ Aquifer Maps - Superficial Deposits Designation ⓘ

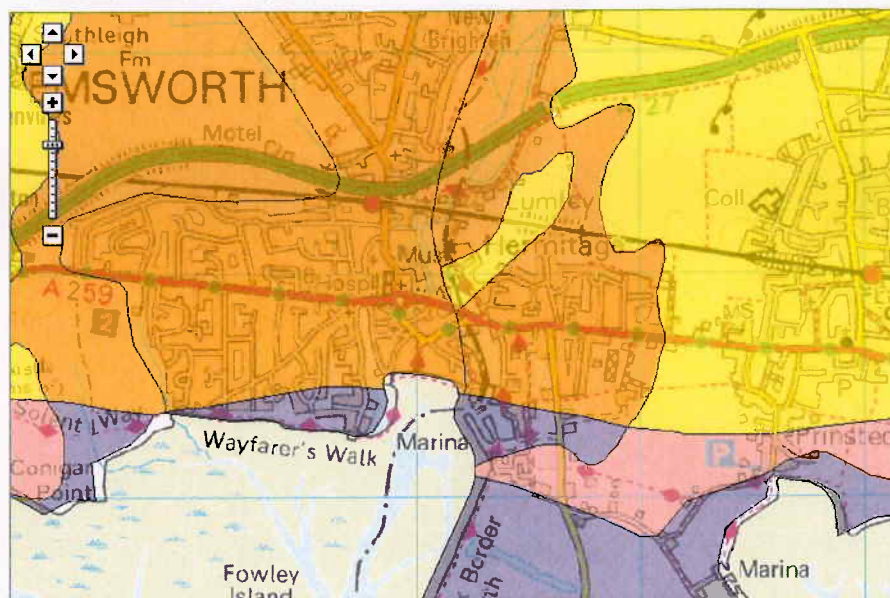
- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes and landfills)

☐ Aquifer Maps - Bedrock Designation ⓘ

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)

X: 475,177; Y: 105,852 at scale 1:20,000

Other maps ⓘ Data search ⓘ Text only version ⓘ



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☐ ☒ Groundwater Vulnerability Zones ⓘ

- Major Aquifer High
- Major Aquifer Intermediate
- Major Aquifer Low
- Minor Aquifer High
- Minor Aquifer Intermediate
- Minor Aquifer Low

EA web map Groundwater vulnerability Zones



We are interested in understanding why you use this

Enter a postcode or place name:

Other topics for this area...

Water Framework Directive - River
Basin Management - Coastal Waters

Go

Map legend

☒ **Current Ecological Quality** ⓘ

- High
- Good
- Moderate
- Poor
- Bad
- Not yet assessed

☐ **Current Chemical Quality** ⓘ

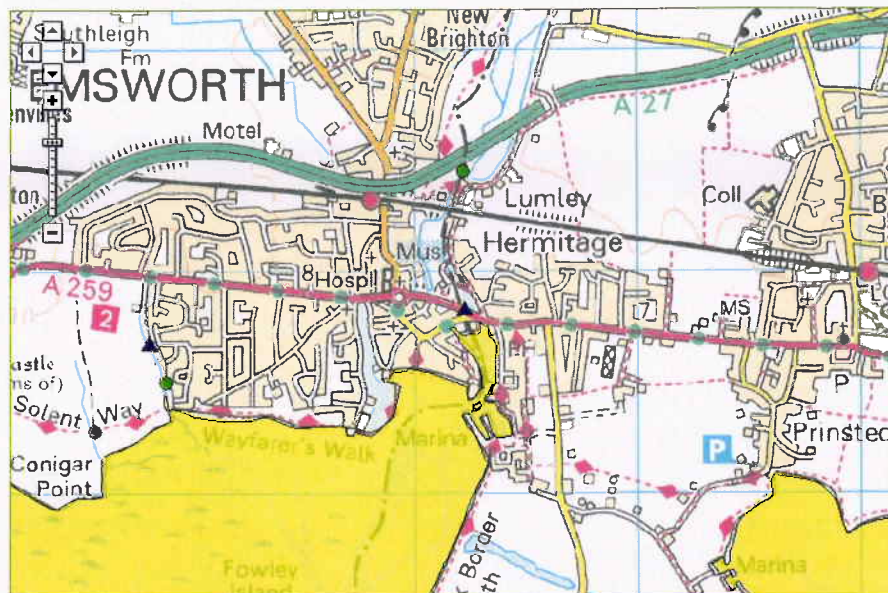
- Good
- Fail
- Does not require assessment

☐ **2015 Predicted Ecological Quality** ⓘ

- High
- Good
- Moderate
- Poor
- Bad
- Not yet assessed

Map of X: 475,177.33; Y: 105,851.77 at scale 1:20,000

[Other maps](#) [Data search](#) [Text only version](#)



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EA web map River Basin Management Plan Coastal Waters Ecological Quality



We are interested in understanding why you use this

Enter a postcode or place name:

Other topics for this area...

Water Framework Directive - River
Basin Management - Coastal Waters

Go

River Basin Management Plans - Coastal Waters

Map legend

☐ Current Ecological Quality

- High
- Good
- Moderate
- Poor
- Bad
- Not yet assessed

☒ Current Chemical Quality

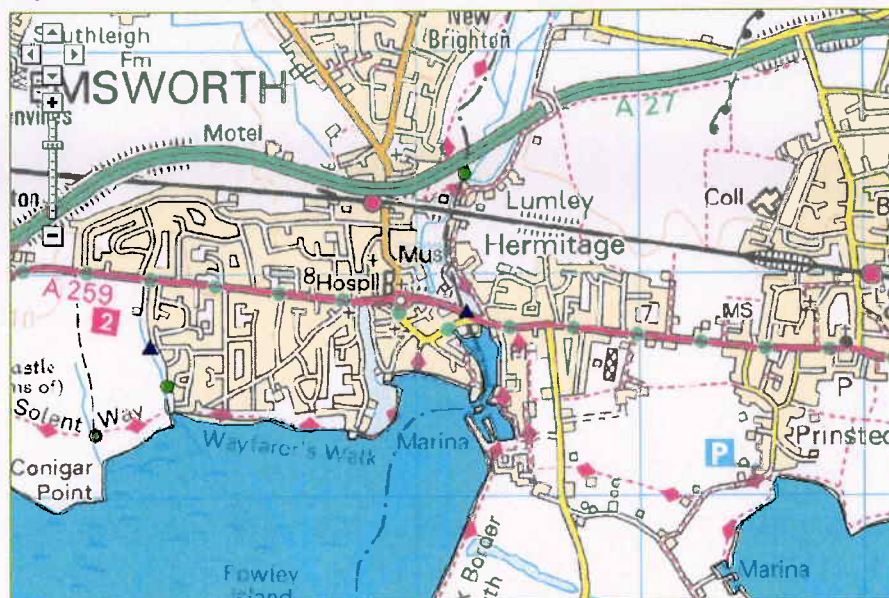
- Good
- Fail
- Does not require assessment

☐ 2015 Predicted Ecological Quality

- High
- Good
- Moderate
- Poor
- Bad
- Not yet assessed

Map of X: 475,177.33; Y: 105,851.77 at scale 1:20,000

Other maps Data search Text only version



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EA web map River Basin Management Plan Coastal Water current Chemical Quality



We are interested in understanding why you use this

Enter a postcode or place name:

Other topics for this area...

Drinking Water Protected Areas

Go

Drinking Water Protected Areas

Map legend	
☒	Surface Water Drinking Water Protected Areas
☒	Surface Water Safeguard Zones
☒	Groundwater Drinking Water Protected Areas
☒	Groundwater Safeguard Zones
☒	Water Protection Areas
☒	Dee Catchment

Map of X: 475,137.65; Y: 105,837.22 at scale 1:20,000

Other maps Data search Text only version



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EA web map Drinking Water Protection Areas (Surface Water)



We are interested in understanding why you use this :

Enter a postcode or place name:

Other topics for this area...

Drinking Water Protected Areas

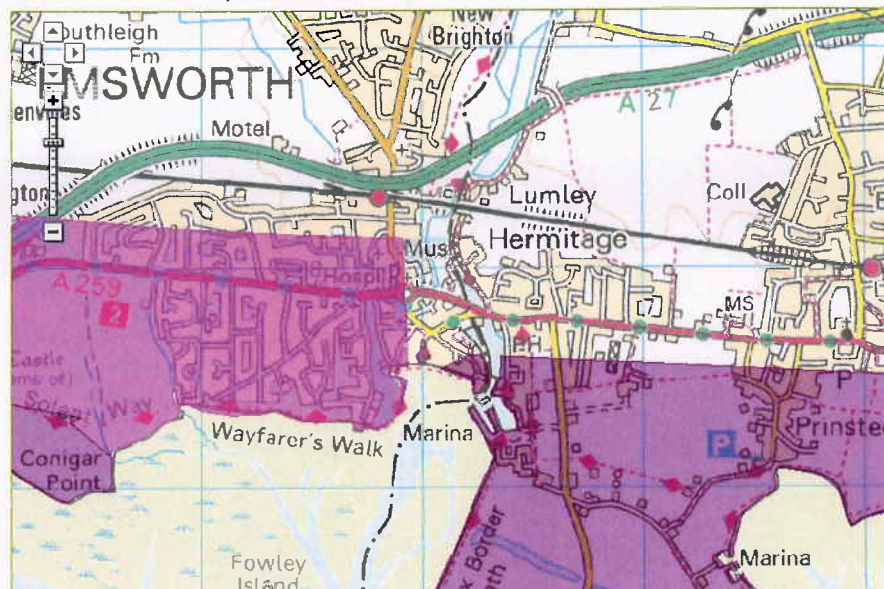
Go

Map legend

- ☐ Surface Water Drinking Water Protected Areas
- ☒ At Risk Areas
- ☐ Not At Risk Areas
- ☐ Surface Water Safeguard Zones
- ☒ Safeguard Zones
- ☐ Groundwater Drinking Water Protected Areas
- ☒ At Risk Areas
- ☐ Probably At Risk Areas
- ☐ Probably Not At Risk Areas
- ☐ Not At Risk Areas
- ☐ Groundwater Safeguard Zones
- ☒ Safeguard Zones
- ☐ Water Protection Areas
- ☒ Dee Catchment

Map of X: 475,137.66; Y: 105,837.22 at scale 1:20,000

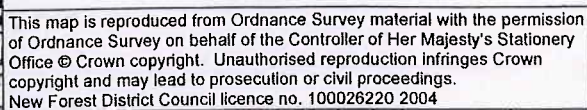
[Other maps](#) [Data search](#) [Text only version](#)



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EA web map Drinking Water Protection Areas (Groundwater)

Not in a risk area



Managed Realignment Site