Gosport Borough Local Plan 2011-2029

Publication Version

Strategic Flood Risk Assessment Technical Report (Level 2)

June 2014

GOSPORT
Borough Council

Gosport Borough Local Plan 2011-2029 (Publication Version)

Strategic Flood Risk Assessment Technical Report (Level 2)

June 2014

CONTENTS

Gosport Borough Local Plan 2011-2029 (Publication Version) June 2014

Strategic Flood Risk Assessment – additional information

1.0 Background

1.1 This new piece of work takes on board the comments received from the Environment Agency on the draft Gosport Borough Local Plan 2011-2029 and Strategic Flood Risk Assessment which were published for consultation in December 2012. The Borough Council has prepared this report with the support of officers from the Environment Agency and the Eastern Solent Coastal Partnership. This report has the objective of providing confidence that the Borough Council's proposed regeneration area allocations at Gosport Waterfront (LP4), Haslar Peninsula (LP6) and the Priddy's Hard Heritage Area (LP9A) can be delivered within the context of flood risk. This work will be published as part of the evidence base for the publication stage of the Local Plan and should be read alongside the Borough Council's Strategic Flood Risk Assessment report updated at June 2014.

1.2 Site specific, FRAs will still be required to accompany individual planning applications within the Regeneration Areas as a whole. This is because the work undertaken by the earlier Strategic Flood Risk Assessment, and this supplementary report, are only high level assessments and therefore less detailed than a site specific FRA required at the planning application stage. This supplementary report provides additional information to support the earlier strategic work. It includes additional information which identifies a number of options and a preferred option for managing flood risk in these key locations.

1.3 The most significant sources of flood risk facing Gosport are flooding from the sea and potential flooding from surface water. In addition to these, the River Alver runs through the Alver Valley in Gosport and so fluvial flooding can also be identified as a potential source of flooding. Policy LP8: Alver Valley proposes a country park, a strategic recreational resource with the potential to enhance local biodiversity.

1.4 Large parts of the Alver Valley are within Flood Zones 2 and 3. The Alver Valley represents a major area of green infrastructure and has the potential to store significant floodwater thereby reducing flood risk elsewhere including residential areas. A new balancing pond has been created to reduce flood risk within the residential development at Cherque Farm.

1.5 The proposed country park will make a significant contribution towards delivering green infrastructure within south Hampshire. The approach to flood risk issues for the Alver Valley as proposed in policy LP8 is supported by the Environment Agency in their response to the consultation draft version of the Local Plan which was published in December 2012. In view of this support, it was considered that additional work on flood risk would not be required for the Alver Valley.

2.0 Methodology

2.1 Gosport has several discrete tidal flood cells each of which has its own flood characteristics and necessary infrastructure considerations. The Borough Council, Environment Agency and Eastern Solent Coastal Partnership have agreed to assess the Regeneration Areas within each flood cell that is considered to have the most

significant and complex flood risk issues. It is assumed that a reasonable prospect of safe development on these sites will provide the confidence that the remainder of the allocation sites can be delivered in the context of flood risk.

2.2 Additional mapping information for this assessment, has been provided by the Environment Agency and was originally prepared as part of the Stubbington, Fareham and Gosport ABD (Areas Benefitting from Defences) and Hazard Mapping Modelling Report (Environment Agency, March 2011). This modelling work takes account of defences and openings along the coast and includes an allowance for wave overtopping. The additional maps reproduced in the Borough Council's additional flood risk report, take account of flood level, velocity and hazard. The tidal events considered in the Environment Agency's study ranged from 3.0m AOD and 4.3m AOD peak tide levels and were informed by the minimum height of the study areas coastal defences and includes a number of intermediate levels including the 1 in 200 year and 1 in 1000 year return period tides in the present day and the 1 in 200 year return period tide taking into account the effects of climate change estimated for 2115. The model shows the effects of water level conditions and wave height have on wave overtopping based on a 40 hour, 3 tide cycle. This information was also used to inform the ESCP's Coastal Processes Report (December 2012) prepared as part of the work on the River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy.

2.3 As part of the local approach to managing flood risk and development in the Borough; the Borough Council, in partnership with the Environment Agency and the Eastern Solent Coastal Partnership, published 'Guidance for New Development in Flood Risk Areas (More Vulnerable Development)'. This document has been used to guide the formulation of this work and prospective applicants should draw on it when preparing site specific FRAs. In preparing site specific FRAs it is expected that development proposals will:

- Follow the flood risk management hierarchy, avoiding areas at highest risk and locating higher vulnerability uses in areas of lowest risk;
- Locate habitable rooms above the design flood level;
- Provide a safe access and egress route wherever feasible;
- Not increase flood risk elsewhere;
- Incorporate flood resilience and resistance measures;
- Remain structurally sound during the design flood event; and
- Demonstrate that residual risk can be managed to a safe level

2.4 In addition to this, new developments will be expected to play a key role in contributing towards the effective delivery of the Borough Council's sustainable development objectives. In flood risk terms this will be achieved through:

- Providing a robust 'front line' defence as an integral part of the development where appropriate;
- Safeguarding sufficient land in order to provide for future flood risk management where a front line defence is not appropriate or currently necessary; and
- Providing a financial contribution for the redesign and/or replacement of existing flood defences and the provision of new flood risk management measures as appropriate.

2.5 The individual assessments in this report include for each strategic location the following information:

a) **Proposed land use for allocation & site location including map**

b) **The nature of the flood risk**, including:
- source / pathway / receptor information;
- current and future flood risk;
- predicted maximum height of flood waters and ground levels at the site; and
- vulnerability category of the proposed use.

c) **Options for dealing with that risk**, covering:
- Off site strategic measures recommended through Flood & Coastal Erosion Risk Management Strategy with the purpose of reducing flood risk to the existing community, but from which new development could benefit and help to deliver. Includes an assessment of how likely the scheme is to attract central government funding.
- On site strategic measures such as sea defences on sites where the waterfront lies within the site boundary.
- On site measures such as land raising and building design. Any measures identified as possible options are subject to being acceptable in wider planning terms. A high level assessment of economic feasibility has been made.
- Adjacent off site measures such as road raising.
- Although it should be considered through site specific Flood Risk Assessments as part of establishing safe entry and exit to and from the site should a severe flooding event occur. It is considered that road raising may not be feasible in most cases in Gosport due to the density of existing development.

d) **A preferred option or combination of options will be identified**
This will represent the preferred approach of Gosport Borough Council and the Environment Agency for managing risk based upon the information available

e) **Conclusion on deliverability of site in light of flood risk.**

3.0 Definitions

3.1 Design flood event
This is the 0.5% probability tidal flood event in 2115 (to take account of climate change over the development lifetime) during which the tide level is predicted to reach 4.3m AOD. There is an aspiration that people will be safe from a 0.1% event and if this cannot be achieved, a minimum standard of safety of resisting the 0.5% event.

3.2 Extreme flood event
This is the 0.1% probability tidal flood event in 2115 (to take account of climate change over the development lifetime) during which the tide level is predicted to reach 4.5m AOD.

4.0 Defence Conditions

4.1 As part of the preparation of the River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy, consultants URS Infrastructure & Environment UK Limited have prepared a Defence Condition Assessment (December 2012) for the whole of the strategy's frontage including the Gosport coastline. It is based upon a visual survey of defences in order to inform the development of the coastal strategy. The Report can therefore be used as a starting point for pre application discussions relating to more detailed assessments required as part of understanding residual risk and mitigation through site specific FRAs. It should be noted that Fort Blockhouse could not be accessed during the survey and therefore information on defence type and residual life information was taken from the ESCP field defence survey datasets. The condition of the defences was assessed in line with the Environment Agency's Condition Assessment Manual (2006).

4.2 The report can be viewed on the ESCP website at: http://www.escp.org.uk/Strategy

5.0 Assessments and options for management

The Gosport Waterfront and Town Centre Regeneration Area

a) Proposed land use for allocation & site location

5.1 The site is allocated under draft policy LP4: Gosport Waterfront and Town Centre Regeneration. This location represents a significant opportunity to deliver regeneration within the South Hampshire sub region and is identified within the Partnership for Urban South Hampshire (PUSH) Business Plan as a strategic site. Proposed uses are for mixed – use development comprising of:

- 33,000 sq.m. (gross) employment floorspace (B uses);
- Upto 6,500 sq.m. of retail (A1) and additional floorspace for other town centre uses (A2-A5);
- Community and leisure uses (D1 and D2);
- 700-900 dwelllings;
- New transport interchange; and
- Enhanced public realm.

SFRA Map sets
Sequential test & supporting information

1E - Climate Change - Year 2115

Tidal Flood Zone 2

Tidal Zone Zone 3

Fluvial Flood Zone 3

Regeneration Area Boundary

This map has been reproduced using data from the PUSH SFRA
The PUSH SFRA can be viewed at http://maps.hants.gov.uk/push

5.2 The land uses proposed at this location will fall within the Less Vulnerable and More Vulnerable Vulnerability categories in the NPPF as shown in the table below:

Proposed Land-use	NPPF Vulnerability classification
Retail, Leisure and commercial	Less vulnerable
Residential	More vulnerable

.

5.3 The location of Gosport Waterfront along the Portsmouth Harbour frontage means that consideration of flood risk particularly over the longer term is paramount. To illustrate this, the site plan above shows the predicted flood outline for this area at 2115. This sets the context for the formulation of a preferred solution for the flood risk management measures in this location. This map is taken from the PUSH Strategic Flood Risk Assessment (2007) and is reproduced from the Borough Council's Strategic Flood Risk Assessment which was published alongside the Gosport Borough Local Plan 2011-2029 in December 2012 an updated in June 2014.

b) <u>The nature of the flood risk</u>

5.4 **Source / Pathway:** The dominant source of flooding to this site will be tidal flooding. The pathway will be overtopping of the frontage to the east of the development.

5.5 Surface water flooding will also need to be considered. Southern Water identified local sewer capacity issues and therefore new and or improved local sewerage infrastructure will be required to serve development in this location. There could be issues with rising groundwater levels as average sea levels rise. This will need to be considered fully in the FRA along with the potential for the use of sustainable drainage techniques.

5.6 **Level of Flood Risk:** Parts of the allocation site currently lie within Flood Zones 2 and 3. Climate change and associated sea level rise will see additional areas of the site within Flood Zones 2 & 3 within the development lifetime. Information provided by the Environment Agency, shows indicative ground levels in this location range from 4.6m AOD to 3.2 m AOD at Mumby Road and Harbour Road. The indicative ground levels are lower than this in areas adjacent to the water level at the harbour frontage and range from 2.7, 2.8m AOD and 3.3m AOD. Therefore tidal flooding during a design event could make safe access and exit difficult and this needs to be addressed through detailed FRA.

5.7 Information from the ESCP Coastal Processes Report (December 2012) indicates that based on contemporary knowledge, Portsmouth Harbour is generally sheltered and wave heights range between 0.1m to 0.3m. Portsmouth Harbour is also subject to prevailing south-westerly winds, the key wind direction will be offshore for the western side of the harbour suggesting a lower risk of wave overtopping.

Flood Hazard Information:

5.8 The hazard maps in this report (shown as maps 1 and 2) are taken from the Environment Agency's 'Stubbington, Fareham and Gosport Areas Benefitting from Defences and Hazard Mapping' Report (2011). The maps show the possible extent of potential hazards if flood defences in this location were to be breached. These scenario events are based on a 1 in a 200 year event. The hazard maps are based on (a) 3.2m AOD at Portsmouth Harbour and (b) at 4.3 m AOD at Portsmouth Harbour (this second map factors in the allowance for sea level rise predicted for 2115).

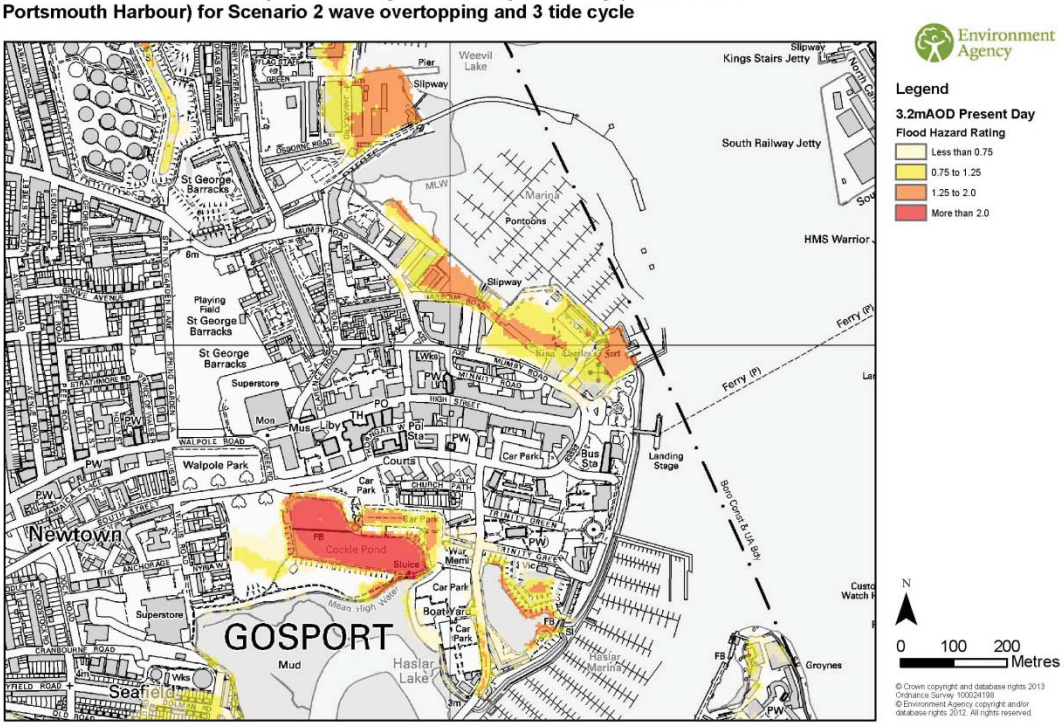
5.9 To help interpret the information shown by the colour codes on the maps below, the accompanying legend taken from the Environment Agency report is based on DEFRA flood hazard indices set out in the DEFRA publication: Framework and Guidance for Assessing and Managing Flood Risks for New Development. The Flood Hazard Rating shown in the table below is based on the depth of water plus an allowance for the velocity of the water and possible debris. For ease of reference, this colour code is explained in the table below:

Flood Hazard Rating	Hazard to people classification
Less than 0.75	Very low hazard – caution
0.75 to 1.25	Danger for some – includes children, the elderly and the infirm
1.25 to 2.0	Danger for most – includes the general public
More than 2.0	Danger for all – includes emergency services

(Source: Environment Agency's 'Stubbington, Fareham and Gosport Areas Benefitting from Defences and Hazard Mapping' Report (2011)

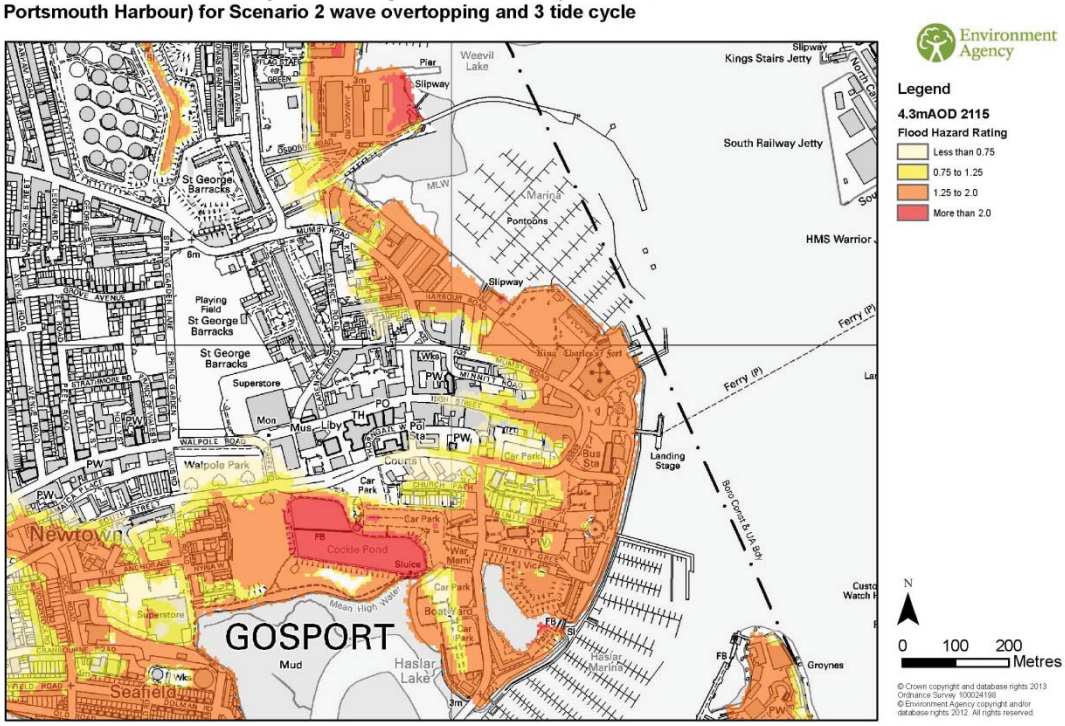
Map 1: Gosport Waterfront and Town Centre (present day)

Waterfront - Flood Hazard map for 1 in 200 year event in present day (3.2m AOD at Portsmouth Harbour) for Scenario 2 wave overtopping and 3 tide cycle



Map 2 Gosport Waterfront and Town Centre (year 2115)

Waterfront - Flood Hazard map for 1 in 200 year event in 2115 (4.3m AOD at Portsmouth Harbour) for Scenario 2 wave overtopping and 3 tide cycle



(Mapping provided by the Environment Agency, 2013)

5.10 In comparing maps 1 and 2 the extent of the potential hazard increases substantially at 2115 in line with predicted increases in sea level rise as shown by the hazard mapping model. It will be necessary to take these risks into consideration when preparing site specific FRAs.

c) <u>Options for addressing Flood Risk and their feasibility</u>

5.11 **1. Off-site strategic measures**: The Shoreline Management Plan's (SMP) long-term (100 year) policy for this frontage is 'Hold the Line'. The evolving Coastal Strategy for this area is likely to support the SMP's Hold the Line policy. However based on early evidence, any proposed coastal defence schemes are not currently eligible for full government funding. Both the SMP and Coastal Strategy will identify that landowners and/or developers will need to make suitable arrangements to provide onsite measures to an agreed standard of protection.

5.12 The Borough Council's Infrastructure Delivery Plan (2014) has identified future flood schemes. This information was taken from Table 2 of the Local Authority and Internal Drainage Board Preliminary Studies Approvals business case (FRM7) for the River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy (CFERMS) which contains a 'high level' investment plan. This information will be refined as an outcome of the CFERMS. In addition to these identified schemes, there will also be a need to develop site-specific measures which will be sought through the development control process. Proposals for flood risk management will need to contribute to the overall strategy for reducing flood risk to the existing community over the next 100 years, and that any proposals that come forward will need to contribute positively to the Portchester to Hamble Flood & Coastal Erosion Risk Management Strategy.

5.13 **2. On-site strategic measures:** The developer could improve defences within the boundary of their site and raise the Standard of Protection (see details in option 3 below). This would reduce the likelihood of breach and wave overtopping. The preferred option for flood risk management will be identified by the evolving coastal defence strategy for this frontage. This is still to be confirmed and may include options such as construction of seawalls, flood defence walls and access gates, ground raising alongside onsite resistance and resilience measures. In the interim, developers should discuss through pre-application discussions, appropriate options for flood risk management of development proposals with the Borough Council, the Environment Agency and the Eastern Solent Coastal Partnership.

5.14 **3. On site measures:** The site should be designed so that flooding would not impact on the buildings. A sequential approach across the site could locate the more vulnerable parts of the development in the areas of lowest flood hazard. If necessary finished floor levels of the site could be raised so that the internals of the building would remain dry during the design extreme tidal flood events. Therefore all residential buildings would have a safe place of refuge. A flood response plan would also need to be prepared & accepted by the Local Planning Authority, taking advice from the Emergency Planner and Emergency Services, and would need to look at conditions experienced in a design and extreme flood event. On-site measures should be designed such that they will not prohibit the use of adjacent water compatible uses such as boat yards and marinas which require on-going access to the waterfront. The developer will need to prepare a comprehensive flood risk management strategy which will manage risk for the allocation site across the plan period whilst all phases of development are being delivered. It would generally be expected to deliver a standard of safety to keep people safe from the 0.5% probability tidal flood event in 2115 (to take account of climate change over the lifetime of the development) during which the tide level is predicted to reach 4.3m AOD. There is an aspiration that people will be safe from a 0.1% event and if this cannot be achieved then a minimum standard of safety of resisting the 0.5% will be required. The 0.1% probability tidal flood event in 2115 is 4.5m AOD which does not account for wave action which will still be an important consideration at this site. The Gosport Waterfront and Town Centre SPD will also include further detail on the requirements for flood risk management measures.

5.15 **4. Adjacent off site measures:** There may be opportunities to raise the levels of Mumby Road to ensure that access is maintained during a flood event. The viability of this has not been assessed at present and will need to be determined. Any flood risk management measures will also be required to be designed in order to tie in with existing defences to the north and south of the allocation site at Royal Clarence Yard and Falkland Gardens respectively.

5.16 **d) <u>Preferred Option(s)</u>**

A combination of **options 2 & 3** are preferred solutions to ensure that the development is safe in this location. The Borough Council would expect the developer to provide these flood risk management measures.

5.17 Prior to the provision of a continuous sea defence for the allocation site and safe access and exit, there will need to be a robust Flood Response Plan which will show how flood risk will be managed i.e. through evacuation or safe refuge. This must be acceptable to the Local Planning Authority in consultation with the Emergency Planner and Emergency Services.

5.18 Any site specific FRA will need to assess the residual flood risk behind the defences delivered (i.e. if the defences are breached or overtopped) or risks until a full continuous flood defence is delivered and the development employs appropriate mitigation techniques. The FRA must show if this site is within a Rapid Inundation Zone should the defence breach or be overtopped. Any site specific FRA will need to assess the residual flood risk behind the defences

e)Conclusion on deliverability of site in terms of flood risk considerations

5.19 A combination of feasible measures should ensure that the site can be made safe. Therefore it is considered that the preferred measures set out have a reasonable prospect of delivery. It should be noted that this is a high level assessment setting out the Borough Council's preferred option for the delivery of flood risk management measures and the conclusion does not remove the need for a full site level FRA when a planning application is made.

Overall Conclusion:

5.20 The information in the assessment shows development on these sites have a reasonable prospect of delivery and a package of measures, both structural and non-structural, can be used to ensure that development is safe.

5.21 The selection of the preferred option is based on this approach and has been identified in consultation with the Environment Agency and the ESCP.

5.22 In terms of implementation, the River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy will look at the preferred scheme to be implemented in more detail. The coastal strategy will be able to provide further technical than is required for this high level assessment prepared for the purposes of the Local Plan. The implementation of the coastal strategy is an important part of the delivery process, helping to secure the provision of the most appropriate technical, environmental and economically sustainable flood risk management measures in this location.

5.23 ***It is important to note the Borough Council recognises that future central funding from the government may be limited and that other sources of funding for example through developer contributions should be sought. This is explained further in the reasoned justification to accompany policy LP45: Flood Risk and Coastal Erosion.***

5.24 It should be noted that any development behind these strategic defences will need to consider the residual flood risk present and apply appropriate mitigation strategies. Appendix 1 has been produced to show best practice and guidance in these situations.

5.25 It is likely that site specific control will be required through building design i.e. raising of finished floor levels and other resistance / resilience / repair ability measures. Therefore buildings will need to be designed in specific ways to ensure that development is safe.

5.26 If safe access to and exit from these buildings cannot be realistically provided during a flood there will need to be a reliance on flood response plans to ensure people are not within hazardous locations i.e. by prior evacuation or provision of safe refuge.

5.27 The site specific FRAs must demonstrate what the flood hazards will be in these areas and the LPA will use this information and guidance from the Environment Agency to decide if the flood response plan will be acceptable and people will be safe and not be exposed to flood hazards. Advice on this is given in Appendix 1.

Haslar Peninsula Regeneration Area – assessment and options for management

a) Proposed land use for allocation & site location

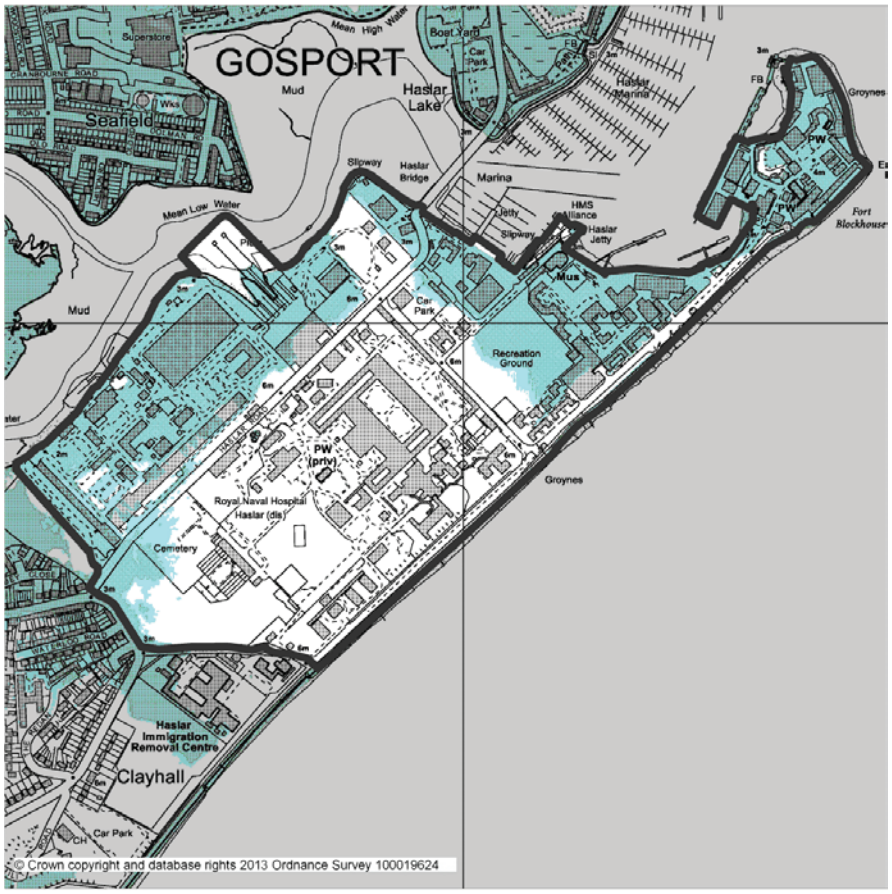
5.28 The Haslar Peninsula Regeneration Area is a significant area of change and consists of three large sites, these are identified as follows:

- Royal Hospital Haslar;
- Blockhouse (sub divided into Blockhouse 1,2 and 3); and
- Haslar Marine Technology Park.

5.29 The sites are allocated under draft Policy LP6: Haslar Peninsula Regeneration Area. Proposed uses on site are for a mix of uses including medical, health and care-led facilities, employment uses, leisure and tourism and some residential. The proposed uses fall within the 'less vulnerable' and 'more vulnerable' categories of the NPPF vulnerability tables as shown below:

.

Proposed Land – uses	NPPF vulnerability classification
Residential	More vulnerable
Health	More vulnerable
Leisure	Less vulnerable
Employment and training	Less vulnerable
Commercial	Less vulnerable



SFRA Map sets
Sequential test & supporting information

1E - Climate Change - Year 2115

Tidal Flood Zone 2

Tidal Zone Zone 3

Fluvial Flood Zone 3

Regeneration Area Boundary

This map has been reproduced using data from the PUSH SFRA
The PUSH SFRA can be viewed at http://maps.hants.gov.uk/push

5.30 Consideration and appropriate levels of management of flood risk in this location are fundamental to the effective delivery of this regeneration area. To illustrate this, the plan above shows the predicted flood outline for this area in 2115.

b)The nature of flood risk

5.31 **Source/Pathway:** The dominant source of flooding to this site will be tidal. The pathway is likely to be to the north west of the site via Stoke Lake and the potential for wave overtopping of the Haslar sea wall to the east. In addition to this matter, surface water flooding will also need to be considered. It is possible there could be flooding issues associated with rising groundwater levels particularly in the longer term as average sea levels rise. This aspect will need to be fully considered through site specific FRAs as part of the information required to accompany planning applications. As a starting point, the Borough Council has published a Strategic Flood Risk Assessment Report (December 2012, updated at June 2014) which provides a high level assessment identifying the potential flood risk issues in relation to the proposed strategic allocations.

5.32 **Level of Flood Risk:** The former Royal Hospital Haslar site currently lies within Flood Zone 1, other parts of the Haslar peninsula lie within Flood Zones 2 and 3. With predicted climate change and the associated sea level rise it is expected that the extent of land in this location falling within Flood Zones 2 and 3 could increase within the lifetime of the development. Tidal flooding during a design event could make safe access and exit difficult. Indicative ground level information provided by the Environment Agency show the ground levels ranging from 2.4m – 6.7m. Two key areas for considering ground levels in site specific FRAs is land to the east at Clayhall and Haslar Bridge.

5.33 **Flood hazard Information:** The hazard maps in this report shows the two key hazard maps taken from the Environment Agency's 'Stubbington, Fareham and Gosport Areas Benefitting from Defences and Hazard Mapping Report' (2011). The maps show the possible extent of potential hazards if flood defences were to be breached. These are based on a 1 in a 200 year event. The hazard maps are based on (a) 3.2m AOD at Portsmouth Harbour and (b) at 4.3m AOD at Portsmouth Harbour (this second map factors in the allowance for sea level rise at 2115).

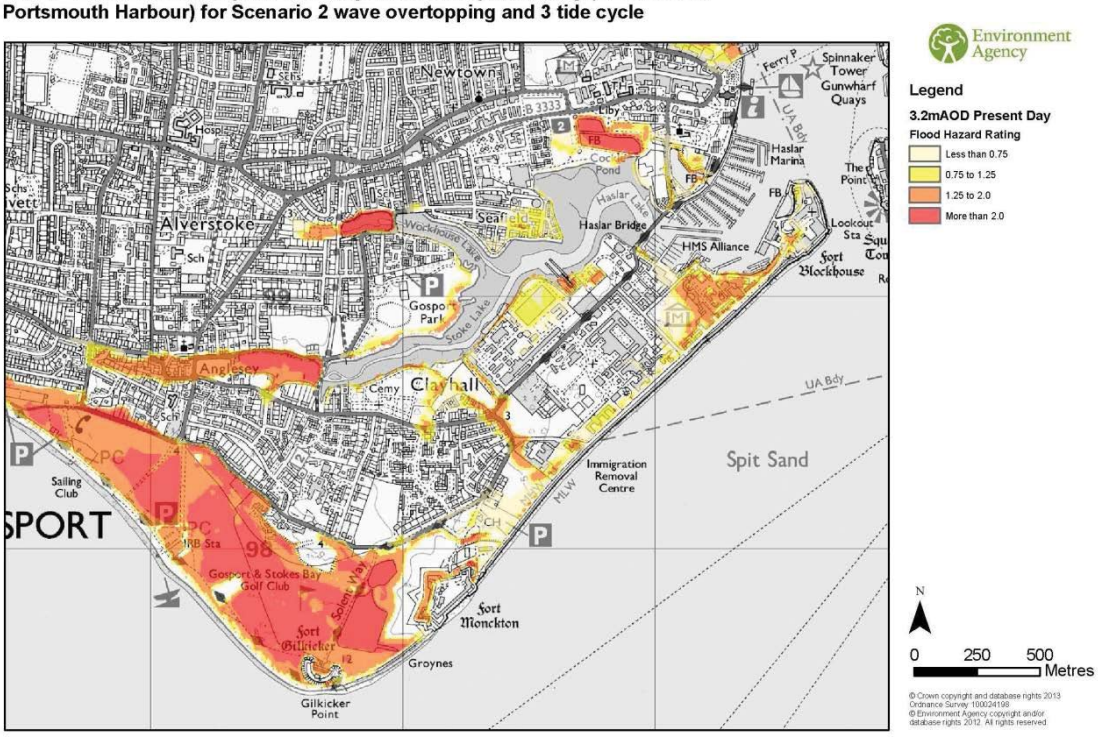
5.34 To help interpret the information shown by the colour codes on the maps, the accompanying legend in the Environment Agency report is based on DEFRA flood hazard indices set out in the Framework and Guidance for Assessing and Managing Flood Risk for New Development). The Flood Hazard Rating is based on the depth of water plus an allowance for the velocity of the water and possible debris. For ease of reference, this code is set out in the table below:

Flood Hazard Rating	Hazard to people classification
Less than 0.75	Very low hazard - caution
0.75 to 1.25	Danger for some – includes children, the elderly and the infirm
1.25 to 2.0	Danger for most – includes the general public
More than 2.0	Danger for all – includes emergency services

(Table is taken from the Environment Agency's 'Stubbington, Fareham and Gosport Areas Benefitting from Defences and Hazard Mapping Report' (2011).

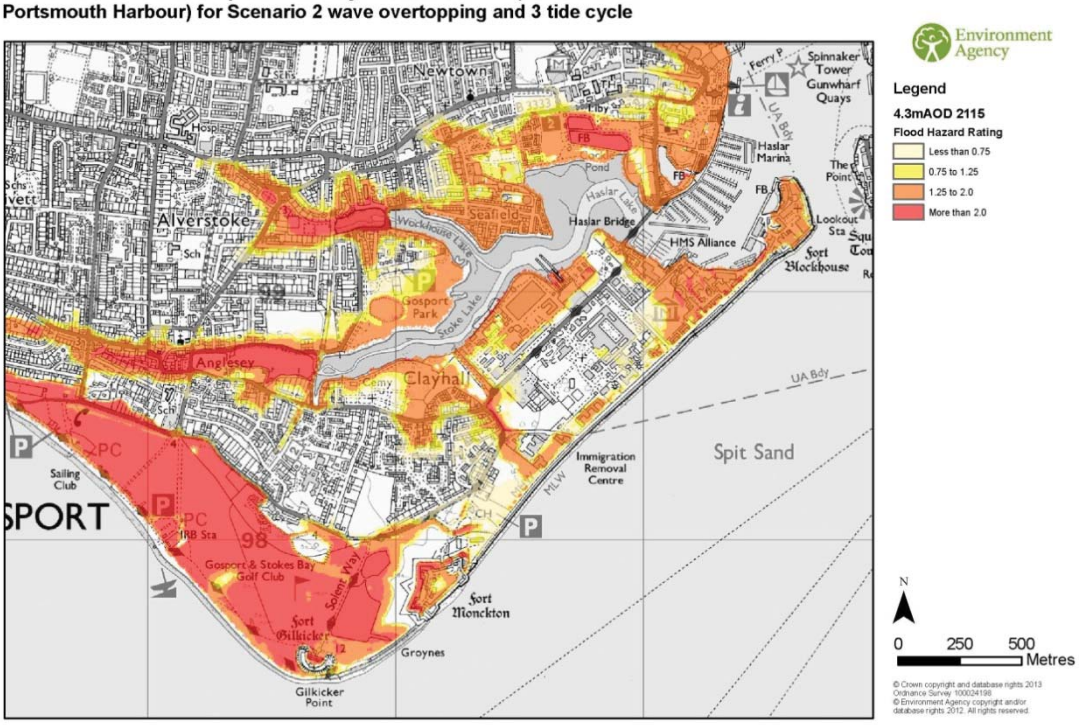
Map 1: Haslar Peninsula Flood Hazard map (present day)

Haslar - Flood Hazard map for 1 in 200 year event in present day (3.2m AOD at Portsmouth Harbour) for Scenario 2 wave overtopping and 3 tide cycle



Map 2: Haslar Peninsula Flood Hazard map (year 2115)

Haslar - Flood Hazard map for 1 in 200 year event in 2115 (4.3m AOD at Portsmouth Harbour) for Scenario 2 wave overtopping and 3 tide cycle



(Mapping provided by the Environment Agency, 2013)

5.35 In terms of the potential hazards posed, the areas at most extensive risk should defences be breached in an extreme flood event would be in the north eastern part of the site towards Fort Blockhouse and on the eastern part adjacent to Stoke Lake and towards the southern part of the site adjoining Clayhall.

5.36 In comparing hazard maps 1 and 2, the extent of the hazard outlines increases substantially in the northern part of the allocation towards Blockhouse with the risk increasing from low hazard (no colouration on base map) with smaller pockets of 'yellow' (danger for some) and 'orange' areas (danger for most), in the north eastern top part of the allocation for the present day scenario. There is extensive coverage across the whole site in relation to the extent of the orange areas, however the level of orange intensifies and includes pockets of 'red' (danger for all) within the Blockhouse area in relation to 2115 and predicted sea level rise as depicted on map 2.

5.37 To the eastern part of the site at Haslar Marine Technology Park, and part of Blockhouse 3, a substantial part of this area is covered in 'orange' with smaller pockets of 'red'

c) Options for addressing flood risk and their feasibility

5.38 The following measures are proposed as possible solutions to flood risk management measures which could be undertaken in this location. These measures have been developed following stakeholder engagement on the draft Gosport Borough Local Plan 2011-2029 with the Environment Agency and the Eastern Solent Coastal Partnership.

5.39 **1. Off-site strategic measures:** The Shoreline Management Plan's (SMP) long-term (100 year) policy for this frontage is 'Hold the Line'. The evolving Coastal Strategy for this area is likely to support the SMP's Hold the Line policy. However, based on early evidence, any proposed coastal defence schemes are not currently eligible for full government funding. Both the SMP and Coastal Strategy will identify that landowners and/or developers will need to make suitable arrangements to provide onsite measures to an agreed standard of protection.

5.40 The Borough Council's Infrastructure Delivery Plan (2014) has identified future flood schemes. This information was taken from Table 2 of the Local Authority and Internal Drainage Board Preliminary Studies Approvals business case (FRM7) for the River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy (CFERMS) which contains a 'high level' investment plan. This information will be refined as an outcome of the CFERMS. In addition to these identified schemes, there will also be a need to develop site-specific measures which will be sought through the development control process.

5.41 **2. On-site strategic measures:** The developer could improve defences within the boundary of their site and raise the Standard of Protection (SOP). This would reduce the likelihood of breach and wave overtopping. The preferred option for flood risk management will be identified by the evolving River Hamble to Portchester Coastal Flood and Erosion Risk Management Coastal Defence Strategy. The sea wall is in private ownership and the Borough Council would expect contributions to the maintenance and enhancements to the sea wall to be met by the developer.

5.42 **3. On-site measures:** The site should be designed so that flooding would not impact on the buildings. A sequential approach across the site could locate the more vulnerable parts of the development in the areas of lowest flood hazard. If necessary finished floor levels of the site could be raised so that the internals of the building

would remain dry during the design and extreme tidal flood events. (The preferred approach to managing risk is to raise land where appropriate the presence of listed buildings may restrict this opportunity to do this here.) Therefore all residential buildings would have a safe place of refuge. A Flood Response Plan would also need to be prepared & accepted by the Local Planning Authority taking advice from the Emergency Planner and Emergency Services looking at conditions experienced in a design extreme flood event. The developer will need to prepare a comprehensive flood risk management strategy which will manage risk for the allocation site across the plan period whilst all phases of development are being delivered. It would generally be expected to deliver a standard of safety of to keep people and property safer from the 0.5% probability tidal flood event in 2115 (to take account of climate change over the development lifetime) during which the tide level is predicted to reach 4.3m AOD. There is an aspiration that people will be safe from a 0.1% event and if this cannot be achieved, a minimum standard of safety of resisting the 0.5% event. The 0.1% probability tidal flood event in 2115 is 4.5m AOD which does not account for wave action which will be an important consideration at this site.

5.43 **4. Adjacent off-site measures:** A number of options for adjacent off site measures could include land raising of access routes. These may be considered less likely to be deliverable. The viability of this has not been assessed at present and will need to be determined. There will need to be a robust Flood Response Plan which will show how flood risk will be managed i.e. through evacuation or safe refuge. This must be acceptable to the Local Planning Authority in consultation with the Emergency Planner and Emergency Services.

d) Preferred Option(s)

Royal Hospital Haslar

5.44 Most of the Royal Hospital Haslar site is within Flood Zone 1 but is surrounded by higher risk areas. There is one small area in the south west corner (which will be retained as open space) within Flood Zone 2. The areas proposed for re-use and potential redevelopment meet the sequential test as they are within Flood Zone 1 and consequently the exception test is not required. An assessment of sea-level rise over the next century indicates that areas of proposed development (i.e. not the area to be retained as historic park and garden) would still be within Flood Zone 1. Therefore the risk of tidal (as well as fluvial flooding) is considered to be low.

5.45 In terms of any FRA for the site a number of issues will need to be addressed including:

- An assessment of the residual flood risk behind the defences delivered (i.e. if the defences are breached or overtopped) and the development employs appropriate mitigation techniques. The FRA must show if this site is within a Rapid Inundation Zone should the defence breach or be overtopped. This should include information an assessment about the condition of the existing defences.

- An assessment of the capacity of the existing sewer network which drains surface water run-off and whether it is satisfactory to meet the needs of the new development and changing climatic conditions. The use of sustainable drainage systems may have a role to help reduce any impact and measures for their long-term management will need to be considered.

5.46 Prior to the provision of a continuous sea defence for the allocation site and safe access and exit, there will need to be a robust Flood Response Plan which will show how flood risk will be managed i.e. through evacuation or safe refuge. This must be acceptable to the Local Planning Authority in consultation with the Emergency Planner and Emergency Services.

5.47 These issues have been taken forward into the policy considerations for Policy LP6.

5.48 Therefore **Option 4 – adjacent off-site measures** to provide safe access to and egress from the site in order to ensure that proposed development is safe is the Borough Council's preferred option. If this option was not deliverable, then option 1 could be considered. Option 3 would be considered by the Borough Council only if options 1 and 4 were not deliverable. Contributions from the developer would be sought to facilitate delivery of these options.

Blockhouse

5.49 The flood risk issues at Blockhouse will be a determining factor on the location, type and scale of uses within the site. Significant parts of Blockhouse are within Flood Zones 2 and 3. This issue is identified in policy LP6. Consequently the FRA will need to consider whether it is appropriate to locate particular uses (as defined by the NPPF) on certain parts of the site. An FRA will need to address a number of issues including the following:

- The condition of the existing Solent seawall defences and the risks of defence failure;
- Whether the sea defences are adequate to deal with future climatic condition and what improvements would be required;
- The potential of overtopping of sea defences; and
- The capacity of the site to deal with surface water and whether sustainable drainage systems can assist.

5.50 Any site specific FRA will need to assess the residual flood risk behind the defences delivered (i.e. if the defences are breached or overtopped) or risks until a full continuous flood defence is delivered and the development employs appropriate mitigation techniques. The FRA must show if this site is within a Rapid Inundation Zone should the defence breach or be overtopped. Any site specific FRA will need to assess the residual flood risk behind the defences.

5.51 In terms of preferred options, a combination of **options 2 & 3** are preferred solutions to ensure that the development is safe in this location. The Borough Council would expect the developer to provide these flood risk management measures as part of the development proposals on the site. Although the potential costs associated in delivering **option 2** may be high, it is considered that with the engineering options available, and with sufficient funding measures in place, be feasible to protect the site.

5.52 Prior to the provision of a continuous sea defence for the allocation site and safe access and exit, there will need to be a robust Flood Response Plan which will show how flood risk will be managed i.e. through evacuation or safe refuge. This must be acceptable to the Local Planning Authority in consultation with the Emergency Planner and Emergency Services.

Haslar Marine Technology Park

5.53 This is an existing employment site includes a cluster of hi-technology, research and development, and specialist engineering marine businesses. The Borough Council requires that this site be retained for employment. There may be scope to provide linkages with Blockhouse and the Royal Hospital Haslar sites.

5.54 Any site specific FRA will need to assess the residual flood risk behind the defences delivered (i.e. if the defences are breached or overtopped) or risks until a full continuous flood defence is delivered and the development employs appropriate mitigation techniques. The FRA must show if this site is within a Rapid Inundation Zone should the defence breach or be overtopped. Any site specific FRA will need to assess the residual flood risk behind the defences.

5.55 In this location the preferred option is **Option 4 – adjacent off-site measures.** However it is likely that a **combination of all 4 options** may be appropriate in this location. The most appropriate measures will be informed by the outcomes from the River Hamble to Porchester Coastal Flood and Erosion Risk Management Strategy and whilst at this stage the coastal strategy has not finalised its preferred coastal defence options for this part of the strategic coastline, there is potential for a strategic scheme to come forward at Haslar Lake which would help to reduce flood risk to this site.

a) Conclusion on deliverability of sites in terms of flood risk considerations

5.56 A combination of feasible measures should ensure that these sites can be made safe. Therefore it is considered that the measures identified have a reasonable prospect of delivery. It should be noted that this assessment or conclusion does not remove the need for a full site level flood risk assessment when a planning application is made.

Overall Conclusion:

5.57 The information in the assessment shows development on these sites have a reasonable prospect of delivery and a package of measures, both structural and non-structural, can be used to ensure that development is safe. In terms of the current engineering options available, it is anticipated that with sufficient funding in place, it would be feasible to maintain the current defences to an appropriate standard. However it is acknowledged there may be significant costs implications. The ESCP carry out regular asset inspections and developers are advised to discuss appropriate flood risk management measures with the ESCP as part of the preparation of site specific FRAs.

5.58 The selection of the preferred option is based on this approach and has been identified in consultation with the Environment Agency and the ESCP.

5.59 In terms of implementation, the River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy will look at the preferred scheme to be implemented in more detail. The coastal strategy will be able to provide further technical than is required for this high level assessment prepared for the purposes of the Local Plan. The implementation of the coastal strategy is an important part of the delivery process, helping to secure the provision of the most appropriate technical, environmental and economically sustainable flood risk management measures in this location.

5.60 ***It is important to note the Borough Council recognises that future central funding from the government may be limited and that other sources of funding for example through developer contributions should be sought. This is explained further in the reasoned justification to accompany policy LP45: Flood Risk and Coastal Erosion.***

5.61 It should be noted that any development behind these strategic defences will need to consider the residual flood risk present and apply appropriate mitigation strategies. Appendix 1 has been produced to show best practice and guidance in these situations.

5.62 It is likely that site specific control will be required through building design i.e. raising of finished floor levels and other resistance / resilience / repair ability measures. Therefore buildings will need to be designed in specific ways to ensure that development is safe.

5.63 If safe access and exit to these buildings cannot be realistically provided during a flood there will need to be a reliance on flood response plans to ensure people are not within hazardous locations i.e. by prior evacuation or provision of safe refuge.

5.64 The site specific FRAs must demonstrate what the flood hazards will be in these areas and the LPA will use this information and guidance from the Environment Agency to decide if the flood response plan will be acceptable and people will be safe and not be exposed to flood hazards. Advice on this is given in Appendix 1.

Priddy's Hard Heritage Area – assessment and options for management

a) <u>Proposed land uses for allocation and site location</u>

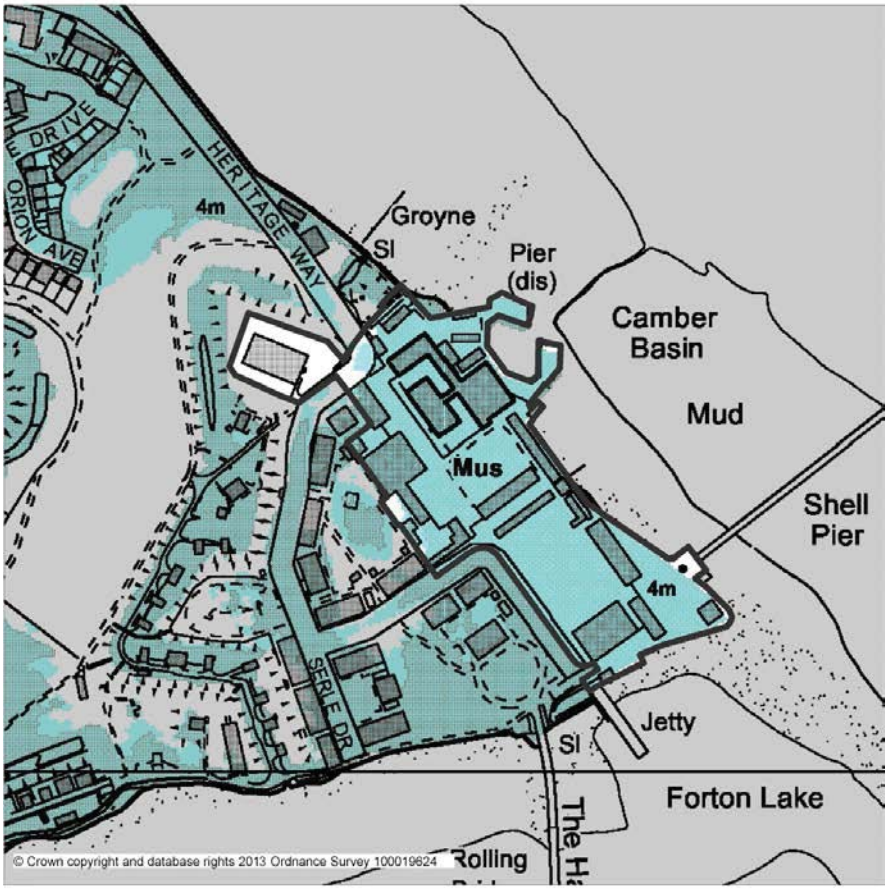
5.65 The site is allocated under policy LP9A: Allocations outside the regeneration areas: Mixed use site. Development should include a mix of uses including:

- Up to 100 dwellings;
- Commercial floorspace; and
- Community and leisure uses (approximately 1,400 sq.m. with a new park at the Ramparts).

5.66 The table below sets out the NPPF vulnerability classification for the proposed uses.

Proposed Land – uses	NPPF vulnerability classification
Residential	More vulnerable
Community	More vulnerable
Leisure uses	Less vulnerable
Commercial	Less vulnerable

5.67 Development proposals will need to be accompanied by a site-specific FRA to demonstrate how the proposal deals with the small part of the undeveloped site which is located within Flood Zones 2 and 3 and will need to accord with the Borough Council's 'Guidance for Developing in Flood Risk Areas'. Development proposals for flood risk management will need to contribute to the overall strategy for reducing flood risk to the existing community over the next 100 years and proposals coming forward will need to contribute positively to the River Hamble to Portchester Flood and Coastal Erosion Risk Management Strategy.



SFRA Map sets
Sequential test & supporting information

1E - Climate Change - Year 2115

Tidal Flood Zone 2

Tidal Zone Zone 3

Fluvial Flood Zone 3

Mixed Use Allocation Boundary

This map has been reproduced using data from the PUSH SFRA
The PUSH SFRA can be viewed at http://maps.hants.gov.uk/push

b) The nature of the flood risk

5.68 **Source / Pathway:** The dominant source of flooding to this site will be tidal flooding. The pathway potentially could be overtopping of the frontages. Priddy's Hard Heritage Area is adjacent to Portsmouth Harbour and the Strategic Flood Risk Assessment identified the harbour frontages as experiencing low wave energy as would be expected in the context of a harbour location.

5.69 Surface water flooding will also need to be considered. Southern Water identified local sewer capacity issues and therefore new and or improved local sewerage infrastructure will be required to serve development in this location. There could be issues with rising groundwater levels as average sea levels rise. This will need to be

considered fully in the FRA as well as the potential for incorporating sustainable drainage systems.

5.70 **Level of Flood Risk:** Small parts of the allocation site currently lie within Flood Zones 2 and 3. Climate change and associated sea level rise are likely to result in additional areas of the site falling within these flood zones.

5.71 LiDAR ground level data provided by the ESCP shows the ground levels across the site range from 3.1m AOD and 4.0m AOD. Information from the ESCP Coastal Processes Report (December 2012) indicates that based on contemporary knowledge, Portsmouth Harbour is generally sheltered and wave heights range between 0.1m to 0.3m. Portsmouth Harbour is also subject to prevailing south-westerly winds, the key wind direction will be offshore for the western side of the harbour suggesting a lower risk of wave overtopping.

5.72 Based on information taken from the PUSH Strategic Flood Risk Assessment, the Standard of Protection for the majority of the Priddy's Hard Heritage Area is greater than 0.1% Annual Exceedance Probability (AEP) meaning that in the event of an extreme sea level the defences or naturally higher ground are still expected to protect the land behind it from flooding. However this information is based on both the natural topography of the area and a still water level within Portsmouth Harbour. It should be noted that at the western end of Priddy's Hard Heritage Area, outside of the proposed allocation, the standard of protection is lower at 1%-2% AEP. The possible effects of this in terms of managing flood risk on the allocated site may need to be addressed through site specific FRA to accompany a planning application.

5.73 **Flood Hazard Information:**
The hazard maps in this report (shown as maps 1 and 2) are taken from the Environment Agency's 'Stubbington, Fareham and Gosport Areas Benefitting from Defences and Hazard Mapping' Report (2011). The maps show the possible extent of potential hazards if flood defences in this location were to be breached. These scenario events are based on a 1 in a 200 year event. The hazard maps are based on (a) 3.2m AOD at Portsmouth Harbour and (b) at 4.3 m AOD at Portsmouth Harbour (this second map factors in the allowance for sea level rise predicted for 2115).

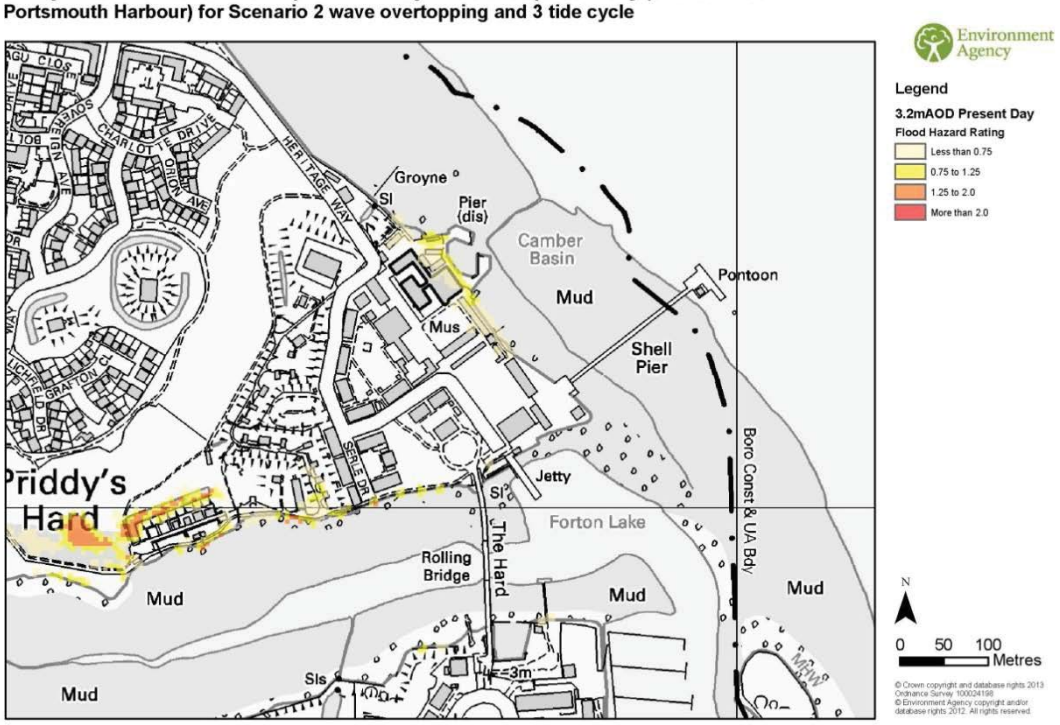
5.74 To help interpret the information shown by the colour codes on the maps, the accompanying legend taken from the Environment Agency report is based on DEFRA flood hazard indices set out in the DEFRA publication: Flood Risk Assessment guidance for new development – Phase 2 (FD2320). The Flood Hazard Rating shown in the table below is based on the depth of water plus an allowance for the velocity of the water and possible debris. For ease of reference, this colour code is explained in the table below:

Flood Hazard Rating	Hazard to people classification
Less than 0.75	Very low hazard – caution
0.75 to 1.25	Danger for some – includes children, the elderly and the infirm
1.25 to 2.0	Danger for most – includes the general public
More than 2.0	Danger for all – includes emergency services

(Source: Environment Agency's 'Stubbington, Fareham and Gosport Areas Benefitting from Defences and Hazard Mapping' Report (2011)

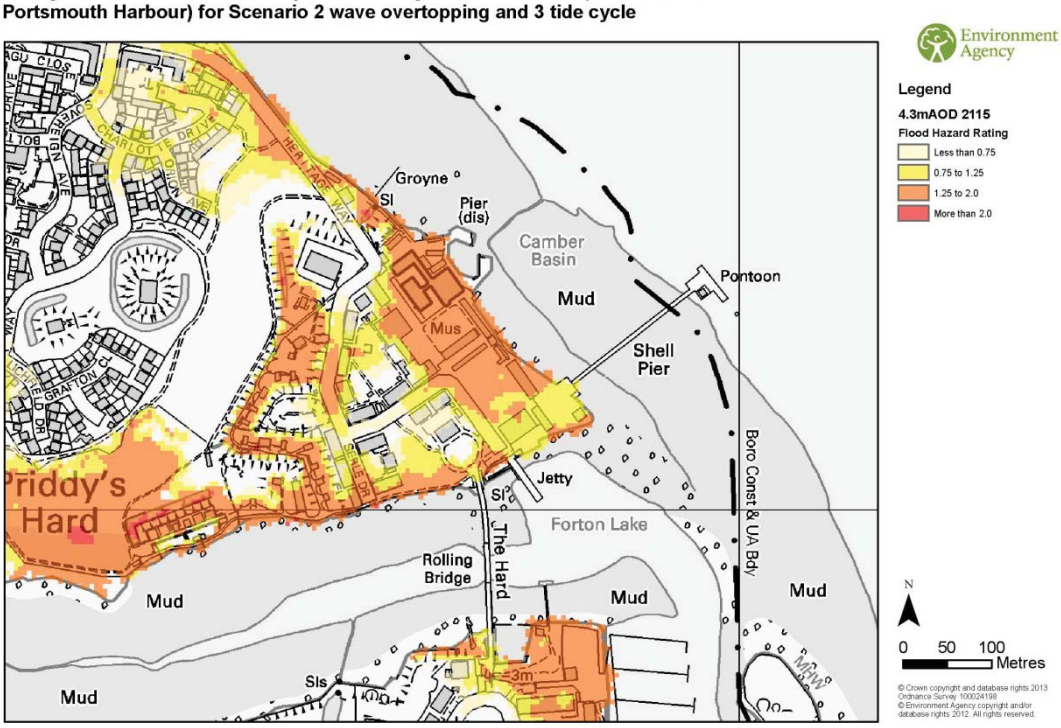
Map 1: Priddy's Hard Heritage Area Flood Hazard map (present day)

Priddy's Hard - Flood Hazard map for 1 in 200 year event in present day (3.2m AOD at Portsmouth Harbour) for Scenario 2 wave overtopping and 3 tide cycle



Map 2: Priddy's Hard Heritage Area Flood Hazard map (year 2115)

Priddy's Hard - Flood Hazard map for 1 in 200 year event in 2115 (4.3m AOD at Portsmouth Harbour) for Scenario 2 wave overtopping and 3 tide cycle



(Mapping provided by the Environment Agency, 2013)

5.75 Map 1 shows the flood hazard map for a 1 in 200 year event. The 'yellow' colouring in the top north eastern corner of the site adjacent to the disused pier shows the potential hazard to be categorised as 'danger for some' but when the two maps are compared together, at 2115 the scope of the potential hazard is as would be expected greater.

b) <u>Options for addressing Flood Risk and their feasibility</u>

5.76 **1. Off-site strategic measures**: The Shoreline Management Plan's (SMP) long-term (100 year) policy for this frontage is 'Hold the Line'. The evolving Coastal Strategy for this area is likely to support the SMP's Hold the Line policy. However based on early evidence, any proposed coastal defence schemes are not currently eligible for full government funding. Both the SMP and Coastal Strategy will identify that landowners and/or developers will need to make suitable arrangements to provide onsite measures to an agreed standard of protection.

5.77 The Borough Council's Infrastructure Delivery Plan (2014) has identified future flood schemes. This information was taken from Table 2 of the Local Authority and Internal Drainage Board Preliminary Studies Approvals business case (FRM7) for the River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy (CFERMS) which contains a 'high level' investment plan. This information will be refined as an outcome of the CFERMS. In addition to these identified schemes, there will also be a need to develop site-specific measures which will be sought through the development control process.

5.78 **2. On-site strategic measures:** The developer could improve defences within the boundary of their site and raise the Standard of Protection (see details in option 3 below). This would reduce the likelihood of breach and wave overtopping. The preferred option for flood risk management will be identified by the evolving coastal defence strategy for this frontage. This is still to be confirmed and may include

options such as construction of seawalls, flood defence walls and access gates, ground raising alongside onsite resistance and resilience measures. In the interim, developers should discuss through pre-application discussions, appropriate options for flood risk management of development proposals with the Borough Council, the Environment Agency and the ESCP.

5.79 **3. On site measures:** The site should be designed so that flooding would not impact on the buildings. A sequential approach across the site could locate the more vulnerable parts of the development in the areas of lowest flood hazard. If necessary finished floor levels of the site could be raised so that the internals of the building would remain dry during the design and extreme tidal flood events. Therefore all residential buildings would have a safe place of refuge. A flood response plan would also need to be prepared & accepted by the Local Planning Authority, taking advice from the Emergency Planner and Emergency Services, and would need to look at conditions experienced in a design and extreme flood event. The developer will need to prepare a comprehensive flood risk management strategy which will manage risk for the allocated site across the plan period whilst all phases of development are being delivered. It would generally be expected to deliver a standard of safety to keep people and property safe from the 0.5% probability tidal flood event in 2115 (to take account of climate change over the lifetime of the development) during which the tide level is predicted to reach 4.3m AOD. There is an aspiration that people will be safe from a 0.1% event and if this cannot be achieved then a minimum standard of safety of resisting the 0.5% will be required. The 0.1% probability tidal flood event in 2115 is 4.5m AOD which does not account for wave action which will still be an important consideration at this site.

5.80 **4. Adjacent off site measures:** A number of options for adjacent off site measures could include potential for land raising at Heritage Way or options for sea wall construction to ensure a continuous flood defence between the allocation site and existing development to the north at Priddy's Hard. The viability of this has not been assessed at present and will need to be determined.

d) <u>Preferred Option(s)</u>

5.81 The FRA for the site will need to address a number of issues including:

- An assessment of defence standards;
- Defence failure scenarios and overland flood flow to ensure the necessary mitigation and safety of the development is addressed throughout its lifetime; and
- Surface water runoff and the appropriateness of sustainable drainage systems.

5.82 Any site specific FRA will need to assess the residual flood risk behind the defences delivered (i.e. if the defences are breached or overtopped) or risks until a full continuous flood defence is delivered and the development employs appropriate mitigation techniques. The FRA must show if this site is within a Rapid Inundation Zone should the defence breach or be overtopped.

5.83 Prior to the provision of a continuous sea defence for the allocation site and safe access and exit, there will need to be a robust Flood Response Plan which will show how flood risk will be managed i.e. through evacuation or safe refuge. This must be acceptable to the Local Planning Authority in consultation with the Emergency Planner and Emergency Services.

5.84 A combination of **options 2 & 4** are preferred solutions to ensure that the development is safe in this location. The Borough Council would expect the developer to provide these flood risk management measures. Measures that could be considered which have been used in previous developments in Priddy's Hard. These could include raising the existing harbour wall to 3.9m above Ordnance Datum (AOD) with a 1metre high splashwall and a collection channel. In addition a sewer to store storm water and the floor levels of the residential blocks to have a minimum level of 4 metres AOD.

e) Conclusion on deliverability of site in terms of flood risk considerations

5.85 A combination of feasible measures should ensure that the site can be made safe. Therefore it is considered that the preferred measures set out have a reasonable prospect of delivery. It should be noted that this is a high level assessment setting out the Borough Council's preferred option for the delivery of flood risk management measures and the conclusion does not remove the need for a full site level flood risk assessment when a planning application is made.

Overall Conclusion:

5.86 The information in the assessment shows that the Local Plan allocation would have a reasonable prospect of being delivered and a package of measures, both structural and non-structural, can be used to ensure that development is safe. The selection of the preferred option is based on this approach and has been identified in consultation with the Environment Agency and the ESCP.

5.87 Similarly to the allocations on the Gosport Waterfront and the Haslar Peninsula; the River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy will look at the preferred scheme to be implemented in more detail. The coastal strategy will be able to provide further technical than is required for this high level assessment prepared for the purposes of the Local Plan. The implementation of the coastal strategy is an important part of the delivery process, helping to secure the provision of the most appropriate technical, environmental and economically sustainable flood risk management measures in this location.

5.88 ***It is important to note the Borough Council recognises that future central funding from the government may be limited and that other sources of funding i.e. developer contributions should be sought. This is explained further in the reasoned justification to accompany policy LP45: Flood Risk and Coastal Erosion.***

5.89 It should be noted that any development behind these strategic defences will need to consider the residual flood risk present and apply appropriate mitigation strategies. Appendix 1 has been produced to show best practice and guidance in these situations.

5.90 It is likely that site specific control will be required through building design i.e. raising of finished floor levels and other resistance / resilience / repair ability measures. Therefore buildings will need to be designed in specific ways to ensure that development is safe.

5.91 If safe access and exit to these buildings cannot be realistically provided during a flood there will need to be a reliance on flood response plans to ensure people are not within hazardous locations i.e. by prior evacuation or provision of safe refuge.

5.92 Site specific FRAs must demonstrate what the flood hazards will be in these areas and the LPA will use this information and guidance from the Environment Agency to

decide if the flood response plan will be acceptable and people will be safe and not be exposed to flood hazards. Advice on this is given in Appendix 1.

6.0 Appendix 1: Further technical advice for preparing site specific FRAs & understanding Residual Risk

Site specific FRAs

6.1 FRAs should be in line with the NPPF Technical Guidance (2012) and current best practice. It will be important for the FRA to describe clearly the characteristics of flooding which include:

- The worst case flooding scenario the development or users would be exposed to (i.e. depths and velocities);
- How the flood propagates (i.e. how quickly the flood spreads, the routes etc.);
- Duration (i.e. how long the flood water stays around on site); and
- The frequency at which the development will be exposed to flooding.

6.2 New development should be designed for any flooding that may occur throughout its lifetime and be able to cope with the flooding effects described.

Understanding Residual Risk behind Sea Defences

6.3 Flood defences reduce the likelihood of flooding, but there is no guarantee that they will not be overtopped or fail as a result of extreme loads or performed as designed over the lifetime of the proposed development.

6.4 As flood defences increase in height so does the flood consequence in the event of overtopping or failure. Whilst the probability of defence overtopping or failure can be low, the consequences can be very high.

6.5 The benefit of flood defences should be taken into account when assessing residual risk. However flood risk for new developments would not usually be considered adequately managed through the provision of defences alone i.e. there may still be a requirement for other mitigation i.e. resilience or resistance measures included within the building design.

Assessment of flood defence breaching and overtopping

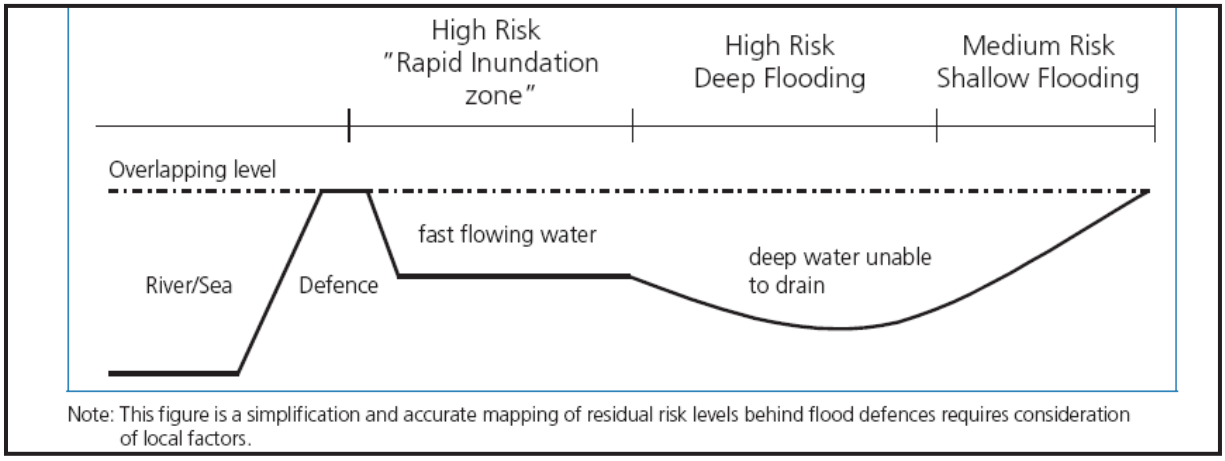
6.6 An assessment focusing on the residual flood risk behind a flood defence will depend on a number of factors including:

- depth of flooding;
- speed of flow of flood water;
- local flow paths;
- speed of onset of the flood;
- distance from the defences (as distance from a defence typically has an effect on velocities and the rate of onset of flooding); and
- duration of the flood and how water will be removed.

6.7 In addition to the guidance published to support the National Planning Policy Framework. The Environment Agency published additional guidance in July 2013. The Environment Agency guidance can be found at: http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/LIT_8495_0264ac.pdf

6.8 Guidance on the level of risk related to distance and flood depth for overtopping and breaching scenarios is provided in *Guidance note S3.2 Risks to people behind defences. Flood Risk in Assessment Guidance for New Development Phase 2 R&D Technical report FD2320* (Defra, 2005). This approach is illustrated in the following diagram.

Figure 1: Risk zones behind a river or sea defence.



Note: This figure is a simplification and accurate mapping of residual risk levels behind flood defences requires consideration of local factors.

6.9 The Defra document suggests that an assessment of flood defence breaching should generally be undertaken on the basis of a design event of the appropriate design standard (0.5 per cent for flooding from the sea), including an allowance for climate change.

6.10 The extent of the breach at any given structure is likely to depend on the method of construction, defence height and other local factors. Estimation of likely breach parameters will often be based on professional judgment and should be agreed with the Environment Agency or relevant operating authority.

6.11 An assessment of overtopping of flood defences should generally be undertaken on the basis of events exceeding their design standard up to a 0.1 per cent flood event, including an allowance for climate change. In coastal areas, factors such as wave height and direction will also need to be included in the assessment.

6.12 When assessing the residual flood risk associated with overtopping or breaching of a flood defence, it is recommended that the following factors should be taken into account:

- how the flood defence infrastructure protecting an area might fail;
- the standard of protection and design freeboard of the flood defence;
- the potential of the defence to fail, including the condition of the flood defence and the potential for human interference;
- the height of the flood defence structure and retained water levels compared to ground levels. Generally the higher a defence is and the greater the depth of water it retains, the more serious and far-reaching the consequences of breaching will be;
- where breach(es) in the flood defences might occur, and their width;

- how long it would take for the operating authority and/or defence owner to close the breach;
- how long it would take for water to drain from the flooded area following an overtopping or breach event;
- the topography of the land and depth of the flooding behind the flood defence;
- the velocity of flood water flowing across the site following a breach or overtopping of the defences;
- the lead time available before depth and velocity of flood water become hazardous to people; and
- the capability of emergency planning to mitigate the risks identified.

6.13 Developers are advised to identify residual risk as part of their site-specific FRA however this should be proportionate to the scale of the development proposed and the risks involved. The SFRA should be the starting point for obtaining information on the residual risk. As with all aspects of development and flood risk, this is best considered early in the development process so that measures to manage residual risk can be incorporated into site layout to make the best use of developable land.

6.14 Measures to manage residual flood risk include:

- developer contributions towards publicly-funded flood alleviation schemes;
- flood resilience and resistance measures; and
- flood warning and evacuation plans.

Rapid Inundation Zones

6.15 A Rapid Inundation Zone is an area which is at risk of rapid flooding should a flood defence structure be breached or overtopped. The zones at highest risk of rapid inundation are typically located close behind the flood defences. New development should be sited away from existing flood defences except in exceptional circumstances, where a FRA shows how the building and its users will be made safe.

Gosport Borough Council is committed to equal opportunities for all.

If you need this document in large print, on tape, CD, in Braille or in another language, please ask.

Published: June 2014

Gosport Borough Council
Town Hall, High Street,
Gosport,
Hampshire,
PO12 1EB

Tel: (023) 9258 4242

www.gosport.gov.uk

GOSPORT
Borough Council