

**Rotunda Building,
Northney Marina, Hayling
Island**

Flood Risk Assessment

Revision A



On behalf of **National Regional Property Group**

**National
Regional
Property
Group**

Project Ref: 37394/4001 | Rev: A | Date: August 2017



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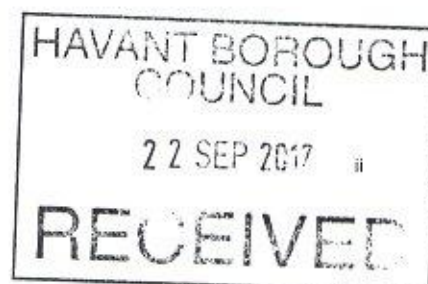
	Name	Position	Signature	Date
Prepared by:	Natasha Vaughan BSc MSc	Assistant Engineer	Natasha Vaughan (NV)	17 th April 2017
Reviewed by:	Andy Robertson BSc CEng MICE MCIWEM C.WEM	Associate	Andy Robertson (AR)	17 th April 2017
Approved by:	Chris Downs MEng CEng MICE MCIWEM C.WEM	Director	Andy Robertson pp Chris Downs (CD)	17 th April 2017
For and on behalf of Peter Brett Associates LLP				

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Executive Summary

This Flood Risk Assessment (FRA) has been prepared by Peter Brett Associates LLP (PBA) to support a Prior Approval application under Class O of the GPDO, for the change of use permitted development rights of the Rotunda Building, Northney Marina, Hayling Island PO11 0NH, from offices to residential.

In accordance with the fundamental objectives of the National Planning Policy Framework (NPPF), the FRA demonstrates that:

- (i) The development is safe;
- (ii) The development does not increase flood risk; and,
- (iii) The development does not detrimentally affect third parties.

The Environment Agency (EA) Flood Zone map shows the site lies wholly within Flood Zone 1 'Low Probability' (as defined in NPPF Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' Table 1) as follows:

Flood Zone 1 'Low Probability' (less than 1 in 1000 (0.1%) annual probability of river or sea flooding)

Detailed analysis of the topographic survey and modelled tidal levels confirms this Flood Zone classification.

The proposals for change of use (office to residential) constitute a 'More Vulnerable' land use, which is considered appropriate within Flood Zone 1 (reference NPPF PPG Tables 2 and 3).

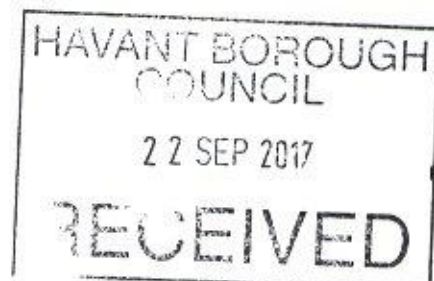
The NPPF section 104 confirms that changes of use should not be subject to the Sequential or Exception Tests.

The flood risk mitigation strategy for the development consists of the following elements:

- Floor levels will be raised approximately 300mm from existing, to a level of 4.67m AOD, providing a 50mm freeboard to the 1 in 200 annual probability plus allowance for climate change, 2120 level;
- The 4.67m AOD is a minimum of 300mm above the external threshold levels;
- Flood resilience/resistance measures are recommended to be implemented to a minimum level of 4.92m AOD, providing a 300mm freeboard to the 1 in 200 annual plus allowance for climate change level;
- Continuous safe access from the site is not provided at the 1 in 200 annual probability plus climate change flood level via Northney Road, therefore a robust Flood Risk Management Plan is advised to be produced as part of the development;
- It is advised that future resident register to the Environment Agency Flood Risk Information Service, to receive flood warnings/alerts for extreme events. Tidal events are predictable and can provide ample warning prior to events;

The proposed development does not result in increased building footprint, and therefore will not result in a change in impermeable areas. The proposals will therefore not significantly change the volume of surface water runoff from the site and therefore the existing drainage arrangements will be continued.

In summary, the FRA demonstrates that the proposed development is safe and in accordance with the requirements of national and local planning policy.



1 Introduction

1.1 Scope of Report

- 1.1.1 This Flood Risk Assessment (FRA) has been prepared by Peter Brett Associates LLP (PBA), on behalf of our client, National Regional Property Group, to support a Prior Approval application under Class O of the GPDO for the change of use permitted development rights of the Rotunda Building, Northney Marina, Hayling Island PO11 0NH, from offices to residential.
- 1.1.2 The report is based on the available flood risk information for the site as detailed in **Section 1.2**, and prepared in accordance with the planning policy requirements set out in **Section 1.3**. The scope of the FRA is consistent with the 'Site-specific Flood Risk Assessment Checklist' from the National Planning Policy Framework (NPPF) Planning Practice Guidance:

<https://www.gov.uk/guidance/flood-risk-and-coastal-change>

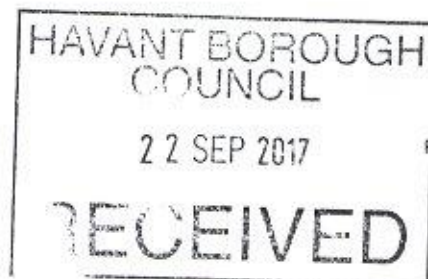
- 1.1.3 The required content of the checklist is detailed below along with specific cross-reference to the content in the FRA as follows:

- 1) **Development site and location** – see Section 2;
- 2) **Development proposals** – see Section 5;
- 3) **Sequential Test** – see Section 5;
- 4) **Climate change** – see Section 4;
- 5) **Site-specific flood risk** – see Section 3;
- 6) **Surface water management** – see Section 7;
- 7) **Occupants and users of the development** – see Section 5;
- 8) **Exception Test** – see Section 5;
- 9) **Residual Risk** – see Section 8;
- 10) **Flood risk assessment credentials** – PBA has many years of experience in, amongst other areas, the assessment of flood risk, hydrology, flood defence and river engineering. The authors and reviewers of the document are all experienced engineers and members of chartered institutions such as the Chartered Institution of Water and Environmental Management (CIWEM) and the Institution of Civil Engineers (ICE).

1.2 Sources of Information

- 1.2.1 The FRA has been prepared based on the following sources of flood risk information:

- The **Environment Agency (EA) online flood maps** at <https://flood-map-for-planning.service.gov.uk/> and <https://flood-warning-information.service.gov.uk/long-term-flood-risk/> ;
- **EA Product 4 data** (SSD/3274, dated 15th March 2016), validity of data re-confirmed by EA 2nd March 2017;
- Hampshire County Council **Preliminary Flood Risk Assessment (PFRA)**;



- Havant Borough Council **Strategic Flood Risk Assessment Supplement**, dated October 2013;
- The **Partnership for Urban South Hampshire (PUSH) Strategic Flood Risk Assessment** adopted December 2007 and updated February 2016;

1.3 Policy Context

1.3.1 This FRA has been prepared in accordance with the relevant national, regional and local planning policy and statutory authority guidance as follows:

- National policy contained within the **National Planning Policy Framework (NPPF)** dated March 2012, issued by Communities and Local Government, with reference to Section 10 'Meeting the challenge of climate change, flooding and coastal change';
- The **NPPF Planning Practice Guidance (PPG)** released in March 2014 ('Flood Risk and Coastal Change' section);
- The **GOV.UK Flood Risk Guidance** current February 2017;
- Local planning policy contained within the Havant Borough Council '**Core Strategy**' (adopted 2011), and '**Allocation Plan**' (adopted 2014) with particular reference to Core Strategy 15 (CS15) '*Flood and Erosion Risk*';

1.4 Caveats and Exclusions

1.4.1 This FRA has been prepared in accordance with the NPPF and Local Planning Policy. The proposed flood management (including ground floor level recommendations) and surface water management strategies are based on the relevant British Standards (BS8533), the standing advice provided by the EA or based on common practice.

1.4.2 The revised Construction (Design and Management) Regulations 2015 (CDM Regulations) came into force on April 2015 to update certain duties on all parties involved in a construction project, including those promoting the development. One of the designer's responsibilities is to ensure that the client organisation, in this instance National Regional Property Group, is made aware of their duties under the CDM Regulations. For further information on the CDM Regulations is provided in the client guide is available at the link below:

<http://www.hse.gov.uk/pubns/indg411.pdf>

1.4.3 The approach for the FRA and proposals for the surface water management strategy are based on the requirements of the EA and Hampshire County Council in its role as the Lead Local Flood Authority (LLFA).

1.4.4 The EA Product 4 flood data March 2016 on which this FRA is based was valid under a 12 month licence. The EA as of the 2nd March 2017, copy e-mail attached in Appendix B, have confirmed that this data is still current. As such, the FRA is accurate at time of issue but we would recommend the end user reviews the validity of the EA flood data on an annual basis.

1.4.5 It should be noted that the insurance market applies its own tests to properties in terms of determining premiums and the insurability of properties for flood risk. Those undertaking development in areas which may be at risk of flooding are advised to contact their insurers or the Association of British Insurers (ABI) to seek further guidance prior to commencing development.

1.4.6 PBA do not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.



- 1.4.7 The findings of this FRA are based on data available at the time of the study and on the subsequent assessment that has been undertaken to date. They relate to current development proposals as outlined in **Section 5**. PBA does not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

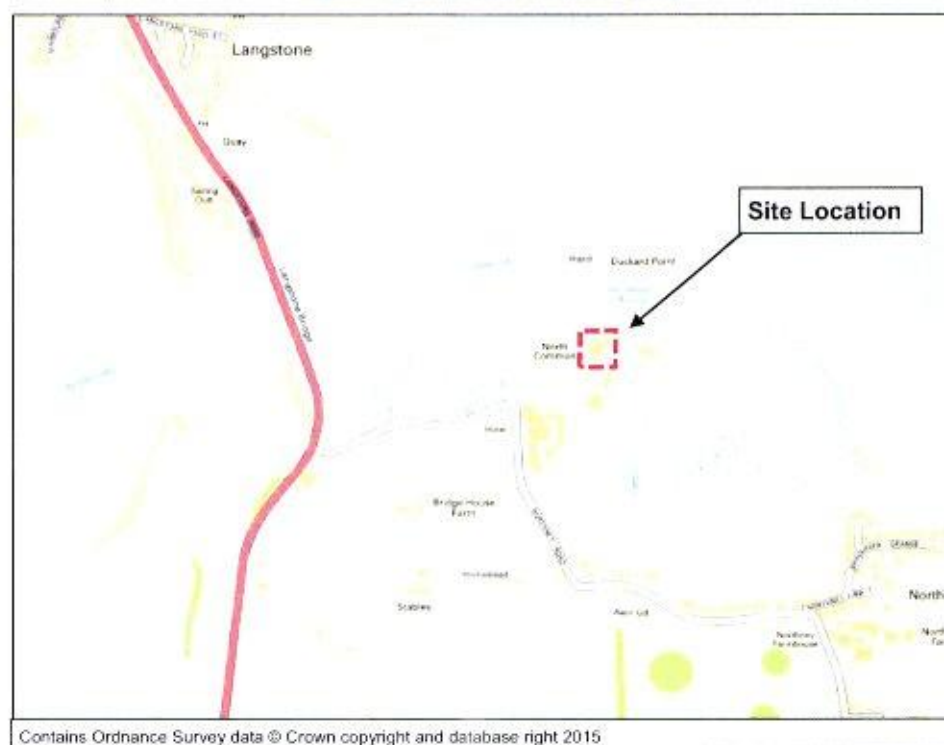


2 Site Setting

2.1 Site Description

- 2.1.1 The site is located within Northney Marina, north east of Hayling Island, in the county of Hampshire (postcode PO11 0NH, site centre OS grid reference 472,670m E, 104,270m N – see **Figure 2-1**).
- 2.1.2 The site lies within the administrative boundary of Havant Borough Council (HBC).

Figure 2-1: Site Location Plan (not to scale)



Contains Ordnance Survey data © Crown copyright and database right 2015

- 2.1.3 The site consists of the existing Rotunda building currently used as office space, external car parking and hard and soft areas. Copies of the Cover Storey Architects drawings for the existing building and site are attached in **Appendix A**.
- 2.1.4 The site is contained within Northney Marina, with 'North Common' located to the west, an area of common land above the mean high water level. The surrounding area is predominantly rural, with residential development lining the roads through the island. The Langstone Hotel is located approximately 175m south west of the site entrance.
- 2.1.5 Access to the site is via a small unnamed road leading to Northney Road to the south west of the site, which connects to the A3023 Langstone Road in the north west and south west.

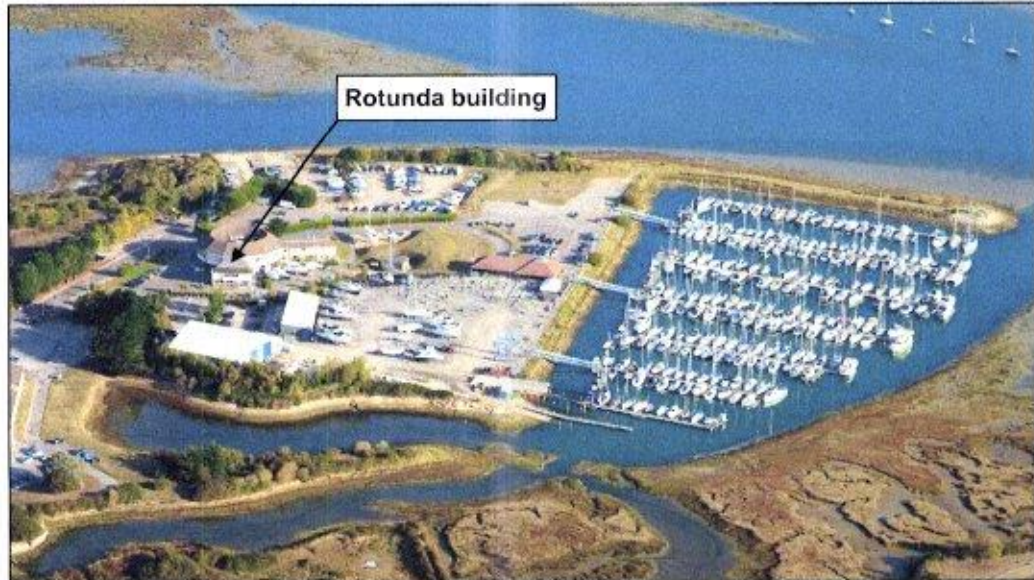
2.2 Topography

- 2.2.1 A topographical survey of the site has been carried out by Digital Terrain Surveys LLP in January 2014. This is detailed in **Appendix A**.
- 2.2.2 The survey data for Northney Marina indicates a variation in ground level from between 3.8m AOD at the north western corner of the site to 4.6m AOD in the north eastern corner of the site.

The access road into the site is located at approximately 3.8m AOD at the southern entrance/exit and approximately 3.5m AOD at the northern entrance/exit.

- 2.2.3 The Rotunda Building indicates external threshold levels of between 4.29m AOD and 4.37m AOD, and internal, existing ground floor levels between 4.33m AOD and 4.37m AOD.
- 2.2.4 The surrounding area is low lying and predominantly flat, with some local gentle low mounding, shown in **Figure 2-2**.

Figure 2-2: Aerial View of the Site and Surrounding Area



2.3 Hydrological Setting

- 2.3.1 The site lies within **Chichester Harbour**. Several channels flow through the Harbour, the main one being the **Sweare Deep**.
- 2.3.2 Sweare Deep passes across the northern side of Hayling Island to provide a link between Chichester Harbour and **Langstone Harbour**, which lies approximately 0.6km west of the site and is located between Portsea Island and Hayling Island.

2.4 Geology and Hydrogeology

- 2.4.1 The British Geological Society (BGS) online geology viewer provides the following information on the geology of the site.
- Bedrock: 'Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Forma'
 - Superficial Deposits: 'Raised Marine Deposits - Sand And Gravel.'
- 2.4.2 The Cranfield University online 'Soilscapes' website provides an overview of the drainage potential of land across Britain. This indicates the site falls within an area designated as 'Freely draining slightly acid loamy soils'.

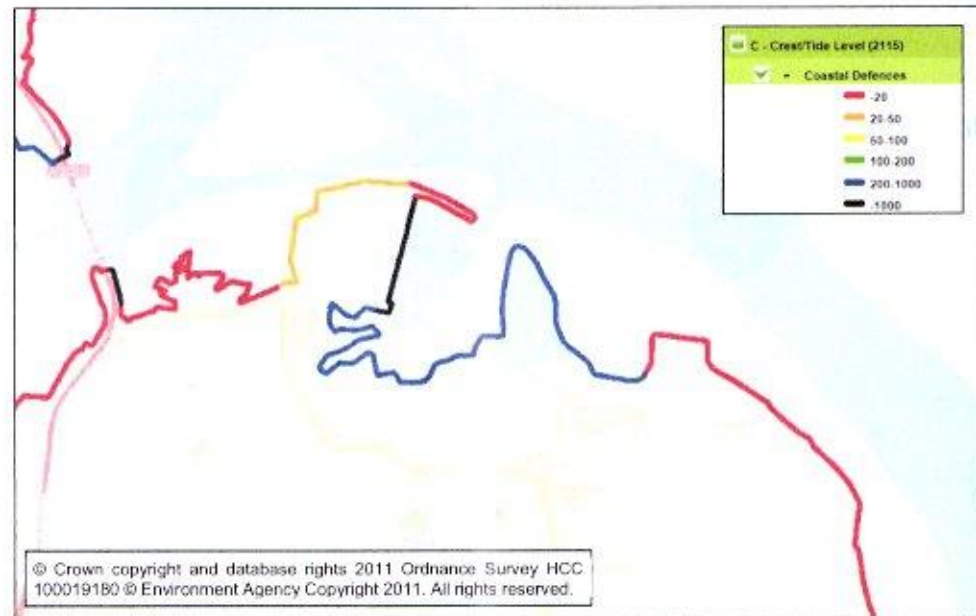
2.5 Existing Flood Defences

- 2.5.1 The EA correspondence states that "the coastal protection the EA maintain adjacent to this site is the earth bank from Langston Hotel to Northney Marina it has an estimated standard of

protection of 1:200 and was found to be in good condition when we last inspected it". However, inspection of the EA Flood Zone map showed that the site and its direct surroundings were not benefitting from flood defences.

- 2.5.2 The PUSH SFRA provides guidance for the standard of defences when sea levels are projected to 2115 – this indicates that the site is protected by defences to the 1 in 1000-year standard. This decreases to between a 1 in 20 and 1 in 50 year standard to the north and west of the site – see **Figure 2-3** below.

Figure 2-3: PUSH SFRA Extract - Future Flood Defence Standard (2115)



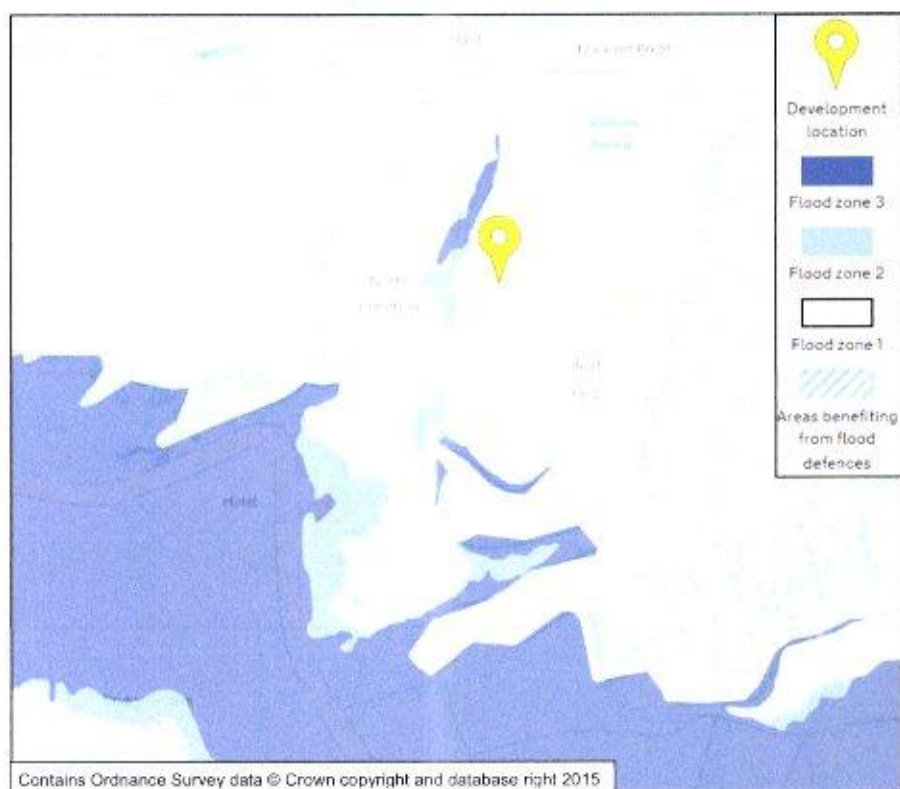
3 Overview of Flood Risk

3.1 EA Flood Maps

Flood Zone Map

- 3.1.1 The first phase in identifying whether a site is potentially at risk of flooding is to consult the EA's Flood Zone maps, available on the EA's website. This provides an initial indication of the extent of the Flood Zones, which is refined by the use of more detailed site-specific level survey and modelled flood levels. **Figure 3-1** shows an extract from the online mapping.

Figure 3-1: EA Flood Zone Map



- 3.1.2 The EA Flood Zone map indicates the site lies within **Flood Zone 1 'Low Probability'** (less than 1 in 1000 (0.1%) annual probability of river or sea flooding).
- 3.1.3 There is a small isolated area of **Flood Zone 3 'High Probability'** (1 in 200 (0.5%) or greater annual probability of tidal flooding) located approximately 50m north west of the site, with a more extensive area of Flood Zone 3 impacting the surrounding land approximately 350m south and 200m south west of the site and associated access routes.

Flood Risk from Reservoirs Map

- 3.1.4 The EA provide maps showing the risk of flooding in the event of a breach from reservoirs, based only on large reservoirs (over 25,000 cubic metres of water). These confirm that the site is not at risk of flooding from such sources.
- 3.1.5 It should be emphasised that the risk of flooding from reservoir breach is very small in any case; the EA are the enforcement authority for the Reservoirs Act (1975) and all large raised

reservoirs are inspected and supervised by reservoir panel engineers, as is stated on the EA's website:

'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'.

- 3.1.6 The risk of such an occurrence is therefore considered negligible.

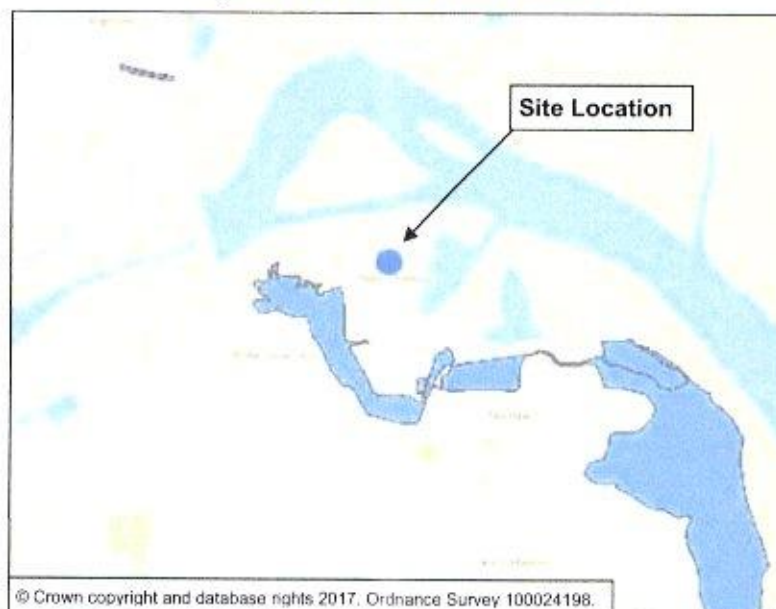
Flood Risk from Surface Water

- 3.1.7 The EA 'Surface Water Flood Risk Map' shows where areas could be potentially susceptible to surface water flooding in an extreme rainfall event.
- 3.1.8 It should be noted that the surface water maps are generated using a generic methodology on a national scale, whereby rainfall is routed over a ground surface model. The analysis does not take account of any specific local information on below-ground drainage infrastructure and infiltration, although an adjustment is included in urban areas to account for the impact of sewerage and a standard infiltration allowance based on soil type. Consequently, the mapping provides a guide to potentially vulnerable areas based on the general topography of an area.
- 3.1.9 The EA online maps show that the site, and access routes to the site, lie in an area at 'Very Low' risk of flooding from surface water (i.e. less than 1 in 1000 (0.1%) annual probability of surface water flooding).

Historic Flood Map

- 3.1.10 The EA Product 4 data provides information relating to historic flood extents, and their subsequent flood extents. It indicated that the site was not affected by the 2008 flood event, which impacted a large area within the north east of Hayling Island. The indicative extent map provided shows that the Rotunda Building is located approximately 220m north east of the recorded flood extent.

Figure 3-2: 2008 Indicative Historic Flood Extent



3.1.11 The main access route to the site, Northney Road, is shown to have been impacted by the historic flood event.

3.1.12 Information provided by the PUSH SFRA, see **Section 3.3**, can reiterate this recording of historic flooding at the site.

3.2 Preliminary Flood Risk Assessment

3.2.1 The Hampshire PFRA provides a high level screening exercise which involves collecting information on historic and potential future floods for the borough. The information of specific relevance to the site is as follows:

- **PFRA Figure 3 'Geology of Hampshire'** identifies the 'Bedrock geology' of the site to be from the 'White Chalk Group'.
- **PFRA Figure 12 'Areas Susceptible to Surface Water Flooding'** indicates that the site is not impacted by surface water flooding in the 1 in 200 annual probability event.

3.3 PUSH Strategic Flood Risk Assessment

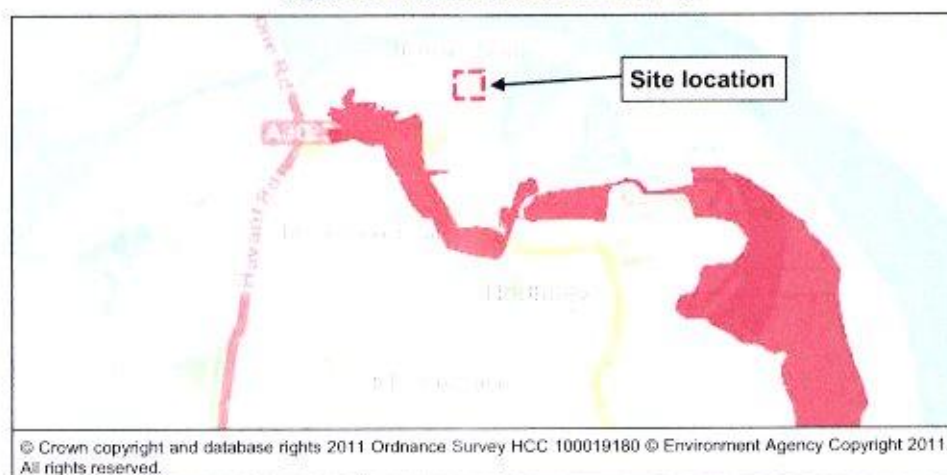
3.3.1 The Partnership for Urban South Hampshire ('PUSH') is made up of 10 Local Planning Authorities – including Havant Borough Council – and Hampshire County Council.

3.3.2 In November 2006, PUSH commissioned a sub-regional Strategic Flood Risk Assessment ('SFRA'), which was released in December 2007. A supplement for Havant Borough Council released in October 2013 as a second stage.

3.3.3 The documents provide flood risk information on a borough-wide scale; the data is available via a GIS interface on the PUSH SFRA website (<http://maps.hants.gov.uk/push/Map.aspx>). The information of specific relevance to the site is as follows:

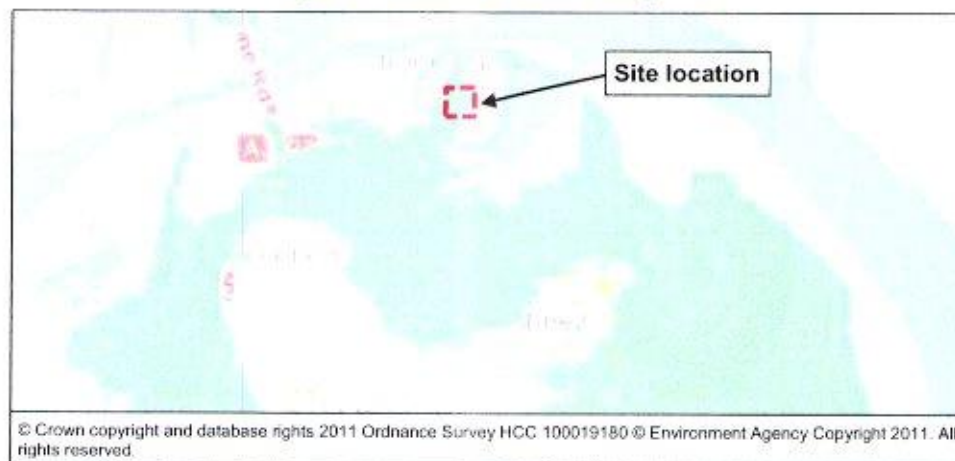
- **Historic Flood Map** – this indicates the site itself has not been subject to historic flooding, but access via Northney Road has been impacted (see **Figure 3-3**). This corroborates the information provided within the EA Product 4 data.

Figure 3-3: Extract of SFRA Historic Flood Map



- **Climate Change Flood Map Year 2115** – indicates that the Flood Zone 3 plus climate change allowance (light green) flood extent covers the site. This is considered in further detail in **Section 4**. Wider access routes from site and to the Island are impacted (see **Figure 3-4**).

Figure 3-4: Extract of SFRA Climate Change 2115



- **'Groundwater Flooding' map** - indicates there have been no historic instances of groundwater flooding. It also confirms the bedrock as high permeability.
- **'Impact of Land Use Change' map** - indicates that there is a low to moderate impact on surface water runoff related with the change of land use at the site. The text further explains that the map is able to allow planners to compare sites with one another with regard to surface water runoff mitigation measures.
- **'Surface Water Sewer Flooding' map** - confirms there have been no recorded instances of flooding from surface water sewers.

3.4 EA Modelled Tidal Data

- 3.4.1 The EA have provided tidal flood data for the area; see copy of Product 4 data (EA ref: SSD/3274 in **Appendix B**). The modelled levels are based on the Extreme Sea-Levels for Southern Estuaries and Harbours report, dated April 2015. The EA on the 2nd March this year, confirmed that their Product 4 data is still current, copy in **Appendix B**.
- 3.4.2 Baseline levels from the original PUSH SFRA report are consistent with the levels provided in the EA Product 4 data (March 2016) but it is important to note that that the sea level rise allowances within the EA Product 4 data are based on the now superseded 'Technical Guidance to the National Planning Policy Framework'.

Table 3-1: Reference Peak Tide Levels

Base Year	Tide Level (m AOD)	
	1 in 200 (0.5%) annual probability event (Flood Zone 3a)	1 in 1000 (0.1%) annual probability event (Flood Zone 2)
2011	3.31	3.48

- 3.4.3 The peak tidal levels at the site derived using the 2011 base year are detailed in **Table 3-1**. Paragraph 026 of the PPG confirms that assessment of residential development should be based on a 100-year design life, so the 2120 scenario is used as basis for assessing the potential impacts and mitigation requirements for the development.
- 3.4.4 The EA climate change guidance, released February 2016, requires the assessment of climate change for the lifetime of the development. The 2120 levels were therefore derived in accordance with EA guidance from 2115 levels. The implications of this new guidance are discussed in Section 4.

3.5 Summary of Flood Risk

3.5.1 The following table provides an overview of the flood risk to the site, based on the information obtained and detailed in **Section 3**.

Table 3.2: Summary of Sources of Flood Risk

Source of Flooding	Risk of Flooding to Site	Comment/Justification	Source of data	Mitigation requirements for new development (see Section 5)
Tidal		Site largely outside current 1 in 1000 annual probability tidal floodplain. However, when sea level rise allowances are considered then significant areas of site are affected.	EA Climate Change Guidance PUSH SFRA	Elevate floor levels 300mm above climate change flood level. Incorporate resilience measures into retained existing buildings where appropriate.
Fluvial		N/A	N/A	N/A
Land Drainage (i.e. Surface Water/ Pluvial)		No records of flooding at site, which is shown at 'very low risk' of surface water flooding on EA maps. Development proposal will not increase the building footprint, and therefore will not alter the volume of surface water runoff. Existing drainage arrangements will be continued.	EA surface water flood maps PUSH SFRA HBC PFRA	Allow for in floor level recommendations.
Ground water		No record of flooding at site and elevation of site of Harbour.	BSG Viewer Soilscapes website	Allow for in floor level recommendations.
Reservoir, Canals, Ponds and Other Artificial Sources		N/A	N/A	N/A
Sewers		No records of sewer flooding identified at site. Potential for increased load into receiving sewers and recommend capacity checks are undertaken to verify any requirements for reinforcement or improvement works.	PUSH SFRA PFRA	Recommend capacity checks are undertaken to Southern Water.
Key:		Low/Negligible Risk – No noticeable impact to site and not considered to be a constraint to development		
		Medium Risk – Issue requires consideration but not a significant constraint to development		
		High Risk – Major constraint to development requiring active consideration in mitigation proposals		

4 Impact of Climate Change

4.1.1 In considering flood risk to the site, it is necessary to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures.

4.1.2 In February 2016 the EA released new guidance on the application of climate change allowances in flood risk assessments:

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.

4.1.3 This guidance provides contingency allowances for sea level allowances in Table 3, and for potential increases in rainfall intensity in Table 2.

4.1.4 The sea level allowances table provides allowances for each epoch per year and with the cumulative sea level rise for each epoch. The provided allowances are also subject to the vulnerability classification of the proposed use and the area of England. The residential nature of the proposed development result in the flood risk needing to be assessed for the lifetime of the development; in this case 100 years, to 2120.

4.1.5 The conditions at the site and consequent sea level allowances to be considered as part of the FRA are as detailed in **Table 4-1**.

Table 4-1: Climate Change – Peak River Flow Allowances

Year	Tide Level (m AOD)	
	1 in 200 (0.5%) annual probability event (Flood Zone 3a)	1 in 1000 (0.1%) annual probability event (Flood Zone 2)
2011	3.31	3.48
2080	4.01	4.21
2115	4.54	4.74
2120	4.62	4.82

4.1.6 The EA Guidance 'Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities' April 2016 Figure 1, provides for extrapolating beyond 2115, by using the same annual allowances beyond 2115 as are used leading up to 2115. For the site an allowance of 75mm (5 x 15mm) has been added to the EA advised 2115 tidal sea levels for the 2120 levels in line with PPG Table 3.

4.1.7 Comparison of the surveyed topography data, 2011 base year and 2120 flood extents for the 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability tidal flood events have been completed, and are provided in **Appendix A**. The drawings indicate that:

- **2011 Baseline:** the site is wholly located above the 1 in 1000 (0.1%) annual probability tidal event level of 3.5m AOD. The southern access road within the vicinity of the site is unaffected, however, the lowest areas of the road in the western part of the site drop to 3.2m AOD and would be subject to up to 100mm depth of flooding in the 1 in 200 (0.5%) annual probability tidal event, rising to 300mm depth of flooding in the extreme (1 in 1000 (0.1%) annual probability) tidal flood event.

This confirms the classification of the site as within Flood Zone 1 (less than a 1 in 1000 (0.1%) annual probability of flooding).

- **2120 Scenario:** The elevated sea level to 2120 results in a significantly more extensive area of the site affected by flooding. In the 1 in 200 (0.5%) plus adjustment for climate change (to 2120) annual probability flood event the associated access roads are impacted by up to 1.93m depth of flooding. The existing Rotunda Building threshold levels are noted to be exceeded by approximately 320mm in the 1 in 200 (0.5%) annual probability tidal event, and by 520mm in the 1 in 1000 (0.1%) annual probability tidal event.

- 4.1.8 The estimated climate change flood levels are used in the consideration of mitigation measures as discussed in **Section 6**.



5 Proposed Development and Sequential Test

5.1 Proposed Development

- 5.1.1 This FRA accompanies a Prior Approval application under Class O of the GPDO, for the change of use permitted development rights of the Rotunda Building, Northney Marina, Hayling Island PO11 0NH, from offices to residential.
- 5.1.2 Copies of the proposal drawings prepared by Cover Storey Architects, are attached in **Appendix C**. The accommodation schedule shows 21 flats, 9 on the ground floor and 12 on the first floor.
- 5.1.3 The proposed residential use of the development indicates that, in accordance with EA climate change guidance, the lifetime of the development will be 100 years. It is required to demonstrate that the building is safe, in terms of flood risk, up to 2120.

5.2 Flood Risk Vulnerability

- 5.2.1 NPPF PPG 'Flood Risk and Coastal Change' Table 2 confirms the '*Flood risk vulnerability classification*' of a site, depending upon the proposed usage. This classification is subsequently applied to PPG Table 3 to determine whether:
- The proposed development is suitable for the flood zone in which it is located, and;
 - Whether an Exception Test is required for the proposed development.
- 5.2.2 The proposed residential development is classed as 'More Vulnerable' development.
- 5.2.3 The location of the proposed 'More Vulnerable' development is in Flood Zone 1 'Low Probability'.

5.3 NPPF Sequential & Exception Tests

- 5.3.1 The NPPF follows a sequential risk-based approach in determining the suitability of land for development in flood risk areas, with the intention of steering all new development to the lowest flood risk areas.
- 5.3.2 The proposed development is for the change of use, from office to residential, of an existing building, therefore the NPPF Sequential and Exception Tests are not required.
- 5.3.3 As the proposed development is located within Flood Zone 1 'Low Probability', PPG Table 3, confirms that the proposed development is appropriate.



6 Flood Mitigation Strategy

6.1 Building Design

Ground Floor Levels

- 6.1.1 Standard requirements for ground floor levels of new development are set out in British Standards (BS) BS8533:2011 'Assessing and Managing Flood Risk in New Development – Code of Practice'. This recommends floor levels are set a minimum of 300mm above the modelled 1 in 200 annual probability plus allowance for climate change flood level.
- 6.1.2 The GOV.UK Guidance 'Flood risk assessment: standing advice' 28th February 2017, whilst referring to 'Minor extensions', recommends to 'Make sure that floor levels are [...] no lower than [...] 300mm above the estimated flood level'. The estimated flood level required for use at this location is the 1 in 200 annual probability plus allowance for climate change.
- 6.1.3 Based upon both the BS8533:2011 and the GOV.UK guidance, the minimum floor level of the proposed building should be 4.92m AOD (1 in 200 annual probability plus allowance for climate change flood level of 4.62m AOD plus 300mm freeboard).
- 6.1.4 Paragraph 2.2.3 of this FRA confirms that the external threshold levels vary between 4.29 and 4.37m AOD, and that the ground floor levels within the building vary between 4.33 and 4.37m AOD.
- 6.1.5 Because of the existing building levels, the proposed ground floor level is set to be raised to 4.67m AOD as part of this Prior Approval application, with the existing ground floor being raised by approximately 300mm.
- 6.1.6 The proposed ground floor level of 4.67m AOD will provide for a 50mm freeboard above the 1 in 200 annual probability plus climate change flood level of 4.62m AOD, 250mm less than that recommended in the BS and GOV.UK guidance. It will provide a minimum of 300mm above the external threshold levels, and flood resistance and resilience are proposed as detailed in the next section.
- 6.1.7 A copy of Cover Storey Architects drawing of the proposed ground level layout at thresholds is provided in **Appendix C**.

Flood Resistance and Resilience Measures

- 6.1.8 With the proposed ground floor level being lower than the level of the BS8533:2011 and GOV.UK guidance, flood resistance and resilience measures are proposed to mitigate the risk.
- 6.1.9 The BRE Digest DG 523 Part 2 Flood-Resilient Building covers taking into account managing flood risk. The BRE use the term 'resilience' to cover a range of resistance and resilient measures.
- 6.1.10 It is recommended that the approach be one of '*Attempt to keep water out (water exclusion strategy)*' as Table 2 of DG 523 Part 2 for a design water depth/duration of flood less than 0.3m deep (above the proposed ground floor level) and less than 4 hours.
- 6.1.11 The DG 523 mitigation measures include low-permeability materials and construction, and flood products for openings offering 0.3m protection. This follows the approach set out in the GOV.UK Guidance 'Flood risk assessment' 27 February 2017 and the DCLG 'Improving the Flood Performance of New Buildings Flood Resilient Construction' May 2007.
- 6.1.12 The use of demountable and temporary barriers at door, window and service openings is recommended to prevent water ingress. The structure of the building should be checked that it can withstand a hydrostatic head of water of up to a minimum level of 5.22m AOD (ie a minimum

of 600mm above the 4.62m AOD level) over a number of hours. In addition, the potential impact of hydrodynamic and debris impact forces need to be considered.

- 6.1.13 Construction should be undertaken with materials of low permeability. Electrical sockets should be raised to at least 1.0m above the finished floor level. Service runs need to be as high as possible, ensuring all joints in pipework are well sealed. Backflow prevention devices should be installed in wastewater pipes and soil pipes.
- 6.1.14 The full specification of the proposed resistance and resilience measures following the appropriate guidance at the time of the detailed design and construction, will be prepared and followed.
- 6.1.15 A Building Flood Risk Management Plan should be prepared to include the following:
- responsibility for registering with the Environment Agency's flood warning service;
 - monitoring with triggers for action in response to a flood warning;
 - making safe the building to prevent the ingress of floodwater; and
 - the procedures for ensuring the building is safe and clean after the flooding has subsided and is no longer a risk.
- 6.1.16 Periodic inspection and maintenance is to be undertaken to ensure that all components will function properly under tidal flood conditions. A maintenance plan should be prepared covering the following:
- the items to be inspected at each periodic inspection;
 - the inspection time periods; and
 - materials or component specifications for repair or replacement purposes.

6.2 Safe Occupancy and Access

- 6.2.1 It is necessary to consider and incorporate safe access arrangements as part of the mitigation, to ensure the users/occupants of the development are safe in times of flooding and can achieve access/egress to/from the wider area safely.
- 6.2.2 This is particularly important for 'More Vulnerable' development that includes sleeping accommodation and is considered up to the reference 1 in 200 annual probability plus the 2120 allowance for climate change tidal flood event.
- 6.2.3 Due to the flood risks indicated for the design event, it is proposed that a FRMP be prepared post planning as part of the development and prior to the first occupation.
- 6.2.4 The FRMP should include:
- management arrangements incl. responsibility for registering with the Environment Agency's flood warning service;
 - access to and availability of flood warnings;
 - monitoring and acting upon flood warnings;
 - triggers for action in response to a flood warning;
 - procedure for ensuring on-site safe occupation;



- procedure for safely evacuating people and the route than can be safely used;
 - procedure for vehicles;
 - procedure if emergency transport arrangements are required;
 - safe area to which those who are evacuated should proceed to;
 - procedure for safe return and occupancy and
 - regular reviews and updating where necessary.
- 6.2.5 As detailed above, this FRMP will be prepared to provide information to the occupants about flood risk and set out actions which can be taken to monitor flood events and liaise with the relevant authorities.
- 6.2.6 It is recommended that future residents and owners of the development take advantage of the EA Flood Information Service to provide information, warning and alerts of an extreme flood event, further preventing against potential hazards as a result of flooding. Registration of an address is free and available from the below website:

<https://www.gov.uk/sign-up-for-flood-warnings>

- 6.2.7 It should be emphasised that the tidal characteristics of flood risk to the site in the 2120 epoch are of a well monitored and predictable nature to allow appropriate advance warning.
- 6.2.8 As such, through the combination of early flood warnings, a thorough FRMP, and the predictable nature of tidal flood events, continuous safe access is available from the site.

6.3 Overall Occupant and Building Safety

- 6.3.1 For the overall management of the site, the FRMP and the Building Flood Risk Management Plan should be part of one document to ensure a consistent approach is applied to the development.



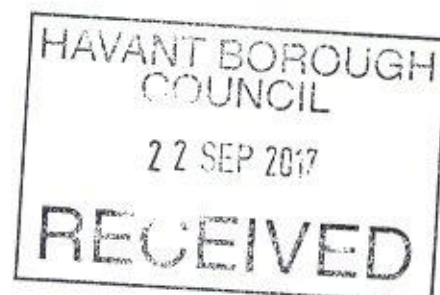
7 Surface Water and SuDS

- 7.1.1 As of April 2015, the Lead Local Flood Authority (LLFA) has become a statutory consultee on planning applications for surface water management. As the LLFA, Hampshire County Council are therefore responsible for confirming to Havant Borough Council, the approval of surface water drainage systems within new major development. Major development consists of any of the following:
- a) the provision of dwelling houses where residential development of 10 or more units; or where the development is to be carried out on a site having an area of 0.5 hectares or more and the number of units is not known;
 - b) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
 - c) development carried out on a site having an area of 1 hectare or more.
- 7.1.2 The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface runoff from development sites, and recommends that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development, this being complementary to the control of development within the floodplain.
- 7.1.3 As the intention of SuDS is to mimic the natural drainage regime of the undeveloped site, the NPPF PPG states the following (consistent with the Building Regulations H3 hierarchy):

...the aim should be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable:

- into the ground (infiltration),*
- to a surface water body,*
- to a surface water sewer, highway drain or another drainage system,*
- to a combined sewer*

- 7.1.4 The change of use of the existing Rotunda building will not result in a change of footprint of the existing building, and therefore will not result in a change in impermeable areas. With the proposed external area, there is now less hard surfaced impermeable area than there is at present. This will reduce the volume of surface water runoff from the site and therefore the existing drainage arrangements will be continued.



8 Residual Risk

- 8.1.1 It is difficult to completely guard against flooding since extreme events greater than the design standard event are always possible, however, it is practicable to minimise the risk by allowing a substantial freeboard (safety margin) and by using suitable construction and management techniques.
- 8.1.2 Residual risk has been addressed through the following methods:
- The existing floor levels will be raised by approximately 300mm to 4.67m AOD, allowing for a 50mm freeboard above the design event (1 in 200 annual probability plus allowance for the 2120 climate change flood level);
 - To comply with the latest EA climate change guidance, flood resistance/resilience measures will be implemented up to the design event including a 300mm freeboard flood level;
 - It is recommended that a FRMP and Building FRMP be completed as part of the development;
 - The body responsible for the managing the flood risk shall register with the EA Flood Information Service to receive flood warnings and alerts; and
- 8.1.3 As such, the residual risk is considered to be acceptable for the lifetime of the development.



9 Conclusions

9.1.1 This Flood Risk Assessment (FRA) has been prepared by Peter Brett Associates LLP (PBA) to support a planning application for Permitted Development rights for the change of use from office to residential of the Rotunda Building, Northney Marina, Hayling Island.

9.1.2 This FRA concludes that:

- The site is in FZ1, shown by the Environment Agency Flood Zone maps, and confirmed through comparison of topographic survey data against the modelled 1 in 1000 (0.1%) annual probability flood event;
- The 1 in 200 (0.5%) annual probability flood event plus 2120 climate change allowance has a flood level of 4.62m AOD. The existing ground floor levels are located at 4.33 – 4.36m AOD, and would therefore be impacted by flood depths of approximately 300mm for this design event;
- The proposed mitigation strategy demonstrates the development is safe through a number of measures as follows:
 - Ground floor levels are to be raised by approximately 300mm, providing a 50mm freeboard to the design event;
 - Appropriate flood resistance/resilience measures will be implemented to a minimum level of 4.92m AOD, providing a 300mm freeboard to the design event;
 - A Flood Risk Management Plan is recommended to be completed as part of the development and submitted to Havant Borough Council Emergency Planners for approval due to the flood risk to safe access routes for the 1 in 200 annual probability plus climate change allowance design event;
 - A Building Flood Risk Management Plan is also recommended to be completed to ensure the safety of the building.
 - It is recommended that building management register with the Environment Agency's Flood Information Service to receive flood warnings/alerts;

9.1.3 The proposed development is classified as 'More Vulnerable' according to the PPG Table 3. The proposal is for the change of use of an existing building, and therefore the Sequential and Exception Tests are not required. The development is located within Flood Zone 1 'Low Probability', and is deemed appropriate.

9.1.4 In conclusion, the future occupants and users of the proposed development will be safe from flooding and there will be no detrimental impact on third parties. The proposal complies with the National Planning Policy Framework (NPPF) and local planning policy with respect to flood risk and is an appropriate development at this location.



Appendix A Site Information

Digital Terrain Surveys LLP, dated January 2014:

- Northney Marina Site Survey (drawing ref: DTS270114-3Q4)

Peter Brett Associates LLP drawings, dated August 2017:

- Modelled Flood Extents 2120 Projection (drawing ref: 37394/4001/003 Revision A)

Cover Storey Architects drawings, dated August 2017:

- P120 Site plan
- P150 Existing ground floor plan
- P151 Existing first floor plan
- P152 Existing roof plan
- P160 Existing elevations – sheet 1
- P161 Existing elevations – sheet 2



Appendix B EA & PUSH Data

EA Product 4 Data (EA ref: SSD/3274) dated 15th March 2016:

- Response covering email;
- Confirmation of data validity;
- Flood Zone Map; and
- Historic Flood Map.

EA e-mail to PBA dated 2nd March 2017

The Partnership for Urban South Hampshire (PUSH) Strategic Flood Risk Assessment Figures (2016)

- 2115 Climate Change Tidal Flood Zone 3
- Historic Flood Extent



Appendix C Proposal Information

Cover Storey Architects drawings, dated July and August 2017:

- P210 Proposed site plan
- P220 Proposed ground floor plan
- P221 Proposed first floor plan
- P240 Proposed elevations – sheet 1
- P241 Proposed elevations – sheet 2
- P400 Sketch ground floor unit threshold
- Accommodation Schedule





HAVANT BOROUGH
COUNCIL
22 SEP 2017
RECEIVED

Scale 1:1000
Date 10/09/17
Drawn by J. Smith
Checked by M. Jones
Approved by P. Brown





KEY

- 2120 1% (20%) ANNUAL PROBABILITY FLOOD EXTENT (A100-A100)
- 2120 1% (100%) ANNUAL PROBABILITY FLOOD EXTENT (A100-A100)

NOTES

- TOPOGRAPHIC SURVEY PROVIDED BY DIGITAL TERRAIN SURVEYS LTD. WORKING REFERENCE 0732714.304.1 DATED JANUARY 2014
- PROJECTED SEA LEVEL RISE ALLOWANCES OBTAINED FROM TABLE 3 OF FLOOD RISK ASSESSMENTS: CLIMATE CHANGE ALLOWANCES GUIDANCE (ENVIRONMENT AGENCY FEBRUARY 2019)
- 2120 FLOOD LEVELS EXTRAPOLATED FROM 2115 LEVELS USING THE CURRENT CLIMATE CHANGE ALLOWANCES GUIDANCE

HAVANT BOROUGH
COUNCIL
22 SEP 2017
RECEIVED

A CHANGE OF CLIENT NAME				19.08.17	MS	AR	AR
Mark	Revision	Date	Drawn	Checked	Appd		
<small>SCALING NOTE: To be used with the drawing. The scale is 1:1000. The drawing is intended to be used as a guide only. It is not intended to be used as a basis for any legal proceedings. The drawing is intended to be used as a guide only. It is not intended to be used as a basis for any legal proceedings.</small>							
Drawing Issue Status							
FOR INFORMATION							
NORTHNEY MARINA, HAYLING ISLAND							
MODELLED FLOOD EXTENTS 2120 PROJECTION							
Client		National Regional Property Group		pba peterbrett			
Date of last issue	03.02.2017	Design	AR	Drawn	AR	Appd	AR
By Name	1.500	Checked	AR	Approved	AR	Appd	AR
Drawing Number		37394/4001/003		Revision		A	