



1ST HORIZON

FLOOD RISK ASSESSMENT & SURFACE WATER DRAINAGE STRATEGY (REF: 8607-R09) REV E

Client: **Home Office**

Project: **Haslar IRC, Gosport**

Date: **01/05/2026**



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1.0 EXECUTIVE SUMMARY

- 1.1** Redevelopment of the Haslar Immigration Removal Centre (IRC) includes refurbishment of a portion of the site for 130 residents (referred to as 'Haslar IRC Refurbishment') followed by an expansion of the IRC to accommodate an additional 470 residents (referred to as the 'Proposed Development') giving a total site capacity of 600 residents. The Haslar IRC Refurbishment works are currently being carried out; this report and associated outline planning application relate to the Proposed Development only.
- 1.2** This report presents a Flood Risk Assessment (FRA) in accordance with the National Planning Policy Framework (NPPF) and National Planning Practice Guidance (NPPG) ID: 7 Guidance, for the Proposed Development.
- 1.3** The report includes an assessment of the surface water drainage requirements of the site and details the flood risk and how this could be managed and mitigated to allow the site to be developed in support of the outline planning application.
- 1.4** The FRA has demonstrated the following:
- The 4.55-hectare (ha) site is comprised of a field area and an area used for parking.
 - The site slopes in a northeast direction and is underlain by soils and superficial deposits with high infiltration potential, and bedrock with low infiltration potential.
 - There are no watercourses within the vicinity of the site. It is noted that the Solent is located 10m east of the site; however, this is not classified as a watercourse.
- 1.5** The risk of flooding is assessed as follows:
- The risk of tidal flooding is assessed as negligible for most of the site. The central extent of the site up to the northwest extent (where the proposed accommodation blocks are proposed) has a moderate risk of tidal flooding.
 - Most of the site has a low risk of groundwater flooding. The northern boundary of the site has a moderate risk and the east boundary has a negligible risk of groundwater flooding.
 - There are two areas of potential high risk surface water ponding in the north of the site. The egress from the site has a high risk of surface water flooding.
- 1.6** The risk of flooding from all other sources is assessed as negligible.
- 1.7** Flood risk from identified sources can be mitigated to a negligible and acceptable level through the following approach:

- The Finished Floor Level for any proposed sleeping accommodation should be above 4.64m Above Ordnance Datum (m AOD) potentially resulting in raising floor levels between 1.08m and 1.27m depending on the building and its respective aspect. This can be achieved by land raising for ground floor sleeping accommodation or, without land-raising, utilising ground floor rooms for uses other than sleeping accommodation.
- Build in a flood resilient way (e.g. tiled floors, auto airbricks, use non-return valves on pipework).
- The management staff onsite should be registered with the Environment Agency Floodline Warnings Direct service.
- Produce a Flood Evacuation Management Plan (FEMP) covering the development and wider site (this document has been provided as part of the outline planning application for the Proposed Development).
- No below surface habitable buildings (i.e. basements).
- Adoption of a surface water management strategy.
- Set finished floor levels above external levels.

1.8 The proposed IRC expansion use is classified as more vulnerable. More vulnerable developments are acceptable in Flood Zones 1 and 2 (low to medium risk). More vulnerable development in Flood Zone 3a is subject to the Exception Test (which we consider within the FRA).

1.9 The FRA has considered the potential impact of the development on surface water runoff rates, given the increase in impermeable areas post-development. These rates have been calculated, and it has been demonstrated that surface water can be managed, such that flood risk to and from the site following development will not increase. This will be achieved through restricted discharge rates and cellular storage as well as lined permeable paving, swales and filter drains. The strategy requires a pumped solution due to levels in the site.

1.10 The FRA demonstrates that the Proposed Development would be operated with minimal risk from flooding and would not increase flood risk elsewhere. The Proposed Development should therefore not be precluded on the grounds of flood risk.

2.0 INTRODUCTION

2.1 Background

- 2.1.1** 1st Horizon were commissioned to conduct a site-specific FRA in support of a planning application for a proposed expansion of Haslar IRC. The site is located on land at Haslar IRC, Gosport (the 'site').
- 2.1.2** The Proposed Development includes the construction of 6 new buildings (4 of these buildings for sleeping accommodation, 1 for a dining hall) and recreational spaces at the 4.55-hectare (ha) site. A copy of an indicative layout of the site is included in **Appendix A**.
- 2.1.3** A site-specific FRA assesses the current and future flood risk to and from a development site. It demonstrates how flood risk will be managed now and over the development's lifetime, taking climate change, drainage, and the vulnerability of its intended users into account.
- 2.1.4** The objectives of a site-specific FRA are to:
- Assess whether a Proposed Development is likely to be affected by current or future flooding from a range of sources;
 - Assess whether the development will increase flood risk elsewhere;
 - Decide on measures to deal with these effects and risks and assess their appropriateness;
 - Provide enough evidence for the Local Planning Authority to apply (if necessary) the Sequential Test, and;
 - Decide whether the development will be safe and will pass the Exception Test if applicable.
- 2.1.5** In England, planning applications for development need an FRA¹ for most developments including:
- In Flood Zones 2 and 3 including minor development and change of use;
 - Sites of 1ha or larger in Flood Zone 1;
 - Sites of less than 1 hectare (ha) in Flood Zone 1, including change of use to a more vulnerable class (for example from commercial to residential), and where they could be affected by sources of flooding other than rivers and the sea;
 - Land in Flood Zone 1-in- a Critical Drainage Area (CDA) as notified by the Environment Agency; and
 - Land in Flood Zone 1 identified in a strategic flood risk assessment as being at increased flood risk in future.

¹ Department for Communities and Local Government (2017). Flood Risk Assessments if You're Applying for Planning Permission [<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>].

- 2.1.6** An FRA is required for this development, as initial screening using Environment Agency online indicative flood mapping shows that the site is located partially in Flood Zone 3, is more than 1ha and is at risk of surface water flooding.
- 2.1.7** The purpose of this FRA is to assess the risk of flooding to the Proposed Development and where possible provide sufficient mitigation to demonstrate that future users of the development would remain safe throughout its lifetime, that the development would not increase flood risk on site and elsewhere and, where practicable, would reduce flood risk overall.

2.2 Scope

- 2.2.1** Government policy on development and flood risk is set out in the National Planning Policy Framework (NPPF)² and is supported by National Planning Practice Guidance: Flood Risk and Coastal Change [NPPG ID7]³.
- 2.2.2** NPPF paragraphs 161-186 set out the need for an appropriate assessment of flood risk at all levels of the planning process and require the application of a sequential risk-based approach to assess the suitability of land for development in flood risk areas.
- 2.2.3** The FRA should also make allowances for climate change⁴ to minimise vulnerability and provide resilience to flooding and coastal change in the future. The allowances are predictions of anticipated change in:
- Peak river flow by river basin district;
 - Peak rainfall intensity;
 - Sea level rise; and
 - Offshore wind speed and extreme wave height.
- 2.2.4** The allowances are based on climate change projections and different scenarios of carbon dioxide emissions to the atmosphere. There are different allowances for different periods of time over the next century.
- 2.2.5** Site-specific FRA's are categorised according to level. Simple Level 1 Screening studies give a general indication of the potential flood risk to a site and identify whether more detailed Level 2 assessment is required or not. A Level 2 assessment is a qualitative appraisal to develop understanding of flood risk to a site and the effects of the site on flooding elsewhere including recommended mitigation measures. Level 3 assessments are more detailed quantitative studies, for example modelling to establish flood levels at a site in the absence of Environment Agency or other data or providing detailed drainage designs.

² Ministry of Housing, Communities & Local Government (published March 2012 and updated December 2024). National Planning Policy Framework [<https://www.gov.uk/government/publications/national-planning-policy-framework--2>].

³ Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (published March 2014 and updated August 2022). Planning Practice Guidance ID7-020-20220825; Flood Risk & Coastal Change [<https://www.gov.uk/guidance/flood-risk-and-coastal-change>].

⁴ Environment Agency (published February 2016 and updated May 2022). Flood Risk Assessments: Climate Change Allowances [<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>].

- 2.2.6** This report is a Level 2 qualitative FRA, which includes a Level 3 assessment of the surface water and foul drainage requirements for the Proposed Development.
- 2.2.7** 1st Horizon undertook a tidal modelling exercise inclusive of a wave model for the site, which is included in the planning application for the Proposed Development.

2.3 Aims

- 2.3.1** This FRA aims to provide enough flood risk information to satisfy the requirements of the NPPF, Planning Practice Guidance (PPG) ID7 and regional/local government plans and policies. It describes the potential for the site to be impacted by flooding, the impacts of the Proposed Development on flooding elsewhere near the site, and the proposed measures that could be incorporated into the development to mitigate the identified risks.

2.4 Planning Context

National Policy

- 2.4.1** The FRA was prepared in accordance with the NPPF and NPPG ID7.

Regional/Local Policy

- 2.4.2** The FRA considers the following policy within the Gosport Borough Local Plan 2011-2029⁵:

- **Policy LP39:** Water Resources.
- **Policy LP45:** Flood Risk and Coastal Erosion.
- **Policy LP47:** Contaminated Land and Unstable Land

- 2.4.3** There is also an emerging Local Plan which is currently in draft, with the latest version released in September 2021 (Gosport Borough Local Plan 2040)⁶. The following policies have also been considered:

- **Policy D7:** Flood Risk and Coastal Erosion.
- **Policy SS7:** Haslar Barracks.
- Policy LE13:** Water Resources.

⁵ <https://www.gosport.gov.uk/localplan2029>

⁶ <https://www.gosport.gov.uk/article/2110/Gosport-Borough-Local-Plan-2038>

2.5 Report Structure

This report is structured as follows:

- **Section 2** identifies the sources of information that were consulted;
- **Section 3** describes the existing site;
- **Section 4** outlines the flood risk to the existing site and Proposed Development;
- **Section 5** details the proposed mitigation measures against identified flooding sources;
- **Section 6** assesses the potential impacts of the Proposed Development on surface water drainage and proposes mitigation for those effects; and
- **Section 7** discusses the site's foul drainage and surface water drainage strategy.
- **Section 8** presents a summary and conclusions.

3.0 SOURCES OF INFORMATION

3.1 Sources of Information

The following information was consulted:

- Ordnance Survey (OS) 1:25,000 mapping (Explorer OL03: Meon Valley and OL29: Isle of Wight).
- Detailed topographic survey (**Appendix C**).
- Environment Agency online mapping (Flood Map for Planning⁷, Long Term Flood Risk Assessment for Locations in England⁸, Catchment Data Explorer⁹ and Main River Map¹⁰).
- River Basin District (RBD) Maps¹¹ (South East RBD) together with guidance on climate change allowances¹².
- 2023/2024 Strategic Flood Risk Assessment (SFRA) Maps (**Appendix D**).
- National River Flow Archive¹³.
- British Hydrological Society Chronology of British Hydrological Events¹⁴.
- National Soils Resources Institute (NSRI): Soilscales online mapping¹⁵.
- British Geological Survey [BGS] online mapping: Geology of Britain Viewer¹⁶.
- Landmark's Promap: Flood Data package: Additional flood mapping.
- Geosmart 1-in- 100-year groundwater flood risk map.
- Southern Water sewer asset plans (**Appendix E**).
- Department for Environment, Food & Rural Affairs' (DEFRA) Magic Map for identifying Designated Sites¹⁷.
- River Levels UK for identifying Flood Alert and Flood Warning areas¹⁸.

⁷ <https://flood-map-for-planning.service.gov.uk/>

⁸ <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

⁹ <http://environment.data.gov.uk/catchment-planning/>

¹⁰ <https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386>

¹¹ <https://www.gov.uk/government/publications/flood-risk-assessments-river-basin-district-maps>

¹² <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

¹³ <http://nrfa.ceh.ac.uk>

¹⁴ <http://www.cbhe.hydrology.org.uk/search.php>

¹⁵ <http://mapapps.bgs.ac.uk/geologyofbritain3d/index.html>

¹⁶ <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

¹⁷ <http://www.natureonthemap.naturalengland.org.uk/>

¹⁸ <https://riverlevels.uk/flood-map#.XclKwPn7RPZ>

3.2 Consultation and Discussion with Regulators

3.2.1 Consultation and discussions were undertaken with the Environment Agency, the Local Planning Authority (LPA) / Lead Local Flood Authority (LLFA), and Water Utility.

Environment Agency

3.2.2 The Environment Agency is a statutory consultee on flood risk and planning and is directly responsible for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas; and it has a strategic overview for all forms of flooding.

3.2.3 Environment Agency Standing Advice¹⁹ and the NPPF/PPG ID: 7 was consulted and reviewed.

3.2.4 Correspondence with the Environment Agency is included in **Appendix F**.

LLFA

3.2.5 Hampshire County Council is the Lead Local Flood Authority (LLFA) responsible for local flood risk management in their area and for maintaining a register of flood risk assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses.

3.2.6 A meeting was held on 18th December 2025 with the LLFA and a report from the meeting is included in **Appendix G**. The LLFA agreed with the principles of the drainage strategy.

LPA

3.2.7 Gosport Borough Council is the Local Planning Authority (LPA) in this area. A copy of the LPA Council pre-application letter is included in **Appendix B**.

Water Utility

3.2.8 Drainage and sewerage services in the UK are provided by a number of water and sewerage companies. Southern Water is responsible for sewerage within the area of the site.

3.2.9 All sewerage undertakers maintain the 'DG5 register' of properties and external areas (such as gardens, highways, open spaces) which have suffered flooding from public foul/combined sewers. It does not include flooding caused by blockages.

3.2.10 Southern Water Asset Plans are included in **Appendix E**.

¹⁹ Department for Communities and Local Government (published April 2012 and updated March 2019). Preparing a Flood Risk Assessment: Standing Advice [<https://www.gov.uk/guidance/flood-risk-assessment-standing-advice>].

4.0 SITE LOCATION AND DESCRIPTION

4.1 Location

- 4.1.1 The site is located on land at Haslar IRC, Dolphin Way, Gosport, PO12 2AW.
- 4.1.2 The site is centred on National Grid Reference (NGR): 461508, 098288.
- 4.1.3 The site location is shown in **Drawing 0001** and in more detail in **Drawing 0002**, which shows the red line boundary enclosing an area of 4.55ha.

4.2 Land Use

- 4.2.1 The land use is comprised of a field area within the existing IRC and an area used for car parking (**Figures 4.1, 4.2 and 4.3**).
- 4.2.2 The site is bounded by Dolphin Way with a housing development and greenspace beyond to the north, a sea wall associated with the Solent to the east, and a golf course to the southwest and residential properties to the west.
- 4.2.3 The site is currently accessed from Dolphin Way to the north of the site. There will also be emergency access off Fort Road to the west of the site.

Figure 4.1 - View Southwest Across the IRC field



Figure 4.2 - View Southeast Across the IRC



Figure 4.3 - Aerial Image of the Site



Image © 2025 Digital Globe.

4.3 Topographic Information

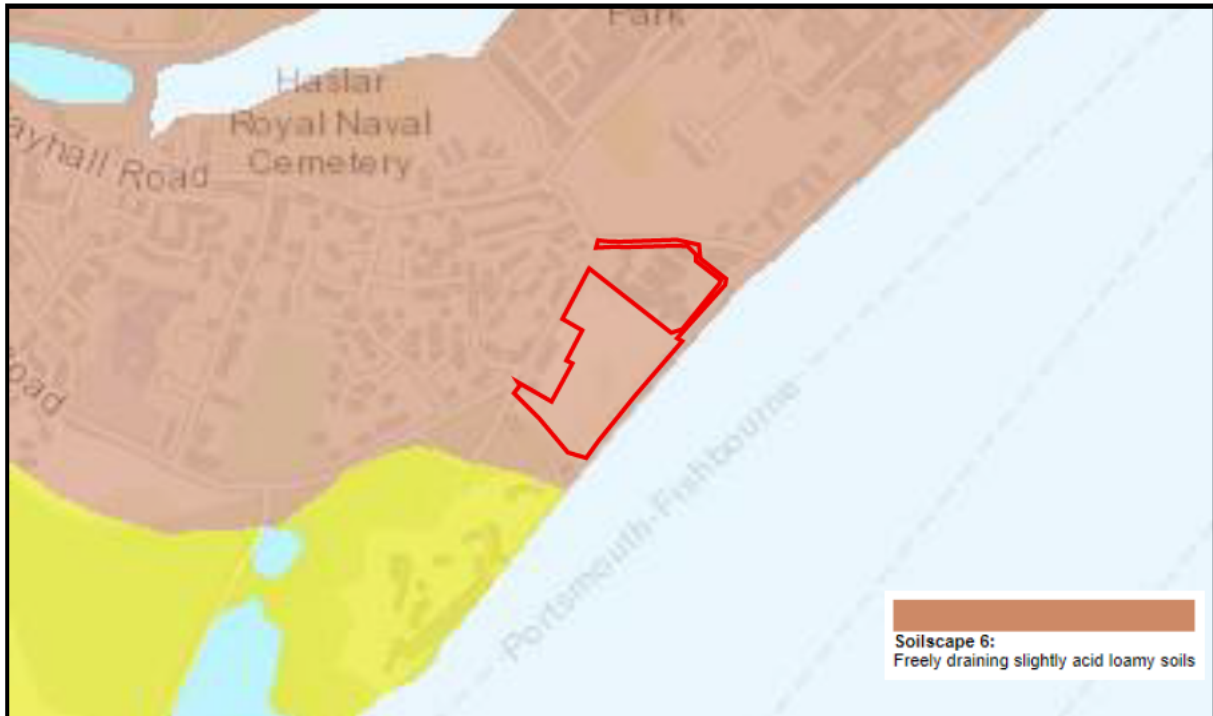
- 4.3.1 A detailed topographic survey was conducted during March 2023 and a copy is included as **Appendix C**. Flow pathway analysis was undertaken in KeyTERRA-FIRMA (KTF) software to understand watershed catchments (**Drawing 0007**). A summary of the site topography is described below.
- 4.3.2 The site falls northeast from 5.91 metres Above Ordnance Datum (m AOD) (located in the southwest corner) to 3.21m AOD (located in the northwest corner). The fall of 2.70m over 225m gives a gradient of 1:83.

4.4 Soils and Geology

Soils Mapping

- 4.4.1 The Soilscape online soils map viewer shows that the site is underlain by freely draining loamy soils (**Figure 4.4**).
- 4.4.2 The soils beneath the site are indicative of high infiltration potential, subject to likely elevated groundwater levels.

Figure 4.4 - Soils Mapping



Soils Data © Cranfield University (NSRI) and for the Controller of HMSO [2025].

Geology Mapping

4.4.3 The Geology of Britain online map viewer (**Figure 4.5**) shows the superficial deposits beneath the site are River Terrace Deposits, 2 – Sand and gravel, which has a high infiltration potential. The bedrock underlying the site is Selsey Sand Formation – Sand, silt and clay. This is likely to have a lower infiltration potential due to the presence of clay or elevated groundwater levels due to the proximity to the sea, as per the borehole records provided later in this report.

Figure 4.5 - Geology Mapping



Top: Superficial Deposits. Bottom: Bedrock Geology. Contains British Geological Survey materials © NERC [2025].

BGS Historical Borehole Records

- 4.4.4 The Geology of Britain online map viewer (**Figure 4.6**) shows there are no historical boreholes located within the site boundary. There are, however, five borehole locations with relevant information within 400m of the site (SZ69NW41 to SZ69NW43, SZ69NW47 and SZ69NW48).
- 4.4.5 The borehole records (**Appendix H**) confirm the geology as depicted by the Geology of Britain mapping (**Table 4.6**).

Figure 4.6 - Borehole Mapping



Contains British Geological Survey materials © NERC [2025].

Table 4.1 - BGS Borehole Data

Reference	Summary of Strata	Depth (m bgl)	Groundwater (m bgl)
SZ69NW41	0.00 – 1.70m = MADE GROUND	1.70	No information available
SZ69NW42	0.00 – 5.00m = MADE GROUND 5.00 – 5.30m = GRAVEL 5.30 – 5.60m = silty sandy CLAY with gravel 5.60 – 10.50m = silty sandy CLAY	10.50	9.80
SZ69NW43	0.00 – 5.00m = MADE GROUND 5.20 – 5.50m = silty CLAY with gravel 5.50 – 5.80m = clayey sandy SILT 5.80 – 6.10m = GRAVEL 6.10 – 8.55m = sandy CLAY with gravel 8.55 – 12.90m = clayey silty SAND 12.90 – 17.50m = silty SAND	17.50	5.80
SZ69NW47	0.00 – 3.40 = MADE GROUND 3.40 – 3.60m = silty CLAY with gravel 3.60 – 3.80m = silty CLAY 3.80 – 3.95m = silty CLAY with gravel 3.95 – 4.50m = clayey GRAVEL 4.50 – 5.30m = sandy CLAY 5.30 – 5.60m = clayey SAND 5.60 – 8.00m = sandy silty CLAY 8.00 – 9.30m = silty sandy CLAY 9.30 – 15.00m = clayey SAND	15.00	3.95
SZ69NW48	0.00 – 1.30m = MADE GROUND 1.30 – 1.70m = silty CLAY with occasional gravel 1.70 – 1.90m = sandy silty CLAY 1.90 – 2.30m = silty sandy CLAY with gravel 2.30 – 3.25m = sandy GRAVEL 3.25 – 6.90m = sandy silty CLAY 6.90 – 10.00m = silty sandy CLAY	10.00	2.70

Contains British Geological Survey materials © NERC [2024].

4.5 Hydrogeology

Infiltration Potential

- 4.5.1 Soils mapping indicates that the loamy soils are likely to represent a high infiltration potential.
- 4.5.2 The infiltration potential of the superficial deposits is likely to be high.
- 4.5.3 Infiltration potential of the bedrock is likely to be low due to the presence of clay. SFRA mapping (Appendix D) shows the site has a moderate bedrock permeability.

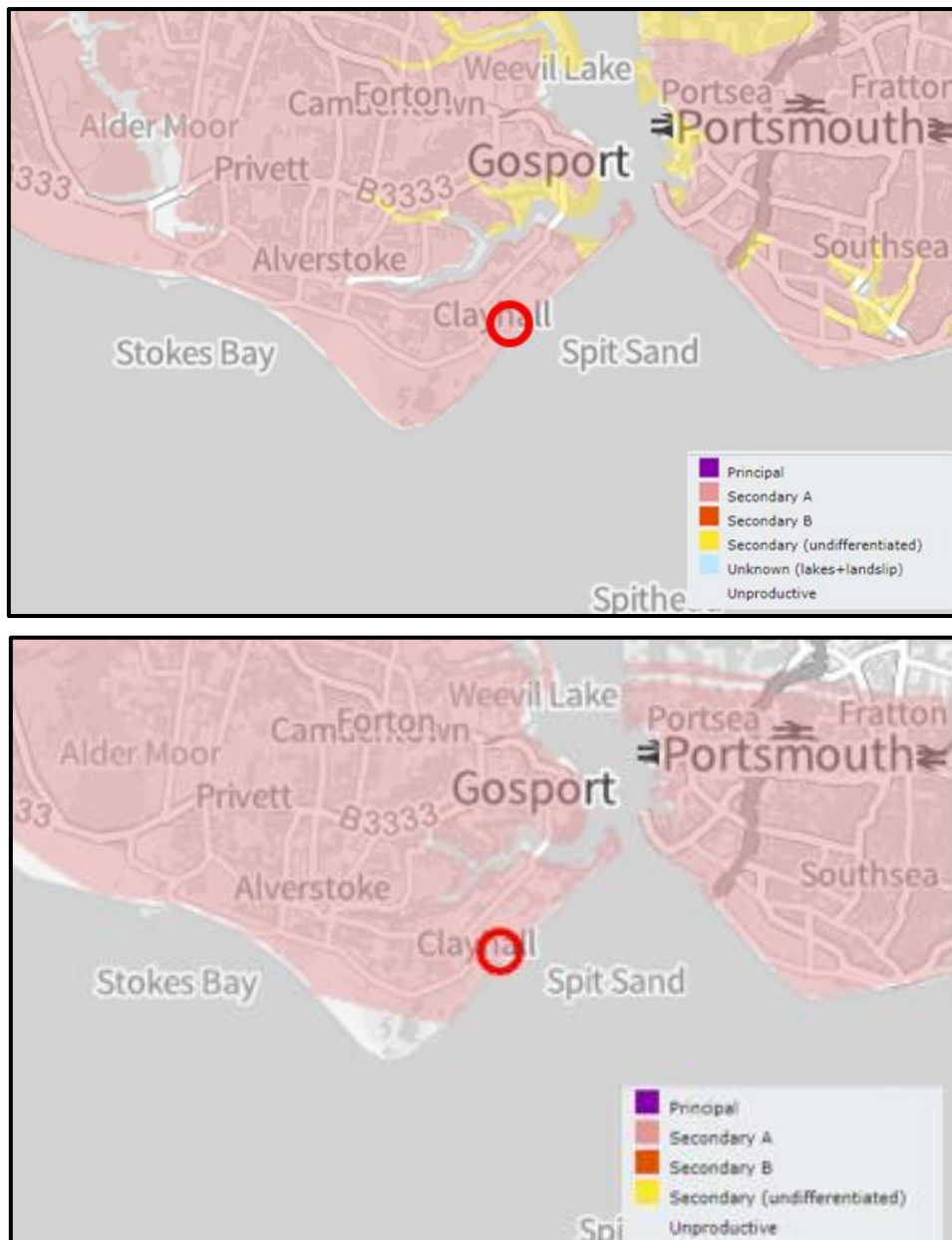
4.5.4 SuDS Infiltration Potential mapping (**Drawing 0005**) shows most of the site has a high infiltration potential. The east of the site has a moderate infiltration potential.

DEFRA Magic Map

4.5.5 Defra Magic Map online mapping shows the site is not located in a groundwater Source Protection Zone (SPZ).

4.5.6 The site is located above a ‘Secondary A’ bedrock and superficial aquifer (**Figure 4.7**).

Figure 4.7 - Aquifer Designation Map



Top: Aquifer Designation (superficial deposits). Bottom: Aquifer Designation (bedrock). From Magic Map. Contains Environment Agency information © Environment Agency and database right [2025].

4.6 Catchment Hydrology

Topographical Survey and Site Walkover Observations

4.6.1 The topographical survey (**Appendix C**) shows there is a pond within the northeast of the site. This was observed to be a water feature during the site walkover and it is determined to have no wider connectivity (**Figure 4.8**).

Figure 4.8 - Pond



OS Mapping and Main River Map

4.6.2 OS mapping shows there are no watercourses located within 100m of the site. It is noted that the Solent is located 10m east of the site. There are also no main rivers within the vicinity of the site (**Figure 4.9**).

Figure 4.9 - Main River Map

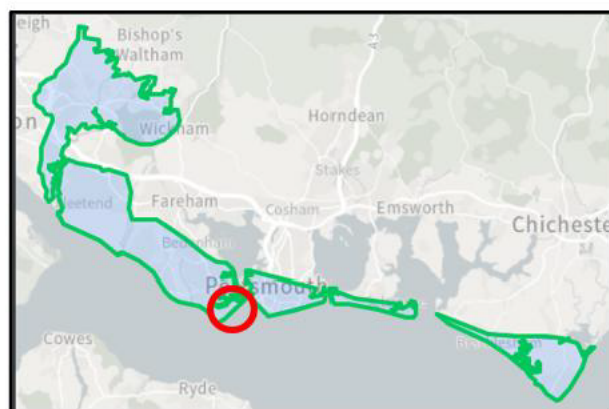


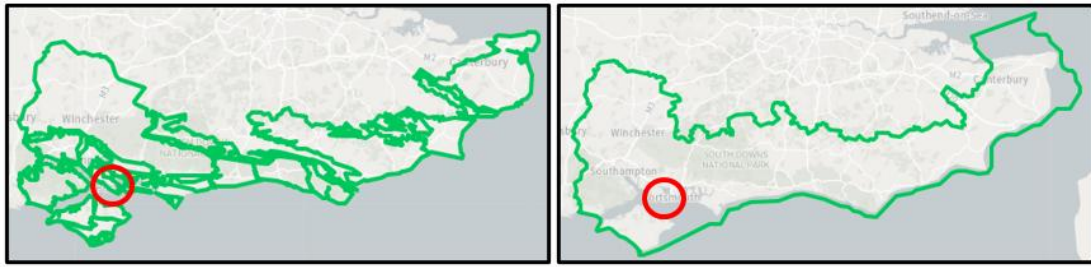
Contains Environment Agency information © Environment Agency and database right [2024].

Environment Agency Catchment Data Explorer Mapping

4.6.3 The site resides within the Hants South East Bracklesham Group Operational Catchment, South East Groundwater Management Catchment and South East River Basin District (Figure 4.10).

Figure 4.10 - Catchment Data Explorer (continues overleaf)





Top: Hants South East Bracklesham Group Operational Catchment. Bottom Left: South East Groundwater Management Catchment. Bottom Right: South East River Basin District. Contains Environment Agency information © Environment Agency and database right [2024].

4.7 Sewerage Assets

Public Sewers

4.7.1 Southern Water Asset Plans (**Appendix E**) show there is a Ø225mm surface water and a Ø225mm foul sewer along Fort Road which bounds the west of the site. The surface water sewer appears to end within the north of the site, but it is likely to continue beneath the site and outfall into the Solent.

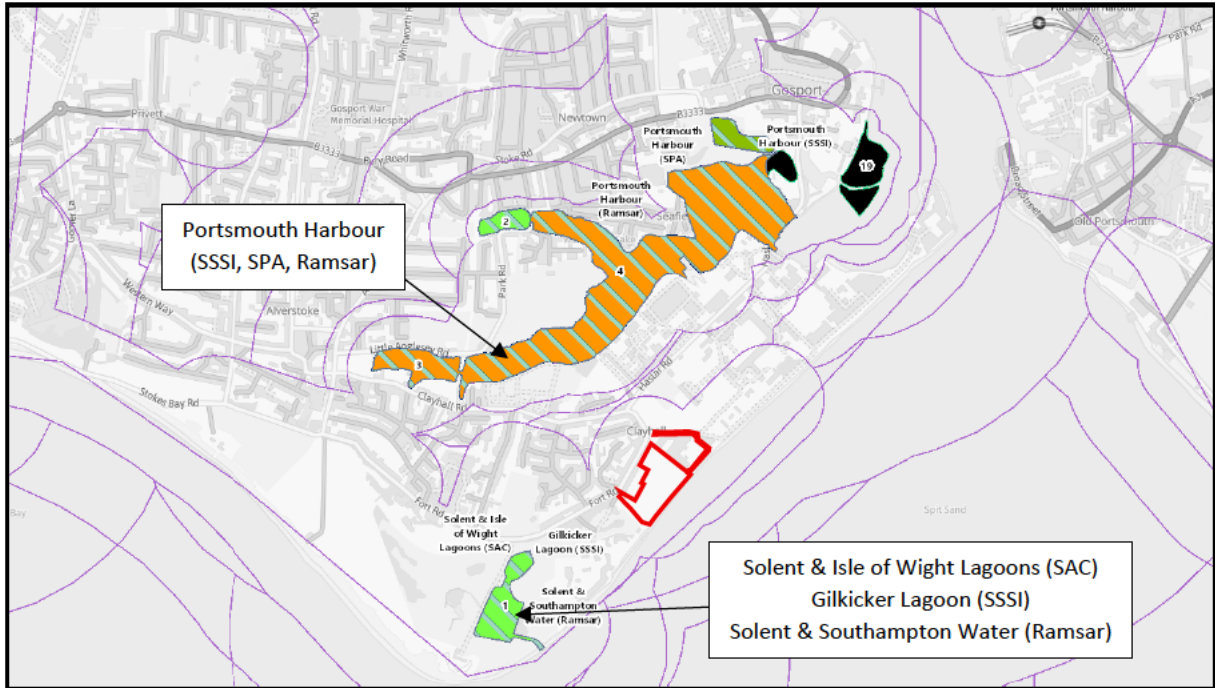
Private Sewers

4.7.2 The topographical survey (**Appendix C**) shows there is currently a network of private sewers serving area to the north of the site (where the existing buildings are located). There are two outfalls into the Solent shown on the topographical survey; one in the north which likely relates to the Southern Water surface water sewer as discussed above, and one towards the centre of the site which is a private outfall from the site. There is also a Ø150mm outfall shown towards Fort Road in the north of the site, which is the foul outfall from the existing building to the north of the site.

4.8 Designated Sites

4.8.1 The DEFRA Magic Map (England and Wales) shows the Solent & Isle of Wight Lagoons (Special Area of Conservation [SAC]), Gilkicker Lagoons (Site of Special Scientific Interest [SSSI]), and Solent & Southampton Water (Ramsar) are located 440m southwest of the site (**Figure 4.11**). Portsmouth Harbour (Ramsar, Special Area of Conservation [SPA] and SSSI) is located 380m northwest of the site. The site is in the SSSI Impact Risk Zone for the aforementioned SSSIs.

Figure 4.11 - Designated Sites



5.0 FLOOD RISK ASSESSMENT

5.1 Potential Sources of Flooding

5.1.1 A summary of the potential sources of flooding and the potential risk posed by each source at the site is presented in Table 5.1. Each source of flooding and level of risk is then assessed in further detail.

Table 5.1 - Potential Risk Posed by Flooding Sources

Flooding Source	Potential Flood Risk at Application Site (Yes/No)	Potential Source	Data Sources
Fluvial	No	None identified	Environment Agency flood mapping (Drawing 0003).
Tidal	Yes	The Solent	Environment Agency flood mapping (Drawing 0003), Environment Agency correspondence (Appendix F), SFRA mapping (Appendix D), 1 st Horizon Coastal Modelling
Groundwater	Yes	Aquifer	SFRA mapping (Appendix D), Geosmart Groundwater (Drawing 0004).
Surface Water	Yes	Poor permeability and site topography	SFRA mapping (Appendix D), Environment Agency correspondence (Appendix F), Environment Agency mapping (Drawings 0006.1 to 0006.2).
Sewer	Yes	Public and private sewers	Public and private asset plans (Appendix C and D).
Infrastructure Failure	No	None identified	Environment Agency online flood mapping.

5.2 Fluvial Flooding

Environment Agency Flood Zone Mapping

5.2.1 The Environment Agency Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, since these can be breached, overtopped and may not be in existence for the lifetime of a development.

5.2.2 The Environment Agency flood map (**Drawing 0003**) shows the northwest of the site is located within Flood Zone 1; outside the 1-in- 1000-year probability of fluvial (river) flooding (0.1% Annual Exceedance Probability [AEP]), at 'low' risk. The east, north and south of the site are located within Flood Zone 3; land within the 1-in- 100-year probability of fluvial flooding (1% AEP) at 'high' risk.

5.2.3 The Flood Zone mapping does not delineate between Flood Zones 3a and 3b, nor fluvial or tidal flooding. However, due to the close proximity of the coastline, it is likely the main source of flooding is tidal and the presence of a defence wall means the site is not functional floodplain (Flood Zone 3b).

Flood Risk Summary

5.2.4 The risk of fluvial flooding is assessed as negligible.

5.3 Tidal Flooding

Environment Agency Flood Zone Mapping

- 5.3.1 The Environment Agency Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, since these can be breached, overtopped and may not be in existence for the lifetime of a development.
- 5.3.2 The Environment Agency flood map (**Drawing 0003**) shows the northwest of the site is located within Flood Zone 1; outside the 1-in- 1000-year probability of tidal (sea) flooding (0.1% Annual Exceedance Probability [AEP]), at 'low' risk. The east, north and south of the site is located within Flood Zone 3; land within the 1-in- 200-year probability of tidal (sea) flooding (0.5% AEP) at 'high' risk.
- 5.3.3 The Flood Zone mapping does not delineate between Flood Zones 3a and 3b, nor fluvial or tidal flooding. However, due to the close proximity of the coastline, it is likely the main source of flooding is tidal. The presence of the seawall to the east of the site means the site is unlikely to be located within the functional floodplain (Flood Zone 3b).
- 5.3.4 Environment Agency correspondence (**Appendix F**) confirms the site is located in Flood Zone 3.

LLFA Pre-app

5.3.5 The LLFA pre-application response (**Appendix G**) also shows the east, north and south of the site are located within Flood Zone 3.

Flood Defences

- 5.3.6 The Environment Agency Asset Management website²⁰, the Environment Agency Flood Zones map, SFRA mapping (**Appendix D**) and Environment Agency Correspondence (**Appendix F**) shows the site does not benefit from flood defences.
- 5.3.7 SFRA mapping (**Appendix D**) does however show that the coastline bounding the site has a frontage protected from tidal 0.5% AEP flood. It shows that the coastline has a moderate wave energy frontage and a crest/ tide level of >1000 years. There is also no current nor

²⁰ <https://environment.data.gov.uk/asset-management/index.html>

proposed investment to improve the defence. Due to the fact that the SFRA recognises the defence and the EA does not, it is assumed that Gosport Borough Council owns the defence.

5.3.8 A survey of the defence was undertaken in February 2021 and is included in **Appendix I**. The survey shows the defence has a tiered slope up to the path which bounds the site. To the south of the site there is also a raised concrete structure with a wall on top, whereas further to the north the concrete wall structure is at the same level as the path.

5.3.9 During the site walkover, the defence appeared to be in good condition (**Figure 5.1**).

Figure 5.1 - Flood Defence



Environment Agency Product 4

5.3.10 The Environment Agency provided modelled flood levels at the site (**Appendix F**). Since the model was created, the Environment Agency has updated their climate change allowances. In the South East RBD, using the upper end allowance and a 75-year development lifetime, sea level rise equates to 943.5mm. This has been used within the below calculations.

5.3.11 Node 4 shown in the information in **Appendix F** had the worst-case flood depth at 0.35m during a 200-year flood event. During a 200 year + CC event, a worst-case flood depth reached 1.29m. Using the DEFRA Flood Risk to People Guidance (**Figure 5.2**), a flood hazard value and a flood hazard classification can be calculated for the site for a worst-case scenario. A value is calculated by comparing depth against velocity (using a worst-case scenario of 1m/s), which then equates to a flood hazard classification.

Figure 5.2 - DEFRA Flood Hazard Table

d * (v+0.5) + DF		Depth									
Velocity		0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
0.00		0.13	0.25	0.38	0.50	0.63	0.75	0.88	1.00	1.13	1.25
0.50		0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
1.00		0.38	0.75	1.13	1.50	1.88	2.25	2.63	3.00	3.38	3.75
1.50		0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
2.00		0.63	1.25	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25
2.50		0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50
3.00		0.88	1.75	2.63	3.50	4.38	5.25	6.13	7.00	7.88	8.75
3.50		1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
4.00		1.13	2.25	3.38	4.50	5.63	6.75	7.88	9.00	10.13	11.25
4.50		1.25	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50
5.00		1.38	2.75	4.13	5.50	6.88	8.25	9.63	11.00	12.38	13.75

Categories of flood hazard:			
	From	To	
Class 1	0.75	1.50	Danger for some
Class 2	1.50	2.50	Danger for most
Class 3	2.50	20.00	Danger for all

5.3.12 A 200-year event would produce a maximum flood hazard value of 1.03, equivalent to a flood hazard classification of ‘Class 1: Danger for Some’ at Node 4. A 200 year + CC event would produce a maximum flood hazard value of 2.44, equivalent to a flood hazard classification of ‘Class 2: Danger for Most’ at Node 4.

5.3.13 The Environment Agency Product 4 data is superseded by the 1st Horizon Coastal Modelling data.

1st Horizon Coastal Modelling

5.3.14 1st Horizon undertook a tidal modelling exercise inclusive of a wave model for the site during December 2025. The results are shown in a separate coastal modelling report, provided as part of the outline planning application for the Proposed Development. Modelled depths were generated for the nodes shown in **Figure 5.3**. Nodes 9, 10 and 14 are the closest to the proposed buildings and have been highlighted within the below tables.

Figure 5.3 - Node Locations



5.3.15 Table 5.2 shows the flood level results of the modelling exercise.

Table 5.2 - Flood Levels (m AOD)

Node	Annual Exceedance Probability Events			
	200 year	1000 year	200 year HC 2125 PPG	200 year UE 2125 PPG
1	5.06	5.06	5.06	5.06
2	6.06	6.09	6.06	6.06
3	3.24	3.24	3.24	3.24
4	6.07	6.07	6.07	6.07
5	5.47	5.47	5.47	5.47
6	6.52	6.52	6.52	6.52
7	5.20	5.20	5.20	5.20
8	-	-	4.26	4.64
9	-	-	4.26	4.64
10	3.95	4.01	4.27	4.64
11	-	-	4.26	4.64
12	4.95	4.95	4.95	4.95
13	5.32	5.32	5.32	5.32
14	4.57	4.57	4.57	4.64

5.3.16 **Table 5.3** shows the modelled flood depths for the nodes located in the site boundary. Flood depths vary across the site due to the varying topographic ground elevations, use of a constant flood elevation and depending upon the AEP event.

Table 5.3 - Flood Depth (mm)

Node	Annual Exceedance Probability Events			
	200 year	1000 year	200 year Higher Central (HC) 2125 PPG	200 year Upper End (UE) 2125 PPG
1	10	10	10	10
2	41	69	41	41
3	10	10	10	10
4	10	10	10	10
5	10	10	10	10
6	10	10	10	10
7	10	10	10	10
8	-	-	896	1270
9	-	-	707	1080
10	420	477	737	1110
11	-	-	1241	1614
12	< 10	< 10	< 10	< 10
13	10	10	10	10
14	10	10	10	80

5.3.17 It should be noted that during a 200-year event the maximum flood depth within the site is 420mm at node 10. In terms of the maximum flood depth for the 200-year UE 2125 CC event, the maximum depth is recorded at node 11 (1614mm), near the junction between Fort Road and Dolphin Way. Notwithstanding this, the maximum depth recorded near the location of the proposed buildings is 1,080mm at node 9. In terms of node 14, the maximum depth recorded is 80mm for the 200-year UE 2125 event.

i. Flood Velocity

5.3.18 Velocities used within the calculations are shown in **Table 5.4**.

Table 5.4 - Flood Velocity (m/s)

Node	Annual Exceedance Probability Events			
	200 year	1000 year	200 year HC 2125 PPG	200 year UE 2125 PPG
1	0.042	0.017	0.002	0.004
2	0.020	0.010	0.012	0.012
3	0.032	0.049	0.040	0.039
4	0.034	0.048	0.040	0.042
5	0.004	0.002	0.002	0.004
6	0.020	0.001	0.002	0.001
7	0.021	0.018	0.028	0.023
8	-	-	0.168	0.149
9	-	-	0.056	0.095
10	0.015	0.018	0.083	0.118
11	-	-	0.323	0.296
12	0.006	0.027	0.009	0.006
13	-	0.001	0.012	0.014
14	0.059	0.073	0.068	0.026

ii. Flood Hazard

5.3.19 Using the DEFRA Flood Risk to People Guidance (Figure 5.2), a flood hazard value and a flood hazard classification can be calculated for the site for a worst-case scenario. A value is calculated by comparing depth against velocity which then equates to a flood hazard classification.

5.3.20 Table 5.5 shows the flood hazard for each tidal scenario on the site.

Table 5.5 - Tidal Scenario Flood Hazard Value

Node	Annual Exceedance Probability Events			
	200 year	1000 year	200 year HC 2125 PPG	200 year UE 2125 PPG
1	0.506	0.506	0.506	0.506
2	0.545	0.559	0.545	0.545
3	0.506	0.506	0.506	0.506
4	0.506	0.506	0.506	0.506
5	0.505	0.505	0.505	0.505
6	0.505	0.505	0.505	0.505
7	0.505	0.506	0.505	0.505
8	-	-	1.479	1.382
9	-	-	1.360	1.272
10	1.283	1.240	1.372	1.283
11	-	-	1.683	1.572
12	0.506	0.507	0.506	0.506
13	0.505	0.506	0.505	0.506
14	0.505	0.506	0.505	0.506

Key: Negligible – White, Class 1: Danger for Some – Yellow, Class 2: Danger for Most – Orange, Class 3: Danger for All - Red

- 5.3.21 A 1-in-200-year event would produce a maximum flood hazard value of 1.283, equivalent to a flood hazard classification of ‘Danger for Most’ at Node 10. Under the present-day conditions, a 1-in-1000-year event would produce a maximum flood hazard value of 1.248, also equivalent to a flood hazard classification of ‘Danger for Most’ at Node 10. It is worth noting that node 10 is located in a natural topographical depression, which skews the values of flood hazard in comparison to the surroundings of Node 10.
- 5.3.22 In terms of future scenarios, a 1-in-200 year Higher Central 2125 event would produce a maximum flood hazard value of 1.372 within the site at Node 10, equivalent to a flood hazard classification of ‘Class 3: Danger for Most’. Notwithstanding this, a flood hazard of 1.683 is also recorded in the lowest stretch of Dolphin Way at the junction with Fort Road, which remains under the same category of flood hazard. The classification of the flood hazard for the 1-in-200-year Upper End CC 2125 event remains unchanged, with a value of 1.283 at Node 10 (within the site), and a value of 1.572 at the stretch of Dolphin way at the junction with Fort Road.
- 5.3.23 It is worth noting that the Higher Central climate-change scenario typically leads to higher values of flood hazard at the locations of Nodes 8 to 11, in comparison to the Upper End scenario. This can be explained by the combination of flows generated from overtopping and inundation from Stokes Lake, which may be associated with opposite velocity directions, thus leading to a lower flood hazard.

iii. Impact of New Buildings on Modelled Flood Levels

- 5.3.24 A model run was undertaken to see if the proposed buildings have any impact on flood levels. Results are shown in Figure 5.4 and Table 5.6. The difference between the baseline

and the proposed building model is negligible and therefore no flood compensation is required.

Figure 5.4 - Impact of New Buildings on Modelled Flood Levels

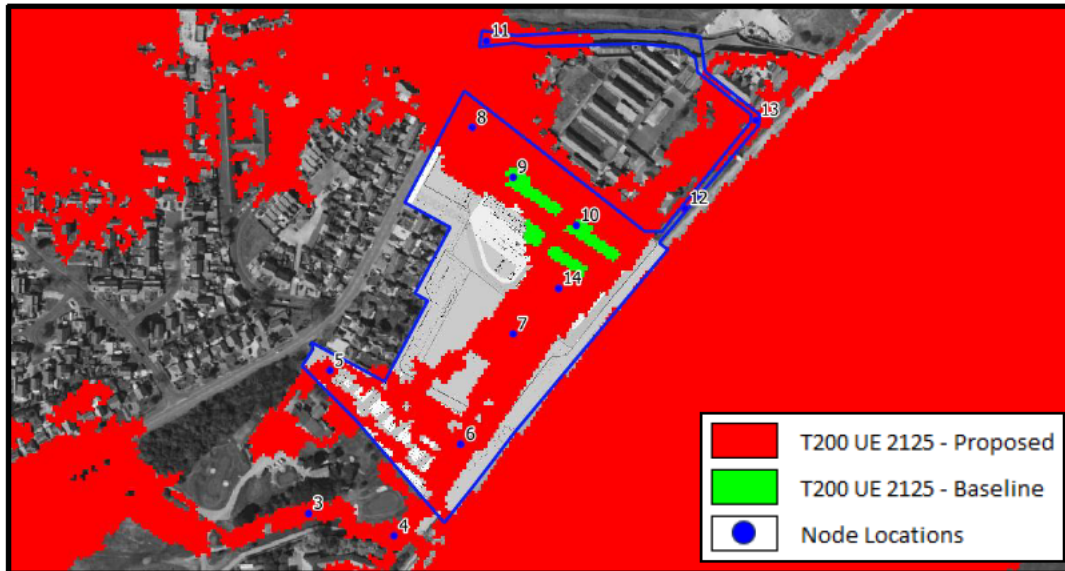


Table 5.6 - Difference Between Baseline And Proposed

Node	Baseline (mm)	Proposed (mm)	Difference (mm)
1	10	10	-
2	41	41	-
3	6	6	-
4	10	10	-
5	10	10	-
6	10	10	-
7	10	10	-
8	1,270	1,270	-
9	1,080	DRY	CELL BECAME DRY
10	1,110	DRY	CELL BECAME DRY
11	1,614	1,614	-
12	< 10	< 10	-
13	10	10	-
14	80	14	-

SFRA Mapping

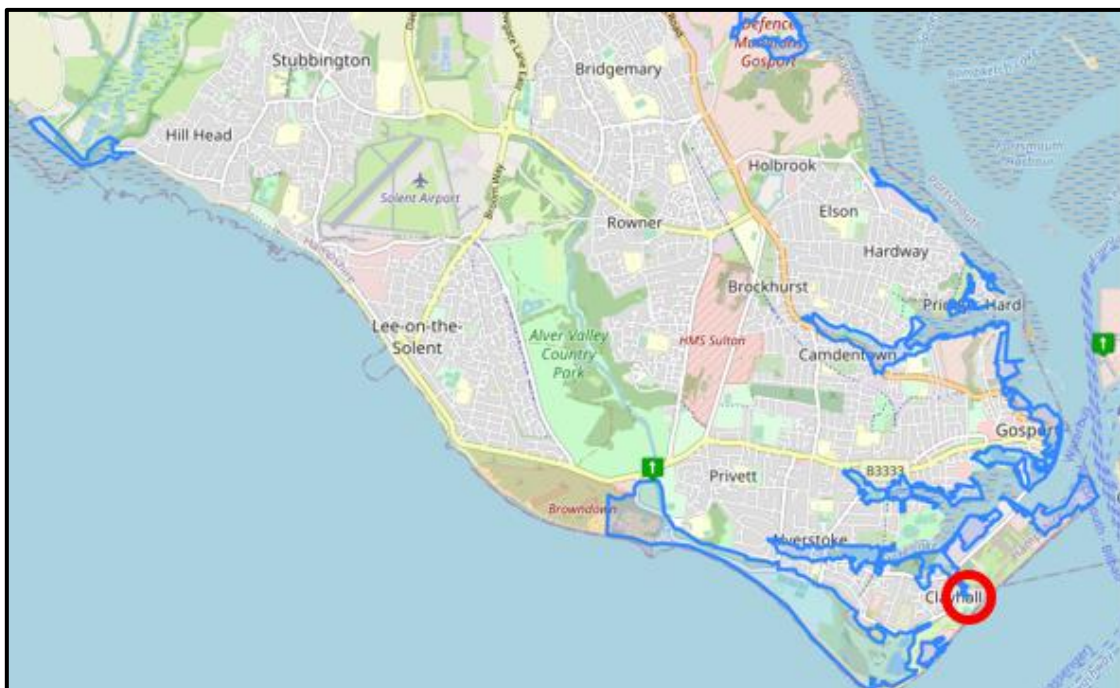
5.3.25 SFRA mapping (Appendix D) shows the northwest of the site is located within Flood Zone 2. The rest of the site is shown to be located within Flood Zone 1. However, it is noted on the Gosport Council website that the Environment Agency’s modelling of flood risk has been improved since the SFRA mapping was created, and therefore this has since been superseded. It is likely this mapping represents the defended scenario (the SFRA mapping does not include any additional information).

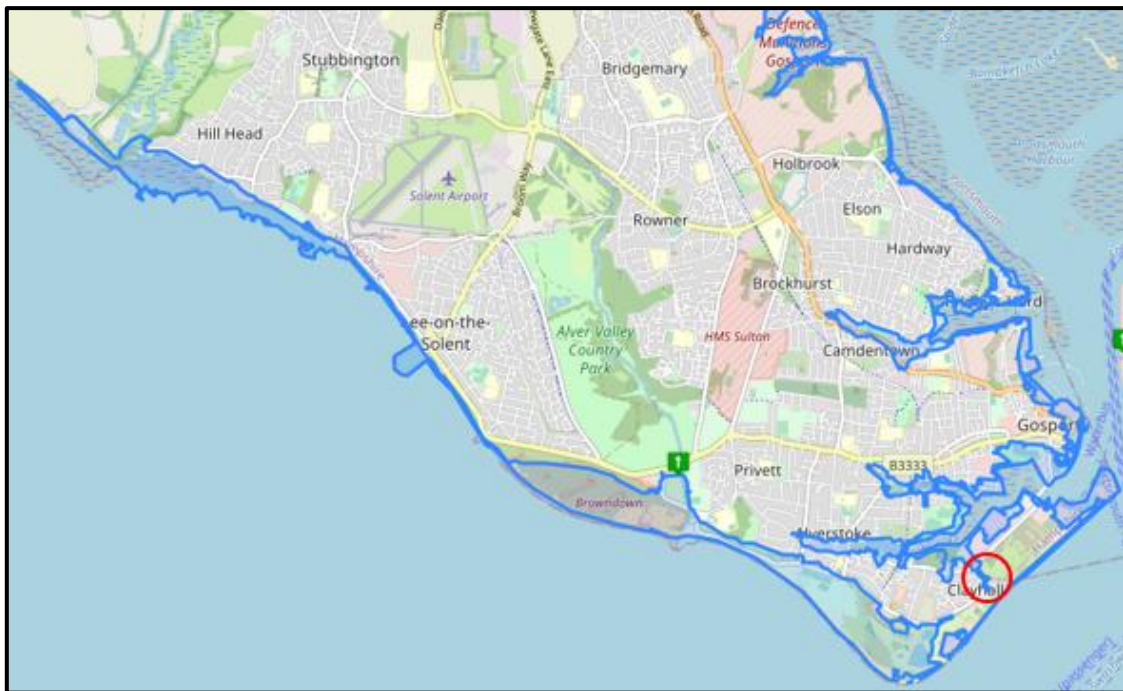
- 5.3.26 Other mapping from the SFRA shows during the undefended Flood Zone 2 event, the site has a low risk in the east and northwest. During the undefended Flood Zone 3 event, the site is not located within the mapped outlines.
- 5.3.27 During the Flood Zone 2 breach scenario, the east and some of the northwest of the site have no danger. A pathway in the northwest of the site is within the outline of 'Danger for some'. The site is not located within the Flood Zone 3 breach scenario outlines.
- 5.3.28 For the climate change (2125) event, the north and northwest of the site are located within tidal Flood Zone 3. The rest of the site is located within Flood Zone 1.
- 5.3.29 Drawing data and hydraulic modelling data is more accurate and site specific and therefore supersedes the SFRA mapping.

Flood Warnings

- 5.3.30 Access into the site is located within the 'Tidal areas at Gosport, including Clayhall, Forton, Priddy's Hard, and the Town Centre' and the 'Coastal area from Hillhead to Gosport' flood warning areas (**Figure 5.5**). The site is also in the Gosport flood warning area according to SFRA mapping (**Appendix D**).

Figure 5.5 - Flood Warning Areas





Top: Tidal areas at Gosport, including Clayhall, Forton, Priddy's Hard, and the Town Centre. Bottom: Coastal area from Hillhead to Gosport.

Flood Risk Summary

- 5.3.31 The risk of tidal flooding is assessed as negligible for most of the site. The central extent of the site up to the northwest extent has a moderate risk of tidal flooding.
- 5.3.32 Mitigation measures against surface water flooding are discussed in **Section 6**.

5.4 Groundwater Flooding

Introduction

- 5.4.1 Groundwater flooding occurs when subsurface water emerges either at surface or in made ground or in subsurface structures such as basements and services ducts. It occurs as diffuse seepage, emergence from new point source springs or an increase in flow from existing springs. It results from aquifer recharge from infiltrating rainfall, from sinking streams entering aquifers from adjacent non-aquifers, or from high river levels or tides driving water through near surface deposits. It tends to occur with a delay following rainfall and can last for several weeks or months. Groundwater flooding or shallow water tables also prevent or reduce infiltration and so can worsen surface water flooding.

SFRA Mapping

- 5.4.2 SFRA mapping (**Appendix D**) shows the site is located within an area where over 50% and under 75% of the area is susceptible to groundwater flooding. There is potential for groundwater flooding of property situated below ground level.

Geosmart Groundwater Flood Risk Map

- 5.4.3 The Geosmart 1-in-100-year groundwater flood risk map (**Drawing 0004**) shows most of the site has a low risk of groundwater flooding and falls within Risk Class 3 (**Table 4.7**). The northern boundary of the site has a moderate risk (Risk Class 2). Patches along the eastern boundary of the site are at negligible risk (Risk Class 4).
- 5.4.4 Mapped classes combine understanding of likelihood, model and data uncertainty, and possible severity. Likelihood is ranked according to whether we expect groundwater flooding at a site due to extreme elevated groundwater levels with an annual probability of occurrence greater than 1%, considering model and data uncertainty. Severity relates to expectations of the amount of property damage or other harm that groundwater flooding at that location might cause (**Table 5.7**).

Table 5.7 - Groundwater Flood Risk Classification

Risk Class	Probability of Groundwater Flooding	Effect
4: Negligible	Annual probability less than 1%.	Negligible unless unusually sensitive use.
3: Low	Annual probability greater than 1%.	Remote possibility of damage to property or harm to sensitive receptors Flooding likely to be limited to seepages and waterlogged ground, damage to basements and subsurface infrastructure, and should pose no significant risk to life. Surface water flooding may be worsened.
2: Moderate	Annual probability greater than 1%.	Significant possibility of damage to property or harm to other sensitive receptors at or near this location. flooding is likely to be in the form of shallow pools or streams. Surface water flooding and failure of drainage systems may be worsened when groundwater levels are high.
1: High	Annual probability greater than 1%.	Groundwater flooding will occur which could lead to damage to property or harm to other sensitive receptors at or near this location. Flooding may result in damage to property, road or rail closures and, in exceptional cases, may pose a risk to life. Surface water flooding and failure of drainage systems may be worsened when groundwater levels are high.

Flood Risk Summary

- 5.4.5 Most of the site has a low risk of groundwater flooding. The northern boundary of the site has a moderate risk and the east boundary has a negligible risk of groundwater flooding.
- 5.4.6 Mitigation measures against surface water flooding are discussed in **Section 6**.

5.5 Surface Water Flooding

Introduction

- 5.5.1 Surface water flooding occurs following rainfall on ground where infiltration rates are less than the rainfall precipitation rate. This can occur when either:
- Soils or ground materials are naturally of low permeability or have been compacted (infiltration excess runoff);
 - Soils or ground materials are saturated from previous rainfall either directly or from upslope (saturation excess runoff and return flow) or from high groundwater levels.

SFRA Mapping

- 5.5.2 SFRA mapping (**Appendix D**) shows there is a low risk surface water flow pathway which flows in a northwest direction across the north of the site. The flow pathway becomes medium risk in the northwest of the site. There is also an area of surface water ponding in the north of the site, shown to be deep flooding.
- 5.5.3 During the 1-in-30 year rainfall, the surface water ponding is representative of shallow flooding.
- 5.5.4 Most of the site is located within an area where there is moderate impact of land use change on surface water runoff. The southeast of the site has a low impact. The site also has a high to very high potential sources of overland flow.

LLFA Pre-app

- 5.5.5 The LLFA pre-application response (**Appendix G**) shows there are two areas of high risk surface water ponding in the north of the site.

Environment Agency Correspondence

- 5.5.6 Environment Agency correspondence (**Appendix F**) shows there are two areas of high-risk surface water flooding in the northeast of the site. There is also a high-risk surface water flow pathway in the northwest of the site.
- 5.5.7 The mapping does not take into account existing drainage infrastructure at the site.

Environment Agency Surface Water Flood Mapping

- 5.5.8 The Environment Agency Surface Water Flood Mapping (**Drawings 0006.1 to 0006.2**) shows there are two areas of potential high risk surface water ponding in the north of the

site. There is also a potential high risk surface water flow pathway which starts in the northwest of the site (along the access road) and flows along the egress from the site.

- 5.5.9 The above flood mapping does not take into account the presence of drainage systems. It is therefore likely the flooding has a lower risk than the mapping suggests. The proposed drainage system for the site will further lower this risk as outlined in **Section 6**.

Flood Risk Summary

- 5.5.10 There are two areas of potential high risk surface water ponding in the north of the site. The egress from the site has a high risk of surface water flooding.
- 5.5.11 Mitigation measures against surface water flooding are discussed in **Section 6**.

5.6 Sewer Flooding

Introduction

- 5.6.1 Sewer flooding occurs when urban drainage networks become overwhelmed after heavy or prolonged rainfall due to restrictions or blockage in the sewer network or if the volume of water draining into the system exceeds the sewer design capacity.
- 5.6.2 New sewers are built to the guidelines within Sewers for Adoption²¹ and have a design standard to the 1-in-30-year flood event. Older sewers were not designed to any standard. Modern sewer systems will only surcharge during rainstorm events with a return period greater than 1-in-30-years (e.g. 1-in-100-years).

Sewerage Assets

- 5.6.3 There are no public or private assets located in the area where the new buildings are proposed (**Appendix C and D**).

Flood Risk Summary

- 5.6.4 The risk of flooding from sewers is assessed as negligible.

²¹ WRC (2012) Sewers for Adoption 7th Edition.

5.7 Flooding from Infrastructure Failure

Reservoir

- 5.7.1 The Environment Agency online flood mapping and SFRA mapping (**Appendix D**) show the site is located outside the extent of flooding sourced from reservoirs. The risk of flooding from reservoirs is assessed as negligible.

Highway Drainage

- 5.7.2 The LLFA pre-application response (**Appendix G**) shows that there are no instances of highway drainage which affect the site. The risk of flooding from highway drainage is assessed as negligible.

6.0 FLOOD RISK MITIGATION MEASURES

6.1 Introduction

6.1.1 The following sources of flooding were identified:

- Tidal flooding.
- Groundwater flooding.
- Surface water flooding.

6.2 Mitigation Measures

6.2.1 Tidal Flooding

- The Finished Floor Level for any proposed sleeping accommodation should be above 4.64m AOD potentially resulting in raising floor levels between 1.08m and 1.27m depending on the building and its respective aspect). This can be achieved by land raising for ground floor sleeping accommodation or, without land-raising, utilising ground floor rooms for uses other than sleeping accommodation.
- Build in a flood resilient way (e.g. tiled floors, auto airbricks, use non-return valves on pipework).
- The management staff onsite should be registered with the Environment Agency Floodline Warnings Direct service.
- Produce a FEMP covering the development and wider site (this document has been provided as part of the outline planning application for the Proposed Development).

6.2.2 Groundwater Flooding

- No below surface habitable buildings (i.e. basements).
- Adoption of a surface water management strategy.
- Set finished floor levels above external levels.

6.2.3 Surface Water Flooding

- Adoption of a surface water management strategy.
- Set finished floor levels above external levels.

6.3 Summary of Flood Risk

6.3.1 **Table 6.1** summarises the probability and level of risk, both with and without mitigation measures.

Table 6.1 - Probability and Consequences of All Sources of Flooding

Flooding Source	Potential Source	Probability	Consequence & Impact Without Mitigation	Consequence & Impact with Mitigation
Fluvial	None identified	Negligible	Negligible	Negligible
Tidal	The Solent	Negligible for most of the Site. The centre up to the northwest of the Site has a moderate risk.	Negligible for most of the Site. The centre up to the northwest of the Site has a moderate risk.	Negligible
Groundwater	Aquifer	Most of the Site has a low risk of groundwater flooding. The northern boundary has a moderate risk and the east boundary has a negligible risk.	Most of the Site has a low risk of groundwater flooding. The northern boundary has a moderate risk and the east boundary has a negligible risk.	Negligible
Surface Water	Poor permeability and site topography	There are two areas of potential high risk surface water ponding in the north of the site. The egress from the site has a high risk of surface water flooding.	There are two areas of potential high risk surface water ponding in the north of the site. The egress from the site has a high risk of surface water flooding.	Negligible
Sewer	Public and private sewers	Negligible	Negligible	Negligible
Infrastructure Failure	None identified	Negligible	Negligible	Negligible

Key: Green - Negligible, Yellow - Low, Orange - Medium and Red - High; based on consequence and impact with mitigation from each flooding source.

6.4 Flood Guidance and Sequential Test

- 6.4.1** The Proposed Development is for an expansion to Haslar IRC. The PPG ID: 7 (not included in this report) classifies the proposed use as ‘more vulnerable’.
- 6.4.2** The Environment Agency Flood Zones and acceptable development types are listed in **Table 6.2**. More vulnerable developments are acceptable in Flood Zones 1 and 2 (low to medium risk). More vulnerable development in Flood Zone 3a is subject to the Exception Test, as indicated in **Table 6.3**.

Table 6.2 - Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land use
Zone 1	Low	Less than 1-in-1000 annual probability of river or sea flooding in any year (<0.1%).	All development types generally acceptable.
Zone 2	Medium	Between a 1-in-100 and 1-in-1000 annual probability of river flooding (1% - 0.1%) or between a 1-in-200 and 1-in-1000 annual probability of sea flooding (0.5% 0.1%) in any year.	Most development type are generally acceptable.
Zone 3a	High	A 1-in-100 or greater annual probability of river flooding (>1%) or a 1-in- 200 or greater annual probability of flooding from the sea (>0.5%) in any year.	Some development types not acceptable.
Zone 3b	'Functional Floodplain'	Land where water must flow or be stored in times of flood. SFRAs should identify this zone (land which would flood with an annual probability of 1-in- 20 (5%) or greater in any year or is designed to flood in an extreme (0.1% flood, or at another probability to be agreed between the LPA and the Environment Agency. including	Some development types not acceptable.

Note: The Flood Zones are the current best information on the extent of the extreme flood from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. The identified risk of fluvial flooding is highlighted green.

Table 6.3 - Vulnerability and Flood Zone 'Compatibility' Identified in Table 2 of PPG ID: 7

Flood Risk Vulnerability classification (see Table 1 of PPG ID: 7)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	Yes	Yes	Yes	Yes	Yes
Zone 2	Yes	Yes	Exception test required	Yes	Yes
Zone 3a	Exception test required	Yes	No	Exception test required	Yes
Zone 3b 'Functional Floodplain'	Exception test required	Yes	No	No	No

Key: Yes: Development is appropriate, No: Development should not be permitted.
The identified risk of fluvial flooding is highlighted green.

Sequential Test

- 6.4.3** As the ‘more vulnerable’ element of the Proposed Development is an expansion of its existing use (Immigration Removal Centre) and is relatively small in comparison to the existing size of the site, the Sequential Test is considered passed as this is the only reasonably available land supporting an expansion as it lies within its existing boundaries.

Exception Test

i. Background

- 6.4.4** Evidence required for the Exception Test is outlined in NPPF and PPG, as directed in the Environment Agency’s standing advice, is based around two questions. These are set out below, together with the responses that apply in the case of the Development Site proposals.

ii. Question 1

‘[...] Can wider sustainability benefits to the community that outweigh flood risk be demonstrated?’

- 6.4.5** The emerging Local Plan for the district recognises the significance of developing the Haslar Barracks area under policy SS7, which is planned to be removed.

iii. Question 2

‘[Can it be demonstrated] that development will be safe for its lifetime?’

- 6.4.6** The expected lifetime of the Proposed Development is a minimum of 75-years.
- 6.4.7** The mitigation measures outlined in **Section 6** of this report demonstrate how the development will be kept safe for its lifetime.

Conclusion

- 6.4.8** It has been shown that the proposed IRC expansion associated flood risk can be outweighed by the benefits to the local community and the nation, which will be increased should the development be permitted. This is in line with the adopted Local Plan.
- 6.4.9** The Proposed Development and its occupants will be kept safe by the mitigation measures (e.g. a FEMP).

7.0 SITE DRAINAGE

7.1 Proposed Foul Strategy

- 7.1.1** It is proposed that foul flow is discharged to the existing private sewer system in the northeastern extent of the site. The topography of the site would require a pumping station to the site's northeastern corner and rising foul main.
- 7.1.2** A foul drainage layout is in **Drawing 009**.
- 7.1.3** In accordance with the Flows and Loads document²², peak foul water discharge from a hotel guest in a 3H & 4H hotel (being the closest use listed) is 250 litres per person per day. Using this method, peak foul flows are estimated to be 1.39 litres per second from the buildings designed to accommodate 470 residents. The calculated foul flow rate will be reviewed at detailed design stage.

7.2 Proposed Surface Water Drainage Strategy

Introduction

- 7.2.1** Consideration of flood issues is not confined to the floodplain. This is recognised in the NPPF and associated guidance where all Proposed Developments of 1ha or more in Flood Zone 1, and so outside the floodplain, nevertheless requires an FRA. The alteration of natural surface water flow patterns through development can lead to problems elsewhere in a catchment, particularly flooding downstream, and the replacement of permeable vegetated areas by low- permeability roofs, roads and other paved surfaces will increase the speed, volume, and peak flow of surface water runoff. So, the NPPF and associated guidance require an FRA for all Proposed Developments of 1ha or more outside the floodplain in Flood Zone 1.
- 7.2.2** A surface water management strategy for the development is proposed to manage and reduce the flood risk posed by surface water runoff from the site. The Developer will be required to ensure that any scheme for surface water management should build in enough capacity for the entire site.
- 7.2.3** The surface water drainage arrangements for any development site should be such that the volume and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the Proposed Development unless specific off-site arrangements are made and result in the same net effect.
- 7.2.4** An assessment of the surface water runoff rates was undertaken to determine the surface water options and attenuation requirements for the site.

²² WRC (2012) Sewers for Adoption 7th Edition.

Existing Drainage System

- 7.2.5** The land use is comprised of a field area and an area used for car parking.
- 7.2.6** The site is underlain by moderately permeable (clayey) soils and Selsey Sand Formation bedrock. Drainage is predominantly via overland flow, following the topography of the site northeast, with a small amount of infiltration to bedrock and throughflow to watercourse.

Developable and Impermeable Areas

- 7.2.7** The Proposed Development will increase the impermeable surfaces and therefore increase the amount of runoff.

Greenfield Runoff Rates

- 7.2.8** An assessment of greenfield runoff rates was undertaken to determine the attenuation requirements for the Proposed Development.
- 7.2.9** The runoff rates were calculated using the HR Wallingford UK SuDS online tool, with Flood Estimation Handbook (FEH) method inputs (descriptors obtained from the FEH webservice²³). This is a recommended methodology for sites up to 50ha in area and the approach is in line with the current 'industry best practice' guidelines as outlined in the Interim Code of Practice for SuDS²⁴, and EA Report SC030219 - Rainfall runoff management for developments.
- 7.2.10** The following parameters were used in the runoff calculations:
- Developable Area: 4.55ha
 - Average Annual Rainfall (SAAR): 775mm/year
 - Region No.: 7
 - BFIHOST19: 0.686
- 7.2.11** Base Flow Index derived from Hydrology of Soil Types (BFIHOST) was updated to BFIHOST19 (November 2019) since a number of issues were identified with BFIHOST, which including a tendency to underestimate BFI in clay-dominated catchments.
- 7.2.12** BFIHOST19 is the Base Flow Index developed using the Hydrology of Soil Types (HOST) classification and is the base flow proportion of the flow on average. It is estimated based on the daily mean flow data. Base flow comprises water entering the watercourse through shallow subsurface flow and groundwater flow (mechanisms other than direct surface runoff); hence permeable soils and geology tend to yield a higher base flow.

²³ Centre for Ecology and Hydrology, Flood Estimation Handbook Web Service [<https://fehweb.ceh.ac.uk/>].

²⁴ Office of the Deputy Prime Minister, National SuDS Working Group (July 2004) Interim Code of Practice for Sustainable Drainage Systems [https://www.susdrain.org/files/resources/other-guidance/nswg_icop_for_suds_0704.pdf].

7.2.13 The Soilsmap online soils map viewer and Geology of Britain online map viewer identified the following, which were confirmed by soakaway testing trial pit logs (**Appendix H**):

- Soils: Freely draining loamy soils
- Superficial Deposits: River Terrace Deposits, 2 – Sand and gravel.
- Bedrock: Selsey Sand Formation – Sand, silt and clay.
- BFIHOST19 value assigned by the FEH webservice is considered to replicate on-site conditions.

7.2.14 **Table 7.1** shows the calculated greenfield runoff rates. Runoff calculations are included in **Appendix J**.

Table 7.1 - Greenfield Runoff Rates

Annual Probability (Return Period, Years)	Greenfield Runoff (Litres per second)
QBAR	8.40
100% (1)	7.20
3.33% (30)	19.40
1% (100)	26.90
1% Plus Climate Change	37.66

Note: 40% climate change added. The 1-in- 1-year, 30-year and 100-year annual probability events are of importance to the Water Companies and the EA when looking at sewage discharge and flood risk.

Surface Water Management Strategy

7.2.15 Hierarchy of Discharge:

7.2.16 In accordance with requirement H3 in the Building Regulations 2010²⁵, rainwater runoff must discharge to one of the following - listed in order of priority:

- **An adequate soakaway or some other adequate infiltration system:** The use of infiltration-based SuDS has not been utilised for this site due to the clayey bedrock mapped at the site. Furthermore, the site proximity to the sea affords the opportunity for an unrestricted outfall thus there is not a need to attenuate water in this manner. The LLFA consultation confirms this approach (**Appendix G**).
- **A watercourse:** There are no watercourses inside the site boundary, or within 100m.

²⁵ Office of the Deputy Prime Minister, The Building Regulations 2010, amended 2021
[\[https://www.gov.uk/government/publications/drainage-and-waste-disposal-approved-document-h\]](https://www.gov.uk/government/publications/drainage-and-waste-disposal-approved-document-h)

- **A sewer:** There are no public surface water sewers located within the immediate vicinity of the site. There are private surface water sewers located within the site’s boundary.

7.2.17 The potential route to discharge surface water from the Proposed Development will be by outfall to an existing sewer system located within the Site.

Sustainable Drainage Options (SuDS)

7.2.18 Sustainable water management measures should be used to control the surface water runoff from the Proposed Development site, thereby managing the flood risk to the site and surrounding areas from surface water runoff. These measures will also improve the quality of water discharged from the site.

7.2.19 Current guidance promotes sustainable water management using SuDS. Options applicable to this site are identified in **Table 7.2**.

Table 7.2 - SuDS Options

Green roofs	Infiltration basins
Water butts	Detention basins
Permeable paving	Oversized pipes
Rainwater harvesting	Brown roofs
Filter drains	Swales
Wetland Areas	Cellular Storage

Note: SuDS appropriate to the development are highlighted yellow.

7.2.20 A hierarchy of SuDS techniques is identified²⁶:

- **Prevention** - the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
- **Source Control** - control of runoff at or very near its source (such as the use of rainwater harvesting).
- **Site Control** - management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole site).
- **Regional Control** - management of runoff from several sites, typically in a detention pond or wetland.

²⁶ CIRIA (2004) Report C609, Sustainable Drainage Systems – Hydraulic, Structural and Water Quality advice.

7.2.21 Using SuDS as opposed to conventional drainage systems provides several benefits by:

- Reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream.
- Reducing the volumes and frequency of water flowing directly to watercourses or sewers from developed sites.
- Improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources.
- Reducing potable water demand through rainwater harvesting.
- Improving amenity through the provision of public open spaces and wildlife habitat.
- Replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

SuDS Maintenance

7.2.22 An attenuation crate will form the main attenuation features within the development site. Swales and filter drains have also been provided for water quality benefits.

7.2.23 Maintenance of the SuDS features would be in line with the SuDS Manual (CIRIA C753, 2015), as detailed in **Figures 7.1 to 7.3**. It is standard for SuDS features within a new development to be maintained by a private maintenance company unless the council adopt it. If the maintenance company goes into administration, the site will be contracted to a new maintenance company and payment for SuDS maintenance will remain the responsibility of the site owner. If the site is sold to a new owner, maintenance of the SuDS features will become the responsibility of the new owner.

7.2.24 Details of other SuDS features and maintenance would be considered further at detailed design when a detailed layout has been produced.

Figure 7.1 - Filter Drains Operation and Maintenance Requirements (Table 16.1 of the SuDS Manual)

TABLE 16.1 Operation and maintenance requirements for filter drains			
	Maintenance schedule	Required action	Typical frequency
	Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
		Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
		Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
		Remove sediment from pre-treatment devices	Six monthly, or as required
	Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
		At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
		Clear perforated pipework of blockages	As required

Figure 7.2 - Swales Operation and Maintenance Requirements (Table 17.1 of the SuDS Manual)

TABLE 17.1 Operation and maintenance requirements for swales		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeded	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Figure 7.3 - Attenuation Storage Tanks Operation and Maintenance Requirements, including Geocellular Storage (Table 22.3 of the SuDS Manual)

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Drainage Design Summary

- 7.2.25** Surface water runoff would be directed to the drainage system through one of the following: a swale located along the lower portion of the eastern boundary; filter drains located in the northwestern extent of the site with precise locations dependent on rainwater pipe positions; attenuation crates in the northeastern corner of the site; permeable paving in the northern extent of the site.
- 7.2.26** Landscaped areas should be incorporated into the layout where possible, and the recreational areas and community garden will allow a proportion of the rainfall to infiltrate into the soil substrate.
- 7.2.27** Surface water will be directed to an existing surface water sewer located within the site.
- 7.2.28** A detailed surface water drainage layout is in **Drawing 008**.

Attenuation Requirements

- 7.2.29** Attenuation storage is required to reduce the post-application surface water runoff from the site to calculated greenfield runoff rates, up to and including the 1-in-100-year (+40% CC) rainfall event, assuming no infiltration losses.
- 7.2.30** The following input parameters were assumed in the calculations:
- Impermeable Area: 2.20ha (48.06%);
 - Cv (proportion of rainfall forming surface water runoff): 100%

- With outfall: 8.4 litres per second (QBAR). A restricted outflow has been selected to ensure the site can discharge via an existing sewer, though it would be possible to discharge to sea directly at an unrestricted rate (LLFA advice, **Appendix G**).

7.2.31 The attenuation volume for the 1-in-100-year event (plus climate change) is 872.90m³.

7.2.32 Attenuation calculations are included in **Appendix J**.

Exceedance Routes

7.2.33 If the system were to become overwhelmed, excess water would follow the topography northwest towards Fort Road as per existing conditions (**Drawing 007**).

Water Quality

7.2.34 Water quality improvements are achieved by decreasing flow rates and a full retention separator, which both in turn trap silt, sediment, and pollutants before discharging to the surface water sewer.

7.2.35 The online Simple Index Approach [SIA] Tool²⁷ has been used to demonstrate the effectiveness of the proposed strategy to manage surface water discharging to the private sewer system.

7.2.36 The use of permeable paving, swales, attenuation crates and filter drains would provide a sufficient level of treatment. A copy of the calculations is included in **Appendix K**, and a summary of the results are included in **Table 7.3**. The sufficient water quality is compliant with Policy LP47 of the local plan.

Table 7.3 - Simple Index Approach Results Summary

	Total Suspended Solids	Metals	Hydrocarbons
Pollution Hazard Score	0.95	0.90	>0.95
Pollution Mitigation Score	0.95	0.90	>0.95
Sufficiency of SuDS	Sufficient	Sufficient	Sufficient

²⁷ https://www.susdrain.org/resources/SuDS_Manual.html

8.0 SUMMARY AND CONCLUSION

8.1 Introduction

- 8.1.1 A site-specific FRA has been undertaken for the Proposed Development located on a 4.55ha site on land at Haslar IRC, Gosport.

8.2 Flood Risk

- 8.2.1 The risk of tidal flooding is assessed as negligible for most of the site. The central extent of the site up to the northwest extent has a moderate risk of tidal flooding.
- 8.2.2 Most of the site has a low risk of groundwater flooding. The northern boundary of the site has a moderate risk and the east boundary has a negligible risk of groundwater flooding.
- 8.2.3 There are two areas of potential high risk surface water ponding in the north of the site. The egress from the site has a high risk of surface water flooding.
- 8.2.4 The risk of flooding from all other sources is assessed as negligible.

8.3 Mitigation Measures

- 8.3.1 Flood risk can be mitigated to a negligible and acceptable level through the following approach:
- The Finished Floor Level for any proposed sleeping accommodation should be above 4.64m AOD potentially resulting in raising floor levels between 1.08m and 1.27m depending on the building and its respective aspect. This can be achieved by land raising for ground floor sleeping accommodation or, without land-raising, utilising ground floor rooms for uses other than sleeping accommodation.
 - Build in a flood resilient way (e.g. tiled floors, auto airbricks, use non-return valves on pipework).
 - The management staff onsite should be registered with the Environment Agency Floodline Warnings Direct service.
 - Produce a FEMP covering the development and wider site (this document has been provided as part of the outline planning application for the Proposed Development).
 - No below surface habitable buildings (i.e. basements).
 - Adoption of a surface water management strategy.
 - Set finished floor levels above external levels.

8.4 Flood Guidance

- 8.4.1 The Proposed Development use is classified as more vulnerable. More vulnerable developments are acceptable in Flood Zones 1 and 2 (low to medium risk). More vulnerable development in Flood Zone 3a is subject to the Exception Test (which we consider within the FRA).

8.5 Conclusion

- 8.5.1 This FRA demonstrates that the Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of national policy and guidance.
- 8.5.2 The development should not therefore be precluded on the grounds of flood risk.



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