

# Havant Footbridge

# Replacement

## Flood Risk Assessment and Drainage Strategy Report

November 2025

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# 1 Introduction

## 1.1 Brief

1.1.1 This Flood Risk Assessment (FRA) and Drainage Strategy report has been prepared by Hampshire Engineering Services on behalf of Hampshire County Council. The purpose of this report is to support a planning application for the proposed replacement of the pedestrian footbridge near Havant railway station. There is associated relandscaping of the Elmleigh Road Car Park. The nearest postcode to the site is PO9 1PP.

## 1.2 Aim

1.2.1 The aim of this report is to fulfil requirements of Section 14 of the National Planning Policy Framework<sup>1</sup> to identify and rationalise flood risks. The relevant areas are the site itself, and those areas where flooding risks may change as a consequence of variations of the replacement footbridge from the original structure. Where significant potential flooding risks are identified, measures are proposed to help mitigate flooding over the lifetime of the structure. Due consideration is included for the anticipated effects of climate change. This report includes an outline surface water drainage strategy for the footbridge replacement.

1.2.2 The proposal does not create or affect any change in foul sewer disposal.

1.2.3 To achieve this aim, the following objectives have been set:

- a review of the national planning policy position regarding the proposed footbridge replacement and the risks of flooding;
- a review of existing sources of flooding local to the site;
- a review of the existing flooding impact of these sources to the changes arising from the footbridge replacement;

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<sup>1</sup> Last updated February, 2025. [National Planning Policy Framework - Guidance - GOV.UK](https://www.gov.uk/guidance/national-planning-policy-framework) - <https://www.gov.uk/guidance/national-planning-policy-framework>.

- a review of the impact changes could have on future flooding from these sources; and
- where necessary, identification of measures for incorporation into the proposed development to mitigate flood risk to and/or arising from the proposed footbridge replacement.

1.2.4 To achieve these objectives, the following documents have been consulted and/or referenced:

- the National Planning Policy Framework (NPPF);
- Development and Flood Risk – Guidance for the Construction Industry, (CIRIA C624);
- The SUDS Manual (CIRIA C753);
- Southern Water existing sewer map records;
- Environmental Agency flood maps;
- ground condition obtained from British Geological Survey (BGS) mapping/percolation test report;
- topographical survey; and
- Havant Borough Council Strategic Flood Risk Assessment (2024).

### **1.3 Study Methodology**

1.3.1 The FRA process consists of a desk study, data research, and, if necessary, consultation with regulatory bodies and third parties.

1.3.2 Preliminary calculation of existing surface water flows was undertaken based on the current conditions and existing drainage systems at the Application Site. Post works surface water flows were calculated based on the proposals for the footbridge replacement.

1.3.3 This document presents an assessment of possible future flooding to the Application Site and the proposed replacement from all possible sources. These sources of flooding include tidal, fluvial, pluvial, groundwater, sewer surcharge, reservoirs, and man-made infrastructure. This assessment also

examines the residual future flood risk to the proposed replacement and to neighbouring properties from these sources.

## 2 Policy and Guidance

### 2.1 National Planning Policy Framework (NPPF)

2.1.1 The NPPF states ‘a site-specific flood risk assessment’ is required for proposed development which:

- has an area of one (1) hectare (ha) or greater in Flood Zone 1;
- all sites in Flood Zones 2 and 3, or
- in an area within Flood Zone 1 which has critical drainage problems, et cetera.

2.1.2 The proposed footbridge replacement has an area of 0.37ha. Using Environment Agency mapping, the Application Site has areas situated within **Flood Zones 1, 2, and 3a** and is within an area of critical drainage issues.

2.1.3 For the purposes of the Policy, Table 1 tabulates the flood zone classifications in any one year.

| <b>Flood Zone</b> | <b>Flood Zone Classification</b> | <b>Definition</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Zone 1            | Low Probability                  | <i>Land having a less than 0.1% annual probability of river or sea flooding. (Shown as ‘clear’ on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)</i>                                                                                                                                                                                                                                                                                                                                                 |
| Zone 2            | Medium Probability               | <i>Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)</i>                                                                                                                                                                                                                                                                                                                   |
| Zone 3a           | High Probability                 | <i>Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)</i>                                                                                                                                                                                                                                                                                                                                         |
| Zone 3b           | Functional Floodplain            | <i>This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters....Planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)</i> |

**Table 1** - Flood Zones

2.1.4 Paragraph **170** of the NPPF states that *“inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere”*.

2.1.5 Paragraph **181** of the NPPF states *“when determining planning applications, Local Planning Authorities (LPAs) should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable), it can be demonstrated that:*

- a) within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location;*
- b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
- c) it incorporates Sustainable Drainage Systems, unless there is clear evidence that this would be inappropriate;*
- d) any residual risk can be safely managed; and*
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.”*

2.1.6 “*The Flood risk and coastal change*” section of the Planning Practice Guidance (PPG)<sup>2</sup> provides more interpretation to the NPPF. This interpretation provides further detail to show to the decision-maker how this infrastructure replacement complies with the NPPF. Whilst in this case, the replacement footbridge would be ‘permitted development’ (i.e. in this case, a capital replacement of a near life expired existing structure), it is located within Flood Zone 2 or 3. Thus as of 2025 issue of the NPPF, it requires further

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<sup>2</sup> [Flood risk and coastal change - GOV.UK](https://www.gov.uk/guidance/flood-risk-and-coastal-change)

consideration. In this issue of the NPPF, Diagram 1 suggests that for this replacement footbridge, a sequential test (see Diagram 2) be undertaken.

2.1.7 As per Diagram 2, the replacement footbridge is within Zone 3a as per Table 1. The replacement footbridge is “*essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.*” As such, **Annex 3** (Flood risk vulnerability classification)<sup>3</sup> of the PPG classifies this replacement footbridge as **Essential infrastructure**.

2.1.8 Table 2 (Flood Risk vulnerability and Flood Zone ‘incompatibility’)<sup>4</sup> of the PPG, shown below, states that ‘Essential infrastructure’ development is appropriate development within Flood Zone 1 and 2.

**Table 2 - Flood risk vulnerability and flood zone ‘compatibility’**

| Flood Zones | Essential infrastructure | Highly vulnerable       | More vulnerable         | Less vulnerable | Water compatible |
|-------------|--------------------------|-------------------------|-------------------------|-----------------|------------------|
| Zone 1      | ✓                        | ✓                       | ✓                       | ✓               | ✓                |
| Zone 2      | ✓                        | Exception Test required | ✓                       | ✓               | ✓                |
| Zone 3a     | Exception Test required  | ✗                       | Exception Test required | ✓               | ✓                |
| Zone 3b     | Exception Test required  | ✗                       | ✗                       | ✗               | ✓                |

**Key:** ✓ Development is appropriate ✗ Development should not be permitted.

However, the replacement footbridge requires an Exception Test if located within Flood Zone 3.

2.1.9 The application site is located within Flood Zone 1, 2 and 3a. The proposed replacement footbridge is an essential transport route. For example, the elevated walking route is well drained and remains effective in all conditions to allow safe transit of people between the north and south of the railway line. The super-structure itself is permeable at envisaged flood levels, and thus will be safe throughout its lifetime. It can thus be considered ‘appropriate

<sup>3</sup> [National Planning Policy Framework - Annex 3: Flood risk vulnerability classification - Guidance - GOV.UK](#)

<sup>4</sup> [Flood risk and coastal change - GOV.UK](#)

development' and therefore passes the requirements of the Sequential Test and the Exception Test.

## **2.2 Local Policy (Strategic Flood Risk Assessment)**

2.2.1 Havant Borough Council Core Strategy, 2024

2.2.2 South Hampshire Level 1 Strategic Flood Risk Assessment (SFRA).

2.2.3 The SFRA was produced by AECOM for Portsmouth City Council (PCC) on behalf of ten planning authorities in South Hampshire (the 'Partnership for South Hampshire' (PfSH)) including Havant Borough to prepare an updated Strategic Flood Risk Assessment (SFRA).

2.2.4 The revised Level 1 SFRA "provides an overview of the risk of flooding from all sources across the Planning Authority Area including flooding from rivers, surface water, groundwater, sewers and other artificial sources, and should be used to assist in the development of policy formulation, strategic planning, application of the Sequential Test, development control, and emergency planning."<sup>5</sup>

2.2.5 The SFRA was used as an additional document to identify the different sources of potential flooding at the proposed site.

## **2.3 Consideration of PfSH Flood Mapping**

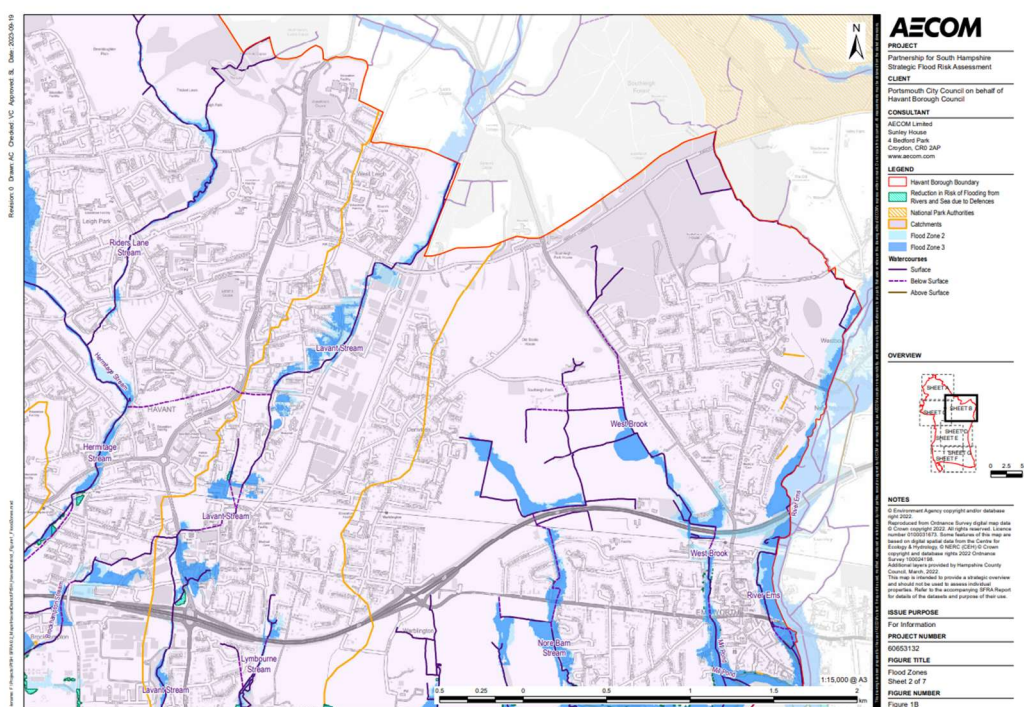
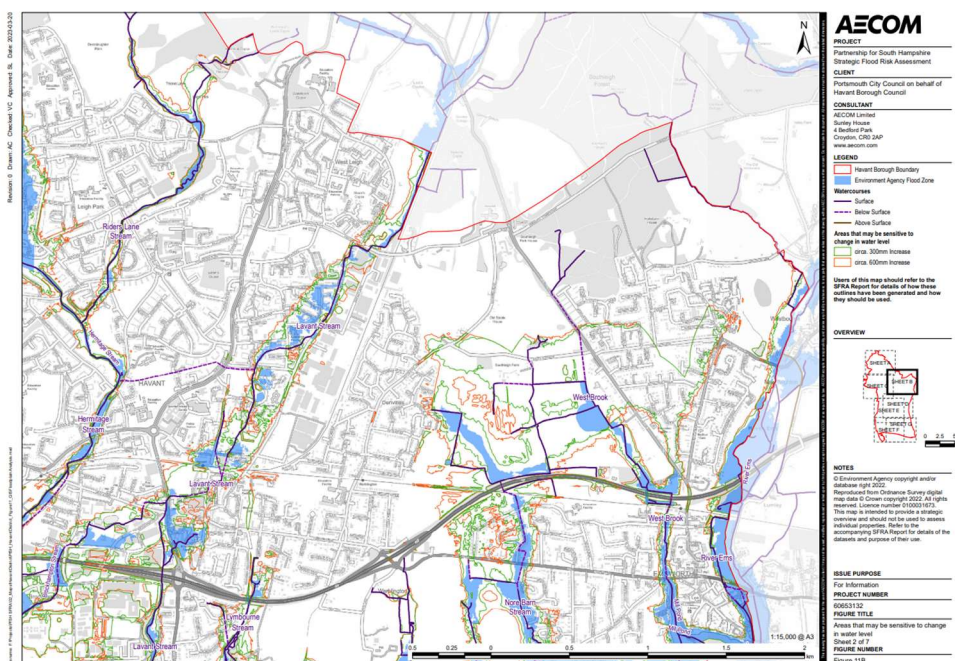
2.3.1 PfSH commissioned and have produced mapping that attempts to estimate the future extents of possible severe flooding from future individual storm events, including a climate change multiplier, for various epochs. These maps are very high-level strategic maps indications extrapolated from existing ground profiles as derived from relative radar measurements (LIDAR).

2.3.2 The site of this replacement footbridge sits within the area influenced by the Lavant Stream. Extracts from their updated 2024 mapping is as follows as

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<sup>5</sup> sentence in original has been corrected for grammar et al in this quotation

referenced from the footnote below.<sup>6</sup>



2.3.3 Site investigations however have found that some of the premises and associated assumptions of these 2024 mapping are in fact not an accurate reflection of the drainage and storm assets present “in and on the ground”.

<sup>6</sup> [PfSH Strategic Flood Risk Assessment \(2024\) | Havant Borough Council](https://www.havant.gov.uk/planning-services/planning-policy/local-plan/pfsh-strategic-flood-risk-assessment-2024) as at <https://www.havant.gov.uk/planning-services/planning-policy/local-plan/pfsh-strategic-flood-risk-assessment-2024>

Thus, the relationship between what is idealised as expected flooding and the actual occurrence of historical flooding is not highly correlated. Some detail of these divergences is discussed later in this report.

## **2.4 Mitigation of existing flood risks**

2.4.1 It will be noted later in the report that there is known to be limited existing issues with short duration flooding in high intensity storms. To mitigate against existing and future flooding, three mitigations have been provisioned within the proposed replacement footbridge.

The proposed mitigations include:

- (1) doubling the soakaway capacity for the car park
- (2) provision for an additional attenuation storage to mitigate for increases in the footbridge area.
- 3) A third mitigation measure allows for some storage to offset the interpretation of lost flood plan created by a raised footway ramp. Further details, calculations, and explanations follow later in this report.

## 3 Existing Site Details

### 3.1 Site location and description

3.1.1 The proposed site, including the existing footbridge, is located **outside** and immediately west of the Havant Railway Station on North Street, Havant, PO9 2AW. The National Grid Reference of the site is 471721, 106606. A council-owned car park is located to the north of the footbridge with access from Elmleigh Road.

3.1.2 The planning area is approximately 0.37ha. It is currently classified as a “brownfield” area with a mixture of permeable and impermeable areas attributed to its current use. The site is bounded by North Street to the south, Leigh Road to the east, Elmleigh Road to the north and the railway track going through the site. See **Figure 1** for site location.



**Figure 1: Site location plan**

3.1.3 The site is currently accessed via North Street from south of the site, and also via another access at Elmleigh Road from north of the site.

3.1.4 The footbridge replacement scheme consists of replacement of the existing footbridge and undertaking alterations to the existing Elmleigh Road car park. See **Appendix A** for proposed location plan.

3.1.5 Existing site levels range from 10.92m Above Ordnance Datum (AOD) at the southern end of the site to 9.74m AOD within the railway track. Refer to **Appendix B** for the full topographical survey.

## 3.2 Site Geology

3.2.1 A review of the British Geological Survey (BGS) mapping indicates that the bedrock geology beneath the site is a Bognor Sand Member - Sand.

Sedimentary bedrock formed between 56 and 33.9 million years ago during the Palaeogene period. See Figure 2 for the BGS map extract.

The superficial deposit on top of the bedrock is Head - Clay and gravel.

Sedimentary superficial deposit formed between 2.6 million years ago and the present during the *Quaternary Period*.

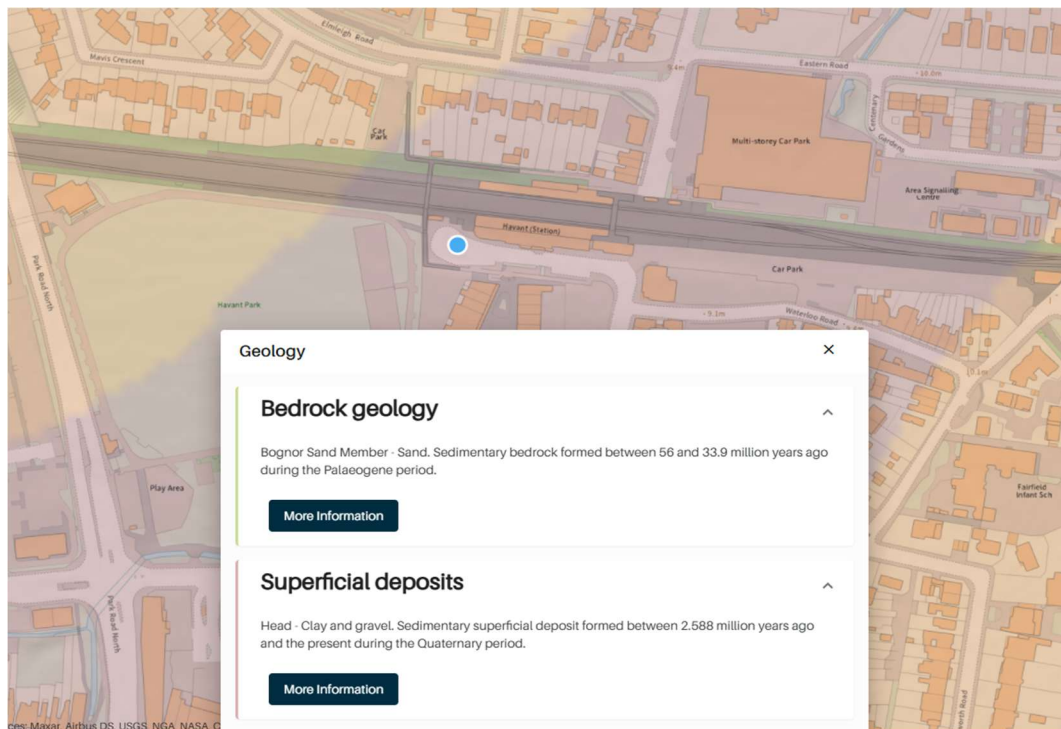


**Figure 2: BGS Map Extract**

3.2.2 There are two boreholes situated south-east of the development site. The boreholes are located approximately 200m away from the site and their numbers are SU70NW61 and SU70NW266. These boreholes show that the soil structure is gravel and sand, with clay underneath. Refer to **Appendix C** for the BGS borehole extract. Additional local boreholes have been undertaken and are shown on the drawing in **Appendix G**.

3.2.3 A site investigation has been undertaken by Terra Firma. This investigation concurs that the site is underlain by the London Clay Formation. This formation comprises blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt, and sometimes silt, with some layers of sandy clay. The Bognor Sand Member comprises of glauconitic fine- and medium-grained sands. The site investigation also confirms that Superficial Deposits, in the form of River Terrace Deposits and Head Deposits, are shown to have overlain the bedrock geology to the west and east of the site respectively. Refer to **Appendix C** for the Terra Firma site investigation report.

## 4 Existing Drainage and Sewers

### 4.1 Existing surface water drainage

- 4.1.1 The site is currently a previously developed or 'brownfield' site, comprising of a mixture of grassed and hardstanding areas. The northern half of the existing footbridge, along with Elmleigh road car park, drains to an existing surface water catchpit gully located north of the footbridge in Mavis Crescent Road. This catchpit gully connects to a carrier drain under Elmleigh Road.
- 4.1.2 The southern half of the existing footbridge drains to an existing drainage channel at the bottom of the ramp access to the footbridge. Rainfall is collected via existing surface water gullies and pipe systems within North Street.
- 4.1.3 The application site is located within the municipal water authority's storm drainage area. These carrier pipes are maintained by a private company called Southern Water. According to Southern Water's existing storm drains and sewers map record, there is an existing 300mm diameter surface water drain flowing east under Elmleigh Road. There is also a 600mm diameter surface water drain running along North Street. See **Appendix D** for Southern Water sewer map record. Their infrastructure will remain unaffected.
- 4.1.4 It is not anticipated to change any water authority, railway authority, or Highway Authority drains as part of these works.
- 4.1.5 The site relates to the replacement of the existing footbridge and associated maintenance works. This is not a new development but a replacement within the existing footprint. For clarity, the area is not being reclassified for future development potential. The Elmleigh Road car park and the existing footbridge catchment areas are impermeable, while surrounding areas comprise a mixture of permeable and impermeable surfaces. Refer to **Appendix E** for drawings of the existing impermeable areas
- 4.1.6 The brownfield run-off rates for the existing site have been estimated by modelling the existing pipe network and allocating the existing catchment areas to the pipe networks accordingly. Hydraulic modelling software was used for these estimations. The pipe networks are separated into two

different networks which are a northern and southern networks. The resulting runoff rate from the existing brownfield calculations is below in **Table 4.1** and **Table 4.2**. A full copy of the brownfield runoff rates calculations can be found in **Appendix F**.

| Return Period        | Estimated Discharge Rates (l/s) |
|----------------------|---------------------------------|
| <i>1 in 1 year</i>   | 9                               |
| <i>1 in 30 year</i>  | 20                              |
| <i>1 in 100 year</i> | 25                              |

**Table 4.1:** Northern Catchment Existing Brownfield Discharge Rates

| Return Period        | Estimated Discharge Rates (l/s) |
|----------------------|---------------------------------|
| <i>1 in 1 year</i>   | 2*                              |
| <i>1 in 30 year</i>  | 3                               |
| <i>1 in 100 year</i> | 4                               |

**Table 4.2:** Southern Catchment Existing Brownfield Discharge Rates.

*\* the calculated value is 1.2 l/s; the minimum value however is 2 l/s.*

Both connections, i.e. on the north and south side of the railway, from the catchpit gullies to the main carrier drains are 150mm in diameter and have sufficient slope to allow higher flow rates than these in Table 4.1. Currently the surface flow passes through a gully grating. Thus, in practise, the discharge rates are restricted by the gully gratings at approximately 15 litres per second.

## 4.2 Existing foul sewer

4.2.1 Southern Water's existing foul sewer map record shows that there is a 225mm diameter foul sewer running along Elmleigh Road and another 225mm diameter running along North Street. See **Appendix D** for the Southern Water sewer map record. None of the foul sewers will be impacted or changed by the proposed footbridge replacement scheme.

## 5 Flood Risks

### 5.1 Long-term flood risk from river (fluvial), tidal, or coastal effects

5.1.1 Flood mapping obtained from the government's 'flood map for planning' website identified that the site falls within Flood Zone 1, 2 and 3a. A small area falls within Zone 3a: the higher probability of flooding zone. This means the site is assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any one year. See **Figure 3** below for map extract.

5.1.2 This section reviews the long-term flood risk from rivers and seas. The flood map for this shows that the proposed development site has a "high probability" of river flooding as mentioned above.

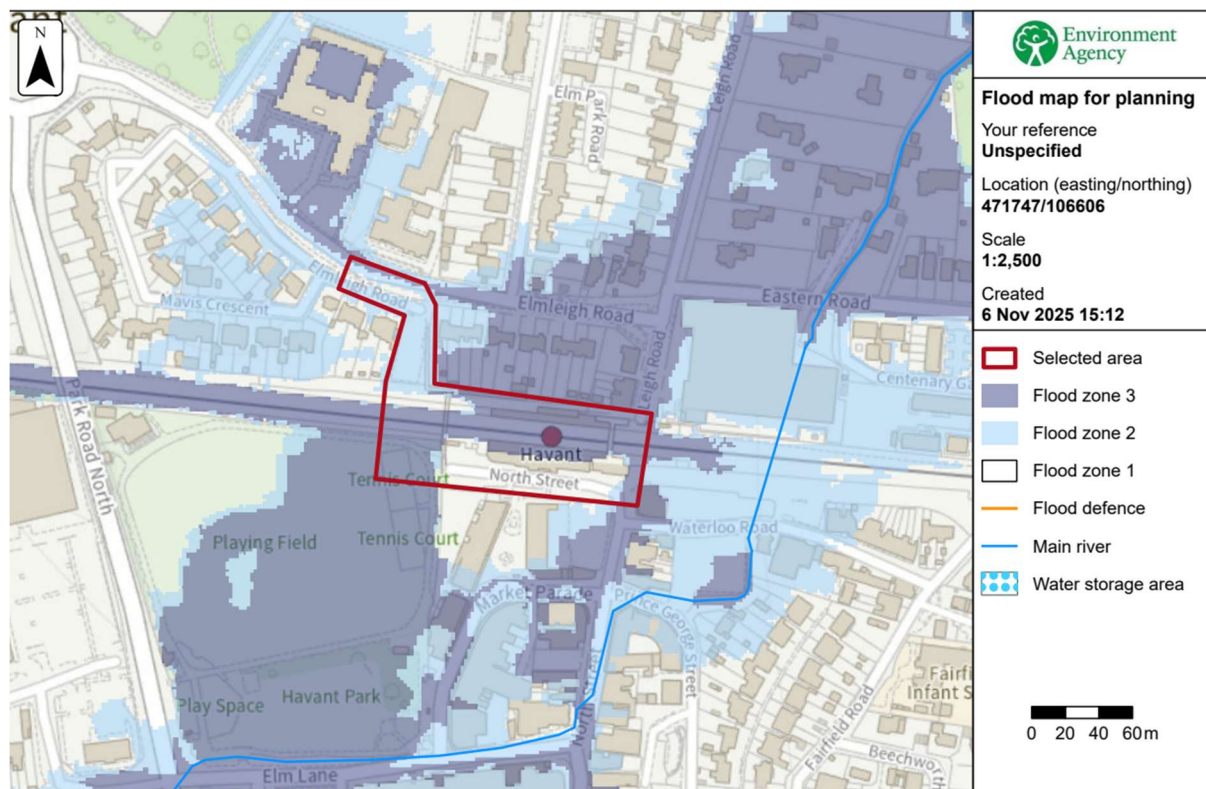


**Figure 3: Flood Zone Map**

5.1.3 However, there is some benefit from adding some interpretive perspective to these maps. The probability of flooding from rivers is physically limited to the Lavant stream to the east (the blue line) and a piped "reach" of the Lavant stream beneath Leigh Road. Of the two, a blockage in the pipe beneath

Leigh Road is more salient. The reason for this is that the flow from the north car park drains into this pipe.

- 5.1.4 The flood risk from coastal flooding is very small. The reason for this is due to the higher elevation of the site (circa 10m above ordinance datum) with respect to lower levels of the maximum high tide level or nominal sea level or even maximum storm surge level (roughly 4m lower). The site is sufficiently far from the sea boundary to reasonably expect little or no influence from coastal flooding.

## **5.2 Long-term flood risk from reservoirs**

The Environment Agency suggests that the development site is not within an area at risk of flooding from reservoirs. However, whilst the site has no historical risk from reservoirs, a new nine million cubic metre reservoir has received planning permission about 3500 metres upstream of the site. Any future flooding incidents arising from infrastructure failure at the reservoir *are expected* to flow along the Hermitage Stream (750 meters to the west), and not via the Lavant stream which passes through this site.

## **5.3 Long-term flood risk from rainfall (Pluvial)**

- 5.3.1 Surface water or 'pluvial' flooding results from rainfall running over ground before eventually entering a watercourse or storm drain. It is usually associated with high-intensity rainfall storms. But pluvial flooding can also occur with lower intensity rainfall or melting snow where the ground is already saturated, frozen, developed, or otherwise has low permeability.
- 5.3.2 The surface water flood risk map from the Environment Agency is shown in **Figure 4**.

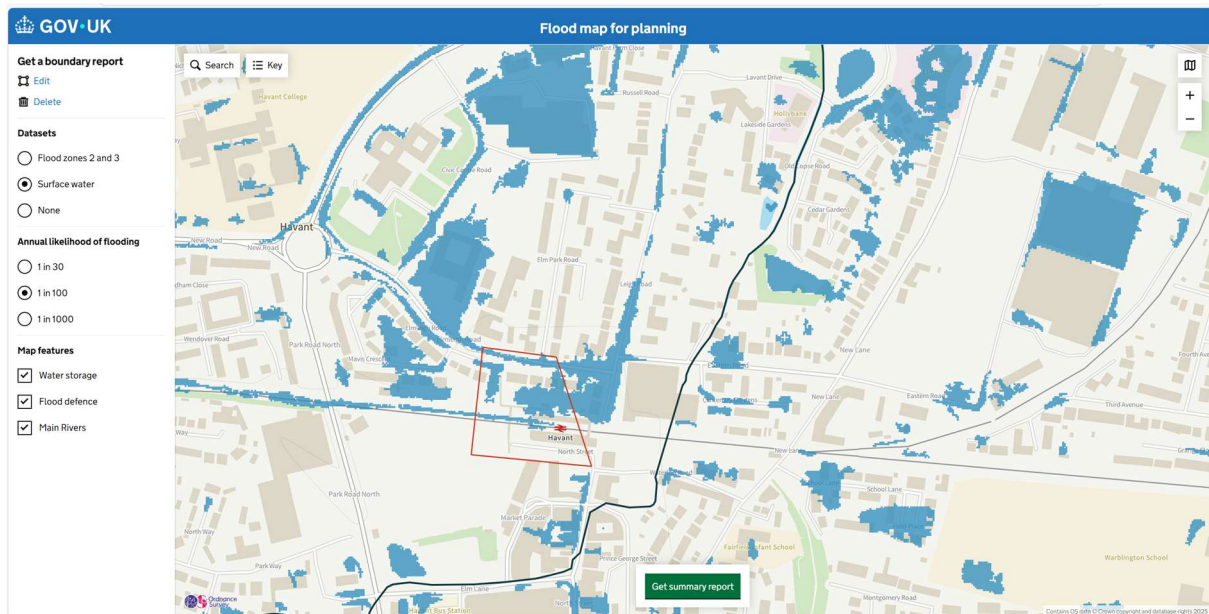


**Figure 4: Long term flood risk from surface water**

It indicates that the existing car park area of the amended development site itself has a high risk of flooding (more than 1%) in any given year. Also, the access roads to the site and around the site all have high risk of flooding more than 1% in any given year. Whilst the EA site does not specifically state a depth, the range of flood depths is likely to be shallow (less than 300mm) and short duration (less than an hour) in most storm scenarios. The duration of flooding will be short lived (less than a day) unless there is a catastrophic failure or blockage of 50% or more in key parts of the storm drainage and river system.

## 5.4 Groundwater-sourced flooding

5.4.1 Several of the undertaken boreholes recorded water at about three metres below the surface, rising to two metres at their maximum.<sup>7</sup> It is expected that groundwater surcharge would be limited reaches of the Lavant stream, which is a metre or more below the surface ground level.

<sup>7</sup> Terra Firma report. Appendix C.

## 6 Drainage Strategy

### 6.1 Surface Water Drainage Strategy

6.1.1 In line with the Building Regulations, Part H3, surface water shall discharge to one of the following, listed in order of priority:

- An adequate infiltration system; or, where not reasonably practicable:
- a watercourse; or where not reasonably practicable:
- a sewer; or where not reasonably practicable:
- a combined sewer.

6.1.2 Both a review of the British Geological Survey (BGS) mapping, and the site investigation report undertaken by Terra Firma for the site, indicate that the bedrock geology beneath the site comprises of silt and clay. Generally, this indicates poor infiltration. In addition to this, the site is located within Flood Zone 1, 2 and 3a which has a higher risk of surface water flooding. However, one of the boreholes near the railway edge of the north car park indicated good infiltration. Also, there is an existing, functioning soakaway with the confines of the north car park. On this site, infiltration systems have not been used on this site to dispose of surface water where they are within five (5) metres of a structural foundation.

6.1.3 The next option in the hierarchy above is to discharge to a watercourse. Neither the EA maps nor online maps show any watercourses adjacent to the development site. The nearest watercourse is 150m to the east and is culverted as a structure. There are existing pipes already to the nearest watercourse which is the 600mm main carrier under the railway at Leigh Road. This direct discharge of storm water from the site into watercourse is not a consideration without going through the existing storm drainage system.

6.1.4 The next option in the hierarchy above is to discharge to an existing surface water storm drain. The highway gullies from the existing footbridge currently discharge into the existing surface water sewer running along Elmleigh Road and North Street<sup>8</sup>. No combined surface and sewer drain exists. Thus, the

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<sup>8</sup> Source: Southern Water existing sewer map record

feasible option is to dispose of the surface water from the proposed replacement footbridge including the car park to the existing drains on Elmleigh Road and North Street respectively. This reflects the existing drainage arrangement.

- 6.1.5 The post development impermeable area is larger than the predevelopment impermeable area. However, the aim is to make sure there is no increase in flow rates of post development surface water runoff leaving the site. For betterment of the site and to reduce the surface water runoff, it is proposed to attenuate surface water runoff generated by the proposed footbridge and Elmleigh Road car park using ground attenuation tanks. Any flows are discharged to the existing surface water drains at a slower rate than the existing runoff rate using a flow control mechanism.
- 6.1.6 For the proposed drainage to reflect the existing drainage arrangement, HCC have proposed two separate networks: a northern and southern network. The proposed northern network drains the northern side of the footbridge including Elmleigh Road car park and connects to an existing combined catchpit gully (CCG) as their outfall. This CCG discharges to existing surface water drainage on Elmleigh Road. The proposed southern network drains the southern side of the footbridge and connects to an existing surface water catchpit gully connected to existing railway drainage on North Street.
- 6.1.7 The proposed northern network discharges to the existing surface water drain at a restricted maximum rate of 15 l/s. The use of a flow control mechanism restricts the flow to less than the existing northern catchment brownfield runoff rate for all rainfall events up to and including the extreme event.
- 6.1.8 The proposed southern network discharge to the existing surface water sewer is restricted maximum rate of **5 l/s**. In most storm events, the flow rate will be less than 2.5 l/s. Again, a flow control mechanism is proposed to restrict the flow rate below the existing southern catchment brownfield runoff rate for rainfall events up to and including the events considered at planning.
- 6.1.9 The proposed discharge flow rate for both the northern and southern network is lower than the existing brownfield runoff rate for all rainfall events up to and including the 1 in 100-year rainfall event plus an allowance for climate change

(+ 45%). These proposed restrictions in future flow rates provide reduction on existing rate which is a significant 'betterment'. See below **Table 5** for the calculated existing "brownfield" run off rates and proposed discharge rates.

| Event               | Existing Brownfield Discharge Rates (l/s) | Proposed Discharge Rates (l/s) |
|---------------------|-------------------------------------------|--------------------------------|
| 1 in 1 year         | 9                                         | < 5                            |
| 1 in 30 year        | 20                                        | < 7.5                          |
| 1 in 100 year       | 25                                        | < 10                           |
| 1 in 100 year + 45% | -                                         | < 15                           |

**Table 5.2: Northern Catchment Proposed Discharge Rates**

| Event               | Existing Brownfield Discharge Rates (l/s) | Proposed Discharge Rates (l/s) |
|---------------------|-------------------------------------------|--------------------------------|
| 1 in 1 year         | 2                                         | 2                              |
| 1 in 30 year        | 4.5                                       | < 4                            |
| 1 in 100 year       | 6                                         | < 4.5                          |
| 1 in 100 year + 45% | -                                         | < 5                            |

**Table 5.2: Southern Catchment Proposed Discharge Rates**

6.1.10 The proposed surface water network consists of a gravity pipe system.

Surface water will be conveyed through gravity pipes and stored within above ground attenuation features and below ground surface features before it discharges to existing surface water drains. As before, a flow control mechanism restricts the outflow rate. Please refer to **Appendix G** for proposed drainage strategy layout.

6.1.11 The proposed SuDS features have been designed to offer betterment over the existing up to a 1-in-100 year storm plus 45% to account for climate change.

Proposed drainage calculations can be found in **Appendix H** and the breakdown of all SuDS features is shown in Table 6 below.

| SuDS Feature                                       | Volume           |
|----------------------------------------------------|------------------|
| Below ground Attenuation Tank – Northern Catchment | ~8m <sup>3</sup> |
| Above ground Attenuation Tank – Northern Catchment | 15m <sup>3</sup> |
| Attenuation tank – Southern Catchment              | 10m <sup>3</sup> |

**Table 6: Proposed SuDS Features**

6.1.12 As the highway catchpit gully on both the south and north side are existing connections to the existing system which are not changing, the drainage

connection to existing surface water drain will not be subject to a S106 (Water Industry Act 1991) with Southern Water in either instance. The chamber at the upstream end of the system leading to the southern connection to Southern Water is being reconstructed as a new combined catchpit gully. This change is proposed to facilitate the introduction of a water quality feature.

## **6.2 Mitigations to release potential conditions of the Exception Test**

6.2.1 There are three possible areas for interpretation with regards to the guidance that the system shall not introduce detriment over and above the existing system.

- *one of these has to do with the increase in impermeable area;*
- *a second has to do with the concept of 'betterment'; and*
- *a third has to do with the theoretical loss of flood storage, as introduced by the creation of a small portion of solid ramp on the northern side of the footbridge structure.*

6.2.2 To provide further betterment in comparison to the existing storm drainage, a second soakaway has been proposed in the existing car park area to reduce the impact of existing, occasional flooding which exists for short durations of a few hours. The depth of current flooding tops out at about 200mm before it surcharges to the existing gully at the highway exit/entrance. With an area of about 350 sqm, this maximum existing flooding represents a maximum volume less than 25 cubic metres. Estimations based on observation suggests anecdotally that this flooding takes less than five (5) hours to soak into the ground at its maximum duration. A rainfall depth of 25mm within less than a few hours does occur roughly once a year. Providing an overflow and / or a second soakaway introduces more than 30% betterment for the car park.

6.2.3 For the increase in the impermeable area of the replacement structure, the addition of attenuation tanks beneath the structure has been introduced. On the north side, 15 cubic metres of storage has been proposed subject to detailed design. Ten (10) cubic metres of storage is proposed on the south side to attenuate rainfall, subject to detailed design.

6.2.4 The addition of the raised earth ramp north of the proposed footbridge's ramp impacts very slightly on flood plain volume for fluvial events. Waters would

lap 200mm up that ramp structure in the worst conditions, meaning that 5m<sup>3</sup> of flood storage is lost. This loss of flood storage has been factored into the drainage design attenuation storage over and above that required for the structure under pluvial loading. One may argue that pluvial and fluvial events occurring together would be very rare; however this provision has been allowed for conservatively.

## 7 Water Quality

### 7.1 Water Quality

- 7.1.1 The surface water drainage strategy has been designed to ensure that a higher percentage of any residual pollutants will be filtered out of the water before leaving the site.
- 7.1.2 Using the UK SuDS Water Quality Toolkit, all systems of surface water drainage have been assessed in regard to water treatment. HCC have proposed to use a vortex separator to filter out and mitigate potential future pollution within surface water runoff, one each on both the north and south sides.
- 7.1.3 A vortex separator provides high levels of surface water treatment. It is a cost-effective mechanism to provide sufficient water quality treatment as demonstrated in the output from the UKSuDS Water Quality toolkit shown in **Appendix I**.
- 7.1.4 Using the UK SuDS Water Quality Toolkit, it can be confirmed that all proposed SuDS components have been assessed and shall provide sufficient treatment for the proposed footbridge replacement. See Table 7 for summary of the SuDS used on site and their respective pollution mitigation indices.

| Land Use                                       | Pollution Hazard Indices     |                   |                   |
|------------------------------------------------|------------------------------|-------------------|-------------------|
|                                                | Total Suspended Solids       | Metals            | Hydrocarbons      |
| Non-residential parking with infrequent change | 0.5                          | 0.4               | 0.4               |
| SuDS Component                                 | Pollution Mitigation Indices |                   |                   |
|                                                | Total Suspended Solids       | Metals            | Hydrocarbons      |
| Proprietary Product (Vortex Separator)         | 0.5                          | 0.4               | 0.8               |
| <b>Sufficiency of water treatment</b>          | <b>Sufficient</b>            | <b>Sufficient</b> | <b>Sufficient</b> |

**Table 7:** UK SuDS Water Quality Toolkit Output

## 8 SuDS Maintenance Strategy

### 8.1 SuDS Maintenance Strategy

- 8.1.1 The management and maintenance of the SuDS features and drainage system within the proposed site will be the responsibility of the respective asset owners. Specifically, Havant Borough Council will be responsible for the north car park, Hampshire County Council for the footbridge, and Network Rail for the southern taxi rank. See drawing CJ009595-HES-SGN- FB560-DR-S-1708 Rev S0 P0.2.
- 8.1.2 All drainage will be designed in accordance with Water UK – Design and Construction Guidance (DCG dated June 2022).
- 8.1.3 Havant Borough Council or any management company appointed is to follow the maintenance schedule shown below in **Table 8 and Table 9**.

| Drainage Component         | Required Action                                                                                                                                                                                            | Typical Frequency                                                            |             |                     |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------|---------------------|
| Pavement Areas / Car Park  | Sweeping of paved areas, disposal of sweepings in a legal manner; removal of trash and litter from pavement                                                                                                | Monthly                                                                      |             |                     |
| Gullies                    | To be cleaned annually and any found to be non-functioning to be recorded for more detailed attention. A list of problems gullies is to be maintained, and these will be cleaned at six monthly intervals. | Cleaned annually<br>Problems gullies to be cleaned at six monthly intervals. |             |                     |
| Underground drainage pipes | Drainage pipes to be inspected once every two years and cleared when required. Where there is evidence more regular attention is required, then frequency of inspection is to be reviewed.                 | Inspection at two-year intervals.                                            |             |                     |
| Catchpits/Manholes         | Monthly inspections with Quarterly cleaning, removal of sediments, oils and floatables.                                                                                                                    | Monthly                                                                      | Inspection, | Quarterly cleaning. |
| Drainage Outlets           | Removal of trash and sediments from drainage outlets twice a year.                                                                                                                                         | April                                                                        | October     |                     |
| Flow control device        | Inspect and identify any areas that are not operating correctly                                                                                                                                            | Monthly (for the first 3 months), then six monthly                           |             |                     |
|                            | Remove sediment from upstream silt trap(sump)                                                                                                                                                              | Six monthly, or as required                                                  |             |                     |
|                            | Hose down unit/chamber                                                                                                                                                                                     | Six monthly, or as required                                                  |             |                     |

**Table 8:** Maintenance Schedule for drainage components

| Maintenance schedule   | Required Action                                                                                                       | Typical frequency schedule                |
|------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Regular maintenance    | Inspection of the tank for debris and sediment build- up, inlets/outlets/withdrawal devices, pumps, filters           | Annually (and following poor performance) |
|                        | Cleaning of tank, inlets, outlets, gutters, withdrawal devices and footbridge drain filters of silts and other debris | Annually (and following poor performance) |
| Occasional maintenance | Cleaning and/or replacement of any filters                                                                            | Three monthly (or as required)            |
| Remedial actions       | Repair of overflow erosion damage or damage to tank                                                                   | As required                               |
|                        | Pump repairs                                                                                                          | As required                               |

**Table 9:** Maintenance schedule for above ground attenuation tank

## 9 Summary and Conclusion

### 9.1 Summary and Conclusion

- 9.1.1 Hampshire Engineering Services of Hampshire County Council prepared a site-specific Flood Risk Assessment and Drainage Strategy. This is in support of a planning application for the scheduled replacement of the Havant Replacement Footbridge and Elmleigh Road car park maintenance in Havant.
- 9.1.2 The application site has a gross area of approximately 0.37ha and the footbridge replacement scheme are located within Flood Zone 1, 2 and 3a. The area in Flood Zone 3a has the high probability of flooding, which is assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any one year.
- 9.1.3 The proposed redevelopment is within Flood Zone 1, 2 and 3a. In accordance with the NPPF and PPG. It is an essential infrastructure for pedestrian transport providing both a travel route and an escape route. As such, it passes the sequential test and the exception test and is therefore an appropriate development.
- 9.1.4 For the surface water drainage strategy, all surface water storage will be provided by the proposed partially above ground attenuation tanks. These features are estimated to attenuate surface water runoff for most rainfall events up to and including the 1 in 30 year rainfall event plus an allowance for 40% climate change. Then they will discharge to existing gullies and drains at a maximum flow rate of 15 l/s from northern system and less than 5 l/s from southern network. In modelled storms scenarios, the calculations of the flow rate are estimated to be lower, and less than the existing brownfield runoff rate respectively, in almost all scenarios. This provides significant betterment compared to the existing drainage.
- 9.1.5 The detailed drainage design is to comply with HCC technical guidance.

- 9.1.6 With respect to water quality, a two-stage system is proposed. This entails a high-level filter with an additional treatment as a separator near as practicable the tail of the system.
- 9.1.7 The footbridge replacement scheme is therefore compliant with the requirements of NPPF and does not increase flood risk in all areas downstream of the site. The application should therefore be looked at positively by the planning authority with regards to flood risk and drainage.

## **Appendix A – Location plan**

- C.J009595-HEH-HDG-17025323-DR-CD-0001 S4 P02

## **Appendix B – Topographical survey**

- C.J009595-HEH-VTO-17025323-DR-CD-0001 S4 P02

## **Appendix C – Site Investigation Report and BGS extracts**

- Ground Investigation Report 2010
- TF-24-356-R01 Ground Investigation (Final)

## **Appendix D – Southern Water sewer map records**

- Sewer Record Map

## **Appendix E – Pre-development and Post-development catchment area plans**

- C.J009595-HEH-HDG-17025323-DR-CD-0009 S4 P02 Existing Impermeable Areas
- C.J009595-HEH-HDG-17025323-DR-CD-0010 S4 P02 Proposed Impermeable Areas

## **Appendix F – Brownfield runoff rate calculations**

- Existing runoff northern network
- Existing runoff southern network

## **Appendix G – Proposed drainage strategy layout**

- C.J009595-HEH-HDG-17025323-DR-CD-0004 S4 P02 Proposed drainage

## **Appendix H – Proposed drainage Calculations**

- proposed runoff northern network
- proposed runoff southern network

## **Appendix I – UKSuDS Water Quality toolkit output**

- Water Quality Toolkit - Non-residential parking Sheet 1
- Water Quality Toolkit - Non-residential parking Sheet 2