

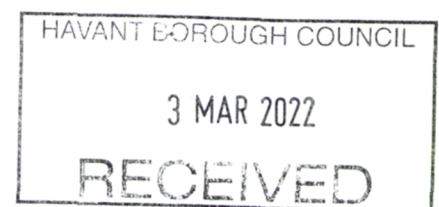
Flood Risk Assessment & Drainage Strategy Report

**17 Haslemere Gardens,
Hayling Island**

Date: February 2022

Project No.: 303499

Revision: 00



Structural
Engineering



Civil
Engineering



CDM
Consultants



Sustainability
and BREEAM



Traffic and
Transport



Flood Risk
Assessments



Highway
Engineering



Event
Engineering

Issue and Amendment Record:

Revision	Comment/Amendment	Prepared	Reviewed	Approved	Date
00	First Issue	MJH	TK	-	17.02.22

Contents

- 1.0 Introduction
- 2.0 Existing Site Conditions
- 3.0 Potential Flood Risk Affecting the site
- 4.0 Flood Mitigation Proposals
- 5.0 Summary and Recommendations
- 6.0 Appendices

1.0 Introduction

- 1.1 Scott White and Hookins have been instructed by Mr Geoff Tournoff to undertake a flood risk assessment of a proposed development at 17 Haslemere Gardens, Hayling Island, PO11 9SD. This flood risk assessment has been produced as a supporting document for a planning application and takes the form of a desk study.
- 1.2 Currently the site comprises a concrete driveway and rear garden associated with property No:17 Haslemere Gardens. The garden includes a garage outbuilding and a static mobile home/caravan. The proposal is to remove the static mobile home and demolition of the outbuildings and to erect a single storey dwelling with amenity areas and parking. A location plan is provided in **Appendix A**. Proposed site plans are given in **Appendix C**.
- 1.3 This report considers the flood risk to the proposed development and the impact that the development will have in relation to flooding of adjacent areas and watercourses. It also considers any limits relating to flooding that are likely to be imposed to allow the development to be undertaken and recommends Sustainable Urban Drainage systems (SUDS) to control surface water runoff.
- 1.4 This report takes into account the requirements of NPPF and local policies and is based on information received from the Environment Agency web site and Southern Water.
- 1.5 Local planning policy is included within the Havant Borough Council Local Plan (Core Strategy) dated March 2011. Policy CS15 covers Flood and Coastal Erosion Risk and mentions that development will only be permitted where 1) It meets the sequential and exception test 2) The site is located in a low hazard area as defined in the Strategic Flood Risk Assessment 3) The development will be safe without increasing flood risk elsewhere 4) The scheme incorporates flood protection, resilience and resistance measures 5) Appropriate flood warning and evacuation plans are in place 6) New site drainage systems are designed taking into account of events which exceed the normal design standard. See **Appendix M**.
- 1.6 This report is for the private and confidential use of the client and its agents and may not be copied in whole or in part without the written permission of Scott White and Hookins LLP.

2.0 Existing Site Conditions

- 2.1 The site is located at land the rear of 17 Haslemere Gardens, Hayling Island, PO11 9SD, centred on grid reference SZ 74524 98626, and is approximately 230m² ha in size (excluding existing drive). A location plan is given in **Appendix A**.
- 2.2 The site currently comprises a concrete driveway and rear garden associated with property No:17 Haslemere Gardens. The garden includes a garage outbuilding and a static mobile home/caravan. The site is surrounded by residential land use in all directions. An aerial view of the site is given in **Appendix A**.
- 2.3 A topographic survey of the site was carried out by Marvin and Partners Limited dated September 2021 (see drawing in **Appendix B**). The site generally falls to the east. Site levels range from 2.76m AOD at eastern edge of the existing driveway to 3.33m AOD at the north-west corner of the site near the location of the existing caravan.
- 2.4 It is assumed the site has no formal drainage infrastructure and drains into the ground or via overland flow towards Haslemere Gardens. The topographic survey shows there several foul manholes at the front and rear of Property No: 17 which appear to discharge to a public foul sewer in Haslemere Gardens as discussed in paragraph below.
- 2.4 Southern Water asset plans in **Appendix E** show no surface water sewers within the site or adjacent to the site. There nearest surface water sewer is located within Bosmere Road south-west of the site. There is a 150mm foul sewer which runs southwards in Haslemere Gardens.
- 2.5 The British Geological Survey records for the site indicate that the site is likely to be underlain by River Terrace Deposits comprising Sand, Silt and Clay. With respect to bedrock the site appears to be on the boundary between the Portsmouth Sand Member and Whitecliff Sand Member (undifferentiated) to the South and the London Clay Formation to comprising Clay, Silt and Sand to the north. See **Appendix H**. Based on the current information available infiltration drainage is likely to be suitable at the site. However, this assumption, will need to be confirmed through intrusive ground investigations.
- 2.6 The site in underlain by a secondary A bedrock aquifer and is not within Source Protection zone.

3.0 Potential Flood Risk Affecting the site

3.1 Fluvial Flooding

- 3.2.1** The nearest EA Main River is approximately 410m north of the site beyond the coastal defences which align the north edge of Hayling Island. It is therefore considered that the risk of fluvial flooding alone is negligible.

3.2 Tidal Flooding

- 3.2.1** Flood plain mapping available online provided by the Environment Agency (EA) indicates that the site lies in Flood Zone 3 due to the site's proximity to the sea. Flood Zone 3 is defined as comprising 'land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 greater annual probability of flooding from the sea (>0.5%) in any year. On this basis the site is considered to have a high risk of flooding from the sea. See extract of flood maps in **Appendix D**.

- 3.2.2** The Flood Map for Planning indicates the site benefits from defences. The EA were consulted with regards to flood data they possess for the site. There are defences north of the site, some of these which have a standard of protection of 1 in 200 years which will reduce the risk of flooding (see EA information in **Appendix G**). The site is there located in Flood Zone 3 'defended'.

- 3.2.3** They provided eleven flood levels within the site should a flood event occur. There are four flood levels within the proposed dwelling area. The maximum flood level within the proposed dwelling area is 3.37m AOD for the 0.5% annual probability tidal flood event and 3.54m AOD for the 0.1% annual probability tidal flood event.

- 3.2.4** No climate change flood levels were provided. The revised NPPF (2021) requires developers to consider flood risk in the future considering the effects of climate change. Climate change is anticipated to result in sea level rise. The EA have issued allowances for Sea Level rise, varying according to which part of the UK. Allowing for a 100 year lifetime for the development and taking into account the recommended sea level allowance for each epoch, a 1.065m sea level rise should be allowed for resulting in a flood level of 4.44m AOD for the 0.5% annual probability flood event including climate change (see calculations in **Appendix I**). The extreme 0.1% annual probability flood level is calculated to be 4.61m AOD.

- 3.2.5** The Partnership for Urban South Hampshire Strategic Flood Risk Assessment (SFRA) shows indicative hazard mapping of the areas at risk of fluvial and tidal flooding including an assessment of the flood hazard due to a breach (a combination of flood depth and flow velocity). The mapping indicates a large proportion of the site has a low hazard due to breach with a small proportion of the site having a moderate flood hazard.

3.3 Surface Water Flooding

- 3.3.1 The EA Surface Water Flood Map indicates the site has a very low risk of surface water flooding (see mapping in **Appendix D**) with overland flow confined to Haslemere Gardens where levels are up to 0.25m lower than site levels.

3.4 Groundwater Flooding

- 3.4.1 The SFRA indicates no groundwater flood incidents have occurred at the site or on Hayling Island itself. Based on a BGS Borehole log at Sparkes Boat Yard Company (Borehole Ref: SZ79NW117 — HAM 0252) located north of the site no groundwater was encountered up to 6m below ground level. It is considered the risk of flooding from groundwater is low.

3.5 Reservoir Flooding

- 3.5.1 EA flood maps show the site is not at risk of flooding from a reservoir failure.

3.6 Sewer Flooding

- 3.6.1 The SFRA indicates that there are no Southern Water records of sewer flooding at the site (see maps in **Appendix J**).

4.0 Flood Mitigation and Outline Drainage Proposals

4.1 Flood Mitigation

Ground Floor Levels

- 4.1.1** Standard requirements for ground floor levels of new development are set out in BS8533:2011 'Assessing and Managing Flood Risk in New Development – Code of Practice'. This recommends floor levels are set a minimum of 300mm above the modelled 0.5% annual probability plus allowance for climate change flood level.
- 4.1.2** The 0.5% annual probability plus allowance for climate change flood level is calculated to be 4.4m AOD. Given the area of the proposed building is 3.00m AOD is not considered practical to set the finished floor level of the proposed building at 4.70m AOD (1.7m higher than existing level). A pragmatic approach is needed. The current 0.1% annual probability flood level is 3.54m AOD. It is proposed therefore that the Finished floor level is set 300mm above this level, i.e. 3.84m AOD.

Site Levels

- 4.1.3** The private access road to the side of the existing property (17 Haslemere Gardens) which leads to the new dwelling should be typically set at 3.54mAOD but will need to ramp down to suit the existing levels at the front of the site.

Flood Resistant and Resilient Measures

- 4.1.4** Due to the residual risk to the pavilion, flood resistant and resilient measures could be incorporated in the construction of the development in line with the current recommendations from the Defra/EA document 'Improving the Flood Performance of New Buildings – Flood Resilient Construction'.
- 4.1.5** It is recommended that flood resistant/resilient measures are incorporated up to the 0.5% annual probability climate change tidal flood level of 4.44m AOD.
- 4.1.6** Flood resistant measures aim to keep flood water out of the building by providing barriers and incorporating low permeability measures in the wall and floors. Such measures include demountable defences, water resistant wall rendering, the sealing of ground level vents (e.g. using Ventguard, Ventseal or SmartBrick) and anti-flood valves fitted to all drainage runs exiting the building. Typically, flood resistance measures are effective up to a maximum flood depth of approximately 500mm.
- 4.1.7** Flood resilient measures are incorporated where it is accepted that, in severe flood events, water may enter parts of the building so it is necessary to ensure the building will remain useable after the floodwater has receded and the area has been cleaned.

Therefore, the key issue is to incorporate materials that retain their structural integrity and have good drying and cleaning properties (e.g. the use of suitable tiling over areas, with water resilient grout). It is also recommended that services are secured and sockets etc. are located with a suitable freeboard above the floor level.

- 4.1.8** Actual measures can be discussed and agreed with Building Control Officers during detailed design

Floodplain compensation

- 4.1.9** Whilst the site is located within Flood Zone 3, the site is considered to benefit from the coastal flood defences and is considered to be tidal, therefore the requirement for compensatory floodplain storage is negated.

Safe Access and Egress

- 4.1.10** It is necessary to consider and incorporate safe access arrangements as part of the mitigation, to ensure the users/occupants of the development are safe in times of flooding. A safe 'dry' access route should be provided from the door of the property to an area/location wholly outside of the 0.5% annual probability plus an allowance for climate change extent. It is not available for this site as the 0.5% annual probability flood level is higher than the whole site and surrounding area. Occupants would not be able to safely reach an area of no flooding unless they walked through flood water. This is not considered acceptable and in the event of flooding this would place additional strain on the emergency services. A flood warning and evacuation (FWEP) plan has therefore been developed (see **Appendix K**). The plan effectively sets out the emergency measures to be followed in the event of flooding (e.g. provision of safe refuge areas, evacuation route offsite).

4.1.11 Designing for Exceedance

Exceedance flow routes for storm events in excess of the 1 in 100 years + 40% Climate change event will be channelled around the building and along the driveway, which mimics the existing natural flows across the site.

4.2 Drainage

- 4.2.1** Based on the drainage hierarchy stated in paragraph 2.3 of **Appendix M**, the preferred method for disposal of surface water from the new development is via infiltration drainage.
- 4.2.2** Geological data for the site indicates that the soil comprises Sand, Silt and Clay near the surface with either Sand or Clay bedrock beneath. The recorded geology suggests infiltration may be viable. An Intrusive Site Investigation will need to be carried out to confirm this assumption.

4.2.3 On the basis of the above the following drainage options are considered to be appropriate for this site:

Device	Description
Green roofs	Soft landscaping at roof level which slows surface water runoff.
Rain Gardens	Elements of landscaping designed to accommodate small areas of discharge close to source.
Infiltration devices & Soakaways	Attenuation of flows and allow water to percolate into the ground via natural infiltration. Forms can include chambers, cellular tanks and trenches.
Permeable surfaces	Storm water is allowed to infiltrate through the surface into a storage layer, from which it can either infiltrate into permeable soils or discharge to sewers.
Rainwater harvesting	Reduces the annual average rate of runoff from the site by reusing water for non-potable uses e.g. toilet flushing.
Filter drains & perforated pipes	Trenches filled with granular materials (which are designed to take flows from adjacent impermeable areas) that convey runoff while allowing infiltration.
Attenuation Underground	Oversized pipes or geo-cellular tanks designed to store water below ground level.
Proprietary Treatment Systems	Petrol interceptors, silt traps and similar devices used as part of an overall SUDS scheme to provide pollution control prior to discharge.

- Infiltration techniques should be considered as the preferred option for disposal of surface water from the proposed development. A conservative infiltration rate of 2l/s was used in the absence of infiltration testing data.
- Preliminary design of permeable paving indicates that this will provide a suitable method for disposal of surface water from the roof of the proposed dwelling and hardstanding areas. The subbase of the car parking area is proposed to be 0.3m deep and provides a total storage volume of approximately 8m³ and is sized to accommodate the 1 in 100 year storm including 40% allowance for climate change with no flooding. Permeable Paving is also proposed at the front of the existing property due to loss of private driveway to serve the new dwelling.

A proposed drainage layout drawing and associated calculations are enclosed in **Appendix F**.

4.2.4 Protection of groundwater from pollution is covered in Chapter 26 of CIRCA SuDS Manual C753. Due to the limited extent of the surface water catchment from the development i.e., rainwater from roofs and residential parking areas, we can utilise the "simple qualitative method" described in this chapter (cl. 26.7.1) where we may select

“SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index”, Table 26.2 & 26.3 CIRIA refers.

Pollution Hazard (Indices method)				
Area	Pollution Hazard	TSS	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Low traffic roads and parking	Low	0.5	0.4	0.4

Note – Please see CIRIA SUDS manual for full descriptions.

Pollution Mitigation (Indices method) for discharge to groundwater				
Area				
Component	TSS	Metals	Hydro-carbons	
Permeable pavement	0.7	0.6	0.7	

Note – Please see CIRIA SUDS manual for full descriptions.

- 4.2.5

Rainwater from roofs is considered have a very low risk pollution risk (Table 26.2 CIRIA). However, to prevent any potential sediment from impacting the storage structure, Sediment Traps should be provided on the downpipes’ outlet to the storage structure to prevent sedimentation, with rodding access provided either side for cleaning and maintenance.
- 4.2.6

Driveways and low traffic roads have a low risk of pollution. Permeable pavements offer sufficient pollution mitigation and are considered acceptable (Table 26.3 and 26.4 CIRIA).
- 4.2.7

To ensure drainage elements function correctly, maintenance of drainage should be covered by a suitable management company and subject to a regular maintenance regime. Maintenance of SuDS to be in accordance with CIRIA SuDS manual C753 where specific intervals are advised within the document as per element type. A summary of these are present in **Appendix L**.
- 4.2.8

Foul flow generated from the new dwelling is proposed to discharge to an existing foul sewer in Haslemere Gardens, subject to agreement with Southern Water.

5.0 Summary and Recommendations

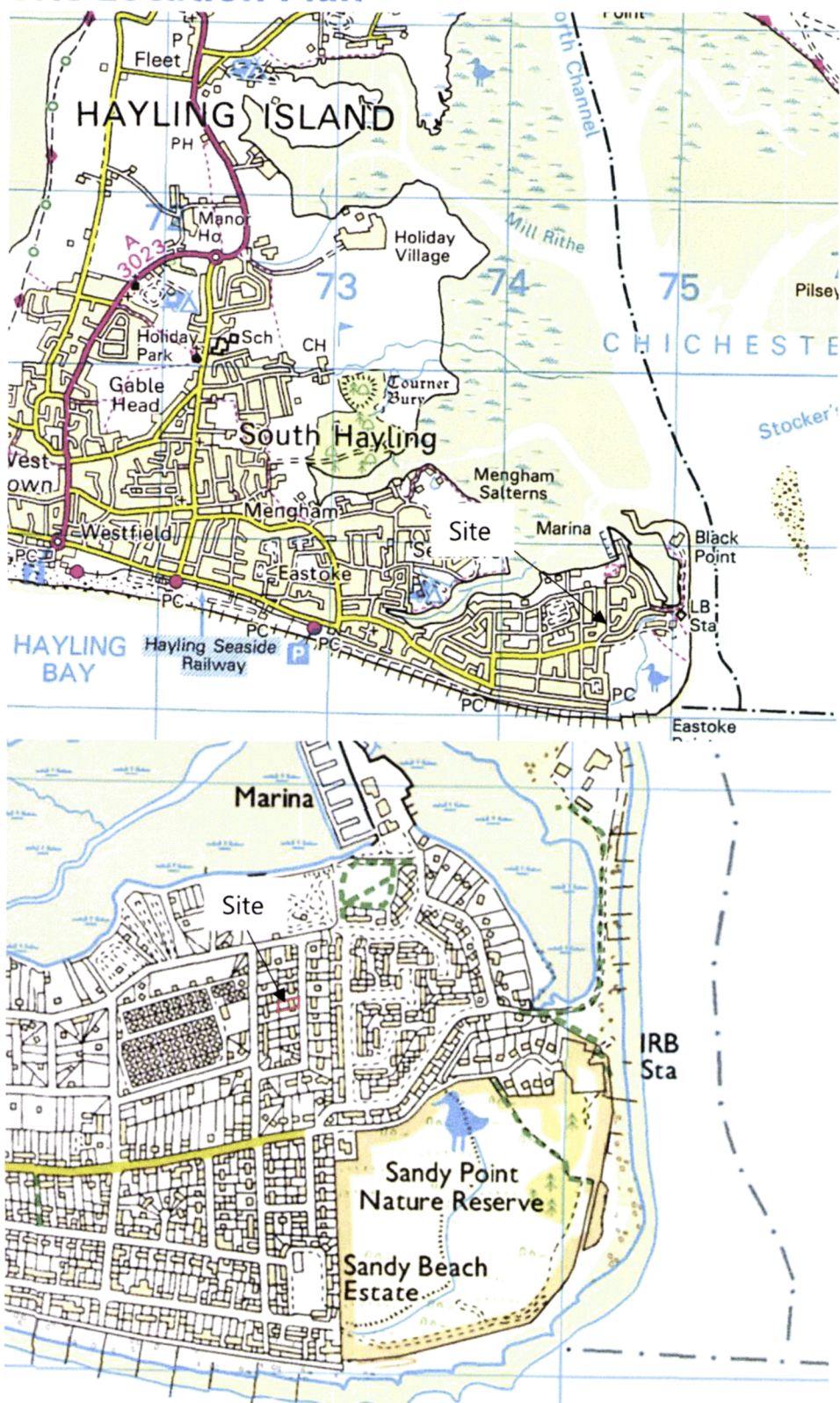
- 5.1** The proposed development lies within Flood Risk Zone 3 as indicated on the Environment Agency flood map due to the site's proximity to the sea. On this basis the site is considered to be at a high risk of tidal flooding, however does benefit from coastal flood defences.
- 5.2** The proposed mitigation strategy demonstrates the development is safe through a number of measures as follows:
- Ground floor levels set at 3.84m AOD, 300mm above the current 0.1% annual probability tidal flood level.
 - Flood Resistance/resilience measures up to the 0.5% annual probability tidal flood level plus climate change for the duration of the development of 4.44m AOD.
 - Production of a Flood Warning and Evacuation Plan with sets out the emergency measures to be followed in the event of flooding.
 - Exceedance flow routes for storm events in excess of the 1% annual probability flood event + 40% Climate change will be channelled around the building and along the existing driveway.
- 5.3** The surface water drainage strategy is infiltration into the ground via permeable paving, subject to infiltration testing results. It is proposed to discharge foul flow to the existing foul sewer in Haslemere Gardens, subject to agreement with Southern Water.
- 5.4** In conclusion, the future occupants and users of the proposed development will be safe from flooding and there will be no detrimental impact on third parties. The proposal complies with the National Planning Policy Framework (NPPF) and local planning policy with respect to flood risk and is an appropriate development at this location.

6.0 Appendices

- A. Site Location Plan
- B. Existing Topographic Survey
- C. Proposed Site Plan
- D. Flood Map Extract
- E. Existing Sewer Record Drawings
- F. Proposed Drainage Drawing and Calculations
- G. EA Records and Correspondence
- H. British Geological Survey Records
- I. Climate Change Calculation
- J. SFRA Extract
- K. Flood Warning and Evacuation Plan
- L. SW Drainage Maintenance Schedule
- M. Local Drainage Planning Policy applicable to the development

Appendix A

Site Location Plan



(c) Crown copyright. All rights reserved. Licence no. AL100018227



Aerial photograph of existing site

Appendix B

Existing Topographic Survey

Appendix C

Proposed Site Plan

Appendix D

Flood Map Extracts

River and Sea Flooding



Flood Map For Planning

Flood risk from rivers or the sea

Low Probability (Flood Zone 1) means that each year this area has a chance of flooding of less than 0.1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Medium Probability (Flood Zone 2) means that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

High Probability (Flood Zone 3) means that each year this area has a chance of flooding of greater than 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

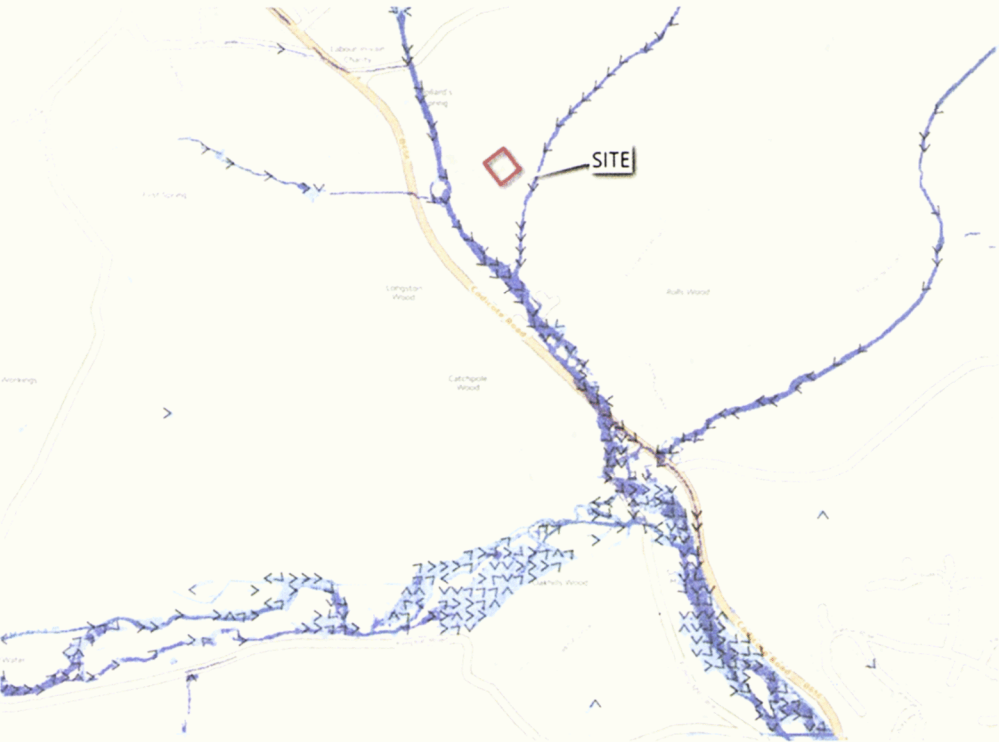
Surface Water Flooding



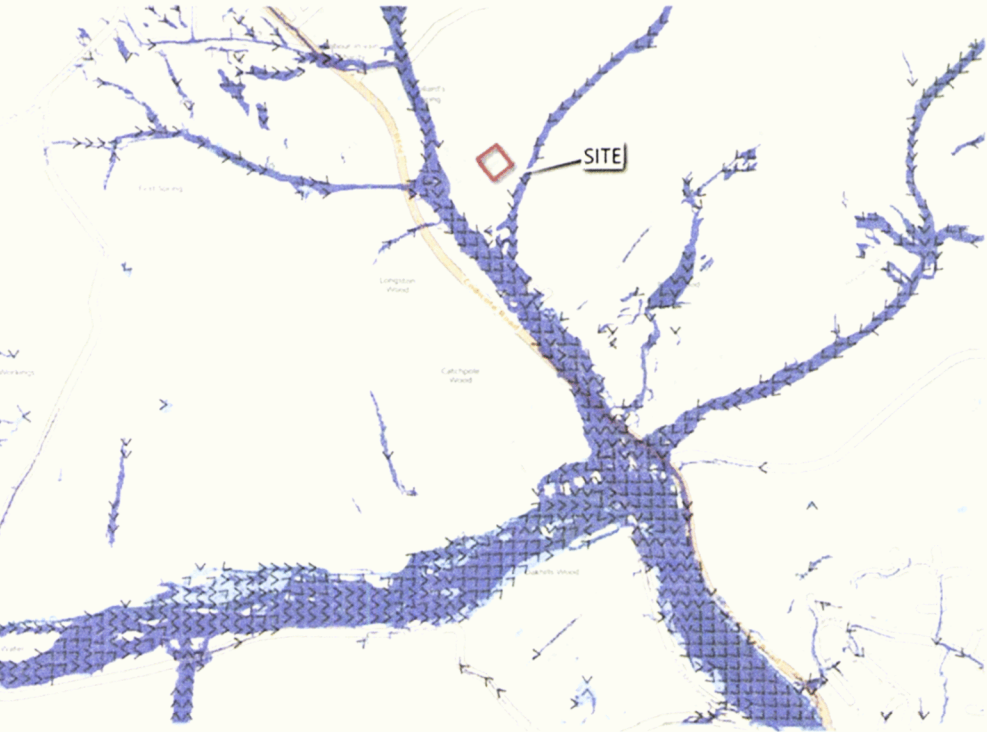
Flood Map – Surface Water (High Risk Depth)



Flood Map – Surface Water (Low Risk Depth)



Flood Map – Surface Water (High Risk Velocity)



Flood Map – Surface Water (Low Risk Velocity)

Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm

Flood velocity (metres/second)

Over 0.25 m/s Less than 0.25 m/s Direction of water flow

Flood risk from surface water

Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

High risk means that each year this area has a chance of flooding of greater than 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Appendix E

Existing Sewer Record Drawings