

FLOOD RISK ASSESSMENT

Proposed Residential & Commercial Development
Pilot House Site, Bembridge Harbour, Isle of Wight

Mr M. Meisel

NN1684R03-Rev01
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DOCUMENT CONTROL

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Figure 1 – Site location & Proposed Development (1 page)

Figure 2 – Proposed Evacuation Plan (1 page)

Appendix A – Environment Agency product Maps

1. INTRODUCTION

E3S Consulting Ltd (E3S) are pleased to present this Flood Risk Assessment (FRA) for the proposed application at Pilot House, Bembridge, Isle of Wight (The Site).

2. SCOPE OF WORK

The scope of work was to provide a flood risk assessment in relation to the proposed development. This report does not provide information to facilitate a sequential test assessment. Neither does it provide an exception test for the site. It is understood that the existing and proposed use of the site can be considered 'Water-Compatible', as such, and given the site classification within Flood zone 3, an exception test will not be required. This assertion is based on National Planning Policy Guidance (PPG).

This report does not consider the requirement for a flood defence consent. It is anticipated advice regarding the need for a consent will be sought from the environment agency if deemed necessary.

This report does not detail a drainage strategy for the proposed development. However, the developments drainage arrangements will mirror those of the adjacent proposed development (application reference number P/00260/18) consisting of foul services and surface run off being directed to mains sewer and roof run off directed to soakaways located on site. The strategy has been accepted for the adjacent development and is considered appropriate for this proposal.

3. METHODOLOGY

The following approach has been adopted to complete this assessment;

- Documentary review and desk-top study;
- Review existing and proposed development details as provided by others; and,
- Identify potential mitigation options, e.g. flood protection/resilience/ design where necessary.

4. SITE DETAILS

4.1 Site Description

A site visit was undertaken on the 11 September 2023 E3S.. Access to the site was gained from Embankment Road. The site covers an area of approximately 0.05ha and is situated to the west and east of 'Pilot House' which is a single-story dwelling bordering Embankment Road.

The site is divided by pilot house, the site to the west is predominantly open land utilised for boat and vehicle storage and parking associated with adjacent commercial activity. To the east of pilot house the site consists of an existing warehouse structure divided into multiple commercial units and an area of concrete hard stand currently utilised as parking. There are separate accesses to the eastern and western portions of the site both off Embankment Road.

Embankment road bounds the site to the north. To the east of the site is a boat yard, to the west is another area of vacant land. Low lying marshland and open water bounds the site to the south in the western portion of the site, this marshland is designated as a SSSI, SAC and RAMSAR site. The eastern portion of the site backs onto another commercial site, the land of the adjacent site is considerably lower than the subject site. It is understood that this adjacent site has received planning permission for development comparable to that proposed for the subject site (application reference number P/00260/18).

The western portion of the site is relatively level however a steep slope exists at the rear of the site dropping to the marsh land to the south. Paddock dumped clayey fill is located in patches on the site, an access track also transects the site forming an access road to the lower level commercial site to the east (to the rear of the eastern section of the subject site). The adjacent site levels are approximately 2-3m lower than the subject site.

The eastern portion of the site consist of an existing warehouse split into multiple units and a concrete hard stand. The existing units and are in a poor state of repair and generally constructed of steel/ wood frame and metal/ wood or cement fibre cladding. The units appear to have been utilised for various purposes including a car mechanics workshop and art gallery. Site photographs are presented in **Figure 2** of this document.

4.2 Topography

The site is situated within 20m of Bembridge harbour to the north and Brading marshes to the south. The site is situated on the edge of the Eastern Yar Floodplain with ground elevations as detailed on drawings supplied by the architect indicate levels ranging from approximately 3.20mAOD to 4.4mAOD.

4.3 Geology

The site is noted as being underlain by historic dredge fill material forming the embankment overlying superficial deposits associated with a marine setting (sandy organic soils) with Bembridge marls forming the recorded bedrock geology.

4.1 Hydrology

The site backs on to the river Yar and associated marsh land.

4.2 Proposed Development

It is understood that the existing buildings on site will be demolished and replaced with 20 new small commercial units and a toilet blocks, hard standings will be created of a mix of permeable construction and concrete bunded hardstand for drainage control.

As previously mentioned, it is understood that given the existing and proposed use of the site, the site will be considered as 'Water-Compatible' as it falls under the *Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location* category.

The finished floor level of the proposed units will be constructed at 4.4mAOD, comparable to that of the existing buildings and several meters higher than the already approved marine workshop buildings located immediately to the south east of the site.

5. POTENTIAL SOURCES OF FLOODING

5.1 Flood Risk

The environment Agency (EA) have provided product information for the site created on the 26 July 2018 and provided to EEES on 3 August 2018. The summary maps for the site are included within **Appendix A** of this report. The EA product information highlights that the western portion of the site is not located within a flood zone, the eastern portion of the site is highlighted as Flood zone 2.

The risk to the southern portion of the site is predominantly tidal from the Eastern Yar River which discharges into the Solent at Bembridge. The eastern Yar drains a total area of 88km² and is 20km long.

The site is located adjacent to the existing Bembridge embankment flood defence. The defence is a structure that prevents tidal waters from entering the Eastern Yar River and is considered the most important flood defence structure associated with the river catchment. It is considered that the defence has a 1 in 25 chance of being over topped in any year. The environment agency states that the approved strategy option for the embankment is to 'sustain and hold the line', flood defence planning includes the maintenance of the embankment to sustain the current level of defence offered for the next 100 years. This will include raising the sea defence in line with sea level rise predictions, likely including the provision of a sea wall. The sea wall is likely to be positioned on the sea ward side of the embankment road.

Whilst the EA have no record of flooding on site, flooding has occurred in the surrounding area in the past. Most notably from the eastern Yar river in 1974.

Modelled flood levels for the 0.5% (1:200) and the 0.1% (1:1000) annual exceedance probabilities relevant to the site are provided in the table below. These levels have been taken from the Isle of Wight Coastal Modelling that was carried out by JAB Consulting in 2015.

Table 1: Modelled Flood Levels as Provided by the EA

Year	Tide Level (mAOD*)
	0.1% annual exceedance probability/1 in 1000 Year (Flood Zone 2)
2015	1.58
2070	1.59
2115	3.73

* Levels in metres above Ordnance Datum Newlyn.

5.2 Groundwater

Groundwater flooding occurs as a result of water rising from the underlying strata or water flowing from below ground springs and can be caused by increased rainfall or alterations to the groundwater regime within the surrounding area (development of adjacent sites, blocking of drainage channel etc). This situation can be worse in low lying areas where the groundwater level is relatively shallow. Given the proximity of the site to the wetland habitat to its south, and the anticipated ground conditions beneath the site, it is likely that the groundwater regime is dictated by the level of standing water within the wet lands, it is considered that the ground water level will be approximately 3.0 meters below existing ground level, however further investigation work will be required to confirm this. No information has been provided to suggest that the site has been subject to groundwater flooding.

5.3 Pluvial (surface Water)

Pluvial flooding can occur when rain water does not drain away through the normal drainage systems or soak into the ground. Sewer blockage or over loading can also cause flooding. The EA Surface water flood map suggests that the site lies in close proximity to areas of a "Very low" risk of flooding from surface water. Whilst no existing surface water drainage strategy exists, the proposed development in the western portion of the site will increase the volume of impermeable surfacing

primarily through the addition of the new units and roof structures. As the existing building and concrete hardstand within the eastern portion of the site will be removed, it is considered that the eastern portion of the site will be subject to a marginally reduced volume of impermeable surfacing. The proposed development will need to accommodate any additional run off rates over above those currently created.

No information has been provided to suggest that the site is susceptible to sewer surcharge flooding. The proposed development includes the addition of a new toilet block. Given the sites location and ecological sensitivity, it is unlikely a permit to discharge foul water through a septic or treatment plant arrangement will be permitted, therefore the new ablutions will be connected to mains sewer.

5.4 Climate Change

Current policy, dictated by NPPF, is that climate allowances should be made based on climate change projections and different scenarios of carbon dioxide (CO₂) emissions to the atmosphere. The NPPF presents a range of climate change allowances for different locations and epochs, or periods of time, over the next century.

Given the site usage, it is considered appropriate that the climate change allowance should be taken from the 2080's epoch, i.e. 2070 to 2115, it is further considered appropriate that the climate change allowance should be taken from the central exceedance risk. Accordingly, a 35% climate change allowance has been used to inform flow estimation.

Applying the 35% climate change allowance, a peak 100 year return period storm water runoff rate plus climate change (100yr RP + CC) of 7.32l/s was determined for the application site.

6. FLOOD MITIGATION MEASURES

Flood mitigation measures will be required for the 'water compatible' commercial units. It is important to note that no accommodation to allow over-night habitation is included within the proposed development.

The measures detailed below will reduce the overall local potential risks associated with flooding when compared to existing site arrangements. Based on the vulnerability category of the existing and proposed development, the mitigation measures will include the following;

6.1 Flood Plan

The establishment of a flood plan will aid in the protection of life and property. The plan will include the following;

- Methods of receiving flood warnings;
- A list of important contact numbers;
- Storage protocols for equipment and belongings that should be moved in the event of a potential flood;
- How to turn off gas, electricity and water supplies;
- Communal storage areas for chemicals and hazardous substances located above 3.73mOD, most likely on the higher ground to the north and west of the site or sufficiently elevated to meet the minimum height requirement;
- Preparation of a flood kit of essential items and safety equipment; and,
- Inclusion of safe evacuation route plan and muster locations.

6.2 Flood Warnings

To conform to EA standing advice the development will implement a flood warning and evacuation plan post development. This will include subscribing to the EA's flood warning service.

6.3 Safe Escape Route Plan

Safe escape route is provided within Figure 2 of this document and would consist of evacuation along the embankment flood defence towards Bembridge to reach high ground above the predicted flood water level.

6.4 Physical Design Measures

The proposed development will include the construction of units with a minimum finished floor level at 3.9mAOD. This is above the anticipated suitably modelled on-site 1:100 year (with climate change allowance) flood levels. The proposed development is also considered "water compatible", therefore it is not a requirement to utilise raised floor levels. However, there are resistant design measures that should be adopted due to the installation of infrastructure that will be at or marginally below the anticipated flood levels (services, base of floor slabs etc) including the following;

- Solid concrete ground floor slabs with a water proof membrane and waterproof screed;
- Closed cell foam insulation in wall cavities with water-pooof internal render;
- Electrical, gas and other services/ equipment run as high as possible and protected from water; and,
- Non-return valves and/ anti-syphon systems fitted on all drain and sewer outlets.

7. OFF SITE IMPACTS

The proposed development will not result in any adverse impacts to surrounding sites in terms of flood risk, indeed the implementation of the mitigation measures and a drainage strategy will be an improvement to current arrangements.

Ecologically sensitive receptors around the site will not be adversely impacted by the proposed development. The environmental assessments carried out as part of this planning application will also delineate any existing contamination on site, with appropriate remediation undertaken as required. This will ensure that sensitive nearby receptors are not adversely affected by any potential existing contamination, again providing a benefit to nearby sites and receptors.

8. POST DEVELOPMENT POLLUTION PREVENTION

As already detailed, the site will be subject to an environmental investigation that will identify any existing contamination prior to development, remediation will then be undertaken as required. Development design measures as proposed will be incorporated to reduce the risk of pollution. Administration measures as identified will be adopted during usage of the site to ensure that the risk of pollution to nearby receptors is kept to a minimum.

All the above measures are designed to improve the site, remove contamination and prevent future contamination. To ensure the measures work effectively, appropriate guidance for site users should be provided. This will take the form of the following;

- Chemical stores located above flood levels as detailed in section 9.1 should be clearly labelled and be of sufficient capacity to accommodate storage of new, in-use and waste chemicals prior to disposal, a product inventory should also be maintained by each business;

- Signage should be erected to identify the wetland habitat to the south of the site and provide information on sensitive receptors and species for the information of site users; and,
- Clearly labelled Spill kits should be provided for each unit along with signage providing guidance on usage of the kits and how to control and report a spill;

Signage should also be erected in relation to;

- Identification of delivery areas, transport routes and general storage areas;
- Capacity of any bunded areas;
- encourage good security and housekeeping, including cleaning and waste disposal; and,
- identify emergency equipment and procedures.

It is also recommended that the above measures form part of an Environmental Management System including an appropriate risk assessment and a pollution incident response plan tailored to the site and its individual tenants.

9. CONCLUSIONS

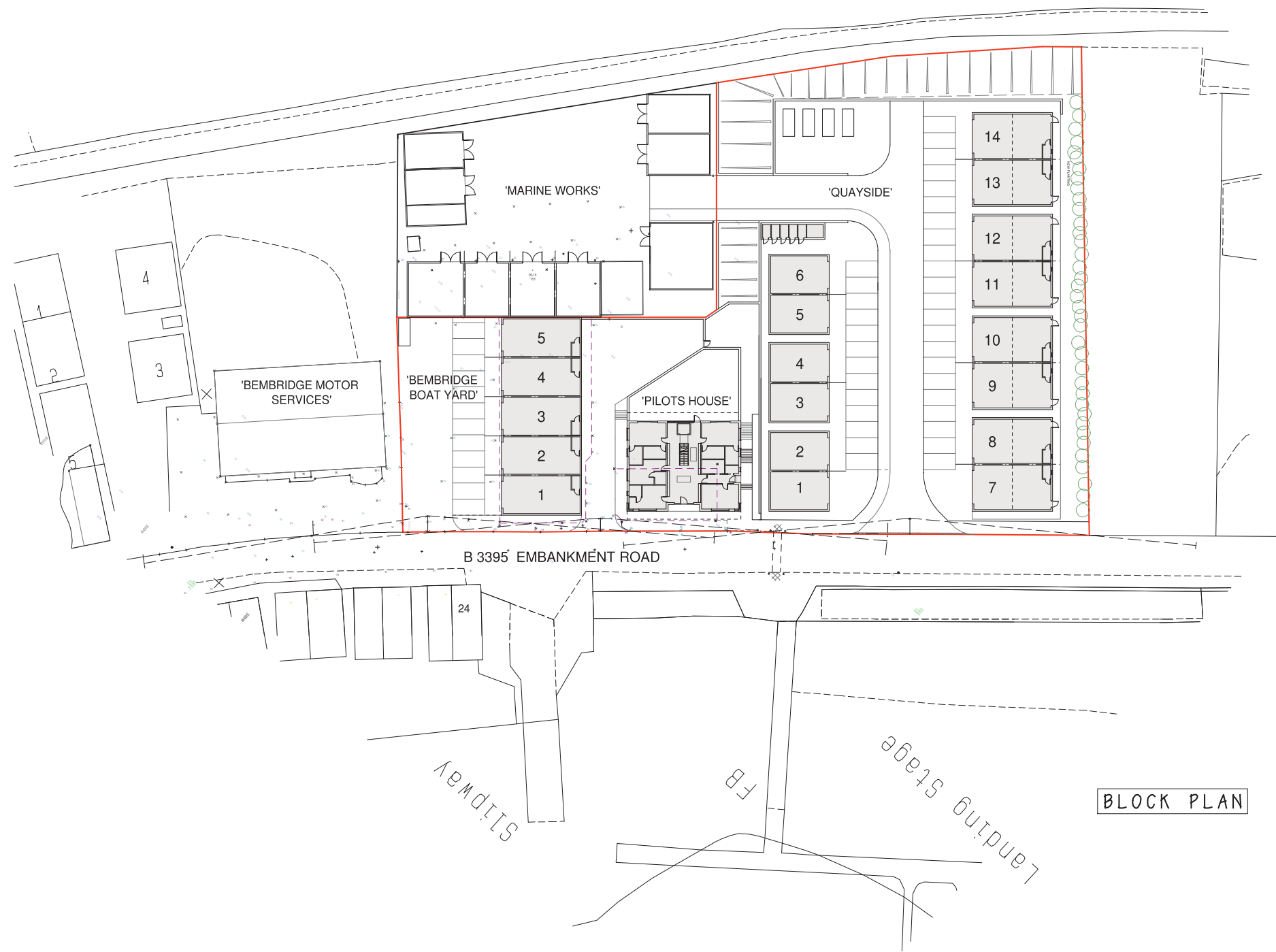
E3S was commissioned to prepare a Flood risk assessment for the proposed development. The findings of these works are summarised as follows:

- A review of existing flood risk data suggests that the eastern portion of the site is situated within a flood zone 2 area, the western portion of the site is not within an area identified as a flood zone. The site is adjacent to existing flood defences that are to be maintained and enhanced to continue to provide the current level of protection afforded;
- The proposed development is water compatible, in addition, the eastern portion of the site (area within a flood zone) is already an active commercial site with the proposed development considered a continuation of the existing site usage;
- The proposed mitigation measures and enhancement proposed in this document represent an improvement to the existing arrangements on site. The proposed flood prevention planning also reduces the existing potential impact of flooding on the site users and nearby operations within the flood zone.
- The environmental assessment being undertaken as part of this application will identify any existing on-site contamination and allow any required remediation to be undertaken as part of the development. This process will aim to reduce the risk posed to surrounding sensitive waterways and other ecological receptors.

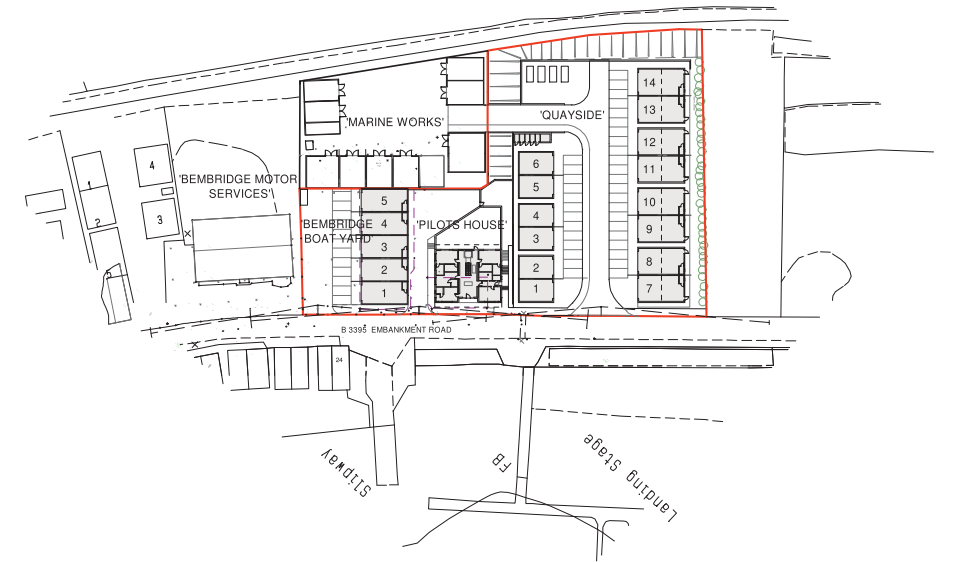
In summary, there is no increased flood risk to the proposed development from the external flood sources considered herein. Any existing contamination issues will be remediated as part of the development and the proposed strategy in relation to both flood risk and water quality issues arising from the proposed have been addressed.

10. CLOSURE

We hope this report meets with your approval, if you would like to discuss the information presented in this report then please do not hesitate to contact us.



BLOCK PLAN



LOCATION PLAN

— SITE BOUNDARY

Drawn	CB
Approved	JO
Date	14/09/2023
Scale	NTS
Original	A3



Client:	MR M MEISEL		
Project:	PROPOSED COMMERCIAL & RESIDENTIAL DEVELOPMENT, PILOT HOUSE, BEMBRIDGE HARBOUR, ISLE OF WIGHT		
Title:	SITE LOCATION PLAN		
Project no:	NN1684	Figure no:	FIGURE 1
			Rev: 1



KEY

 = EVACUATION ROUTE ALONG EXISTING FLOOD DEFENCE AND INTO BEMBRIDGE TO HIGHER GROUND

Drawn	CB
Approved	CB
Date	20/12/2018
Scale	NTS
Original	A3



Client:	CHESTER BUILDINGS LTD		
Project:	FLOOD RISK ASSESSMENT QUAYSIDE & BEMBRIDGE BOAT YARD REDEVELOPMENT		
Title:	FLOOD EVACUATION ROUTE		
Project no:	NN1071	Figure no:	FIGURE 2
			Rev: 1

APPENDIX A

Environment Agency Product Maps



Flood Map for Planning (Rivers and Sea) Centred on Embankment Road - Created 26 July 2018



Scale 1: 6,250



Flood Map for Planning (Rivers & Sea)

- Defences
- Flood Storage Areas
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

Flood Map Areas (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Defences Centred on Bembridge Boat Yard - Created 26 July 2018

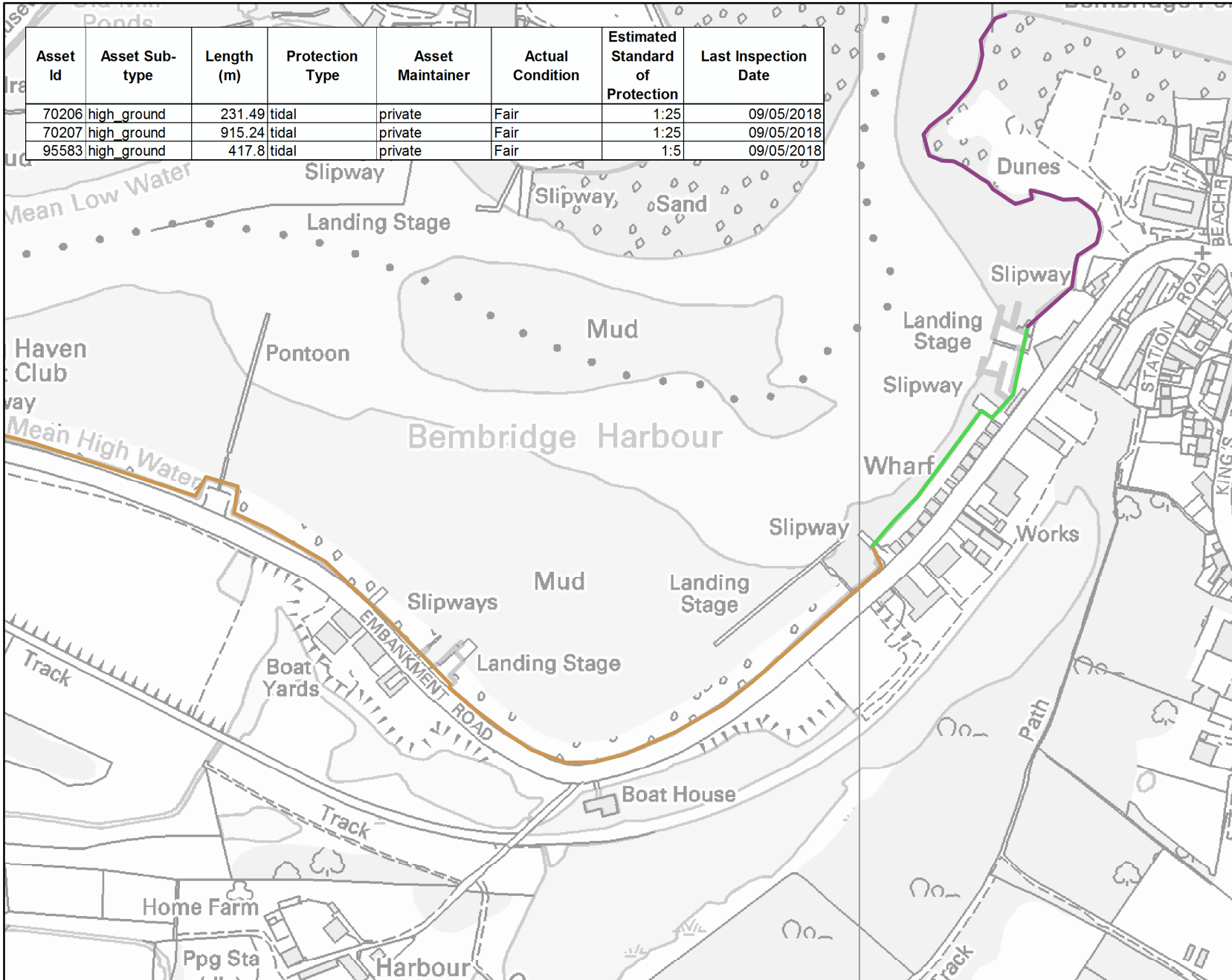
Asset Id	Asset Sub-type	Length (m)	Protection Type	Asset Maintainer	Actual Condition	Estimated Standard of Protection	Last Inspection Date
70206	high ground	231.49	tidal	private	Fair	1:25	09/05/2018
70207	high ground	915.24	tidal	private	Fair	1:25	09/05/2018
95583	high ground	417.8	tidal	private	Fair	1:5	09/05/2018



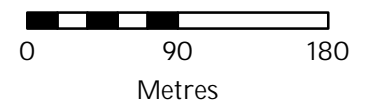
Legend

ASSET_ID

- 70206
- 70207
- 95583



1:4,528 *
*when printed at A4.



Risk of flooding from Surface Water Centred on Embankment Road - Created 26 July 2018



Scale 1:6,250



Likelihood of flooding from Surface Water

- High ($\geq 3.3\%$)
- Medium (3.3% - 1%)
- Low (1% - 0.1%)
- Very Low

Likelihood of flooding from Surface Water

- High:** Greater than or equal to 3.3% (1 in 30) chance in any given year
- Medium:** Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
- Low:** Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
- Very Low:** Less than 0.1% (1 in 1,000) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on our website.