

# Flood Risk Assessment & Drainage Strategy

Demolition of Unit 3, and Repairs to Seawall, Princess Yachts, Plymouth PL1 3QG



For: Nick Grech-Cini  
Ref: 34146-BPC-XX-XX-R-0001 FloodRiskAssessment  
Date: November 2023  
Job: 34146  
Rev: P01

## Document Status

Issue	Issue date	Status	Author	Checked	Approved
01	30/11/23	First Issue	KKT	MJH	MJH

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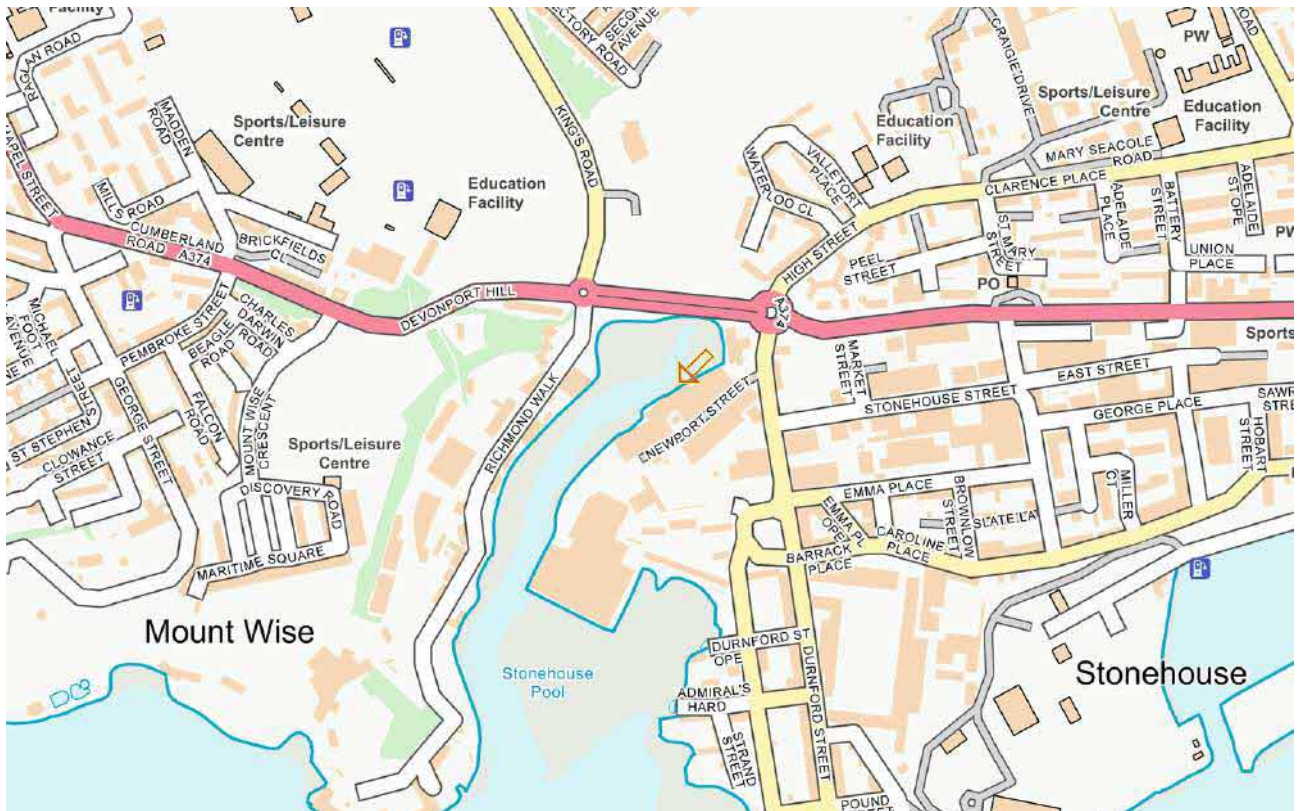
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# 1 Introduction and Brief

- 1.1 Bailey Partnership (Consultants) LLP has been appointed by Nick Grech-Cini of Princess Yachts to prepare a Flood Risk Assessment for the repair of a damaged section of existing seawall, and reinforced concrete framed pier at Princess Yachts, Newport Street, Plymouth.
- 1.2 The works include the enabling works comprising the demolition of Unit 3 which is a linking existing structure between other units, to gain access to the seawall which is otherwise only accessible from the water.
- 1.3 Plans showing the proposed works are provided in Appendix A and B respectively.
- 1.4 The development is situated within an area noted as at flood risk by the Environment Agency triggering the requirement of a flood risk assessment (Flood zone 3).
- 1.5 The site is situated right on the edge of the Plymouth Critical Drainage Area (CDA) which has been considered in this report.
- 1.6 This site-specific flood risk assessment has been prepared to support the outline planning application to Plymouth County Council, submitted by others.
- 1.7 This FRA reviews the potential flood risk to the proposed development and identifies whether there are any flooding or surface water management issues that may warrant further consideration or may affect the feasibility of the proposed works. This FRA includes a qualitative appraisal of existing flood risk and potential impacts the development will have on flood risk elsewhere, along with possible measures to reduce flood risk.
- 1.8 This document has been prepared for the exclusive use of Princess Yachts, unless agreed otherwise in writing by Bailey Partnership, no other party may use, make use of or rely on the contents of this document.

## 2 Site Description

- 2.1 The site is located south of the main road, Devonport Hill in Plymouth, adjacent to the Stonehouse Pool, on the River Tamar. A site location plan is provided in Figure 2-1 below.



Imagery from Streetmap.co.uk  
 Figure 2-1: Site Location Plan

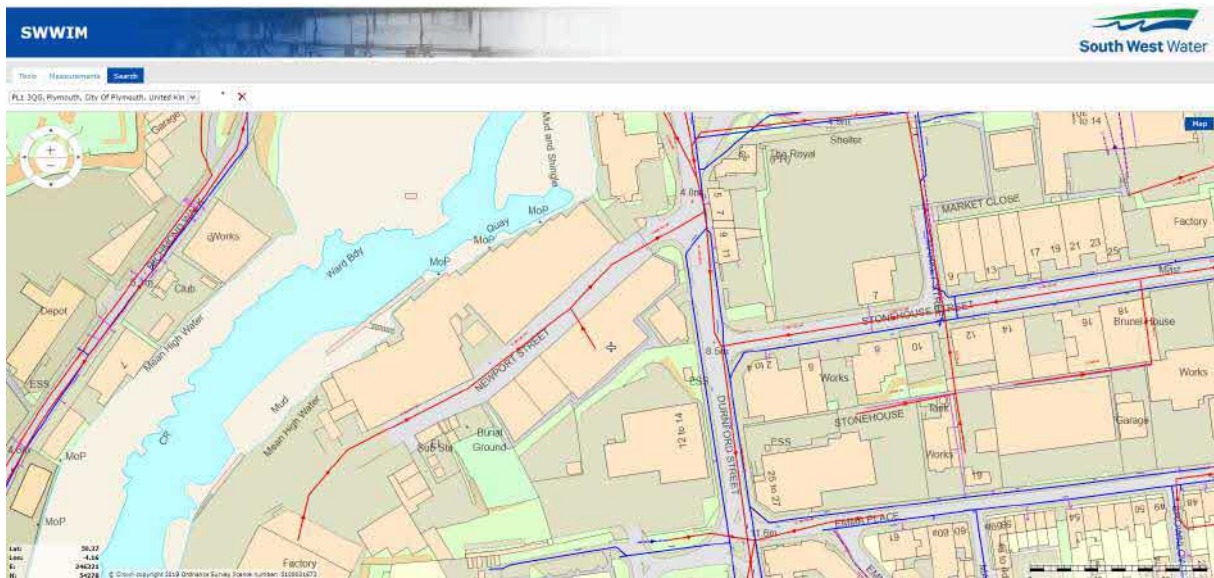
- 2.2 The area of works is situated within part of the larger Princess Yachts International Ltd Newport Street Site, which manufactures luxury yachts. The site itself comprises a section of the north-east sea wall in addition to a small section of Unit 3 which fronts both the Stonehouse Pool water's edge and Newport Street. The site is surrounded mostly by a mixture of commercial and industrial units.
- 2.3 Recent surveys have identified the reinforced concrete supporting substructure and slab under Unit 3 along with a section of masonry sea wall in a poor overall condition and in need of substantial repairs to extend the operational service life of the structures themselves and the building over. The seawall has partially collapsed and is currently being supported temporarily with sand filled dumpy bags placed in the water alongside the wall.
- 2.4 The existing seawall is approximately 3-4m in height and is subject to tidal fluctuations in water level.
- 2.5 A Ground investigation has been carried out by South West Geotechnical Report No.12033. The report summarises 'The investigation generally encountered made ground overlying cohesive and

granular Alluvium which in turn was underlain by Residual soil and the Plymouth Limestone Formation.'

- 2.6 Groundwater was noted as tidal and approximately level with the sea level in the adjacent estuary.
- 2.7 Contamination was not encountered, however the GI report did note that a hydrocarbon odour was present.

### 3 Existing Drainage

- 3.1 The site is located adjacent to the estuary on the River Tamar. It is therefore assumed that any surface water is discharged directly into the river at an unrestricted rate. Rainwater pipes can be seen discharging onto the walkway.
- 3.2 A review of South West Waters (SWW's) online mapping was carried out, shown in the figure below. This indicates an existing public combined sewer (225mm dia., vitrified clay) running directly beneath Newport Street. It is assumed this sewer serves the majority of the existing units in the area in terms of foul water with the surface water discharging directly into the estuary.



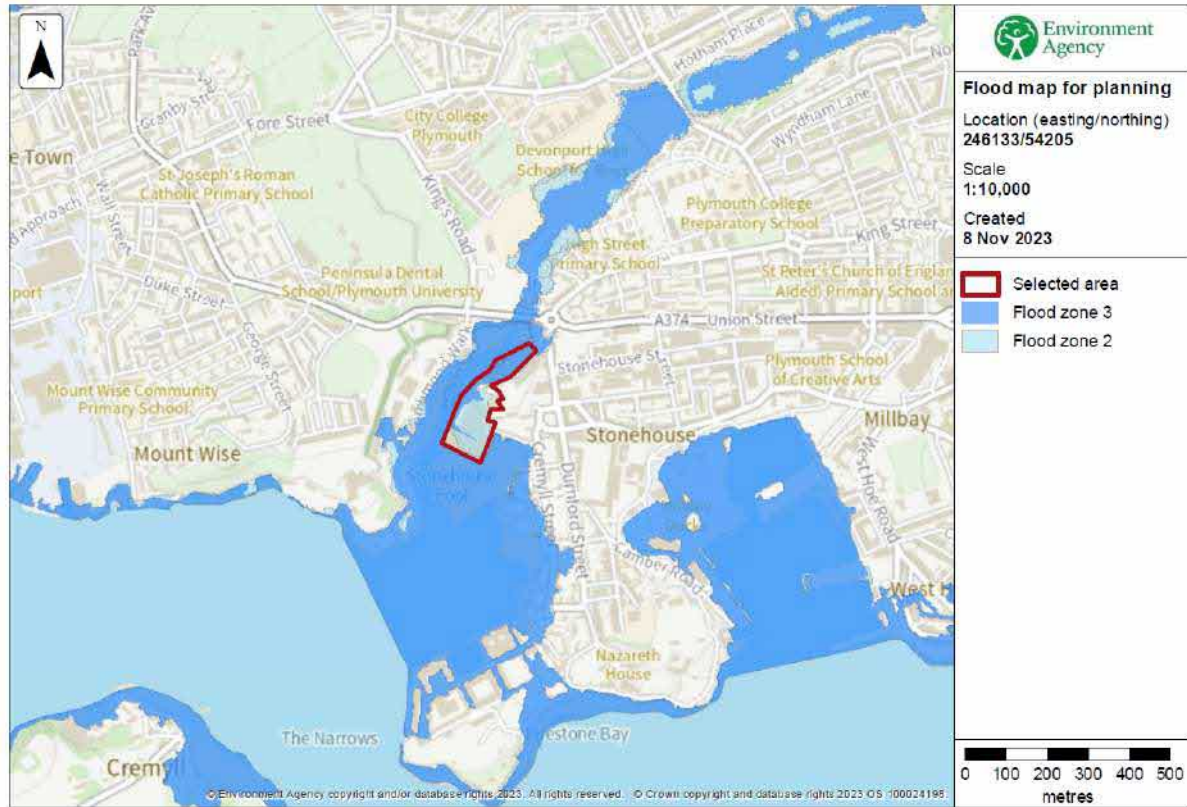
SWW Online Asset Mapping  
Figure 3-1 SWW Asset Mapping

## 4 Existing Risk of Flooding

- 4.1 The primary sources of information reviewed to assess the risk of flooding for the proposed sites were:
1. The Environment Agencies' online flood risk mapping: Providing a general indication on the area's long term flood risk from rivers, the sea, surface water and reservoirs. The EA designates the risk according return period, as follows:
    - a. Flood Zone 1: Locations in flood zone 1 have a low probability of flooding. This means in any year land has a less than 0.1% chance of flooding from rivers or the sea.
    - b. Flood Zone 2: Locations in flood zone 2 have a medium probability of flooding. This means in any year land has between a 1% and 0.1% chance of flooding from rivers and between a 0.5% and 0.1% chance of flooding from the sea.
    - c. Flood Zone 3: Locations in flood zone 3 have a high probability of flooding. This means in any year land has a 1% or more chance of flooding from rivers, or a 0.5% or more chance of flooding from the sea.
  2. Plymouth Council:
    - a. Plymouth Level 1 Strategic Flood Risk Assessments (SFRA)
    - b. The site falls on the cusp of the Plymouth Critical Drainage Area.
- 4.2 A summary of the EA's flood risk mapping and Product 4 information package has been included in the following sections of this report.



Fluvial and Tidal (River and Sea)

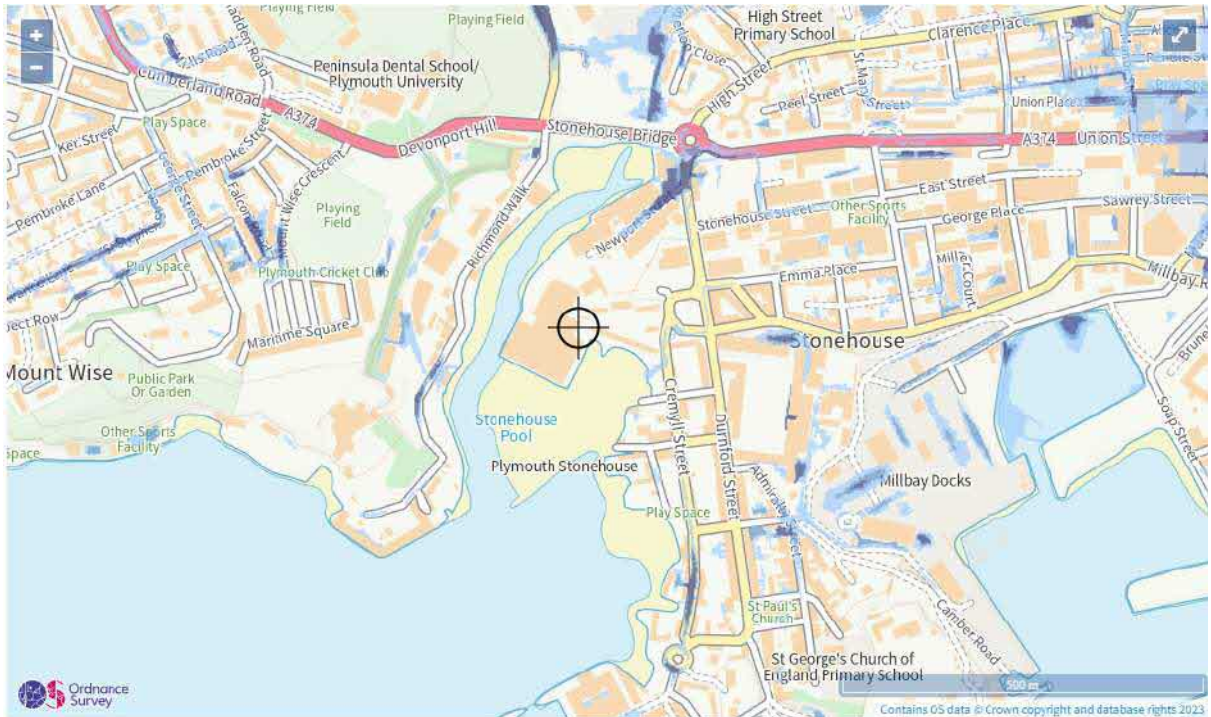


EA Product Four Information

Figure 4-1 EA Flood Mapping for River or the Sea

- 4.3 Figure 4-1 above shows the EA flood mapping extent for rivers and sea. The information shows that the extent of the site falls inside of the designated flood zone 2 and 3 area of Stonehouse Pool.

## Surface Water Flooding



### EA Online Flood Mapping

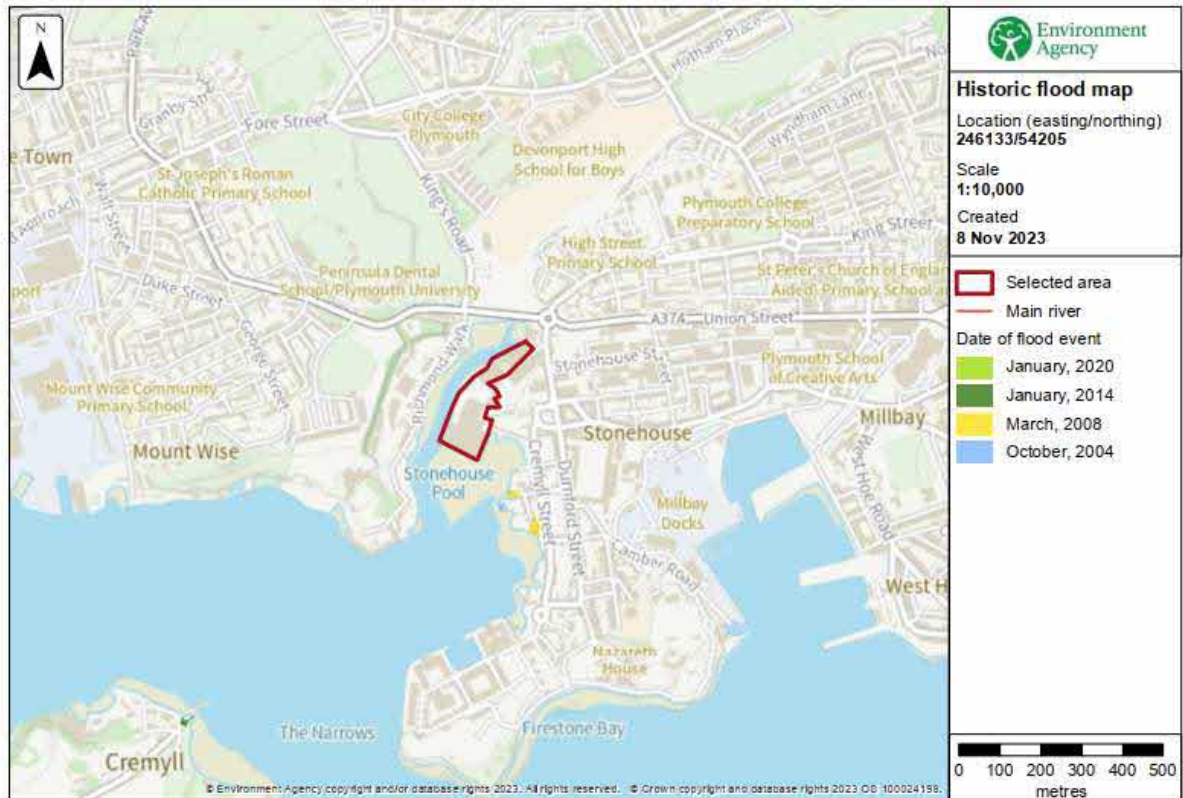
Figure 4-2 EA Flood Mapping for Surface Water

- 4.4 Figure 4-2 above shows the EA flood mapping extent for surface water. The information shows the site as a very low risk for flooding; a chance of flooding less than 0.1% each year. This takes into account the flood defences in the area.
- 4.5 Small pockets of flooding are noted on Newport Street running along the south east of the building. Flooding from surface water is however difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and security of flooding.

## Product 4 Modelled Flooding Data

- 4.6 The Environment Agency Product 4 Information package gives a range of modelled flood data in the close proximity to the site. This is summarised below and included in Appendix A of this report.

## Historic Flood Events



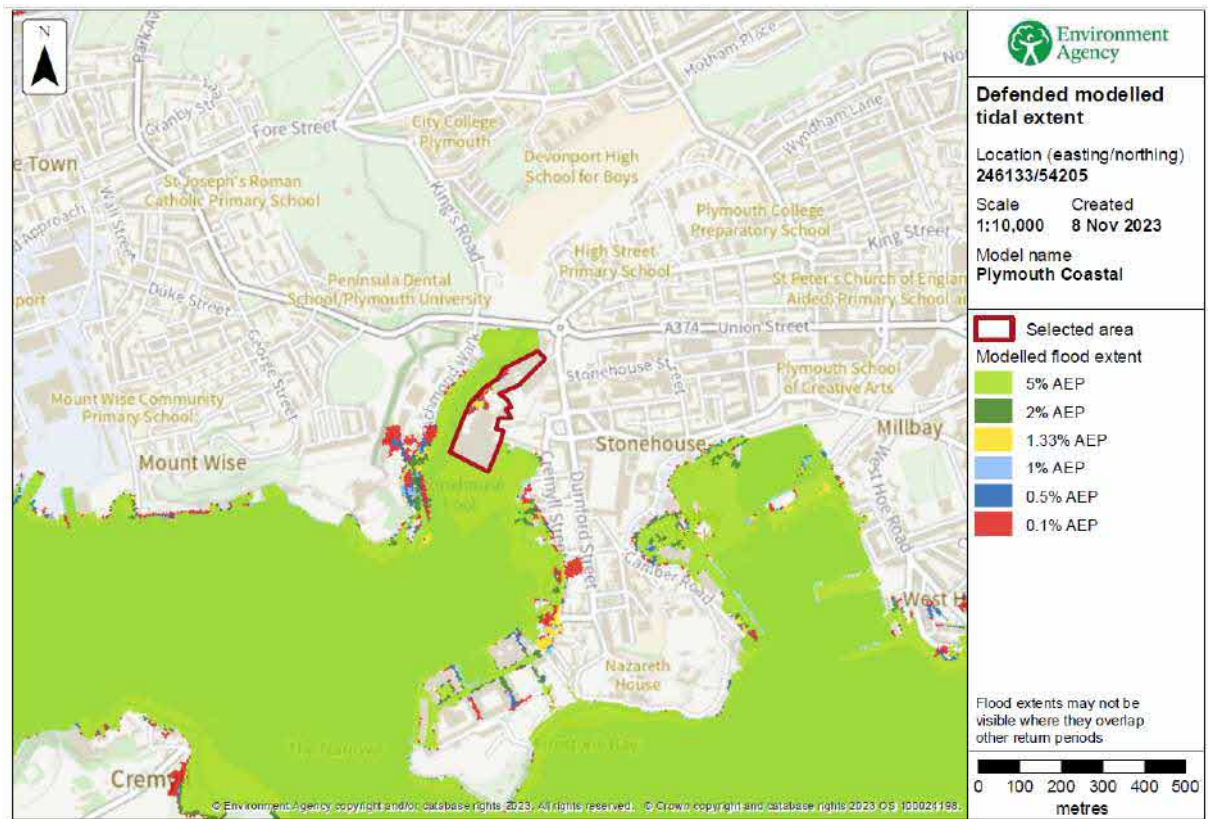
## EA Online Flood Mapping

Figure 4-3 EA Historic Flooding Events

- 4.7 Figure 4-3 above shows the EA flood mapping extent for historic flooding events. The information shows the site has no recorded history of flooding. The appended Product 4 information detailed historic flood events in the area noting none which affect the site.

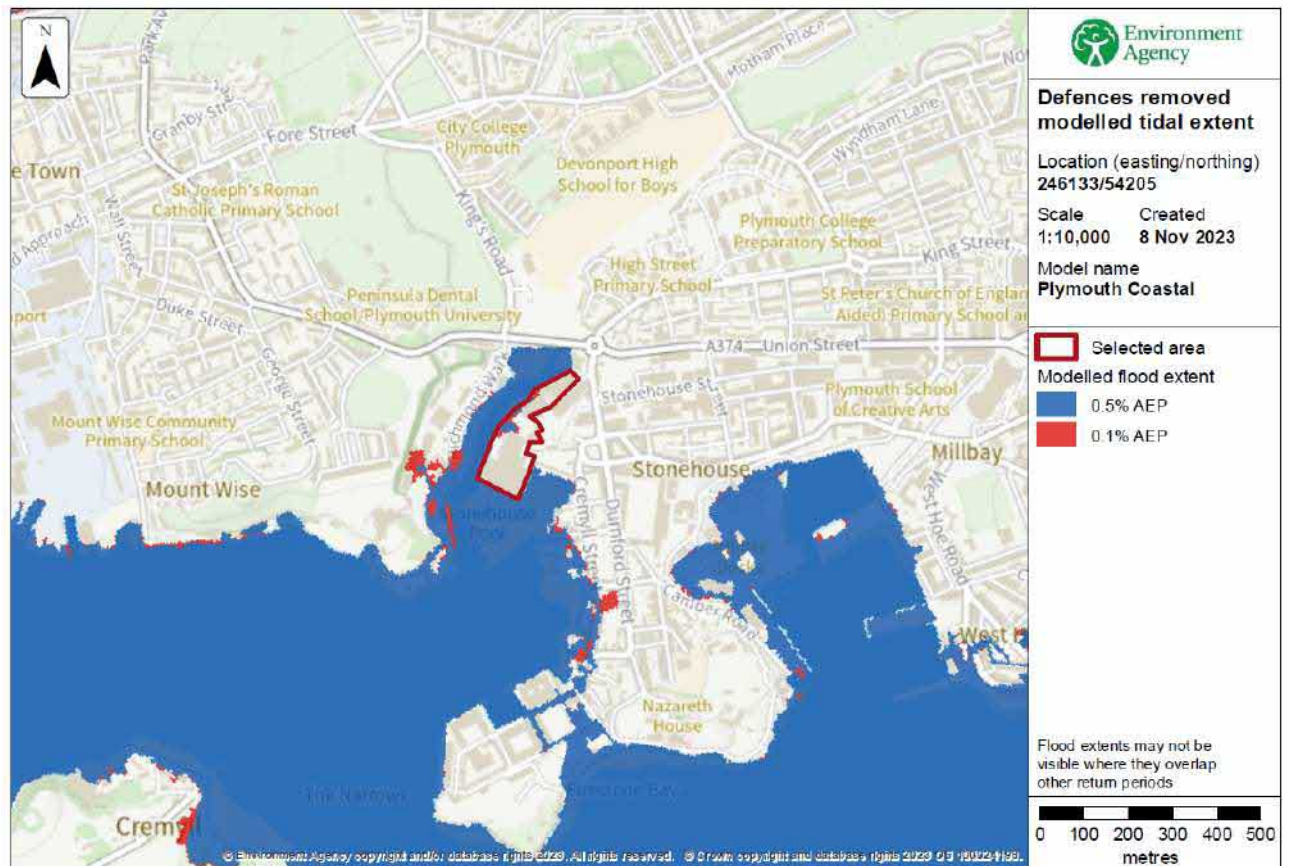
Product 4 Modelled Flooding Data

4.8 The Environment Agency Product 4 Information package gives a range of modelled flood data in the close proximity to the site. This is summarised below and included in Appendix A of this report.



EA Product 4  
Figure 4-4 Defended Modelled Tidal Extent

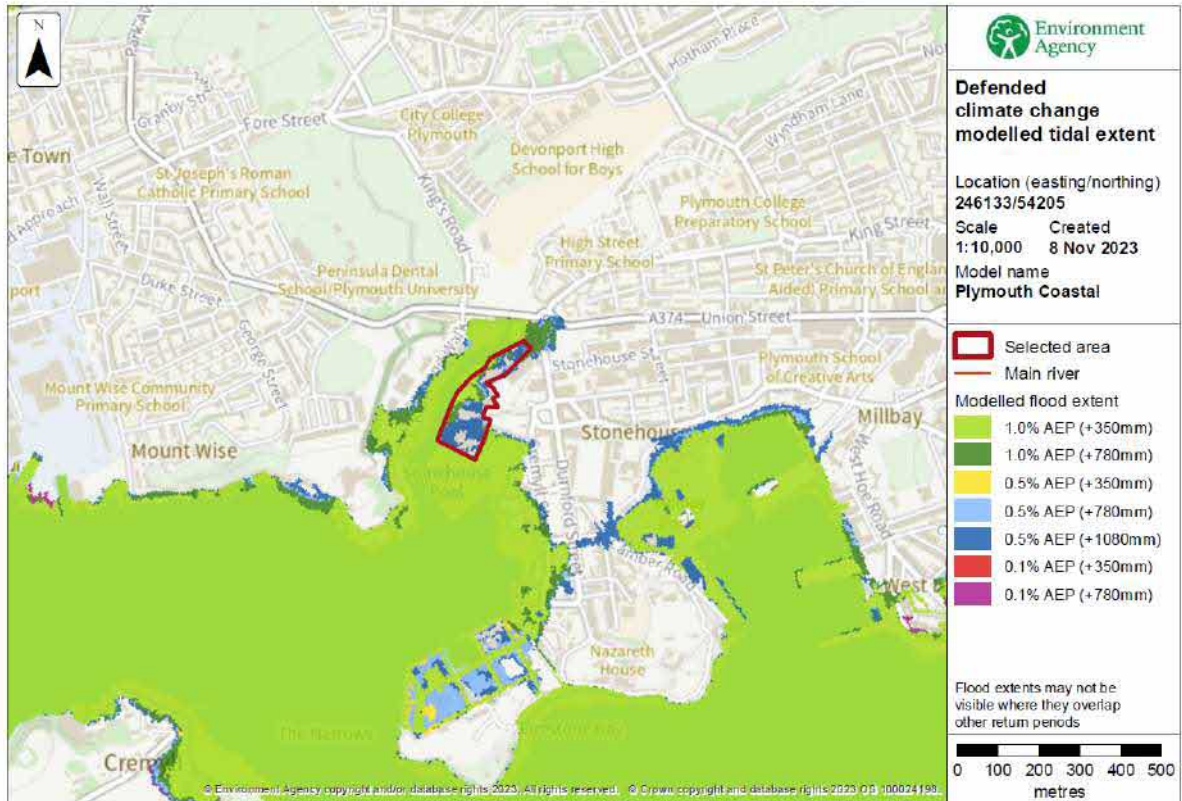
4.9 The above shows the site in relation to the Defended Modelled Tidal Extent, to the noted periods. The mapping shows the site is adjacent to the zone affected by 5% AEP and is affected by pockets of higher AEP%.



EA Product 4

Figure 4-5 Defences Removed Modelled Tidal Extent

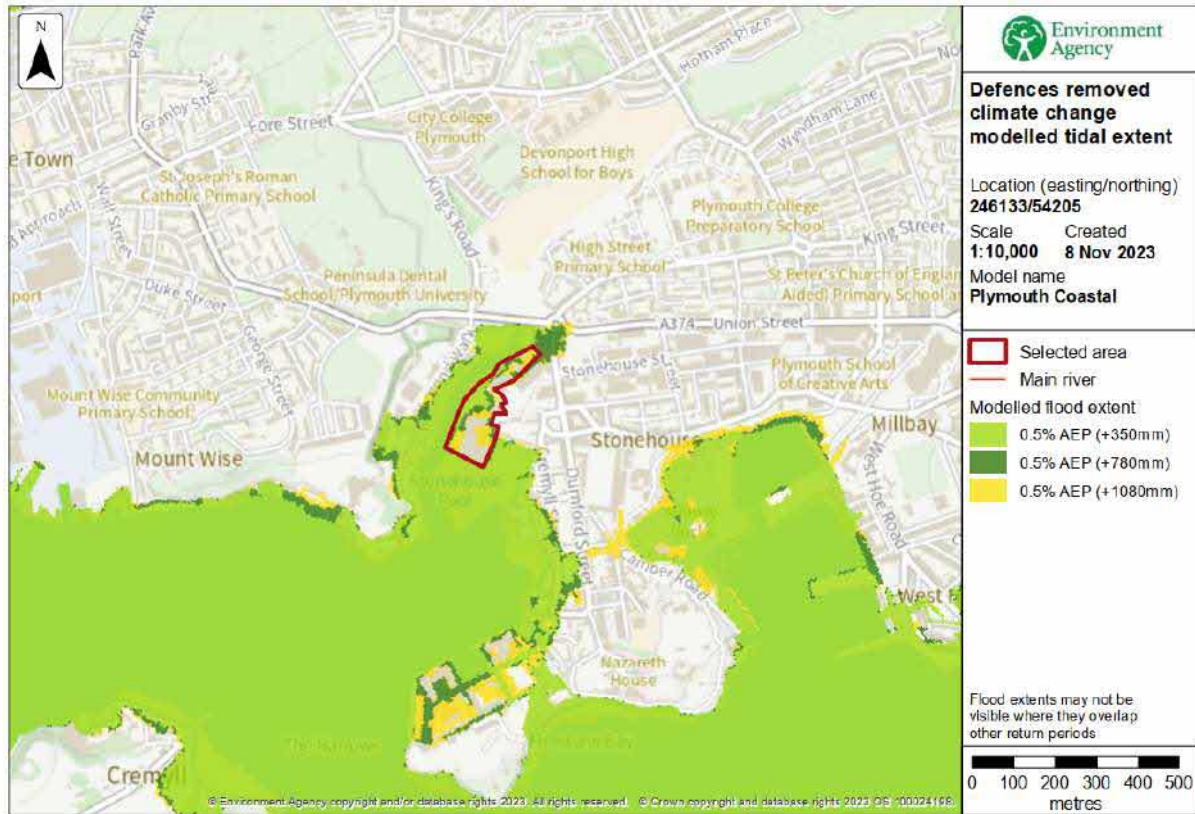
4.10 The above shows the site in relation to the Defences removed modelled tidal extent to the noted periods. Again, the site is bordered by a 0.5% AEP centred on the Estuary with pockets of the 0.1% AEP event.



EA Product 4

Figure 4-6 Defended Climate Change Modelled Tidal Extent

4.11 The above shows the site in relation to the Defended climate change modelled tidal event, to the noted periods. The information suggests that the site in the vicinity of the work would be subject to the 1.0% AEP at +350mm above existing ground level.



EA Product 4

Figure 4-7 Defences Removed Climate Change Modelled Tidal Extent

4.12 The above shows the site in relation to the Defences Removed climate change modelled tidal event, to the noted periods. The information suggests that the site in the vicinity of the works would be subject to the 0.5% AEP at +350mm existing ground level, again with pockets of the other noted periods.

## 5 Proposed Development

- 5.1 The proposal includes the demolition of a local structure to gain access to the existing damaged sea wall and RC pier structure to enable repairs to be undertaken. The ends of the remaining buildings will be made weather tight.
- 5.2 There is an existing level difference of upwards of 1.5m between the south east (front) and north west (rear) sides of the main building. This difference in height will be dealt with by way of a small retaining feature spanning between the buildings to remain.
- 5.3 The proposed area of works plan has been extracted in the figure 5-1 below.

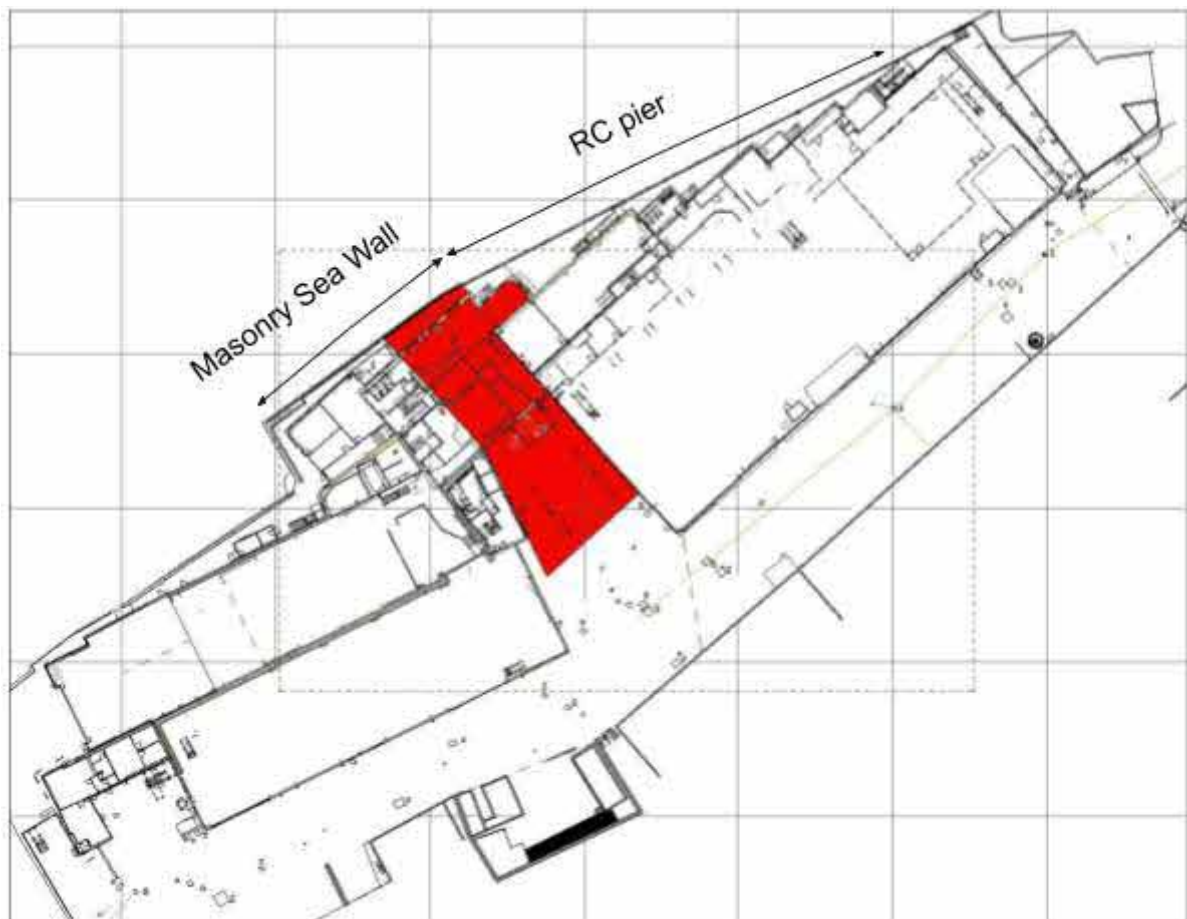


Figure 5-1 Proposed area of works Plan

- 5.4 The full site suite showing the proposals have been provided in Appendix B.



## Surface Water Disposal

- 5.5 The demolition of the building is not expected to alter the existing surface water network from its existing scenario. Guttering will be altered, but additional downpipes are not envisaged. Existing external hardstanding areas will remain as existing. New hardstanding will be positively drained and connected to the existing network with sufficient silt control measures provided in the form of silt traps and trapped gullies etc.

## Foul Water Disposal

- 5.6 There are no direct alterations to the existing foul network associated with these works, however works will proceed carefully to ensure any unknown foul drainage is identified and dealt with accordingly.

## Flood Exceedance

- 5.7 Flood exceedance routing will remain as existing, cross falling from the walkway into the Estuary.

## 6 Residual Risk of Flooding

- 6.1 Given the nature of the works the risk of flooding will not be adversely affected by the development, nor will the risk to adjacent or downstream development sites be increased . The residual risk of flooding is therefore deemed to mimic the pre-development scenario.

## 7 Safe Access and Egress

- 7.1 The nature of the development is considered as non-habitable. In the extreme event of flood water inundation as noted in the previously mentioned modelled mapping, safe refuge can be sought towards the higher ground on Newport Road.
- 7.2 During the site construction works, the nominated contractor should sign up to the EA flood warning service and regularly check the weather and tidal reports throughout the works.

## 8 Conclusion

- 8.1 EA mapping indicates the development to be at risk of flooding from fluvial/river but no risk from surface water.
- 8.2 The modelled flooding data to include climate change shows the site will likely be subjected to flood water inundation to a depth of 350mm above existing ground level for a 1%AEP event.
- 8.3 The proposed contractor and client should sign up for the EA flood warning service and maintain vigilant checks on the weather and tidal tendencies during the works.
- 8.4 The development proposals and surface water disposal principles outlined in this Flood Risk Assessment are not considered to create or increase the flood risk to the proposed, or adjacent sites.

## Appendix A

Existing Topographical Survey

Environment Agency Product 4 Information

Critical Drainage Area Document

# Flood risk assessment data

**Location of site:** 246133 / 54205 (shown as easting and northing coordinates)

**Document created on:** 8 November 2023

**This information was previously known as a product 4.**

**Customer reference number:** E7J48BGBDBEK

Map showing the location that flood risk assessment data has been requested for.



## **Flood map for planning (rivers and the sea)**

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change




This data is updated on a quarterly basis as better data becomes available.

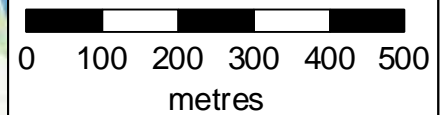
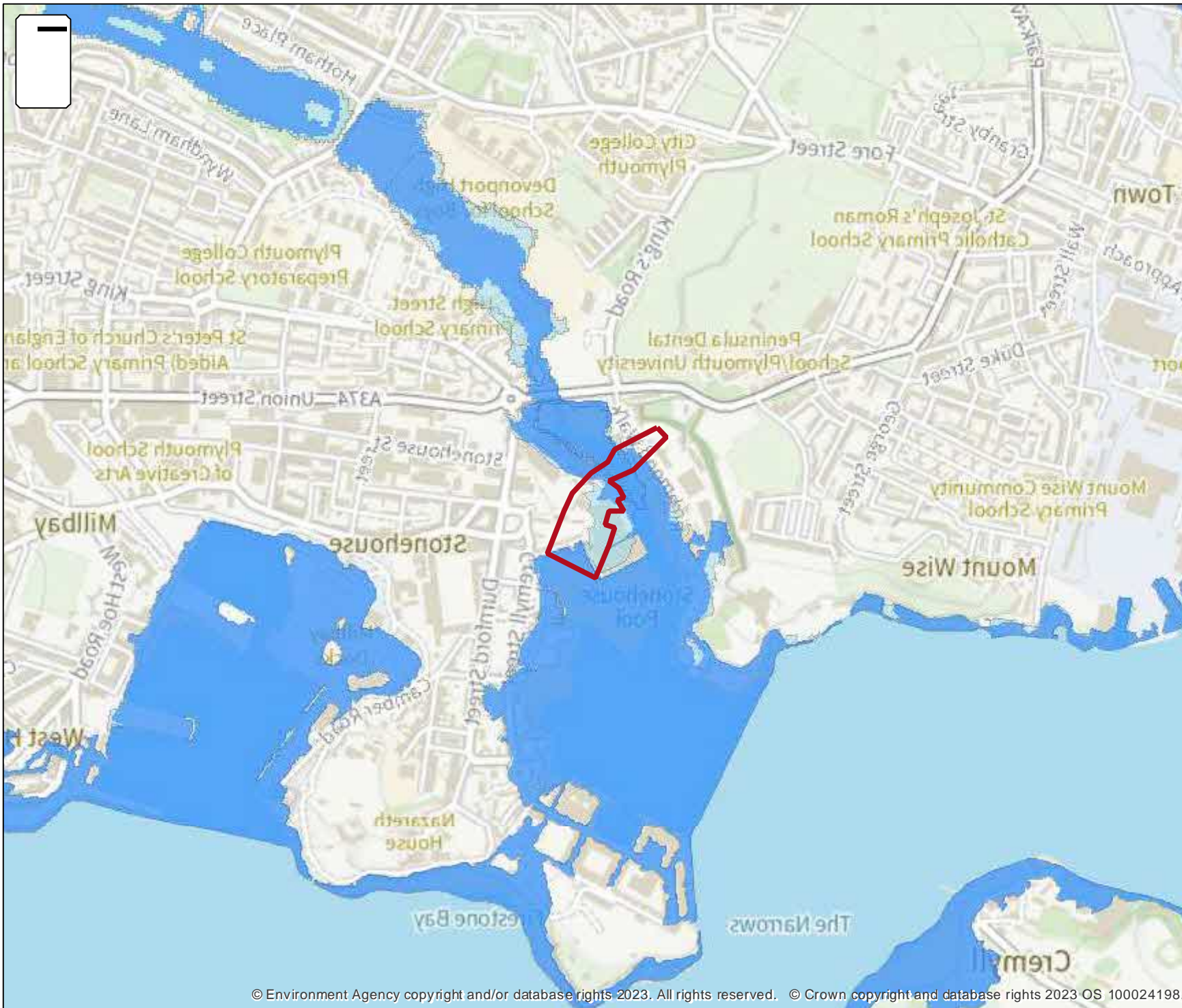
### Flood map for planning

Location (easting/northing)  
**246133/54205**

Scale  
**1:10,000**

Created  
**8 Nov 2023**

-  Selected area
-  Flood zone 3
-  Flood zone 2





## Historic Information

The map below is an indicative outline of areas that have previously flooded.

Historic outlines may not be visible where they overlap. You can download the outlines separately via the link below.

[Download recorded flood outlines in GIS format](#)

Our historic flood event outlines:

- are an indication of the geographical extent of an observed flood event. We map flooding to land, not individual properties.
- not give any indication of flood levels for individual properties. They also do not imply that any property within the outline has flooded internally.
- are based on a combination of anecdotal evidence, Environment Agency staff observations and survey.
- do not provide a definitive record of flooding.

It is possible that there will be an absence of data in places where we have not been able to record the extent of flooding. It is also possible for errors to occur in the digitisation of historic records of flooding.

Remember that: other flooding may have occurred that we do not have records for







Please note that our records are not comprehensive. We would therefore advise that you make further enquiries locally with specific reference to flooding at this location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

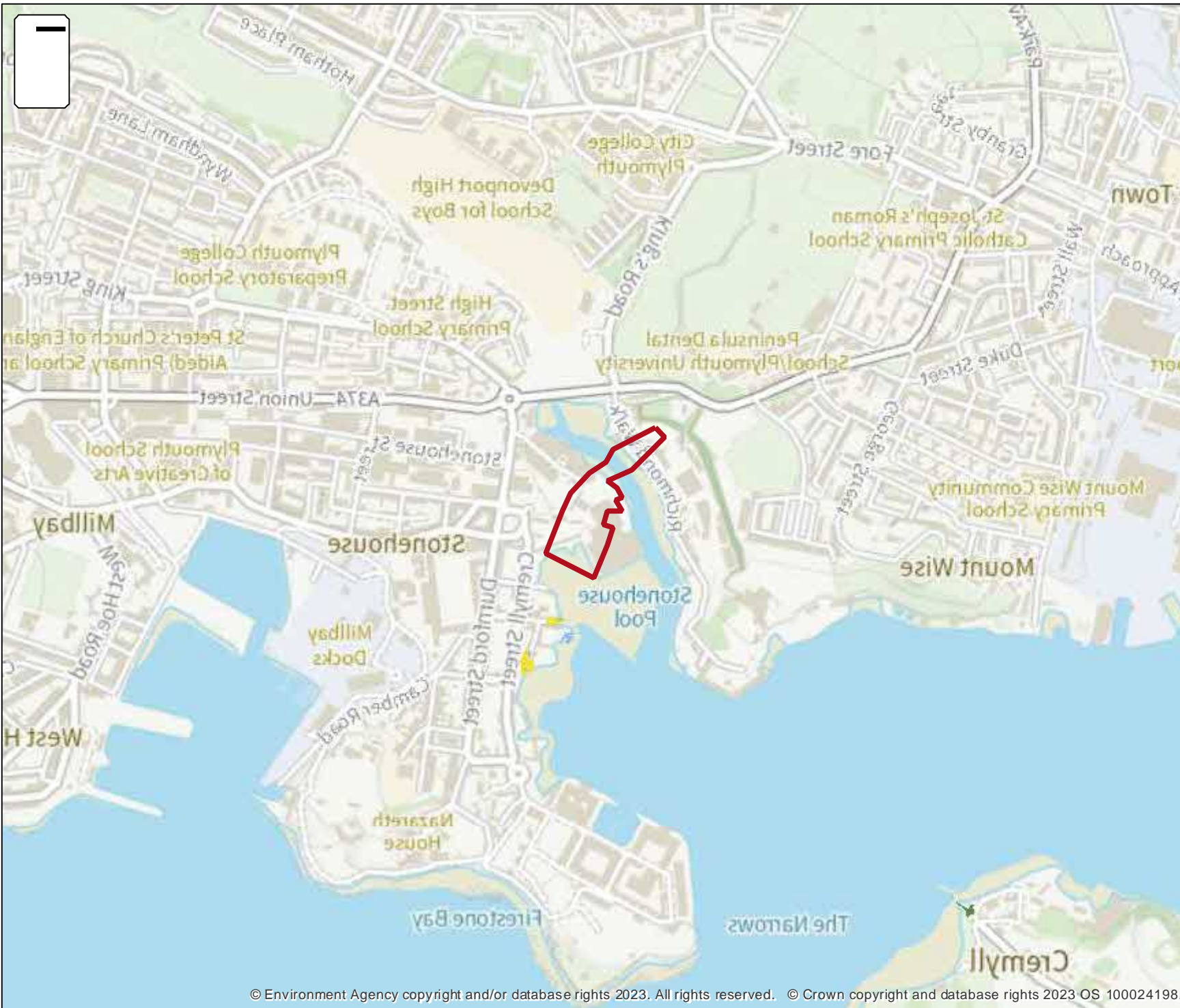
## Historic flood map

Location (easting/northing)  
**246133/54205**

Scale  
**1:10,000**

Created  
**8 Nov 2023**

-  Selected area
-  Main river
- Date of flood event
  -  January, 2020
  -  January, 2014
  -  March, 2008
  -  October, 2004



## Historic flood event data

Start date	End date	Source of flood	Cause of flood	Affects location
14 January 2020	14 January 2020	sea	overtopping of defences	No
3 January 2014	6 January 2014	sea	overtopping of defences	No
10 March 2008	10 March 2008	sea	other	No
27 October 2004	27 October 2004	sea	channel capacity exceeded (no raised defences)	No

**332373 - Records of flooding in the Plymouth area.**

Date	Location	Detail	Cause	Estimated Number of Properties Flooded	Flood Source
14/01/2020	Plymouth	Tidal flood from storm Brendon with small surge, causing a small amount of overtopping of slipways flooding roads.	minor overtopping of slipways	0	Coastal
25/07/2013	Plymouth	Plymouth. Heavy rainfall led to flooding of the road and a property on Fellowes Place, Stoke. Fourteen other locations reported flooding across Plymouth due to surcharging sewers and highway drainage.	Surface water flooding followed intense rainfall	1	Surface Water Runoff
17/10/2012	Plymouth	Plymouth. Mountwise. Minor flooding of road to boatyard.	High spring tides and overtopping	0	Tidal
17/10/2012	Plymouth	Plymouth. Millbay. High spring tides and overtopping caused minor flooding of the quay.	High spring tides and overtopping	0	Tidal

Date	Location	Detail	Cause	Estimated Number of Properties Flooded	Flood Source
03/11/2009	Plymouth	Plymouth, Stonehouse. Adelaide Street, report of flooding. No further details	Unknown		Unknown
06/08/2009	Plymouth	Plymouth, Mount Wise. Clowance Street. Report of flooding, no further details	Unknown		Unknown
15/04/2009	Plymouth	Plymouth, Stonehouse. Clarence Place, reports of flooding. No further details.	Unknown		Unknown

Date	Location	Detail	Cause	Estimated Number of Properties Flooded	Flood Source
27/10/2004	Plymouth	Plymouth. Tidal flooding following high tides & severe storms. In Stonehouse the Car Park area flooded on Strand Street. On the Barbican, there was some slight overtopping at West Pier, and waves were observed splashing over the gate. No significant flood	High tides & severe storms. Devonport tide gauge peaked at 17:15hrs at 3.13m AOD (0.74m surge) equates to an approx. 1 in 5 year return period event.	0	Tidal
22/10/2003	Plymouth	Plymouth - Reported flooding to one property on Admiralty Street, Stonehouse . Flooding thought to be due to hydraulic overload. Flooded on several occasions:- 05 Nov, 26 Nov, 29 Nov, 11 Dec, 12 Dec, 28 Dec 2003 / 01 Jan, 09 Jan 2004. No further details.	Hydraulic overload	1	Surface Water Runoff
29/07/2003	Plymouth	Plymouth - Reported flooding to one property on Admiralty Street, Stonehouse - Flooded internally due to hydraulic overload. Flooded on 29 July and 1 Aug 2003. No further details.	Hydraulic overload	1	Surface Water Runoff
01/05/2003	Plymouth	Plymouth, Stonehouse. Reported flooding to a property on Pound Street. Repeated flooding following installation of clean sweep system. Also flooded on 1 and 2 May 2003. No further details.	Hydraulic overload to system.	1	Fluvial

Date	Location	Detail	Cause	Estimated Number of Properties Flooded	Flood Source
13/12/2000	Plymouth	Plymouth, Devonport - Devonport Leat Overflowing (NGR general) - location not specified	Overtopping following heavy rainfall	0	Fluvial
08/09/1994	Plymouth	Plymouth, Stonehouse. Reported flooding to properties on Durnford Street, Stonehouse. No further details.	Hydraulic inadequacy of sewer system	2	Sewerage
09/07/1993	Plymouth	Plymouth, Stoke. Flooding to Victoria Park and Saint Barnabas Terrace. Number of properties affected unknown.	Hydraulic inadequacy of sewer system	0	Sewerage
01/03/1992	Plymouth	Plymouth, Flood Waters affected Phoenix Street in the Stonehouse Area and Seaton Place in the Ford Area. Number of properties affected unknown.	Hydraulic inadequacy of sewer system	0	Sewerage

Date	Location	Detail	Cause	Estimated Number of Properties Flooded	Flood Source
25/10/1990	Plymouth	Plymouth. Flooding incidents across the city with Kings Rd (Devonport), Blandford Rd (Efford) and Sheridan Rd (Penny Cross) the Hoe and Albert Gate entrance of Devonport Dockyard affected. A379 to Plymstock Rd flooded by Surface Water.	Heavy rain and Surface water drainage system blockages.	0	Surface Water Runoff
01/06/1980	Plymouth	Plymouth - Stonehouse area. Reported flooding to Strand Street and Cremyll Street from high tides and wave action. No further details. Exact dates unknown.	High Tides and wave action.	5	Tidal
30/12/1852	Plymouth	Plymouth. Millbay Docks. A coal store was destroyed with stones weighing upwards of 1 ton thrown 40 feet into the air.	Unknown		Coastal

This list contains all the records of flooding we hold, in a 1km radius of the specified location. Although this information is compiled to the best of our knowledge, the absence of flooding does not mean that an area has not flooded in the past, nor guarantee it will not flood in the future. Our records are updated as more information comes to light, and as flood incidents occur.

*Correct as of 13 November 2023*



## **Modelled data**

### **About the models used**

Model name: JFLOW

Date: 2007

Model name: Plymouth Coastal Model

Date: 2018

This model contains the most relevant data for your area of interest.

You will need to consider the [latest flood risk assessment climate change allowances](#) and factor in the new allowances to demonstrate the development will be safe from flooding.

### **Terminology used**

#### **Annual exceedance probability (AEP)**

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occurring in any one year, is described as 1% AEP.

#### **Metres above ordnance datum (mAOD)**

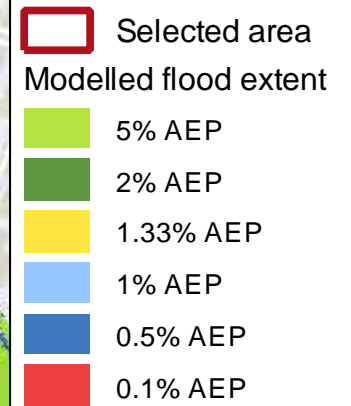
All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

## Defended modelled tidal extent

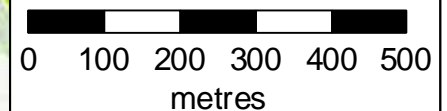
Location (easting/northing)  
**246133/54205**

Scale Created  
**1:10,000 8 Nov 2023**

Model name  
**Plymouth Coastal**



Flood extents may not be visible where they overlap other return periods






## Defences removed modelled tidal extent

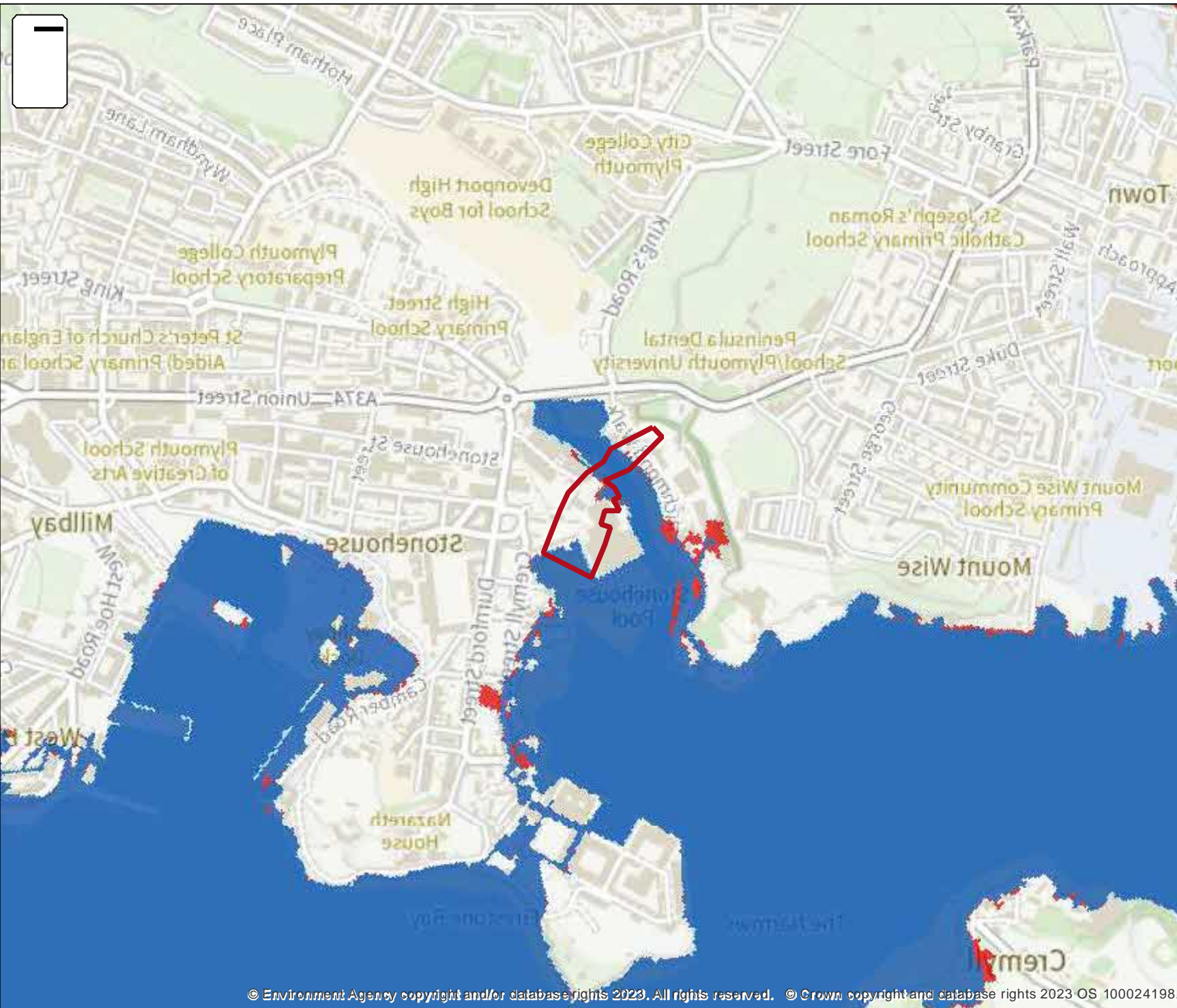
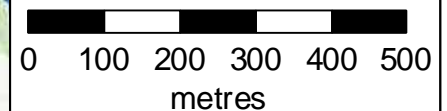
Location (easting/northing)  
**246133/54205**

Scale Created  
**1:10,000 8 Nov 2023**

Model name  
**Plymouth Coastal**

-  Selected area
- Modelled flood extent
  -  0.5% AEP
  -  0.1% AEP

Flood extents may not be visible where they overlap other return periods












## Defended climate change modelled tidal extent

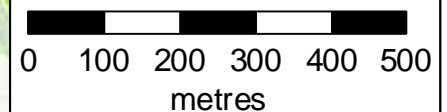
Location (easting/northing)  
**246133/54205**

Scale Created  
**1:10,000 8 Nov 2023**

Model name  
**Plymouth Coastal**

-  Selected area
-  Main river
- Modelled flood extent**
-  1.0% AEP (+350mm)
-  1.0% AEP (+780mm)
-  0.5% AEP (+350mm)
-  0.5% AEP (+780mm)
-  0.5% AEP (+1080mm)
-  0.1% AEP (+350mm)
-  0.1% AEP (+780mm)

Flood extents may not be visible where they overlap other return periods








## Defences removed climate change modelled tidal extent

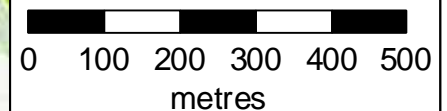
Location (easting/northing)  
**246133/54205**

Scale Created  
**1:10,000 8 Nov 2023**

Model name  
**Plymouth Coastal**

-  Selected area
-  Main river
- Modelled flood extent
  -  0.5% AEP (+350mm)
  -  0.5% AEP (+780mm)
  -  0.5% AEP (+1080mm)

Flood extents may not be visible where they overlap other return periods



You asked us to provide you with depth / flow / water level data from the JFLOW model used to produce the Flood Zones.

The water depths have been produced from the JFLOW model (2007) as a 'by-product' of running the model to produce Flood Zones.

In 2013, over 600km of watercourses were remodelled using JFlow+. These watercourses were either previously not modelled in 2008, or where modelled using a lesser quality DTM. This project used an improved DTM, revised hydrology and the latest version of Jflow+.

You should be aware of the following points.

Our work to produce Flood Zones followed a 10 year programme which delivered more detailed mapping for 821 locations. However, in order to complete Flood Zones we needed national coverage, hence a generalised approach was used to provide this national coverage within the time available, to fill the gaps between the 821 locations where we had more detailed information. The Flood Zones are therefore not as accurate as we would normally specify for river modelling, but they do provide an adequate indication of the extent of flood risk such that developers can consider flooding as part of their proposals to ensure they are not unknowingly putting additional lives at risk. This is the purpose for which the Flood Zones were produced

Depths outputs were not specified when we commissioned this generalised modelling for Flood Zones. As the JFLOW modelling method was developed, tested and reviewed for production of the Flood Zone extents only, we currently have no information on the accuracy of the water depth data.

The models were run using a Digital Terrain Model (DTM) with a grid generalised to between 5m and 100m (depending on the type of model and location, for reasons such as processing speed). Fluvial modelling produced depth data which can be processed using the DTM to provide water level data. However the differing grid sizes means that there is a significant potential for inaccuracy in producing level data, because of the DTM generalisation. Therefore because of the nature of the model and the DTM, in many cases it will not be possible to confidently assess whether or not a site is above the resulting water level. This is because there are further inherent uncertainties in the depth calculation and within the DTM itself.

Depth or level outputs from the National Generalised Modelling (JFLOW) are suitable to be used for decision making at a broad catchment scale

JFLOW and JFlow+ is a suitable method for broad scale flood mapping. It may however fail to produce satisfactory results in some locations.

They are not suitable for use in site specific Flood Risk Assessments or Strategic Flood Risk Assessments and must not normally be used for these studies. However, where in exceptional circumstances Nationalised Generalised Modelling outputs are requested to be used for anything other than at a broad catchment or Shoreline Management Plan coastal cell scale further verification must be undertaken.

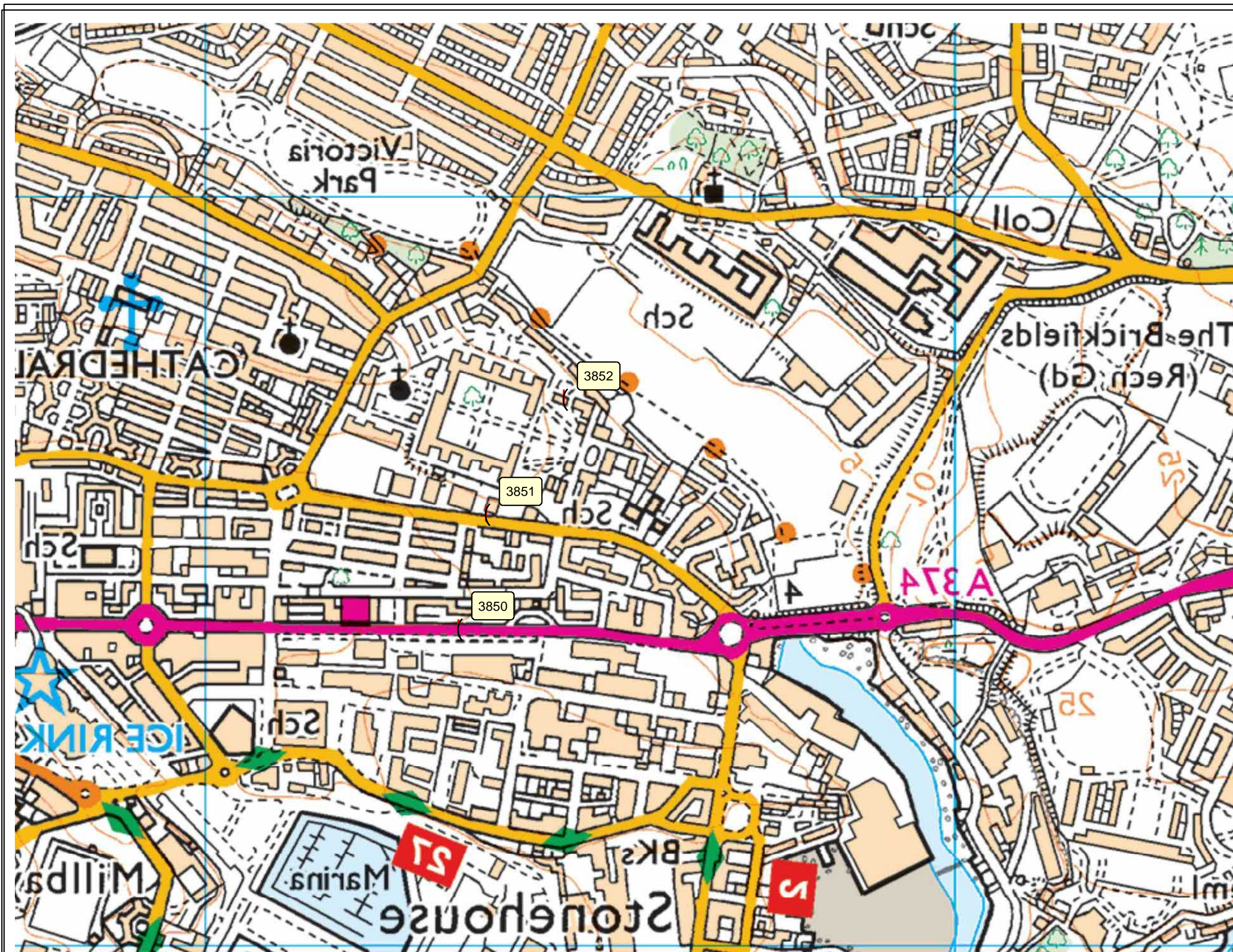
For the 2013 data we can provide the data for the 100 year plus climate change scenario. The influence of climate change on expected flows for the 2080 planning horizon was represented by increasing the 1 in 100-year flood hydrograph by 30%.

Any assessment of Flood Risk undertaken must be appropriate for the decisions that need to be based upon it, consider the risks and also take into account any limitations of the data used.

Please be aware that the Environment Agency does not guarantee that this data is suitable for your purposes.

# 332373 - JFLOW Node Location Map

Please note this map is intended only as a guide - it is not accurate at individual property level



### Legend

( ) JFLOW selection

Please refer to the enclosed table, for modelled water level data, and the enclosed caveat when considering modelled levels.

1:5,000 Correct as of the 13<sup>th</sup> November 2023

### **332373 - Modelled JFLOW Flood levels**



This data is taken from the JFLOW model. Please refer to the attached caveat when considering JFLOW modelled levels.

Jflow Study: Jflow\_2007

Node Reference	Easting	Northing	Modelled Flood levels, in mAOD	
			1% AEP (1 in 100 year)	0.1% AEP (1 in 1000 year)
3850	246226	54425	2.29	2.02
3851	246263	54578	4.21	4.36
3852	246367	54732	6.10	6.14

Correct as of 13 November 2023



## **Plymouth Coastal Model (2018)**

We have provided data from the Plymouth Coastal Model, 2018. Please consider the following information when using this model data:

This is coastal model, and does not consider the risk of flooding from other source, including fluvial or surface water flooding.

The study area extends from Plymouth Sound, up the Tamar estuary as far as Weir Quay, and includes the tidal rivers the Lynher and Plym.

A 1D-2D ESTRY-TUFLOW model was constructed to assess the coastal flood risk. The model incorporates a tidal boundary, a wave overtopping boundary and a wind boundary. A range of model scenarios and extreme events were simulated.

A low-resolution copy of this model (coarse model) was also developed to assess how wind conditions affect water levels at Plymouth. The results from this model were used in the calculation process of the boundary conditions for the detailed, high resolution model

The detailed flood inundation model includes wave overtopping boundaries at coastal defences

The maps and digital data supplied should be considered only a summary of the conclusions of the study. It will be necessary to collect more detailed topographic information for particular sites where development is proposed and undertake a more detailed site-specific hydrological and hydraulic analysis for the location using guidance from the National Planning Policy Framework (NPPF)

In this commission the focus has been on flooding from the sea rather than from fluvial sources. It is important that consideration is given to fluvial flooding for any development sites if appropriate. The impact of combined fluvial and tidal events should be examined to understand the impact that this has upon flood depth extent and the duration of inundation

The model has been calibrated to the 14<sup>th</sup> February 2014 event

To calculate the impact of climate change on wave overtopping discharge rates, changes were applied to the water level, wind speeds and wave heights.

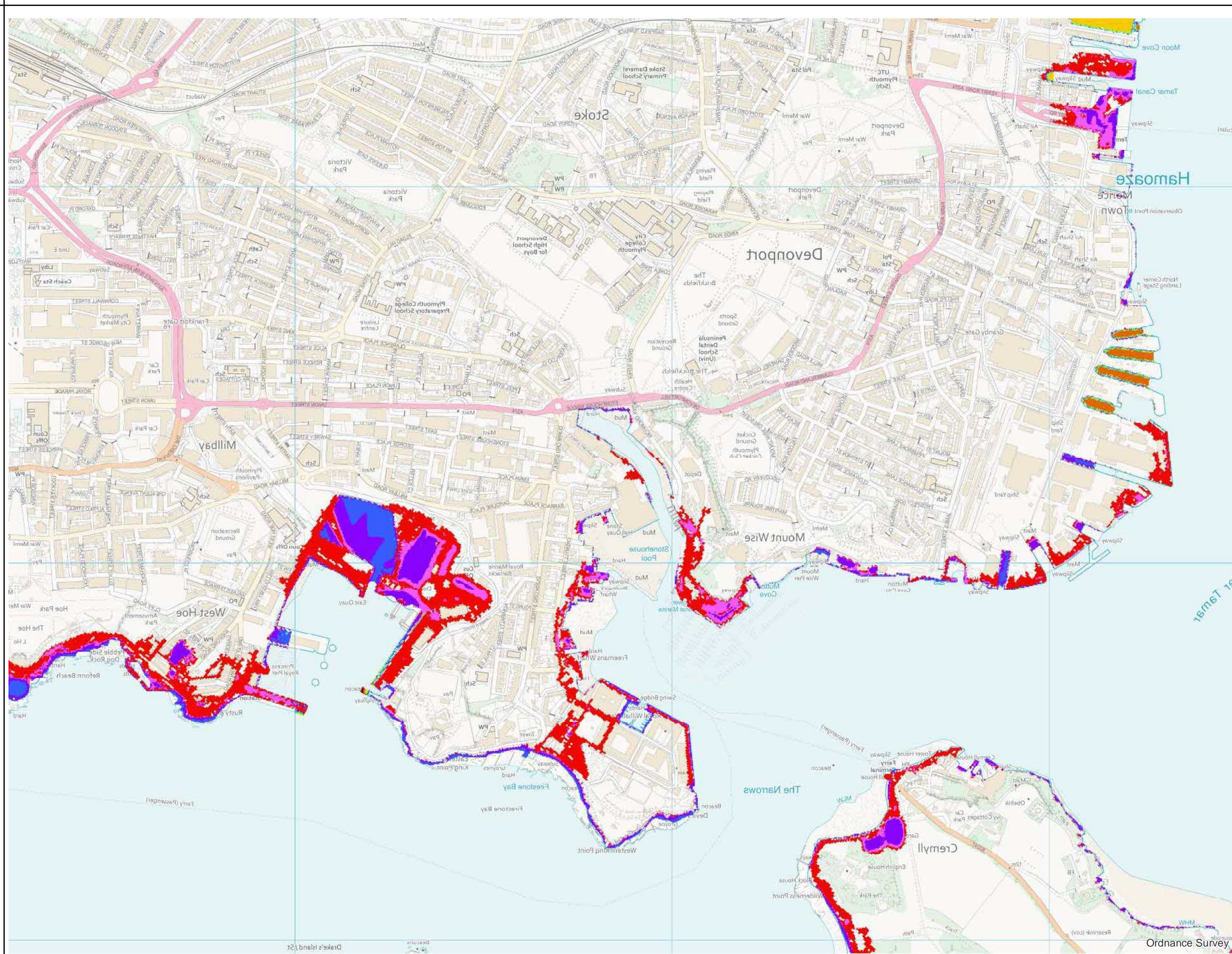
Any assessment of Flood Risk undertaken must be appropriate for the decisions that need to be based upon it, consider the risks and also take into account any limitations of the data used.

Please be aware that the Environment Agency does not guarantee that this data is suitable for your purposes.

December 2018

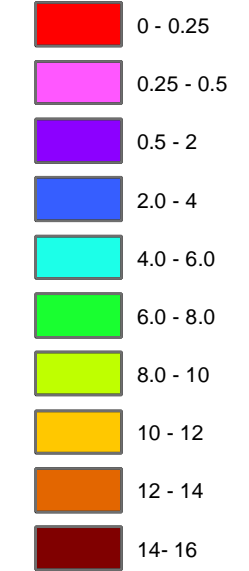
# 332373 - Depth Map (Undeclared, 0.5% AEP) taken from the Plymouth Coastal Model 2018 centred on Plymouth

Please note this map is intended only as a guide - it is not accurate at individual property level



## Legend

### Plymouth 1 in 200 year - Depth metres

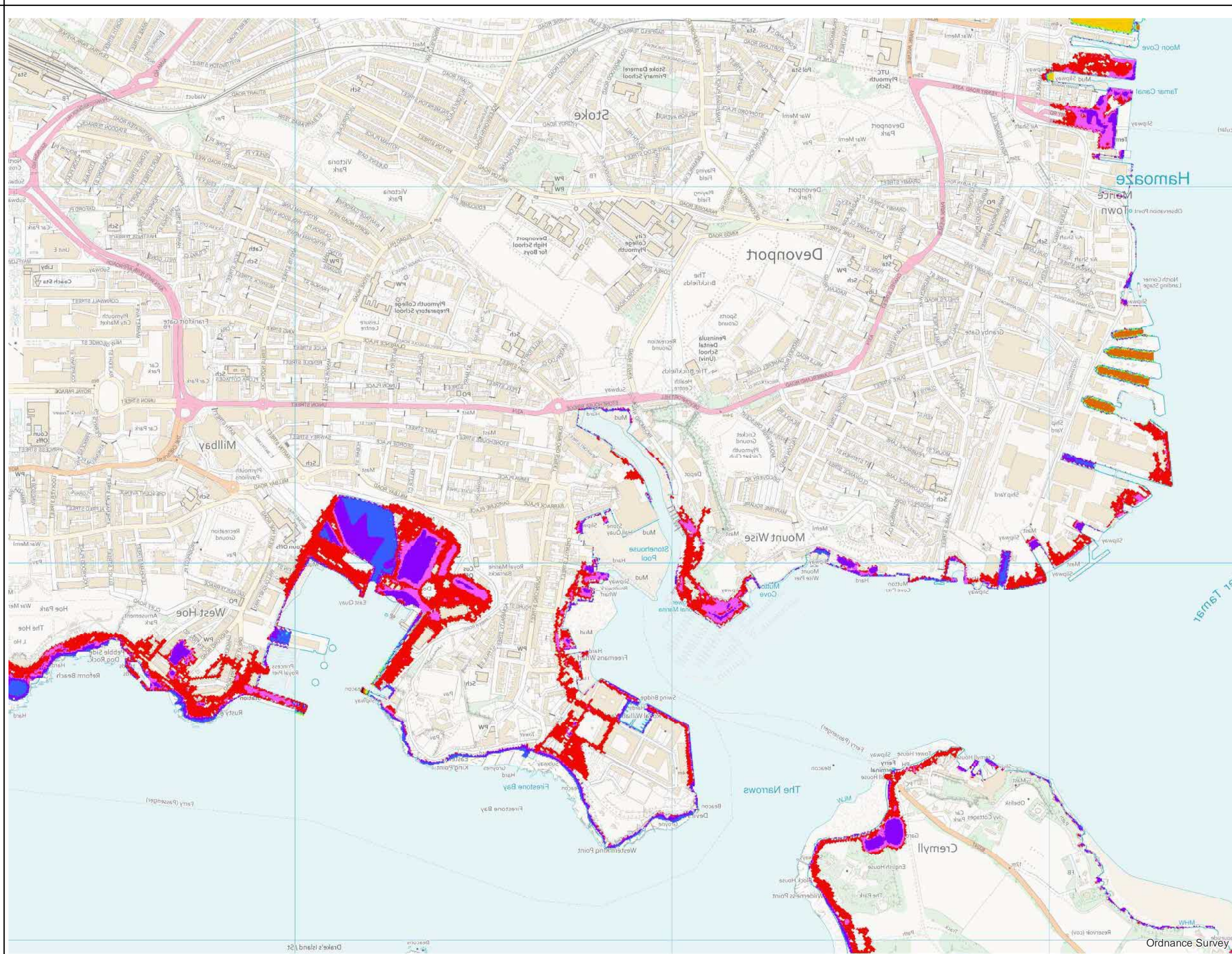


This map displays the depths (m) across the site for a 0.5% AEP event, taken from the Plymouth Coastal Model 2018 and includes an allowance for wave overtopping.

1:10,000 Correct as of the 13<sup>th</sup> November 2023

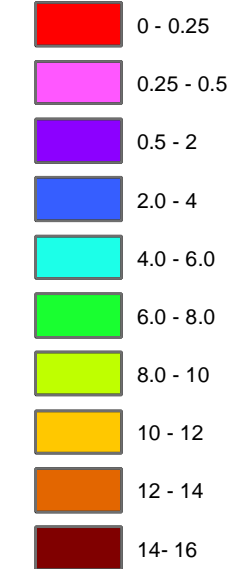
# 332373 - Depth Map (Undefended, 0.5% AEP & Climate Change) taken from the Plymouth Coastal Model 2018 centred on Plymouth

Please note this map is intended only as a guide - it is not accurate at individual property level



### Legend

#### Plymouth 1 in 200 year - Depth metres



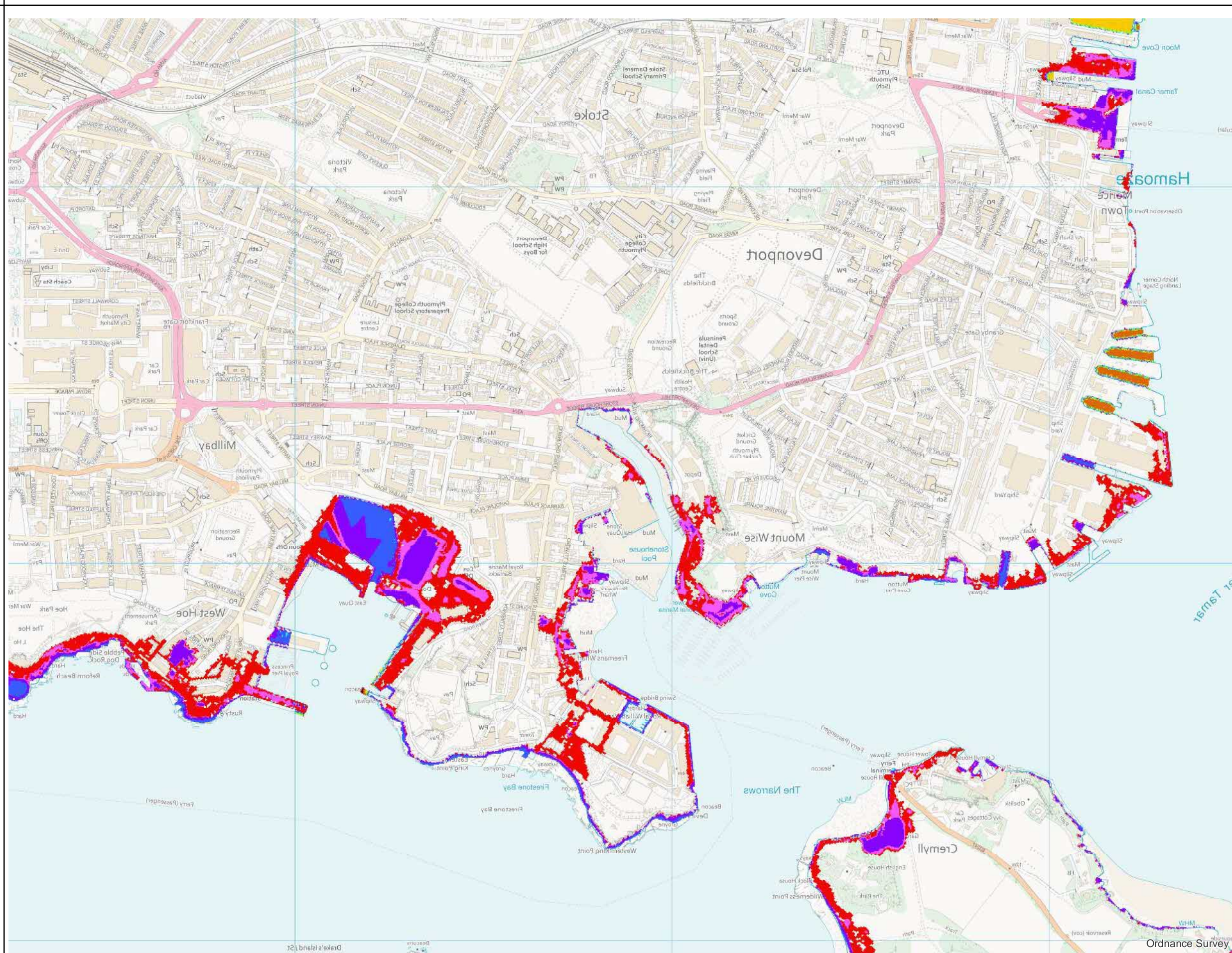
This map displays the depths (m) across the site for a 0.5% AEP event, taken from the Plymouth Coastal Model 2018 and includes an allowance for wave overtopping.

Climate change scenarios  
To calculate the impact of climate change on wave overtopping discharge rates, changes were applied to the water level, wind speeds and wave heights. For more information, please see the attached caveat.

1:10,000 Correct as of the 13<sup>th</sup> November 2023

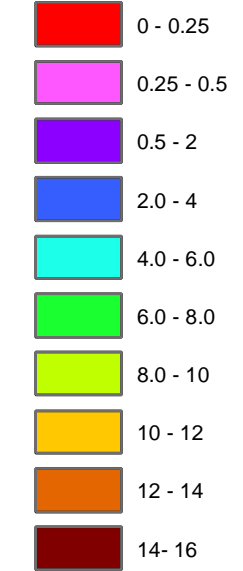
# 332373 - Depth Map (Undefended, 0.1% AEP) taken from the Plymouth Coastal Model 2018 centred on Plymouth

Please note this map is intended only as a guide - it is not accurate at individual property level



## Legend

Plymouth 1 in 1000 year - Depth metres

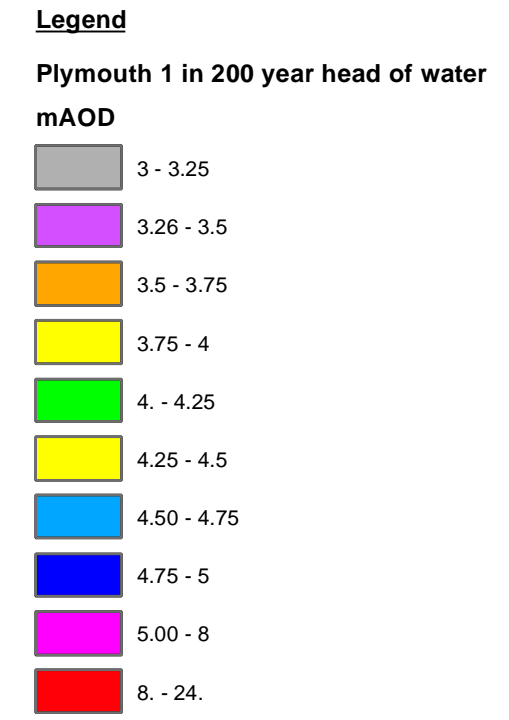
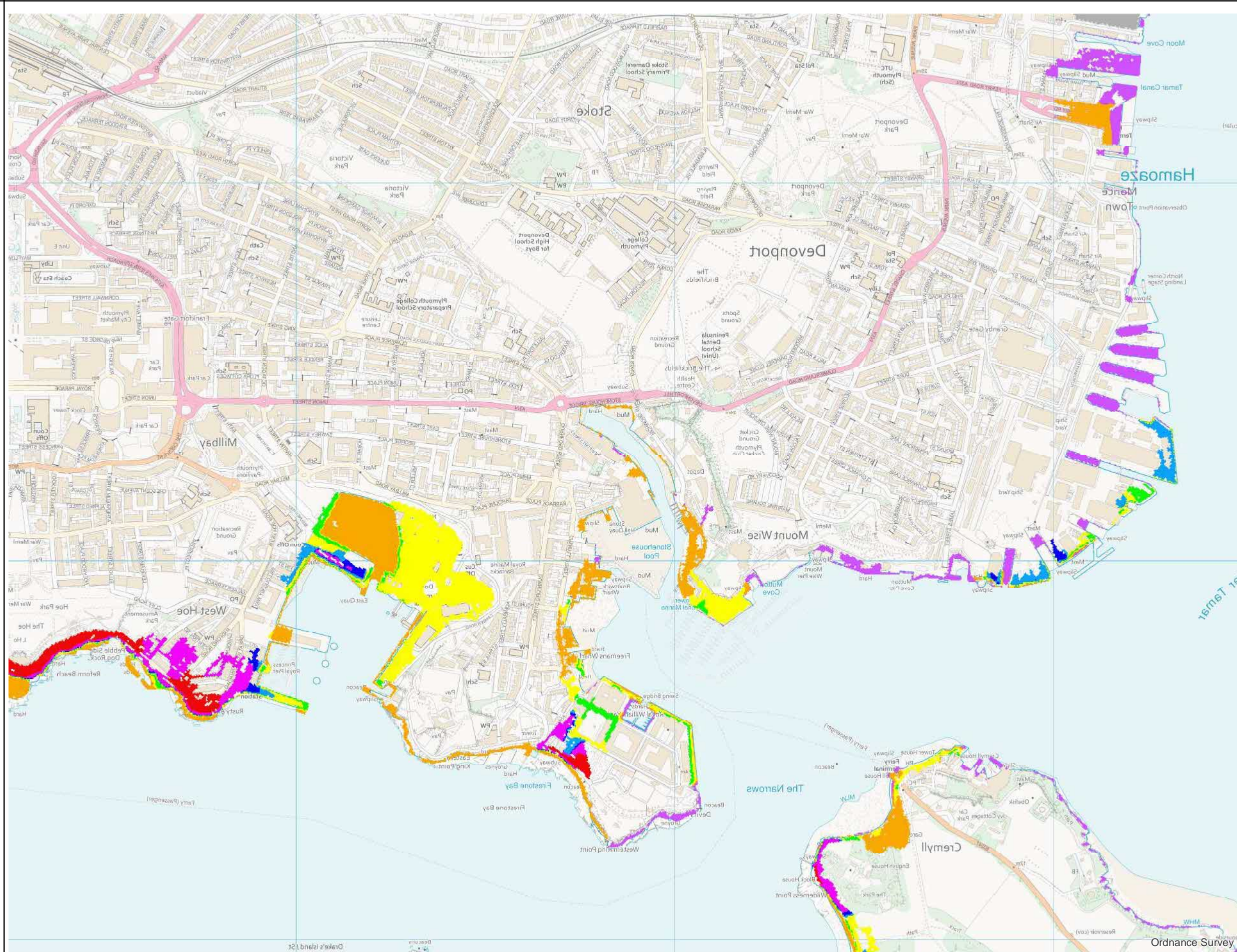


This map displays the depths (m) across the site for a 0.1% AEP event, taken from the Plymouth Coastal Model 2018 and includes an allowance for wave overtopping.

1:10,000 Correct as of the 13<sup>th</sup> November 2023

# 332373 - Head of Water Map (Undefended, 0.5% AEP) taken from the Plymouth Coastal Model 2018 centred on Plymouth

Please note this map is intended only as a guide - it is not accurate at individual property level

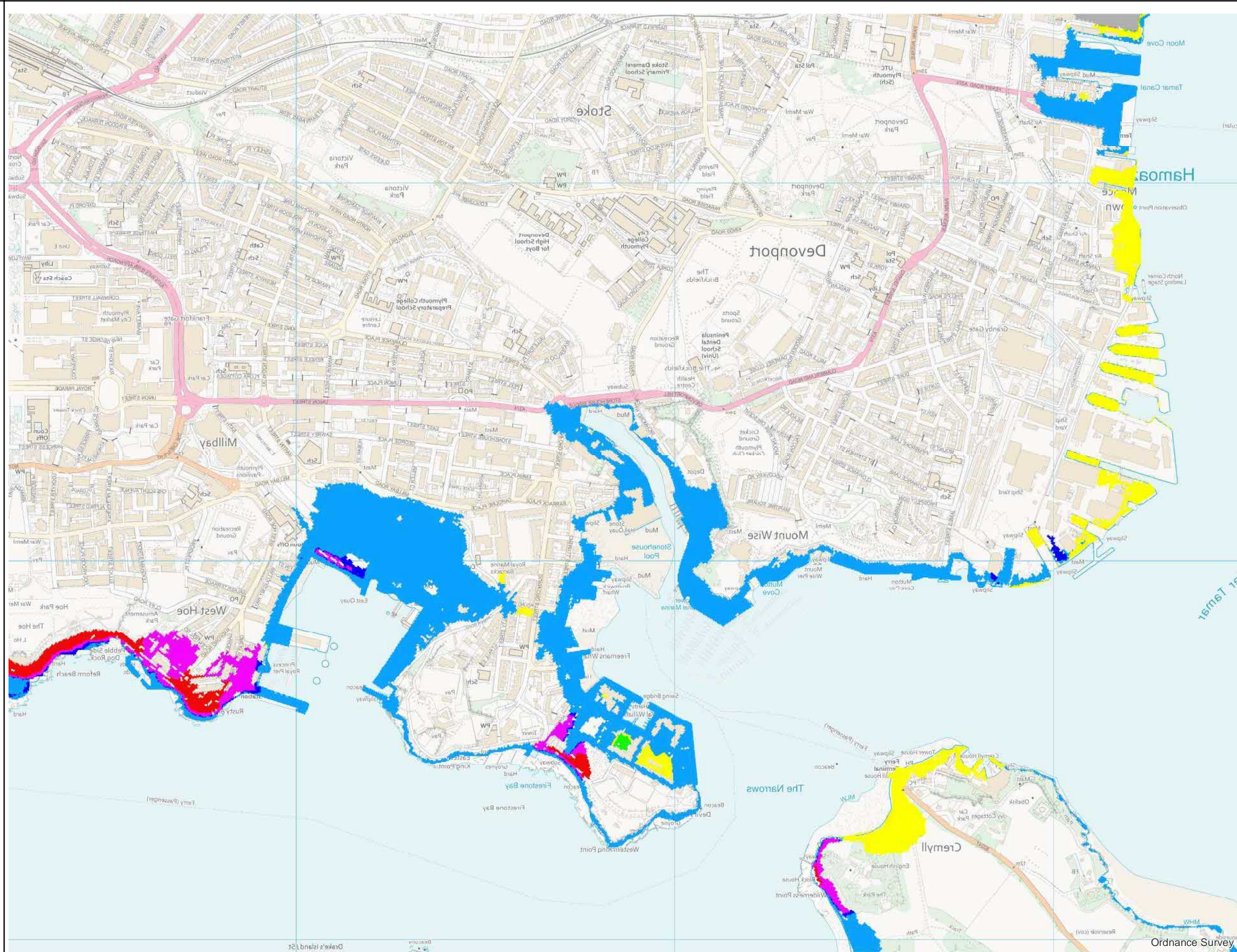


**Head of Water**  
This map displays the head of water (mAO) across the site for a 0.5% AEP event, taken from the Plymouth Coastal Model 2018 and includes an allowance for wave overtopping.

**1:10,000** Correct as of the 13<sup>th</sup> November 2023

# 332373 - Head of Water Map (Undefended, 0.5% AEP & Climate Change) taken from the Plymouth Coastal Model 2018 centred on Plymouth

Please note this map is intended only as a guide - it is not accurate at individual property level



### Legend

Plymouth 1 in 200year+cc - head of water

mAO

- 3 - 3.25
- 3.26 - 3.5
- 3.5 - 3.75
- 3.75 - 4
- 4 - 4.25
- 4.25 - 4.5
- 4.50 - 4.75
- 4.75 - 5
- 5.00 - 8
- 8 - 24.

### Head of Water

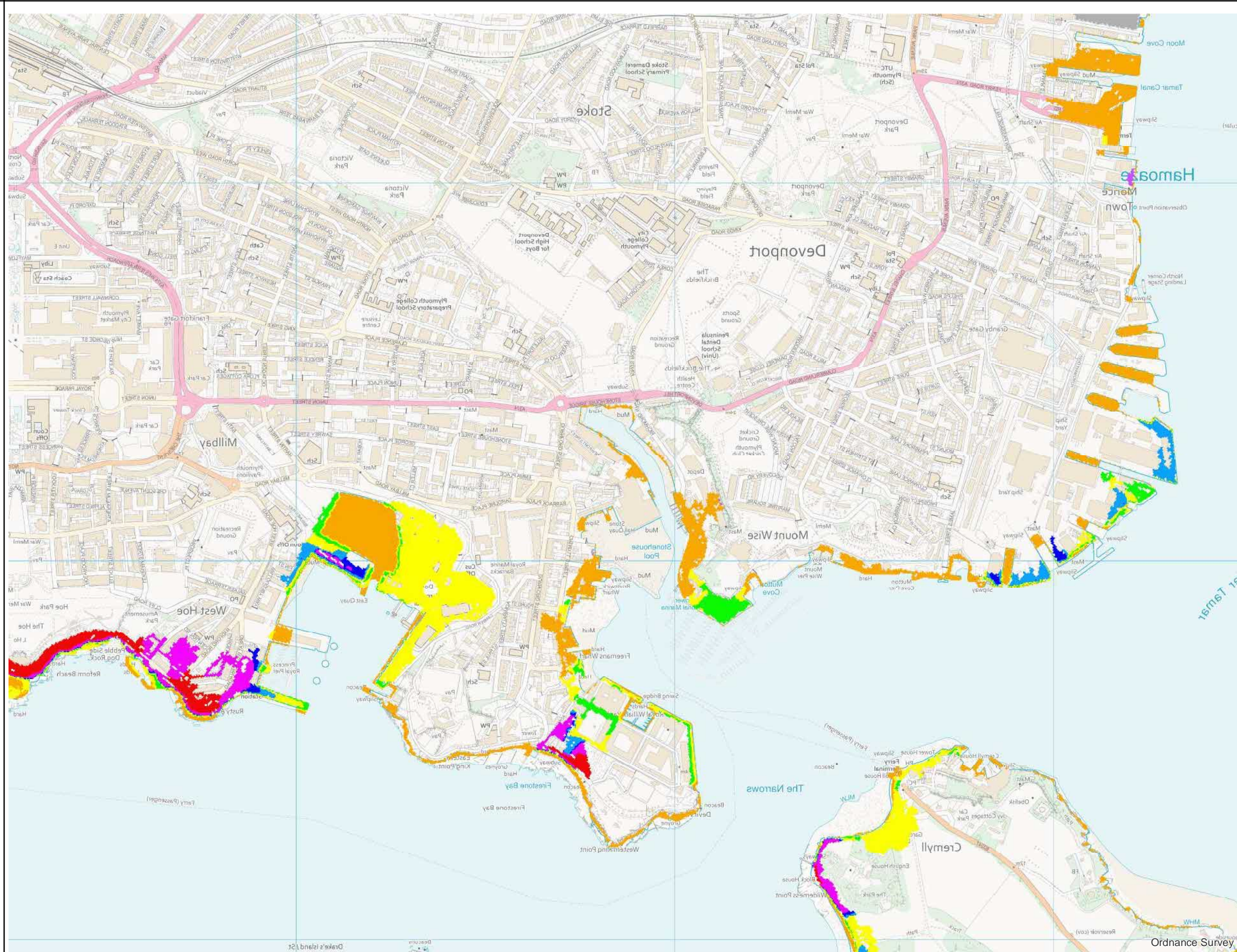
This map displays the head of water (mAO) across the site for a 0.5% AEP event, taken from the Plymouth Coastal Model 2018 and includes an allowance for wave overtopping.

**Climate change scenarios**  
To calculate the impact of climate change on wave overtopping discharge rates, changes were applied to the water level, wind speeds and wave heights. For more information, please see the attached caveat.

1:10,000 Correct as of the 13<sup>th</sup> November 2023

# 332373 - Head of Water Map (Undefended, 0.1% AEP) taken from the Plymouth Coastal Model 2018 centred on Plymouth

Please note this map is intended only as a guide - it is not accurate at individual property level



## Legend

Plymouth 1 in 1000year - head of water  
mAOd

- 3 - 3.25
- 3.26 - 3.5
- 3.5 - 3.75
- 3.75 - 4
- 4 - 4.25
- 4.25 - 4.5
- 4.50 - 4.75
- 4.75 - 5
- 5.00 - 8
- 8 - 24.

**Head of Water**  
This map displays the head of water (mAOd) across the site for a 0.1% AEP event, taken from the Plymouth Coastal Model 2018 and includes an allowance for wave overtopping.

**1:10,000** Correct as of the 13<sup>th</sup> November 2023



## Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

## About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

## Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

[Find out more about flood risk activity permits](#)

## Help and advice

Contact the Devon Cornwall and the Isles of Scilly Environment Agency team at [dcisenquiries@environment-agency.gov.uk](mailto:dcisenquiries@environment-agency.gov.uk) for:

- [more information about getting a product 5, 6, 7 or 8](#)
- general help and advice about the site you're requesting data for



## What can we offer?

We can provide **free preliminary opinion advice note** that will identify the environmental constraints you will need to consider and signpost where you can find further information. In addition, in some areas we have some locally specific advice. Any other planning advice would fall within our cost recovery service at a **standard fee of £100 per hour plus VAT**.

Our cost recovery service is also available for Local Planning Authorities seeking strategic advice.

As part of this service we can:

- Provide bespoke advice;
- Review technical documents;
- Attend meetings;
- Attend site visits.

We may not always agree with your conclusions, but will act as a critical friend to ensure that your planning submissions are complete and well-reasoned. This will help local planning authorities to make informed decisions.

## Want to know more?

If your development is within Devon, Cornwall or the Isles of Scilly please contact the Sustainable Places team:

✉ [SPDC@environment-agency.gov.uk](mailto:SPDC@environment-agency.gov.uk)

Alternatively, if the development is located elsewhere, you can find your local Environment Agency office by:

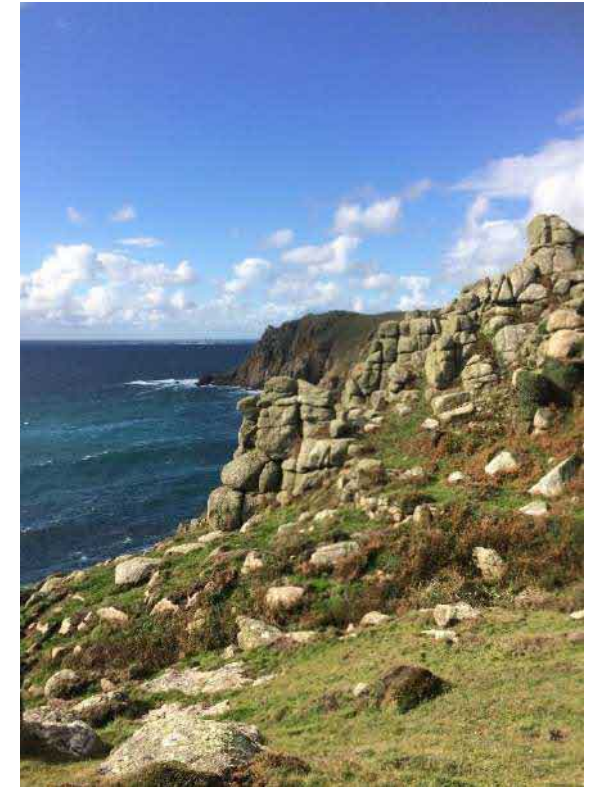
☎ **03708 506 506\*** (Monday – Friday, 8am to 6pm)

✉ [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

Or visit our website

[www.gov.uk/government/organisations/environment-agency](http://www.gov.uk/government/organisations/environment-agency)

\*details of call charges can be found on the GOV.UK website.



## Planning Advice from the Environment Agency



**We are the Sustainable Places team covering Devon, Cornwall and the Isles of Scilly.**

**Through partnership with other place makers, we enable sustainable growth and create better places for people and wildlife.**

**We will be your single point of contact for planning advice relating to the water environment and waste management.**



**Please come to us for advice relating to Flood Risk; Water Quality; Water Resources; Water-based habitats and species; and Waste.**

## What is our Planning Service?

We can provide advice at all stages in the planning process: strategic plan making, pre-application, resolving objections, discharge of conditions and any subsequent amendments.

### Developers

We want to work with you to make the process as smooth as possible. We provide evidence and advice to a range of customers, including land agents, house builders, consultants, local authorities and the public.

By seeking our advice early, environmental issues can be identified and worked through before formal submission to the local planning authority. This will provide you with certainty going forward and save you time and resources at a later stage.

### Local Planning Authorities

The advice that we provide will help you understand the strategic environmental issues to shape growth strategies. For example, we can provide early technical advice on evidence based documents.

## What are the benefits of our advice?

**A dedicated project manager** will be assigned to your enquiry and will be your single point of contact at the Environment Agency.

We will provide you with an estimation of costs and will agree a **clear schedule of work with realistic timescales**, so that you can develop your project plan with certainty.

You will be provided with **technical bespoke advice**. Through **constructive challenge** and reality checking, we will use our experience to identify any omissions in your submissions and help you prepare the best case for your planning proposals.

Our advice will help to **speed up the process** when your proposals are formally submitted to the local planning authority and **save you money later** by avoiding costly revisions to the scheme and any supporting documentation.

By ensuring that your development is safe and sustainable, it will be more **desirable to customers**.

For Local Planning Authorities our service helps provide certainty that the **environmental issues have been appropriately addressed in Local Plans**.

We can provide an early indication of **permitting requirements** so you can be confident of what is needed and when.

# Pre-planning application Guidance Note: Devon, Cornwall & Isles of Scilly Area

Last Updated: September 2022

This guidance has been produced to help you plan and prepare your development proposal.

It sets out the environmental issues we expect to be considered as part of a planning application. Please be aware that this guide is not exhaustive and further details may be requested by us at planning application stage to address site specific environmental issues.

This guidance is only for use in the Environment Agency's Devon, Cornwall and Isles of Scilly Area and should be read alongside our detailed national guidance which can be found on the GOV.UK website.

It can be used by applicants, developers and consultants at the pre-planning stage.

## Further bespoke advice

The information provided below details generic information which may or may not be applicable to your development. We can provide bespoke guidance or review technical information prior to the submission of a planning application. This is part of our charged service, which equates to £100 per person per hour plus VAT.

Further engagement at the pre-application stage will speed up our formal response to your planning application and provide you with certainty as to what our response to your planning application will be. It should also result in a better quality and more environmentally sensitive development. As part of our charged for service we will provide a dedicated project manager to act as a single point of contact to help resolve any problems.

If you are interested in finding out more about this service, please email: [SPDC@environment-agency.gov.uk](mailto:SPDC@environment-agency.gov.uk).

We also recommend that you consult with the relevant Local Planning Authority (LPA) to ensure that your planning application meets their requirements.

## Section 1: Flood Risk

The National Planning Policy Framework (NPPF) requires development in areas at risk of flooding to be safe and not increase the risk of flooding.

You can view a site's flood zone on the [Flood Map for Planning](#). If your proposed development is located within Flood Zone 2 or 3 you should consult the [Flood Risk and Coastal Change](#) pages of the National Planning Practice Guidance (NPPG).

The guidance will help you determine whether the flood risk vulnerability of your proposed development and the flood zone are compatible. You can also establish if there are flood risk sequential test and exception test requirements for your proposed development. These are summarised in the table below, which is adapted from [Table 3](#) in the NPPG.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
<b>Zone 1</b>	✓ Avoid flood risk from sources other than rivers & sea	✓ Avoid flood risk from sources other than rivers & sea	✓ Avoid flood risk from sources other than rivers & sea	✓ Avoid flood risk from sources other than rivers & sea	✓ Avoid flood risk from sources other than rivers & sea
<b>Zone 2</b>	? Sequential Test required	? Sequential and Exception Tests required	? Sequential Test required	? Sequential Test required	? Sequential Test required
<b>Zone 3a</b>	? Sequential and Exception Tests required	X Development should not be permitted	? Sequential and Exception Tests required	? Sequential Test required	? Sequential Test required
<b>Zone 3b</b>	? Sequential and Exception Tests required	X Development should not be permitted	X Development should not be permitted	X Development should not be permitted	? Sequential Test required

### 1.1 Sequential Test

The NPPF and associated NPPG ([Flood Risk and Coastal Change](#) chapter) requires the Sequential Test to be applied to planning applications where development is located within Flood Zone 2, 3a or 3b in the circumstances shown in the table above. The only exceptions are sites allocated in an adopted Local Plan which have already been subject to the test, change of use or [minor development](#).

For the site to pass the Sequential Test it must be satisfactorily demonstrated to the LPA that there are no appropriate alternative sites available for this development at a lower risk of flooding. It is for the LPA to determine if the Sequential Test has to be applied and whether or not there are other sites available at lower flood risk. Therefore, we recommend that you discuss the requirements of the Sequential Test with the LPA at the earliest opportunity.

### 1.2 Sequential Approach

If the Sequential Test is passed then a sequential approach should be applied within the site to direct development to the areas of lowest flood risk (Flood Zone 1 first, followed by Flood Zone 2). If it is not possible to locate all of the development within Flood Zone 1, then the most vulnerable elements of the development should be located in the lowest risk parts of the site.

### 1.3 Exception Test

The Exception Test should only be applied in the circumstances shown in the table above following application of the sequential test. The Exception Test should not be used to justify the grant of planning permission in flood risk areas when the Sequential Test has not been satisfied.

The Exception Test is in two parts and both need to be met for the test to be satisfied. It is for the applicant to demonstrate this to the LPA, but we will provide advice on the second part of the test. The second part requires a site-specific flood risk assessment (FRA) to demonstrate that the new development will be safe over its lifetime (including access and egress), will not increase flood risk elsewhere and, where possible, will reduce flood risk overall. The NPPF states that both parts of this test should be satisfied for development to be permitted.

## 1.4 Inappropriate development in areas at risk of flooding

[Table 3](#) in the NPPG sets out the circumstances where development is inappropriate and should not be permitted.

Flood Zone 3b is land classed as the 'functional floodplain' and is land defined by an LPA's Strategic Flood Risk Assessment (SFRA) as having the highest probability of flooding, and where water has to flow or be stored in times of flood. Only water compatible development and essential infrastructure (subject to the Exception Test) can be acceptable within the functional floodplain.

We would **object in principle** to any development that falls under any other vulnerability classification. It is important to note that the functional floodplain is not separately distinguished from Zone 3a on the Flood Map for Planning. Instead, areas of functional floodplain have been identified by LPAs within their SFRA's.

Highly vulnerable development, which includes caravans, mobile homes and park homes intended for permanent residential use and basement dwellings, is also not acceptable in Flood Zone 3a.

## 1.5 Flood Risk Assessment (FRA) Requirements

A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3 in accordance with paragraph 167, footnote 55 of the [National Planning Policy Framework](#) (NPPF). In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

In accordance with the NPPF and associated NPPG, a site specific FRA must clearly demonstrate how you intend to manage flood risk on site to ensure that the proposed development will be safe for its lifetime and that flood risk is not increased on site and elsewhere.

The FRA should be appropriate to the scale, nature and location of the development. While it is possible for applicants to undertake their own assessment, most employ suitably experienced professionals. We are not able to recommend specific consultants, but details of competent individuals or companies can be found online.

We would expect your FRA to address (but not necessarily be limited to) the following issues:

Consideration of the level of flood risk and whether the proposed use would be appropriate in accordance with its vulnerability classification outlined within [Table 2](#) of the Planning Practice Guidance: [Flood Risk and Coastal Change](#) (section 25).

Identification of the level of flood risk on the site and consideration of the impact a range of flood events would have on the proposed development, including an assessment of the impacts of climate change by selecting the appropriate climate change allowances.

Confirmation of any flood defences and standard of protection provided, to confirm the level of residual risk in accordance with the Strategic Flood Risk Assessment (SFRA) for the local planning authority in which the development is located.

Estimation of flood depths at the site for a range of flood events, to calculate internal flood depths and level of refuge required in the event of a breach or failure of the flood defences.

Appropriate and realistic flood mitigation measures based on flood characteristics at site.

Details of set back of the development from the riverbank / defence.

Confirmation that a safe route of access and egress with a 'very low flood hazard' rating in accordance with the guidance document '[FD2320 \(Flood Risk Assessment Guidance for New Developments\)](#)' is achievable.

For further information on our flood map products please visit our [website](#). Guidance on the content of a site-specific FRA can be found on the NPPG and at [gov.uk](#).

We can provide any flood risk information which we have available – such as predicted flood levels and historical flood data – for use in FRAs. Please contact our Customers and Engagement Team at [DCISEnquiries@environment-agency.gov.uk](mailto:DCISEnquiries@environment-agency.gov.uk) for further details.

## 1.6 Modelling

In some instances a detailed hydraulic model or flood modelling work may be necessary, in particular if there is no available data for the area of your planning application or to take into account correct climate change allowances. Please be aware that if you are required to carry out flood modelling as part of your proposal you will need to submit the flood model files to the LPA as part of your planning application, which will then need to be reviewed by us.

Where modelling is required, we advise you to contact us ahead of submitting your planning application to discuss your modelling requirements and avoid delays when you submit your planning application.

## 1.7 Climate Change Allowances

In order to demonstrate the risks to the proposal over its lifetime, a site-specific FRA must also consider the impact of climate change on future flood risks. The latest guidance on how to apply the correct, up to date climate change allowance for FRAs is available at [gov.uk](#).

## 1.8 Finished Floor Levels

Raising floor levels above the design flood level is the most effective means of ensuring development will not be subject to internal flooding. The finished floor levels of new buildings in areas at a high risk of flooding should be at least 300 millimetres above the design flood level, including an allowance for climate change. Where this cannot be achieved due to other planning constraints, we request that floor levels are set as high as possible (for extensions to existing buildings, no lower than the existing floor levels) and that flood resilience/resistance measures are considered, where appropriate, up to the design flood level.

Where floor levels cannot be raised sufficiently, consideration should be given to the use of flood resilient construction practices and materials in the design and build phase. Choice of materials and simple design modifications can make the development more resistant to flooding and reduce rehabilitation time in the event of future inundation. We may object unless it can be demonstrated that the safety of occupants can be managed by including other flood resilience/resistance measures up to the design flood level.

Detailed information on flood proofing and mitigation can be found on the gov.uk website in the documents [‘Improving the Flood performance of new buildings’](#) and [‘Prepare your property for flooding’](#).

### 1.9 Floodplain Compensation

Your FRA will need to demonstrate that any increase in built footprint within the 1 in 100 year plus climate change flood extent can be directly compensated for, on a volume-for-volume and level-for-level basis to prevent a loss of floodplain storage. If it is not possible to provide level for level flood plain compensation, other forms of mitigation may be considered if agreed with the LPA or there should be no increase in built footprint. It will also need to be demonstrated that the proposed development does not impact the flow and conveyance of water.

The use of voids, stilts or under-croft parking as mitigation for a loss in floodplain storage should be avoided, as they may become blocked over time by debris or domestic effects. We would not recommend these methods to the LPA as an acceptable means of compensation.

### 1.10 Safe Access

During a flood, the journey to safe, dry areas completely outside the 1 in 100 year plus climate change flood extent would involve crossing areas of potentially fast flowing water. Those evacuating on foot in areas where flooding exceeds 100 millimetres or so would be at risk from a wide range of hazards, including for example unmarked drops, or access chambers where the cover has been swept away.

Where safe access cannot be achieved, an emergency flood plan that deals with matters of evacuation and refuge to demonstrate that people will not be exposed to flood hazards should be submitted to and agreed with the LPA.

We recommend that you discuss safe access and egress routes with the local authority emergency planners, as they will be responsible for agreeing to any emergency plan submitted with your application.

### 1.11 Flood Defences

It should be demonstrated that any flood walls/defences are in good enough condition to protect the proposed development for its lifetime. This is usually 100 years for residential development. This should be submitted in the form of a survey and should include an assessment of any remedial works or flood defence replacement options required to protect the site from flooding for the lifetime of the development.

The FRA should assess the impacts of a failing flood defence (for example, a breach scenario) on the proposed development and demonstrate that there will not be an unacceptable risk of flooding.

### 1.12 Critical Drainage Areas

A Critical Drainage Area (CDA) is defined as an area (including areas within Flood Zone 1) which has critical drainage problems, as notified to the local planning authority by the Environment Agency. Within such areas developments may present significant risks of flooding on-site and/or off-site if surface water run-off is not effectively managed. Within CDAs development is therefore expected to meet tighter drainage standards. In accordance with Paragraph 167, footnote 55 of the NPPF, applicants for planning permission are required to submit an appropriate FRA when development is proposed in such locations.



The responsibility for determining whether surface water drainage proposals are appropriate rest with the relevant Lead Local Flood Authority (LLFA). There are four LLFAs within Devon and Cornwall (Cornwall Council, Devon County Council, Plymouth City Council and Torbay Council). The CDAs that have been notified in each LLFA area are listed below. For further information please contact the LLFAs directly.

<b>Cornwall LLFA</b> <a href="mailto:floodrisk@cornwall.gov.uk">floodrisk@cornwall.gov.uk</a>
Bodmin – Bude – Camborne, Pool, Illogan & Redruth – Falmouth & Penryn – Flexbury – Hayle – Helston – Launceston – Liskeard – Lostwithiel – Padstow – Penzance and Newlyn – Saltash (Latchbrook Leat) – St Austell – St Blazey – St Ives – Truro (Kenwyn, Allen & Tregolls Rd and Tinney) – Wadebridge
<b>Devon LLFA</b> <a href="mailto:floodrisk@devon.gov.uk">floodrisk@devon.gov.uk</a>
Ashburton – Axminster – Barnstaple (southwest and east) – Bideford – Bovey Tracey – Cullompton – Dawlish Warren – East the Water – Feniton – Fremington and Yelland – Holbeam Dam (River Lemon) – Holsworthy – Ilfracombe and Hele – Ivybridge – Kingsbridge – Modbury – Okehampton – Palmers Dam (River Harbourne) – Tavistock – Totnes (Bridgetown & Warlands) – Whimble
<b>Plymouth LLFA</b> <a href="mailto:FloodRiskTeam@plymouth.gov.uk">FloodRiskTeam@plymouth.gov.uk</a>
All areas of the city except Ennesettle, Whitleigh, Woolwell, Glenholt, Mainstone and Plymstock
<b>Torbay LLFA</b> <a href="mailto:highways@torbay.gov.uk">highways@torbay.gov.uk</a>
All areas of Torbay

### 1.13 Flood Risk Standing Advice for lower risk development

We have produced a series of standard comments for LPAs and applicants to refer to for lower risk development proposals. These comments replace direct consultation with us. These standard comments are known as Flood Risk Standing Advice (FRSA), and can be found on [gov.uk](http://gov.uk). We recommend that you view our standing advice in full before submitting the required information as part of a planning application. The LPA will then determine whether flood risk has been considered in line with FRSA recommendations.

Within Devon, Cornwall and Isles of Scilly Area we have also produced Local Flood Risk Standing Advice (LFRSA). The LFRSA covers non-major changes of use to residential uses (i.e. less than 10 dwellings) and replacement dwellings in areas at risk of flooding. We will issue the relevant LFRSA guidance notes directly to Local Planning Authorities when consulted on these proposals.

## Section 2: Main Rivers & Ecology

### 2.1 Flood Risk Activity Permit

The Environmental Permitting (England and Wales) Regulations 2016 require a permit to be obtained for any activities which will take place:

in, over or under a main river  
on or within 8 metres of the bank of a main river, or 16 metres if it is a tidal main river  
on or within 8 metres of any flood defence structure or culvert on a main river, or 16m for a tidal main river or sea defence  
involving quarrying or excavation within 16 metres of any main river, flood defence (including a remote defence) or culvert  
in a floodplain more than 8 metres from the riverbank, culvert or flood defence structure (16 metres if it is a tidal main river) without planning permission.

Flood risk activities can be classified as: Exclusions, Exemptions, Standard Rules or Bespoke. These are associated with the level of risk your proposed works may pose to people, property and the environment. Further guidance on applying for flood risk activity permits can be found [online](#).

To identify any Main Rivers in proximity to your proposed development please check our Flood Map for Planning.

Where a Flood Risk Activity Permit (FRAP) is required, it is unlikely that our consent will be granted for works that do not allow access for maintenance or repair purpose or that have an unacceptable impact on flood risk or the natural environment. The permanent retention of a continuous unobstructed area is an essential requirement for emergency access to the river for repairs to the bank and for future maintenance and/or improvement works.

Where development or works are proposed that would require a FRAP, it is recommended that detailed planning advice is obtained from us prior to the submission of a planning application. We may object to a planning application if we do not consider that we can issue a FRAP for a development as proposed. The determination of a planning application could be delayed until our concerns are resolved.

FRAPs are required irrespective of any planning permission and are not guaranteed. You should not assume that a permit will automatically be forthcoming once planning permission has been granted, and we advise you to consult with us at the earliest opportunity.

### 2.2 Ecological Enhancements & Biodiversity Net Gain

Paragraphs 174 and 179 of the National Planning Policy Framework (NPPF) recognise that the planning system should conserve and enhance the environment by minimising impacts on and providing net gains for biodiversity. If significant harm resulting from a development cannot be avoided, adequately mitigated, or as a last resort compensated for, planning permission should be refused.

We recommend that development proposals protect and enhance the local environment and seek opportunities to enhance ecology and provide Biodiversity Net Gains (BNG). The enhancement of

biodiversity in and around development should be led by a local understanding of ecological networks, and should seek to include:

- habitat restoration, re-creation and expansion;
- improved links between existing sites;
- buffering of existing important sites;
- new biodiversity features within development; and
- securing management for long term enhancement

### 2.3 River Naturalisation and Culverted Watercourses

Development on sites with existing culverts present opportunities for de-culverting as part of the proposal. Deculverting and river restoration will provide environmental improvements and contribute to the delivery of BNG, will help deliver [Water Framework Directive \(WFD\)](#) improvements and will also reduce the risk of flooding. We strongly recommend you consider all options to remove any culverted sections of watercourses as part of your development proposals, restoring the river to its natural state. If deculverting is not possible on the site we would expect to see adequate evidence for this.

We will object to any proposal to culvert main river watercourses. Development that involves culverting for land gain purposes is not sustainable. It works against the natural processes of watercourses and can exacerbate the risk of flooding and increase maintenance costs and complexity. It can also destroy wildlife habitats, hinder fish passage, reduce amenity value, interrupt the continuity of the linear corridor of a watercourse and affect channel stability. It can also significantly reduce resilience to the effects of drought, floods and pollution. Culverting an ordinary watercourse requires the prior consent of the Lead Local Flood Authority.

### 2.4 Buffer Zone

Development adjacent to main rivers should be designed with a naturalised buffer zone of at least 8 metres from the bank top or retaining wall to protect and enhance the conservation value of the watercourse and ensure access for flood defence maintenance. This increases to 16 metres for a tidal main river, and the requirement for a buffer zone also applies to culverted watercourses. Where such a buffer strip does not currently exist, we normally seek to ensure that it is established. In urban areas in particular, rivers have often been degraded by past development, and we expect that any new development should go some way to redress the balance.

The buffer zone should be designed and managed for the benefit of biodiversity and should be undisturbed by development with no fencing, footpaths or other structures. It should not include formal landscaping, and should include the planting of locally appropriate native species. Mowing regimes should be low intensity, allowing plants to flower. Light spill within the buffer zone from external artificial lights should be kept at an absolute minimum and be located and directed so that light levels of 0-2 lux are maintained. The buffer zone will help provide more space for flood waters, provide improved habitat for local biodiversity and allows access for any maintenance requirements.

We recommend that you submit a suitably scaled plan showing the distance of the new development from the watercourse.

## 2.5 Nature Conservation & Ecology Surveys

The presence of a main river on or within 8 metres of your proposed development site means an ecological survey should accompany your planning application to establish whether development is likely to have a detrimental impact on the biodiversity of the watercourse. We would not support development proposals if there was shown to be a likely detrimental impact on the water environment. In accordance with the NPPF, any development proposal should avoid significant harm to biodiversity and seek to provide a net gain in biodiversity. Opportunities to incorporate biodiversity in and around the development will be encouraged where appropriate, see examples in our [Estuary Edges Guidance](#).

If there is the potential for protected species or habitats to be present on or adjacent to the site, as part of your planning application you will need to undertake the necessary ecological surveys / assessments to determine if they are present. Where protected species and / or habitats are present, detailed assessments and mitigation measures may be necessary. We may offer advice in relation to water-based species and / or habitats that are within our remit.

Where protected species or habitats are present, works may also require licensing from Natural England and therefore we recommend you contact Natural England for their advice.

You can find a full list of protected sites, species and the precautions required for planning on the [GOV.UK](#) website.

## 2.6 Water Framework Directive (WFD)

With any development alongside watercourses, consideration should be given to the requirements of the [Water Framework Directive](#) (WFD) which includes causing no overall deterioration in water quality or the ecological status of any waterbody.

Proposed development in close proximity to watercourses may require a [WFD compliance assessment](#). This must assess any potential impacts on the watercourses and demonstrate that the required enhancements will be delivered. Any development that has the potential to cause deterioration in classification under WFD or that precludes the recommended actions from being delivered in the future is likely to be considered unacceptable to us. You will find actions associated with the WFD by searching for your watercourse on the [EA Catchment Data Explorer](#). For further guidance on undertaking a WFD compliance assessment, please refer to [gov.uk](#).

## 2.7 Non-native Species

Development and construction activities may increase the risk of spreading invasive species present within a proposed development site. Where the presence of invasive species is known or suspected, prior to the commencement of development (including ground clearance) we would expect a detailed method statement for the removal or long-term management /eradication of the invasive species on the site to be submitted to and approved in writing by the LPA. This will help prevent the spread while work is being carried out and consider the longer-term management. When visiting any site, work methods must include appropriate biosecurity measures (considered for all potential spread pathways) to prevent the spread and introduction of invasive non-native species in order to avoid contravention of the Wildlife and Countryside Act 1981. Without this, avoidable damage could be caused to the nature conservation value of a site.

## Section 3: Groundwater Quality and Contaminated Land

### 3.1 Land Affected by Contamination

The NPPF takes a precautionary approach to land contamination. Before the principle of development can be determined, land contamination should be investigated to see whether it could preclude certain development due to environmental risk or cost of remediation.

Where contamination is known or suspected, a desk study, site investigation, remediation and other works may be required to enable safe development (paragraph 183 of the NPPF). The minimum requirements for submission with a planning application are a preliminary risk assessment, such as a site walkover or desk top study.

Site Investigation and Remediation Strategy reports may be required for submission with a planning application for sensitive land use types or where significant contamination or uncertainty is found. Where these reports are missing or where they do not demonstrate no adverse impact on the environment, we are likely to raise an objection to the planning application.

If during site works contaminated material is suspected, you are advised to stop works and seek further guidance. Remediation of contaminated land may require a permit under Environmental Permitting Regulations.

When dealing with land affected by contamination, developers should follow the risk management framework provided in 'Model procedures for the management of land contamination' ([CLR11](#)).

Please also note that any surface water drainage system must not pose a risk to groundwater quality and must not be constructed in ground affected by contamination.

Further guidance can be found at:

What is [contaminated land](#)?

[NPPF: Land affected by contamination](#)

[Environment Agency Land contamination: technical guidance](#)

[Land contamination risk assessment](#)

We recommend you contact your Local Authority's Environmental Health team who may hold records on known/potential land contamination. Please note our primary concern is with regards to water quality. Your Local Authority's Environmental Health team will advise you on issues related to human health.

### 3.2 Groundwater Protection

Our [groundwater protection position statements](#) set out our position on groundwater protection for a wide range of activities and developments. These cover both planning and permitting.

We have defined Source Protection Zones (SPZs) for 2000 groundwater sources such as wells, boreholes and springs used across the country for public drinking water supply. These zones are more vulnerable to contamination from activities that might cause pollution in the area. The closer the activity to groundwater, the greater the risk.

To see if your proposed development is located within a Source Protection Zone, please use our [online map](#).

We will **object** to the following developments within **SPZ1** in line with our groundwater protection position statements:

- large-scale above or below ground storage of hazardous substances (as may occur at a chemical works or at a petrol filling station)
- new development of non-landfill waste operations where the operation poses an intrinsic hazard to groundwater, for example deposit of waste for recovery activities.
- landspreading of sludge or liquid waste containing significant concentrations of pollutants.
- the locating of any new cemetery or the extension of any existing cemetery, within SPZ1, or 250 metres from a well, borehole or spring used to supply water that is used for human consumption, whichever is the greater distance.

### 3.3 Cemeteries

Development proposals for cemeteries should be avoided in areas where they present a high risk to the water environment. A [groundwater risk assessment](#) should be undertaken to accompany any planning application for a proposed burial site. This should show that there are minimal risks to the environment either at the time of burial, or in the future.

From 1 April 2022, cemeteries with the highest environmental risk are also controlled through the permitting system under the Environmental Permitting (England and Wales) Regulations 2016. If you need to apply for an environmental permit, you must also provide a risk assessment as part of your application.

More information and guidance can be found on the following GOV.UK pages:

[protecting groundwater from human burials](#)

['The Environment Agency's approach to groundwater protection](#) – specifically Section L: Cemetery developments

### 3.4 Surface Water Drainage

We recommend the use of Sustainable Drainage Systems (SuDS). These techniques can provide a method for reducing runoff that could otherwise lead to flooding. They can also minimise pollution impacts, improve biodiversity and provide amenity areas.

Where infiltration drainage is proposed, it must be demonstrated that it will not pose a risk to groundwater quality. Infiltration should not be focused in areas where ground contamination has been identified. Surface water infiltrating through contaminated ground can mobilise contaminants and result in pollution of the groundwater. Where necessary, we will seek to control the depths of soakaway systems by recommending maximum penetration depths and a requirement that the water table should not be intersected. In general, groups of shallow soakaways are preferable to one or two deep boreholes.

Where infiltration SuDS are to be used for surface run-off from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of

groundwater. For the immediate drainage catchment areas used for handling and storage of chemicals and fuel, handling and storage of waste and lorry, bus and coach parking or turning areas, infiltration SuDS are not permitted without an environmental permit.

Please note that we cannot issue an environmental permit for the direct discharge of hazardous substances into groundwater.

Further guidance can be found in our [groundwater protection position statements](#) and the updated [CIRIA SUDs manual](#).

Sustainable Drainage Systems (SuDS) should always be carefully considered in discussions with the Lead Local Flood Authority, who are responsible for providing advice on the management of surface water drainage. You should consult them for their comments on your proposal.

## Section 4: Foul Water Drainage & Water Resources

### 4.1 Foul Water Drainage

Government guidance contained within the [NPPG](#) (Water supply, wastewater and water quality – considerations for planning applications, paragraph 020) sets out a hierarchy of drainage options that must be considered and discounted in the following order:

1. Connection to the public sewer
2. Package sewage treatment plant (adopted in due course by the sewerage company or owned and operated under a new appointment or variation)
3. Septic tank

The first presumption must be to provide a system of foul drainage discharging into a public sewer to be treated at a public sewage treatment works. Only where an applicant can demonstrate to the satisfaction of the LPA that connection to a public sewer is not feasible due to the cost and / or practicability should a non-mains foul sewage disposal solution be considered.

The NPPG states that ‘applications for developments relying on anything other than connection to a public sewage treatment plant should be supported by sufficient information to understand the potential implications for the water environment’. Any planning application which includes a non-mains system should therefore be accompanied by a [foul drainage assessment form](#) (FDA) which provides sufficient information for an assessment to be made of the risks of pollution to the water environment. For the proposal to be acceptable the FDA will need to demonstrate that the proposed system will be viable and will not be detrimental to the water environment.

Where the proposed development involves the connection of foul drainage to an existing non-mains drainage system, the applicant should ensure that it is in a good state of repair, regularly de-sludged and of sufficient capacity to deal with any potential increase in flow and loading which may occur as a result of the development. We have provided [guidance](#) to LPAs on non-mains drainage from non-major development to help them determine these planning applications.

Further information on septic tanks and treatment plants can be found [here](#).

## 4.2 Trade Effluent

Effluent discharged from any premises operating as a trade or industry, and effluent generated by a commercial enterprise where the effluent is different to that which would arise from domestic activities in a normal home, is described as trade effluent.

If you wish to discharge a trade effluent to groundwater or surface water via a non-mains system, you will require a permit under the Environmental Permitting Regulations.

If you wish to discharge a trade effluent to the public sewer, or a private sewer that connects to a public foul sewer, a trade effluent consent or a trade effluent agreement with your water and sewerage company must be obtained before you do so.

If you are not able to discharge effluent it will be classed as waste and you must then comply with your duty of care responsibilities.

## 4.3 Environmental Permitting Regulations (Foul Drainage and Trade Effluent)

Environmental Permitting Regulations require any discharge of sewage or trade effluent made to either surface water or groundwater to be registered as an exempt discharge activity or hold a permit issued by the Environment Agency, additional to planning permission. This applies to any discharge to inland freshwaters, coastal waters or relevant territorial waters.

The granting of planning permission does not guarantee the granting of an Environmental Permit. Upon receipt of a correctly filled in application form we will carry out an assessment. It can take up to 4 months before we are able to decide whether to grant a permit or not.

Where a pre-existing non-mains drainage system is covered by a permit to discharge then an application to vary the permit will need to be made to reflect the increase in volume being discharged. It can take up to 13 weeks before we decide whether to vary a permit.

## 4.4 Water Resources

All new homes are required to meet the mandatory national water efficiency standard for consumption as set out in the [Building Regulations](#) of 125 litres/person/day. In some water-stressed areas, LPAs have adopted policies in their Local Plans that require developers to apply the tighter Building Regulations optional requirement of 110 litres/person/day. While the use of the tighter consumption requirement is not required everywhere, we still recommend developers apply it where possible to ensure their schemes minimise their impact on the environment as much as possible by reducing demand for water.

We suggest you submit a [water efficiency calculator](#) report, or equivalent information, at the planning stage to demonstrate compliance with this standard. Achieving these targets can be done with existing technology by installing efficient showerheads, spray taps and low flush toilets. Complex greywater recycling and rainwater harvesting schemes are not typically required to adhere to this water efficiency standard.

We also recommend that new non-residential commercial buildings are required to achieve a BREEAM 'excellent' rating for water efficiency (or an equivalent rating with any successors).

Older buildings are often the least efficient in resource use. We strongly recommend the retrofitting of existing buildings where opportunities arise through refurbishments and changes of use. There



are a number of [BREEAM Technical Standards](#) documents to support retrofitting for commercial and residential buildings.

## Section 5: Waste

### 5.1 Development Close to an Existing Permitted Sites

New development in close proximity to an existing waste facility could result in the community at the proposed development being exposed to odour, noise, dust and pest impacts. The severity of these impacts will depend on the size of the facility, the nature of the waste it takes and prevailing weather conditions. If the site operator can demonstrate that they have taken all reasonable precautions to mitigate these impacts, the facility and community may co-exist, with some residual impacts. In some cases, these residual impacts may cause local residents concern, and there are limits to the mitigation the operator can apply. Only in very exceptional circumstances would we revoke the operators permit.

Generally, sensitive development (e.g. occupied buildings) within 50m of such a facility is unacceptable because of the potential impacts to residents that may not be able to be mitigated. If any development is proposed within 50m of such a site at the planning application stage, we may object to the application on this basis.

### 5.2 Waste Management

The CL:AIRE Definition of Waste: Development Industry Code of Practice (version 2) provides operators with a framework for determining whether or not excavated material arising from site during remediation and/ or land development works are waste or have ceased to be waste. Under the Code of Practice:

- excavated materials that are recovered via a treatment operation can be re-used on-site providing they are treated to a standard such that they fit for purpose and unlikely to cause pollution
- treated materials can be transferred between sites as part of a hub and cluster project
- some naturally occurring clean material can be transferred directly between sites

Developers should ensure that all contaminated materials are adequately characterised both chemically and physically, and that the permitting status of any proposed on-site operations are clear. If in doubt, the Environment Agency should be contacted for advice at an early stage to avoid any delays.

We recommend that developers should refer to:

- the position statement on the Definition of Waste: Development Industry Code of Practice
- The waste management page on GOV.UK

### 5.3 Waste To Be Taken Off-Site

Contaminated soil that is (or must be) disposed of is waste. Therefore, its handling, transport, treatment and disposal are subject to waste management legislation, which includes:

- Duty of Care Regulations 1991
- Hazardous Waste (England and Wales) Regulations 2005
- Environmental Permitting (England and Wales) Regulations 2016
- The Waste (England and Wales) Regulations 2011

Developers should ensure that all contaminated materials are adequately characterised both chemically and physically in line with British Standard BS EN 14899:2005 'Characterization of Waste - Sampling of Waste Materials - Framework for the Preparation and Application of a Sampling Plan' and that the permitting status of any proposed treatment or disposal activity is clear. If in doubt, the Environment Agency should be contacted for advice at an early stage to avoid any delays.

If the total quantity of hazardous waste material produced or taken off-site is 500kg or greater in any 12 month period, the developer will need to register with us as a hazardous waste producer. Refer to the hazardous waste pages on gov.uk for more information.

## 5.4 Environmental Permitting Regulations (Waste)

To see if your proposed development requires an Environmental Permit under the Environmental Permitting Regulations please refer to [gov.uk](http://gov.uk).

As planning and permitting decisions are often closely linked, we have issued [detailed guidance for developments requiring planning permission and environmental permits](#). This guidance explains how, when responding to planning consultations that require environmental permits, we will advise of three possible positions:

No major permitting concerns

More detailed consideration is required and parallel tracking is recommended

Don't proceed – unlikely to grant a permit

We advise joint discussions with the applicant, planning authority and ourselves, as well as parallel tracking of the planning and permit applications where possible. Parallel tracking planning and environmental permit applications offers the best option for ensuring that all issues can be identified and resolved, where possible, at the earliest possible stages. This will avoid the potential need for amendments to the planning application post-permission.

## Section 6: Agricultural Development

### 6.1 Agricultural Buildings

If the buildings are to be used for livestock housing, the operator must ensure that they comply with the relevant regulations regarding the storage of slurry and silage. Any increase in the numbers of livestock may require the construction or expansion of slurry and silage storage facilities.

The operator should ensure that they comply with the requirements of The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010, commonly known as the 'SSAFO regs', and the storage requirements of The Nitrate Pollution Prevention Regulations 2015, commonly known as the 'NVZ regs'.

### 6.2 Slurry Storage

If your livestock produces slurry, you must be able to store the slurry produced in accordance with the regulations on capacity, construction, and the associated calculations and records.

Depending on the relevant regulations, slurry stores must have the capacity to store:

4, 5 or 6 months of slurry;  
rainfall expected to enter the store during the storage period including yards and roofs; and  
any wash water or other liquids that enter the store during that period.

If you have poultry manure or other types of solid manure you must store them:

in a vessel;  
on an impermeable base, with appropriate collection and containment of runoff;  
in a roofed building; or  
in an appropriately located temporary field heap.

If you build a new facility for storing organic manure (i.e. slurry stores or impermeable bases for solid manure) and/or if you substantially reconstruct or enlarge your existing facilities, you must:

comply with standards set down in the SSAFO Regulations, and  
notify the Environment Agency in writing about your intention to build a new store, or  
substantially enlarge or reconstruct an existing store at least 14 days before you start  
construction or reconstruction works.

### 6.3 Silage Storage

All parts of a silo must be resistant to attack. Your silo must have:

an impermeable base extending beyond any walls  
impermeable drainage collection channels around the outside, flowing into an appropriately  
sized effluent tank

Further guidance is available at [gov.uk](http://gov.uk).

#### Disclaimer

Please note that this document is a response to a pre-application enquiry only and does not represent our final view in relation to any future planning application made in relation to any site. We reserve the right to change our position in relation to any such application. This response is based on current planning policy, associated legislation, and environmental data/information. If any of these elements change in the future then we may need to reconsider our position.

As part of this preliminary response we have not technically reviewed any documents. You should seek your own expert advice in relation to technical matters relevant to any planning application before submission.

If you have any questions please contact the Devon, Cornwall & Isles of Scilly Sustainable Places team: [SPDC@environment-agency.gov.uk](mailto:SPDC@environment-agency.gov.uk)

# FIRST

Please check the latest Climate Change allowance :-

[Flood risk assessments: climate change allowances - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/612224/Climate_Change_Allowances_-_GOV.UK.pdf)

We expect you to use the scenario values as shown on the adjacent table for the different types of development. You may provide different scenario ( i.e. High Cen for SLR) as additional assessment but we will use these values/allowances for our assessments of FRA/Designs

\*CFB = Coastal Flood Boundary – available at [data.gov.uk](https://data.gov.uk)

Valid May 2022 – FCRM

## DCIS Climate Change Allowances – Strategic and Development Planning

Development Vulnerability NPPG	Rainfall 1% Storms		River Less than 5km2		Fluvial	Sea Level Rise (SLR) Upper End
	Exe & East Devon	All others	Urban	Rural		
					Use 2080s values for all	Added to CFB* 2017 data
Commercial 60yr lifetime	30%	30%	30%	? - tbc	Central Allowance- See map next page	0.74m (2082 value)
Residential 100yr lifetime	45%	50%	50%	? - tbc	Central Allowance - see map next page	1.445m (2122 value)
Essential Infrastructure	45%	50%	50%	? - tbc	Higher Central - See map next page	Please confirm with EA office

SPDC@environment-agency.gov.uk or SW\_Exeter-PSO@environment-agency.gov.uk



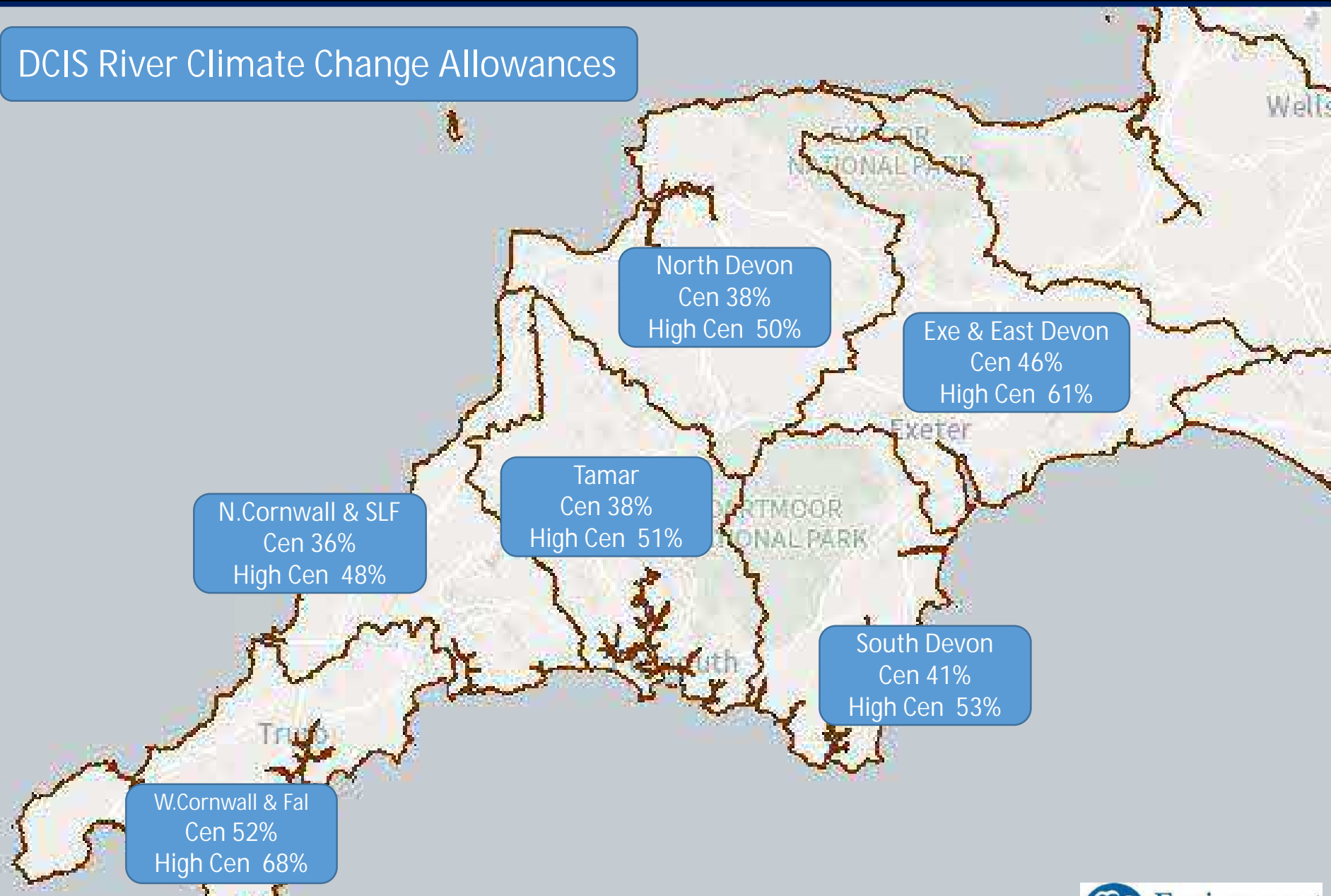
# FIRST

Please check the latest Climate Change allowance :-

Flood risk assessments:  
climate change allowances - GOV.UK  
([www.gov.uk](http://www.gov.uk))

- Wave Actions (Coastal & Estuary) will also have to be considered
- Freeboard will need to be added to set minimum floor or defence levels
- +40%CC Modelled scenarios, may still be used for some catchments (>5% diff from new values).

## DCIS River Climate Change Allowances



Valid May 2022 - FCRM

SPDC@environment-agency.gov.uk or SW\_Exeter-PSO@environment-agency.gov.uk

## Use of Environment Agency Information for Flood Risk / Flood Consequence Assessments

### **Important**

If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:-

<http://www.environment-agency.gov.uk/research/planning/33580.aspx>

Depending on the enquiry, we may also provide advice on other issues related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In **England**, you should refer to the Environment Agency's Flood Risk Standing Advice, the technical guidance to the National Planning Policy Framework and the existing PPS25 Practice Guide for information about what flood risk assessment is needed for new development in the different Flood Zones. These documents can be accessed via:

<http://www.environment-agency.gov.uk/research/planning/82587.aspx>

<http://www.communities.gov.uk/publications/planningandbuilding/nppftechnicalguidance>

<http://www.communities.gov.uk/publications/planningandbuilding/pps25guideupdate>

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

In **Wales**, you should refer to TAN15 for information about what flood consequence assessment is needed for new development in the different flood zones

<http://new.wales.gov.uk/splash;jsessionid=8yIGTfGZthmB0t2vhp6hS1GcB1LXvZzB3Ylczf20Xn7LK3zK0nMk!981825250?orig=/topics/planning/policy/tans/tan15/>

You should also consult the Strategic Flood Consequence Assessment if one has been produced by your local planning authority.

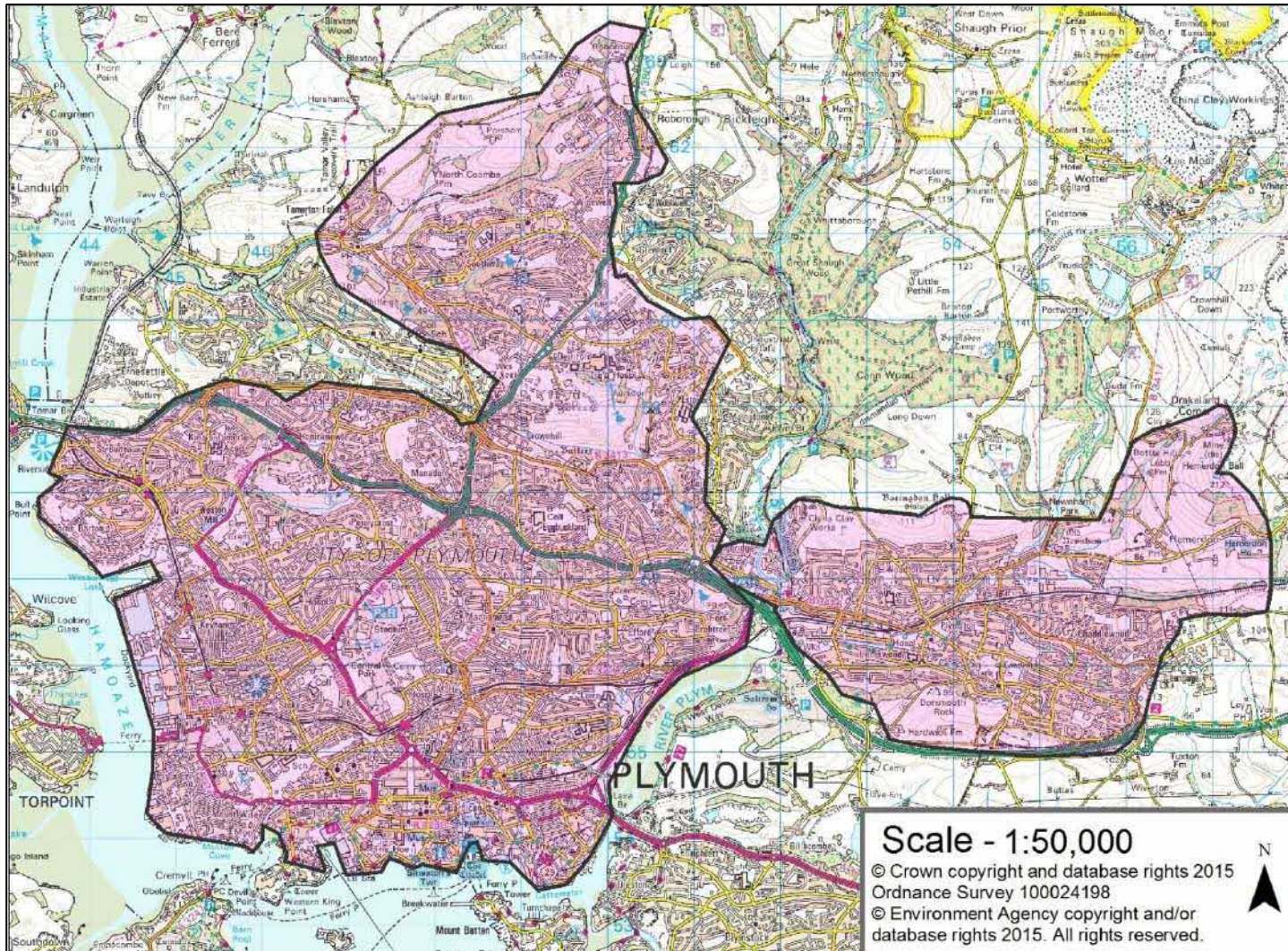
In both **England and Wales** you should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk / Consequence Assessment (FRA / FCA) where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or overland runoff. The information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires a FRA / FCA and this is not submitted or deficient, the Environment Agency may well raise an objection.
4. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your local planning authority.

# Critical Drainage Area (CDA)

## DEVON – Plymouth

May 2015





## Catchment Drainage / Flooding Issues

Many catchments within the City of Plymouth are small, steep and heavily urbanised making them prone to 'flash' flooding during heavy rainfall events. Other critical drainage problems include flooding and water quality problems resulting from the reliance on combined drainage systems (where surface water uses the same pipes as foul water) in many areas of the City and flooding associated with high tides restricting the discharge of surface water from low lying land.

Climate change predictions, which indicate that the frequency and intensity of short, heavy rain storms will increase, will mean these problems are likely to be exacerbated.

These critical drainage problems necessitate additional measures to manage surface water flood risk and the management of water quality, particularly in relation to Plymouth's designated bathing waters and Water Framework Directive objectives. New surface water drainage connections should not be made to the combined drainage system and we are working together with Plymouth City Council and South West Water to deliver new surface water networks in order to provide appropriate connection points for new developments.

## Minimum Drainage Standards Required

All new developments will have to play their part in reducing current rainfall runoff rates. This requirement also applies to brownfield sites that will have to match the same standards. The surface water drainage hierarchy should be followed by using infiltration as far as is practicable. Further guidance on such systems can be found in the CIRIA SuDS Manual and in Lead Local Flood Authority guidance.

All off-site surface water discharges from developments should mimic greenfield performance up to a maximum 1 in 10 year discharge rate. On site all surface water should be safely managed up to the 1 in 100 plus climate change conditions. This will require additional water storage areas to be created thereby contributing to a reduction in flooding downstream.



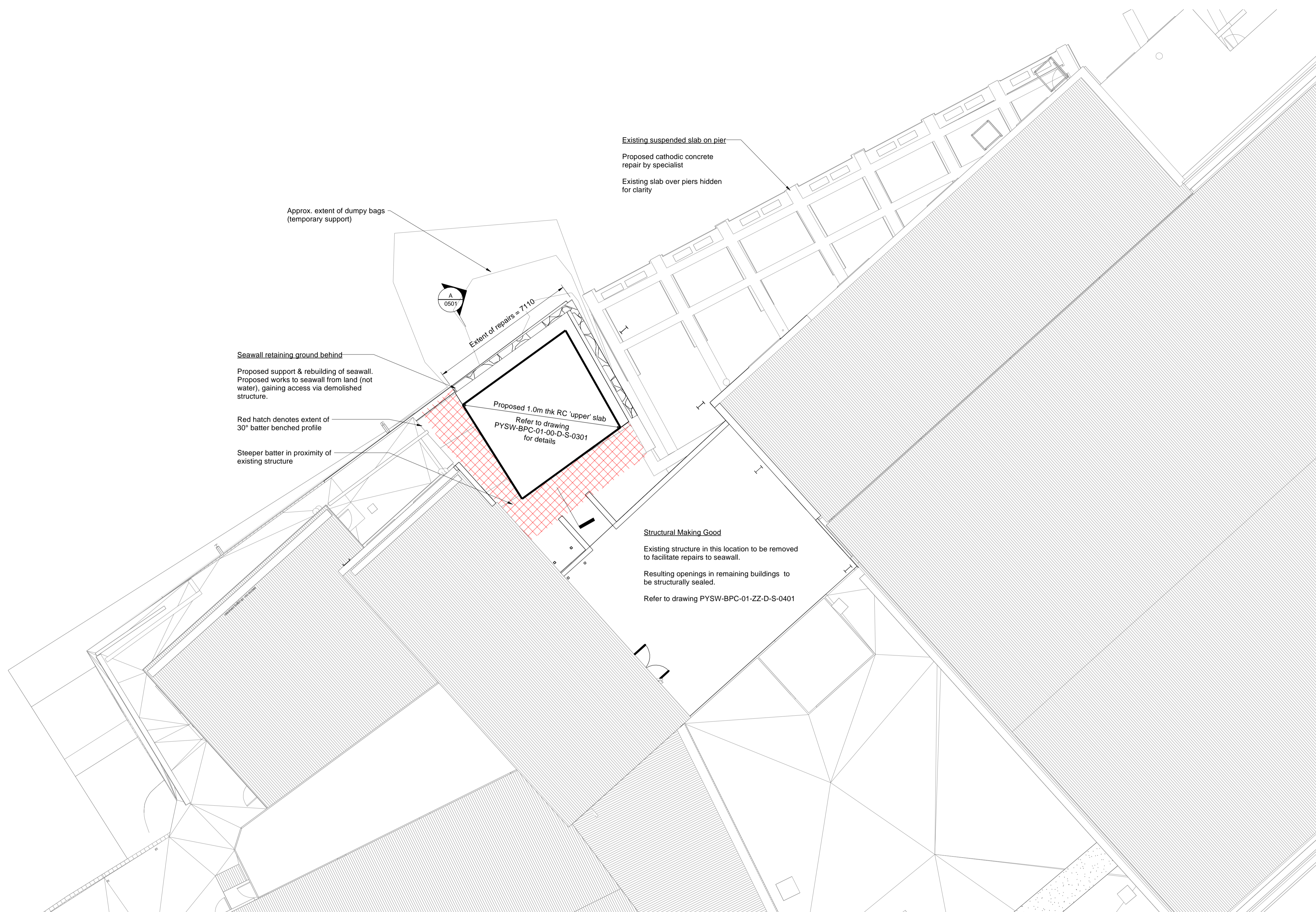
# Appendix B

Proposed Layout Plan and Sections

**Notes**

1. Do not scale, work to figured dimensions only.
2. All materials used in connection with this design must:
  - not be deleterious to health & safety or adversely affect durability of the construction, and
  - where applicable, be in accordance with current British Standards, Codes of Practice and good building practice.
3. Drawing to be read in conjunction with drawing No.(s):
 

PYSW-BPC-01-00-D-S-1601	Service Trench Cover Slab
PYSW-BPC-01-00-D-S-0201	Repair Phasing & Overview GA
PYSW-BPC-01-00-D-S-0301	Seawall Repair GA
PYSW-BPC-01-ZZ-D-S-0501	Seawall Repair Sections
PYSW-BPC-01-00-D-S-8101	Seawall Repair Pile Cap RC
PYSW-BPC-01-ZZ-D-S-0401	Temporary Infill Elevations
4. For setting out, waterproofing, fire proofing details and finishes, refer to Architect's drawings.



**Repair Overview GA**  
1 : 100

Rev	Description	By/Chk'd/App'd	Date
P02	Preliminary Issue (updated)	RB / BB / BB	21/11/2023
P01	Preliminary Issue	RB / BB / BB	10/11/2023

Client  
**Princess Yachts**

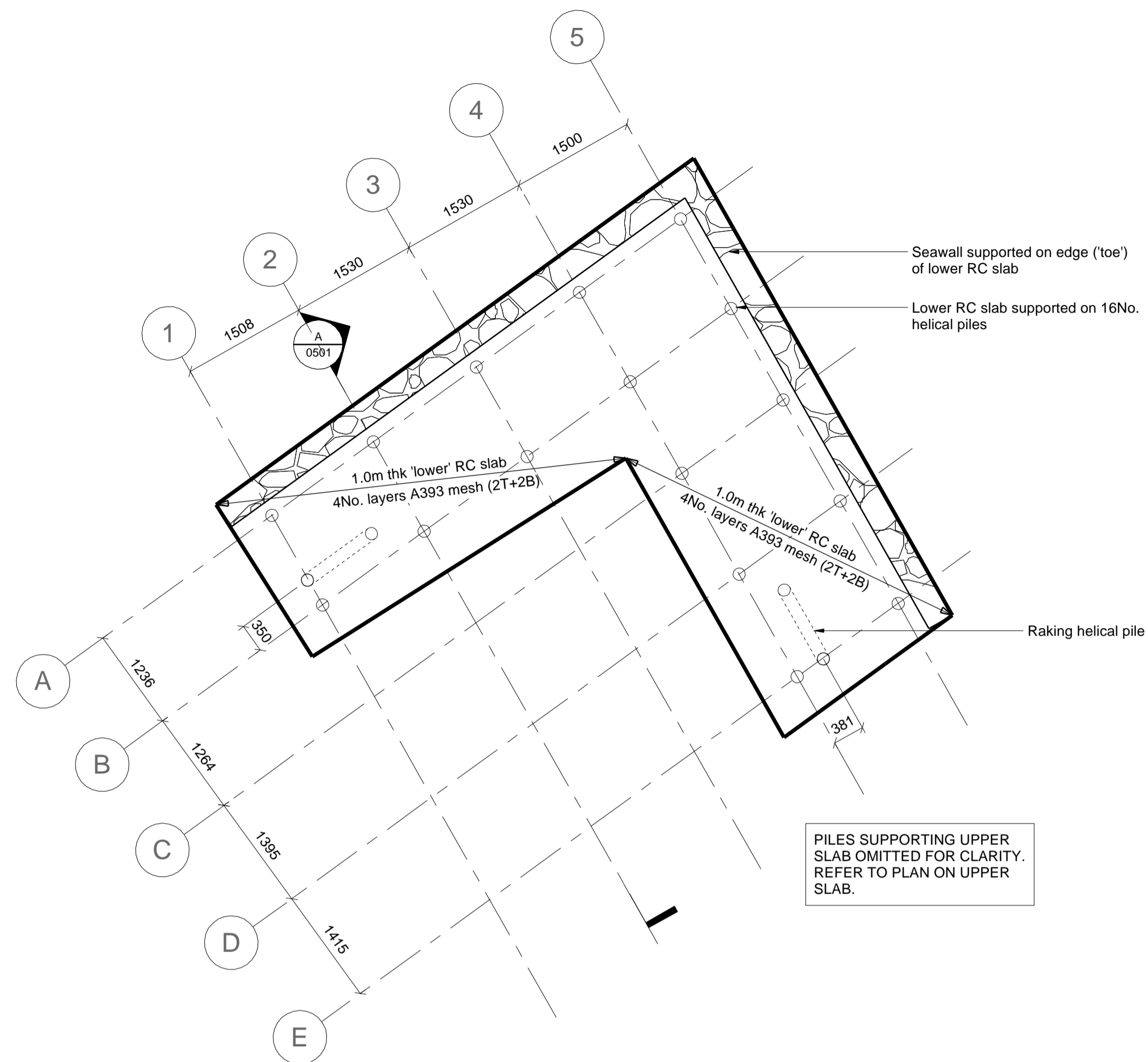
Project  
**Princess Yachts**

Drawing Title  
**Repair Phasing & Overview GA**

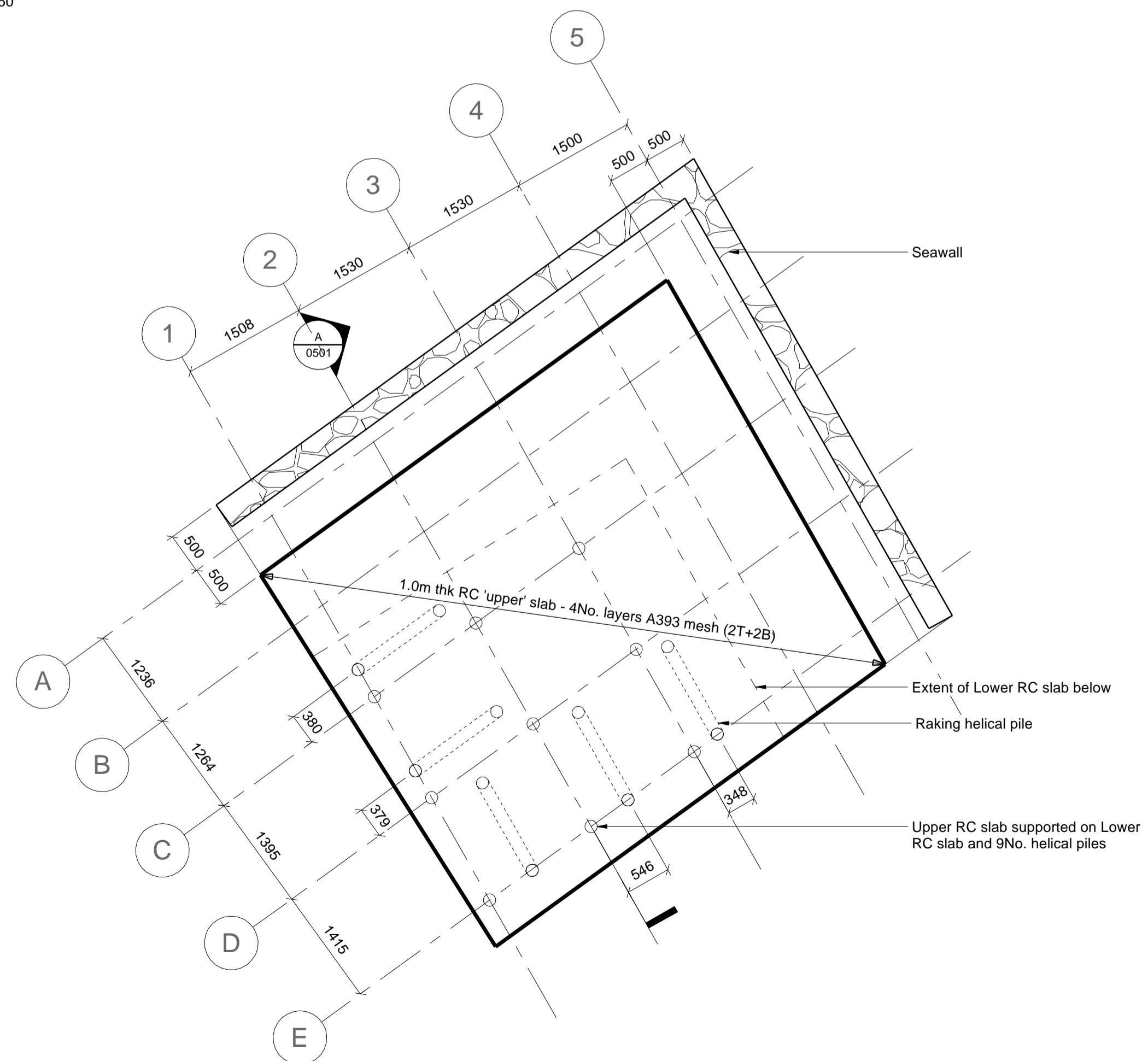
Suitability Status Code - Description  
**S2 - Information**

Internal Project No.	Scale @ A1	Revision
<b>34146</b>	<b>1 : 100</b>	<b>P02</b>

Drawing Identifier  
Project Code - Discipline - Function - Space - Form - Discipline - Number  
**PYSW - BPC - 01 - 00 - D - S - 0201**



Lower Slab GA  
1 : 50



Upper Slab GA  
1 : 50

Notes

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- Drawing to be read in conjunction with drawing No.(s):
 

PYSW-BPC-01-00-D-S-1601	Service Trench Cover Slab
PYSW-BPC-01-00-D-S-0201	Repair Phasing & Overview GA
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PYSW-BPC-01-ZZ-D-S-0501	Seawall Repair Sections
PYSW-BPC-01-00-D-S-8101	Seawall Repair Pile Cap RC
PYSW-BPC-01-ZZ-D-S-0401	Temporary Infill Elevations
- For setting out, waterproofing, fire proofing details and finishes, refer to Architect's drawings.

P02	Preliminary Issue (updated)	RB / BB / BB	21/11/2023
P01	Preliminary Issue	RB / BB / BB	10/11/2023
Rev	Description	By/Chk'd/App'd	Date

Client  
**Princess Yachts**

Project  
**Princess Yachts**

Drawing Title  
**Seawall Repair GA**

Suitability Status Code - Description  
**S2 - Information**

Internal Project No. <b>34146</b>	Scale @ A1 <b>1 : 50</b>	Revision <b>P02</b>
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Drawing Identifier  
**PYSW - BPC - 01 - 00 - D - S - 0301**

Safety, Health & Environmental Information		
Ref	Summary	Actions taken & comments
01	Unexploded Ordnance	1st Line Defence report DA11781-00 advises the works are in a Medium Risk area of the site, and appropriate precautions should be taken while carrying out works.
02	Contaminated Land	SW Geotechnical Report No.12033 advises that 'a strong hydrocarbon odour was noted below 2.80mbgl in BH13 [a nearby borehole]'. PYSW-BPC-01-00-D-S-1601 Service Trench Cover Slab PYSW-BPC-01-00-D-S-0201 Repair Phasing & Overview GA PYSW-BPC-01-ZZ-D-S-0301 Seawall Repair GA PYSW-BPC-01-ZZ-D-S-0501 Seawall Repair Sections PYSW-BPC-01-00-D-S-8101 Seawall Repair Pile Cap RC PYSW-BPC-01-ZZ-D-S-0401 Temporary Infill Elevations

**Notes**

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- Drawing to be read in conjunction with drawing No.(s):
  - PYSW-BPC-01-00-D-S-1601 Service Trench Cover Slab
  - PYSW-BPC-01-00-D-S-0201 Repair Phasing & Overview GA
  - PYSW-BPC-01-ZZ-D-S-0301 Seawall Repair GA
  - PYSW-BPC-01-ZZ-D-S-0501 Seawall Repair Sections
  - PYSW-BPC-01-00-D-S-8101 Seawall Repair Pile Cap RC
  - PYSW-BPC-01-ZZ-D-S-0401 Temporary Infill Elevations
- For setting out, waterproofing, fire proofing details and finishes, refer to Architect's drawings.
- Locations of existing services shown are indicative and provided for information only. Contractor to verify and establish the actual position of mains, pipes, cables, services and other apparatus onsite before any activities are undertaken.
- Retaining wall designed for a uniformly distributed surcharge load of 5kN/m<sup>2</sup>.
- Tidal flap and weephole:
  - 160mm dia hole drilled through masonry stonework to accommodate 150dia HDPE pipe forming weephole.
  - Tidal flap is finished black Plascoat PPA571 to provide resistance against UV light, salt spray and atmospheric pollutants and bolted to face of masonry stonework with 4No. M16 Hilti HIT-V-R anchors and HY2790 resin and bedded with non-shrink grout. Separation washers to be installed between stainless steel anchors and iron tidal flap.
  - End of weephole at internal face of wall fitted with formed plastic mesh cap to prevent loss of fines.

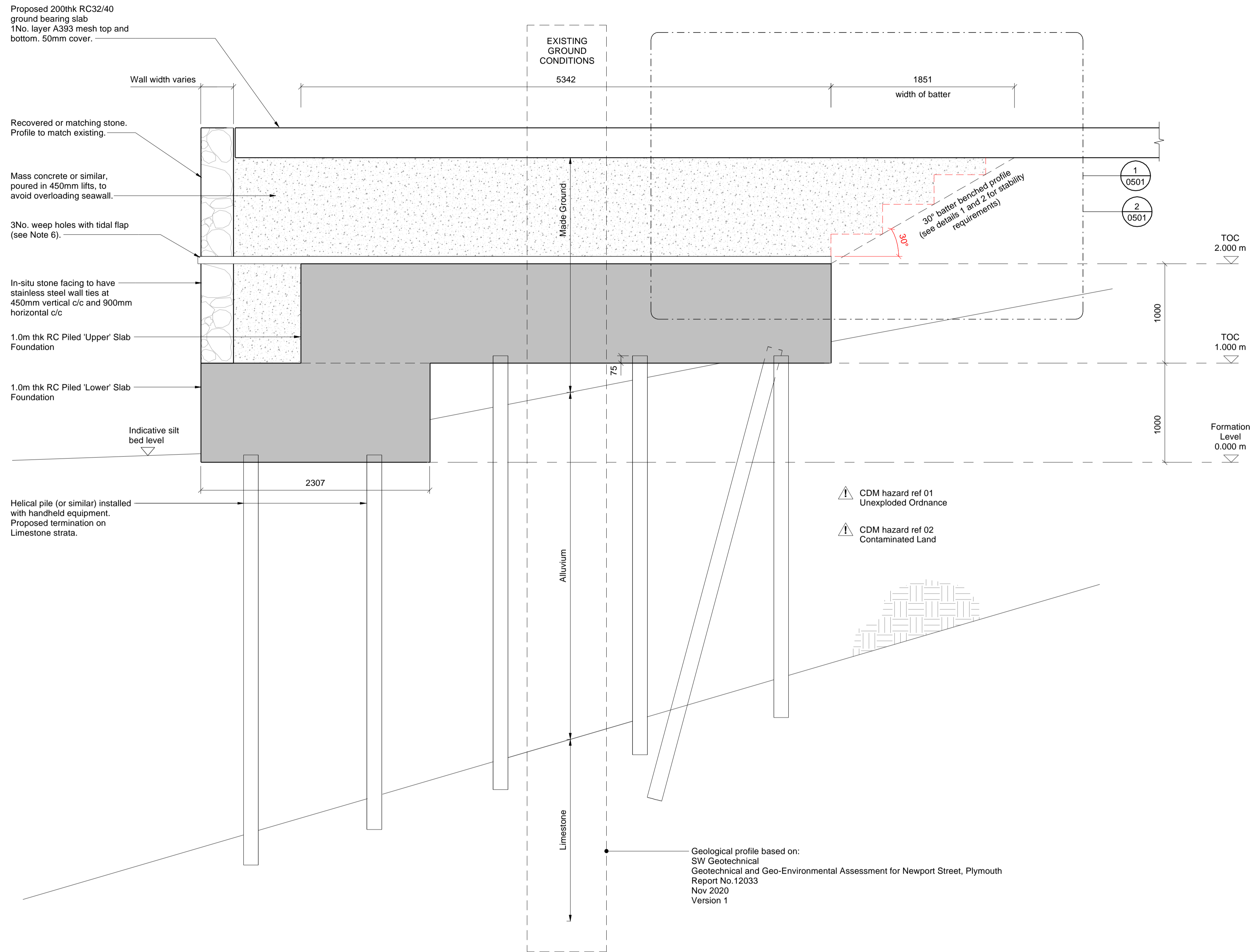
**Concrete:**

- Concrete grades to BS 8500
- For prescribed and designated mixes, concrete producers must hold current conformity certification together with an accredited quality system complying with BS EN 9001.
- Concrete to be fully compacted to full depth to remove entrapped air.
- Exposed concrete surfaces to be maintained above 5°C in cold conditions to avoid frost damage, and covered in hot sunny conditions to eliminate excess evaporation throughout the curing period.
- Exposed edges of concrete to have 25x25 chamfer or 6mm radius edging trowel finish.

**Reinforcement:**

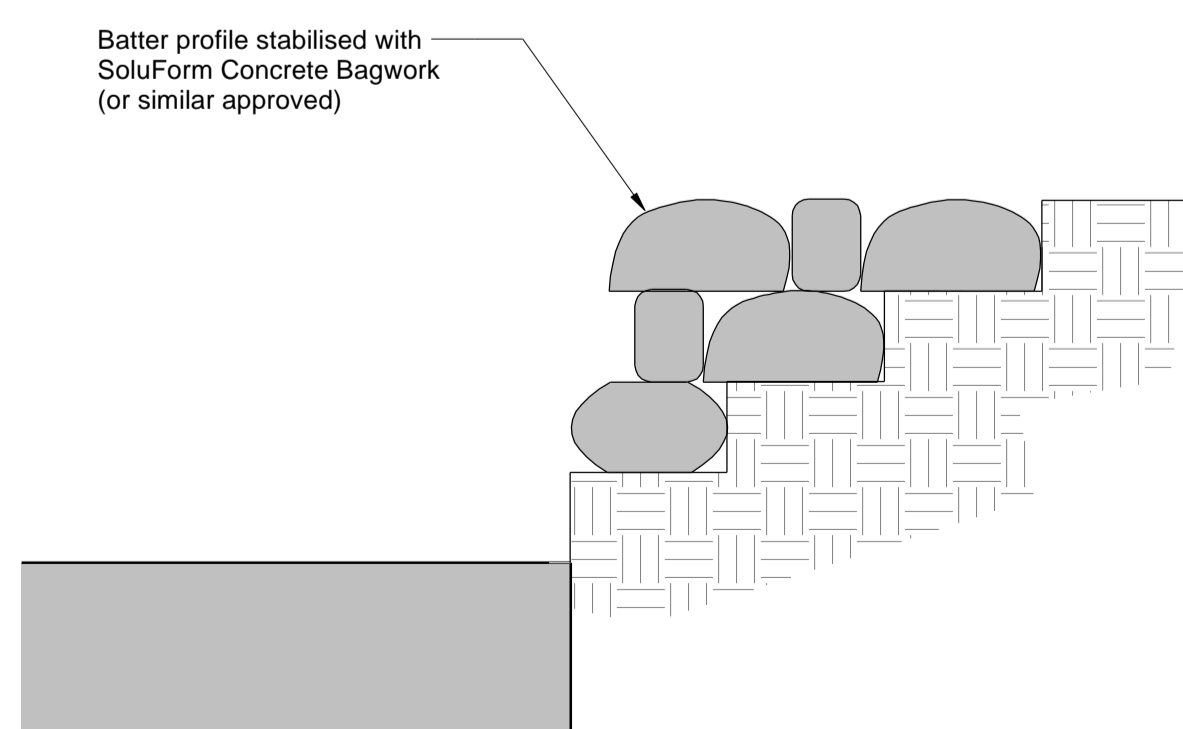
- Steel reinforcement is to be obtained from a supplier registered under CARES.
- Concrete cover to reinforcement to be 65mm to top and side faces and 75mm to bottom face of RC pile foundation.
- Contractor to provide proprietary chairs/spacers, sufficient to maintain cover and to support weight of personnel.
- Contractor to provide protective caps to all reinforcement starter bars to prevent injury to personnel.
- Refer to drawing 33017-BPC-XX-XX-DR-S-1610 for reinforcement details and bar bending schedule.

P02	Preliminary Issue (updated)	RB / BB / BB	2/11/2023
P01	Preliminary Issue	RB / BB / BB	10/11/2023
Rev	Description	By/Chk'd/App'd	Date



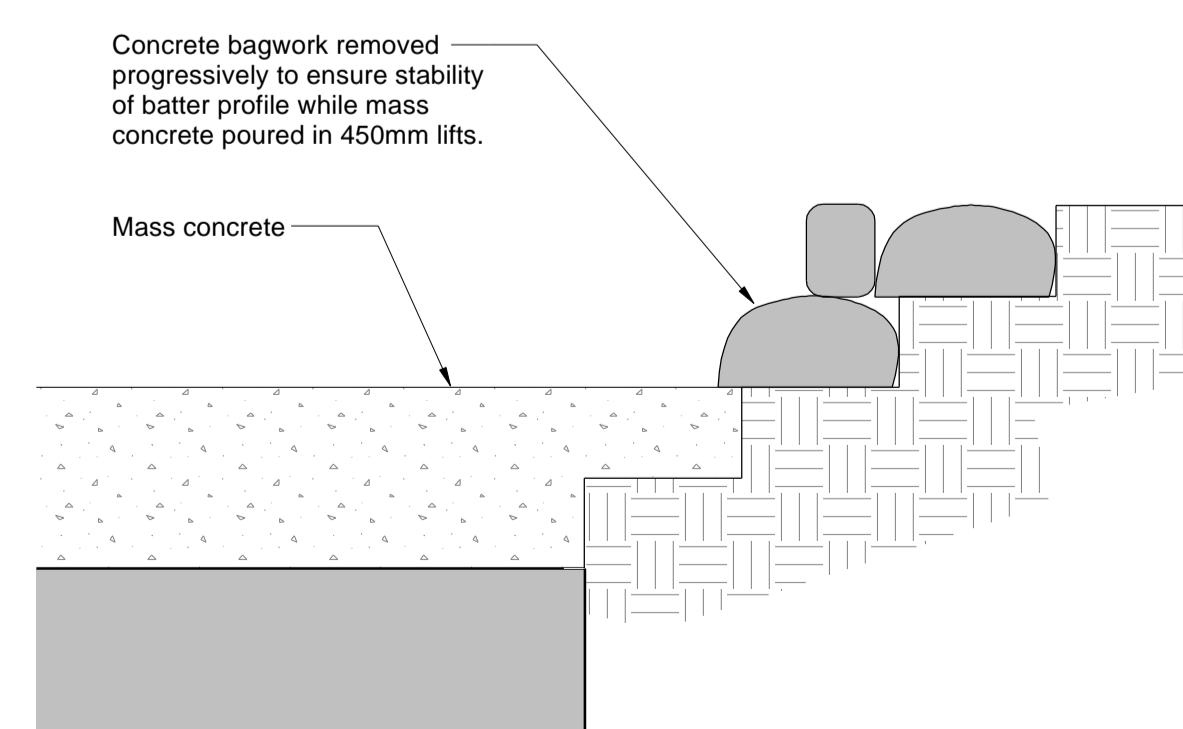
**Section A**

1 : 25



**Detail 1: Batter Stability - Fully Excavated**

1 : 25



**Detail 2: Batter Stability - Partially Infilled**

1 : 25

Client  
**Princess Yachts**

Project  
**Princess Yachts**

Drawing Title  
**Seawall Repair Sections**

Suitability Status Code - Description  
**S2 - Information**

Internal Project No.	Scale @ A1	Revision
<b>34146</b>	<b>1 : 25</b>	<b>P02</b>

Drawing Identifier  
**PYSW - BPC - 01 - ZZ - D - S - 0501**