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Land Adjacent to White Cottage, Scilly

Mrs Leanne Hicks

Flood Risk Assessment

May 2022

Document Control

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Status	For Planning	
Client	Mrs Leanne Hicks	
	Name	Date
Prepared By	Ben Fleming	May 2022
Checked By	Kris Tovey	May 2022
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Record of Revisions

Revision	Date	Details	Made By
1	05/2022	For Planning	BF

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Contents

List of Figures and Tables

Appendices

1 Introduction

Background

1.1 The purpose of this FRA is to assess the risk of flooding to the proposed development and where possible provide sufficient mitigation to demonstrate that the future users of the development would remain safe throughout its lifetime, that the development would not increase flood risk on site and elsewhere and, where practicable, that the development would reduce flood risk overall.

Site Proposals

1.2 The proposal is for the construction of a dwelling at land adjacent to White Cottage, Porthloo, St Mary's, Isles of Scilly. A copy of the proposed development drawings is included within **Appendix A**.

National & Local Planning Policy

1.3 The National Planning Policy Framework (NPPF) sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Planning Practice Guidance (PPG) is also available online.

1.4 The PPG sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.

1.5 The NPPF states that a site-specific Flood Risk Assessment will be required for proposals:

a) that are greater than 1 hectare in area within Flood Zone 1
b) for all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3
c) in an area within Flood Zone 1 which has critical drainage problems; and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding
d) in an area within Flood Zone 1 identified in a Strategic Flood Risk Assessment as being at increased flood risk in the future
e) in an area in Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use

1.6 This FRA aims to provide sufficient flood risk information to satisfy the requirements of the NPPF, PPG and regional/local government plans and policies.

1.7 This assessment considers the risks of all types of flooding to the site including tidal, fluvial, surface, groundwater, sewer and artificial sources and provides mitigation measures to ensure that the flood risk to the site is minimised and that flood risk off-site is not increased.

Sources of Information

1.8 This FRA has been based on the following sources of information:

a) NPPF
b) NPPF-PPG
c) Site Layout Plan
d) Ordnance Survey mapping
e) DEFRA Magic mapping
f) Environment Agency mapping and request for information
g) Isles of Scilly Local Flood Risk Management Strategy
h) Lidar aerial survey data
i) Web Based Soil Mapping
j) British Geological Survey Drift & Geology Maps
k) South West Water Sewer Records
l) Local Press Flood Reports / Anecdotal Evidence

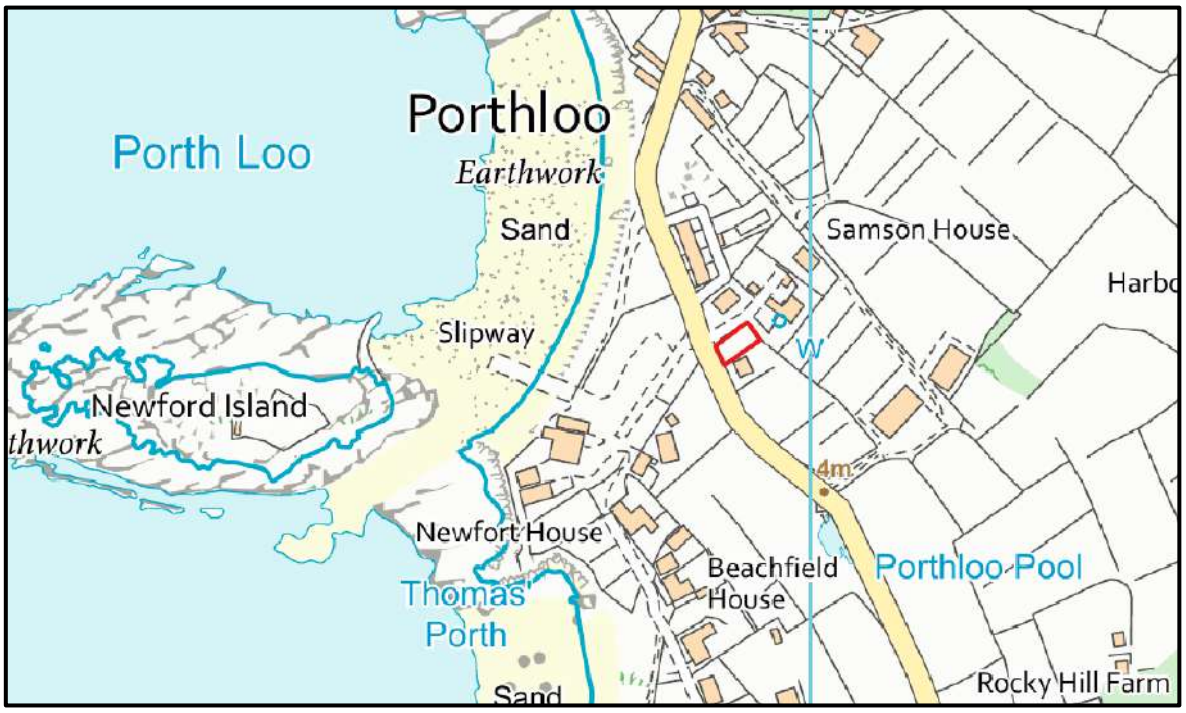
2 Existing Site & Hydrology Characteristics

Site Location & Composition

2.1 The site comprises a plot of residential land measuring 0.03 hectares to the north of the dwelling White Cottage in the village of Porthloo. This dwelling was constructed following the demolition of a chalet on site. To the north of the site is the dwelling The Rope Walks. To the east is the dwelling Compass Rose.

2.2 The site location is shown approximately outlined in red in **Figure 2.1**. A location plan is included with **Appendix A.**

2.3 The approximate site co-ordinates for the centre of the site are E: 90951, N: 11254, with the nearest post code of TR21 0NF.

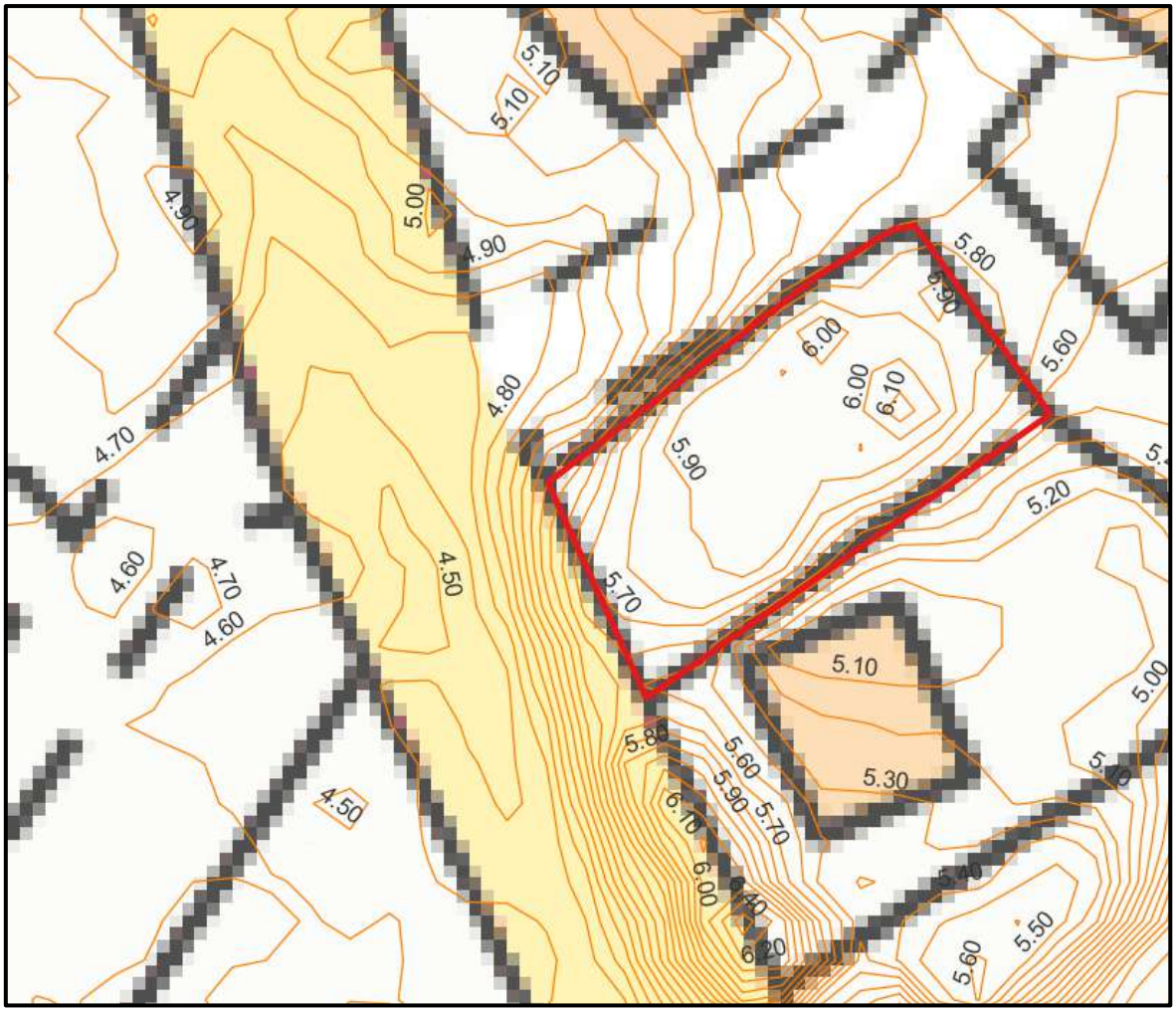


(Source: Promap)

Figure 2.1 Site Location

Topography

2.4 Ground levels in the area the site is located within generally fall in a western and southern direction away from the site. With levels on the site as indicated on **Figure 2.2** ranging from a high point of circa 6.1mAOD within the east of the site down to a low point of approximately 5.7mAOD along the western boundary. This information has been derived through referral to freely available Lidar aerial survey information.



(Source: DEFRA Data Download)

Figure 2.2 Ground Levels

Ground Conditions

2.5 Geological data held by the British Geological Survey (BGS) shows that the bedrock geology underlying the site is Granite. The superficial deposits present is Sand.

2.6 Soilscapes mapping indicates the underlying soil as slowly permeable wet very acid upland soils with a peaty surface. The rest of the island of St Mary's is considered to be freely draining.

Existing Drainage & Hydrology

2.7 South West Water asset plans show there are no public sewers in the vicinity of the site. Sewer records are contained in **Appendix B**.

2.8 There are no watercourses shown to be in the vicinity of the site from review of OS mapping. The site is located circa 146m south east of Port Loo and 207m north west of St Mary's Pool off the West Coast of St Mary's with the North Atlantic Ocean beyond.

3 Development Vulnerability & Flood Zone Classification

National Planning Policy Framework

3.1 Local Planning Authorities, (LPA) have a statutory obligation to consult the Environment Agency, (EA) on all applications in flood risk zones. The EA will consider the effects of flood risk in accordance with the NPPF.

3.2 NPPF requires that, as part of the planning process:

a) A 'site specific' Flood Risk Assessment will be undertaken for any site that has a flood risk potential.
b) Flood risk potential is minimised by applying a 'sequential approach' to locating 'vulnerable' land uses.
c) Sustainable drainage systems are used for surface water disposal where practical.
d) Flood risk is managed through the use of flood resilient and resistant techniques.
e) Residual risk is identified and safely managed.

3.3 Table 1 of NPPF, categorises flood zones into:

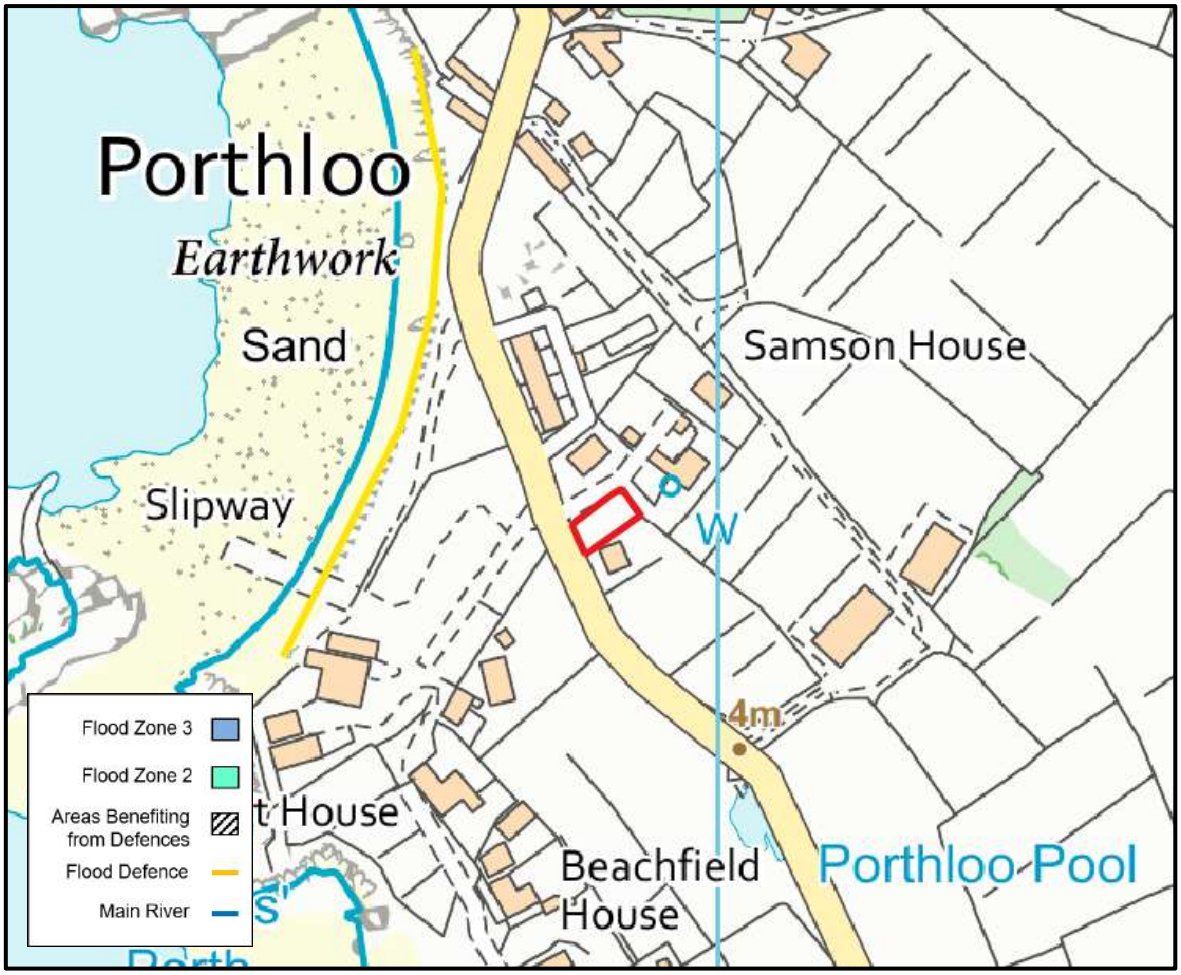
a) Zone 1- Low risk, less than 0.1% Annual Event Probability (AEP) (< 1 in 1000 years)
b) Zone 2- Medium risk, 0.1% AEP (1 in 1000 - 1 in 100 years)
c) Zone 3a- High risk, 1% AEP (> 1 in 100 years)
d) Zone 3b- High risk - Functional Floodplain, 5% AEP (>1 in 20 years)

Environment Agency Flood Map for Planning

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

3.5 The site is located within Flood Zone 1 and at low risk as shown on the Environment Agency Flood Map for Planning[1] and **Figure 3.1**.

[1] https://flood-map-for-planning.service.gov.uk/



(Source: Environment Agency)

Figure 3.1 Environment Agency Flood Map for Planning

Flood Risk Vulnerability

3.6 The proposed development is considered to be 'more vulnerable' in terms of its land use type flood risk vulnerability as shown in Table 2 of the PPG[2].

3.7 The NPPF sets out a matrix indicating the flood risk vulnerability types of development that are acceptable in different flood zones based upon the Flood Map for Planning as shown in Table 3 of the PPG. All forms of development is considered appropriate to consider in Flood Zone 1 locations.

[2] https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

4 Site Specific Flooding

National Planning Policy Framework (NPPF)

4.1 In accordance with the National Planning Policy Framework, this Flood Risk Assessment considers all sources of flooding including:

a) Tidal flooding – from sea;
b) Fluvial flooding – from rivers and streams;
c) Pluvial flooding – overland surface water flow and exceedance;
d) Groundwater flooding – from elevated groundwater levels or springs;
e) Flooding from sewers – exceedance flows from existing sewer systems; and
f) Artificial sources – reservoirs, canals etc.

Historic Flooding

4.2 The Environment Agency Open Data recorded flood mapping suggests the site is not located in an area that has been flooded historically.

4.3 There have been no significant past local events from local sources of flooding, namely surface water and groundwater as detailed in the Isles of Scilly Local Flood Risk Management Strategy (LFRMS)[3].

Tidal Flooding

4.4 The Isles of Scilly are vulnerable to the impact of climate change, rising sea level, inundation and coastal erosion. The islands bear the brunt of Atlantic storms and storm surges, vulnerability to flooding is increased by their low lying character coupled with the fact that much of the housing stock, critical infrastructure, water resources and commercial property are located close to sea level.

4.5 The main threat imposed on the Isles of Scilly is from coastal flooding from the Atlantic Ocean at times of high tide and storm. Flooding from the sea defences being over topped is more likely to occur if particularly high tides coincide with bad weather conditions such as high tides and storm surges. Porthloo is considered at risk if erosion of the coastline occurs or through breaching and overtopping of the embankment along the shoreline.

4.6 The flood protection/erosion embankment at Porthloo has a design crest level of 5.858mAOD. Ground levels on the site are no lower than 5.7mAOD. Meaning the site is protected from tidal flood events and is on higher ground for the most part than the height which the defences offer protection for.

4.7 The site is located within Flood Zone 1 as shown on **Figure 3.1**. This is the area shown to be at low risk of tidal flooding.

[3] https://www.scilly.gov.uk/sites/default/files/document/planning/Local%20Flood%20Risk%20Management%20Strategy%20FINAL.pdf

4.8 Flood data was requested from the Environment Agency (see **Appendix C**). This information is taken from their Isles of Scilly Coastal Flood Model 2019, which they suggest supersedes the Flood Zone mapping.

4.9 Mapping outputs from the modelling identifies the site is on the edge of an area that could be affected from flooding in the 1 in 200 year (0.5% AEP) flood event accounting for climate change, and the 1 in 1000 year (0.1% AEP) flood event. With flood extents bordering the site on the northern and western boundaries. The proposed house being positioned so that it is located outside the area, which could be affected.

4.10 On the basis of the sites topographical position, the presence of the defence embankment and the location of the site outside the modelled floodplain, the proposed property is considered to be at low risk of tidal flooding, whilst it is recognised that land adjacent could be at high risk over the lifetime of the development.

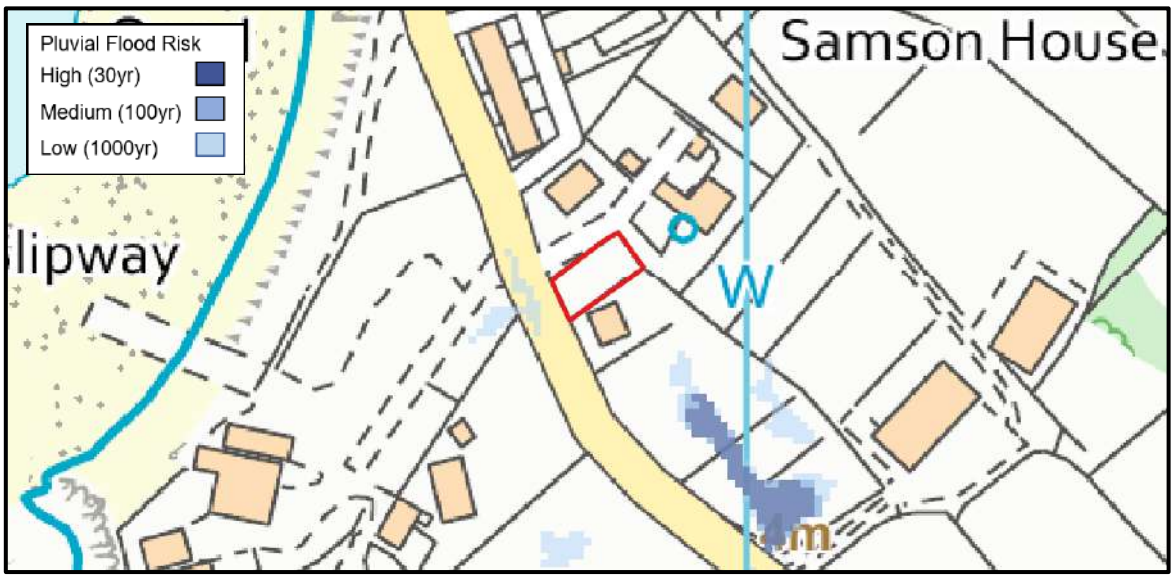
Fluvial Flooding

4.11 There are no watercourses/waterbodies in the vicinity of the site that pose a fluvial risk to the site. The risk of fluvial flooding is therefore negligible.

Pluvial Flooding

4.12 Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes. Risk of flooding from surface water mapping has been prepared, this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead.

4.13 The Surface Water (Pluvial) Flood map provided by the Environment Agency (**Figure 4.1**) indicates that the site is at very low risk.



(Source: Environment Agency)

Figure 4.1 Surface Water Flood Risk Map

Groundwater Flooding

4.14 Groundwater flooding occurs when the water table rises above ground elevations. It is most likely to happen in low lying areas underlain by permeable geology. This may be regional scale chalk or sandstone aquifers, or localised deposits of sands and gravels underlain by less permeable strata such as that in a river valley.

4.15 The site and surrounding area is located within the area considered not to be at risk of groundwater flooding based on the lack of groundwater flooding history as detailed within the LFRMS.

Sewer Flooding

4.16 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

4.17 The site is not at risk of sewer flooding as there are no sewers in the vicinity of the site.

Flooding from Artificial Sources

Reservoirs

4.18 Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain water in times of flood. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.

4.19 To help identify this risk, reservoir failure flood risk mapping has been prepared , this shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst case scenario and is only intended as a guide. This identifies the site isn't at risk from this source and there are no waterbodies on St Mary's large enough to qualify as reservoirs.

5 Flood Mitigation Measures

Introduction

5.1 It is important to demonstrate that future users will not be at risk from flood hazards during the lifetime of the development, as well as ensuring that flood risk is not increased elsewhere.

Assessment Findings & Implications

5.2 The site has been identified to be adjacent to an area at theoretical high to medium risk of tidal flooding over the intended design lifetime based on Environment Agency flood model data. However, the site and in particular the proposed property is located outside the floodplain and at low risk.

5.3 The position of the proposed house Flood Zone 1 as shown on **Figure 3.1** is considered to be sequentially preferable. No increase in fluvial flood risk will result due to the house being sited on land outside the floodplain.

Finished Floor Levels (FFLs)

5.4 The applicant shall consider setting FFLs nominally above finished ground levels to protect the new property from the risk of tidal flooding over the design lifetime of the development (100 years).

Ground Levels

5.5 Ground levels should be finished so that overland runoff is encouraged to flow away from the proposed new buildings and be directed to the nearest on site drainage system runoff collection point.

Access & Egress

5.6 Safe pedestrian access/egress is not considered available in order to access the wider road/street network and land outside the floodplain when considering the modelled flood data provided by the Environment Agency. The hazard mapping provided suggesting a danger for most would be present on the road adjacent if the tidal embankment defences were breached in particular. In account of this, the future occupier will register to receive Flood Warning information for expected tidal flooding or extreme tidal storms, so that they choose to leave the property prior to flooding occurring and travel to stay with relatives or friends elsewhere.

Flood Warning

5.7 Provision of flood warning systems is the responsibility of the Environment Agency. However, the Council of the Isles of Scilly, as a Category 1 responder under the Civil Contingencies Act 2004, has a duty to warn, inform and advise the public in the event of an emergency. To ensure that the public are kept advised well in advance of potential flooding incidents weather is monitored, particularly when there are significant Spring tides. It is

understood through researching the availability of flood warnings provided to the site location that there is no flood warning service provided by the Environment Agency.

5.8 When weather/flood warnings are received, or if felt necessary, precautionary warnings of potential flooding are advertised by the IOS Council as follows:

a) Council website.
b) Community Message Board.
c) Tourist Information Office.
d) Town Hall.
e) Radio Scilly.
f) Posters in various locations.
g) Where deemed appropriate – door knocking in specific vulnerable areas or in the case of off islands telephone calls.
h) Direct to IOS Fire and Rescue Service.

5.9 General flooding advice is provided on the Council website and guidance can be distributed to all households giving information about how to be prepared in the event of an emergency including flood incidents.

5.10 In the event of a tidal flood warning being issued by the Council for an extreme event that could affect the road fronting the site, guidance will be provided by the council as to the need to evacuate the property. Should this occur or the occupants chose to do so then plans should be made to leave the property and travel to stay in alternative accommodation on the island prior to flooding taking place.

5.11 Alternatively, the occupants could choose to remain in the dwelling, which is located outside the tidal floodplain, until the threat of tidal flooding has passed, and it is safe to leave the property to travel to the wider area.

5.12 An emergency 'flood kit' should be retained on site. It should include but is not limited to:

a) bottled water and non-perishable food;
b) a first aid kit;
c) a torch (plus batteries);
d) a portable radio to monitor local news and weather broadcasts (plus batteries);
e) a mobile phone, fully charged and with a charger;
f) blankets;
g) rubber gloves;
h) waterproof clothing; and
i) wellington boots, or similar footwear.

Drainage

5.13 A drainage strategy has been prepared to demonstrate how surface water generated by the proposals will be managed so that the proposals do not increase flood risk elsewhere, which is included in **Appendix D** with supporting calculations in **Appendix E**. See Section 6 for further details.

6 Proposed Drainage Strategy

Introduction

6.1 Consideration of flood issues is not confined to the floodplain. This is recognised in the NPPF and associated guidance. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in a catchment, particularly flooding downstream; and replacing permeable vegetated areas with low permeability roofs, roads and other paved areas will increase the speed, volume and peak flow of surface water runoff.

6.2 A surface water management strategy for the development is proposed to manage and reduce the flood risk posed by surface water runoff from the site. The surface water drainage arrangements for any development site should be such that the volume and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development unless specific off-site arrangements are made and result in the same net effect.

6.3 An assessment of the surface water runoff rates was undertaken to determine the surface water options and attenuation requirements for the site and is discussed below.

Surface Water Management

6.4 Sustainable drainage system measures (SuDS) should be used to control the surface water runoff from the proposed development site, thereby managing the flood risk to the site and surrounding areas from surface water runoff. These measures will also improve the quality of water discharged from the site.

6.5 The SuDS hierarchy demands that surface water run off should be disposed of as high up the following list as practically possible:

a) Into the ground (infiltration) and re-use, or then;
b) To a surface water body, or then;
c) To a surface water sewer, highway drain or another drainage system, or then;
d) To a combined sewer.

Proposed Drainage

6.6 The introduction of hardstanding associated with the proposed development will increase the amount of runoff generated and could increase flood risk elsewhere unless managed to Local Authority drainage requirements.

6.7 BGS mapping indicates the bedrock geology underlying the site is of Granite formation with overlying sand deposits. The client has advised soakaway drainage is used to dispose of surface water runoff in the absence of main sewers and given the sandy soil conditions meaning infiltration drainage is the preferred method.

6.8 It is proposed to introduce a new gravity stormwater system with attenuation and a controlled discharge for up to a 1 in 100 year event plus 40% climate change allowance, which will reduce risk of flooding downstream.

6.9 To demonstrate that the necessary storage volumes can be accommodated on the site an illustrative drainage layout has been prepared and has been included as **Appendix D**. Supporting drainage calculations are included in **Appendix E**.

6.10 Surface water runoff shall be collected through gravity-fed gutters and downpipes for the proposed building and discharged to the geocellular soakaway system located to the north of the building. The discharge will then infiltrate into the ground. The soakaway system is located a minimum of 5m from the proposed building and has a porosity of 95%.

6.11 The soakaway system has been sized using a design infiltration rate of 0.108m/hr as per the typical infiltration coefficient for loamy sand in the SuDS Manual (C753).

6.12 The final layout and design of the surface water drainage network will be determined at the detailed design stage as the development masterplan evolves.

Foul Water Management

6.13 As there are no sewer assets present within the local area, it is proposed to connect the proposed development to the existing private package treatment plant system, which as advised by the client is designed to serve up to 5 properties and at present 2 are connected to it.

Water Reuse

6.14 The proposed development provides an opportunity to reuse surface water through the provision of rainwater harvesting products.

6.15 Rainwater butts should be provided at suitable locations where feasible, to reduce the volume of water entering the underground drainage system and the demand on the water supply network.

6.16 Harvested rainwater may be used for garden watering and other applications where a pressurised hose connection is not required. Stored rainwater also provides a source of clean water when hosepipe bans are in effect.

Maintenance Regime

6.17 Maintenance of SuDS features are essential to ensure that the surface water drainage system operates effectively and that flooding of the site and surrounding areas is prevented.

6.18 The responsibility of maintaining the private surface water and foul water drainage components would lie with the landowner of the site, who may delegate responsibility to an appointed external private management company.

6.19 For all drainage aspects a full maintenance regime should be carried out to ensure that drainage systems remain operational in accordance with manufacturer's guidelines and drainage features maintenance requirements as set out in the SuDS Manual (C753) outlined in **Table 6.1**.

Drainage Component	Required Action	Typical Frequency
Pipework, manholes, flow control chambers, catch pits and silt traps	Stabilise adjacent areas	As required
	Remove weeds	As required
	Clear any poor performing structures.	As required
	Inspect all structures for poor operation	Three monthly, 48 hours after large storms in first six months
	Monitor inspection chambers. Inspect silt accumulation rates and determine silt clearance frequencies	Annually
Soakaway Device	Check upstream silt traps	Monthly and after large storms

Figure 6.1 Initial Operation and Maintenance Plan

7 Summary and Conclusions

Summary

7.1 This assessment has considered the risks of all types of flooding to the site including tidal, fluvial, surface, groundwater, sewer and artificial sources and provides mitigation measures to ensure that the flood risk to the site is minimised and that flood risk off-site is not increased.

Conclusions

7.2 The proposed dwelling is to be located within Flood Zone 1 and at low risk of river flooding as shown on the Environment Agency Flood Map for Planning.

7.3 Proposed development within Flood Zone 1 locations is considered to be appropriate and sequentially preferable.

7.4 The risk of surface water flooding generated by the proposed development will be managed through the inclusion of a formalised drainage system to intercept and contain flows of overland runoff and directed to an onsite soakaway.

7.5 Finished floor levels of the proposed new properties will be set a nominal height above surrounding finished ground levels to protect them from the risk of extreme tidal flooding.

7.6 In compliance with the requirements of the National Planning Policy Framework, and subject to the mitigation measures proposed, the development will not cause or be subject to significant flood risk issues.

Appendix A – Proposed Development Drawings

Flat

A

The Rope Walk

Porthloo Lane

The Stables

Compass Rose

Well

access only

access only

hedges

hedges

hedges

hedges

White Cottage

Glandore

11253

H A Planning
67 Cleevemount Road
Cheltenham
Gloucestershire
GL52 3HD
07500 555495

Client: Leanne Hicks, White Cottage, Porthloo St Mary's, Isles of Scilly, Cornwall, TR21 0NF	Description: Existing Site Plan
Drawn: AVB	Job: 900446
Scale @ A2:	1:200
Date:	20.03.22
Dwg No:	AE-03(900446)001

Flat

A

The Rope Walk

Porthloo Lane

The Stables

Compass Rose

access to compass rose

Well

access to white cottage

hedges

parking

hedges

hedges

hedges

White Cottage

Glandore

11253

H A Planning
67 Cleevemount Road
Cheltenham
Gloucestershire
GL52 3HD
07500 555495

Client: Leanne Hicks, White Cottage, Porthloo St Mary's, Isles of Scilly, Cornwall, TR21 0NF	Description: Proposed Site Plan
Drawn: AVB	Job: 900446
Scale @ A2:	1:200
Date:	20.03.22
Dwg No:	AE-04(900446)001

Appendix B – Sewer Records

South West Water

Source for Searches

RAPPOR
CTP HOUSE, KNAPP ROAD
CHELTENHAM
GLOUCESTERSHIRE, GL50 3QQ

UNDERGROUND ASSET INFORMATION

PUBLIC DRAINAGE & WATER

Location:	WHITE COTTAGE/PORTHLOO ST. MARYS, ISLES OF
Report Reference:	GIS/BM/WHI/19052022/42
Your Reference:	22-0332
Date:	19 May 2022
For the Attention of:	BEN FLEMING

Further to your request for information dated 19 May 2022, the Company's apparatus for the above site is shown herewith. South West Water Limited has made all reasonable efforts to ensure the accuracy of this information, but provides it subject to the following conditions:

• Service pipes and drainage connections may not be shown.

• No liability whatsoever is accepted for any inaccuracies or omissions in the information.

• If no reference is made in the information to any interest or right of the Company on any land, this is not to be taken as conclusive evidence that no such interest or right exists.

These reservations are in addition to any statutory regulations which apply.

Source for Searches - A South West Water Service contactus@sourceforsearches.co.uk 0845 330 3401

ASSETS NOT SHOWN? THEY MAY BE PRIVATE HOMEOWNERS RESPONSABILITY
PRIVATE SEWER CCTV SURVEYS AVAILABLE
GO TO SOURCEFORSEARCHES.CO.UK

USEFUL CONTACTS:

LEAKS / PIPE COLLAPSE	0344 346 2020
NEW CONNECTIONS	0800 083 1821
SOUTH WEST WATER	0344 346 2020

South West Water

South West Water

The information indicated on this plan is provided only as a guide and no assurance as to its accuracy is given or implied. The Company accepts no liability whatsoever for any error or omission in the information. It should be noted that not all mains, service pipes and other apparatus of the Company in the area of the plan are shown.

WATER

WHITE COTTAGE/PORTHLOO ST. MARYS, ISLES OF SCILLY TR210NE

Water Pipe Details

Distribution	
Trunk	
Communication	
Untreated	
Private	
Abandoned	

Common Materials

Cast Iron	CI	High Density Polyethylene	HDPE
Spun Iron	SI		
Ductile Iron	DI	Medium Density Polyethylene	MDPE
Steel	ST		
Asbestos Cement	AC	High Pressure Polyethylene	HPPE
Plastic	UPVC		

Water Features

Washout	Hatchbox	Customer Meter	C
Hydrant	Pump	Mains Meter	M
Washout Hydrant	Sluice Valve Open (AC)	Relief Valve	
Air Valve (Single)	Sluice Valve Closed	Pressure Reducing Valve	
Air Valve (Double)	Sluice Valve (CC)	Pressure Sustaining Valve	
Stop Tap	Stop Tap	Non Return Valve / Reflux	
		Relief Valve	

South West Water

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DRAINAGE

WHITE COTTAGE/PORTHLOO ST. MARYS, ISLES OF SCILLY TR210NE

South West Water has no record of drainage in this area

Sewer Pipe Details

Public - Foul	
Public - Surface	
Public - Combined	
Public - Treated	
Pumping Main	/EL
Elevated	
Unverified	
Abandoned	A
Highway	

Common Shapes

Circular	C	Barrel	B	U Shaped	US
Rectangular	R	Trapezodial	T	Horseshoe	H
Unknown	U	Egg Shape	E	Oval	OV

Common Materials

Vitrified Clay	VC	Alkathene	AK	Medium Density Polyvinylchloride	MDPE
Pre Cast Concrete	PCO	Asbestos Cement	AC	Unplasticised Polyvinylchloride	UPVC
Concrete	CO	Polyvinylchloride	PVC	Unknown	U

Sewerage Structures

Manhole Foul		Manhole Surface	
Manhole Combined		Manhole Private	
Soakaway	SK	Catchpit	CP
Washout	WO	Hatchbox	HB
Buried	BU	Unable to Locate	UL

REQUIREMENTS AND DEVELOPMENT/TREE PLANTING GUIDAN

In accordance with the provisions of Clause 26 of South West Water's Code of Practice, you are advised that in order to maintain adequate future access to the pipeline and to avoid interference with it, it is necessary to ensure that the following guidelines are observed:

1. Buildings And Permanent Structures

Clear working strip:

A clear working strip along the pipe is required between buildings and permanent structures and this must be:-

Pipes up to 150mm diameter	**6.0 metres**
Pipes 151-600mm diameter	**7.0 metres**
Pipes 601mm diameter and over	**9.0 metres**

If a building or permanent structure is planned within these limits please contact our Development Planning team as Build Over consent may be required. Development Planning developerservices@southwestwater.co.uk.

Proximity of buildings:

No buildings or permanent structures should be placed within 3 metres of pipes below 300mm in diameter or within 3.5 metres of pipes of 300mm or over in diameter (distances measured from the centre of the pipe), and in addition, buildings and permanent structures must be constructed so as to ensure that no additional loads are transmitted to the pipe.
(N.B: Pipe sizes refer to the internal diameter / bore of the pipe).

2. Trees And Shrubs

Roots can damage pipelines over time and extensive root systems will limit access to the pipeline in breach of the Company's right to access for repair or replacement. As a rule of thumb, the root spread of a tree is approximately the same as its eventual canopy spread. To help you avoid damage or interference to the pipeline, the Company suggests the following guidelines:

· No large or forest trees should be planted with 7 metres of the pipeline (examples include Oak, Ash, Beech, Douglas Fir, Sitka Spruce etc.)

· Medium to small sized trees should always be planted in such a way as to ensure that the eventual root spread reaches no closer than 1 metre of the pipeline, in practice, if trees are planted a distance of 5 metres away from the pipeline, this should be sufficient.

· Bushes and shrubs should never be planted closer than 2 metres from the pipeline.

· Closer than 2 metres either side of the pipeline may be planted with hedge plants and ground cover only.

· The measurement s and distances set out are for guidance only and there will always be exception, for example: Poplars and Willows, which have a particularly invasive root sys tem. If you are unsure of any individual case, then specialist advice should always be sought prior to planting.

· The guidelines set out above are based on the Company's standard access requirements for its apparatus. If, for engineering reasons, the distances set out need to be varied at particular locations, you will be advised of this before compensation for works is finalised. If you need to know the precise underground location of a new water main / sewer after its installation, please contact any of the Company's local offices, and Company staff will be pleased to mark out the position of the pipeline within your land.

· If the Company finds any infringement of its legal rights of access, or any damage being caused to the pipeline, the Company reserves the right to take appropriate action to ensure that there is no interference with its statutory apparatus.

Requirements to be met by persons carrying out works near to water mains and sewers:

1. The precise position of water mains and sewers must be ascertained by hand digging trial holes after first contacting South West Water, who will give such information as is available regarding the general location of the mains and sewer in the area. No liability is accepted for the accuracy of any information given as to the position or existence of water mains and sewers . In particular, service pipes and drainage connection are not generally shown on mains records, but their presence should be anticipated and precautions taken to avoid damage.
2. Notices of intent must be given to South West Water before any works are carried out in the vicinity, except in cases of emergency when our Operations Centre should be contacted as soon as possible.
3. Unless prior written approval has been obtained, mechanical excavation may not be permitted around, or within, 3 meters of the water main or sewer. Excavation may be necessary by hand.
4. Concrete haunches or surrounds to sewer s must not be disturbed without prior written consent from South West Water.
5. Before backfilling, the mains and sewer s will be inspected and any flaws or damage to the pipe or wrapping, if found, will be repaired by South West Water . All such flaws or damage must be immediately reported to the Company as soon as they are discovered. The carrying out of such repair s by South West Water shall not affect the question of liability, should any damage found to have resulted from the acts of those undertaking the works, their contractors, servants or agents.
6. Approved backfill will be used immediately around or over the ma ins and sewer s to a minimum cover of 300mm and the remainder of the backfill shall be to the appropriate Highways Authority Specification for the Reinstatement of Openings in Highways.
7. Both the existing main or sewer and the new works shall be suitably supported to prevent future settlement and any subsequent damage to equipment.
8. Ground adjacent to concrete thrust blocks supporting the main(s) and sewer(s) must not be disturbed.
9. Adequate support must be given to all water mains and sewers where these are likely to be undermined, and to all trenches in the vicinity of these, during the process of the works.
10. No apparatus shall be laid on or over any land within 300mm measured horizontally from any part of a water main or sewer or other apparatus belonging to the Company. Provided always that this cause shall not prevent any pipe, cable or conducting medium being laid at an angle of between 45 and 90 degrees across the line of the Company's apparatus, with a vertical clearance in excess of 300mm. In exceptional circumstances this clause may be varied or deleted with the prior written consent from South West Water.
11. South West Water must be consulted before any work representing an increased risk to the integrity of the mains or sewers (e.g., piling, using explosives, thrust boring, pipe bursting etc.) is carried out.
12. Facilities for inspecting all work carried out shall be given to South West Water with adequate notice

IN THE EVENT OF A LEAK OR PIPE COLLAPSE PLEASE CONTACT SOUTH WEST WATER IMMEDIATELY ON 0344 346 2020 (24 HOURS)

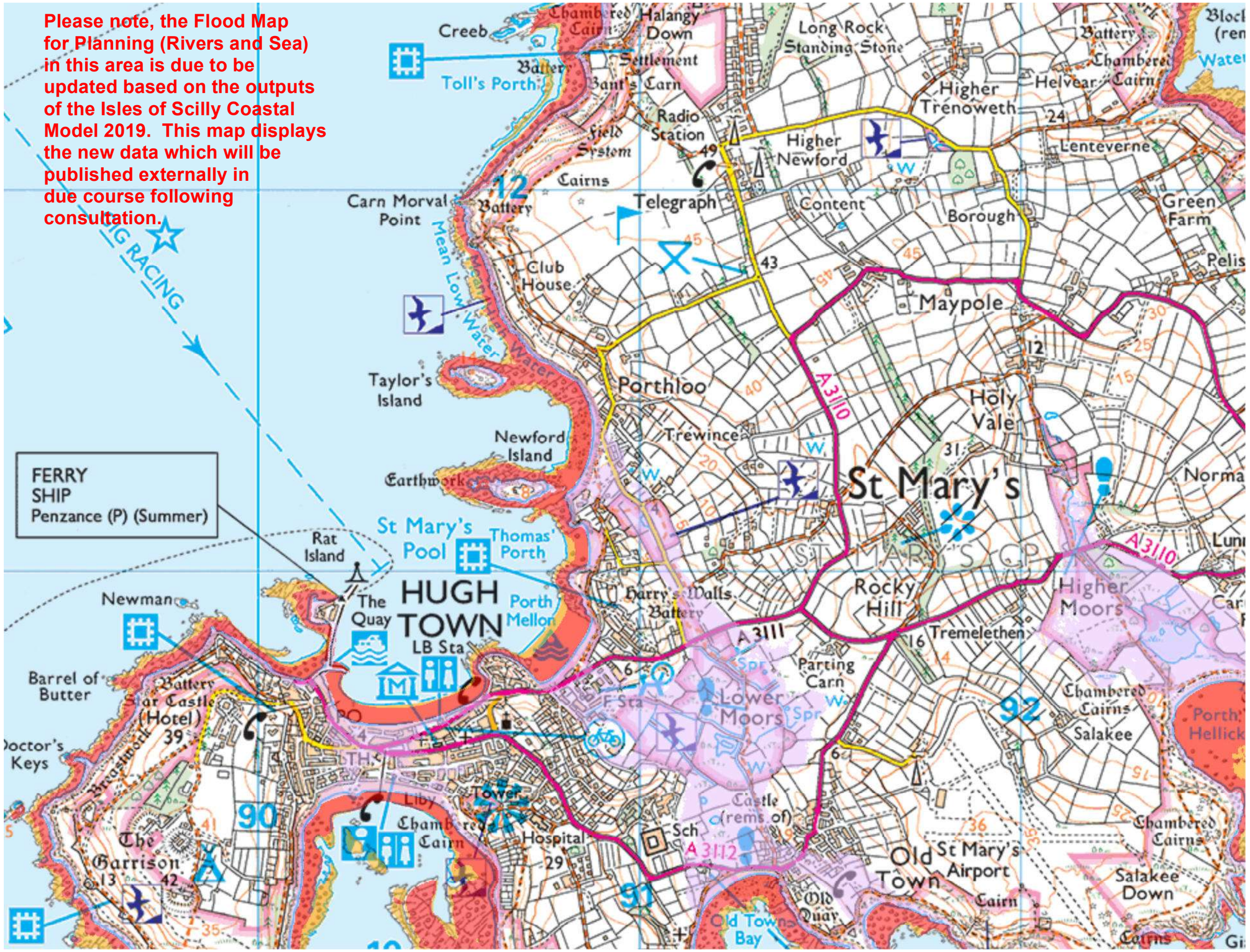
Appendix C – Environment Agency Flood Data

ENQ22/DCIS/258414 - Depth Map defended 1 in 200 year + cc taken from the Isles of Scilly Coastal Model 2019 centred on Porthloo, St Mary's

Environment Agency

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

Please note, the Flood Map for Planning (Rivers and Sea) in this area is due to be updated based on the outputs of the Isles of Scilly Coastal Model 2019. This map displays the new data which will be published externally in due course following consultation.



Legend

St Marys def 1 in 200 year+cc - Depth metres

- 0.0 - 3.0
- 3.0 - 6.0
- 6.0 - 9.0
- 9.0 - 13
- 13 - 17
- 17 - 21
- 21 - 26
- 26 - 31
- 31 - 35
- 35 - 41

This map displays the depths (m) across the site for a 1 in 200 year (0.5% AEP) event, taken from the Isles of Scilly Coastal Model 2019 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 25th April 2022

N

ENQ22/DCIS/258414 - Depth Map defended 1 in 1000 year taken from the Isles of Scilly Coastal Model 2019 centred on Porthloo, St Mary's

Environment Agency

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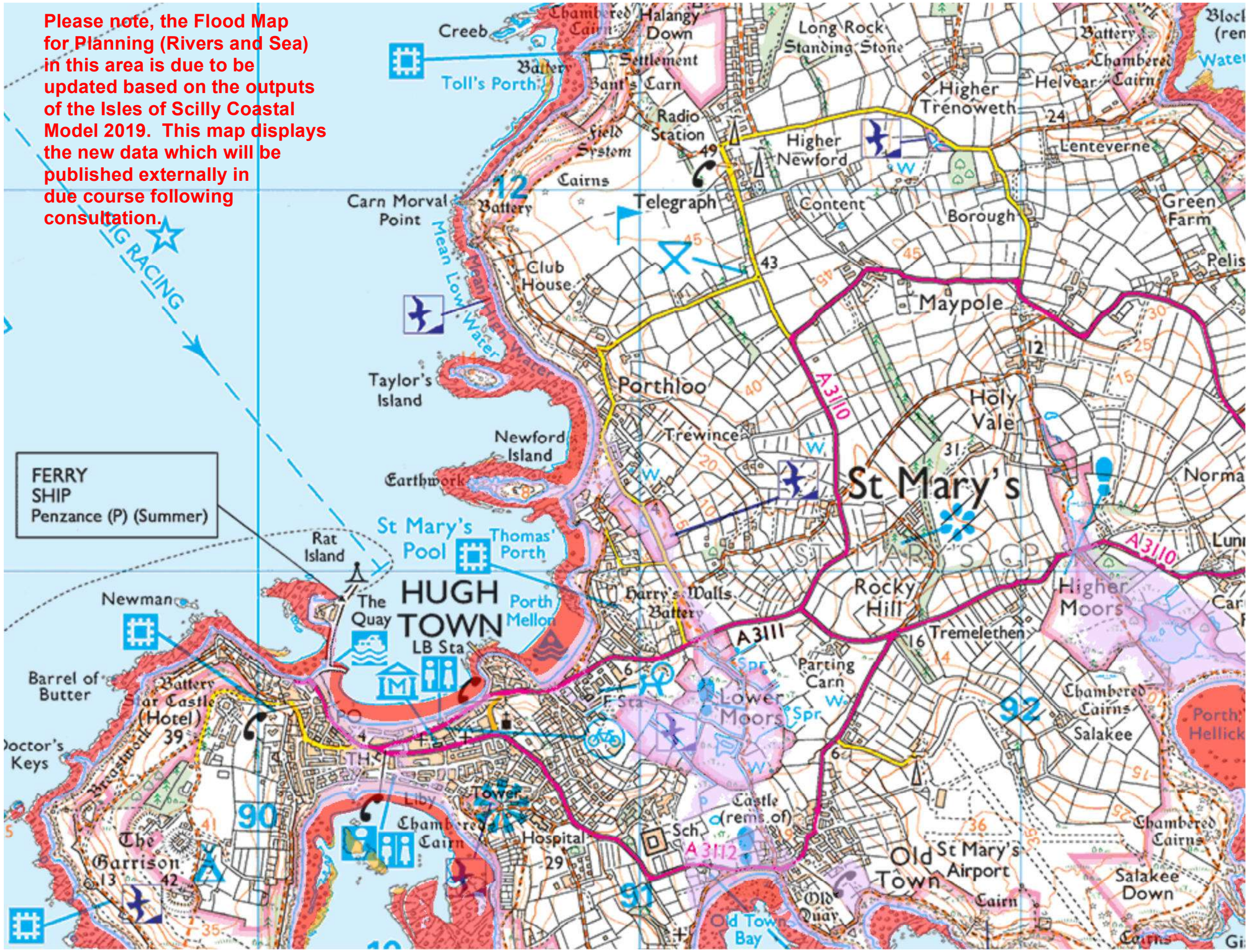
Please note, the Flood Map for Planning (Rivers and Sea) in this area is due to be updated based on the outputs of the Isles of Scilly Coastal Model 2019. This map displays the new data which will be published externally in due course following consultation.



Legend

St Marys def 1 in 1000 year - Depth metres

- 0.0 - 3.0
- 3.0 - 6.0
- 6.0 - 9.0
- 9.0 - 13
- 13 - 17
- 17 - 21
- 21 - 26
- 26 - 31
- 31 - 35
- 35 - 41

This map displays the depths (m) across the site for a 1 in 1000 year (0.1% AEP) event, taken from the Isles of Scilly Coastal Model 2019 and includes an allowance for wave overtopping.

1:10,000 Correct as of the 25th April 2022

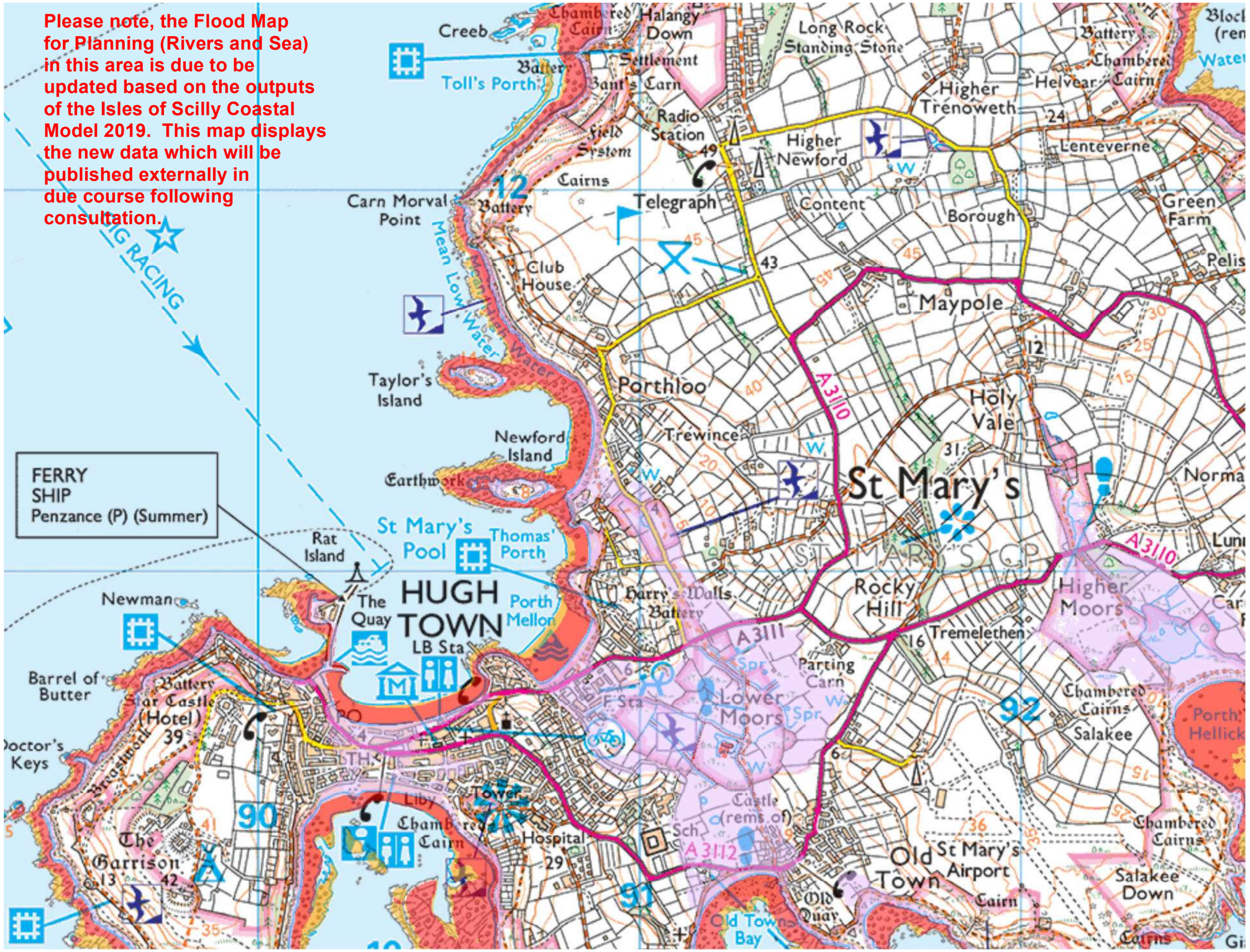
N

ENQ22/DCIS/258414 - Depth Map undefended 1 in 200 year + cc taken from the Isles of Scilly Coastal Model 2019 centred on Porthloo, St Mary's

Environment Agency

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

Please note, the Flood Map for Planning (Rivers and Sea) in this area is due to be updated based on the outputs of the Isles of Scilly Coastal Model 2019. This map displays the new data which will be published externally in due course following consultation.



Legend

St Marys Undef 1 in 200 year+cc - Depth metres

- 0.0 - 3.0
- 3.0 - 6.0
- 6.0 - 9.0
- 9.0 - 13
- 13 - 17
- 17 - 21
- 21 - 26
- 26 - 31
- 31 - 35
- 35 - 41

This map displays the depths (m) across the site for a 1 in 200 year (0.5% AEP) event, taken from the Isles of Scilly Coastal Model 2019 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.

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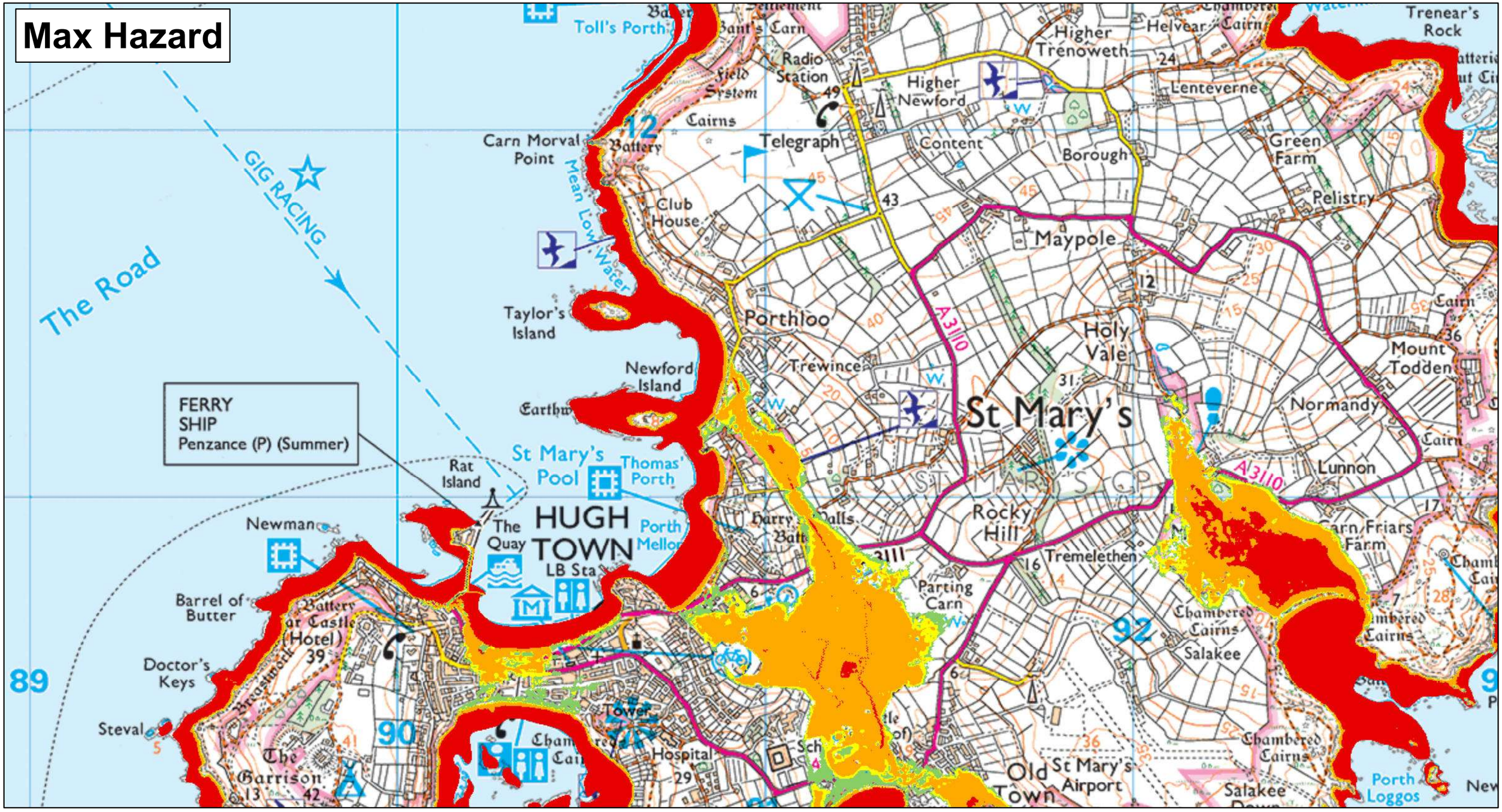
1:10,000 Correct as of the 21st April 2022

N

Max Hazard



★ **Modelled Breach Locations** - see also the accompanying plan "Location of Modelled Breaches"

Max Hazard
(Flood Risk to People : FD2320)

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.0 (Danger for Most)
- Greater than 2.0 (Danger for All)

Date Printed	April 2022	Scenario year	2019	Scenario Annual Chance	defended 0.5% 1 in200y+cc

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

Please contact the Environment Agency for further information on emergency planning associated with flood risk in this area.

General Enquiries No: 08708 506 506. Weekday daytime calls cost 8p plus up to 6ppm from BT Weekend Unlimited. Mobile and other providers charges may vary

Environment Agency

Isles of Scilly Coastal Model 2019 Hazard Map

Map Centered on TF 55890 65900

Max Hazard

★ **Modelled Breach Locations** - see also the accompanying plan "Location of Modelled Breaches"

Max Hazard
(Flood Risk to People : FD2320)

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.0 (Danger for Most)
- Greater than 2.0 (Danger for All)

Date Printed	April 2022	Scenario year	2019	Scenario Annual Chance	defended 0.1% 1 in1000y

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

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Environment Agency

Isles of Scilly Coastal Model 2019 Hazard Map

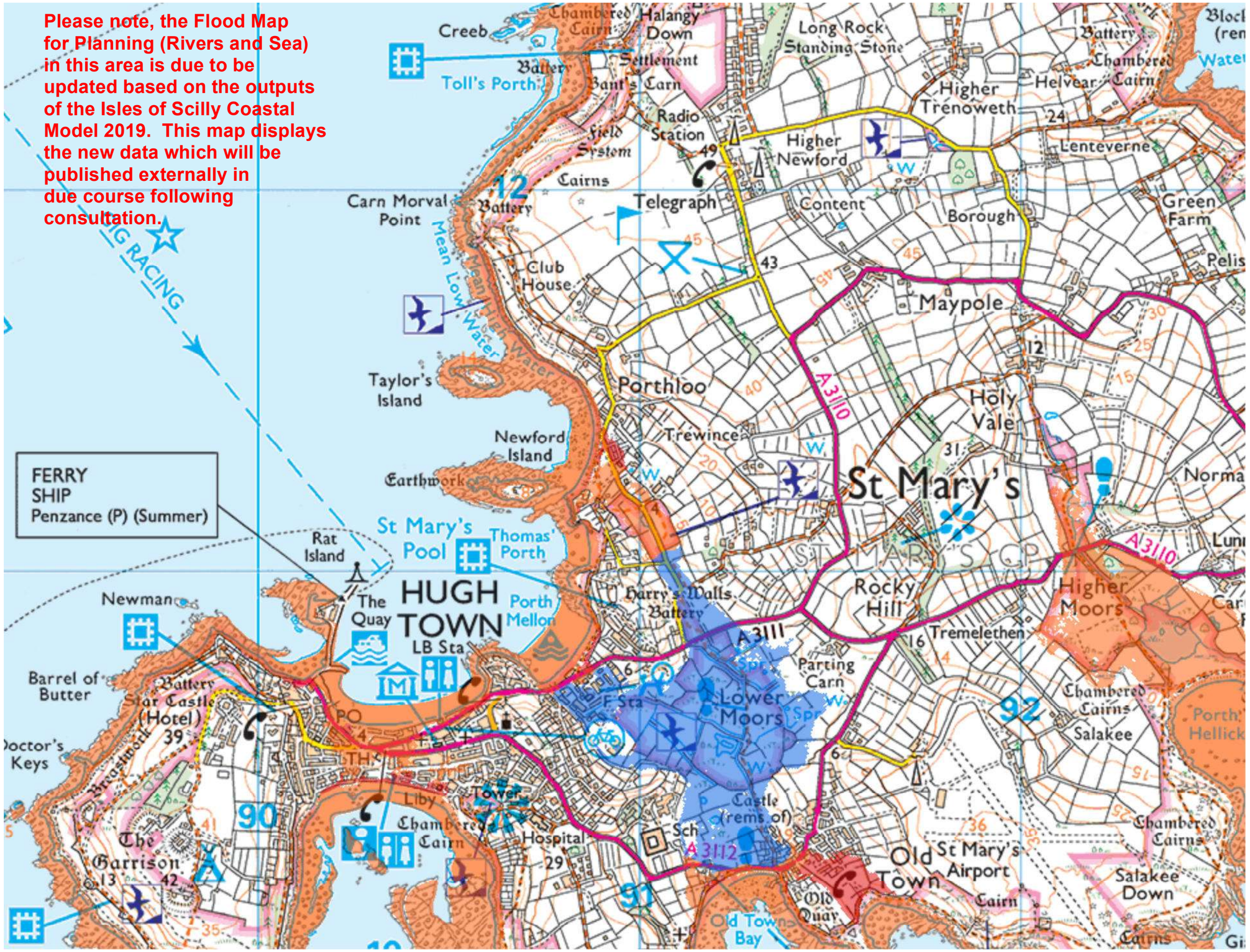
Map Centered on TF 55890 65900

ENQ22/DCIS/258414 - Head of Water Map defended 1 in 200 year + cc taken from the Isles of Scilly Coastal Model 2019 centred on Porthloo, St Mary's

Environment Agency

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

Please note, the Flood Map for Planning (Rivers and Sea) in this area is due to be updated based on the outputs of the Isles of Scilly Coastal Model 2019. This map displays the new data which will be published externally in due course following consultation.



Legend

St Marys Def 1 in 200 year+cc - Head of Water mAOD

- 1.9 - 2.5
- 2.5 - 3.5
- 3.5 - 4.5
- 4.5 - 5.5
- 5.5 - 6.5

Head of Water
This map displays the head of water (mAOD) across the site for a 1 in 200 year (0.5% AEP) event, taken from the Isles of Scilly Coastal Model 2019 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 25th April 2022

N

ENQ22/DCIS/258414 - Head of Water Map defended 1 in 1000 year taken from the Isles of Scilly Coastal Model 2019 centred on Porthloo, St Mary's

Environment Agency

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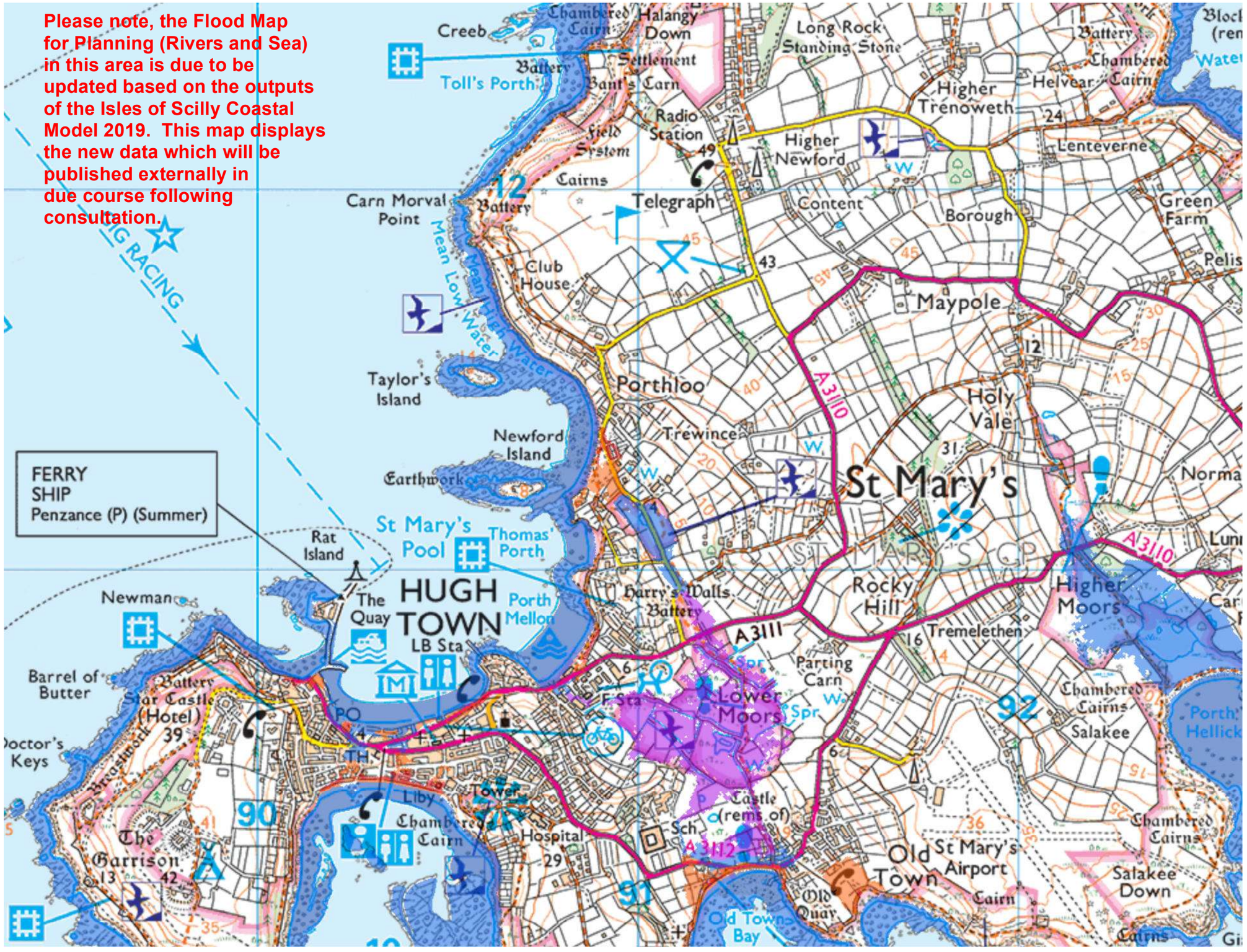

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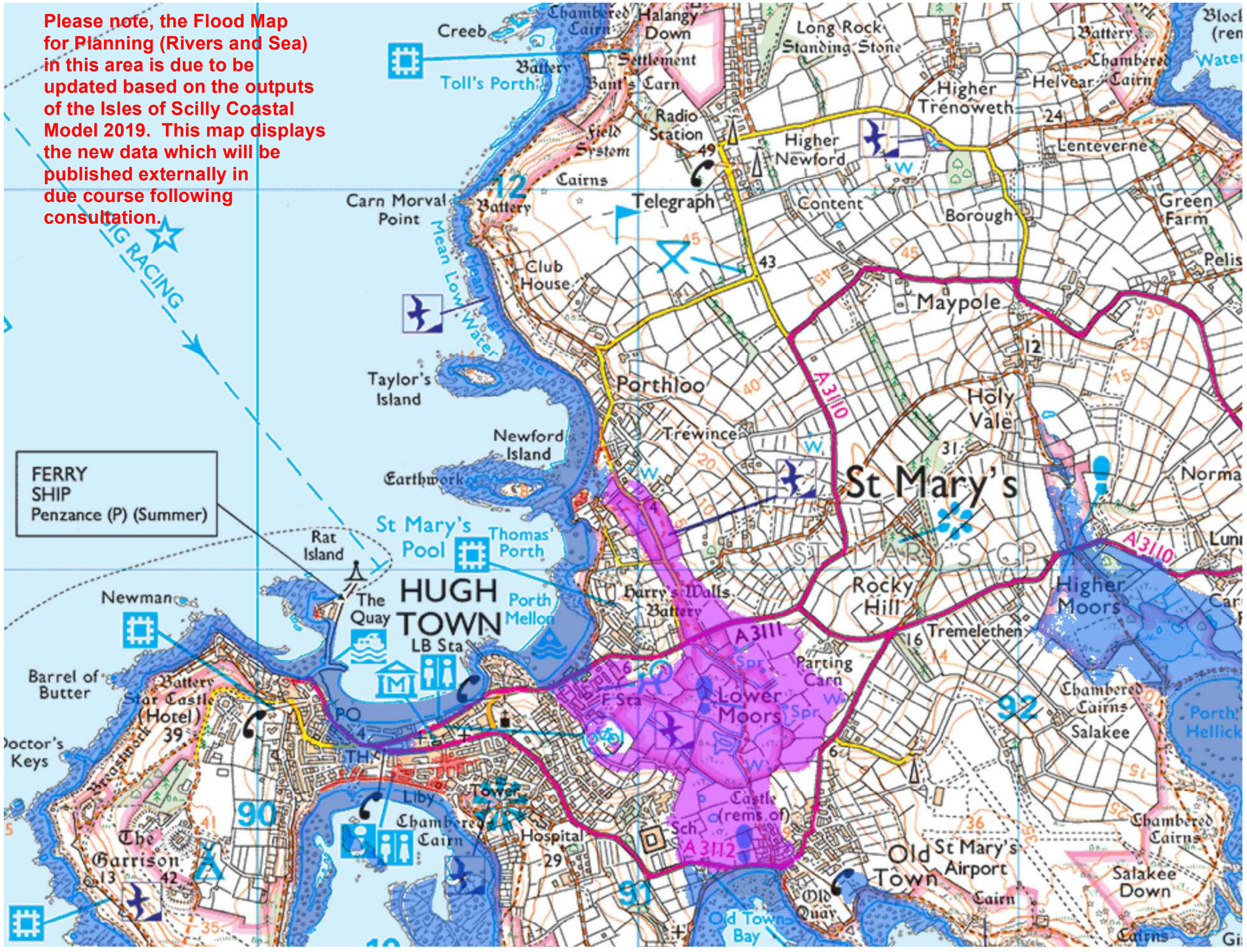

Legend

St Marys Undef 1 in 200 year+cc - head of water mAOD

- 4.4 - 4.6
- 4.6 - 4.8
- 4.8 - 5.0
- 5.0 - 5.2
- 5.2 - 5.6

Head of Water
This map displays the head of water (mAOD) across the site for a 1 in 200 year (0.5% AEP) event, taken from the Isles of Scilly Coastal Model 2019 and includes an allowance for wave overtopping.

Climate change scenarios
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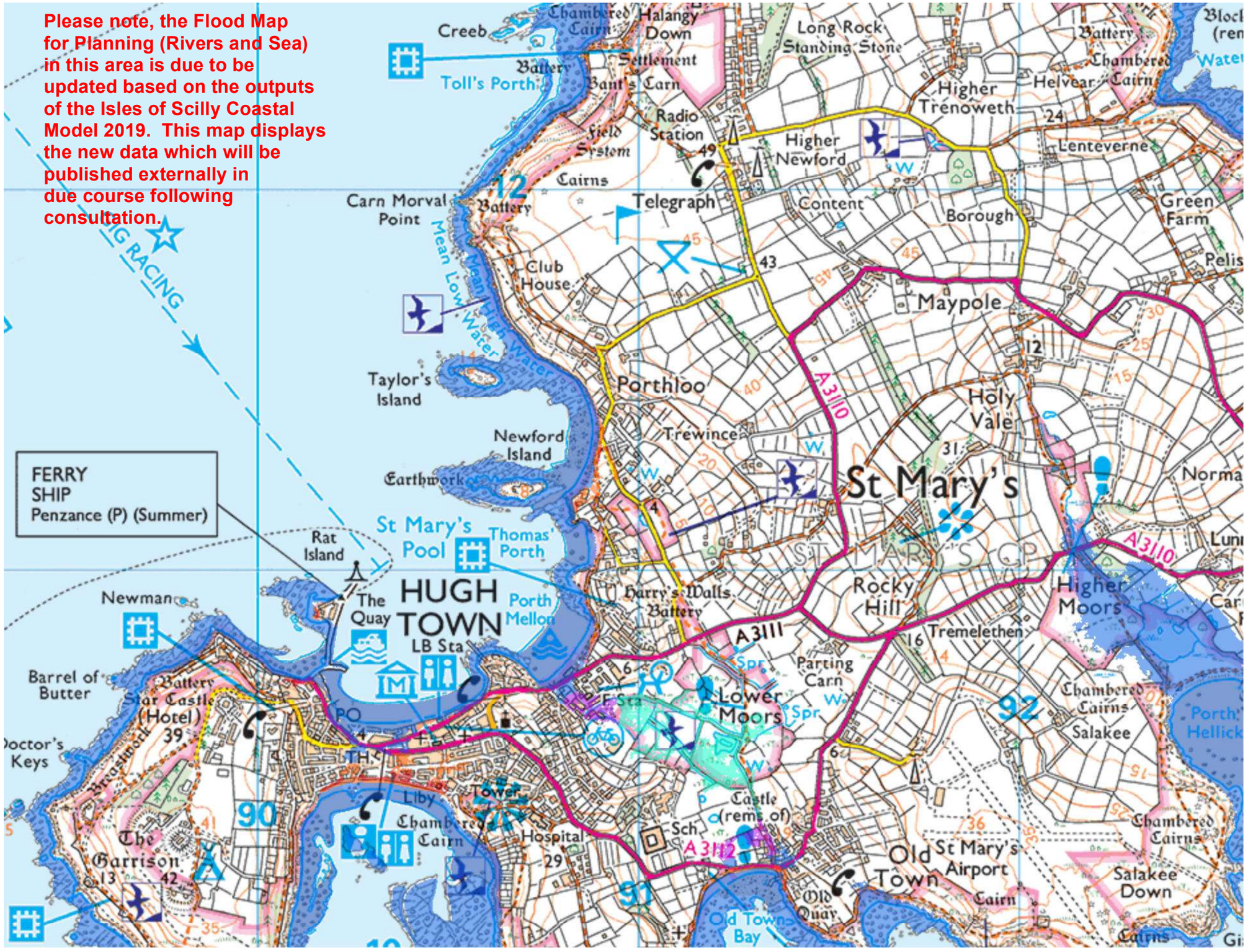

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1:10,000 Correct as of the 21st April 2022

N

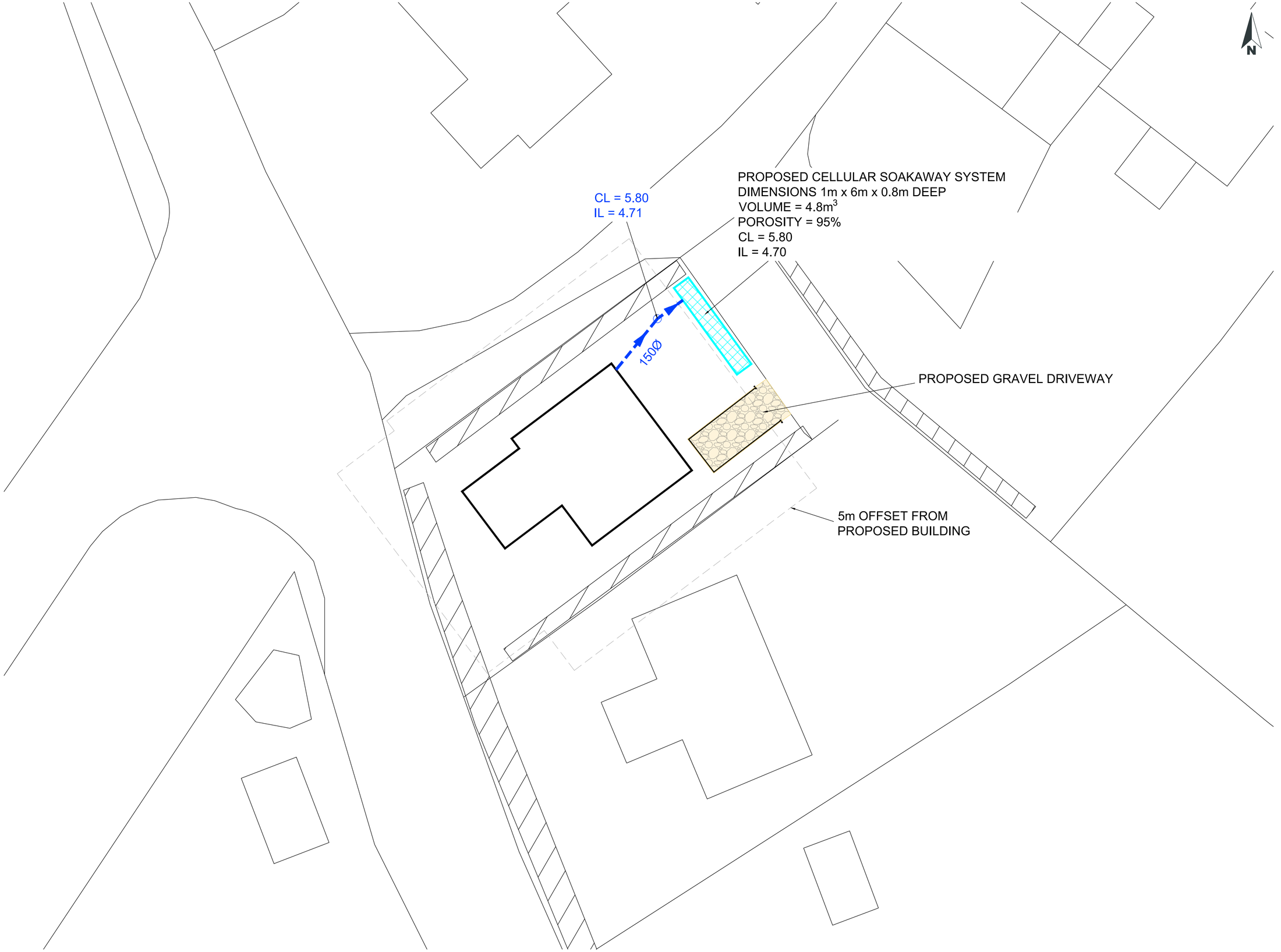
ENQ22/DCIS/258414 - Coastal Flood Boundary Data - Tidal Levels (2018)

Site	Grid Ref		Tidal Still Water Level (m OD) for return period Base year is 2017					
	Easting	Northing	50% AEP 1 in 2 year	20% AEP 1 in 5 year	10% AEP 1 in 10 year	2% AEP 1 in 50 year	0.5% AEP 1 in 200 year	0.1% AEP 1 in 1000 year
St Marys	90210	10890	3.48	3.56	3.61	3.74	3.84	3.96
Confidence intervals (2.5%)			3.46	3.54	3.59	3.71	3.79	3.86
Confidence intervals (97.5%)			3.48	3.56	3.62	3.77	3.89	4.05

Although levels are given to 2 decimal places, practitioners should treat them as only accurate to 1 decimal place. Confidence levels are provided when conducting sensitivity testing in a study or design.

Correct as of 21 April 2022

Appendix D – Drainage Strategy



NOTES:

1. DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS ARE IN METRES, UNLESS STATED OTHERWISE.
2. THIS DRAWING IS BASED ON THE ARCHITECTS' LAYOUT RECEIVED IN MAY 2022.
3. ORDNANCE SURVEY, (C) CROWN COPYRIGHT 2020. ALL RIGHTS RESERVED. LICENCE NUMBER 100022432.
4. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER 5 WORKING DAYS IN ADVANCE OF UNDERTAKING ANY WORK.
5. THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION.
6. INVERT LEVELS AND DIAMETERS OF EXISTING SEWERS TO BE CONFIRMED PRIOR TO DETAILED DESIGN.
7. PIPE DIAMETERS AND GRADIENTS ARE SHOWN INDICATIVELY ONLY.

KEY:

- SURFACE WATER INSPECTION CHAMBER/MANHOLE
- SURFACE WATER SEWER
- INFILTRATION CRATE SYSTEM
- GRAVEL

Rev	Date	Details	Drawn by	Checked by
-	27.05.22	ISSUED FOR INFORMATION	CE	KT

rappor

Infrastructure and environmental consultants

rappor.co.uk

CLIENT:
MRS LEANNE HICKS

PROJECT:
LAND ADJACENT TO WHITE COTTAGE, SCILLY

TITLE:
DRAINAGE LAYOUT

STATUS:
INFORMATION

SCALE @ A1:	DATE:	DRAWN:	CHECKED:	APPROVED:
1:100	27.05.22	CE	KT	KT

JOB NO:	DRAWING NO:	REVISION:
22-0332	C001	-

Appendix E – Drainage Calculations

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 157 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	4.957	0.257	0.1	1.5	O K
30 min Summer	5.043	0.343	0.2	2.0	O K
60 min Summer	5.124	0.424	0.2	2.4	O K
120 min Summer	5.180	0.480	0.2	2.7	O K
180 min Summer	5.197	0.497	0.2	2.8	O K
240 min Summer	5.201	0.501	0.2	2.9	O K
360 min Summer	5.192	0.492	0.2	2.8	O K
480 min Summer	5.177	0.477	0.2	2.7	O K
600 min Summer	5.159	0.459	0.2	2.6	O K
720 min Summer	5.142	0.442	0.2	2.5	O K
960 min Summer	5.107	0.407	0.2	2.3	O K
1440 min Summer	5.043	0.343	0.2	2.0	O K
2160 min Summer	4.965	0.265	0.1	1.5	O K
2880 min Summer	4.905	0.205	0.1	1.2	O K
4320 min Summer	4.821	0.121	0.1	0.7	O K
5760 min Summer	4.771	0.071	0.1	0.4	O K
7200 min Summer	4.749	0.049	0.1	0.3	O K
8640 min Summer	4.743	0.043	0.1	0.2	O K
10080 min Summer	4.738	0.038	0.1	0.2	O K
15 min Winter	4.989	0.289	0.2	1.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	104.373	0.0	18
30 min Summer	72.185	0.0	32
60 min Summer	47.821	0.0	62
120 min Summer	30.679	0.0	110
180 min Summer	23.321	0.0	140
240 min Summer	19.055	0.0	174
360 min Summer	14.198	0.0	242
480 min Summer	11.527	0.0	312
600 min Summer	9.797	0.0	380
720 min Summer	8.572	0.0	448
960 min Summer	6.935	0.0	584
1440 min Summer	5.133	0.0	840
2160 min Summer	3.788	0.0	1216
2880 min Summer	3.049	0.0	1588
4320 min Summer	2.239	0.0	2292
5760 min Summer	1.796	0.0	2992
7200 min Summer	1.516	0.0	3672
8640 min Summer	1.320	0.0	4400
10080 min Summer	1.174	0.0	5104
15 min Winter	104.373	0.0	18

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	5.087	0.387	0.2	2.2	O K
60 min Winter	5.182	0.482	0.2	2.7	O K
120 min Winter	5.251	0.551	0.2	3.1	O K
180 min Winter	5.268	0.568	0.2	3.2	O K
240 min Winter	5.272	0.572	0.2	3.3	O K
360 min Winter	5.254	0.554	0.2	3.2	O K
480 min Winter	5.229	0.529	0.2	3.0	O K
600 min Winter	5.202	0.502	0.2	2.9	O K
720 min Winter	5.174	0.474	0.2	2.7	O K
960 min Winter	5.121	0.421	0.2	2.4	O K
1440 min Winter	5.029	0.329	0.2	1.9	O K
2160 min Winter	4.925	0.225	0.1	1.3	O K
2880 min Winter	4.849	0.149	0.1	0.8	O K
4320 min Winter	4.757	0.057	0.1	0.3	O K
5760 min Winter	4.742	0.042	0.1	0.2	O K
7200 min Winter	4.736	0.036	0.1	0.2	O K
8640 min Winter	4.731	0.031	0.1	0.2	O K
10080 min Winter	4.728	0.028	0.1	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	72.185	0.0	32
60 min Winter	47.821	0.0	60
120 min Winter	30.679	0.0	116
180 min Winter	23.321	0.0	146
240 min Winter	19.055	0.0	184
360 min Winter	14.198	0.0	262
480 min Winter	11.527	0.0	338
600 min Winter	9.797	0.0	410
720 min Winter	8.572	0.0	482
960 min Winter	6.935	0.0	624
1440 min Winter	5.133	0.0	894
2160 min Winter	3.788	0.0	1276
2880 min Winter	3.049	0.0	1640
4320 min Winter	2.239	0.0	2288
5760 min Winter	1.796	0.0	2896
7200 min Winter	1.516	0.0	3632
8640 min Winter	1.320	0.0	4376
10080 min Winter	1.174	0.0	5136

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.008

Time (mins) From:	To:	Area (ha)
0	4	0.008

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 5.800

Cellular Storage Structure

Invert Level (m) 4.700 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.10800 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.10800

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	6.0	6.0	0.801	0.0	17.2
0.800	6.0	17.2			

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