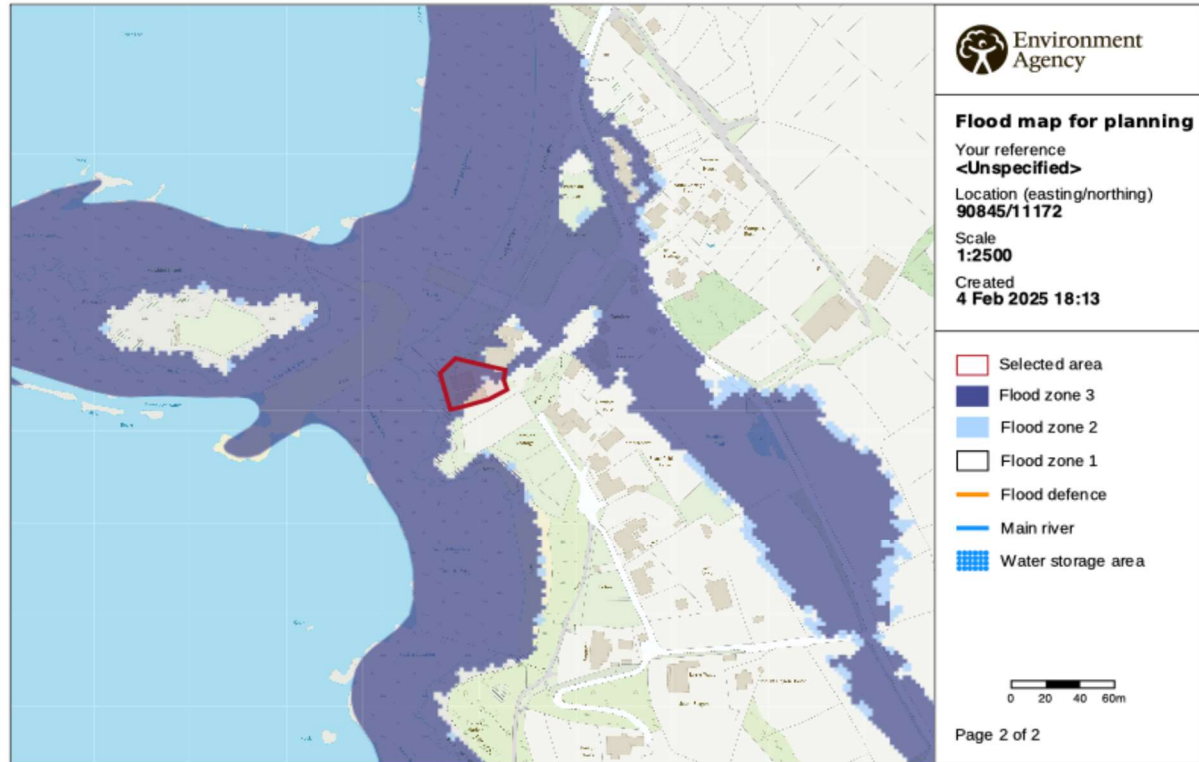


Flood Risk Assessment – Porthloo Workshop TR21 ONE

As indicated on the flood map below, the proposed development site falls within flood zone 3 and therefore has a potential flood risk.



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Location

The proposed development site is located within our business premises at the southern end of Porthloo Boatpark (Easting: 90387, Northing:11174).

This section of land is bordered by a line of pittosporum trees on three sides which provides protection from the prevailing north westerly wind. Access to the yard is located at the main entrance which faces east-northeast. The existing agricultural shed (18m x 9m) was erected circa 2000. As can be seen from the aerial photograph (**Figure 1.**) there is also a World War II pillbox located in the north-western section of the land. On the northern face of the surrounding border there is a two-to-three foot granite wall which provides further protection from the north westerly wind.

On the proposed development site there is currently a 9.2m x 9.5m steel framed polytunnel which was erected in 2016. Despite being a 'temporary structure', the polytunnel is marked on all relevant location plans and aerial imagery. The ground beneath the polytunnel is covered with a semi-permeable membrane and 20mm granite chippings.

Existing and Proposed Building Design and Layout

The existing 9.2m x 9.5m polytunnel is secured to the ground by steel rebar pins with metal ground plates on each footing of the structure (**Figure 2.**). A galvanised steel framework forms the main shape of the tunnel and a heavy-duty PVC fabric cladding is tensioned over the structure. The longitudinal edges of the cladding reach down to ground level and overhang the building by two feet. At each gable end of the tunnel there are doors constructed of PVC fabric cladding and galvanised steel support bars. These doors reach down to the floor and lay over the granite chippings.

The proposed new building is a 10.5m x 12.45m galvanised steel frame timber clad shed with a design-matched 4.0m x 8.3m lean-to attached. The main structure of the building would be supported by 7 upright sections of galvanised steel joining into a low-pitch, corrugated fibre cement roof. The height of the building would be 3.8m to the underside of the eaves and 5.14m to the apex of the roof, this matches the height of the existing shed building.

Prior to erecting the new main shed, 7 concrete footings of 0.8m³ would be set into the ground followed by a steel reinforced RC35/45 concrete pad of approximately 150-200mm in depth. Surrounding the inner walls of the shed, there would be multiple courses of 100mm concrete blocks which would give the internal surface of the shed an additional layer of protection from water intrusion underneath the overlapped cladding. The same method of construction would be used on the lean-to section of the building, however there would only be three footings of 0.8m³. The access to the main building would consist of a pair of bi-folding doors on the east-northeast facing gable end of the building. Access to the lean-to would be through a pair of side-hinged doors also on the east-northeast facing gable end.

Assessment of Flood Risks

Groundwater

On review of the flood map shown above, it is clear that, due to the close proximity of the proposed development site to the sea, any groundwater drains down to the local sea levels. Additionally, the proposed development plans would result in the building's floor level being raised up by approximately 150mm, further reducing the risk of groundwater causing any immediate issues. Within the timeframe that the polytunnel has been erected, groundwater flooding has never presented a significant risk.

Furthermore, as part of the proposed building works, there are plans in place to install a further soakaway and drainage system surrounding the easterly-facing gable end which would eliminate the potential for groundwater to settle. It can therefore be argued that

flooding from groundwater is not considered to represent a meaningful risk to the proposed development.

Overland Flow

The risk of flooding from overland flow is minimised significantly by the topography of the site. The only potential area for overland flow to be generated is located south of the proposed development site (**Figure 3.**) The existing shed is located between the proposed building site and the area of upslope. Additionally, there are two 0.8 x 0.8 x 14m French drains located either side of the existing building which allow overland flow to exit towards the sea. As part of the proposed building works, there are also plans in place to install a further soakaway and drainage system surrounding the easterly-facing gable end which would eliminate the risk of flooding from overland flow. This clearly demonstrates that flooding from overland flow is not considered to present a significant risk to the proposed building.

Fluvial Flood Risk

There are no rivers, streams or significant watercourses within proximity or upslope of the proposed development site. Flooding from fluvial sources is therefore not considered to pose any risk to the proposed building.

Tidal/Weather Flooding

Despite the proposed building site being located within close proximity to the sea, the risk of tidal flooding is far less significant than expected. Since the completion of sea defence works along the northern end of Porthloo beach, the topography of Porthloo bay has changed. Due to the placement of rock armour in the northern section of the beachfront there has been a shift in the sand bar between the south-western tip of Porthloo and the rocks adjoining Newford Island. This redistribution of material has created a larger and more defined sand bar and therefore an increase in height of the sand level on the southern end of the beach (**Figure 4.**) A difference of approximately 2-2.5m is visible between the beach level and that of the lowest point on the proposed building site. The current elevation of the proposed development site is 3.7m AOD, which would be increased to approximately 3.85m AOD with the proposed building work before erecting the new shed.

According to the Environment Agency, it is predicted that sea levels in the UK will be rising as a result of climate change. Even accounting for the rise in sea level, the risk of tidal flooding at still water level only bears any significance on the proposed building at the 200 year tidal event mark. In light of this, the risk from still water tidal flooding does not pose a significant risk to the proposed building.

The risk from tidal flooding in extreme weather events is the only instance which could present an immediate risk to the proposed building. However, due to the layout of the site there are various factors that reduce this risk significantly. The location of the pillbox in the northwest corner provides shelter from any prevailing winds and weather. The pillbox is constructed of steel reinforced concrete walls with an approximate thickness of 0.8m along with foundations sunk into the ground and meeting the granite bedrock below. Also, located in the north-western corner of the yard is there is a two-to-three foot high granite wall which historically formed part of field boundary. This provides an additional level of protection from tidal surges in extreme weather conditions.

Due to the factors outlined above, tidal flooding is not considered to pose a significant risk to the proposed building.

Flood History

The Isles of Scilly Local Flood Risk Management Strategy (March 2017) does not include any records of flooding in the locality of the proposed building site. The Defra Isles of Scilly Water Interests Survey Report on Flood Defenced (produced by ARUP in 2011) does not identify any instances of flooding to the northern end of Porthloo Boatpark. However, due to the topography of the land the risk to flooding at the proposed building site is naturally reduced. The most recent instance of flooding occurred in 2014 when north westerly winds of up to 92 mph coincided with high spring tides. The result was an extreme weather event which led to over-topping of Porthloo bank (pre-sea defence work). However, due to the previously established drainage system at the proposed site, there was no evidence of significant flooding and no damage to property or landscape.

Flooding as a result of development

The proposed development will not increase the risk of flooding down slope of the site. Due to the addition of another drainage system and soakaway, there will be a larger area for water drainage. Additionally, the surrounding area of the building will be covered in permeable membrane and granite chippings which will further aid drainage. The use of effective water collection from roof guttering will also mean that the rainwater can be diverted into the drainage system thus further reducing the flooding risk. Run-off from

the proposed building will not be increased due to the inclusion of effective drainage and therefore the risk to flooding to nearby property or land does not provide a significant enough risk for consideration.

Flood Summary

The risk presented by flooding from various sources has been considered in relation to the proposed building. The only source of flooding which could present a potential risk is flooding as a result of an extreme weather event. With the predicted effects of climate change, the risk of tidal flooding will increase over time. However, the timeframe with which the risk becomes significant will far outdate the usable lifespan of the proposed building. In summary, the risks of flooding from groundwater, overland flow, development and fluvial sources are negligible. The risk of flooding from tidal and weather-based events may potentially pose a threat in the future but based on the historical data available, it can be strongly argued that the risk to the proposed building is not significant enough to put to consideration.

Flood Evacuation

In the highly unlikely event of a flood, there has been consideration taken towards an effective flood evacuation route. With the most significant risk of flooding coming from an extreme tidal/weather event the appropriate evacuation route would be to head to higher ground to the south east of the site. Depending on the severity of the flood, there are two possible effective evacuation routes:



1. The first evacuation route would be to depart the yard entrance towards the coast path and follow the coast path around to the front of Newfort house.



2. The second evacuation route would be used if the first route was in accessible. In the case of an extreme weather event there is a minor risk that the storm boards at Porthloo could breach leading to flooding of the boatpark. This could cut off access to the coast path to the north-east of the proposed site entrance. In this event, the alternative evacuation route would be used. This route would lead upslope into the storage field leading to a significant elevation gain. From the storage field, access to the coast path can be made via the fields at the front of Newfort House.

Mitigation Measures

Due to the building being located in Flood Zone 3, a number of measures will be put in place to mitigate the risks of flooding:

1. All electrical sockets will be mounted a minimum of 1.2m above floor level, reducing the risk of damage to property or person in the event of a flood.
2. The site level will be raised a minimum of 150mm to increase the overall AOD level of the site thus reducing flood risk.
3. In the event of extreme weather and tides all suitable precautions including, limiting customer and employee access to the yard, will be undertaken to prevent the risk of damage to persons.
4. Careful monitoring of the seawall, shoreline and pillbox will be carried out and regularly assessed to ensure coastal erosion is not increasing the risk of flooding. In the event of significant coastal erosion, the necessary repair/maintenance work will be completed with the consent of the appropriate council committee or governing bodies.
5. A detailed flood evacuation plan will be prepared and made available to all employees and customers who visit or work in the yard.
6. Local weather channels, forecasts and radio alerts will be monitored regularly to ensure that extreme weather events are not unexpected and preparations can be made in the event of an emergency.

Conclusions

The risk of flooding to the proposed building from various sources have been considered. It was noted that, although minor, the only significant risk to be considered is tidal/extreme weather from the north to north western heading causing flooding. Despite the Environment Agency classifying the site as being located in Flood Zone 3 there is insignificant historical data to support an immediate risk of flooding at the site. Despite this, plans and assessments will be carried out to help mitigate the effects of flooding at the site and a detailed flood evacuation plan will be prepared. Due to the commercial nature of the proposed building, the risk to safety of flooding would be reduced further to the business' normal opening hours 09:00 – 17:00. The design of the proposed building has taken into consideration the risk of flooding and the necessary drainage has been included in plans to help further mitigate the risk of flooding. With the combination of mitigation measures, the building and its users will be safely protected from the risks of flooding throughout its use.

Figure 1. Pillbox highlighted by red outline

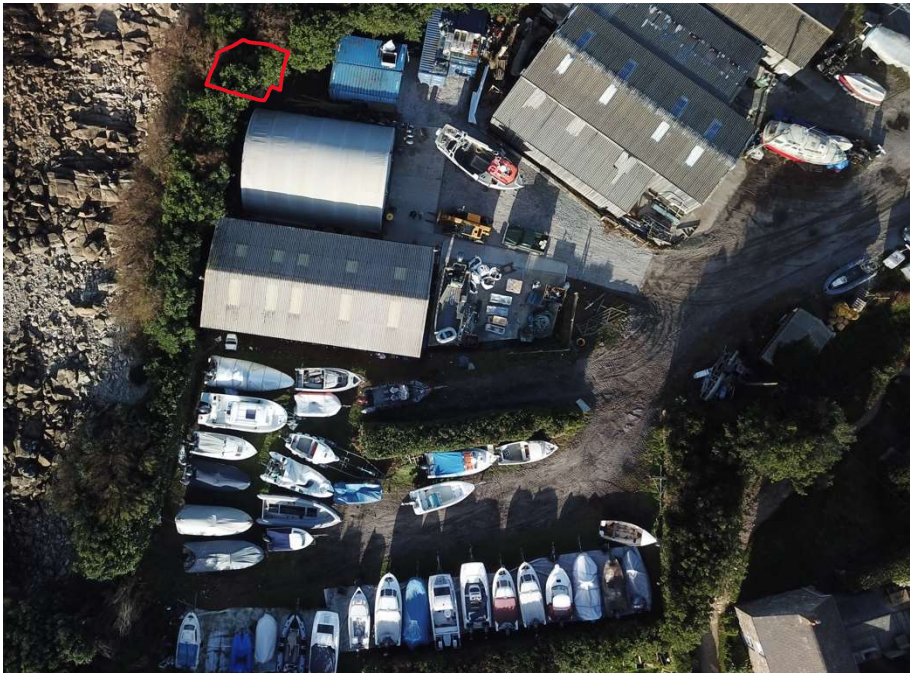


Figure 2. Polytunnel and existing yard taken facing west



Figure 3. Storage field and access highlighted in yellow



Figure 4. Redistribution of materials on sea front. Sand bar highlighted in blue.

