JOB NUMBER: **MD1811**

PROJECT: **29 THE TERRACE, BARNES**

CLIENT: JENNIE AND ANGUS

REPORT NUMBER: MD1811/rep/001 Rev A

REPORT TITLE: **FLOOD RISK & DRAINAGE ASSESSMENT**

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INTRODUCTION

M Design were commissioned to undertake a flood risk assessment in relation to the proposed works at 29 The Terrace, Barnes. The proposals are mainly internal alterations to the ground and first floor of the building. There will be a small extension to the rear of the building. There will be no sleeping accommodation on the ground floor.

The building is surrounded by other residential properties. The site served by an access road to the north.

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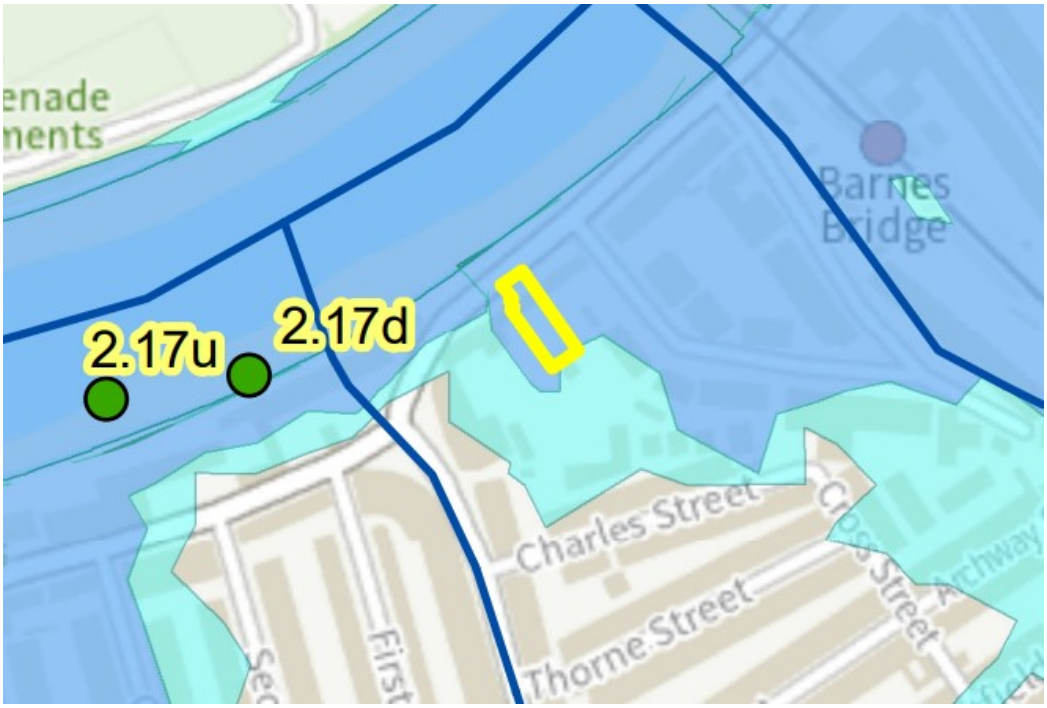
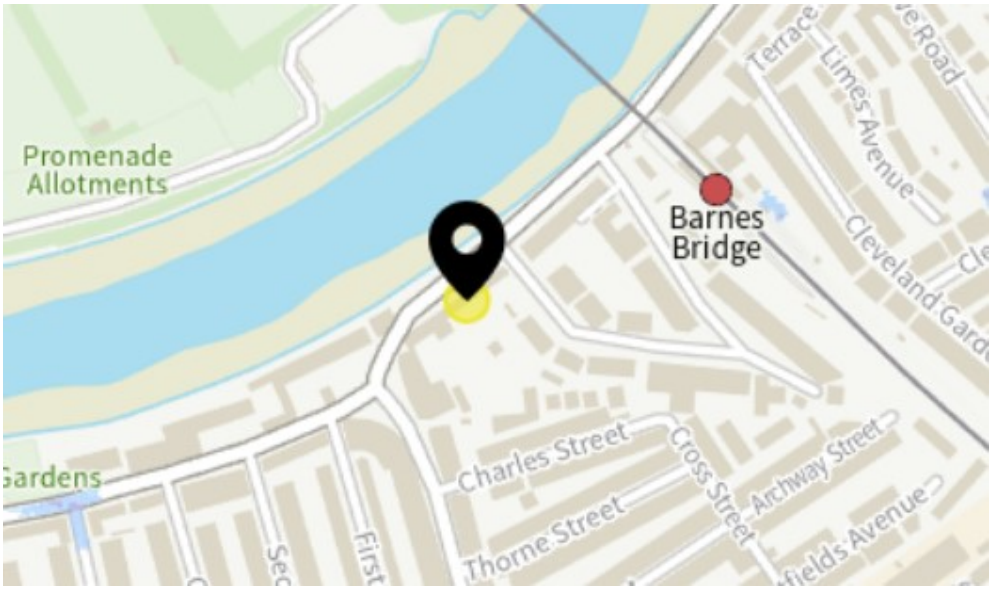


The site within flood zone 3 of the River Thames to the north. It covers all the local houses and ends to the rear boundary of the site where it is then classed as flood zone 2.

Other sources of flooding have also been considered. The plan below shows that there is no flooding near the site in a 1 in 30 years storm event.



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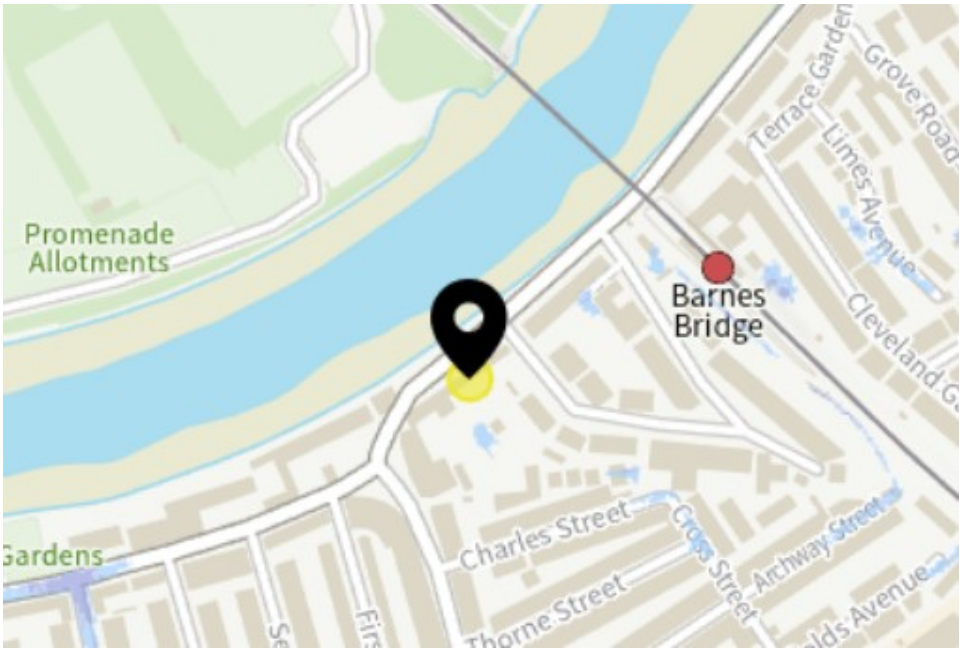
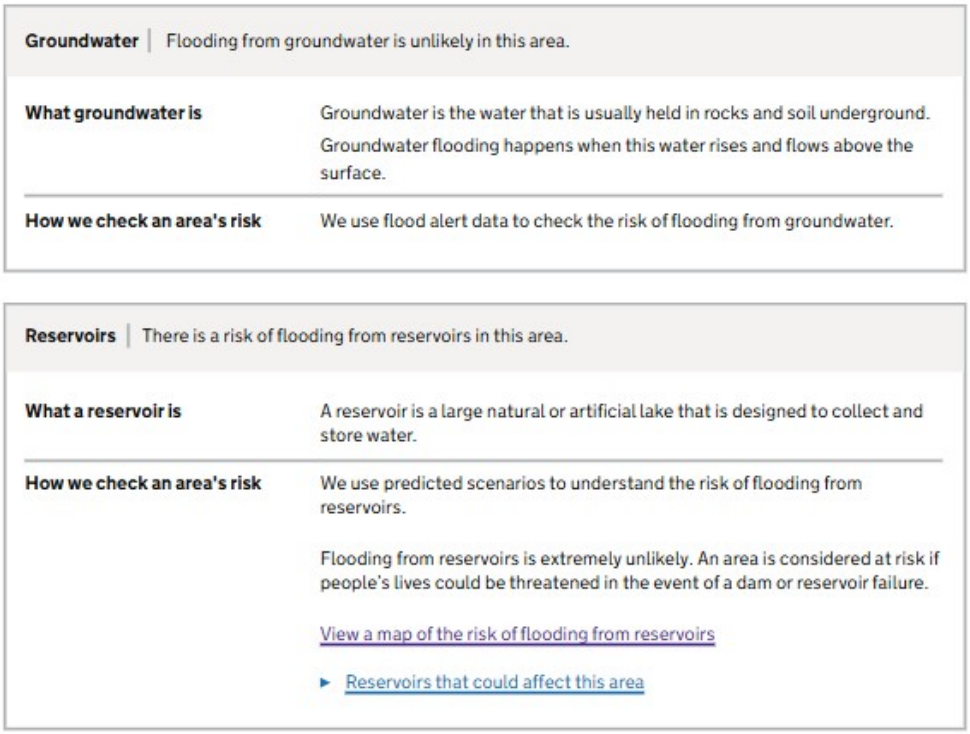
The 1 in 100 year storm event is shown below. Again there is no flooding near the dwelling.



The final surface water plan is the extreme 1 in 1000 year event. There is a small area of ponding to the rear of the property. However this is an unlikely event and the plan also does not take into account any drainage that could be installed in this area that will reduce the risk of ponding.

The table below shows that there is a risk to the site if the local reservoir was to fail. However the Environment Agency have stated that this is an extremely unlikely event. It also highlights that there is no risk from ground water flooding.



Groundwater | Flooding from groundwater is unlikely in this area.	
What groundwater is	Groundwater is the water that is usually held in rocks and soil underground. Groundwater flooding happens when this water rises and flows above the surface.
How we check an area's risk	We use flood alert data to check the risk of flooding from groundwater.

Reservoirs | There is a risk of flooding from reservoirs in this area.	
What a reservoir is	A reservoir is a large natural or artificial lake that is designed to collect and store water.
How we check an area's risk	We use predicted scenarios to understand the risk of flooding from reservoirs. Flooding from reservoirs is extremely unlikely. An area is considered at risk if people's lives could be threatened in the event of a dam or reservoir failure. View a map of the risk of flooding from reservoirs ► Reservoirs that could affect this area

M Design have also ordered the flood information for the area from the Environment Agency.

Defence Details

The design standard of protection of the flood defences in this area of the Thames is 0.1% AEP; they are designed to defend London up to a 1 in 1000 year **tidal** flood event. The defences are all raised, man-made and privately owned. It is the riparian owners' responsibility to ensure that they are maintained to a crest level of 5.94 m AODN (the Statutory Flood Defence Level in this reach of the Thames). Information relating the TE2100 Plan and any future defence crest levels can be found on ShareFile at following link: https://ea.sharefile.com/d-s5e5640147244482193 31e780c91c4ac2

This has confirmed that the flood defences in the area are maintained by the EA and protect the area up to a 1 in 1000 year storm event with the crest set at 5.92m.

The information shows that the only way the property would be put at risk of flooding from flooding from the watercourse would be in the event of a breach in the flood defences.

Legend

Site

Main Rivers

Upriver MLWL Breach Inundation

Epoch

2014

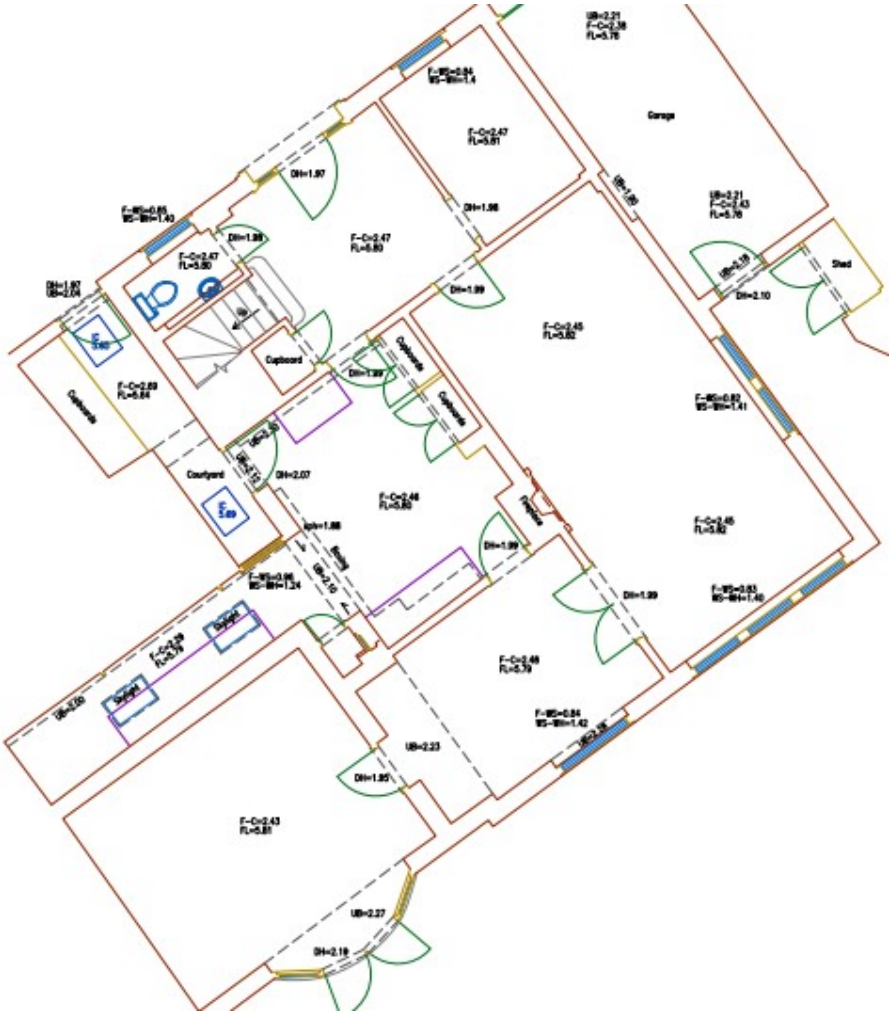
2100

This is an extremely unlikely scenario as the modelling simulates 5679 continuous tidal breaches along the entire extent of the Thames from Teddington to the Thames Barrier. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide and even in this extreme event the flood waters are only shown to reach the property in the year 2100 event.

To establish if the works are acceptable within this zone it is important to what changes will be made to the building and if any mitigation can be put in place to reduce the damage by any potential flooding.

Proposed Development

The existing house is a two storey dwelling. The finished floor level is approximately 5.80m.



Existing Layout

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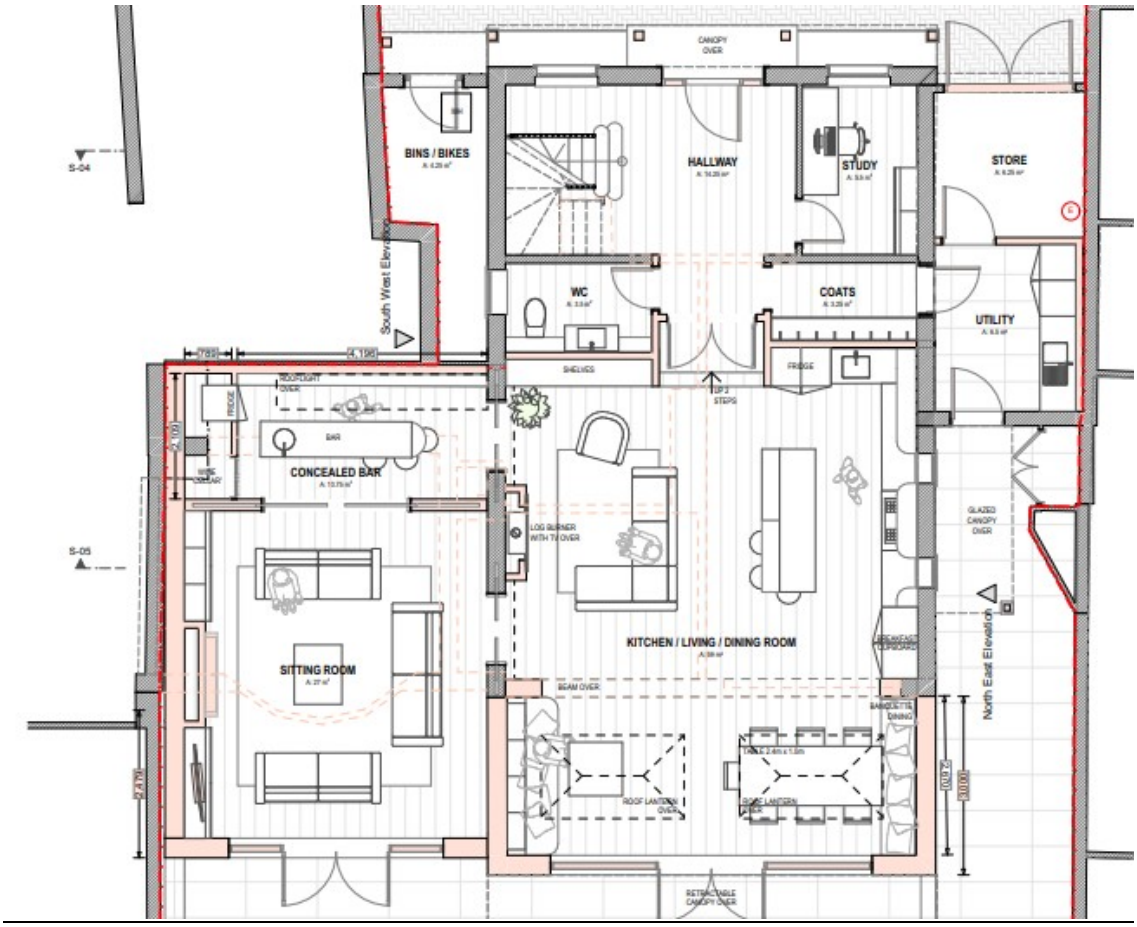
The proposal is to carry out internal alterations and construct a small rear extension. The hallway area to the front of the building will maintain the existing finished floor level. The area to the rear will be reduced slightly by 300mm to 5.5m to aid with the head height of the room. There will be no ground floor sleeping accommodation.



Proposed Layout

The works will not increase the risk category of the building and will be maintained as a residential dwelling.

As the building is in a flood zone, if it is not already the case, the occupiers of the building are to sign up to the Environmental Agency early flood warning system which gives the residents an advanced warning in the event of a flood and give advance on flood procedures. This should also be referred to within the deeds of the building to make future occupiers aware of the flooding issues.

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It is important to take the flood risk into consideration when carrying out the works. This will help reduce damage to the property should flooding occur. The proposed mitigation has been shown below.

• Use materials with either good drying and cleaning properties, or, sacrificial materials that can easily be replaced;
• Design access to all spaces to permit drying and cleaning; (easily accessed from other areas of the building)
• Raise the level of electric wiring, appliances and utility metres as high above ground level as practically possible.

General advice for resilient design

Ensure high quality workmanship at all stages of construction.

Masonry walls:

Use good quality facing bricks for the external face of cavity walls.

Do not use soft bricks, such as hand made clay bricks, which can easily crumble when subjected to water.

Concrete blocks dry more quickly than Aircrete blocks. However, Aircrete blocks allow less leakage. Therefore, design of blockwork walls needs to take into account these two opposite types of behaviour and consider whether drying or resistance to water is most relevant in each situation. For a "water entry strategy" which is aimed at allowing water passage through the property, concrete blocks are recommended.

Clear cavity walls, i.e. with no insulation, have better resilience characteristics than filled or part filled cavity walls as they dry more quickly.

Framed walls: Avoid timber framed walls containing construction materials that have poor performance in floods, namely oriented strand board and mineral fibre insulation. Timber framed walls are generally not recommended, unless a sacrificial approach is adopted whereby some materials will be stripped to allow drying.

Steel framed walls may offer a suitable alternative option but specialist advice needs to be sought on how to incorporate resilient materials/construction methods in the design. The possible use of bituminous paint on steel plates may be a means of preventing corrosion.

External renders should not be used as they provide a barrier to water penetration and may induce excessive differences in depth between outside and inside of the property resulting in possible structural problems.

Insulation:

External insulation is better than cavity insulation because it is easily replaced if necessary; however it is generally protected by rigid lining which may create a barrier to water.

Cavity insulation should incorporate rigid closed cell materials as these retain integrity and have low moisture take-up. Other common types, such as mineral fibre batts, are not generally recommended as they can remain wet several months after exposure to flood water which slows down the wall drying process. Blown-in insulation can slump due to excessive moisture uptake, and some types can retain high levels of moisture for long periods of time (under natural drying conditions).

Internal linings:

Avoid internal cement renders as these can prevent effective drying.

Use standard gypsum plasterboard up to the predicted flood level (plus freeboard of 50mm) as a sacrificial material. For this purpose, the use of a dado rail to separate the above and below flooded area may be useful. Splash proof boards do not necessarily offer better protection against flood waters, which may remain for some time and exert pressure on the board.

Above predicted flood level (plus freeboard) the use of plasterboard or internal cement renders is appropriate.

Anecdotal evidence suggests that internal lime plaster/render can be a good solution. Lime plaster depends on contact with the air to set and harden. Because of this, full strength lime plaster, which typically requires over 6months, was not possible to test. Consequently, no assurance can be given for its performance. Tests performed when young showed that it crumbles very easily under high water pressure.

6.6 Doors and windows

Doors, windows and air vents are potential flow paths into properties.

General advice for resilient/resistant design

Doors: Raising the threshold as high as possible, while complying with level access requirements, should be considered as the primary measure. In addition, sealed PVC external framed doors should be used and, where the use of wooden doors is a preferred option, all effort should be made to ensure a good fit and seal to their frames.

Hollow core timber internal doors should not be used where the predicted frequency of flooding is high. Where sufficient flood warning is given, butt hinges, that allow internal doors to be easily removed and stored in dry areas prior to a flood, should be used. Where the frequency of predicted flooding is low or where there is no warning (e.g. overland or sewer flooding) it may be necessary to replace the doors after the flood.

Windows/patio doors: Windows and patio doors are vulnerable to flood water and similar measures to those used for doors should be taken. Special care should be taken to ensure adequate sealing of any PVC window/door sills to the fabric of the house. Of particular concern would be excessive water pressure on the glazing of patio doors. Double glazing conforming to the relevant standards would in principle adequately resist the pressures generated by flood waters; debris carrying flows may cause damage.

Air vents: special designs of air vent are available in the market to prevent water ingress in circumstances where the predicted flood depth is low (i.e. < 0.3m); e.g. periscopic air vent, see Figure 6.11. Careful consideration should be given to effectively sealing any associated joints.

The following guidance is for the fixtures and fittings with the dwelling:

6.7.2 *Water entry strategy*

General advice for resilient design

Although a sacrificial approach can be adopted whereby fittings are designed to be replaced after a flood, it is advisable to specify durable fittings that are not appreciably affected by water and can be easily cleaned (e.g. use of plastic materials or stainless steel for kitchen units). The cost of these units may need to be balanced against the predicted frequency of flooding. Avoid wood fibre based carcases and use easily removable solid wood doors and drawers.

Place fittings (e.g. electrical appliances, gas oven) as high as practical above floor to minimise the risk of being affected by flood water.

When allowing water in, it is important to provide means for effective drainage and cleaning. Providing gaps behind kitchen units will facilitate drainage and will allow access for forced drying, if proved to be necessary.

Ensure high quality workmanship in the application of fittings.

More details are given in 'Standards for the repair of buildings following flooding' (CIRIA, 2005a) or in web sites such as the 'Guide to flood resilient repairs', promoted by Norwich Union (Norwich Union web site).

There is a small increase of impermeable area due to the extension to the rear. If possible, the new drainage should discharge into a soakaway. If the ground conditions are not suitable then the new drainage should connect to the existing plot drainage on site. The client will contact the local sewer undertaker regarding the connection and design the drainage accordingly.

The levels to the rear of the property should be set to fall away from the building and adequate drainage installed to minimise the risk of ponding in the rear garden area.

In conclusion the development is within a flood zone, however the works will not increase the risk classification of the building and there is no ground floor sleeping accommodation. All bedrooms will be on the first floor high above any potential flooding.

The data shows that the dwelling is in a flood zone but only at risk in an extreme scenario of large storm events and breaches to the flood barriers.

If not already the case a personal flood plan will be prepared to give guidance on the flood risks and emergency procedures and the owners will sign up to the Environment Agency Flood Warning System.

Therefore the client has taken the necessary steps to ensure that the works are acceptable in relation to flood risk.

Please refer to Architecture's drawings for existing and proposed plan/elevations.

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