

Flood Risk Assessment report

For the proposed non-habitable domestic
outbuilding to

181 Shakespeare Avenue, Hayes,
Hillingdon, UB4 0BH

Prepared by

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1 Executive Summary

- A. The proposal is for a domestic non-habitable outbuilding not exceeding 250m², lies within an existing developed area and is minor development.
- B. The site lies in Flood Zone 2 and is adjacent to an area with a Low risk of flooding from surface water and infrastructure failure. Flood resilience and alleviation methods will be implemented on site, the extension does not impact on existing access and egress routes and the site will be signed up to flood warning schemes.
- C. There is no documented evidence of flood risk from any other sources and the re-development does not impact on flood risk elsewhere.
- D. Assuming the mitigation, warning and evacuation procedures can be maintained over the lifetime of the development, the proposed extension to an existing domestic building is considered acceptable

2 Introduction

2.1 Site location

The project is at 181, Shakespeare Avenue, Hayes, Hillingdon, UB4 0BH (see Figure 1). The site is located within close proximity to the Yeading Brook.

181, Shakespeare Avenue, Hayes, Hillingdon, UB4 0BH



Figure 1: Site location plan, outlined in red with North topmost. (source: client)

2.2 Development description

The proposal is for a domestic outbuilding (non-habitable) not exceeding 250m² in footprint. The site is an existing developed site and the proposed work is classed as minor development. The existing and proposed layouts and proposed sections are provided in Appendix A.

2.3 Site geology

Geological mapping data from within the vicinity indicate London Claye. The local geology is classed as virtually impermeable ^[1].

3 Policies

In preparation for this Flood Risk Assessment (FRA), National Planning Policy Framework^[6] and British Standards on Assessing and Managing Flood Risk^[3] were reviewed, and their related policies are, where applicable, referred to in this report.

The Environment Agency has been consulted in order to establish the flood zone of the proposed site.

In addition, planning policies from the Local Authority were also reviewed including its Strategic Flood Risk Assessment^[8].

Some of key policies are summarised as below.

3.1 Standing Advice

Generally the following applies: Apart from habitable basements, domestic extensions within the curtilage of the dwelling (see GDPO definition of, minor development) and non-domestic extensions with a footprint of less than 250 m² will not require a detailed FRA. These applications should demonstrate that the risk of flooding from all sources has been assessed. The main sources of flooding are likely to be tidal, surface water and sewer flooding.

3.2 Environment Agency Guidance on Standing Advice

- You need to provide a plan showing the finished floor levels and the estimated flood levels.
- Make sure that floor levels are either no lower than existing floor levels or 300 millimetres (mm) above the estimated flood level. If your floor levels aren't going to be 300mm above existing flood levels, you need to check with your local planning authority if you also need to take flood resistance and resilience measures.

- State in your assessment all levels in relation to Ordnance Datum (the height above average sea level). You may be able to get this information from the Ordnance Survey. If not, you'll need to get a land survey carried out by a qualified surveyor.
- Your plans need to show how you've made efforts to ensure the development won't be flooded by surface water runoff, eg. by diverting surface water away from the property or by using flood gates.
- If your minor extension is in an area with increased flood risk as a result of multiple minor extensions in the area, you need to include an assessment of the off-site flood risk. Check with your local planning authority if this applies to your development.
- Make sure your flood resistance and resilience plans are in line with the guidance on improving the flood performance of new buildings.

For all relevant vulnerable developments (ie more vulnerable, less vulnerable and water compatible), you must follow the advice for:

- surface water management
- access and evacuation
- floor levels

4 Flood risk analysis

4.1 Sources of potential flooding

Flood risk from various sources at the site is analysed in this section. It is concluded that the sources of flooding risk at the site are fluvial from the adjacent Yeading Brook with a residual risk from infrastructure failure.

4.1.1 Flood risk from sea and rivers

Flooding can occur from the sea due to a particularly high tide or surge, or combination of both.

The site is not at risk from tidal flooding.

Flooding can also take place from flows that are not contained within the channel due to high levels of rainfall in the catchment.

With reference to the Environment Agency 2017 Flood Map, Figure 2, the site lies just within Flood Zone 2 at extreme limits of Flood zone 2. This means that the proposed site has a medium probability of fluvial flooding (between a 1 in 100 and 1000 annual probability of fluvial flooding).

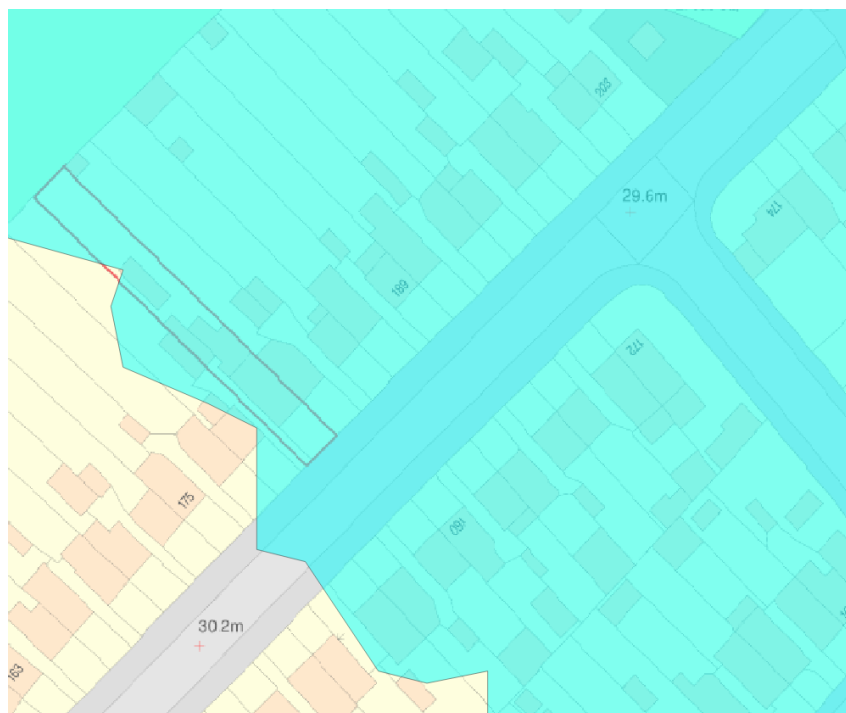


Figure 2: Flood Mapping from the 2017 EA flood data.

4.1.2 Flood risk from groundwater

Groundwater flooding occurs when water levels in the ground rise above surface levels. It is most common in low-lying areas underlain by permeable rock (aquifers), usually due to extended periods of wet weather. The site's geology is classified as having low susceptibility to groundwater flooding.

Since the proposed development does not involve any basement elements, the impact of groundwater flooding on the proposed site will be minimal. Hence, the risk of groundwater flooding on the proposed site can be considered to be Low.

4.1.3 Flood risk from sewer and highway drains

Flooding occurs when combined, foul or surface water sewers and highway drains are temporarily over-loaded due to excessive rainfall or due to blockage.

The site may lie in an area of Victorian era sewers which have not been upgraded, and hence may suffer from frequent overload however, there are no indicators to Sewer flooding at the site.

Hence, the risk of sewer and highway flooding to the proposed site can be considered to be Low.

4.1.4 Flooding risk from surface water

Flooding occurs when rainfall fall on a surface (on or off the site) which acts as run-off which has not infiltrated into the ground or entered into a drainage system.

With reference to the E.A online mapping, Figure 3, the site is classed as being adjacent to an area with a Low risk of surface water flooding, Figure 3. On the site itself, for design purposes, while the 1 in 100yr predicted Surface water depths are not shown to impact on the building.

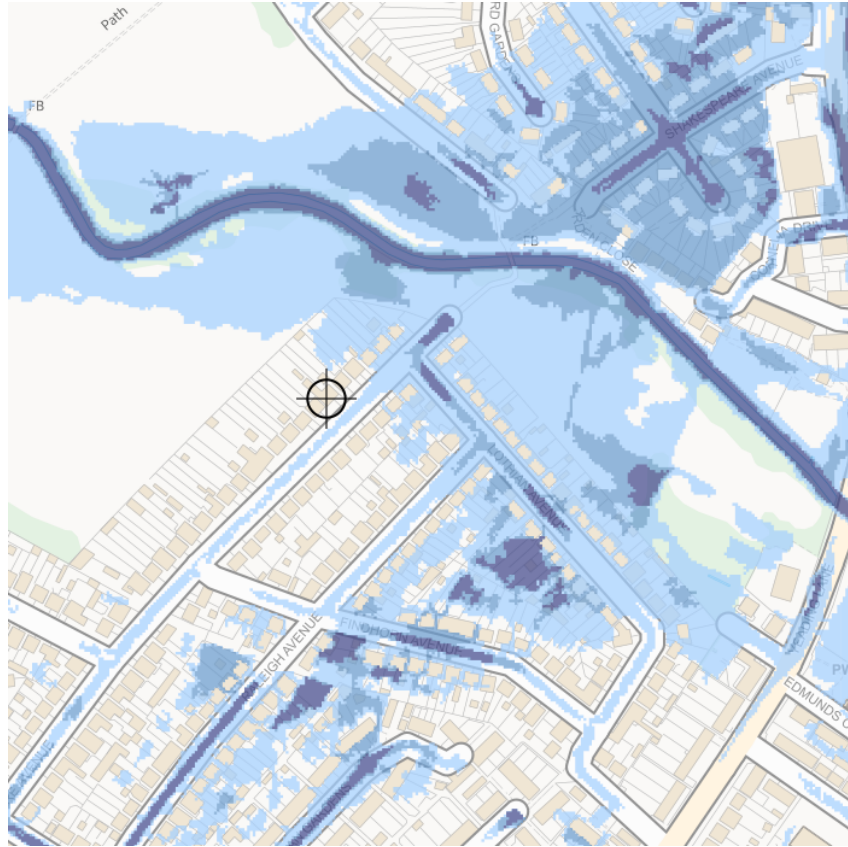


Figure 3: SW Flood risk mapping from the EA online data

4.1.5 Flood risk from infrastructure failure

Flooding occurs because of canals, reservoirs, industrial processes, burst water mains or failed pumping stations.

“There are two large flood storage reservoirs on the Yeadon Brook which provide storage capacity up to the 1 in 50 year standard”^[8].

The site is in an area deemed at no risk from reservoir failure although within close proximity to an at risk area. Figures 4. However, the EA state:

“Reservoirs in the UK have an extremely good safety record with no failures resulting in the loss of life since 1925. Reservoirs are more carefully maintained now. This means reservoir flooding is very unlikely to happen. The Environment Agency is the enforcement authority for the Reservoirs Act 1975 in England. All large reservoirs that we think could endanger human life must be inspected and supervised by reservoir engineers. We ensure that reservoirs are regularly inspected and essential safety work is carried out.”

Therefore the relative flood risk from reservoir flooding is considered to be Low.

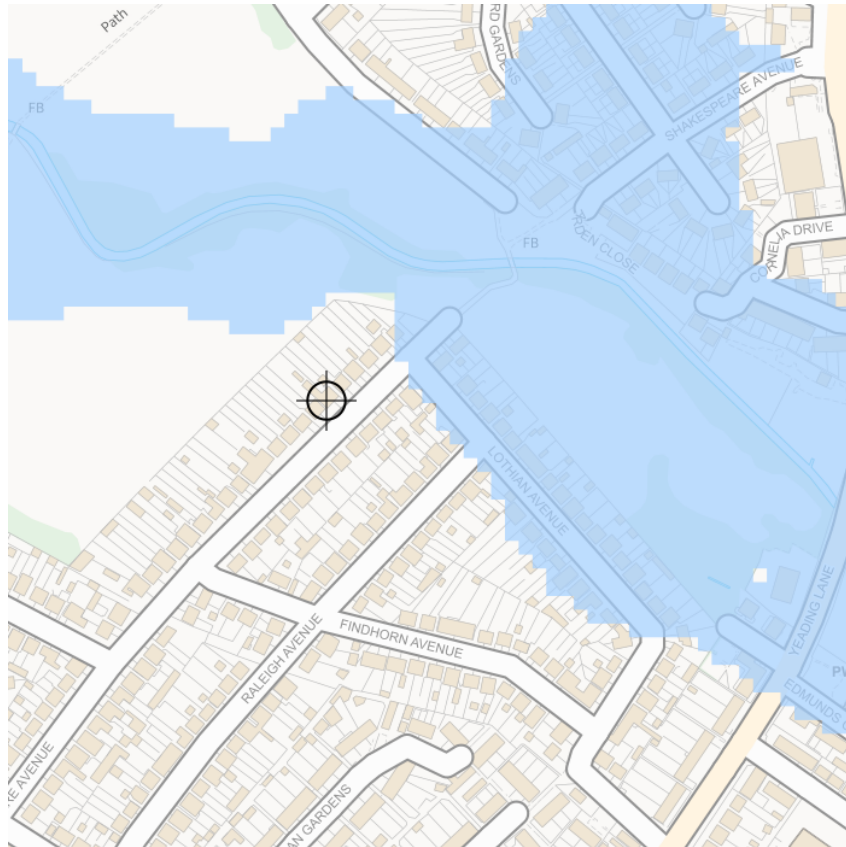


Figure 4: Reservoir failure flood risk mapping from the EA online data

4.2 On-site surface water analysis and management

4.2.1 Generation of Run-off

The post-development surface water run-off volume will not increase when compared to the pre-development level because of a nett reduction in impermeable areas. An existing garage and timber structure with a total drained area of 65m^2 are being removed (note: a proposal for a 16m^2 extension is under a separate cover).

The design team have detailed a Sedum roof as the primary SuDS strategy for the site, with exceedence flows taken to the existing system (without any increase in nett outfall) via a rainwater butt in offline configuration.

4.2.2 Design parameters

“In summer green roofs can retain 70–80% of rainfall and in winter they retain 10–35%”^[7] hence, it follows, will reduce run-off by these amounts.

The green roof will be designed to prevent run-off from all rainfall events up to the 5mm event which is equivalent to a 1 in 1 peak run-off summer storm for the site -

generally the standard target reduction for sedum roofs. A suitable option with a max 20mm (20kg.m⁻²) of retention capacity can be found in Appendix C.

Rainwater harvesting

Rain water harvesting / water butts: These provide additional, “off line” SuDS, and are deemed a suitable SuDS component for small plots^[4]. The collection and re-use of water can reduce run off volumes arising from roofs. The collected water, via readily available diverters, being used for external uses.

The project team have detailed an “off line” rainwater butt(s) to collect water for external use.

4.2.3 Impact on flood risk elsewhere

SW arising: The surface water cannot, for reasons given above, be wholly managed at source however given the 46m² is replacing a larger nett drained area of 49m² then the proposal is not increasing flood risk elsewhere.

5 Levels

5.1 Flood level data

Not known at time of writing report - conservative assumptions made.

5.2 Floor level data

The proposed floor level to the outbuilding is be no lower that existing ground floor levels of the main dwelling house. The outbuilding contains no sleeping accommodation and will contain only items of low relative value.

5.2.1 Assumption regarding relative levels

Without evidence to offer flood levels and relative floor levels, for the purpose of this risk assessment, it is assumed that the existing and hence proposed floor levels are at or below predicted flood levels (rationale: there is no evidence to suggest they are at a higher level than flood levels for undefended flood zone 2).

6 Flood risk mitigation measures

Because the extension site is located immediately adjacent to the limits of flood zone 2, in an area with a residual risk of flooding from infrastructure failure and it is conservatively assumed the floor levels cannot be raised 300mm above flood levels, flood risk mitigation measures will be considered during the development.

In accordance with the document “Improving the Flood Performance of New Buildings - Flood Resilient Construction”^[5] a series of design approaches are planned to mitigate the flood risk.

6.1 Flood resistance and resilience measures

The development team will consider flood risk mitigation measures where possible and practicable.

Table 1 provides guidance on which materials are most suitable, suitable and unsuitable, when considering construction work involved in this project. This report recommends the use of materials from the “most suitable” column where this is at all possible on site, however they are not mandatory requirements.

Component	Most suitable	Suitable	Unsuitable
Flooring	Concrete, pre-cast or in situ	Timber floor, fully sealed, use of marine plywood.	Untreated timber, Chipboard
Floor Covering	Clay tiles, Rubber sheet floors, Vinyl sheet floors	Vinyl tiles, Ceramic tiles	
External Walls - to max flood level	Engineering brick, Reinforced concrete	Low water absorption brick	Large window openings
Doors	Solid panels with waterproof adhesives, Aluminium, plastic or steel	Epoxy sealed doors	Hollow core plywood doors
Internal Partitions	Brick with waterproof mortar, Lime based plasters	Common bricks	Chipboard, Fibreboard panels, Plasterboard, Gypsum plaster
Insulation	Foam or closed cell types	Reflective insulation	Open cell fibres
Windows	Plastic, metal	Epoxy sealed timber with waterproof glues and steel or brass fittings.	Timber with PVA glues and mild steel fittings

Table 1: Summary of Material Suitability for Building Components^[2]

6.1.1 Flood alleviation

The developer will provide the following flood alleviation products for use within and around the extension for use in any flooding event:

- Flood resilient doors: Specifically designed to prevent ingress of flood water - passive system.
- Anti flood air bricks: Replacements for standard air bricks these prevent water entering the sub floor void - passive system i.e. fully automatic.
- A supply of pre-filled sand bags.

6.2 Safe access and egress routes

The NPPF stipulates that, where required, safe access and escape routes should be available to/from new developments in flood risk areas. Access routes should be such that occupants can safely access and exit their buildings in design flood conditions. The outbuilding does not impact on existing access and egress routes.

During any flooding event the outbuilding will not be used.

6.3 Residual Risk

Since it has been established that the site is sited in an area with a possibility of flooding the management team of the building should sign up to the E.A. “Flood Warnings Direct” which is a free service providing flood warnings by phone, text or email. See <https://fwd.environment-agency.gov.uk/app/olr/home>, or call the E.A. on 0845 988 1188 for full information. In doing so any residual risk can be safely managed.

6.3.1 Flood Plan

The project team will also provide the owners of the premises with a proforma Flood Plan (See Appendix B for an example). The plan will provide guidance on emergency response procedures in the event of flooding to the site. This will:

- Provide details of who to contact and how;
- Provide details of how to turn off gas, electricity and water mains supplies;
- Provide details of designated safe egress routes out of the building and out of the local area at risk;
- Provide details of E.A. Flood warning codes;
- Provide details of local radio stations
- Provide a check list of essential items.

7 Conclusions

Given that:

- The site lies within an existing developed area and this is minor development;
- The site lies on the boundary of the extents of Flood Zone 2, flood resilience and alleviation methods will be implemented on site, safe access/egress routes are not affected and the site will be signed up to flood warning schemes;
- There is no documented evidence of flood risk from any other sources;
- The development does not impact on flood risk elsewhere;

and assuming the mitigation, warning and evacuation procedures can be maintained over the lifetime of the development, the proposed minor development to an existing domestic building is considered acceptable.

Signed:



Dr Robin Saunders C. Build E, MCABE, BEng(Hons), PhD

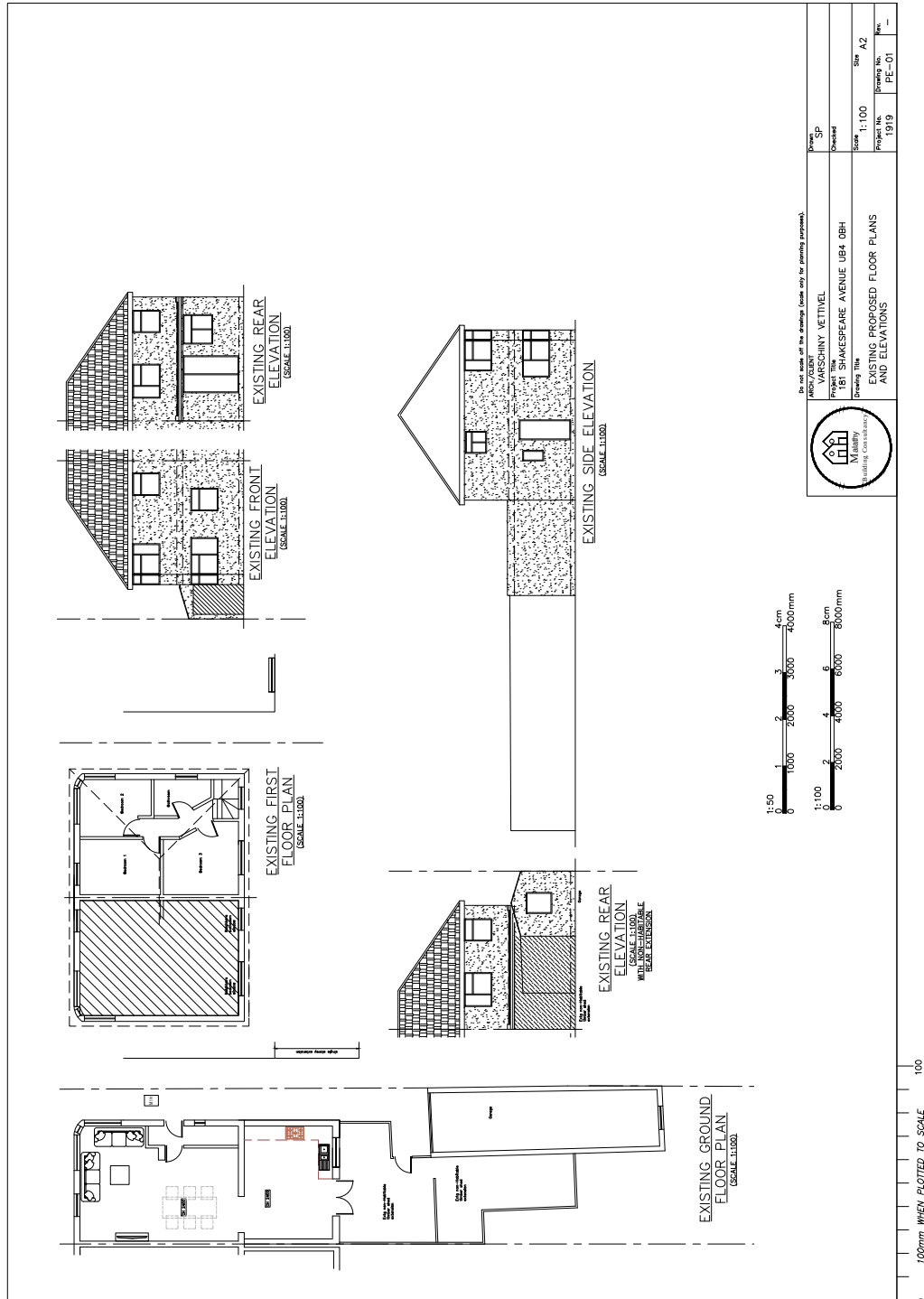
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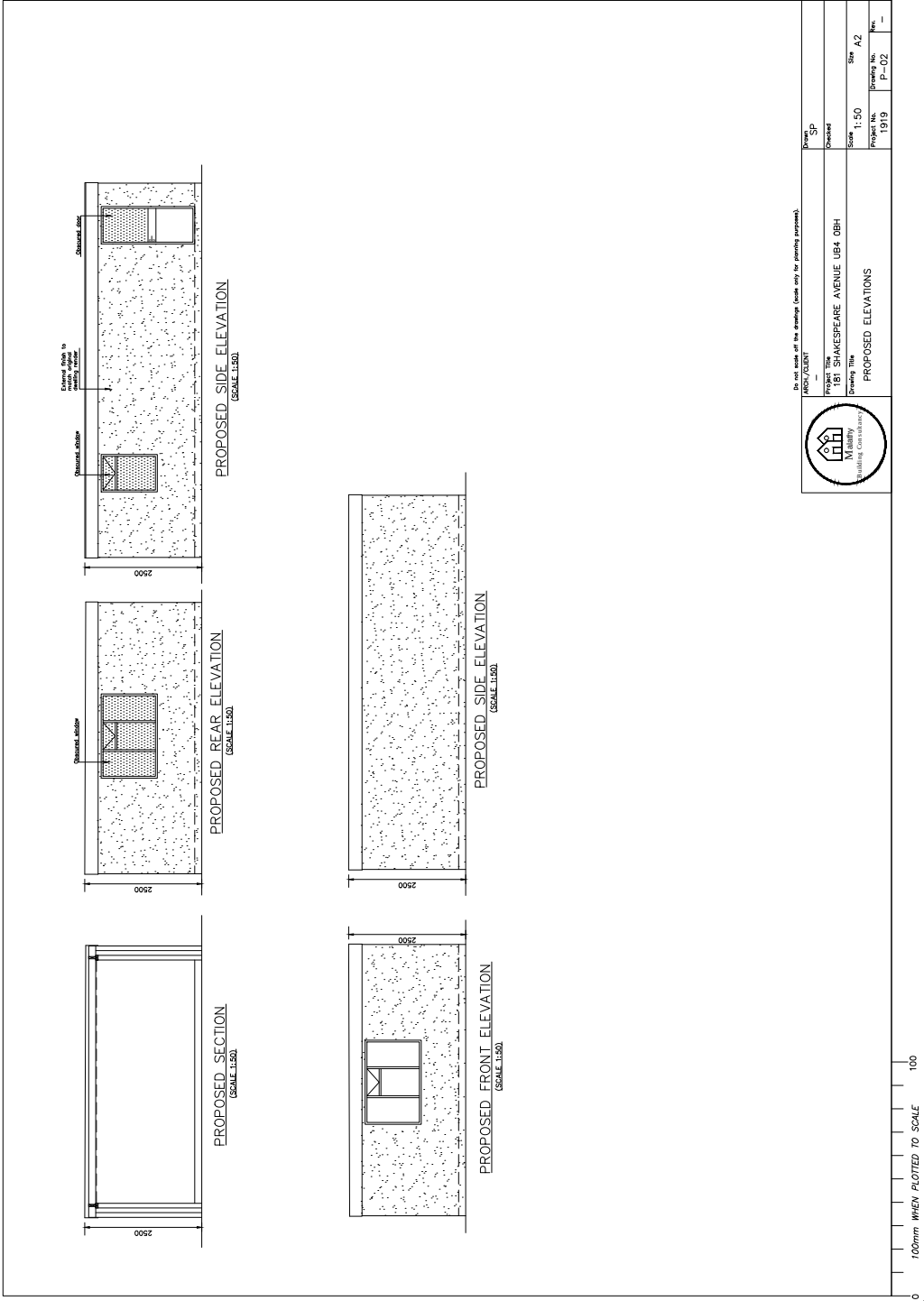
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- [8] L.B. Hillingdon. Strategic flood risk assessment 2008. 2008.

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		Do not scale off the drawings (scale only for printing purposes). ARCH/CLIENT: SP Project Title: 181 SHAKESPEARE AVENUE UB4 0BH Drawing Title: PROPOSED ELEVATIONS Scale: 1:50 Project No.: 1919 Size: A2 Drawing No.: P-02 Rev: -	
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B Emergency flood plan (example)

Personal flood plan

Name



Environment Agency

Are you signed up to receive flood warnings?
If not call Floodline on 0345 988 1188 to see if your area receives free flood warnings.

Let us know when you've completed your flood plan by calling Floodline on **0345 988 1188**. This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company			
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station			
Travel/weather info			

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

Personal flood plan

What can I do NOW?



☐ Put important documents out of flood risk and protect in polythene
 ☐ Look at the best way of stopping floodwater entering your property
 ☐ Find out where you can get sandbags
 ☐ Identify what you would need to take with you if you had to leave your home

☐ Check your insurance covers you for flooding
 ☐ Make a flood plan and prepare a flood kit
 ☐ Identify who can help you/who you can help
 ☐ Understand the flood warning codes

What can you do if a flood is expected in your area?

Actions	Location
Home - Move furniture and electrical items to safety - Put flood boards, polythene and sandbags in place - Make a list now of what you can move away from the risk - Turn off electricity, water and gas supplies - Roll up carpets and rugs - Unless you have time to remove them hang curtains over rods - Move sentimental items to safety - Put important documents in polythene bags and move to safety	
Garden and outside - Move your car out of the flood risk area - Move any large or loose items or weigh them down	
Business - Move important documents, computers and stock - Alert staff and request their help - Farmers move animals and livestock to safety	
Evacuation - Prepare a flood kit in advance - Inform your family or friends that you may need to leave your home - Get your flood kit together and include a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons	

There are a range of flood protection products on the market to help you protect your property from flood damage. A directory of these is available from the **National Flood Forum** at www.bluepages.org.uk

Be prepared for flooding. Act now

GEH00709BQRU-E-E

C Sedum option



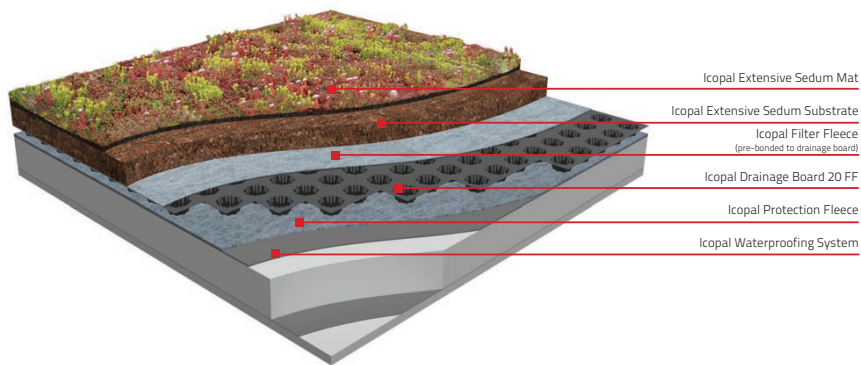
Icopal ST Sedum Mat System



GREEN ROOF SYSTEMS

Code: 3101062

An extensive lightweight green roof system utilising a pre-grown vegetation mat of 8 – 12 sedum species. Provides an immediate green planting scheme for instant impact. The vegetation mat is installed on a shallow depth of specially formulated free-draining substrate and drainage board.



System Properties

The following data relates to the green roof element only.

System Dry Weight:	80 kg/m ²
System Saturated Weight:	100 kg/m ²
System Typical Depth:	104 mm
Growing Substrate Depth:	50 mm (settled)
Contouring:	Flat/level

Biodiversity:	● ● ● ● ●
Pollen/Nectar Richness:	● ● ● ● ●
Habitat Provision:	● ● ● ● ●

Key Features

- A lightweight system suitable for a range of roof construction types.
- System type allows for shallower substrate depths.
- Attractive mix of sedum species.
- Sedum plants are low-growing.
- Moderate range of bio-diversity.
- Moderate provision of Nectar and Pollen to attract insects.
- Suitable for flat and pitched roofs.
- Versatile system; quick and easy to install.
- Low maintenance and drought tolerant.
- Pre-grown mat provides an instant green coverage.



Icopal ST Sedum Mat System



Plant Species

The sedum family of flowering plants are succulents and therefore have leaves which are able to store water. The majority grow naturally in arid, well drained areas, often on shallow substrate depths. Therefore they are drought tolerant, and able to survive in extremes of conditions. They generally flower from early summer to autumn.

General Notes

The system is suitable for both new build and refurbishment projects. Roof pitches up to 45° may be used, but for slopes over 9° a retention system is required. All slopes over 5° will require a mechanically fixed eaves edge restraint.

Detailing

A border with a recommended width of 300 – 500 mm of washed river stones (20 – 40 mm diameter) should be used around all roof penetrations, outlets, perimeters and system edges to provide a vegetation free zone.

Irrigation

Initial: Irrigation required immediately after installation for up to 8 – 12 months until fully established. Recommended irrigation period: 12 months. Pitched roofs retain less water and therefore a permanent irrigation system should be considered.

Once established: Irrigation is only generally required during prolonged periods of hot dry weather.

Water Source: A roof top source with a pressure of 2.5 – 3 bar and a flow rate of 60 L/min is recommended to connect a temporary system if required.

Maintenance:

Sedum systems are designed to be low maintenance. Species selection ensures that the roof will evolve naturally, however weeds should be removed periodically through the year to reduce the likelihood that they become dominant. It is recommended that a suitable fertiliser is applied to keep the plants healthy. This may be a spring feed of slow/controlled release fertiliser to last the growing season, or more regular granular/liquid feeds throughout the growing season.



Flowering Period: May – August.

Typical Colours: Seasonal variation of yellows, whites, and pinks. Foliage turns from green to red in periods of plant stress.

N° of Species Sown: 8 – 12.

Typical Species: (subject to season variation)

- Sedum acre, Sedum album, Sedum ellacombianum, Sedum floriferum, Sedum forsterianum, Sedum hybridum, Sedum kamtschaticum, Sedum montanum, Sedum oreganum, Sedum reflexum, Sedum rupestre, Sedum selskianum, Sedum sexangulare, Sedum spirium.

Flower Attraction

Low-moderate mixed pollen source, applicable to Bees – Mason, Honey Bombus spp; Insects – Chrysoperla (Lacewing), hoverfly (Episyrphus), Ladybird (Harmonia), Aphidius, Aphelinus, Aphidoletes (beneficial parasitic wasps).

Establishment Period: 6 – 8 months.



For more information please visit

www.icopal.co.uk

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