

Flood Risk Assessment

For the domestic extension to
7 Greenpark Road, Manchester,
M22 4DS

Prepared by
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August 2021



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1 Executive Summary

- A. This FRA supersedes that previously submitted with the planning application.
- B. The proposal is for a domestic extension not exceeding 250m², lies within an existing developed area and is minor development.
- C. The site lies in Flood Zone 2 and at a Low risk from surface water flooding and reservoir failure.
- D. Flood resilience and resistive materials will be used and flood mitigation 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.
- E. There is no documented evidence of flood risk from any other sources and the re-development does not impact on flood risk elsewhere.
- F. Assuming the mitigation, warning and evacuation procedures can be maintained over the lifetime of the development, the proposed minor development to an existing building is considered acceptable.

2 Introduction

2.1 Scope

This FRA supersedes that previously submitted with the planning application.

2.2 Site location

The project is at 7 Greenpark Road, Manchester, M22 4DS (see Figure 1).

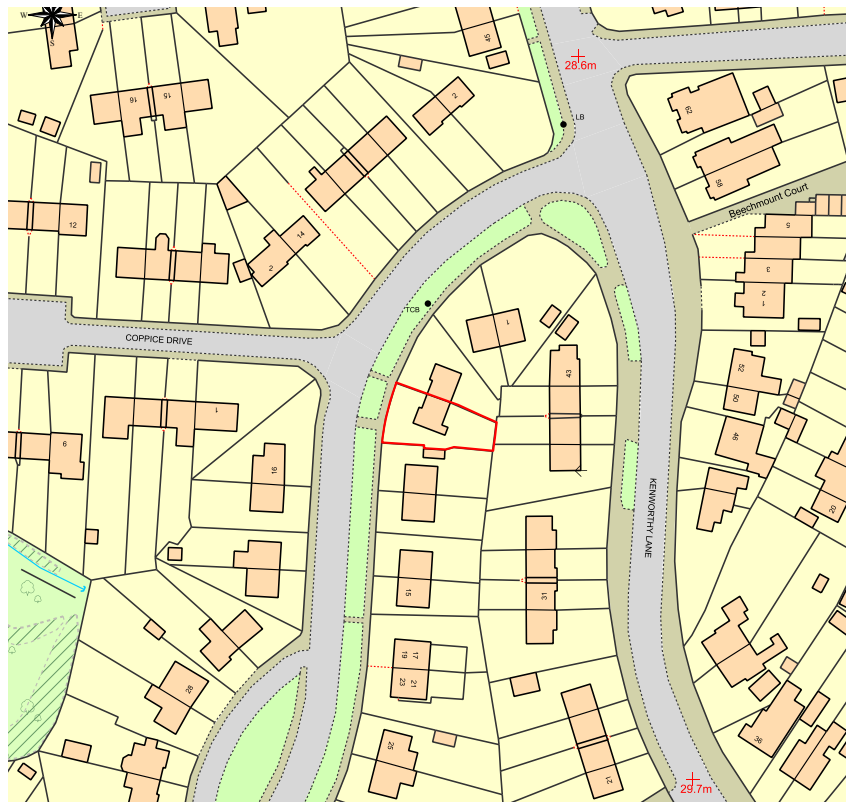


Figure 1: Site location plan, as indicated with North topmost. (source: client)

2.3 Development description

The approval is for a domestic extension not exceeding 250m² in footprint. The site is an existing developed site and the proposed work is classed as minor development. The existing and approved layouts are provided in Appendix A.

2.4 Site geology

Geological mapping data from within the vicinity indicate Glaciofluvial Sheet Deposits, Devensian - Sand And Gravel.

Historic BGS bore hole records (SJ89SW43) from very close proximity indicate gravel in a band at 1.7m to 3.3m with ground water at 3.9m.

However this would require confirmation on site. If available on site, the superficial deposits will offer medium to good permeability. Infiltration SuDS therefore may be viable (subject to site testing).

3 Policies

In preparation for this Flood Risk Assessment (FRA), National Planning Policy Framework^[?] and British Standards on Assessing and Managing Flood Risk^[?] 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.

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

3.3 Planning Condition 5: 129307/FH/2021

Our responses in red font.

"No development shall take place until an updated Flood Risk Assessment is submitted to and approved in writing by the City Council as local planning authority, the updated FRA shall include:

- An assessment of the flood risk posed by groundwater to the development. This should also include associated openly accessible maps. **This FRA report to EA standing advice covers all flood risk.**
- Identification of any recorded historic flood events on site. **Refer to Sections 4.1.2 & 4.1.3.**
- Identification of safe access and egress during flood events. **Refer to Section 7.1.**

- An outline drainage layout should be produce highlighting the locations of the proposed permeable pavings and aco drains surrounding the proposed extension (as listed within the FRA by AJ Architectural Ltd). Refer to Section 4.3.3. **There are no new proposed areas of permeable paving that are controlled under the T&CP Act (the existing front driveway is not impacted by the extension). The originally proposed perimeter ACO drain is not required. Drainage provision for the extension will be a soakaway to BRE 365 sizing which will be designed, installed and inspected under the Stature requirement of the Building Regulations.**
- Overland flow arrows should be overlain on the drainage layout drawing to illustrate how the proposed drainage will attenuate the surface water run-off and prevent water flowing into the adjacent property. **Refer to Appendix C.**

The development shall be subsequently carried out in accordance with the agreed details.”

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 primary source of flood risk to the site is fluvial from the River Mole.

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 a river channel due to high levels of rainfall in the catchment.

With reference to the Environment Agency Flood Map, Figure 2, the site lies in Flood Zone 2. This means that the site has a Medium probability of fluvial flooding (between a 1 in 100yr and 1 in 1000yr annual probability of fluvial flooding).



Figure 2: Flood Mapping from the EA online data. The site falls within flood zone 2

4.1.2 Historic flooding

The site is not shown to lie in an area of historic flooding.

4.1.3 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 SFRA shows the site to lie just outside of the ground water flood risk zone as extract at Figure 3.



Figure 3: Susceptibility to ground water flooding. The site falls outside of an area at risk

Since the proposed development does not involve any basement elements, the impact of groundwater flooding on the proposed site would be minimal.

Hence, the risk of groundwater flooding on the Approved development can be considered to be Low.

4.1.4 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.

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.

4.1.5 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 4, the site itself is at risk from surface water flooding to 300mm for the design period, 1 in 100yr event however this does not impact on the footprint of the extension. The site is also at lower risk from the 1 in 100yr to 1 in 1000yr event as shown in Figure 5. This again does not however impact on the location of the extension.

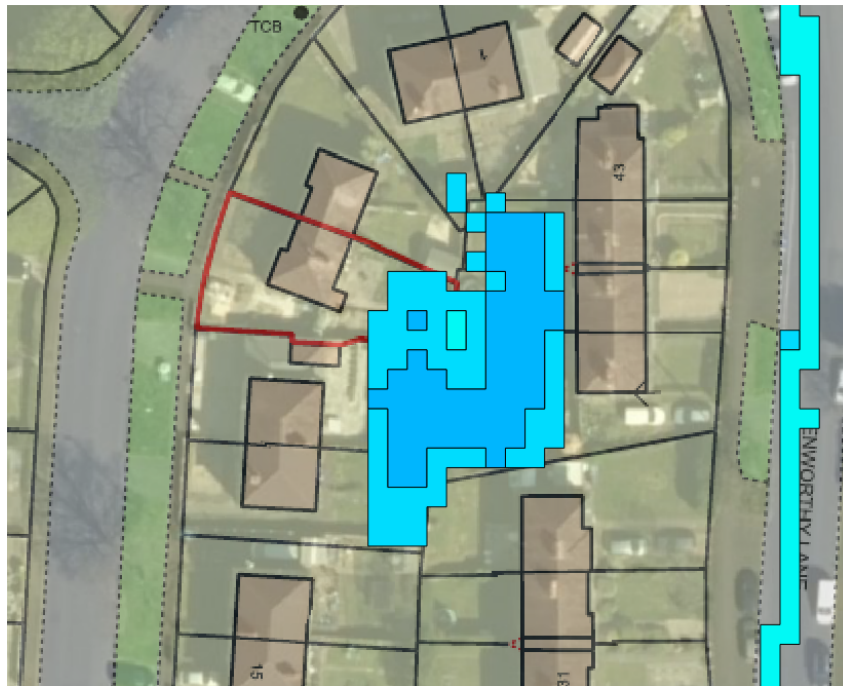


Figure 4: 1 in 100yr SW Flood depth and extent mapping.

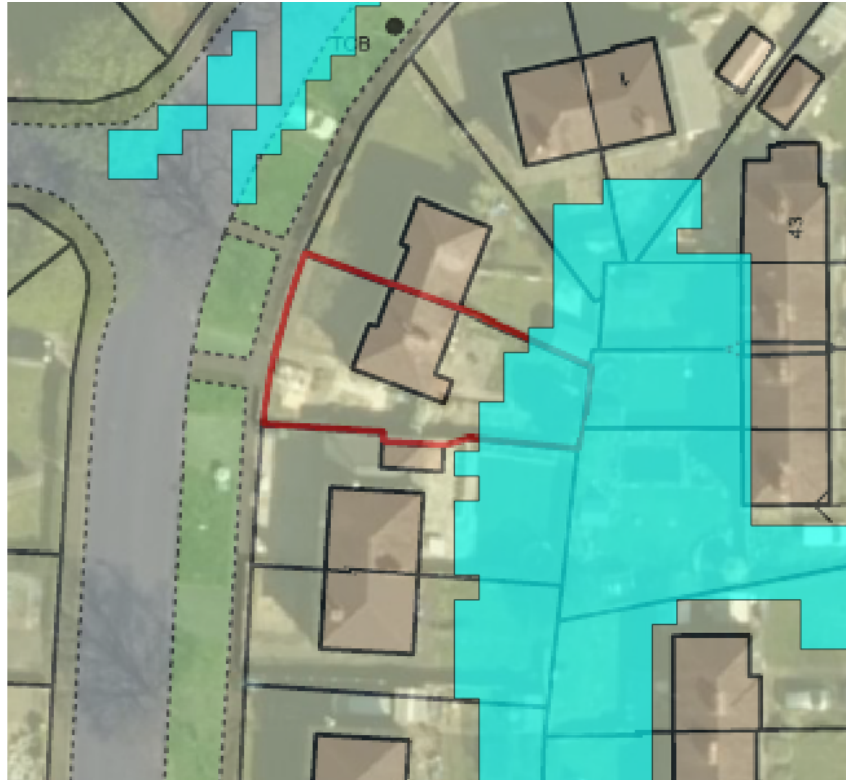


Figure 5: 1 in 1000yr SW Flood extent mapping.

4.1.6 Flood risk from infrastructure failure

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

The site is shown to be at flood risk due to reservoir failure, as shown in Figure 6.

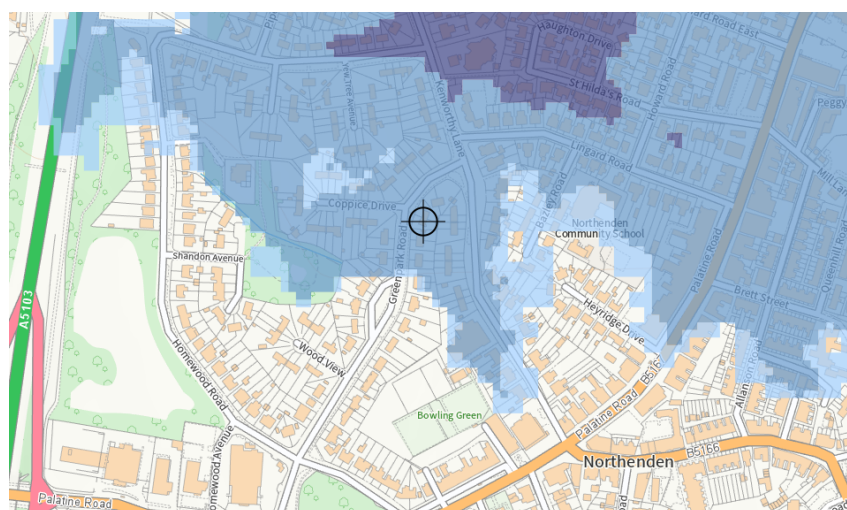


Figure 6: Flood risk from reservoir flooding. Predicted flood depths are shown up to 2000mm (Source: EA flood mapping)

However the EA have previously stated that:

“Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, we ensure that reservoirs are inspected regularly and essential safety work is carried out.”

Hence the flood risk to the site from reservoir failure is considered to be Low.

4.2 Historic flood events

Non identified.

4.3 On-site surface water analysis and management

4.3.1 Critical drainage area

The site falls within the Manchester and Trafford South Critical Drainage Area.

4.3.2 Generation of Run-off

The post-development surface water run-off volume will increase when compared to the pre-development level because there is an overall reduction in permeable areas. The site is also in a critical drainage area. Hence surface water arising from the area of the extension must be managed on site in line with current best practice and Non-Statutory guidance.

4.3.3 SuDS Statement:

Surface water will be managed in full alignment with the SuDS hierarchy as required under provisions made under the Town and Country Planning Act 1990.

While not required for Planning permission consent it can be confirmed that all SW on site will be also be designed, installed and tested in full accordance with Part H of the Building Regulations 2010 (as amended 2013), Requirement H3, as made under the Building Act 1984.

It is expected that soakaways will be viable given the expected ground conditions associated with the local geology hence the recommendation of this report would be to

adopt the use of a soakaway and water butts as a viable and proportionate SuDS solution with the naturally reduced outfall from the water butts taken to the soakaway. See also an outline of the SW drainage proposal at Appendix C.

Informative: All areas of new hardstanding to be formed as a pervious surface on a DoT Type 3 sub-base.

Note: There are however no proposed such areas that are covered by the T&CP Act (only front driveways and raised ground require such consent).

4.3.4 Impact on flood risk elsewhere

SW arising: Since the proposal is intending to manage any additional surface water at source the impact on flood risk elsewhere is Low.

Volumetric displacement: The site is in Flood Zone 2 hence flood compensation storage volume is not required.

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 be no lower than any existing ground floor levels.

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 undefended flood levels (rationale: there is no evidence to suggest they are at a higher level than flood levels for undefended Flood Zone 2).

6 Management of flood risk

6.1 Flood risk mitigation measures

Because the site is located in Flood Zone 2 it is a recommendation¹ of this report that flood risk mitigation measures should be incorporated into the development's construction, specifically at ground floor and below.

In accordance with the document "Improving the Flood Performance of New Buildings - Flood Resilient Construction"^[?] a series of design approaches should be planned to mitigate the flood risk.

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.

¹While not a Statute requirement under the T&CP Act 1990, the designer should follow best practice guidance. Hence the designer is advised to consider in full such recommendations so that Compliance with Part C of the Building Regulations 2010 can later be demonstrated to the B.C.B.

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^[7]

6.2 Flood mitigation measures

The designer is also recommended to consider the provision of a combination of the following flood mitigation measures, to be installed if at all practicable, 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.
- Door defence: Bespoke barriers fitted externally across doors and low windows and/or the provision of filled sandbags.

- Anti flood air bricks: Where these are unavoidable, these offer replacements for standard air bricks these prevent water entering the sub floor void - passive system i.e. fully automatic.
- Air brick and flue covers.
- No service penetrations or other openings (cat flaps and letter boxes included) below 1m above FFL.

7 Management of residual risk

Any residual risk can be safely managed by not impairing access and evacuation routes, signing residents up to flood warning schemes and preparation of domestic flood plans.

7.1 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 buildings in design flood conditions.

The extension does not impact on existing access and egress routes with the adjacent highway not shown to be in a flood risk zone (ref Figure 7).

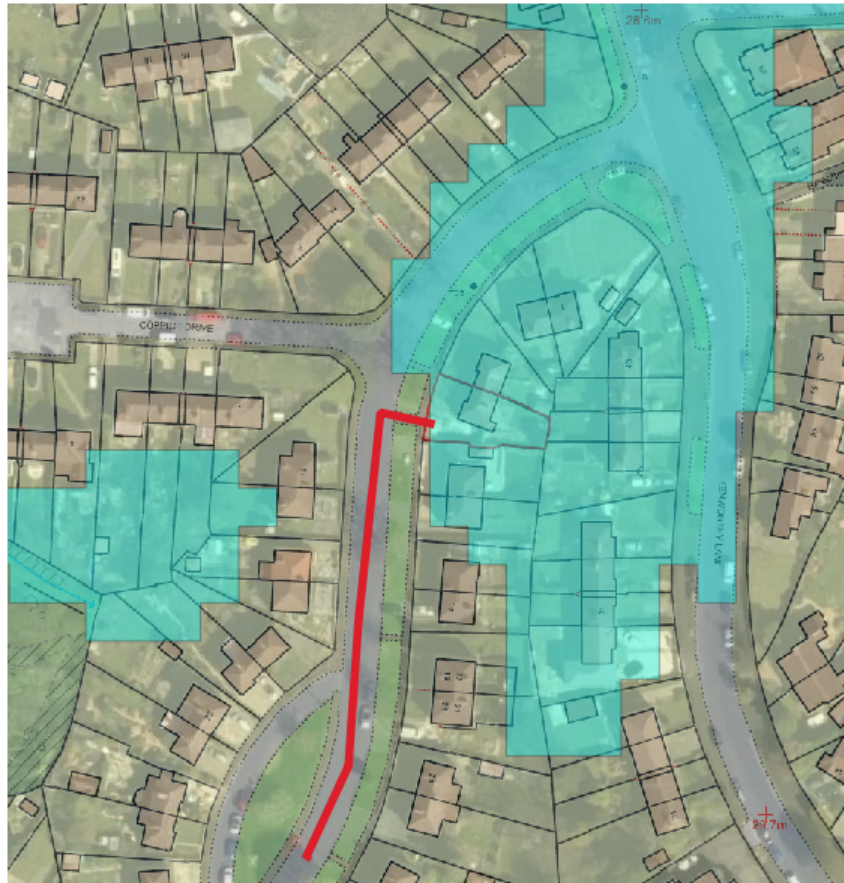


Figure 7: Access and evacuation route

7.2 Flood warning schemes

Since it has been established that the site is sited in an area with a possibility of flooding the owners of the dwelling should (if they have not done so already) sign up to the E.A. “Flood Warnings Direct” which is a free service providing flood warnings by phone, text or email. See <https://www.fws.environment-agency.gov.uk/app/olr/register>, or call the E.A. on 0345 988 1188 for full information.

7.2.1 Flood Plan

The project team will also provide the owners of the dwelling 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.

8 Conclusions

Given that:

- The extension lies within an existing developed site and this is minor development;
- The site lies in Flood Zone 2 and at a Low risk from surface water flooding and reservoir failure;
- 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 dwelling is considered acceptable.

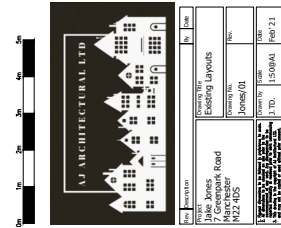
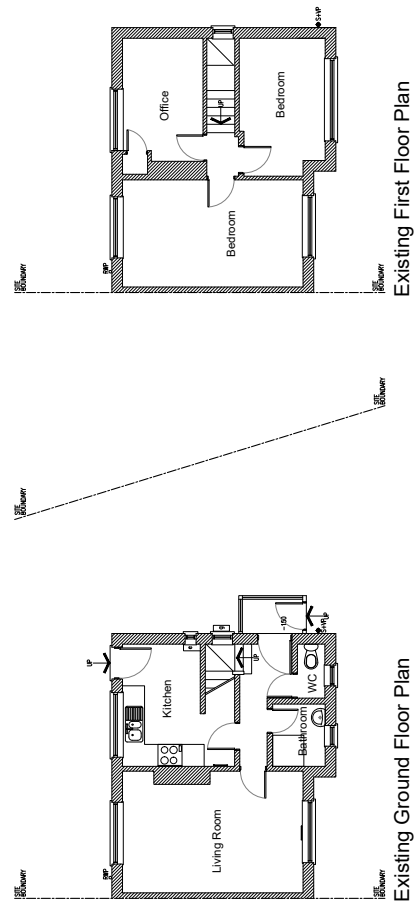
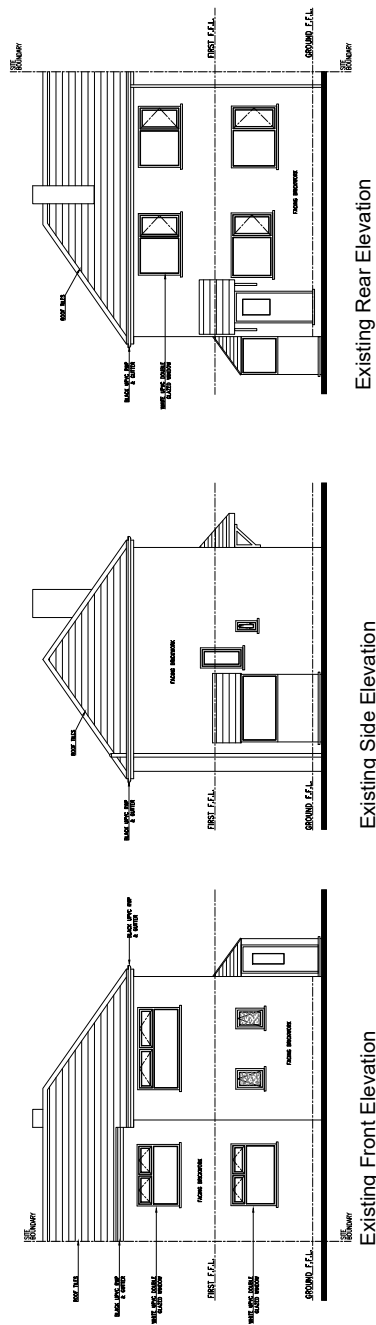
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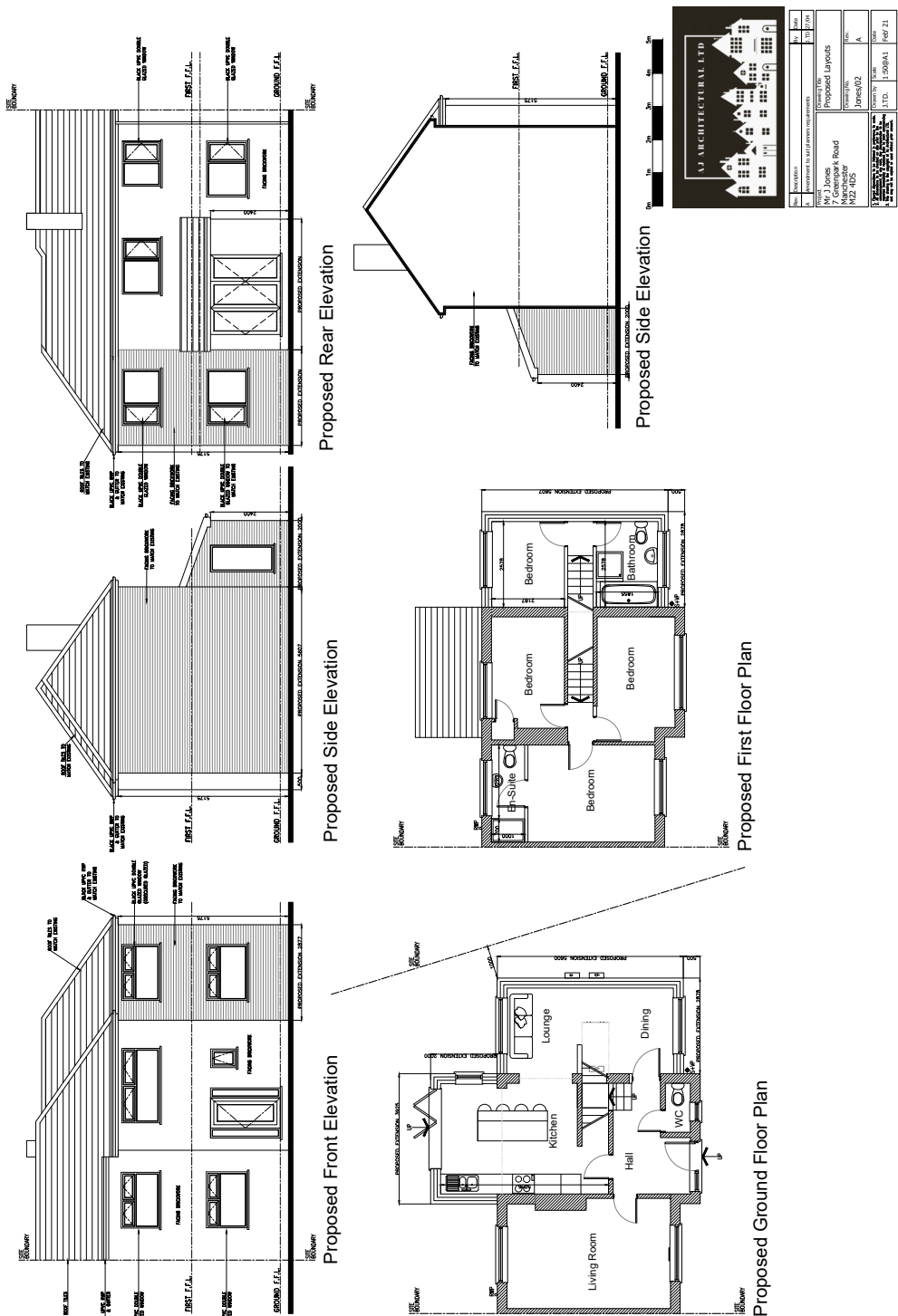
Dr Robin Saunders CEng, C. Build E, MCABE, BEng(Hons), PhD

Date: 27th August, 2021

A.1 Existing



A.2 Approved



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 SW Drainage

C.1 Roof area - soakaway

The extension is 24m² plan. The soakaway will also need to accommodate part of the existing roof hence, designed drained area = 40m².

All surface water arising from the area of new roofing is controlled by direct infiltration through a soakaway. Notes:

- For this report the drained area to the soakaway(s) arises from the area of new roofing plus a 1 allowance for urban creep.
- The soakaway is designed for all events up to and including the M100 6hr event.
- An allowance of x1.4 is made for climate change in line with current best practice.

Designed to BRE365, and to accommodate all surface water arising from a drained area of 40m² requires 1 , 95% void ratio soakaway 1.5m wide x 1.2m long with a 1m effective depth. See Table 2.

Permeability	2.78E-05	ms ⁻¹
Urban Creep	1	
Drained area	40	m ²
Designed drained area	40	m ²
Return Period	100	yr
% voids	95	%
Climate change	1.4	

Design Width, m	1.5
Design Depth _{eff} , m	1
Design Qty	1

Duration, mins	5	10	15	30	60	120	240	360	600	1440
Rainfall, mm	16.0	23.8	28.9	38.0	47.8	58.3	69.5	76.2	84.8	101.6
Volume in, m ³	0.6	1	1.2	1.5	1.9	2.3	2.8	3	3.4	4.1
Length req'd, m	0.4	0.7	0.8	1	1.1	1.2	1.2	1	0.8	0.1

Crit Length, m	1.2
Crit Duration, mins	120
Empty to 50%, hrs	3.21

Table 2: BRE 365 Calculation results

C.1.1 Sedimentation risk

Generally, roofing carries a very low sediment loading. Worst case 216 kg.ha⁻¹yr⁻¹ - so for this site that equates to circa 0.9kg.yr⁻¹ in the worst case. Generally this would reduce the attenuation capacity by circa 2% over 50yrs (all data from the SuDS manual). The design allows for this amount with extra capacity provided to a 100yr design life. The BRE 365 method acknowledges this sedimentation and hence the base area is not considered in the sizing calculations.

C.1.2 Minimising sedimentation risk

The developer will fit accessible sumped rainwater gulleys at the base of all RWP's so as to reduce the amount of any sediment entering the soakaway.

The developer will also fit downpipe leaf guards to all outfalls from the roof (or "hedgehog" gutter guards).

C.1.3 Soakaway detail

The soakaway is designed to use open crates offering a circa 95% void ratio, encased within a geotextile membrane and provided with circa 400mm minimum cover. A typical detail is shown in Figure 8.

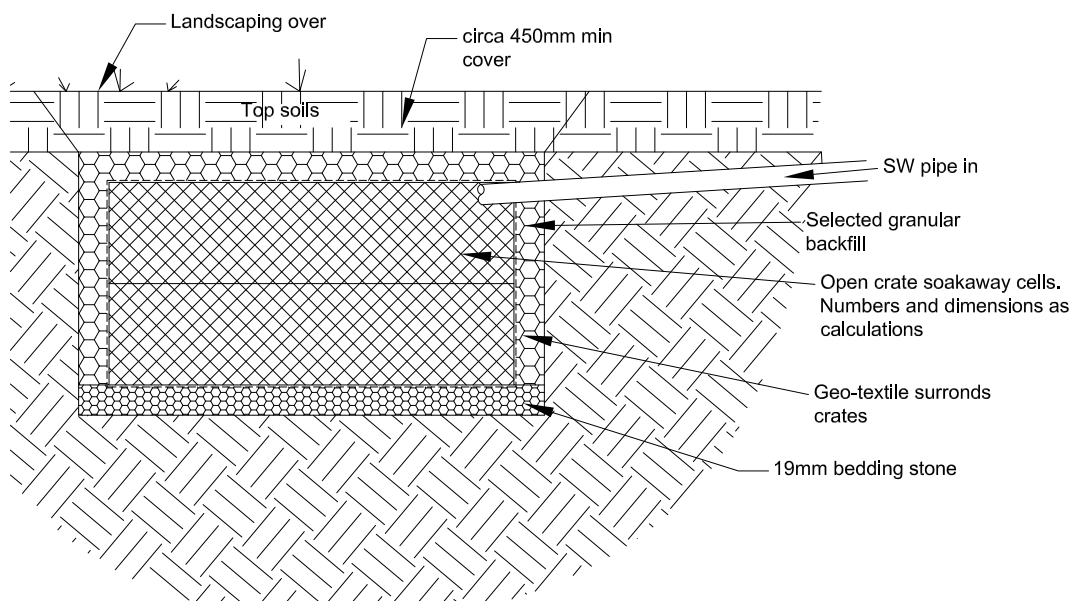


Figure 8: Typical soakaway details

C.2 Pipe size

Flow will be conveyed to the soakaway via 100mm diameter drainage runs laid at no less than 1:80 falls giving a maximum design capacity of 6.6ls^{-1} (Part H design chart, Figure 9).

1 in 100yr max mean intensity storm = 128mmhr^{-1}

Drained area to one pipe = 40m^2

Required pipe capacity = $40 \times 0.1278 / 3.6 = 1.4 \text{ ls}^{-1}$

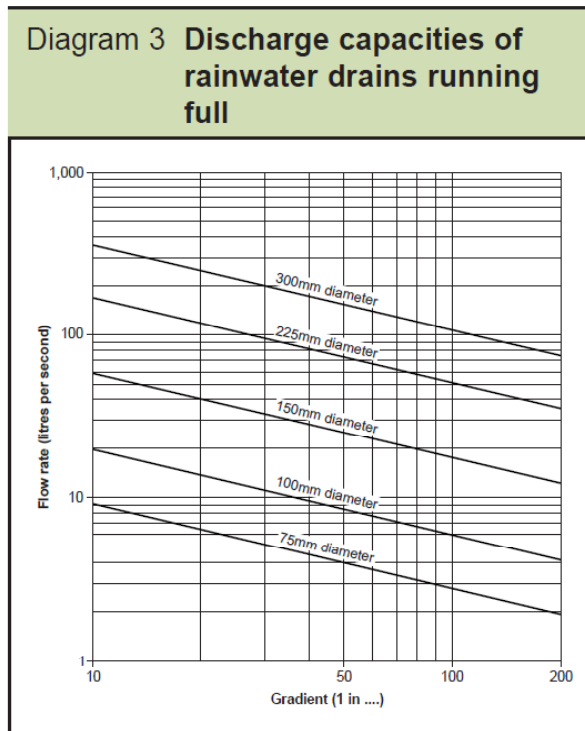
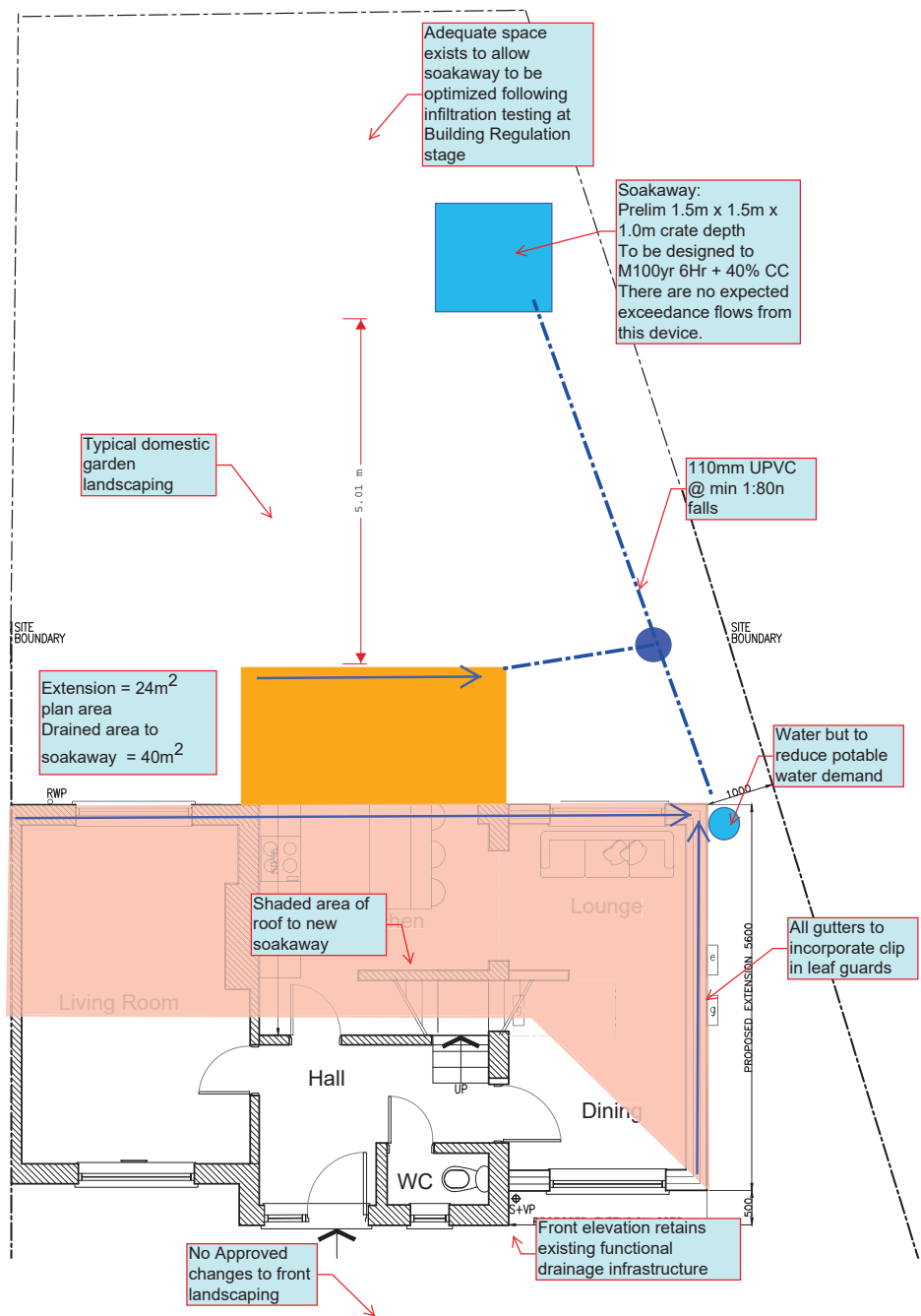


Figure 9: Part H drainage design chart

C.3 Layout



C.4 Exceedance flows

- Water butt - When full water is diverted back to the RWP
- Soakaway - Given the conservative nature of BRE365 design (not allocating drainage flows through the base area) there is no expected exceedance from soakaways to BRE 365.
- Landscape planting - There are no anticipated exceedance flows from areas of garden planting.

There are no design overland exceedance flow paths other than as noted above.