Flood Risk Assessment

To accompany a planning application for a domestic extension to

18 Denmark Road, Twickenham, TW2 5EN

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Contents

Appendix

List of Figures

List of Tables

Disclaimer

1 Executive Summary

A This is minor development;

B There are no identified flood risks to the site;

C A soakaway to the rear of the site is designed to manage all additional roof area plus $11m^2$ of existing roof area;

D The development does not impact on flood risk elsewhere;

E The proposed minor development to an existing dwelling is considered acceptable.

2 Introduction

2.1 Site location

The project is at 18 Denmark Road, Twickenham, TW2 5EN (see Figure 1).

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

2.2 Development description

The proposal is for a domestic extension not exceeding 250m^2 in footprint.

The proposed work is classed as minor development.

The existing and proposed layouts and proposed sections are to be submitted under separate cover.

2.3 Site geology

Geological mapping data from within the vicinity indicate Taplow Gravel Member - Sand and gravel., however this would require confirmation on site. If available on site, the superficial deposits will offer medium - good permeability. Infiltration SuDS may therefore be viable (subject to site testing).

3 Policies

In preparation for this Flood Risk Assessment (FRA), National Planning Policy Framework[2] and British Standards on Assessing and Managing Flood Risk[1] 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 m^2 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
- extra flood resistance and resilience measures

4 Flood risk analysis

4.1 Sources of potential flooding

Flood risk from various sources to the site are analysed in this section.

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 Flood Map, Figure 2, the site lies in Flood Zone 1. Hence the site is not at risk from fluvial flooding.

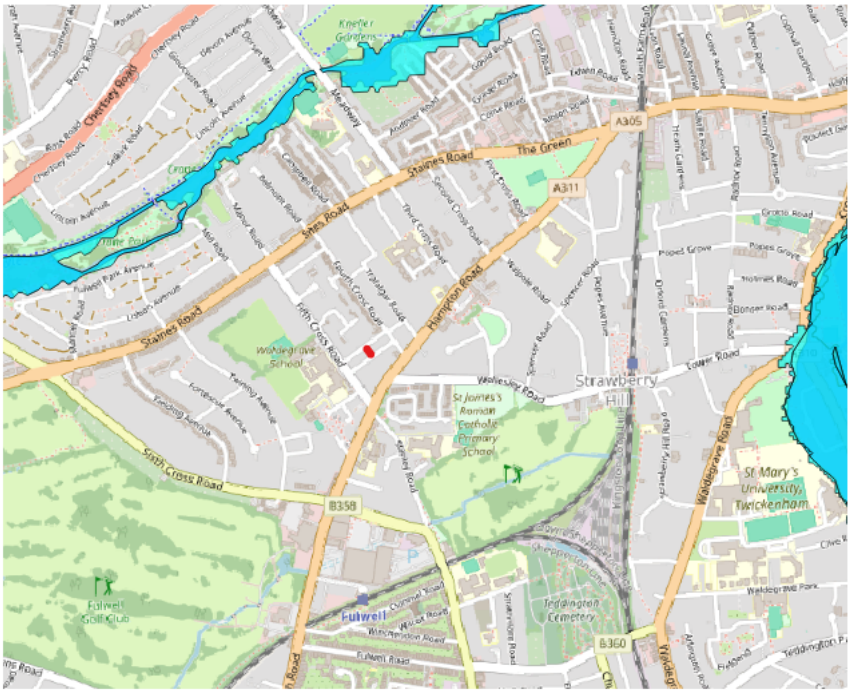

Figure 2: Zone 1 Flood Mapping from the EA online data

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 a High susceptibility to groundwater flooding (>=50% <75%).

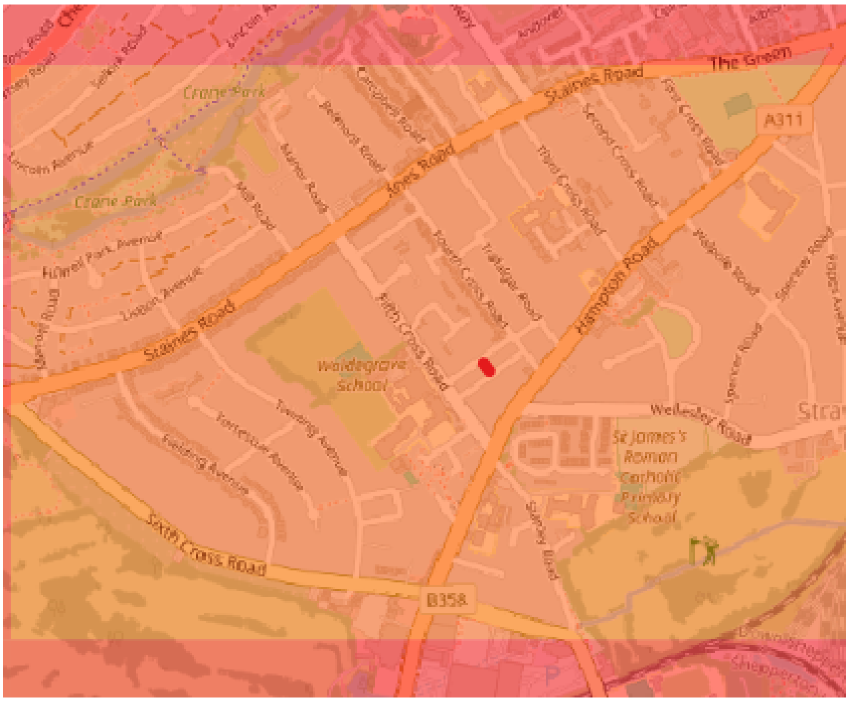

Figure 3: Susceptibility to ground water flooding. The site falls within an area at Low risk

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 negligible.

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.

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, the rear of the site is not at risk from surface water flooding, Figure 4.

Figure 4: 1 in 1000yr SW flood extent. The site is not at risk.

4.1.5 Flood risk from infrastructure failure

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

The site is not at flood risk due to reservoir failure, as shown in Figure 5.

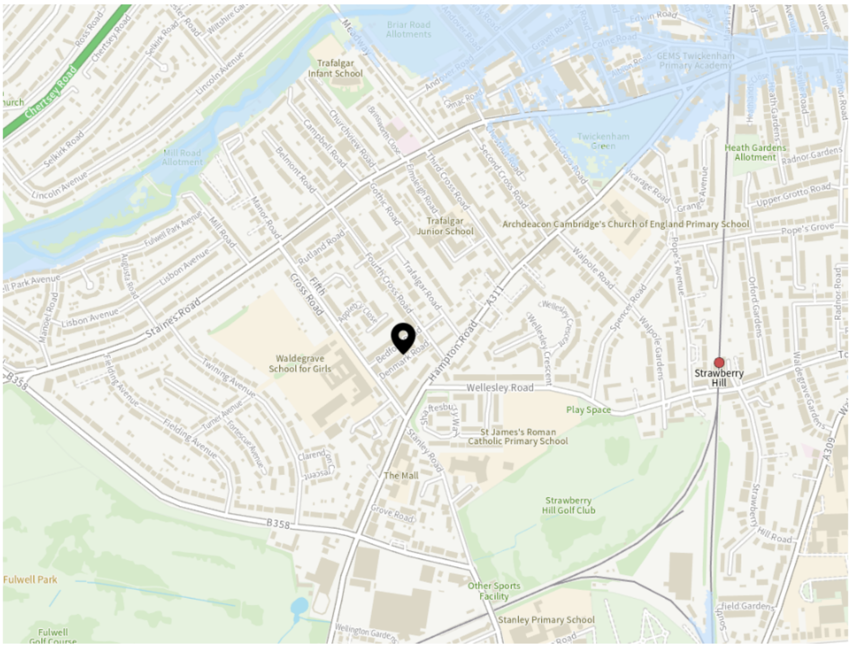

Figure 5: Flood risk from reservoir flooding. (Source: EA flood mapping)

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

4.2 EA summary of flood risk

18, Denmark Road, Twickenham, TW2 5EN

This information tells you the flood risk of an area, not a specific property.

We have paused updates to information about flood risk from rivers and the sea and surface water while we get ready for new data.

▸ How we assess an area's flood risk

Surface water

More about your surface water flood risk

Yearly chance of flooding

[Very low] Low Medium High

What surface water is

Surface water flooding is sometimes known as flash flooding. It happens when rainwater cannot drain away through normal drainage systems.

▸ Why surface water flooding is a problem

Rivers and the sea

More about your rivers and sea flood risk

Yearly chance of flooding

[Very low] Low Medium High

What makes rivers and sea flooding more likely

Low-lying areas that are close to rivers or the sea are more likely to flood when water levels rise.

This information takes into account any flood defences.

▸ Why flood defences cannot completely prevent flooding

Other flood risks

More about groundwater and reservoirs

Groundwater	Flooding from groundwater is unlikely in this area.
Reservoirs	Flooding from reservoirs is unlikely in this area.

Figure 6: EA summary of flood risk to the site

4.3 Surface water management

The site is in a critical drainage area.

4.3.1 Generation of Run-off

The post-development surface water run-off volume will not increase when compared to the pre-development level because there is no overall reduction in permeable areas.

4.3.2 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 likely that a small soakaway serving the extension 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 a water butt as a viable and proportionate SuDS solution on site.

Refer to Appendix A for preliminary soakaway design and pipe sizing.

4.4 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.

5 Levels

5.1 Flood level data

No predicted flooding on site.

5.2 Floor level data

N/A

6 Management of flood risk

No identified risk to manage.

7 Conclusions

Given that:

- This is minor development;
- There are no identified flood risks to the site;
- A soakaway to the rear of the site is designed to manage all additional roof area plus 11m^2 of existing roof area;
- The development does not impact on flood risk elsewhere;

hence the proposed minor development to an existing dwelling is considered acceptable.

Signed: 

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

Date: 22nd July, 2024

References

[1] BSI. BS 8533:2011. Technical report, 2011.

[2] Ministry of Housing, Communities and Local Government. National planning policy framework. 2021.

A Preliminary surface water drainage sizing

A.1 Soakaway

Additional drained roof area = $9m^2$

New flat roof covering part existing plus new area = $20m^2$

Subject to site testing preliminary design is based on an infiltration rate of $100mm.hr^{-1}$.

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 CIRIA C753, and to accommodate all surface water arising from a drained area of $20m^2$ requires 1 , 95% void ratio soakaway 1.5m wide x 2m long with a 0.4m effective depth. See Table 1.

Permeability	2.78E-05	ms^{-1}
Urban Creep	1	
Drained area	20	m^2
Designed drained area	20	m^2
Return Period	100	yr
% voids	95	%
Climate change	1.4	
Factor of Safety	1.5	

Design Width, m	1.5
Design Length, m	2
Design Depth$_{eff}$, m	0.4
Design Qty	1

Duration, mins	5	10	15	30	60	120	240	360	600	1440
Duration, hrs	0.08	0.17	0.25	0.5	1	2	4	6	10	24
Intensity, mm/hr	229.2	171.6	138.0	90.8	56.7	34.3	20.1	14.6	9.7	4.8
H max, m	0.13	0.19	0.22	0.27	0.30	0.29	0.21	0.12	-0.01	-0.22

Max depth, m	0.30
Crit Duration, mins	74
Empty to 50%, hrs	1.42

Table 1: CIRIA C753 Calculation results

The maximum design head with respect to the critical storm duration is shown in Figure 7.

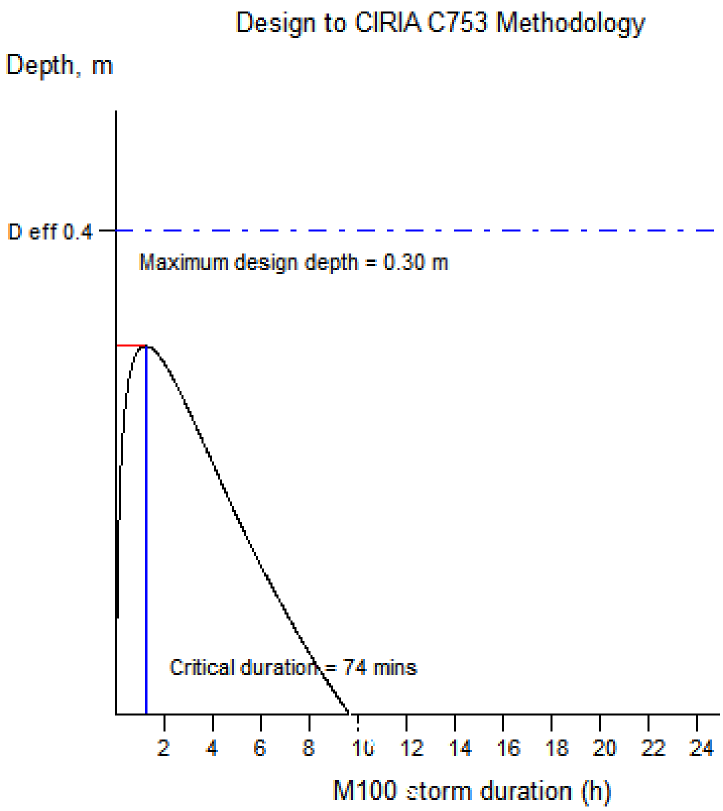

Figure 7: Critical storm duration and max design depth

A.1.1 Sedimentation risk

Generally, roofing carries a very low sediment loading. Worst case 216 $kg.ha^{-1}yr^{-1}$ - so for this site that equates to circa $0.4kg.yr^{-1}$ in the worst case. Generally this would reduce the attenuation capacity by circa 2% over 50yrs (all data from the SuDS maunual). The design allows for this amount with extra capacity provided to a 100yr design life. The CIRIA C753 method acknowledges this sedimentation and hence the use of a saftey factor of 1.5 is used in the calculations.

A.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 clip-in leaf guards to all roof gutters so as to remove gross solids.

A.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 450mm minimum cover. A typical detail is shown in Figure 8.

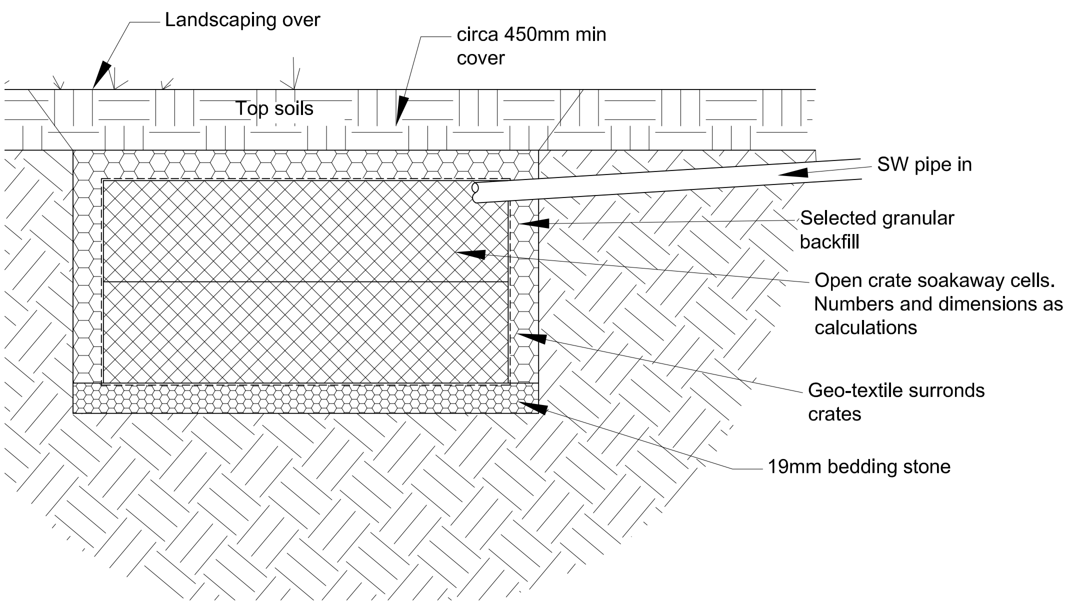

Figure 8: Typical soakaway details

A.2 Pipe size

Flow will be conveyed 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 = 153mmhr^{-1}

Drained area to one pipe = 20m^{2}

Required pipe capacity = 20 x 0.153 / 3.6 = 0.9 ls^{-1}

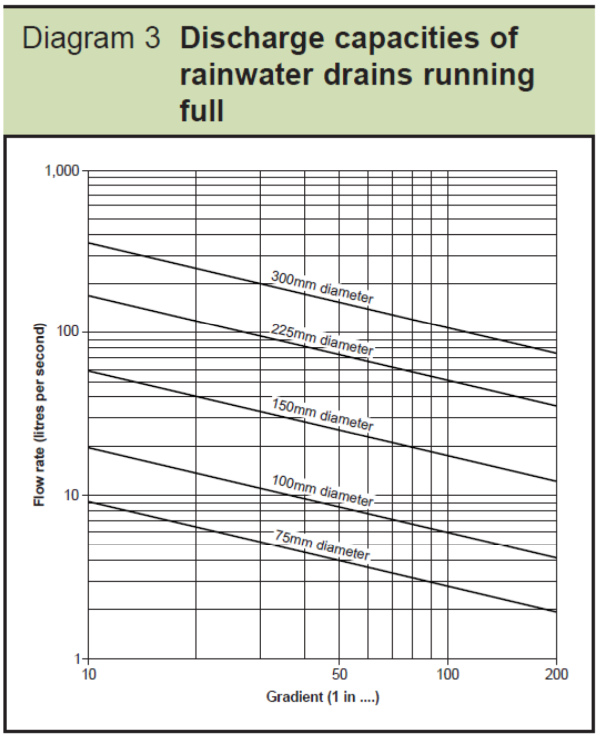

Figure 9: Part H drainage design chart