



## Flood Risk Assessment AEG3739\_OX3\_Oxford\_01

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Flood risk, water and environment

Site Address: 25 Fairfax Avenue

Oxford

OX3 0RP

UK Experts in Flood Modelling, Flood Risk  
Assessments, and Surface Water Drainage Strategies

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Flood risk, water and environment

# Document Issue Record

Project: Flood Risk Assessment

Prepared for: Jindui Hong

Reference: AEG3739\_OX3\_Oxford\_01

Site Location: 25 Fairfax Avenue, Oxford, OX3 0RP

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# Summary

| Development Description                       | Existing  | Proposed   |
|---|---|--|
| Development Type                              | A residential dwelling  | Rear double extension (ground floor and first floor)   |
| EA Vulnerability Classification               | More Vulnerable   | More Vulnerable  |
| Ground Floor Level                            | Based on EA LiDAR data, the existing ground elevations on site range between 57.2m Above Ordnance Datum (AOD) and 57.6m AOD | Recommended that new finished floor levels to match existing.  |
| Level of Sleeping Accommodation               | First floor   | Ground floor and first floor   |
| Surface Water Drainage                        | N/A <sup>1</sup>  | Recommended to discharge runoff as per existing. Small scale SuDS recommended.   |
| Site Size                                     | 220m <sup>2</sup>   | No change  |
| Development Size                              |   | <250m <sup>2</sup> and therefore classified as a minor development in terms of flood risk.   |
| Risk to Development                           | Summary   | Comment  |
| EA Flood Zone                                 | Flood Zone 1  |  |
| Flood Source                                  | N/A   |  |
| SFRA Available                                | Oxford City Council Level 1 Strategic Flood Risk Assessment (Oxford City Council, 2017)                                     |  |
| Management Measures                           | Summary   | Comment  |
| Ground floor level above extreme flood levels |   | Minor development - new finished floor levels to match existing. Additional flood resilience measures recommended.                   |
| Safe Access/Egress Route                      |   | Safe access/egress via Fairfax road for the 100-year pluvial event. Greater event, safe refuge can be sort in the existing dwelling. |
| Flood Resilient Design                        |   | Recommended - Flood resistant and resilient design in line with guidance set out in 'Improving the Flood                             |

|   |         |  |
|---|---------|--|
| Site Drainage Plan                          |         | Performance of New Buildings' (2007).  |
| Flood Warning and Evacuation Plan           | N/A     | Recommended to discharge runoff as per existing. Small scale SuDS recommended.     |
| Offsite Impacts                             | Summary | Comment  |
| Displacement of floodwater                  | No      | Minor developments are likely to have a negligible impact on flood risk elsewhere. |
| Increase in surface run-off generation      | No      | Recommended to discharge runoff as per existing. Small scale SuDS recommended.     |
| Impact on hydraulic performance of channels | No      | Does not impact channel.   |

<sup>1</sup> not required for this assessment

<sup>2</sup> data not available.

# 1. Introduction

- 1.1. Aegaea were commissioned by Mr Jindui Hong to undertake a Flood Risk Assessment (FRA) to facilitate a planning application for the proposed development. This FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance.
- 1.2. This FRA is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

## Site Overview

- 1.3. The site of the proposed development is 25 Fairfax Avenue, Oxford, OX3 0RP, as shown in Figure 1. It is understood that the proposed development is for the construction of a rear double extension, ground floor and first floor. Proposed plans are shown in Appendix A.

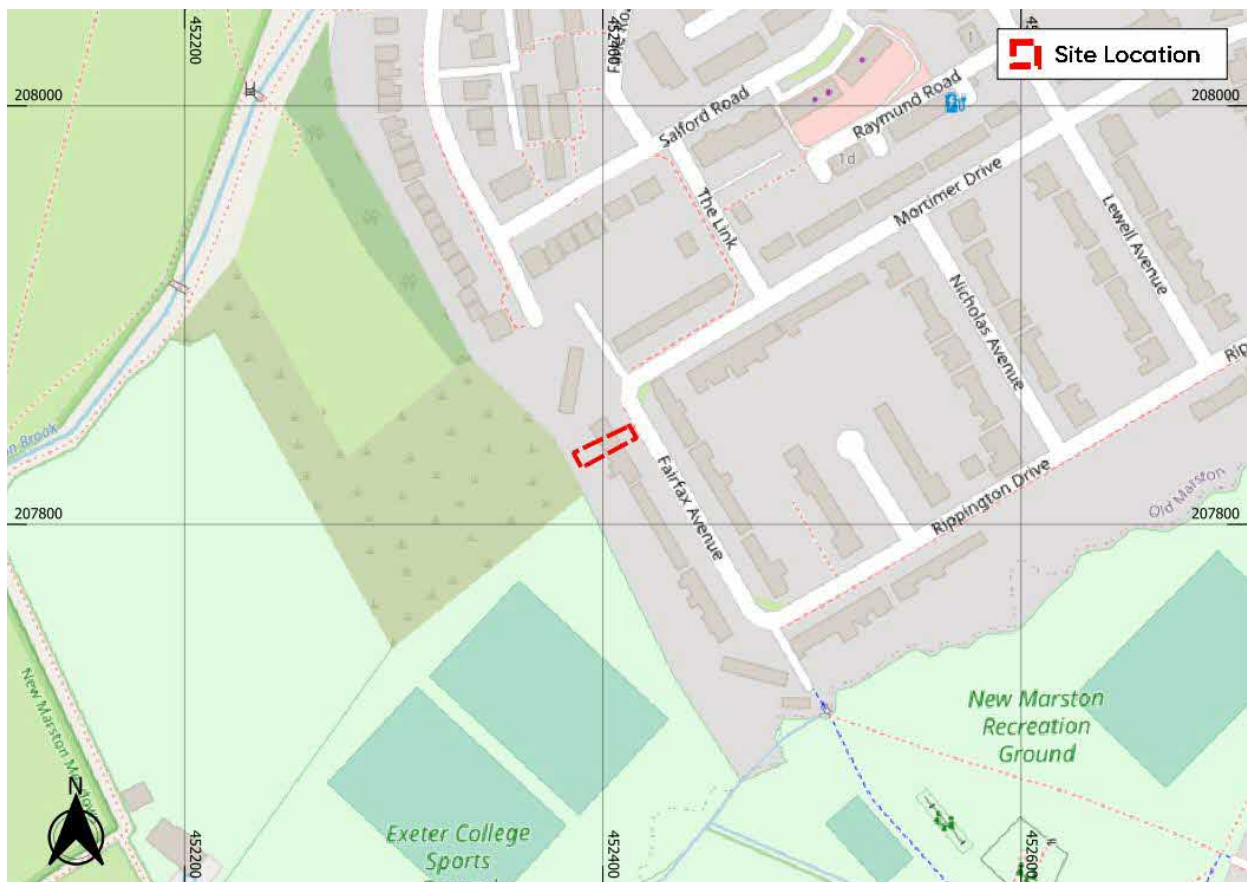


Figure 1: Site Location (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors)

- 1.4. In the absence of a topographical survey, Environment Agency Light Detection and Ranging (LiDAR) data Digital Terrain Model has been used to review the topography of the site. The LiDAR data (1m resolution) shows that the ground elevation of the site vary between

approximately 57.2 metres Above Ordnance Datum (mAOD) and 57.6 mAOD. The site is relatively flat with a gradual slope towards the centre of the site, as shown in Figure 2.

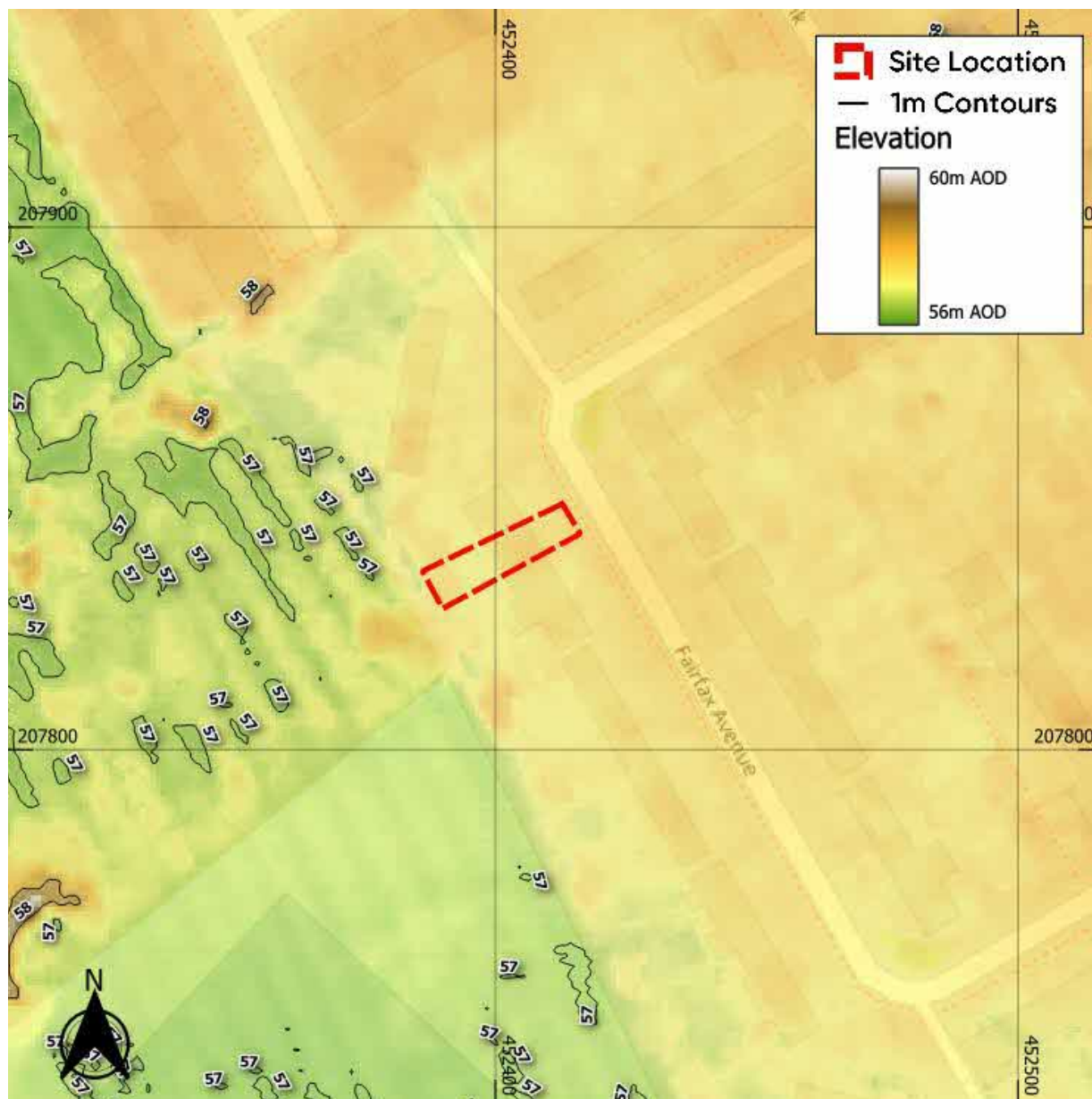


Figure 2: Site Topography(Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

- 1.5. Based off the LiDAR data and the assumption finished floor levels will be the same as the existing dwelling, finished flood levels for the site will be approximately 57.5 mAOD.
- 1.6. Oxford City Council is the Local Planning Authority (LPA) for the site and Oxfordshire County Council is the designated Lead Local Flood Authority (LLFA). The site sits within the Environment Agency's Thames region.

## Planning Policy and Guidance

- 1.7. UK government planning guidance states<sup>1</sup> that an FRA is required for developments which are:

*in flood zone 2 or 3 including minor development and change of use more than 1 hectare (ha) in flood zone 1*

*less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)*

*in an area within flood zone 1 which has critical drainage problems as notified by the Environment Agency*

- 1.8. The site is located within Flood Zone 1 on land which has been identified by the Environment Agency as having critical drainage problems. According to NPPF Footnote 55 an FRA is required.
- 1.9. The objective of this FRA is to demonstrate that the proposals are acceptable in terms of flood risk. This report summarises the findings of the study and specifically addresses the following issues in the context of the current legislative regime:

Fluvial flood risk

Surface water flood risk

Risk of flooding from other sources

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<sup>1</sup><https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications#when-you-need-an-assessment>



## 2. Planning Policy

- 2.1. Inappropriate development in a flood risk area could pose significant risk in terms of personal safety and damage to property for the occupiers of the development or for people elsewhere. The approach taken in the assessment of flood risk at the planning stage is set out in national, regional, and local planning policy and associated guidance. This section summarises the key policies and guidance relevant to the proposed development.

### National Planning Policy Framework (NPPF)

- 2.2. The National Planning Policy Framework<sup>2</sup> (NPPF) (DLUHC, 2023) which includes UK Government policy on development and flood risk states:

*159. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.*

*167. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:*

- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
- b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
- c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
- d) any residual risk can be safely managed; and*
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.*

*168. Applications for some minor development and changes of use should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55.*

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<sup>2</sup><https://www.gov.uk/guidance/national-planning-policy-framework>, last updated September 2023

2.3. Paragraph 051 of the Flood Risk and Coastal Change Planning Practice Guidance (PPG) states:

*Minor development means:*

*minor non-residential extensions (industrial/commercial/leisure etc): extensions with a floorspace not in excess of 250 square metres.*

*alterations: development that does not increase the size of buildings, e.g. alterations to external appearance.*

*householder development: for example, sheds, garages, games rooms etc within the curtilage of the existing dwelling, **in addition to physical extensions to the existing dwelling itself**. This definition excludes any proposed development that would create a separate dwelling within the curtilage of the existing dwelling (eg subdivision of houses into flats) or any other development with a purpose not incidental to the enjoyment of the dwelling.*

2.4. As such, the proposal would be considered a Minor Development under the PPG.

2.5. Footnote 55 of the NPPF states:

*A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.*

2.6. Flood Zones in England are defined as follows:

Table 1: Flood Zone Definitions

| Flood Zone                        | Definition  |
|-----------------------------------|---|
| Zone 1 Low Probability            | Land having less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3).  |
| Zone 2 Medium Probability         | Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.  |
| Zone 3a High Probability          | Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.  |
| Zone 3b The Functional Floodplain | This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: |

land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or

land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

- 2.7. An FRA should be appropriate to the scale, nature, and location of the development. It should identify and assess the risk from all sources of flooding to and from the development and demonstrate how any flood risks will be managed over the lifetime of the development.
- 2.8. An assessment of hydrological impacts should be undertaken, including to surface water runoff and impacts to drainage networks in order to demonstrate how flood risk to others will be managed following development and taking climate change into account.
- 2.9. The Planning Practice Guidance, which was substantially revised in March 2015 in relation to drainage, requires that sustainable drainage systems (SuDS) should be considered and included where practicable, in line with Defra Technical Standards<sup>3</sup>.

## Local Plan

- 2.10. The Local Plan prepared by the Local Planning Authority, Oxford City Council, sets out the policies for development in the local area.
- 2.11. Policy RE3 Flood Risk Management outlines the requirements for new development within the area. It states:

*Planning permission will not be granted for development in Flood zone 3b, except where it is for water-compatible uses or essential infrastructure; or where it is on previously developed land and it will represent an improvement for the existing situation in terms of flood risk.*

*All of the following criteria must be met:*

- a) it will not lead to a net increase in the built footprint of the existing building and where possible lead to a decrease; and
- b) it will not lead to a reduction in flood storage (through the use of flood compensation measures) and where possible increase flood storage; and

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### 3 Technical Standards Accessed Online

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/415773/sustainable-drainage-technical-standards.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf)

- c) it will not lead to an increased risk of flooding elsewhere; and
- d) it will not put any future occupants of the development at risk, new development will be directed towards areas of low flood risk (Flood Zone 1).

*In considering proposals elsewhere, the sequential and exception tests will be applied. Planning applications for development within Flood Zone 2, 3, on sites larger than 1 ha in Flood Zone 1 and, in areas identified as Critical Drainage Areas, must be accompanied by a Site Specific Flood Risk Assessment (FRA) to align with National Policy. The FRA must be undertaken in accordance with up to date flood data, national and local guidance on flooding and consider flooding from all sources. The suitability of developments proposed will be assessed according to the sequential approach and exceptions test as set out in Planning Practice Guidance. Planning permission will only be granted where the FRA demonstrates that:*

- e) the proposed development will not increase flood risk on site or off site; and
- f) safe access and egress in the event of a flood can be provided; and
- g) details of the necessary mitigation measures to be implemented have been provided.

*Minor householder extensions may be permitted in Flood Zone 3b, as they have a lower risk of increasing flooding. Proposals for this type of development will be assessed on a case by case basis, taking into account the effect on flood risk on and off site.*

2.12. Policy RE4 Sustainable and foul drainage, surface and groundwater flow outlines the requirements for new development within the area. It states:

*All development proposals will be required to manage surface water through Sustainable Drainage Systems (SuDS) or techniques to limit run-off and reduce the existing rate of run-off on previously developed sites. Surface water runoff should be managed as close to its source as possible, in line with the following drainage hierarchy:*

- a) store rainwater for later use; then:
- b) discharge into the ground (infiltration); then:
- c) discharge to a surface water body; then:
- d) discharge to a surface water sewer, highway drain or other drainage system; and finally:
- e) discharge to a combined sewer.

*Details of the SuDS shall be submitted as part of a drainage strategy or FRA where required. Applicants must demonstrate that they have had regard to the SuDS Design and Evaluation Guide SPD/ TAN for minor development and Oxfordshire County Council guidance for major development.*

*Surface and groundwater flow and groundwater recharge: Planning permission will not be granted or development that would have an adverse impact on groundwater flow. The City Council will, where necessary, require effective preventative measures to be taken to ensure that the flow of groundwater will not be obstructed. Within the surface and groundwater catchment area for the Lye Valley SSSI development will only be permitted if it includes SuDS and where an assessment can demonstrate that there will be no adverse impact on the surface and groundwater flow to the Lye Valley SSSI.*

*Development on the North Oxford gravel terrace that could influence groundwater flow to the Oxford Meadows Special Area of Conservation (SAC) will only be permitted if it includes SuDS and if a hydrological survey can demonstrate that there will be no significant adverse impact upon the integrity of the SAC.*

#### *Foul Drainage*

*Developers are encouraged to separate foul and surface water sewers on all brownfield sites delivering new development. For clarity this does not include householder extensions or conversions that input into the existing network. A Foul and Surface Water Drainage Strategy must be provided for all new build residential development of 100 dwellings or more; non-residential development of 7,200sqm or more; or student accommodation of 250 study bedrooms or more.*

## Sequential and Exception Tests

- 2.13. The Sequential and Exception Tests are applied in specific cases defined by UK Government policy. Their purpose is to drive development to areas of low flood risk and to support developments which improve flood risk for developments in areas at risk of flooding.
- 2.14. The proposed development is viewed as minor development in accordance with the EA standing advice. In accordance with the NPPF paragraph 168, minor developments should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55.

# 3. Consultation and Review

## Consultation

- 3.1. Aegaea requested flood data for the area and received the Thames (Eynsham to Sandford) 2018 and 2022 modelling data. The proposed development lies within the model's study area and has been analysed in Section 4 of this report to determine the flood risk to the site. EA consultation is shown in Appendix B.

## Documents and Online Mapping

- 3.2. Local Governments and Lead Local Flood Authorities provide documents which contain data and policies on flood risk and new development in their areas. These documents are introduced and briefly summarised below. For the purposes of this FRA, these documents have been reviewed for relevant information and any relevant data is discussed within the appropriate sub heading of this report.
- 3.3. The following sources of information have been reviewed for this assessment:

Flood Map for Planning on the Environment Agency website <https://flood-map-for-planning.service.gov.uk/>

Long Term Flood Risk Information on the Environment Agency website <https://www.gov.uk/check-long-term-flood-risk>

National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2023)

Planning Practice Guidance - Flood Risk and Coastal Change (Department for Levelling Up, Housing and Communities, 2022)

Geoindex Onshore (British Geological Survey, 2023)

Oxford Local Plan 2036 (Oxford City Council, 2020)<sup>4</sup>

Oxford County Council Preliminary Flood Risk Assessment (2011)<sup>5</sup>

Oxford City Council Level 1 Strategic Flood Risk Assessment (Oxford City Council, 2017)<sup>6</sup>

Oxford County Council Local Flood Risk Management Strategy (2016)<sup>7</sup>

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<sup>4</sup> [https://www.oxford.gov.uk/info/20067/planning\\_policy/1311/oxford\\_local\\_plan\\_2016-2036](https://www.oxford.gov.uk/info/20067/planning_policy/1311/oxford_local_plan_2016-2036)

<sup>5</sup>

[https://mycouncil.oxfordshire.gov.uk/documents/s5786/2010s4568%20Oxfordshire%20PFRA\\_v1.2\\_Apr1\\_1\\_version%20for%20Scrutiny.pdf](https://mycouncil.oxfordshire.gov.uk/documents/s5786/2010s4568%20Oxfordshire%20PFRA_v1.2_Apr1_1_version%20for%20Scrutiny.pdf)

<sup>6</sup> [https://www.oxford.gov.uk/downloads/download/435/strategic\\_flood\\_risk\\_assessment](https://www.oxford.gov.uk/downloads/download/435/strategic_flood_risk_assessment)

<sup>7</sup> <https://www.oxfordshirefloodtoolkit.com/wp-content/uploads/2016/04/OxfordshireFloodRiskManagementStrategy.pdf>

## Preliminary Flood Risk Assessment (PFRA)

- 3.4. The PFRA is a high-level appraisal of flood risk across Lead Local Flood Authority Oxfordshire County Council. The flood risk from all sources, including fluvial, surface water, groundwater, and surcharged sewers is evaluated. It is the basis upon which the Local Flood Risk Management Strategy is produced.
- 3.5. The PFRA summarises historical flood incidents in Oxfordshire County Council. The site is not recorded as having been affected by any flood event.

## Strategic Flood Risk Assessment (SFRA)

- 3.6. The SFRA, published in 2017, provides the evidence base for the Local Planning Authority Oxford City Council Local Plan and guidance for consideration when determining planning applications. The SFRA seeks to place new development into areas of lower flood risk taking into account current flood risk, future flood risk, and the effect a proposed development would have on the risk of flooding.
- 3.7. The SFRA mapping provided by Oxford City Council has been used throughout production of this report as a source of information, particularly pertaining to historical flood incidents.

## Local Flood Risk Management Strategy (LFRMS)

- 3.8. The Local Flood Risk Management Strategy sets out roles and responsibilities for flood risk management, assesses the risk of flooding in the area, where funding can be found to manage flood risk, and the policies, objectives, and actions of the Lead Local Flood Authority.
- 3.9. The Oxfordshire County Council LFRMS is used within this report to identify any flood management infrastructure and historical incidences of flooding.

## 4. Sources of Flood Risk

### Fluvial

- 4.1. Flooding from watercourses arises when flows exceed the capacity of the channel, or where a restrictive structure is encountered, resulting in water overtopping the banks into the floodplain.
- 4.2. The entire site is located within Flood Zone 1, as shown in Figure 3. Flood zone 2 is located approximately 8 m west of the site boundary.

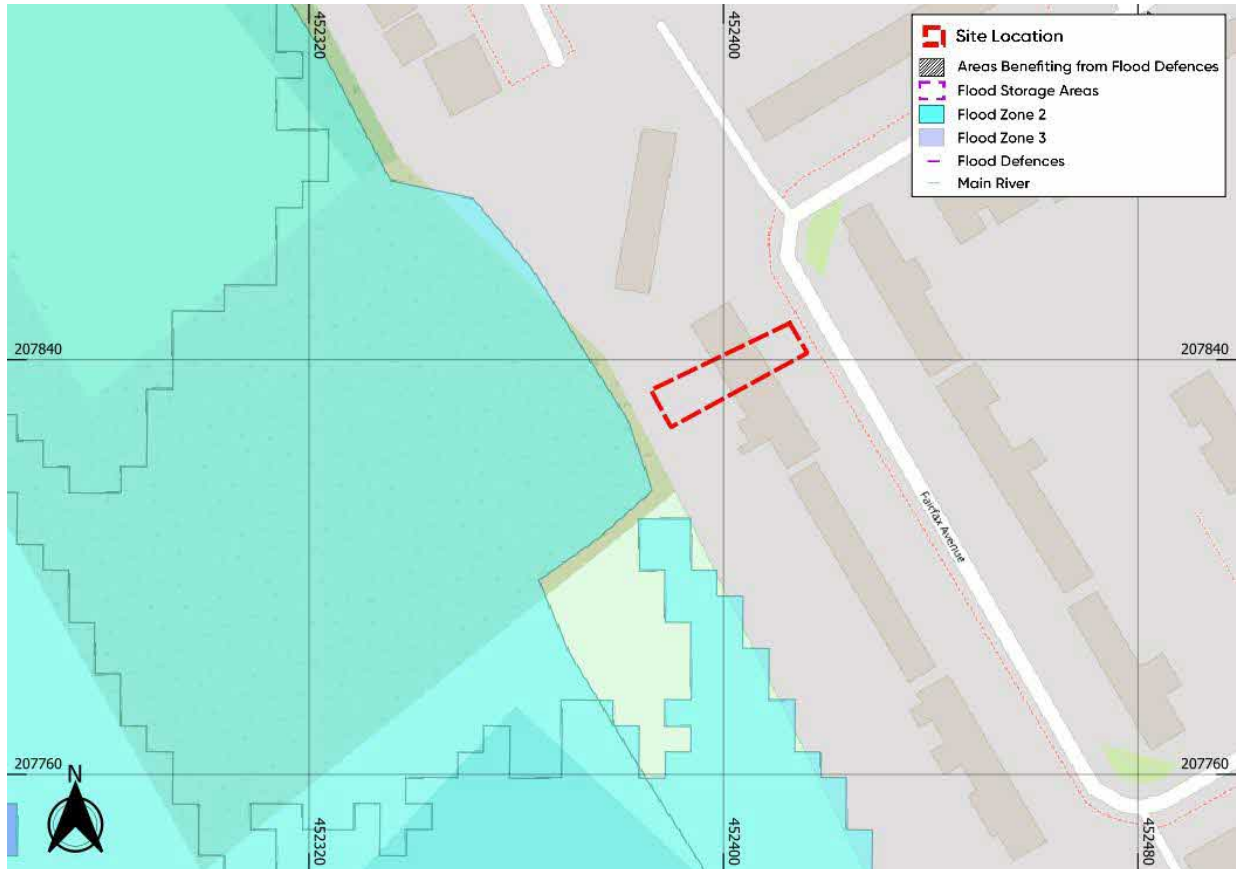


Figure 3: EA Flood Map for Planning (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

### Main Rivers

- 4.3. The nearest main river, Peasmoor Brook, is located approximately 170 m south of the site. The Marston Brook is located 250 m north of the site. Both watercourses flow west and discharge into the River Cherwell, is located approximately 600 m west of the site.

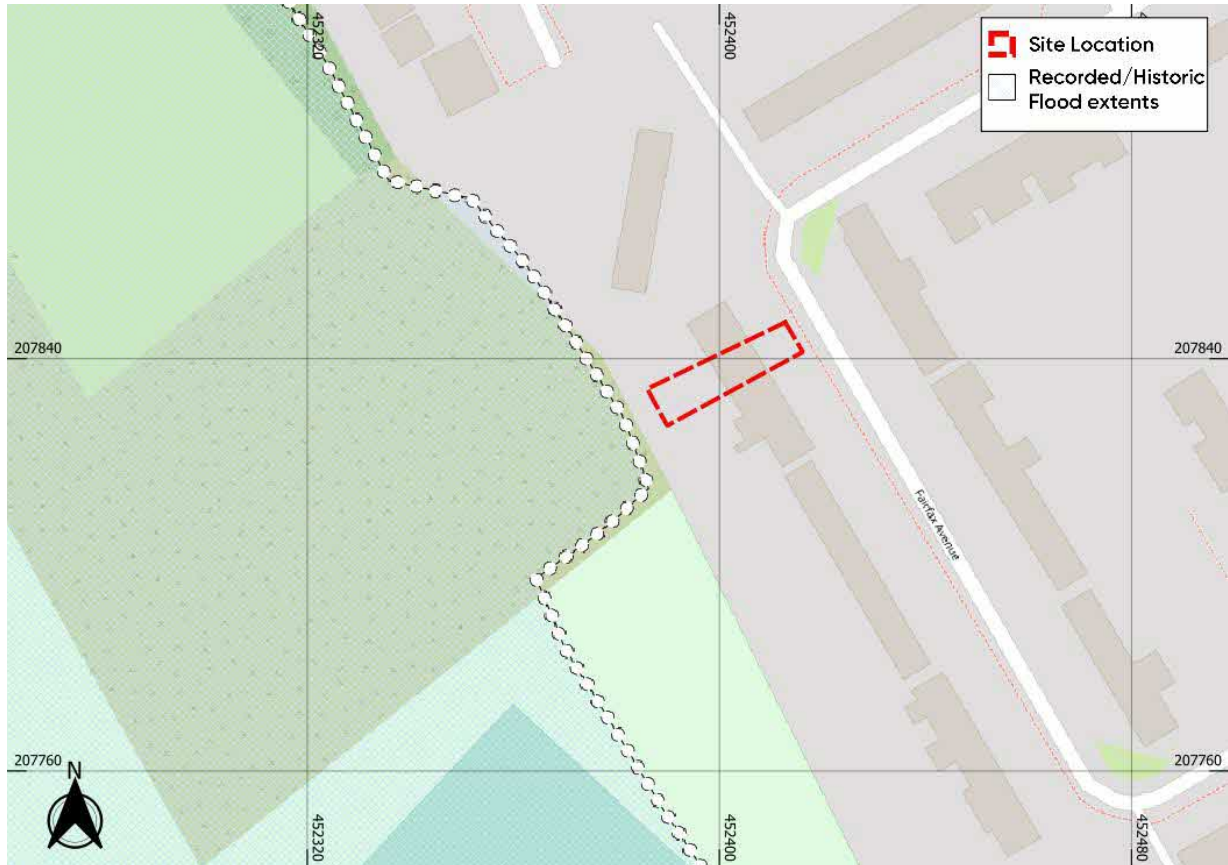
### Ordinary Watercourses

- 4.4. There are no other watercourses in the vicinity of the site.



## Historical Fluvial Flooding

- 4.5. The SFRA 'Historical Flood Outlines' map shows the site was flooded however do not provide context of which event or further details within the SFRA report. The site was not flooded during 1947, 1977, 1979, 1992, 1993, 1998, 2000, 2003 and 2007 events.
- 4.6. The EA historical flood data does not show the site has been previously flooded. The nearest flooding is approximately 8m west of the site boundary, as shown in Figure 4.



4.7.

Figure 4: EA Historic Flood Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

## Thames (Eynsham to Sandford) 2022

- 4.8. The site is located outside of Flood Zone 2 however given the close proximity; EA data has been reviewed to confirm the site is located within Flood Zone 1.
- 4.9. Aegaea has been provided with Product 6 (raw data) for this area by the Environment Agency which has been used to inform this FRA. This information is based on the River Thames model, dated 2021 which superseded the 2018 model. This is understood to be the best available information for this area.
- 4.10. The site is located within the 'Cherwell and Ray Management Catchment'. The proposed development is for the construction of an extension to the existing residential dwelling on site.

Residential development should be considered to have an anticipated lifetime of a minimum of 100 years.

- 4.11. Guidance suggests that 'More Vulnerable' developments in Flood Zone 2 or 3a should utilise the 'central' climate change allowance. The increase in peak river flow for the 2080s epoch for the 'central' allowance is +15%.
- 4.12. The climate change scenarios for the model simulations consisted of 11%, 13%, 30% and 82%. The 30% climate change scenario has been used given the other climate change allowances are below the central allowance 15%.
- 4.13. The 100-year event plus 30% climate change allowance shows the site is located outside the model extent, as shown in Figure 5.

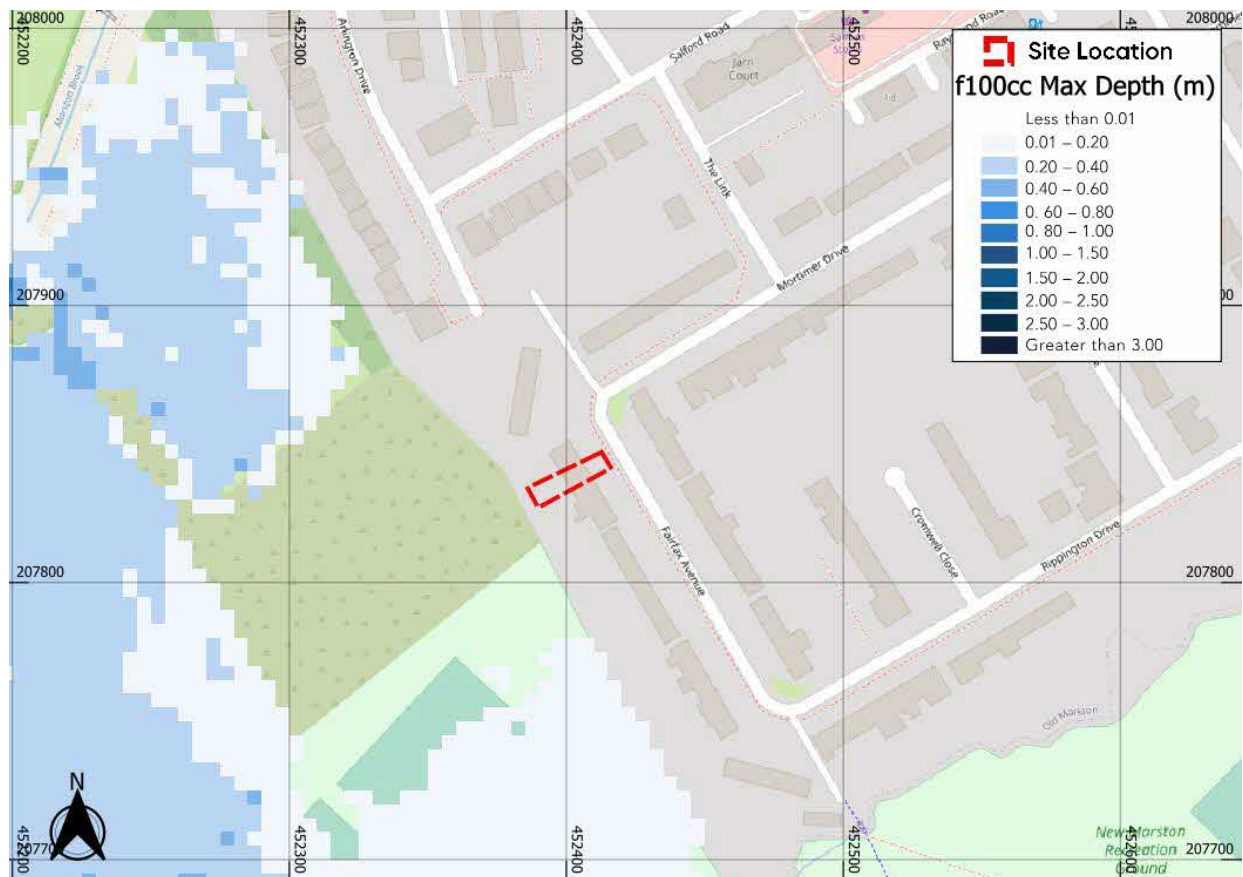


Figure 5: 2021 modelled 100-year plus climate change event. (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

- 4.14. The EA data provided only consisted of climate change scenarios for the 1 in 1000-year event, therefore the lowest climate change allowance, 11%, was used.
- 4.15. The 1000-year event plus 11% climate change allowance shows the site is located outside the model extent, as shown in Figure 6.

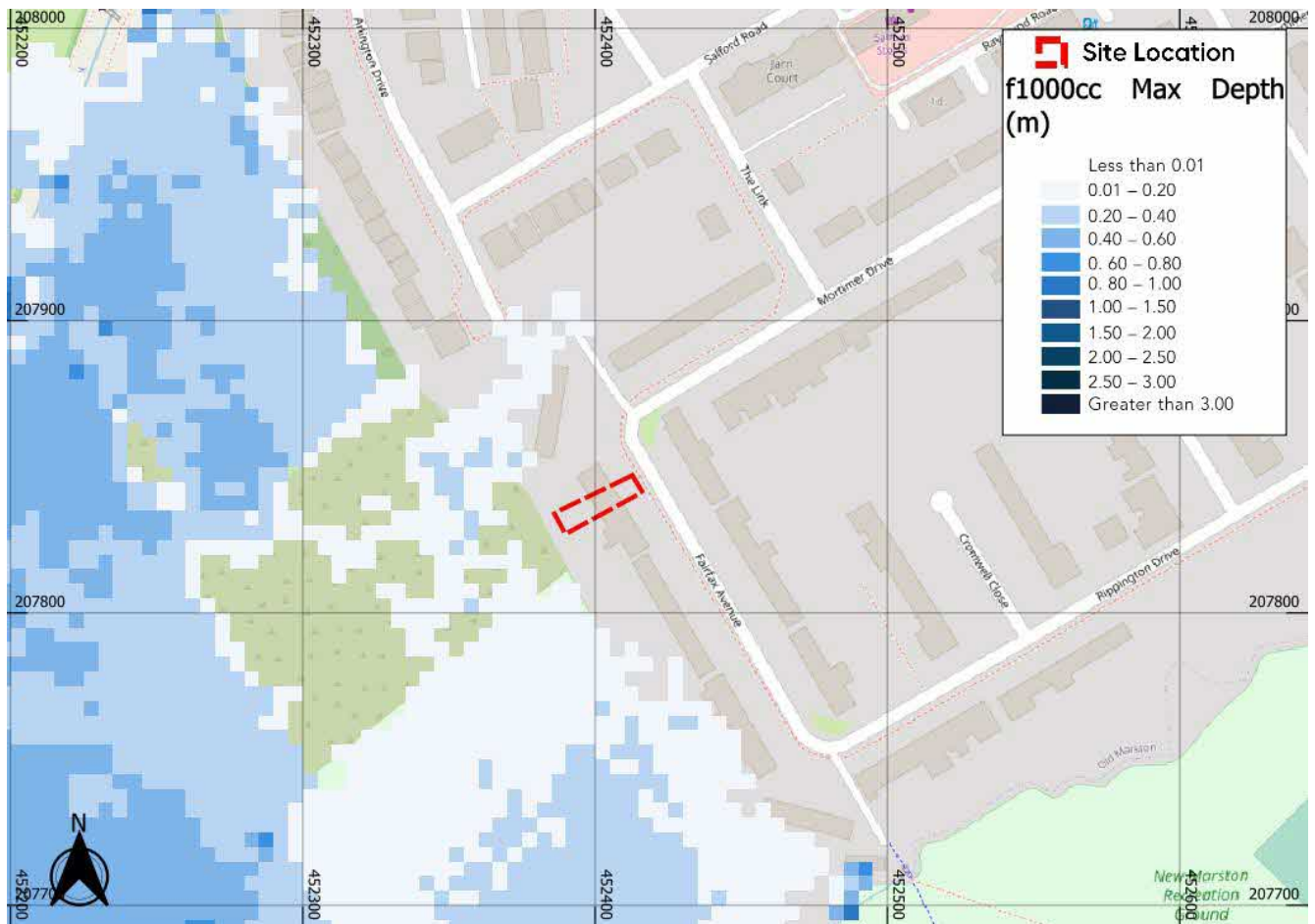


Figure 6: 2021 modelled 1000-year plus climate change event. (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

## Summary

4.16. Based on the above information, the fluvial flood risk to the site is considered to be low.

## Tidal

4.17. Tidal flooding occurs when a high tide and high winds combine to elevate sea levels. An area behind coastal flood defences can still flood if waves overtop the defences or break through them. Tidal flooding can also occur a long way from the coast by raising river levels. Water may overtop the riverbank or river defences when tide levels are high. The site is a significant distance from any tidal source and above the anticipated extreme tidal levels, even when considering the impacts of climate change. The risk of flooding from tidal sources is low. The site is not located within the vicinity of any tidal sources.

4.18. The site is not located within the vicinity of any tidal sources.

4.19. The tidal flood risk to the site is considered to be low.

## Canals

- 4.20. The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders, and boreholes and manages water levels by transferring it within the canal system.
- 4.21. The site is not located within the vicinity of any canals.
- 4.22. The canal flood risk to the site is considered to be low.

## Pluvial

- 4.23. Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.
- 4.24. Local policy documentation identifies the site as being in a Critical Drainage Area. Being inside a Critical Drainage Area means that there could be development restrictions to help prevent overloading the sewer system and causing flooding elsewhere.
- 4.25. Annual surface water flood risk is labelled by the EA as:
  - 'High Risk'; >3.3% AEP (annual probability greater than 1 in 30).
  - 'Medium Risk'; 1.1% to 3.3% AEP (annual probability between 1 in 100 and 1 in 30).
  - 'Low Risk'; 0.1% to 1% AEP (annual probability between 1 in 1000 and 1 in 100).
  - 'Very Low Risk'; <0.1% AEP (annual probability less than 1 in 1000).
- 4.26. Examination of the EA's Flood Risk from Surface Water mapping for High Risk, Medium Risk, and Low Risk AEP flood events shows the site is at risk of flooding in 'Low' surface water flood events, as shown in Figure 7.

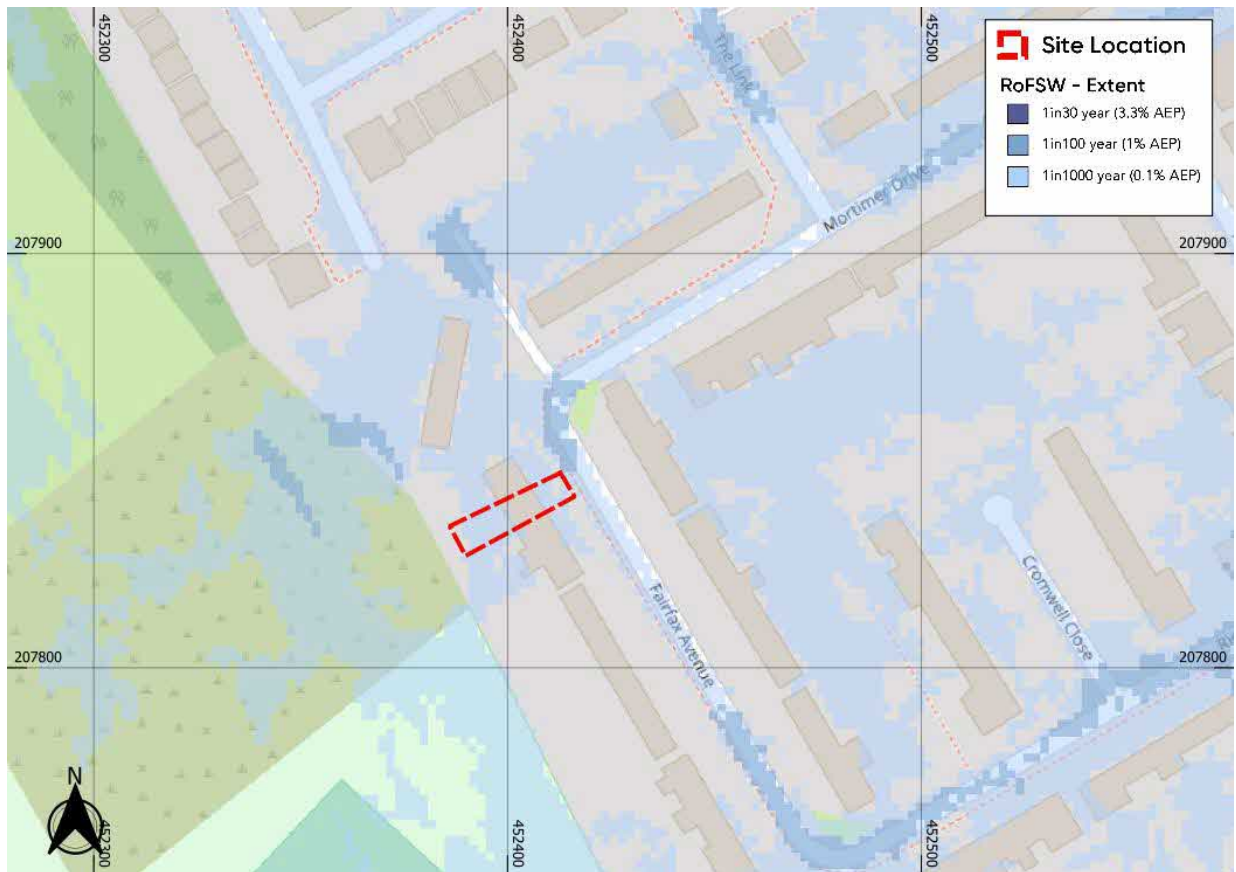


Figure 7: EA Surface Water Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.27. In the modelled 1 in 100-year event (Figure 8), the site is shown to not be affected by surface water flooding.

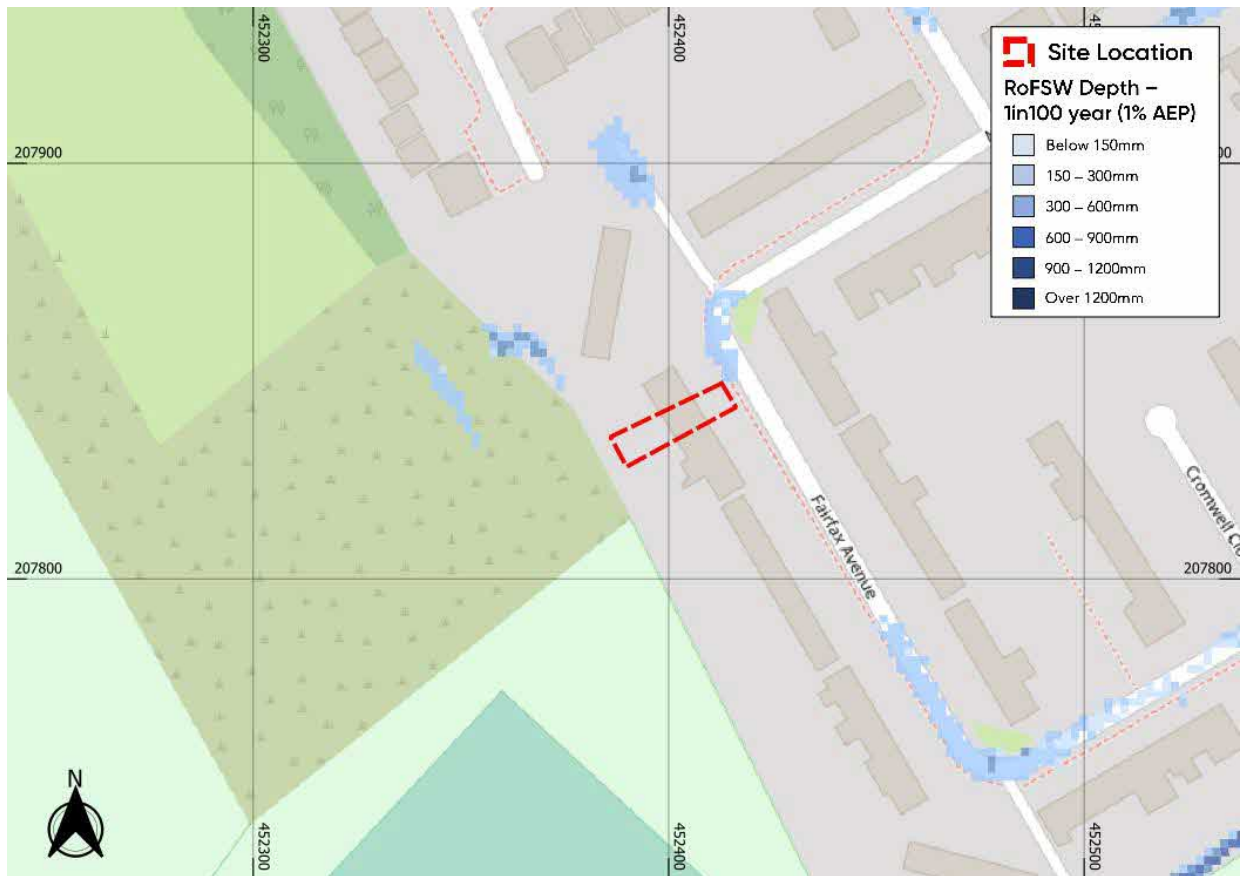


Figure 8: EA Surface Water Flood Risk Mapping 100-year event (Source: Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors, © EA copyright and/or database right 2015)

In the modelled 1 in 1000-year event (Figure 9), the site is shown to be affected by surface water flooding. The proposed development is shown to be affected with flood depths ranging up to

300mm.

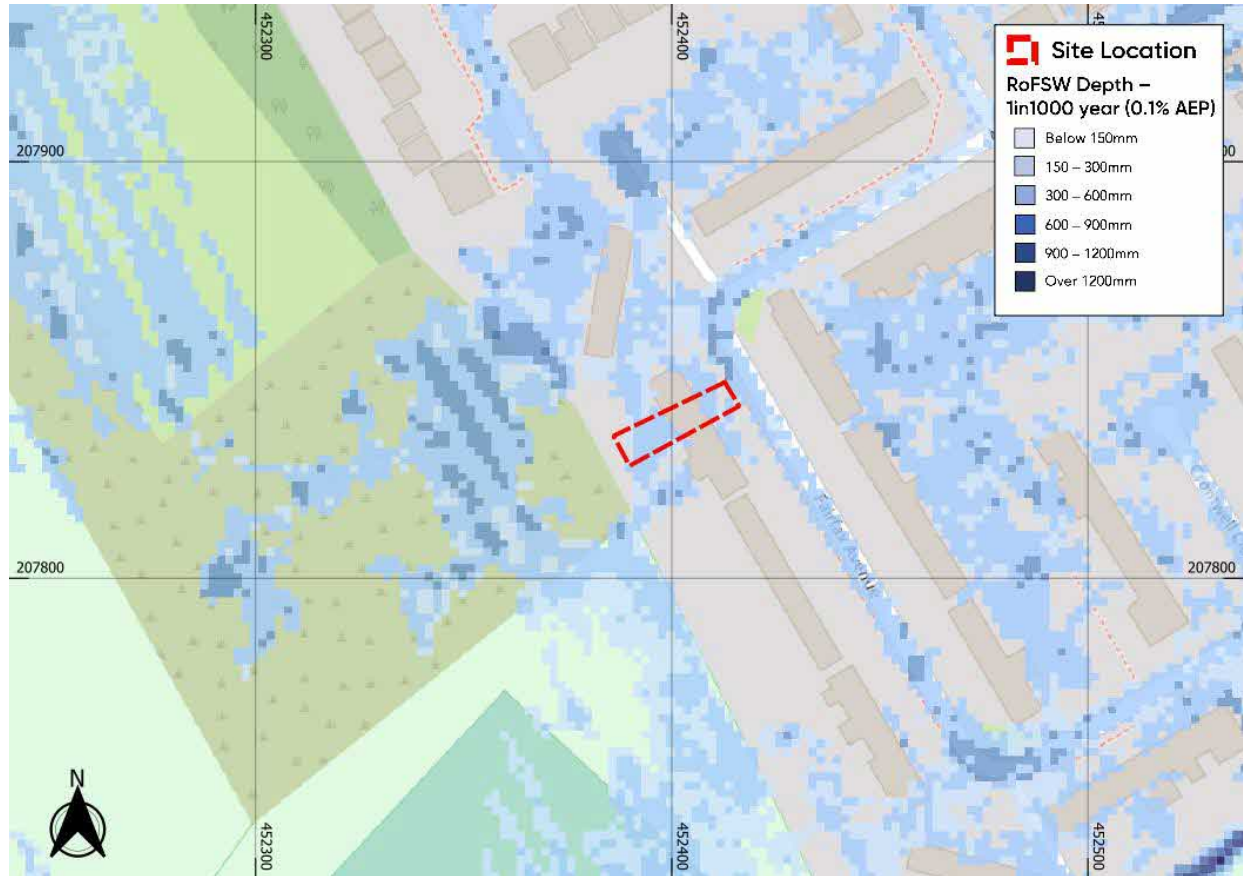


Figure 9: EA Surface Water Flood Risk Mapping 1000-year event (Source: Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors, © EA copyright and/or database right 2015)

- 4.28. The EA velocity maps show a flow path from the road past the site of number 27 and then across the back of the existing dwelling. A wooden fence is located along the site of number 27 therefore significantly reducing the likelihood of surface water entering the back of the site, as shown in Figure 10.



Figure 10: Streetview image showing fence along Number 27. Source: Google Street View.

- 4.29. Fairfax Road to the northeast of the site which provides the access/egress route to the development is shown to be affected with flood depths ranging up to 600 mm to the north of the site curtilage. The EA hazard rating denoted to the flood extent on the highway is shown to be Low (0.5 – 0.75) to Moderate (0.75 – 1.25) at the site entrance, as shown in Figure 9. As such, it is understood safe access/egress may not be possible in this event. Safe refuge could be sort at the existing dwelling in the event of a flood.



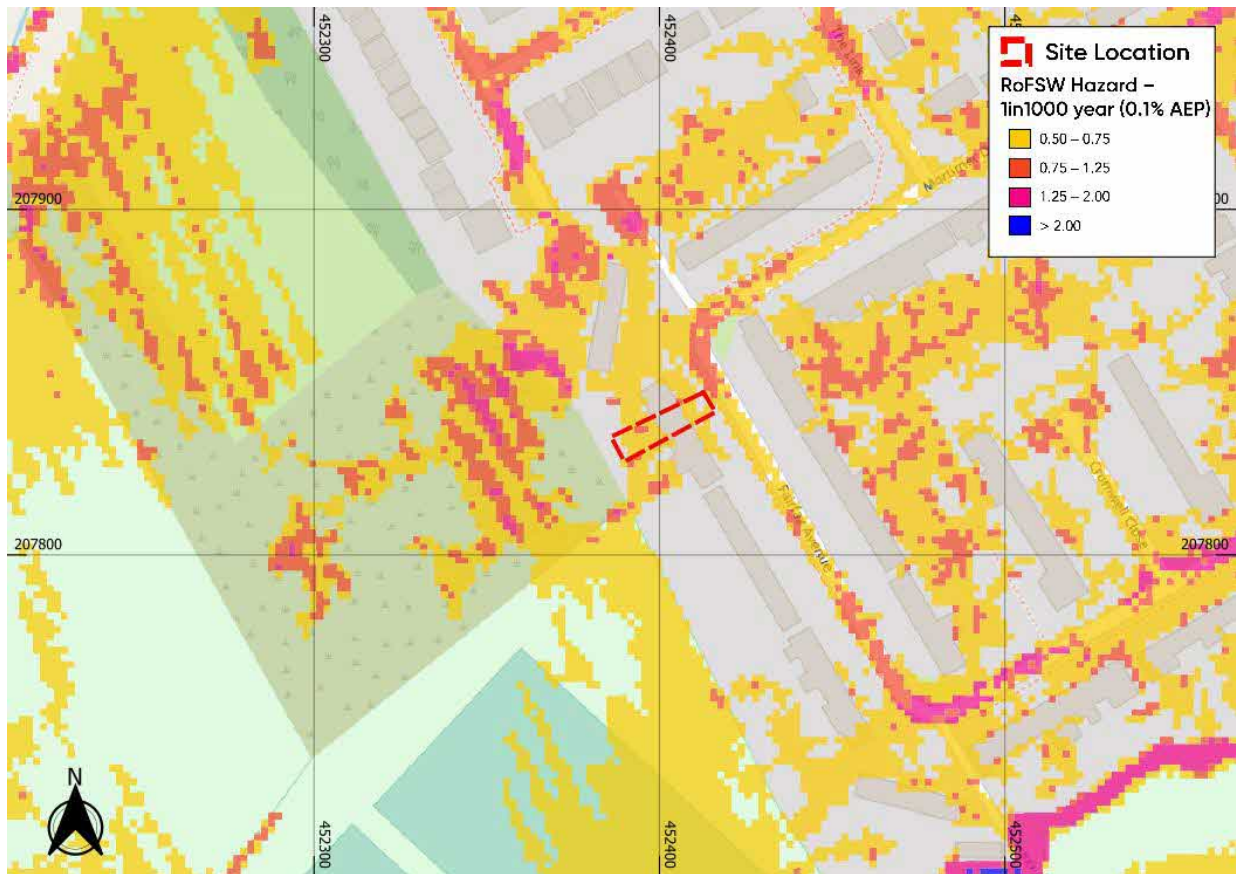


Figure 11: EA hazard map 1 in 1000-year event. (Source: Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors, © EA copyright and/or database right 2015).

- 4.30. The SFRA does not highlight historical surface water incidents have been recorded in the vicinity of the site.
- 4.31. Based on the information above, the pluvial flood risk to the site is considered to be low.

## Reservoirs

- 4.32. Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain floodwater. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.
- 4.33. According to the EA's Flood Risk from Reservoirs mapping (Figure 12) the site is at risk of flooding in the event of a breach at the Farmoor No.1, Farmoor No.2, and Banbury FAS reservoirs. The worst reservoir failure model is a 'wet day' scenario meaning that it would have to happen at the same time as other flooding for there to be enough water to reach the site.

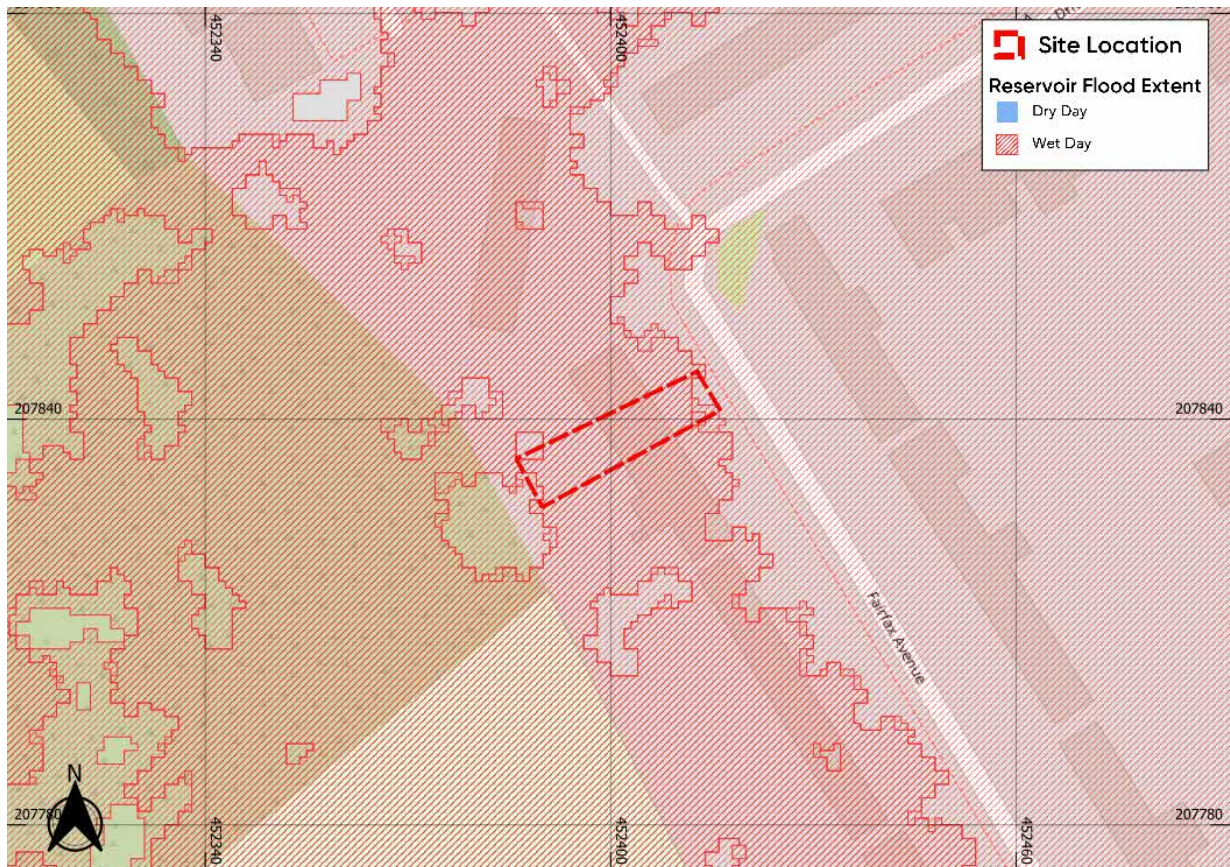


Figure 12: EA Reservoir Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). ©<https://www.openstreetmap.org> and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

- 4.34. All large reservoirs must be inspected and supervised by reservoir panel engineers as detailed by the Reservoirs Act 1975 in England and Wales. The EA are responsible to ensure that reservoirs are inspected regularly, and essential safety work carried out. As reservoirs are highly managed the maximum flood extent provided in the EA Risk of Flooding from Reservoirs mapping is considered a worst-case scenario. As reservoir flooding is unlikely and the modelled flood depths are based on the worst-case scenario, flooding from this source may be considered as a relatively low risk. Although to be precautionary flood resilient design and building practices could be implemented to further reduce risk.
- 4.35. Based on the information above, the reservoir flood residual risk to the site is considered to be low.

### Groundwater

- 4.36. Groundwater flooding occurs in areas where underlying geology is permeable and water can rise within the strata sufficiently to breach the surface.
- 4.37. The British Geological Survey's (BGS) mapping shows superficial deposits of Northmoor sand and gravel underlying the site. The bedrock underlying the site is Oxford Clay Formation and West Walton Formation comprising Mudstone and Oxford Clay Formation and West Walton Formation comprising Mudstone.

- 4.38. The nearest BGS borehole is located 380 m southeast of the site and is underlain by approximately 1m soft to firm brown sandy clay, 2.5 m firm light brown and grey mottled clay and 0.6 m stiff blue grey fissured clay. No water was encountered within the borehole.
- 4.39. The distance of the borehole from the site and the watercourse between suggest the records may not best represent the underlying conditions of the site. The borehole located has the same BGS superficial deposits and geology which suggests similar conditions can be assumed. The present of clay under the site reduces the risk of groundwater reaching the surface and affecting the site.
- 4.40. The SFRA presents a 'registered groundwater flooding incidents' map. The map shows the site has no registered groundwater flooding nor within the vicinity of the site.
- 4.41. The proposed development included a double rear extension and therefore does not include any a basement or subsurface changes to the existing development.
- 4.42. Based on the information above, the groundwater flood risk to the site is considered to be low.

## Sewers

- 4.43. Foul or surface water sewers can be a cause of flooding if the drainage network becomes overwhelmed, either by blockage or due to local development beyond the designed capabilities of the drainage system.
- 4.44. The SFRA 'Thames Water Sewer Flooding Incidents by Postcode Area' map shows the site has no history of sewer flooding. In addition, the surrounding area of the site also has no history of sewer flooding.
- 4.45. Based on the above, the sewer flood risk to the site is considered to be low.

# 5. Flood Risk Mitigation

## Pluvial

- 5.1. The proposed development is located outside the 100-year pluvial event however is located within the 1000-year event therefore the site is potentially vulnerable to flooding in the future.
- 5.2. As a precautionary measure, it is recommended that the development should comply with relevant EA Flood Risk Standing Advice (for Minor Developments) which requires that flood levels are either no lower than existing floor levels or 300mm above the estimated flood level.
- 5.3. It will not be possible to raise the finished floor levels of the extension to 300mm above the estimated flood level, instead, the floors will remain no lower than existing and the proposed extension should be constructed using flood resilient and resistant measures, in accordance with DCLG Report *Improving the Flood Performance of New Buildings Flood Resilient Construction (2007)* (standards for the installation and retrofit of resistance measures are available In British Standard 851188-1:2019+A1:2021). Flood resistant measures can be used to prevent internal flooding up to a depth of 600 mm and flood resilient measures can reduce the cost and time of recovery from flooding. Mitigation measures such as the following are recommended:

Finish floor levels or the proposed extension are to be set no lower than existing finished floor levels.

Raised wiring and power outlets at ground level.

Damp proof membranes should be included within the design of the dwelling to minimise the passage of water through ground floors. Impermeable polythene membranes should be at least 1200 gauge to minimise ripping. Effective methods of joining membrane sections are overlaps of 300 mm, and also taping (mastic tape with an overlap of 50 mm minimum).

Cavity insulation should preferably incorporate rigid closed cell materials as these retain integrity and have low moisture take-up.

Air bricks covers to be installed.

Non-return valve fitted to any new sewer connections.

All new plumbing insulation to be of closed cell design.

Finish shall be water resistant render with lime-based plaster finish, hydraulic lime coating or ceramic tiles up to at least the design flood level plus 300 mm freeboard. Plasterboard placed horizontally as a sacrificial material, not vertically.

## Fluvial, Reservoirs, Groundwater and Sewers

- 5.4. Flood risk from other sources is deemed to be low, therefore mitigation is not required.

## Increase to Flood Risk Elsewhere

5.5. The proposed development is for the construction of an extension to the existing dwelling on site. Rear double extension, ground floor and first floor as such, the proposal constitutes a Minor Development under the NPPF.

5.6. Paragraph 051 of the Flood Risk and Coastal Change Planning Practice Guidance (PPG) states:

*Minor developments are unlikely to raise significant flood issues unless:*

*they would have an adverse effect on a watercourse, floodplain or its flood defences;*

*they would impede access to flood defence and management facilities, or;*

*where the cumulative impact of such developments would have a significant effect on local flood storage capacity or flood flows.*

5.7. As such, the proposed development in isolation should have a negligible impact on flood risk elsewhere.

## Flood Warnings

5.8. The site is not in an area where Environment Agency (EA) provide specific flood alerts and warnings. We advise the occupant of the dwelling to monitor Met Office Weather Warnings to be prepared for extreme weather events.

5.9. Flood warnings/alerts can be enforced at any time of the day or night. Signing up for this service provides site owners some notice before a flood event. The amount of time afforded before a flood occurs depends on the site-specific location (e.g. proximity to the source of flooding, topography of the surrounding area) and the flood mechanism (e.g. bank over topping versus a breach event). Flood alerts and warnings provide site managers with time to take necessary action, e.g. communication of the risk of flooding to occupants/employees etc, evacuation of occupants offsite or to a safe level, removal of valuable items out of reach of flooding and the mounting of site-specific flood defences.

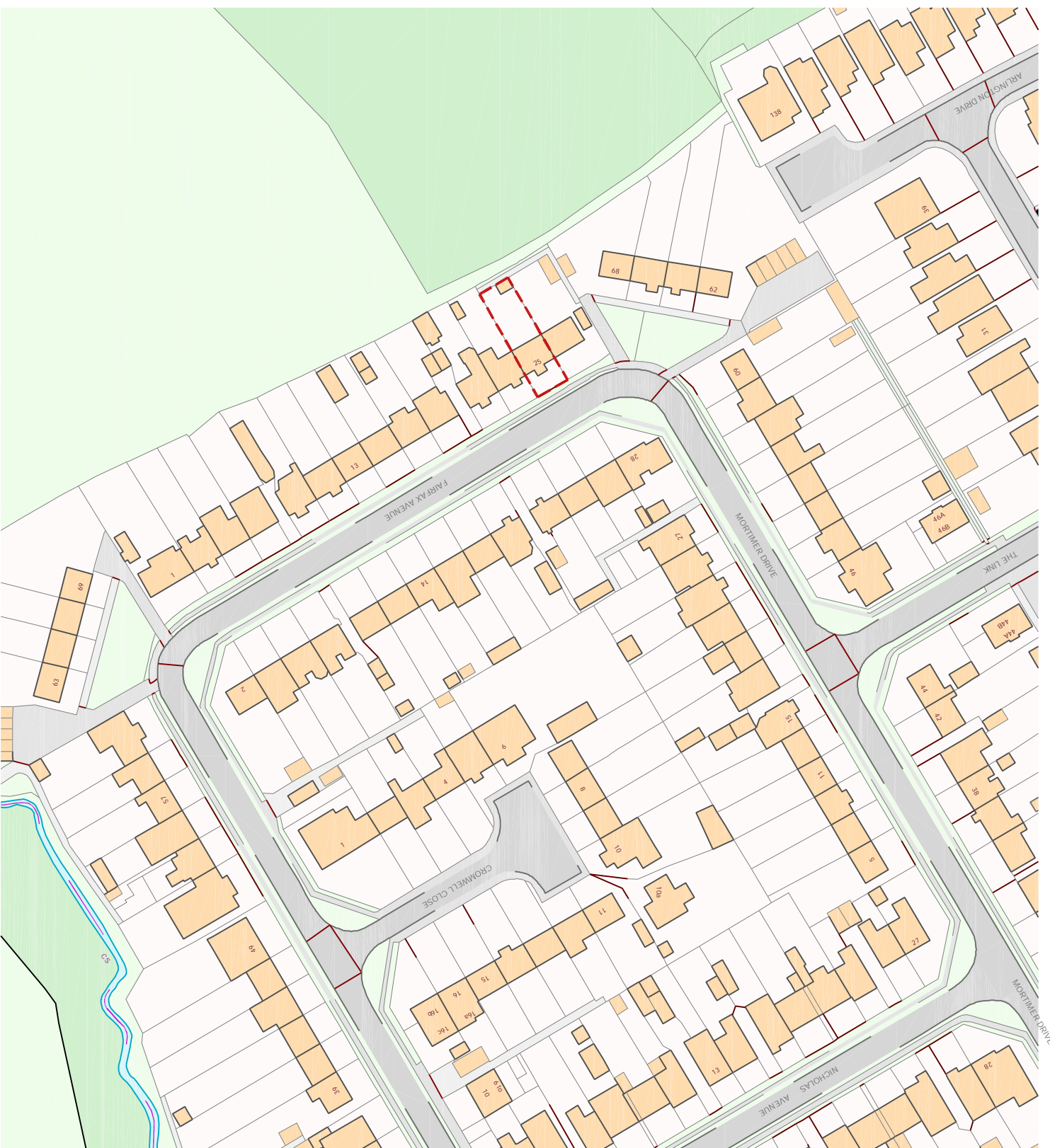
## 6. Conclusions

- 6.1. This FRA has been undertaken with reference to the requirements of NPPF and Planning Practice Guidance with respect to the development at 25 Fairfax Avenue, Oxford, OX3 0RP. It has been written to support a planning application and prepared with due consideration to the nature of the proposed development to provide the appropriate level of detail.
- 6.2. An assessment of the risk of flooding from all sources has been undertaken and is summarised in the table below:

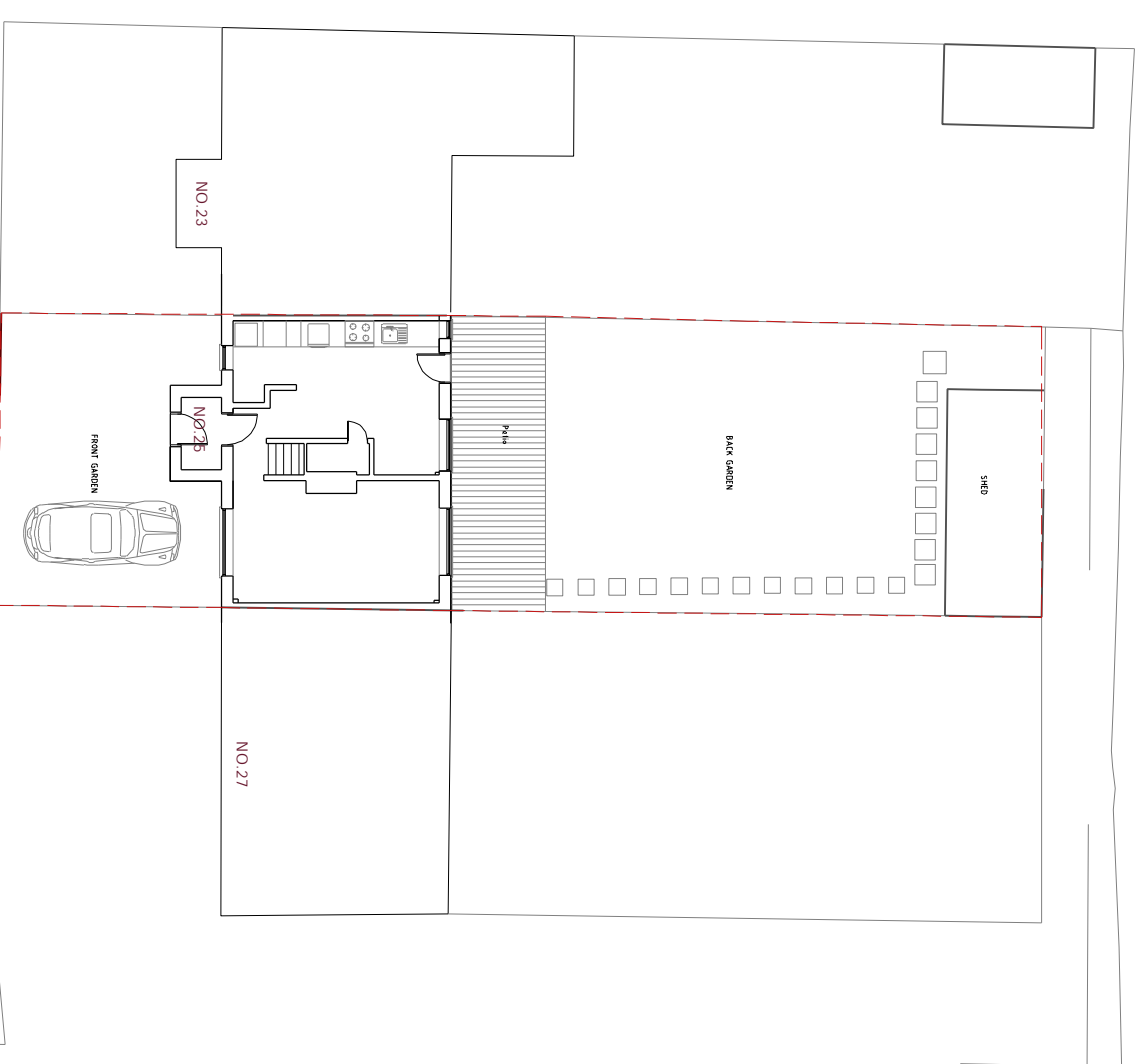
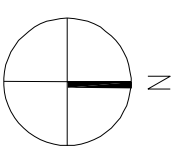
| Source of Flooding   | Flood Risk Summary   |
|--|--|
| Pluvial<br>Fluvial<br>Tidal<br>Reservoirs<br>Groundwater<br>Sewers<br>Canals | The site is considered to be at low risk from other sources. |

- 6.3. The FRA supports the planning application and demonstrates that there is an acceptable level of flood risk to the site if the mitigation strategies recommended are implemented in the scheme. The development does not increase flood risk off site or to the wider area.
- 6.4. This Flood Risk Assessment should be submitted as part of the planning application to satisfy the requirements under NPPF.

# Appendix A - Development Proposals



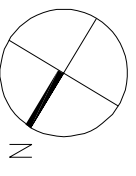
SITE LOCATION 1:1250



FAIRFAX AVENUE



EXISTING BLOCK PLAN 1:200



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 Robert Tomlinson Digbyhong Kevin Dip Acqui Dip ULD

AD DRESS: 4 Broughton Close, Old Marston, Oxford, OX3 9RD  
 TEL NOS: 01865 761707 or 017979754918  
 EMAIL: info@digbyarchitectural.co.uk

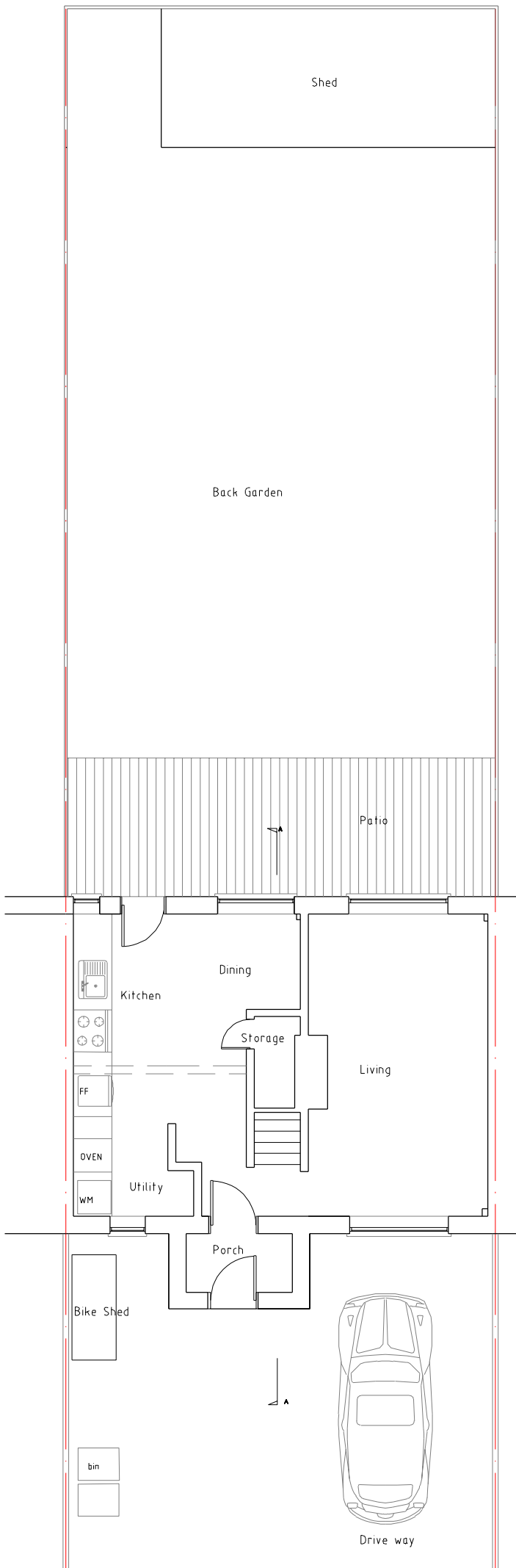
CLIENT: DR. JINDUI HONG & DR. CHUNPING CHEN

PROJECT: REAR EXTENSION TO NUMBER 25 FAIRFAX AVE. MARSTON

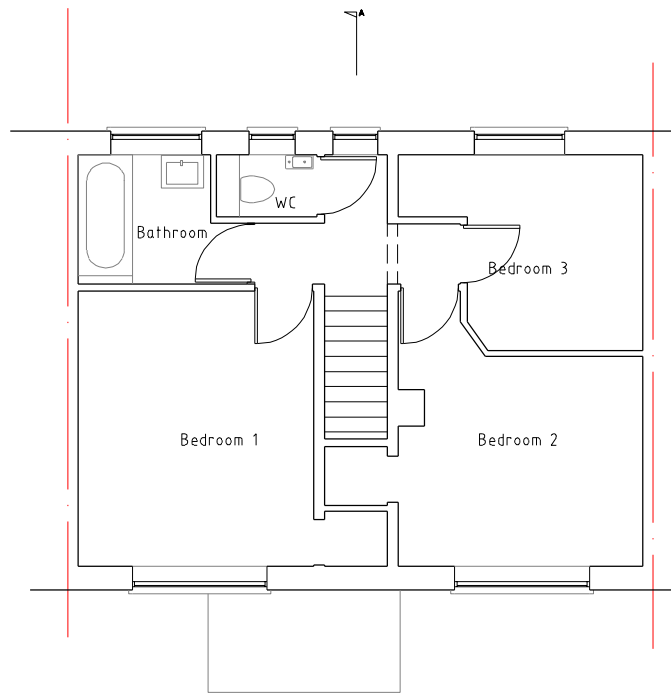
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| DRAWING NO. | 25FFAMSU01 | REVISION |          |

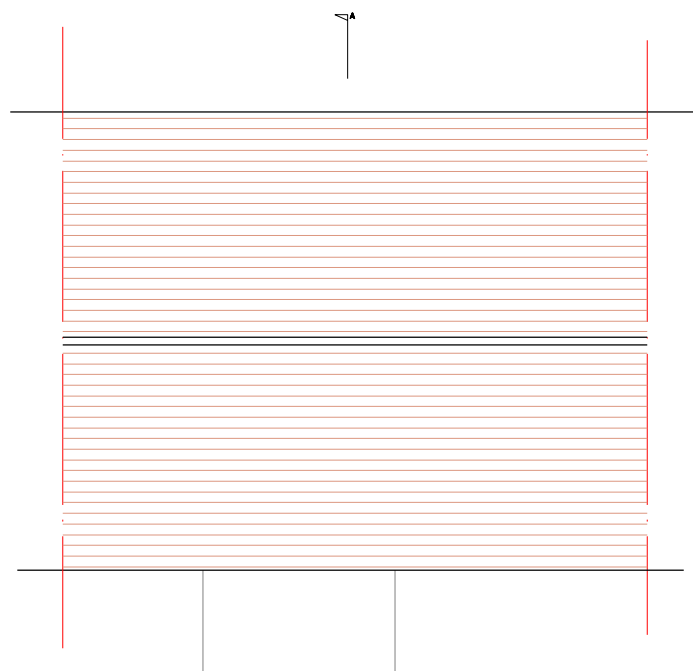




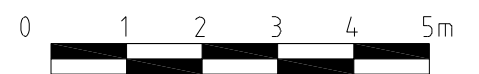
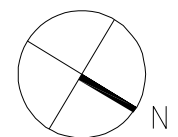
GROUND FLOOR PLAN 1:100



FIRST FLOOR PLAN 1:100



ROOF PLAN 1:100



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Robert Tomlinson BA(Hons) Arch/Dip Arch/Dip U.D

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EMAIL: info@digbyarchitectural.co.uk

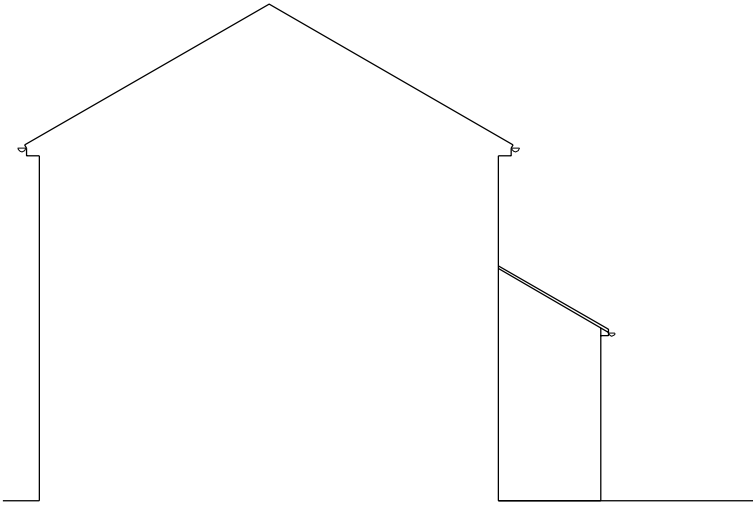
CLIENT: DR.JINDUI HONG & DR. CHUNPING CHEN

PROJECT: REAR EXTENSION TO NUMBER  
25 FAIRFAX AVE.MARSTON

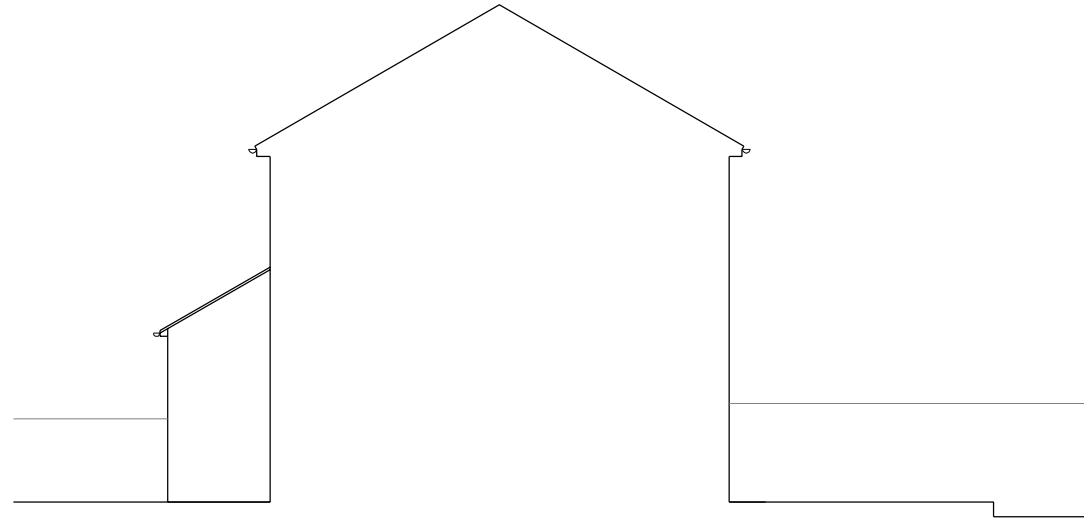
DRAWING: EXISTING FLOOR AND ROOF PLANS

DATE: OCT.2023 SCALE: 1:100 AT A3

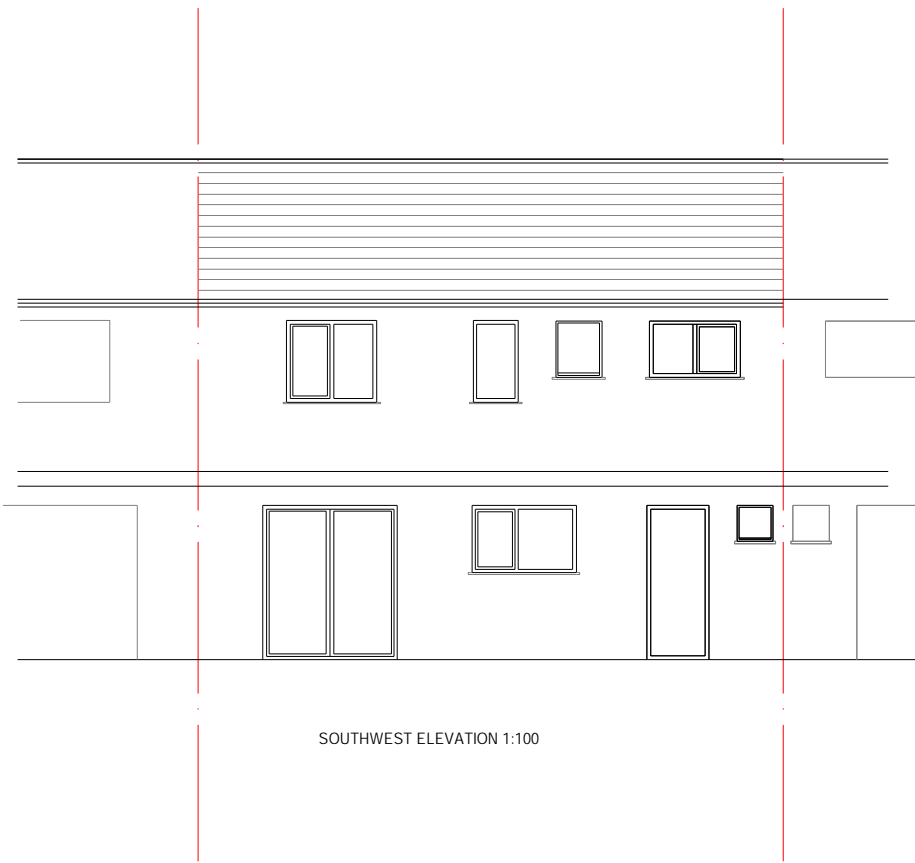
DRAWING NO: 25FFAMSU02 REVISION:



SOUTHEAST ELEVATION 1:100



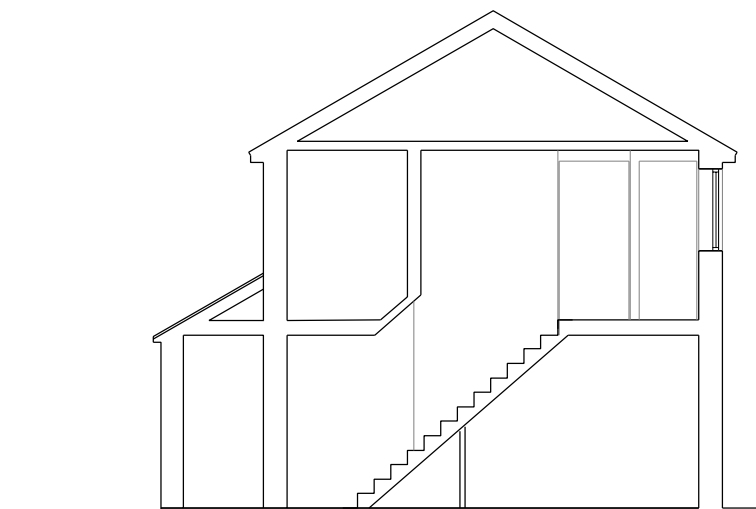
NORTHWEST ELEVATION 1:100



SOUTHWEST ELEVATION 1:100

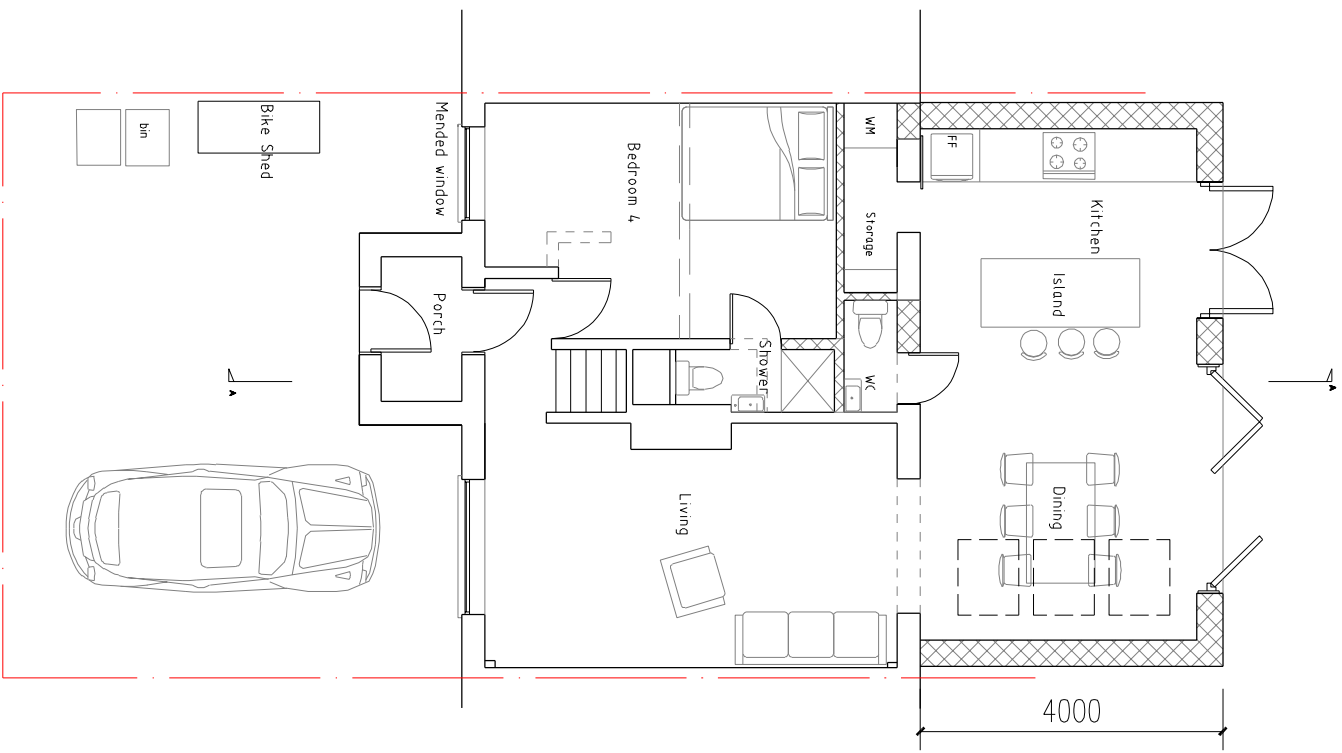


NORTHEAST ELEVATION 1:100

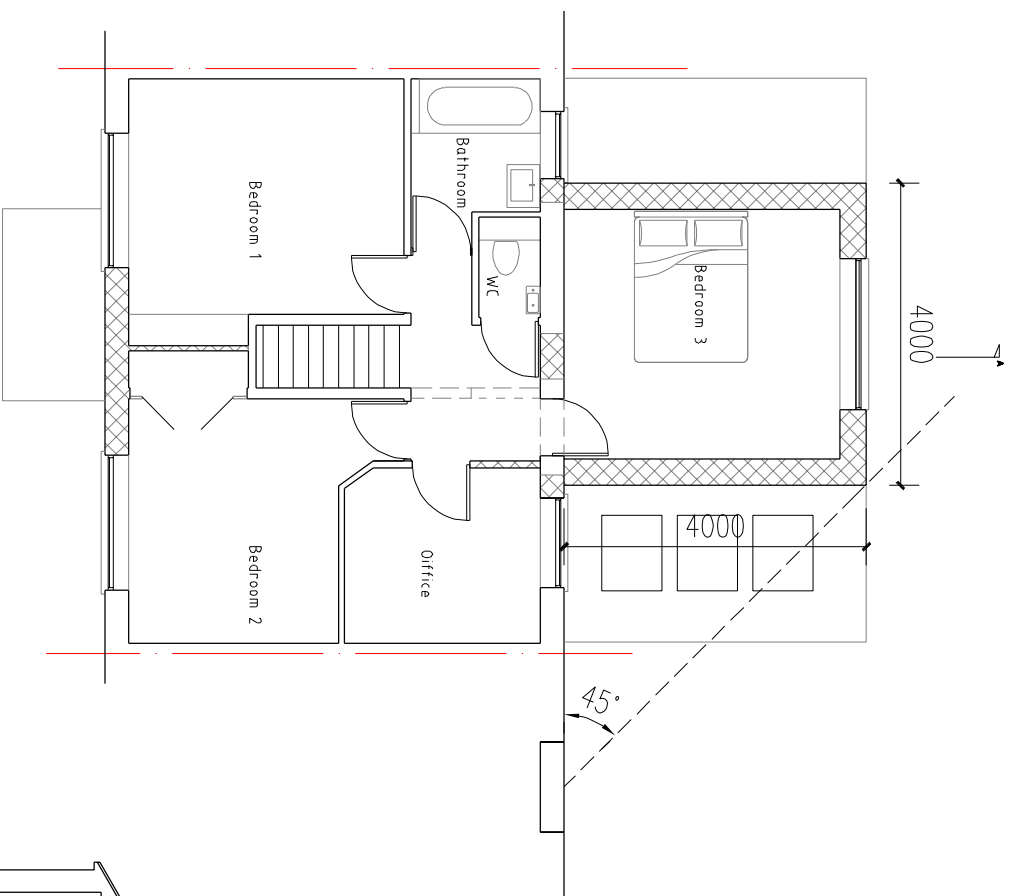


SECTION A-A 1:100

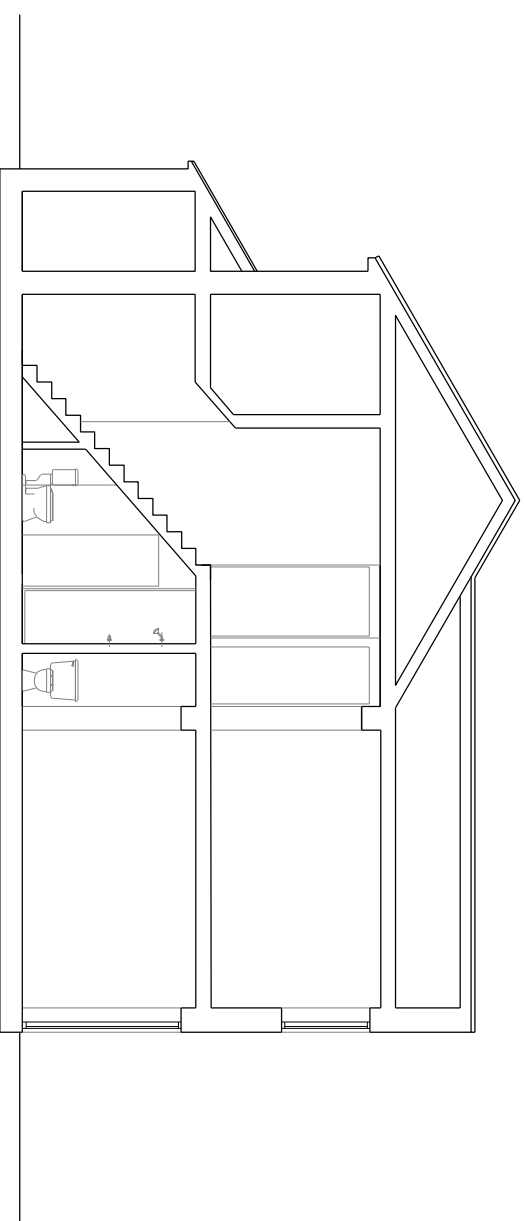
|   |                                   |
|---|-----------------------------------|
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| <small>CLIENT: DR. JINDUI HONG &amp; DR. CHUNPING CHEN</small>  |                                   |
| <small>PROJECT: REAR EXTENSION TO NUMBER<br/>25 FAIRFAX AVE. MARSTON</small>  |                                   |
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| <small>DATE: OCT. 2023</small>  | <small>SCALE: 1:100 AT A3</small> |
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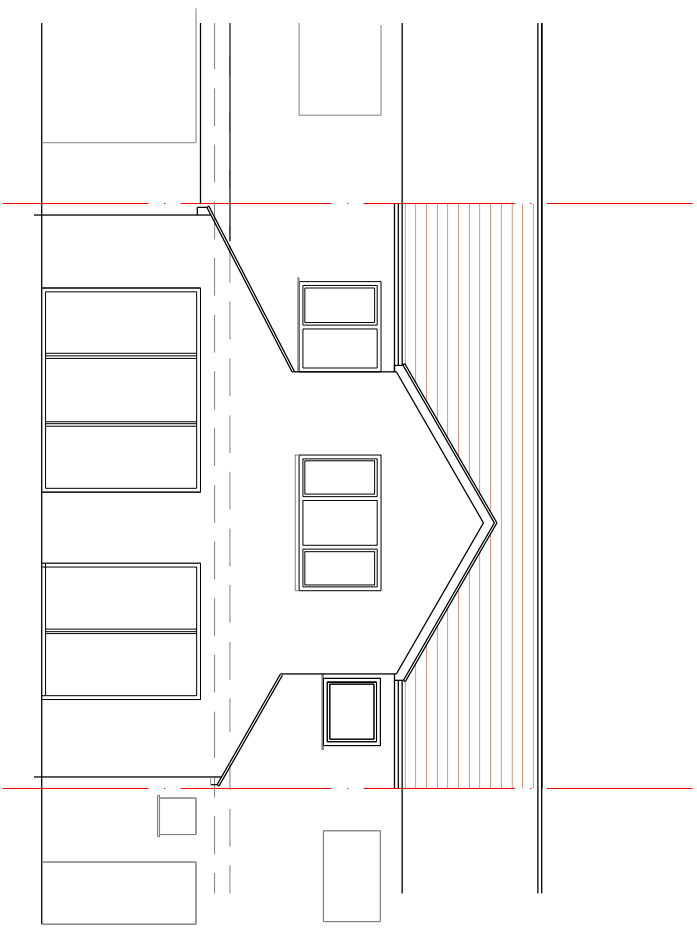
PROPOSED GROUND FLOOR PLAN 1:100



PROPOSED FIRST FLOOR PLAN 1:100

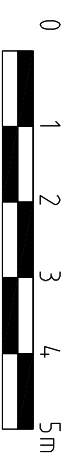
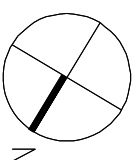


SECTION A-A 1:100



PROPOSED REAR ELEVATION 1:100

|  |   |
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| TEL NOS: 01865 761707 or 017929156918  |   |
| EMAIL: info@digbyarchitectural.co.uk   |   |
| CLIENT:  | DR JINDUI HONG & DR. CHUNPING CHEN                  |
| PROJECT:   | REAR EXTENSION TO NUMBER<br>25 FAIRFAX AVE, MARSTON |
| DRAWING:   | PROPOSED PLAN AND ELEVATION                         |
| DATE:  | NOV. 2023   |
| DRAWING NO:  | 25FFAMSU08  |
| SCALE:   | 1:100 AT A3   |
| REVISION:  |   |



# Appendix B - EA Consultation

Dear Lisa,

Reference: THM **334632**

Thank you for your email.

Please find sharefile link below that will enable you to download the Products 5, 6, and 7

|   |         |   |   |
|---|---------|---|---|
| Thames (Eynsham to Sandford) 2018 + 2022 (CC data only) | 5, 6, 7 | <a href="https://ea.sharefile.com/d-sdcf490ebbb494ac08db753187ec2d413">https://ea.sharefile.com/d-sdcf490ebbb494ac08db753187ec2d413</a> | PLEASE NOTE - the 2018 model has been supplemented with data from a 2022 re-run of the 2018 model: the new data is for climate change scenarios only; the model baseline has not changed. |
|---|---------|---|---|

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|----------------------|---|
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|             |   |
|-------------|---|
| Name        | Product 6   |
| Description | Model Output Data for Thames (Eynsham to Sandford) 2018 + 2022 (CC data only) |
| Name        | Product 7   |

|                      |   |
|----------------------|---|
| Description          | Calibrated and Verified Model Input Data for Thames (Eynsham to Sandford) 2018 + 2022 (CC data only)  |
| Licence              | <a href="#">Environment Agency Conditional Licence</a>  |
| Conditions           | <ol style="list-style-type: none"> <li>1. You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you.</li> <li>2. Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice.</li> <li>3. We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentiality of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights.</li> </ol> <p>4.1 The Information may contain some data that we believe is within the definition of "personal data" under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual.</p> <p>4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data.</p> <p>5. The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km<sup>2</sup>. Information about the operation of flood assets should not be published..</p> <ol style="list-style-type: none"> <li>6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as "the Data".</li> <li>6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its internal purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.</li> </ol> |
| Information Warnings | Please be aware that model data is not raw, factual or measured but comprises of estimates or modelled results based on the data available to us.   |
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Please be aware that from 20th July 2021 the climate change allowances required in flood risk assessments have been updated. Please see <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#contents> for more information.

Did you know that many of our datasets are available online? Simply visit [environment.data.gov.uk](https://environment.data.gov.uk)

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

Please get in touch if you have any further queries or contact us within two months if you would like us to review the information we have sent.

Kind regards,

Customers & Engagement Team - Thames

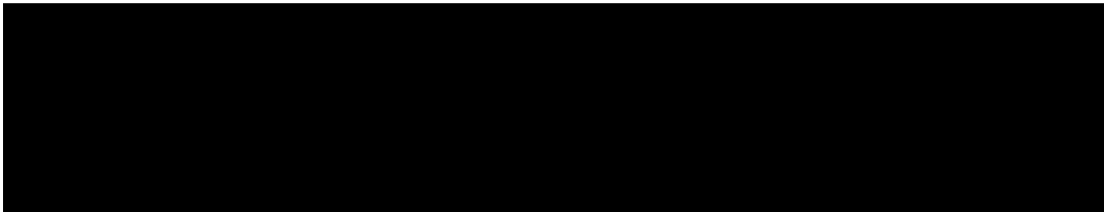
( External: 0203 0259 804

8 [enquiries\\_THM@environment-agency.gov.uk](mailto:enquiries_THM@environment-agency.gov.uk)

+ Environment Agency | Red Kite House, Howbery Park, Wallingford, OX10 8BD

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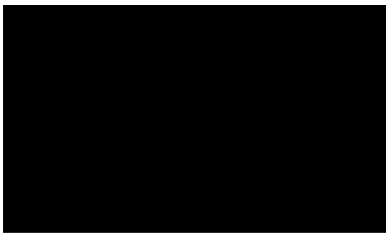


Dear Team,

Pleased can I request product 4 6 & 8 for the above and attached site.

Many thanks,

Lisa Slater



## Flood Risk, Water and Environmental Consulting

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