

FLOOD RISK ASSESSMENT

Site Address

70 Kenworthy Lane
Northenden
Manchester
M22 4EF

Client

Joe Prince

Date

22/02/2023



**CONSULTING GEO-ENVIRONMENTAL
ENGINEERS AND SCIENTISTS**

Phase 1 Contaminated Land Desk Studies, Geo-Environmental Site Investigations, Environmental Due Diligence, Flood Risk Assessments, Surface Water Management Strategies (SuDS), Ecology, Noise and Air Quality Assessments, Environmental Management Systems, GIS & Data Management Systems

1 Document Control



FLOOD RISK ASSESSMENT



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2 Abbreviations

Abbreviation	Description
STM	STM Environmental Consultants Limited
BGS	British Geological Survey
EA	Environment Agency
OS	Ordnance Survey of Great Britain
FRA	Flood Risk Assessment
NPPF	National Planning Policy Framework
FWD	Floodline Warning Direct
FRMS	Flood Risk Management Strategy
MCC	Manchester City Council
SWMP	Surface Water Management Plan
SFRA	Strategic Flood Risk Assessment
CDA	Critical Drainage Area
AEP	Annual Exceedance Probability
CC	Climate Change
SuDS	Sustainable Urban Drainage Systems
GWSPZ	Groundwater Source Protection Zone
LLFA	Lead Local Flood Authority
mbgl	metres below ground level
DCLG	Department for Communities and Local Government
PPGPS	Planning practice guidance and Planning system

3 Disclaimer

This report and any information or advice which it contains, is provided by STM Environmental Consultants Ltd (STM) and can only be used and relied upon by Joe Prince (Client).

STM has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. However, STM gives no warranty, representation or assurance as to the accuracy or completeness of any information, assessments or evaluations presented within this report. Furthermore, STM accepts no liability whatsoever for any loss or damage arising from the interpretation or use of the information contained within this report. Any party other than the Client using or placing reliance upon any information contained in this report, do so at their own risk.

4 Executive Summary

SECTION	SUMMARY
Location	70 Kenworthy Lane, Northenden, Manchester, M22 4EF Grid Reference: 382756, 390496
Area	366m ²
Proposed Development	The erection of a single storey rear extension and rear patio.
Flood Zone	The site is located in Flood Zone 2.
Topography	The ground level at the site ranges from 27.30mAOD (NE) to 28.08mAOD (SW). The proposed development lies at approximately 27.75mAOD.
Sequential and Exception Tests	Development is minor so Sequential and Exception Tests should not be required. LLFA to decide.
Main Sources of Flooding	The main source of flooding is considered to be the River Mersey which is located approximately 256m east of the site.
Flood Defences	The EA Flood Defences Map indicates that the site benefits from high ground, walls and embankments on the west bank of the River Mersey and a water storage area to the east of the site.
Records of Historic Flooding	4 instances of historic fluvial flooding in the vicinity of the site; the only year to affect the site was in 1964.
Fluvial (River) and Tidal (Sea) Flood Risk	Low – During all modelled defended events and the majority of undefended scenarios, which includes the undefended 1% AEP + 41% CC, the site remains dry. In the undefended 0.1% AEP fluvial event, flood levels could reach a maximum of 28.00mAOD by witnessing a flood depth of 0.22m.
Pluvial (Surface Water) Flood Risk	Low – During the 1 in 100-year pluvial event, the site remains dry. In the 1 in 1000-year pluvial event, the proposal becomes a dry island where the site floods to maximum depths of 600mm surrounding the proposal.
Flood Risk from Artificial (Canals and Reservoirs) Sources	Medium – The site is in an area that is at risk of reservoir flooding. There are 2 pit lakes in the vicinity of the site.
Groundwater Flood Risk	Low – According to the BGS, there is no information regarding groundwater flooding susceptibility. The groundwater table depth is approximately less than 3mbgl.
Development Impacts on Local Flood Risk	The development will increase the sites impermeable area by 33m ² meaning it could impact upon local flood risk, flood storage and flood flow pathways. However, as the site remains dry in the 1% AEP + 41% CC fluvial scenario and the 1 in 100-year pluvial scenario, this impact is thought to be negligible.
Proposed Flood Risk Mitigation Measures	- Finished floor levels will be set to match existing at approximately 27.92mAOD; - Construction will utilise flood resistant materials and services will be placed as high as practicable to reduce impact of flooding; - Occupants will sign up for EA Emergency Flood Warning Direct

SECTION	SUMMARY
	Service; • Safe egress to Flood Zone 1 is a 1-minute walk to Yewtree Lane; • Safe refuge is available on upper floors;
Surface Water Management (SuDS)	SuDS would reduce current surface water run off rates; given the size of the site (366m²), there is good potential for implementation. Consideration should be given to green roofs, rainwater harvesting and infiltration techniques where possible.
Conclusions	Based on the information reviewed and taking into account the proposed mitigation measures, it is considered that overall flood risk to the proposed development is acceptable and that will not increase local flood risk. As such, the development is considered to be in compliance with local planning policy and the NPPF.

5 Introduction

STM Environmental Consultants Limited (STM) were appointed by Joe Prince (Client) to provide a Flood Risk Assessment (FRA) at a site located at 70 Kenworthy Lane, Northenden, Manchester, M22 4EF.

6 Development Proposal

The FRA is required to support a planning application for the erection of a single storey rear extension and rear patio.

Further details including drawings of the development plans are available in [Appendix 2](#).

7 Report Aims and Objectives

The purpose of this report is to establish the flood risk to the site from all potential sources and, where possible, to propose suitable mitigation methods to reduce any risks to an acceptable level. It aims to make an assessment of whether the development will be safe for its lifetime, taking into account climate change and the vulnerability of its users, without increasing flood risk elsewhere.

The FRA assesses flood risk to the site from tidal, fluvial, surface water, groundwater, sewers and artificial sources. The FRA has been produced in accordance with the National Planning Policy Framework (NPPF) and its supporting guidance.

8 Summary of Data Review Undertaken

The following research has been undertaken as part of the FRA:

-  Desktop assessment of topographical, hydrological and hydrogeological settings through review of the information sourced from the British Geological Survey (BGS), the Environment Agency (EA) and the Ordnance Survey (OS);
-  Review of publicly available flood risk mapping provided by the EA;
-  Review of the Preliminary Flood Risk Assessment (PFRA) and Level 1 Strategic Flood Risk Assessment (SFRA) produced by the LLFA outlining flood risk from various sources within the borough.

9 Legislative and Policy Context

9.1 Legislative Context

The Flood and Water Management Act was introduced in 2010. The Act defines the role of lead local flood authority (LLFA) for an area. All LLFA are required to develop, maintain, apply and monitor a strategy for local flood risk management in its area, called “local flood risk management strategy”.

Alongside the Act, Flood Risk Regulations (2009) outline the roles and responsibilities of the various authorities, which include preparing Flood Risk Management Plans and identifying how significant flood risks are to be mitigated.

9.2 Policy Context

9.2.1 National Planning Policy Framework (NPPF)

The NPPF (updated July 2021) sets out the government’s planning policies for England and how these are expected to be applied. It also provides a set of guidelines and philosophy with which local planning authorities (LPAs) can build their own unique policies to appropriately regulate development within their jurisdictions.

Section 14 entitled “Meeting the challenge of climate change, flooding and coastal change” deals specifically with flood risk.

Paragraph 159 states that “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”.

In addition, Paragraph 161 outlines that “All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:

-  applying the sequential test and then, if necessary, the exception test as set out below;
-  safeguarding land from development that is required, or likely to be required, for current or future flood management;
-  using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management);
-  where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations”.

The NPPF then states in Paragraph 163 that “if it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification”.

It further states that when determining any planning application, LPAs should “ensure that flood risk is not increased elsewhere. Where appropriate, applications

should be supported by a site-specific flood-risk assessment⁵⁵. 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:

- 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;
- development is appropriately flood resilient and resistant;
- it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
- any residual risk can be safely managed; and
- safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

Applications for 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.

Footnote 55 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.”

The NPPF also lays out requirements for how LPAs should deal with planning applications in coastal areas. They should ensure that should they “reduce risk from coastal change by avoiding inappropriate development in vulnerable areas or adding to the impacts of physical changes to the coast.”

Developments in Coastal Change Management Areas should only be considered appropriate where it is demonstrated that:

-  it will be safe over its planned lifetime and will not have an unacceptable impact on coastal change;
-  the character of the coast including designations is not compromised;
-  the development provides wider sustainability benefits;
-  the development does not hinder the creation and maintenance of a continuous signed and managed route around the coast.

9.2.2 Local Planning Policy – Manchester City Council

Policy EN 14

Flood Risk

-  In line with the risk-based sequential approach contained within PPS25, development should be directed away from sites at the greatest risk of flooding, and towards sites with little or no risk of flooding; this should take account of all sources of flooding identified in the Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA).
-  In addition to the requirements for site-specific Flood Risk Assessments (FRAs) set out in PPS25, an appropriate FRA will also be required for all development proposals, including changes of use, on sites greater than 0.5ha within Critical Drainage Areas (CDAs) and Canal Hazard Zones identified in the SFRA.
-  All new development should minimise surface water run-off, including through Sustainable Drainage Systems (SUDS) and the appropriate use of Green Infrastructure. Developers should have regard to the surface water run-off rates in the SFRA User Guide. In CDAs, evidence to justify the surface water run-off approach / rates will be required.
-  The City of Manchester contains many sections of rivers which are culverted or 'hidden'; where these are indicated in the SFRA beneath the proposed development site, further investigation will be required and the development

proposal should take this into account; where feasible and appropriate development should seek to open up culverted/hidden rivers to reduce the associated flood risk and danger of collapse, taking advantage of opportunities to enhance biodiversity and Green Infrastructure.

9.3 EA Standing Advice on Flood Risk

The Environment Agency's [standing advice](#) lays out the process that must be followed when carrying out flood risk assessments for developments.

Flood Risk Assessments are required for developments within one of the Flood Zones. This includes developments:

-  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.

10 Site Description and Environmental Characteristics

10.1 Site Location and Area

The site is located at 70 Kenworthy Lane, Northenden, Manchester, M22 4EF and is centred at national grid reference 382756, 390496. The site has an area of 366m².

A site location map and aerial photo are shown below. Photographs of the site are available in [Appendix 1](#).

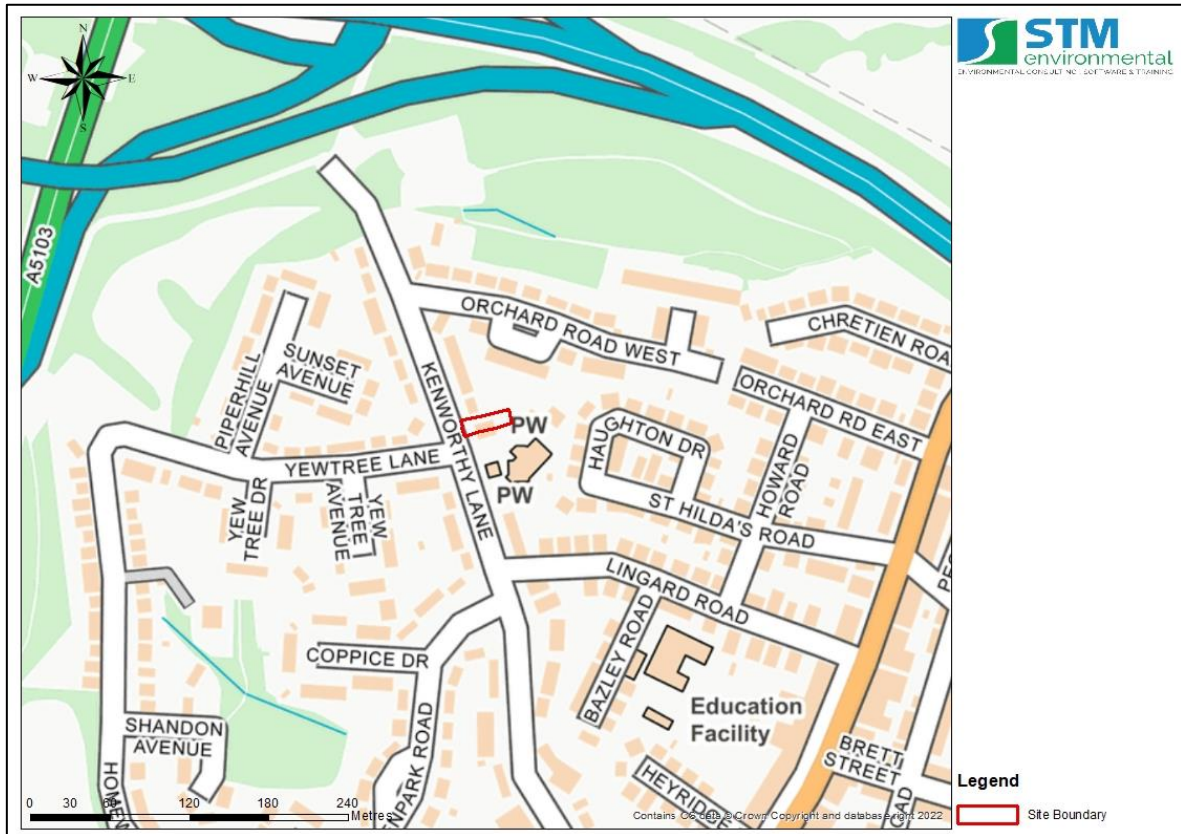


Figure 1: Site Location Map



Figure 2: Site Aerial Map

10.2 Site Access

The site is accessible via Kenworthy Lane.

10.3 Local Planning Authority

The site falls within the jurisdiction of Manchester City Council in terms of the planning process.

10.4 Lead Local Flood Authority

Manchester City Council is also the Lead Local Flood Authority (LLFA).

10.5 Flood Zone

For planning purposes, the site is located in Flood Zone 2 as defined by the EA and LLFA.

10.6 Site and Surrounding Land Uses

10.6.1 Site Current Land Use

The site is currently used as a residential dwelling.

10.6.2 Surrounding Land Uses

A description of the current and surrounding land uses of the site is given in

Table 1.

Table 1: Summary of surrounding land uses

Boundary	Land Use Description	
	Immediately Adjacent (Within 0 – 25m)	General Local Area (Within 25 – 250m)
Northern	Residential	Residential, Greenspace, Woodland
Eastern	Residential	Residential, Commercial
Southern	Residential	Residential, Commercial, Greenspace
Western	Residential	Residential, Greenspace

10.7 Hydrology

The nearest main watercourse is the River Mersey which is located approximately 256m east of the site.

10.8 Geology

Data from the British Geological Survey indicates that the underlying superficial geology is characterised as Glaciofluvial Sheet Deposits. The underlying bedrock geology is characterized as Tarporley Siltstone.

10.9 Hydrogeology

The site lies upon a Secondary A superficial aquifer and a Secondary B bedrock aquifer.

[Appendix 3](#) provides BGS mapping showing the hydrogeology at the site location.

10.10 Topography

A LIDAR DTM map showing the topography of the site and surrounding area is available in [Appendix 3](#). As a topographic survey was not available, site levels were estimated using this.

The ground level at the site ranges from 27.30mAOD (NE) to 28.08mAOD (SW). The proposed development lies at approximately 27.75mAOD

11 The Sequential and Exception Tests

11.1 The Sequential Test

The Sequential Test aims to steer developments and redevelopments to areas of lower flood risk. The test compares the proposed development site with other available sites, in terms of flood risk, to aid the steering process. The Sequential Test is not required if the proposed development is a minor development or if it involves a change of use unless the development is a caravan, camping chalet, mobile home or park home site.

Based on Government Guidance, Minor Development means:

-  minor non-residential extensions: industrial/commercial/leisure etc extensions with a footprint less than 250 square metre.
-  alterations: development that does not increase the size of buildings eg 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.

With regard to residential and commercial developments, major development, as defined by the Town and Country Planning (Development Management Procedure) means one or more of the following:

-  c(i) - the number of dwelling houses to be provided is 10 or more; or
-  c(ii) - the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within subparagraph (c)(i);
-  the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more;
-  or development carried out on a site having an area of 1 hectare or more.

The development is minor and as such the Sequential Test should not be required by the LLFA.

11.2 The Exception Test

Where the Sequential Test is undertaken and alternative sites of lower flood risk are not available, then the proposed development may require an Exception Test in order to be granted planning permission. Where the exception test is required, it

should be applied as soon as possible to all local development document allocations for developments and all planning applications other than for minor developments. All three elements of the exception test have to be passed before development is allocated or permitted. For the exception test to be passed:

-  It must demonstrate that the development provides wider sustainability benefits to the community that outweigh the flood risk, informed by an SFRA, where one has been prepared;
-  The development should be on developed land or on previously developed land;
-  A flood risk assessment must demonstrate that the development will be safe without increasing flood risk elsewhere, and where possible will reduce the overall flood risk.

The requirements for an Exception Test are given in Table 2 and are defined in terms of Flood Zone and development vulnerability classification.

Table 2: NPPF Flood Zone vulnerability compatibility (source: NPPF).

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	X	Exception Test required	✓	✓
Zone 3b	Exception Test required	X	X	X	✓

Key:

- ✓ Development is appropriate
- X Development should not be permitted.

The Exception Test should not be required by the LLFA.

12 Site Specific Flood Risk Analysis

The PFRA and Level 1 SFRA produced by the LLFA and maps from the EA provide information regarding historic flooding events and incidents as well as predictions of flood extents and depths during extreme rainfall events.

12.1 Fluvial (River) and Tidal (Sea) Flood Risk

12.1.1 Mechanisms for Fluvial Flooding

Fluvial, or river flooding, occurs when excessive rainfall over an extended period of time or heavy snow melt causes a river to exceed its capacity. The damage from a fluvial flood can be widespread as the overflow may affect downstream tributaries, overtopping defences and flooding nearby inhabited areas. Fluvial flooding consists of two main types:

-  Overbank flooding – this occurs when water rises steadily and overflows over the edges of a river or stream;
-  Flash flooding – this is characterized by an intense, high velocity torrent of water that occurs in an existing river channel with little to no notice. Flash floods are very dangerous and destructive not only because of the force of the water, but also the hurtling debris that is often swept up in the flow.

12.1.2 Definition of EA Modelled Fluvial Flood Risk Zones

Fluvial flood risk is assessed using flooding maps produced by the Environment Agency. These maps use available historic data and hydraulic modelling to define zones of flood risk. The maps allow a site to be defined in terms of its flood zone (e.g. 1, 2, 3) and in terms of the overall flood risk (very low, low, medium or high). It is important to note that existing flood defences are not taken into account within the models or the maps. The EA fluvial flood zones are defined as follows:

-  Flood zone 1: Less than 1 in 1000 (0.1%) annual probability of flooding;
-  Flood zone 2: Between 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of flooding;
-  Flood zone 3: Greater than 1 in 100 (1%) annual probability of fluvial flooding.

Flood zone 3 is split into two sub-categories (3a and 3b) by LLFAs depending on whether the land is considered to be a functional flood plain (i.e. an important storage area for flood waters in extreme events).

-  Flood zone 3a: Greater than 1 in 100 (1%) annual probability of fluvial flooding and/or greater than 1 in 200 (0.5%) annual probability of tidal flooding;
-  Flood zone 3b: Functional flood plain (definition specific to the LLFA). Less than a 1 in 20 (5%) annual probability of fluvial and/or tidal flooding.

12.1.3 Main Potential Sources of Local Fluvial Flooding

The nearest potential source of fluvial flooding to the site is considered to be the River Mersey.

12.1.4 Records of Historic Fluvial Flooding Incidents

The EA's historic flood maps show indicate that there has been historic flooding at or in the vicinity of the site in the years 1964, 1973 and 1998. The only year to affect the site was in 1964. Copies of these maps are available in [Appendix 4](#).

12.1.5 Designated Fluvial Flood Risk Zone for the Site

The site is considered to be located within Flood Zone 2 as defined by the Environment Agency and the LLFA indicating that it has less than a 1% annual probability of fluvial flooding.

12.1.6 Mechanisms for Tidal Flooding

Tidal flooding may be described simply as the inundation of low-lying coastal areas by the sea, or the overtopping or breaching of sea defences. Tidal flooding may be

caused by seasonal high tides, storm surges and where increase in water level above the astronomical tide level is created by strong on shore winds or by storm driven wave action.

12.1.7 Definition of EA Tidal Flood Risk Zones

As with fluvial flood risk, tidal flood risk is assessed using flooding maps produced by the Environment Agency. The difference is in the probability return periods used to define tidal flood zones. The EA tidal Flood Zones are defined as:

-  Flood zone 1: Less than 1 in 1000 (0.1%) annual probability of flooding;
-  Flood zone 2: Between 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability of tidal flooding;
-  Flood zone 3: Greater 1 in 200 (0.5%) annual probability of tidal flooding.

12.1.8 Potential Sources of Tidal Flooding

The area in which the site is located is considered unlikely to be affected by tidal flooding.

12.1.9 Flood Defences

The EA's flood defence map which is available in [Appendix 7](#) shows that the site benefits from high ground, walls and embankments on the west bank of the River Mersey and a water storage area to the east of the site.

12.1.10 Peak River Flow Climate Change Allowances

The EA's [climate change allowances for peak river flow](#) maps show that the site is considered to be in the Upper Mersey Management Catchment. The climate change allowances for this catchment are available in [Appendix 11](#).

In flood zones 2 or 3a for:

-  essential infrastructure – use the higher central allowance
-  highly vulnerable – use central allowance (development should not be permitted in flood zone 3a)
-  more vulnerable – use the central allowance
-  less vulnerable – use the central allowance
-  water compatible – use the central allowance

In flood zone 3b for:

-  essential infrastructure – use the higher central allowance
-  highly vulnerable – development should not be permitted
-  more vulnerable – development should not be permitted
-  less vulnerable – development should not be permitted
-  water compatible – use the central allowance

The central allowance for more vulnerable developments indicates a climate change allowance of 41% should be used.

12.1.11 Climate Change - EA Modelled Predictions of Fluvial and Tidal Flood Levels and Extents

The EA Product 4 dataset which is presented in [Appendix 11](#) provides modelled flood levels and flows for model node points close to the site. These are summarised in **Error! Reference source not found.** below.

Table 3: EA modelled expected flood depths (m) and levels (mAOD) for different scenarios.

Label	Easting	Northing	Defended	Undefended								
			0.1% AEP	5% AEP	1% AEP	1% AEP + 35% CC	1% AEP + 41% CC *		1% AEP + 70% CC		0.1% AEP	
			Depth	Depth	Depth	Depth	Depth	Level	Depth	Level	Depth	Level
1	382730	390496	0	0	0	0	0	27.36	0	27.78	0.04	27.82
2	382736	390496	0	0	0	0	0	27.31	0.01	27.73	0.03	27.77
3	382742	390496	0	0	0	0	0	27.26	0.02	27.68	0.04	27.71
Node A	-	-	-	-	-	-	-	-	-	-	0.22	28.00

*The 1% AEP + 41% CC was extrapolated from in channel node data.

The EA supplied modelled data with node points which were centred around 68 Kenworthy Lane rather than the site, and as such do not completely full cover the site. Nevertheless, the mapping provides the detail required to extract depths closer to the proposed development area. As such we've added an additional node, Node A, and used the upper end of the classification symbology to extract values.

During all modelled defended events, the site remains dry.

During the undefended 1% AEP + 41% CC, the flood level reaches a maximum of 27.63mAOD, which will not impact the site.

In the undefended 0.1% AEP, the flood level will reach a maximum of 27.71mAOD on site. This level could reach a maximum of 28.00mAOD (Node A) by a flood depth of approximately 0.22m.

12.1.12 Long Term Fluvial/Tidal Flood Risk Considering Flood Defences

The EA's [long term flood risk maps](#) give an indication of the actual risk associated with flooding after taking into account the effect of any flood defences in the area. Copies of maps for the site which are available in [Appendix 9](#) indicate that the long-term risk from fluvial flooding to the site is medium.

12.2 Pluvial (Surface Water) Flood Risk

A pluvial, or surface water flood, is caused when heavy rainfall creates a flood event independent of an overflowing water body. Surface water flooding occurs when high intensity rainfall leads to run-off which flows over the ground surface, causing ponding in low-lying areas when the precipitation rate or overland flow rate is greater than the rate of infiltration, or return into watercourses. Surface water flooding can be exacerbated when the underlying soil and geology is saturated (as a result of prolonged precipitation or a high-water table) or when the drainage network has insufficient capacity.

12.2.1 Mechanisms of Pluvial Flooding

The chief mechanisms for surface water flooding can be divided into the following categories:

-  Runoff from higher topography;
-  Localised surface water runoff – as a result of localised ponding of surface water;
-  Sewer Flooding – areas where extensive and deep surface water flooding is likely to be influenced by sewer flooding. Where the sewer network has reached capacity, and surcharged, this will exacerbate the flood risk in these areas;
-  Low Lying Areas – areas such as underpasses, subways and lowered roads beneath railway lines are more susceptible to surface water flooding;
-  Railway Cuttings – railway infrastructure cut into the natural geological formations can cause extra surface run off and pooling disrupting service and potentially affecting adjacent structures;
-  Railway Embankments – discrete surface water flooding locations along the up-stream side of the raised network rail embankments where water flows are interrupted and ponding can occur;

 Failure of artificial sources (i.e. man-made structures) such as such as canals and reservoirs.

12.2.2 Main Potential Sources of Local Pluvial Flooding

The main potential source of pluvial flooding to the site is considered to be surface water ponding and flooding associated with heavy rainfall in the area.

12.2.3 Records of Historic Pluvial Flooding Incidents

Examination of the LLFA's Level 1 SFRA revealed no evidence of pluvial flooding on or in the vicinity of the site.

A map showing the location of surface water flooding incidents is available in [Appendix 4](#).

12.2.4 Surface Water Flood Risk from Artificial Sources (Reservoirs and Canals)

An examination of OS mapping and the EA's mapping revealed the artificial pit lakes Chorlton Water Park and Sale Water Park approximately 1.33km and 3.16km northeast of the site respectively.

The EA's reservoir flood risk map indicates that the site does lie within an area that is at risk of reservoir flooding.

12.2.5 Sewer Flooding

Examination of the LLFA's Level 1 SFRA revealed no evidence of sewer flooding on or in the vicinity of the site.

A map showing recorded incidents of sewer flooding is available in [Appendix 4](#).

12.2.6 Peak Rainfall Climate Change Allowances

The EA's [climate change allowances for peak rainfall](#) maps show that the site is considered to be in the Upper Mersey Management Catchment.

Development with a lifetime beyond 2100:

Design your development so that for the upper end allowance in the 1% annual exceedance probability event:

- there is no increase in flood risk elsewhere
- your development will be safe from surface water flooding

Development with a lifetime of between 2061 and 2100:

For development with a lifetime between 2061 and 2100 take the same approach but use the central allowance for the 2070s epoch (2061 to 2125).

Development with a lifetime up to 2060:

For development with a lifetime up to 2060, take the same approach but use the central allowance for the 2050s epoch (2022 to 2060).

As the site remains dry during the 1 in 100-year pluvial event, a peak rainfall climate change allowance isn't required.

12.2.7 Climate Change - Modelled Predictions of Surface Water Run-off Flooding

Mapping of the predicted extent and depth of surface water flooding for the 1 in 100-year, and 1 in 1000-year rainfall return periods provided by the EA are available in [Appendix 6](#).

During the 1 in 100-year pluvial event, the site remains dry.

In the 1 in 1000-year pluvial event, the proposal becomes a dry island where the site floods to maximum depths of 600mm surrounding the proposal.

12.2.8 Long Term Surface Water Flood Risk

The EA's [long term flood risk maps](#) which are available in [Appendix 9](#) indicate that the long term risk of flooding from surface water is considered to be low.

12.3 Risk of Flooding from Multiple Sources (ROFMS)

The Environment Agency provides a map which gives an indication of the overall flood risk to a site from fluvial, tidal and surface water sources after considering the presence of flood defences. This map indicates that there is between 0.1% and 3.3% chance of flooding at the site in any year. A copy of the map is presented in [Appendix 8](#).

12.4 Groundwater Flood Risk

Groundwater flooding occurs when water rises from an underlying aquifer (i.e. at the location of a spring) to such a level where it intersects the ground surface and inundates the surrounding land. Groundwater flooding tends to occur after long periods of intense precipitation, in often low-lying areas where the water table is likely to be at a shallow depth. Groundwater flooding is known to occur in areas underlain by principal aquifers, although increasingly it is also being associated with more localised floodplain sands and gravels. A high groundwater table also has the potential to exacerbate the risk of surface water and fluvial flooding by reducing rainfall infiltration capacity, and to increase the risk of sewer flooding through sewer/groundwater interactions.

12.4.1 Historic Records of Groundwater Flooding

Examination of the LLFA's Level 1 SFRA revealed no records of groundwater flooding at or within 500m of the site.

A map showing the locations of historic groundwater flooding incidents is available in [Appendix 4](#).

12.4.2 Susceptibility to Groundwater Flooding

The Groundwater Flood Susceptibility Map provided by BGS and presented in [Appendix 10](#) indicates that there is no information regarding groundwater flooding. The Groundwater Depth map also provided by BGS indicates that the groundwater level may be at approximately less than 3mbgl.

12.5 Critical Drainage Area

A Critical Drainage Area (CDA) may be defined as “a discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding in one or more Local Flood Risk Zones during severe weather thereby affecting people, property or local infrastructure”. A CDA is defined in the Town and Country Planning (General Development Procedure) (Amendment) (No. 2) (England) Order 2006 as “an area within Flood Zone 1 which has critical drainage problems and which has been notified to the local planning authority by the Environment Agency”.

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

13 Potential Impacts of the Development on Local Flood Risk

13.1 Changes to Impermeable Area and Building Footprint

Changes in ground cover arising from the development are presented in Table 4 and Table 5 below.

Table 4: Existing and proposed site ground cover.

	Impermeable Area (m ²)	Permeable Area (m ²)	Total Area (m ²)
Existing	101	265	366
Proposed	134	232	366

Table 5: Break down of site uses

Use	Existing (m ²)	Proposed (m ²)	Change (m ²)
Building	77	110	+33
Impermeable Paving	24	24	0
Permeable Paving	162	152	-10
Garden	103	80	-23
Total	366	366	-

As the development will increase the impermeable area by 33m², it is considered possible that it will impact upon flood flow and surface water runoff rates.

13.2 Impacts on Flood Storage and Flood Flow Routes

The development will change the site's built-up area by 33m², it is possible to have an impact on local flood storage and flood flow pathways.

It should be noted that as the site remains dry during the defended and undefended 1% AEP + 41% CC fluvial event and the 1 in 100-year pluvial event, this effect is thought to be negligible.

14 Flood Risk Mitigation Measures

14.1 SuDS

Planning practice guidance (PPG) which is prepared by the Ministry of Housing, Communities and Local Government (DCLG) states that developers and Local Authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

As such, the developer has the option to implement a SuDS strategy in line with the drainage hierarchy as outlined in Table 6 below to reduce surface water discharges from the site.

Table 6: SuDS Options

	Store rainwater for later use;
	Use infiltration techniques, such as porous surfaces in non-clay areas;
	Attenuate rainwater in ponds or open water features for gradual release;
	Attenuate rainwater by storing in tanks or sealed water features for gradual release;
	Discharge directly to a water course;
	Discharge rainwater directly to a surface water sewer/drain;
	Discharge to a combined sewer.

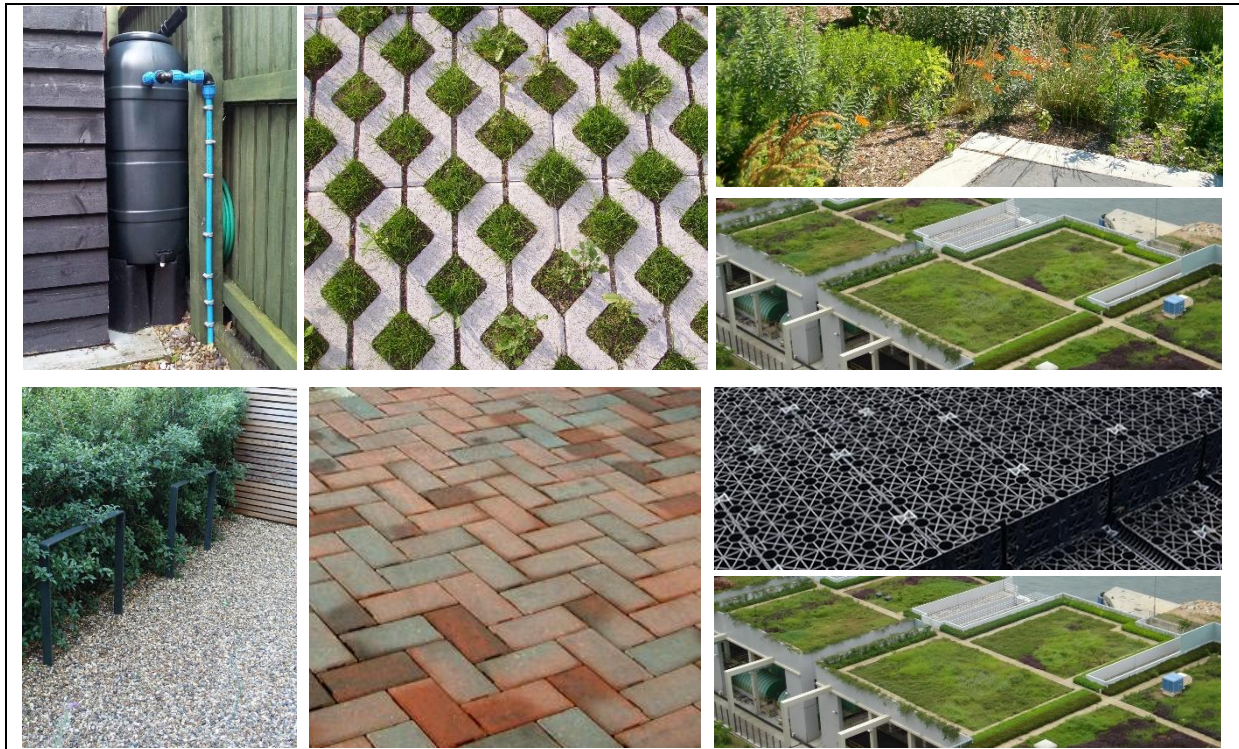


Figure 3: Surface water storage facilities and potential SuDS features - rainwater harvesting, on-site tank storage, rain garden soak-away and green roofs. (Source: UK SuDS Manual)

Given the nature of the development and the size of the site, it is considered that there are good opportunities for implementing SuDS. Measures such as green roofs, rainwater harvesting and infiltration (soakaways, permeable paving, rain gardens) should be considered. A full SuDS strategy is outside the scope of works of this FRA.

14.2 Flood Resilience

Flood resilient construction uses methods and materials that reduce the impact from a flood, ensuring that structural integrity is maintained, and the drying out and cleaning required, following inundation and before reoccupation, is minimised.

14.2.1 Finished Floor Levels

The approximate finished floor level of the existing development is 1

For **minor extensions**, the EA's Standing Advice states that finished floor levels are either no lower than existing floor levels or 300mm above the estimated flood level.

Where floor levels cannot be set to 300mm above existing flood levels, applicants should check with the LPA if they need to take flood resistance and resilience measures.

During the 1% AEP + 41% CC undefended and defended fluvial event and the 1 in 100-year pluvial event the proposed development remains dry. Thus, due to the nature of the proposed development being an extension, the FFL should be set no lower than existing ground floor levels (27.92mAOD).

14.2.2 Compensatory Flood Storage (CFS)

All new development within Flood Zone 3 must not result in a net loss of flood storage capacity. Where possible, opportunities should be sought to achieve an increase in the provision of floodplain storage.

Where proposed development results in a change in building footprint, the developer must ensure that it does not impact upon the ability of the floodplain to store water, and should seek opportunities to provide a betterment with respect to floodplain storage.

Compensatory Flood storage is not required. As the site remains dry during the defended and undefended 1% AEP + 41% CC fluvial event and the 1 in 100-year pluvial event.

14.2.3 Flood Resilience Construction Measures

In terms of achieving resilience, there are two main strategies, whose applicability is dependent on the water depth the property is subjected to. These are:

 Water Exclusion (Flood Resistance) Strategy - should be employed where predicted flood depths are less than 0.3m and are likely to be for short duration. Emphasis is placed on minimising water entry and giving occupants time to

relocate ground floor contents, maintaining structural integrity, and on using materials and construction techniques to facilitate drying and cleaning;

- Water Entry (Flood Resilience) Strategy - Flood resilience measures are designed to allow water in but to limit damage and allow rapid re-occupancy. Resilience measures should be employed where flood depths are greater than 0.6m and where it is likely that structural damage will occur due to excessive water pressure.

Given that flood depths less than 0.3m are predicted in extreme scenarios, the water exclusion is considered most applicable for this site.

Water Exclusion Strategy:

There are a range of flood protection devices/methods that can be used in the Water Exclusion Strategy including:

- Using materials and construction with low permeability;
- Landscaping e.g. creation of low earth bunds (subject to this not increasing flood risk elsewhere);
- Raising thresholds and finished floor levels (e.g. porches with higher thresholds than main entrance);
- Flood gates with waterproof seals;
- Sump and pump for floodwater to remove waste water faster than it enters;
- Door guards and airbrick covers.

Flood resilience design and measures that will be implemented are outlined below. Water-resistant and resilient materials will be utilized throughout the construction to minimize the flood risk and potential impacts.

Floor construction:

- Use of resilient flooring materials as ceramic tiles or stone floor finishes;
- Use of a concrete slab 150mm thick;
- Use of ceramic tiles or stone floor finishes is recommended;

-  Maintain existing under floor ventilation by UPVC telescopic vents above 400 mm to external face of extension;
-  Damp proof membrane of impermeable polythene at least 1200 gauge;
-  Avoid the use of MDF carpentry.

Wall construction:

-  Include in the external face of the extension a damp – proof course, 250 mm above ground level, to prevent damp rising through the wall;
-  Use rigid closed – cell material for insulation above the DPC;
-  Spread hardcore over the site within the external walls of the building to such thickness as required to raise the finished surface of the site concrete. The hardcore should be spread until it is roughly level and rammed until it forms a compact bed for the oversite concrete. This hardcore bed will be 100 mm thick and composed by well compacted inert material, blinded with fine inert material.

Doors:

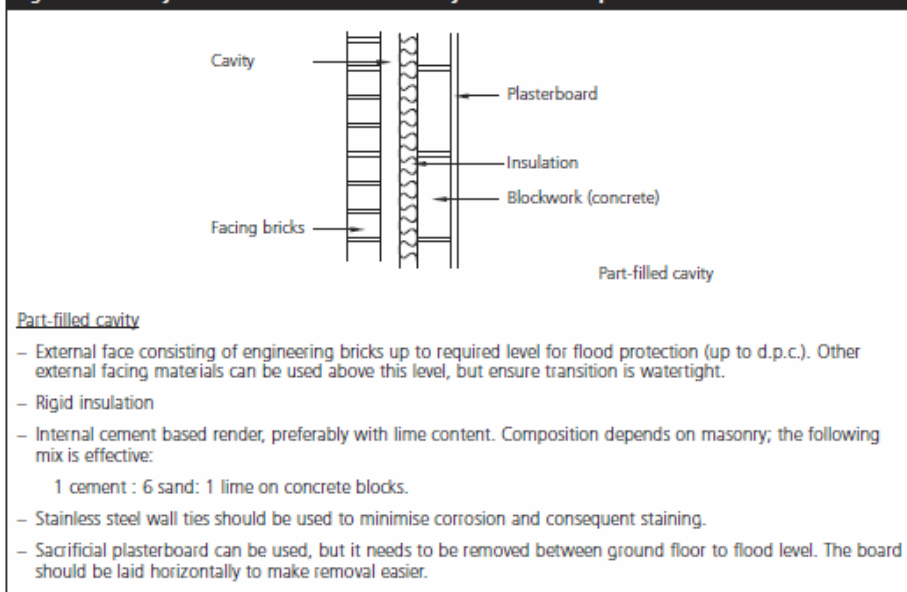
-  Seal doors around edges and openings. UPVC or composite material will be used with passive protection meaning that minimal intervention will be required in the event of flooding.

Underground drainage:

-  Avoid use of metal for any underground piping;
-  Use closed cell insulation for pipes that are below the predicted flood level;
-  Provide non – return valves for the drainage system to prevent back water flow;
-  Use UPVC or clay pipework for fells and surface water drainage.

Figure 4: Cavity External Walls

Figure 6.10 Cavity External Walls – Part-filled cavity with sacrificial plasterboard



As well as the above the following flood resilience features should be applied as part of the development:

-  Electrical sockets should be installed above flood level for the ground floor;
-  Utility services such as fuse boxes, meters, main cables, gas pipes, phone lines and sockets will be positioned as high as practicable;
-  All external openings for pipes or vents below 400mm to be sealed around pipe or vent with expanding foam and mastic.

14.3 Emergency Plan

14.3.1 Assessment of Danger to People

The dangers associated with flood water to people are possible injury and/or death. This can occur as a result of drowning or being carried along by the waters into hard objects or vice versa. The risk to life is largely a function of the depth and velocity of the floodwater as it crosses the floodplain. Fast flowing deep water that contains debris would represent the greatest hazard.

The assessment of danger to people from walking in floodwater is described in the Flood Risks to People guidance documents (FD2321_TR1 and FD2321_TR2) by DEFRA/EA.

Danger can be estimated by the simple formula:

$$HR = d \times (v + 0.5) + DF$$

where, HR = (flood) hazard rating; d = depth of flooding (m); v = velocity of floodwaters (m/sec); and DF = debris factor.

The scoring methodology and calculation matrix for this is summarised in [Appendix 13](#).

The use of a flood emergency plan is therefore sufficient for the proposed development. The key elements of the emergency plan are described below.

14.3.2 EA Flood Warnings Direct Service Subscription

The occupants will subscribe to the EA Flood Warnings Direct Service which is a free service offered by the EA providing flood warnings direct to people by telephone, mobile, email, SMS text message and fax. The EA aims to provide 2 hours' notice of flood, day or night, allowing timely evacuation of the site.

The agency operates a 24-hour telephone service on 0345 988 1188 that provides frequently updated flood warnings and associated floodplain information. In addition, this information can also be found at <https://fwd.environment-agency.gov.uk/app/olr/home> along with recommendations on what steps should be taken to prepare for floods, what to do when warnings are issued, and how best to cope with the aftermath of floods.

14.3.3 Access and Safe Egress

Safe egress to Flood Zone 1 is available by a 1-minute walk to Yewtree Lane, Northenden, Manchester, M22 4DY. Directions of this route are presented in [Appendix 12](#).

14.3.4 Safe Refuge

The proposed development will have internal connections to upper floors in the property which will act to provide sufficient safe refuge in the event of an extreme flood event.

15 Conclusions and Recommendations

This assessment has considered the potential risks to the application site associated with flooding from fluvial, tidal, surface water, artificial and groundwater sources and the potential impacts of climate change.

A review of LLFA's PFRA and SFRA as well as data provided by the EA was undertaken. The main findings of the review and assessment are provided below:

-  Development is minor so Sequential and Exception Tests should not be required. LLFA to decide;
-  The main source of flooding is considered to be the River Mersey which is located approximately 256m east of the site;
-  The EA define the site as being within Flood Zone 2;
-  Finished floor levels will be set to match existing at approximately 27.92mAOD;
-  The site benefits from high ground, walls and embankments on the west bank of the River Mersey and a water storage area to the east of the site;
-  4 instances of historic fluvial flooding in the vicinity of the site; the only year to affect the site was in 1964;

-  The site is located within the Manchester and Trafford South Critical Drainage Area;
-  The development will increase the site impermeable area by 33m² meaning it could impact upon local flood risk, flood storage and flood flow pathways. However, as the site remains dry in the 1% AEP + 41% CC fluvial scenario and the 1 in 100-year pluvial scenario, this impact is thought to be negligible;
-  There is good opportunity for implementing SuDS mitigation measures. Consideration should be given to use of green roofs, rainwater harvesting and infiltration techniques;
-  Flood resilient materials and construction methods will be used so as to ensure that the impacts of any potential flooding are minimised as much as possible;
-  Occupants will subscribe to the EA Flood Warnings Direct Service;
-  Safe egress routes to Flood Zone 1 are easily accessible by a 1-minute walk to Yewtree Lane, Northenden, Manchester, M22 4DY;
-  In the event that evacuation is not possible, safe refuge is available in the upper floors of the building which are accessible via an internal staircase.

The proposed development is considered to be in compliance with local planning policy and the NPPF.

16 References

1. Communities and Local Government - National Planning Policy Framework NPPF, July, 2021.
2. Communities and Local Government - Planning Practice Guidance: Flood Risk and Coastal Change, Updated 06 March 2014.
3. Manchester City Council, Manchester's Local Development Framework Core Strategy Development Plan Document, Adopted July 2012
4. JBA Consulting – Level 1 Strategic Flood Risk Assessment for Greater Manchester, Update, March 2019
5. CIRIA, Defra, Environment Agency – UK SuDS Manual, 2015.

17 Appendices

17.1 Appendix 1 – Site Photographs

N.A. – None available at the time of writing.

17.2 Appendix 2 – Development Plans

See next page.

Do not scale this drawing. All dimensions are to be verified on site and any discrepancies reported before commencement of any work or shop drawings.

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Client

Project Description

Project Number **KEN070**

Drawing Title

Location Plan

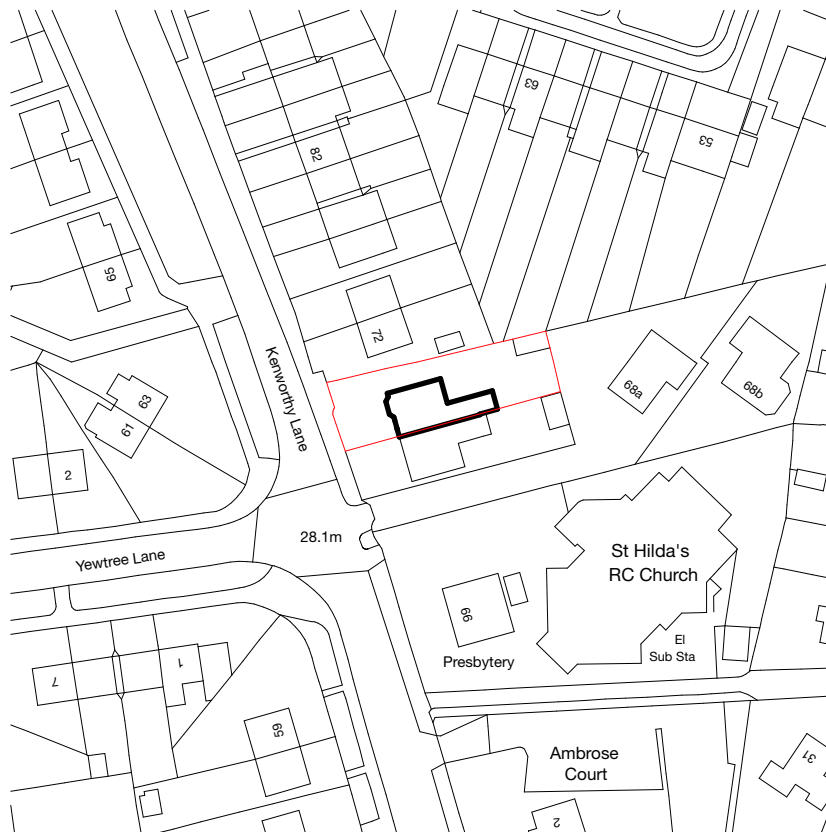
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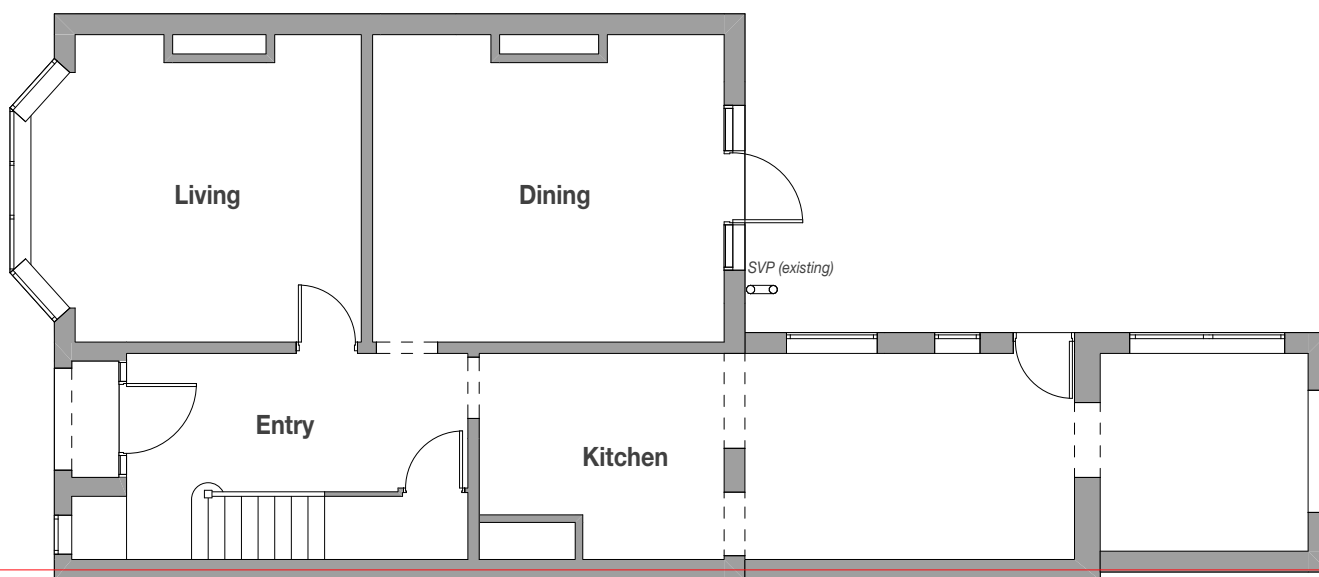




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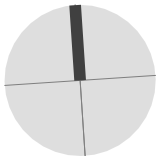
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Joseph Prince & Dominic Fitzgerald	
Project Description	
70 Kenworthy Ln, Northenden, Wythenshawe	
Project Number	KEN070
Drawing Title	
Site Plan - Proposed	
Drawing Number	Scale
WD2.2	1:200 @ A



The floor plan shows a rectangular building layout. At the top are two bedrooms, 'Bed. 1' on the left and 'Bed. 2' on the right, separated by a central hallway. Below 'Bed. 1' is 'Bed. 3'. Below 'Bed. 2' is a 'WC' and a 'Bath.'. A staircase is located between 'Bed. 3' and the 'Bath.'. An 'SVP (existing)' is marked on the right wall near the 'WC'. The plan includes various architectural details like doors, windows, and built-in furniture.

Existing - First Floor Plan

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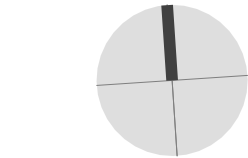
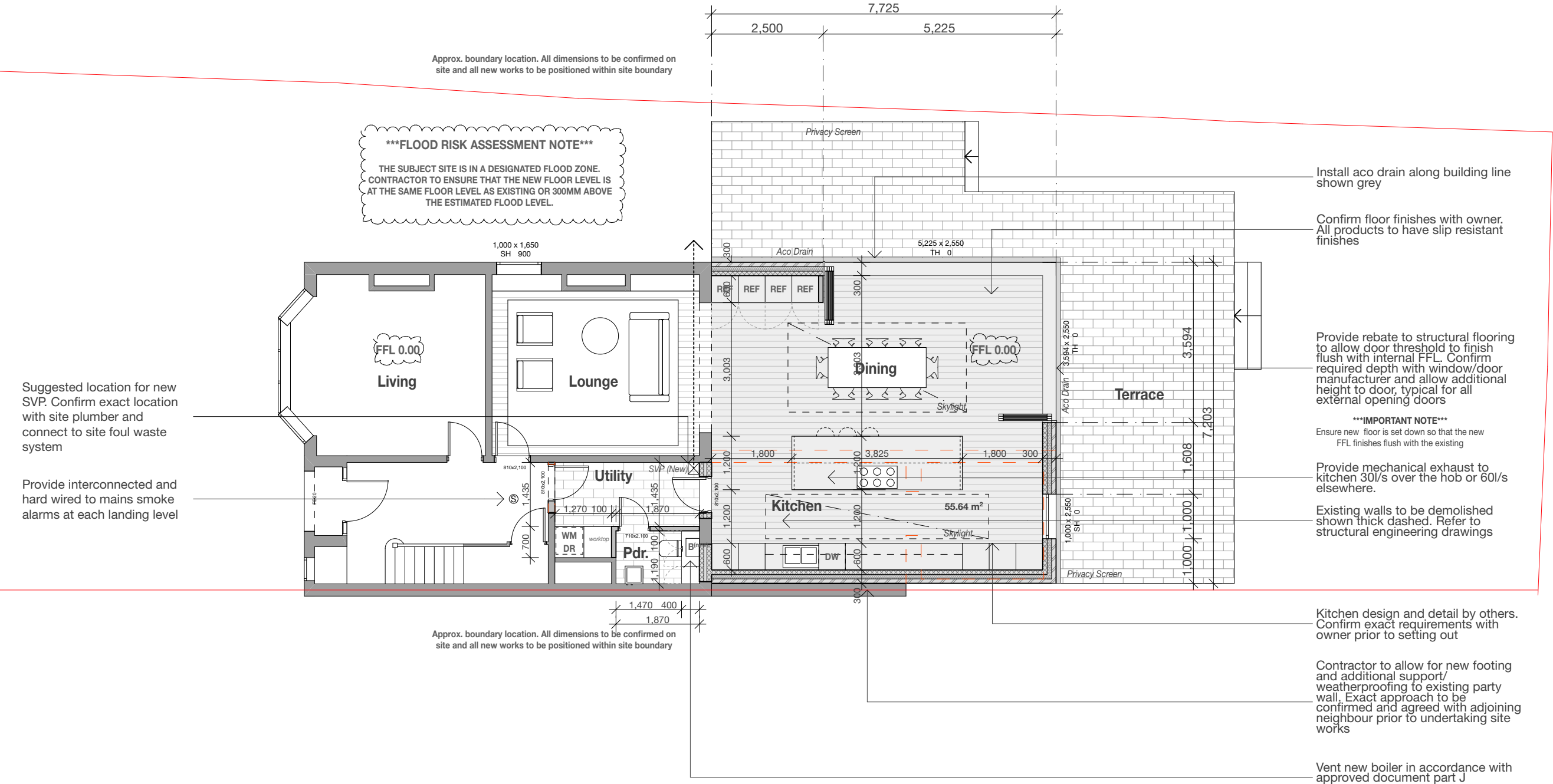
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Joseph Prince & Dominic Fitzgerald	
Project Description	
70 Kenworthy Ln, Northenden, Wythenshawe	
Project Number	KEN070
Drawing Title	
Plans - Existing	
Drawing Number	Scale
WD3.1	1:100 @

NOTES

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Issue/ Rev	Description	Date
#	Initial Issue	14.11.22
A	See clouded areas	05.12.22



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APPROVAL

Client

Joseph Prince & Dominic
Fitzgerald

Project Description

70 Kenworthy Ln, Northenden,
Wythenshawe

Project Number KEN070

Drawing Title

Plans - Proposed Ground Floor
Plan

Drawing Number Scale

WD3.2 1:100 @ A3

Legend						Refer to General Notes For Details
ref.	refrigerator	B	boiler	OP	overflow	
wo.	wall oven	W1	wall type 1	HOP	hopper	***All structure shown as graphic representation: please refer to structural engineering package for exact details of footings, concrete slab, timber framed floors, wall & roof framing***
dw	dishwasher	W2	wall type 2	FG	floor gully	
shr.	shower	R1	roof type 1	S	sink	
st	store	PS	plumbing stack	SVP	soil vent pipe	
wir	walk in wardrobe	R1	roof type 1	GM	gas meter	
pdr.	powder room	DP	downpipe	EM	electricity meter	

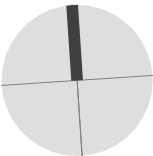
Notes	Notes on setting out	Brickwork
- Do not scale this drawing. All dimensions are to be verified on site and any discrepancies reported before commencement of any work or shop drawings - All new windows and doors sizes indicated are to structural openings and to be site measured. Window style/ detailing and opening sash locations to be confirmed and approved by owner prior to fabrication. All new windows require means of escape with an unobstructed openable area of 0.33sq.m. and at least 450mm high and 450mm wide. The bottom of the openable area should not be more than 1100mm above floor level. All windows to achieve the minimum U values specified in the British Standards. - All floors (suspended or on ground) walls and roofs are to be insulated and achieve at least the minimum U values listed under Approved Document Part L of the British Regulations. - Confirm all finishes and materials with owner. ***All works to be constructed in accordance with accredited construction details***	***All opening sizes are to structural openings*** FR = Fire rated door where required 	windpost and restraint requirements for piers less than 665mm wide to be confirmed by structural engineer - Provide DPC min. 150mm above natural ground level - Provide weep holes at 900mm centers above all openings

NOTES

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Issue/ Rev	Description	Date
#	Initial Issue	14.11.22



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Client

Joseph Prince & Dominic Fitzgerald

Project Description

**70 Kenworthy Ln, Northenden,
Wythenshawe**

Project Number **KEN070**

Drawing Title

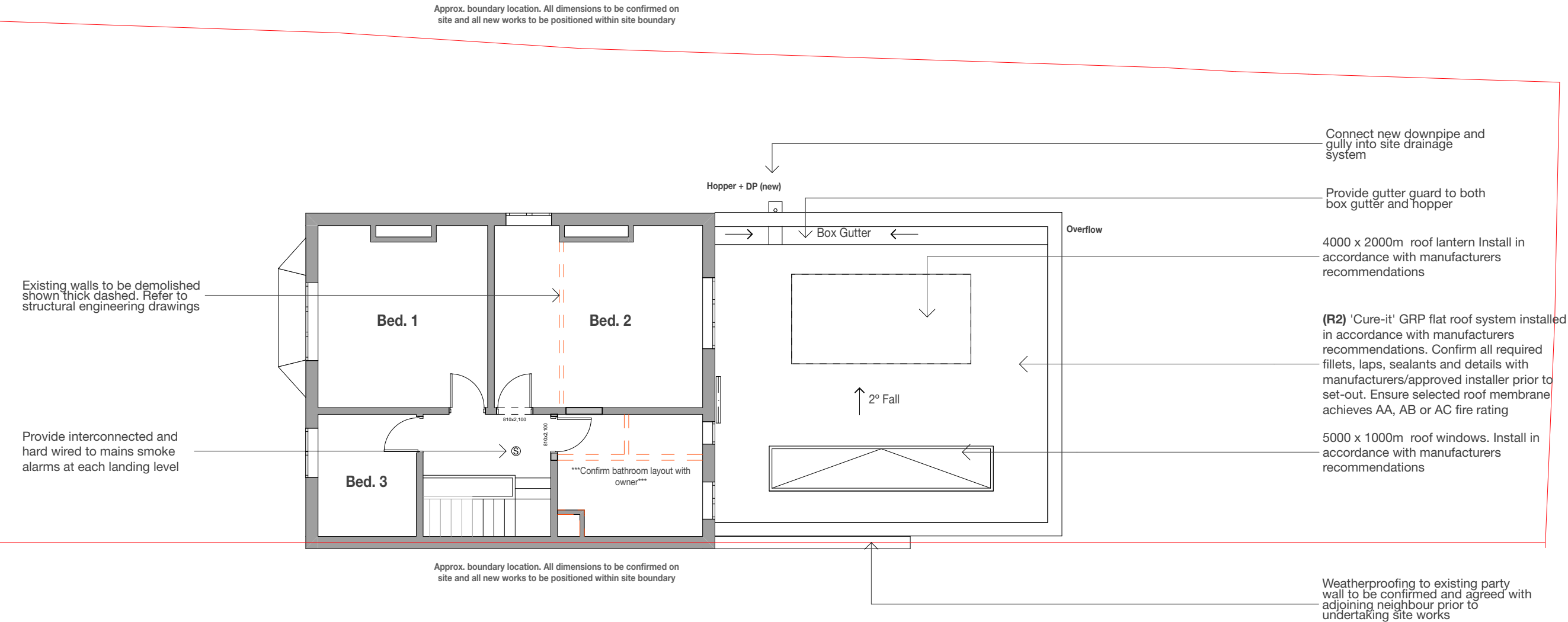
Plans - Proposed First Floor Plan

Drawing Number	Scale
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Scale

WD3.3

1:100 @ A3



Legend						
ref.	refrigerator	B	boiler	OP	overflow	Refer to General Notes For Details ***All structure shown as graphic representation: please refer to structural engineering package for exact details of footings, concrete slab, timber framed floors, wall & roof framing***
wo.	wall oven	W1	wall type 1	HOP	hopper	
dw	dishwasher	W2	wall type 2	FG	floor gully	
shr.	shower	R1	roof type 1	S	sink	
st	store	PS	plumbing stack	SVP	soil vent pipe	
wir	walk in wardrobe	R1	roof type 1	GM	gas meter	
pdr.	powder room	DP	downpipe	EM	electricity meter	

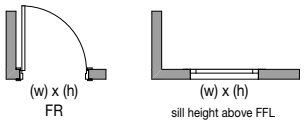
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- Do not scale this drawing. All dimensions are to be verified on site and any discrepancies reported before commencement of any work or shop drawings
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- **All floors (suspended or on ground) walls and roofs are to be insulated and achieve at least the minimum U values listed under Approved Document Part L of the British Regulations.**
- Confirm all finishes and materials with owner.

*****All works to be constructed in accordance with accredited construction details*****

Notes on setting out

All opening sizes are to structural openings
FR = Fire rated door where required

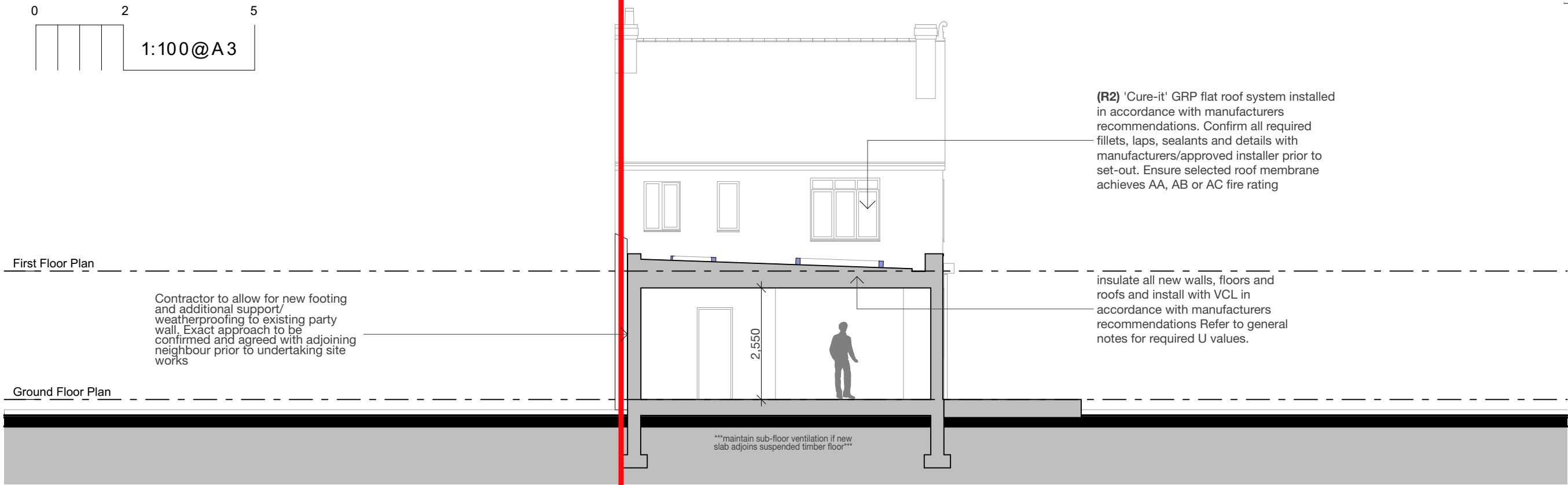


Brickwork

windpost and restraint requirements for piers less than 665mm wide to be confirmed by structural engineer



- Provide DPC min. 150mm above natural ground level
- Provide weep holes at 900mm centers above all openings

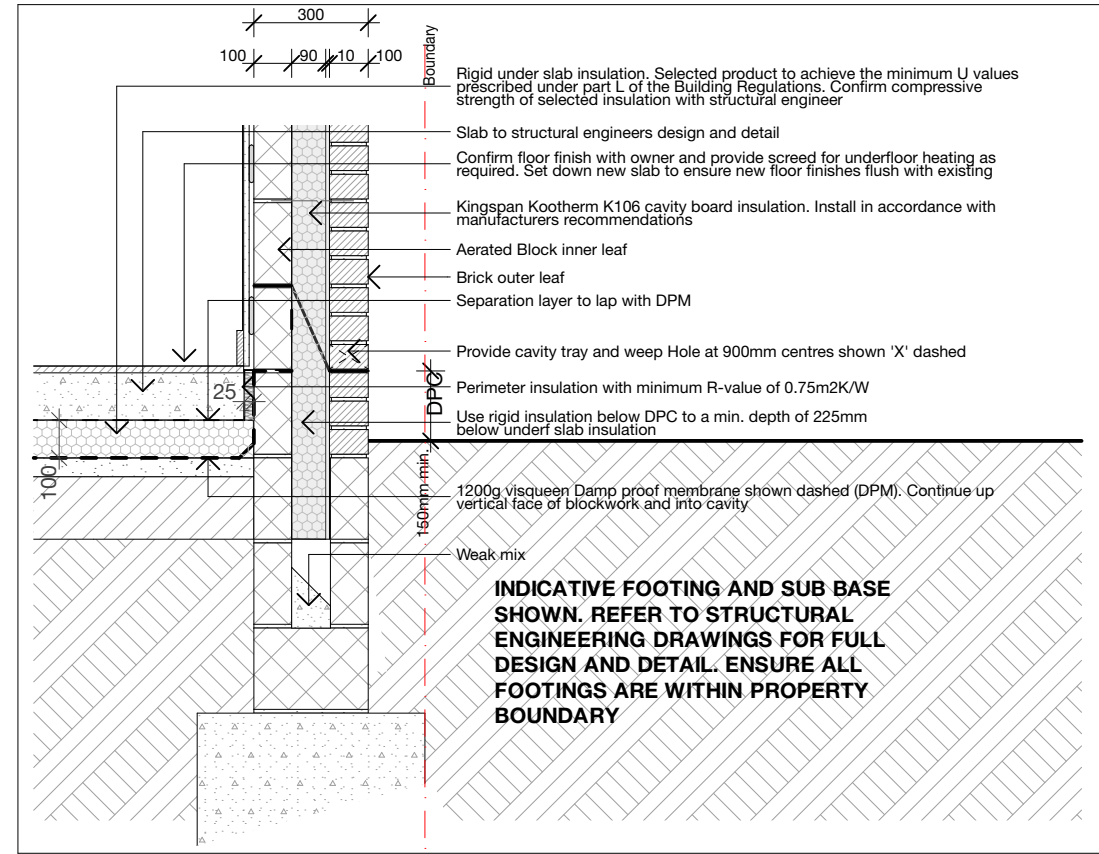


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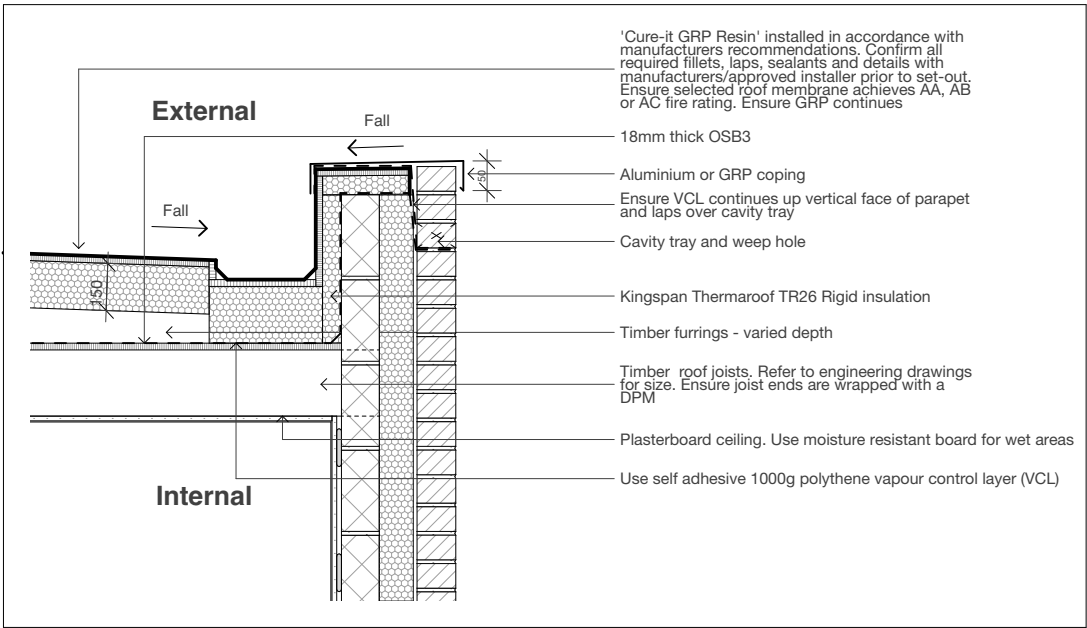
Do not scale this drawing. All dimensions are to be verified on site and any discrepancies reported before commencement of any work or shop drawings.

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Issue/ Rev	Description	Date
#	Initial Issue	14.11.22

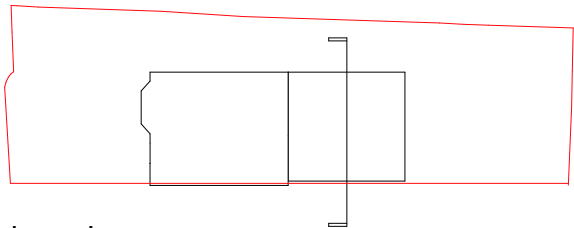


Typical Wall Detail
(Scale 1:20)



Typical Box Gutter Detail
(Scale 1:20)

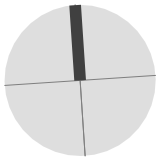
ALL DETAILS ARE SUBJECT TO APPROVAL BY APPOINTED BUILDING INSPECTOR



key plan
scale 1:500

Legend						Refer to General Notes For Details
ref.	refrigerator	B	boiler	OP	overflow	
wo.	wall oven	W1	wall type 1	HOP	hopper	***All structure shown as graphic representation: please refer to structural engineering package for exact details of footings, concrete slab, timber framed floors, wall & roof framing***
dw	dishwasher	W2	wall type 2	FG	floor gully	
shr.	shower	R1	roof type 1	S	sink	
st	store	PS	plumbing stack	SVP	soil vent pipe	
wir	walk in wardrobe	R1	roof type 1	GM	gas meter	
pdr.	powder room	DP	downpipe	EM	electricity meter	

Notes	Notes on setting out	Brickwork
- Do not scale this drawing. All dimensions are to be verified on site and any discrepancies reported before commencement of any work or shop drawings - All new windows and doors sizes indicated are to structural openings and to be site measured. Window style/ detailing and opening sash locations to be confirmed and approved by owner prior to fabrication. All new windows require means of escape with an unobstructed openable area of 0.33sq.m. and at least 450mm high and 450mm wide. The bottom of the openable area should not be more than 1100mm above floor level. All windows to achieve the minimum U values specified in the British Standards. - All floors (suspended or on ground) walls and roofs are to be insulated and achieve at least the minimum U values listed under Approved Document Part L of the British Regulations. - Confirm all finishes and materials with owner. ***All works to be constructed in accordance with accredited construction details***	***All opening sizes are to structural openings*** FR = Fire rated door where required (w) x (h) FR (w) x (h) sill height above FFL	windpost and restraint requirements for piers less than 665mm wide to be confirmed by structural engineer <665 - Provide DPC min. 150mm above natural ground level - Provide weep holes at 900mm centers above all openings



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FOR PLANNING/
BUILDING CONTROL
APPROVAL

Client

Joseph Prince & Dominic
Fitzgerald

Project Description

70 Kenworthy Ln, Northenden,
Wythenshawe

Project Number KEN070

Drawing Title

Section A - A

Drawing Number

Scale

WD4.1

1:100, 1:20 @

These drawings are for the purpose of achieving planning and building regulations approval only and subject to final review/approval by building control. All drawings must be read in conjunction with structural engineers design drawings and calculations. All products to be installed in accordance with manufacturers recommendation and details.

[illegible]

Existing Front Elevation



Existing Rear Elevation

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Client

Joseph Prince & Dominic Fitzgerald

**70 Kenworthy Ln, Northenden,
Wythenshawe**

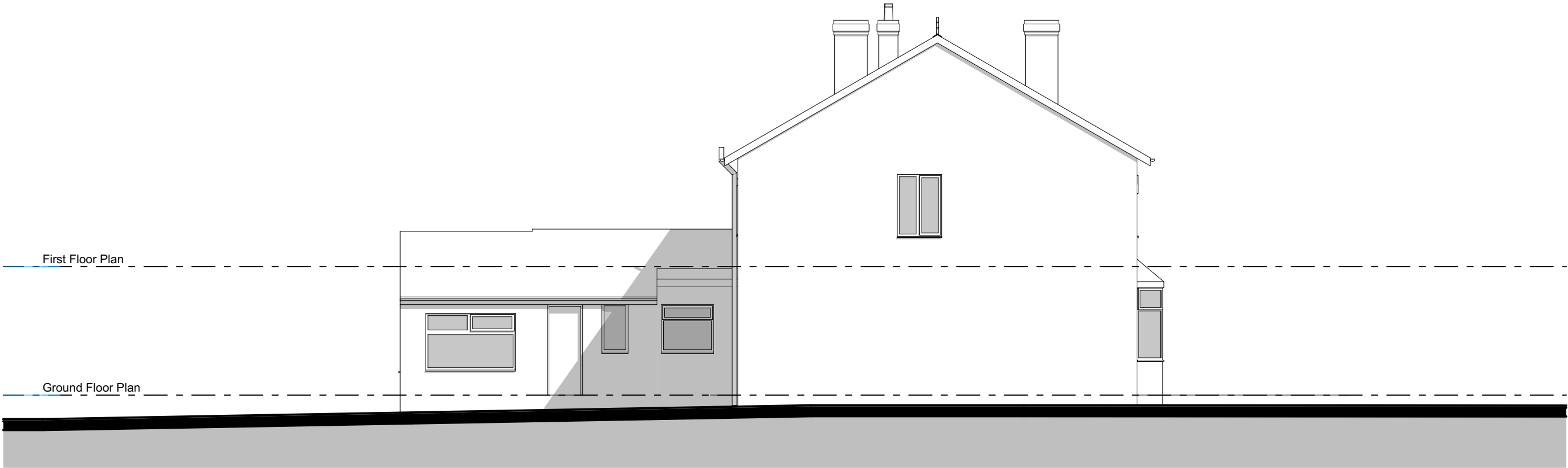
Project Number **KEN070**

Drawing Title

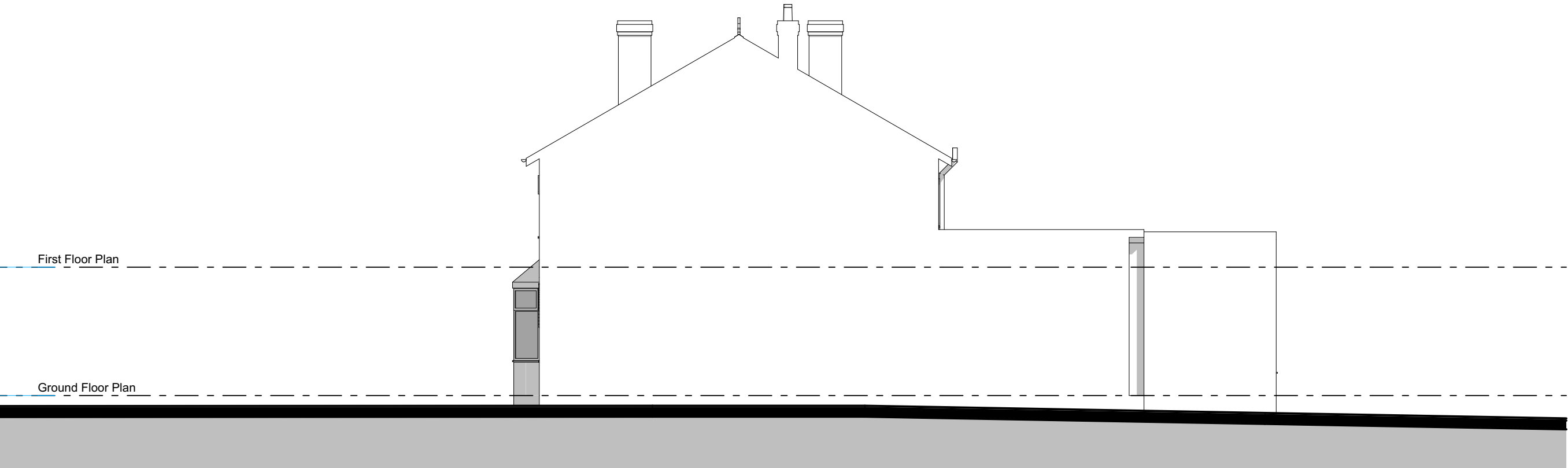
Elevations - Existing

Drawing Number	Scale
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WD5.1 1:100 @ A3

[illegible]

Existing Side Elevation



Existing Side Elevation

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**70 Kenworthy Ln, Northenden,
Wythenshawe**

Project Number **KEN070**

Drawing Title

Elevations - Existing

Drawing Number	Scale
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WD5.2 1:100 @ A3



NOTES

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Ground Floor Plan

Ground Floor Plan

Legend						Refer to General Notes For Details
ref.	refrigerator	B	boiler	OP	overflow	
wo.	wall oven	W1	wall type 1	HOP	hopper	
dw	dishwasher	W2	wall type 2	FG	floor gully	
shr.	shower	R1	roof type 1	S	sink	
st	store	PS	plumbing stack	SVP	soil vent pipe	
wir	walk in wardrobe	R1	roof type 1	GM	gas meter	
pdr.	powder room	DP	downpipe	EM	electricity meter	

Brickwork

windpost and restraint requirements for piers less than 665mm wide to be confirmed by structural engineer

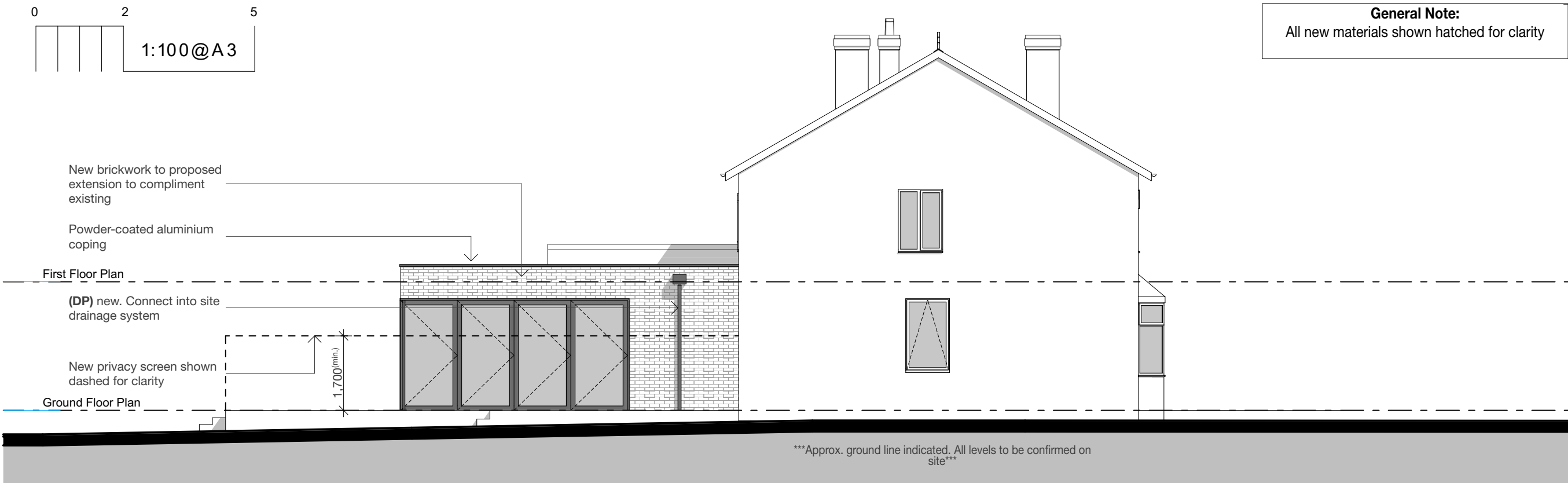


- Provide DPC min. 150mm above natural ground level

- Provide weep holes at 900mm centers above all openings

Drawing Number Scale

WD5.3 **1:100 @ A3**



First Floor Plan

Ground Floor Plan

Powder-coated aluminium coping

New brickwork to proposed extension to compliment existing

New privacy screen shown dashed for clarity

1,700(min.)

Approx. ground line indicated. All levels to be confirmed on site

Legend						Refer to General Notes For Details
ref.	refrigerator	B	boiler	OP	overflow	
wo.	wall oven	W1	wall type 1	HOP	hopper	
dw	dishwasher	W2	wall type 2	FG	floor gully	
shr.	shower	R1	roof type 1	S	sink	
st	store	PS	plumbing stack	SVP	soil vent pipe	
wir	walk in wardrobe	R1	roof type 1	GM	gas meter	
pdr.	powder room	DP	downpipe	EM	electricity meter	

Notes

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- **All floors (suspended or on ground) walls and roofs are to be insulated and achieve at least the minimum U values listed under Approved Document Part L of the British Regulations.**
- Confirm all finishes and materials with owner.

*****All works to be constructed in accordance with accredited construction details*****

Notes on setting out

All opening sizes are to structural openings

FR = Fire rated door where required

(w) x (h)
FR

(w) x (h)
sill height above FFL

Brickwork

windpost and restraint
requirements for piers less than
665mm wide to be confirmed by
structural engineer



Provide DPC min. 150mm above natural
ground level

Provide weep holes at 900mm centers
above all openings

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[illegible]

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Joseph Prince & Dominic Fitzgerald

Project Description

**70 Kenworthy Ln, Northenden,
Wythenshawe**

Project Number **KEN070**

Drawing Title

Elevations - Proposed

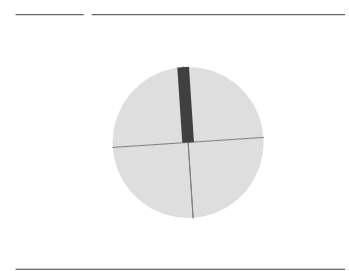
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WD5.4	1:100 @ A3

******NOTE******

- perspectives are provided for visual aid only. Refer to drawings for all information.

******NOTE******

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Project Description

70 Kenworthy Ln, Northenden,
Wythenshawe

Project Number **KEN070**

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Wythenshawe

Project Number **KEN070**

70 Kenworthy Ln, Northenden,
Wythenshawe

Project Number **KEN070**

Drawing Title

Perspective 01

Perspective 01

Drawing Number	Scale
WD9.1	@ A3

Drawing Number	Scale
WD9.1	@ A3

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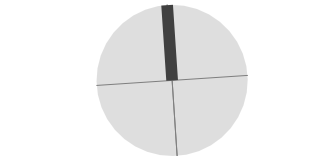
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Joseph Prince & Dominic Fitzgerald

Project Description

**70 Kenworthy Ln, Northenden,
Wythenshawe**

Project Number **KEN070**

Drawing Title

Perspective 02

Drawing Number	Scale
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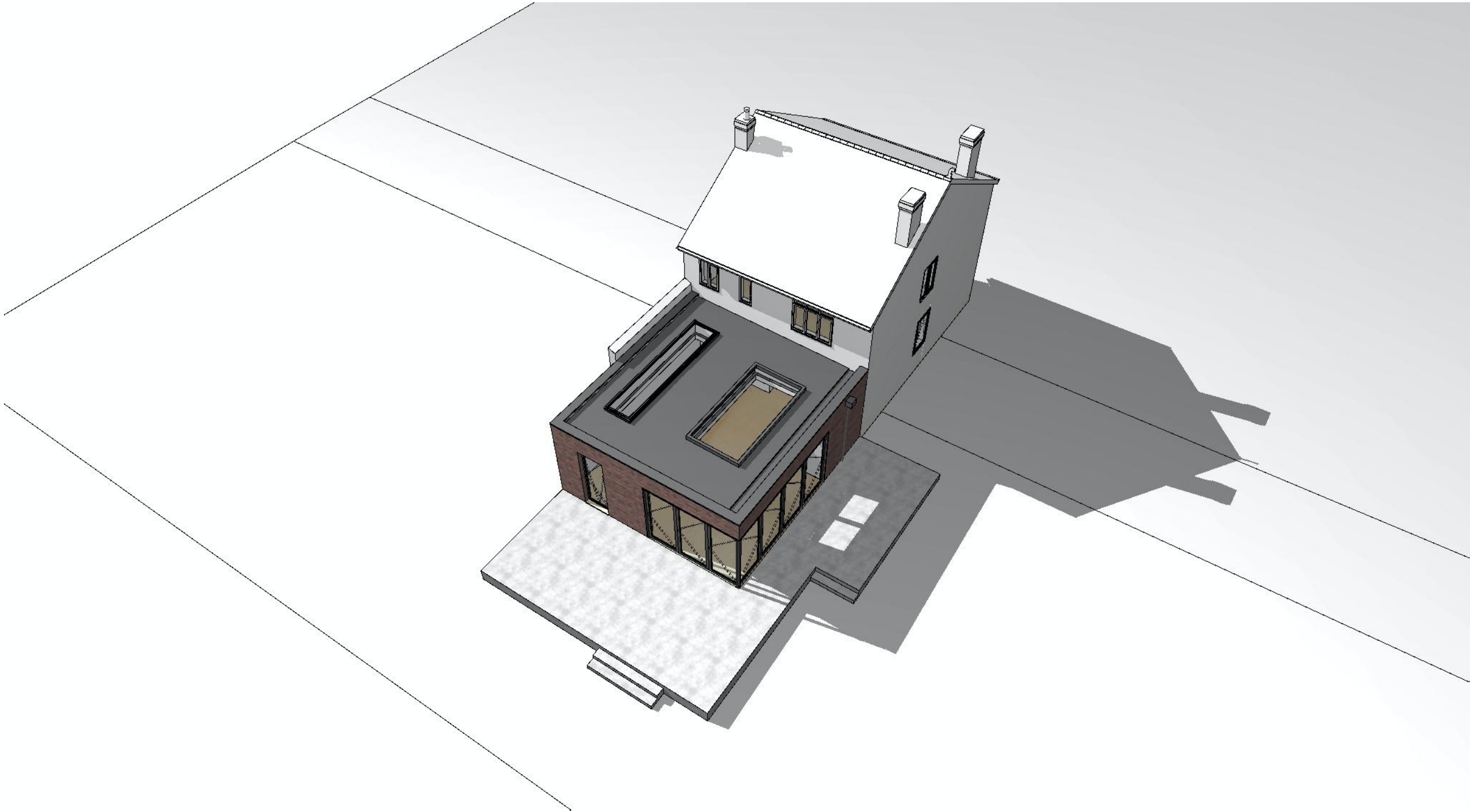
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******NOTE******

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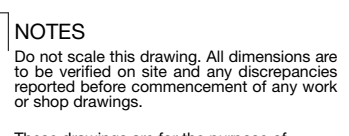
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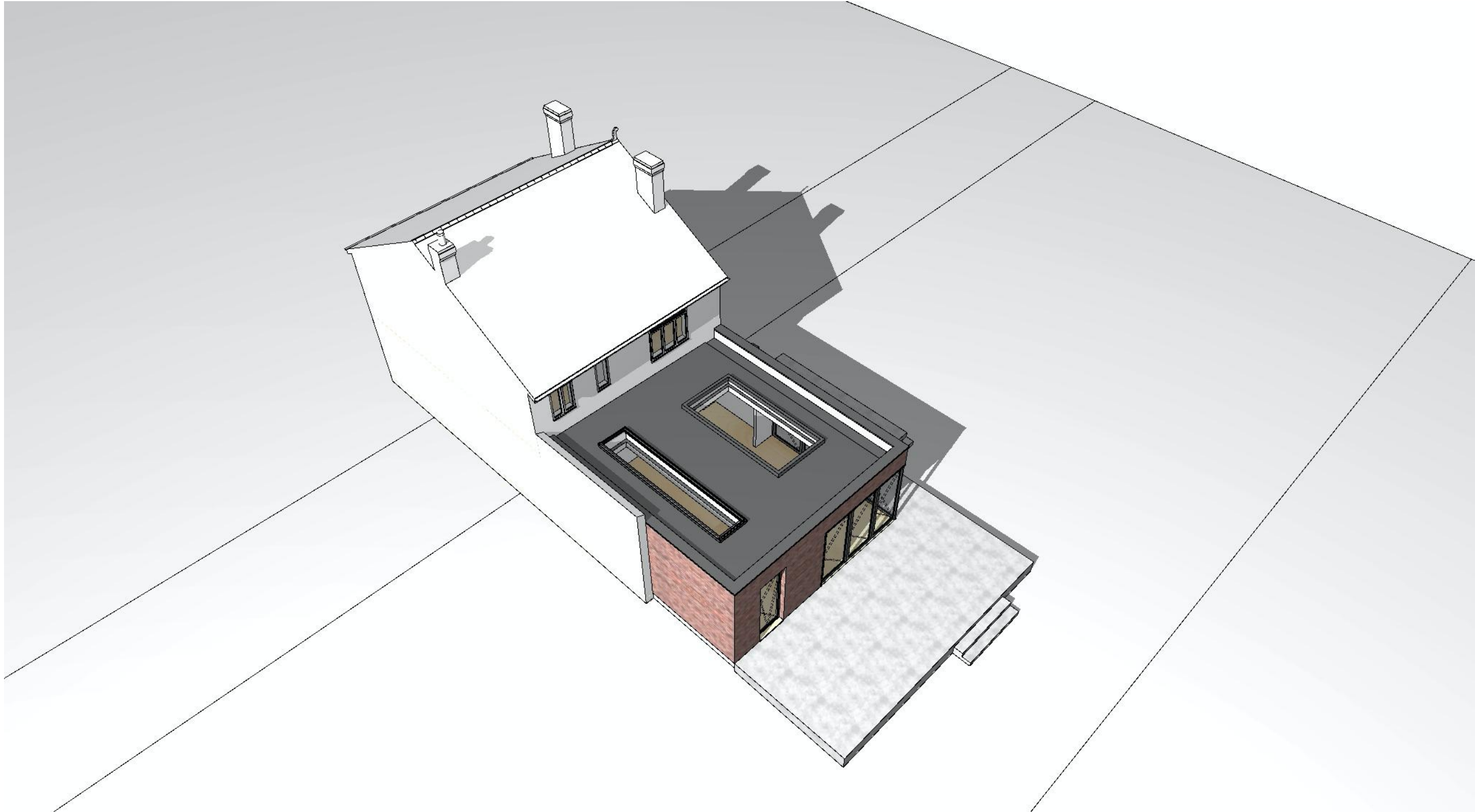
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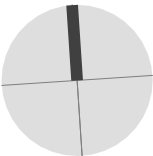
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**FOR PLANNING/
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APPROVAL**

Client

Joseph Prince & Dominic Fitzgerald

Project Description

**70 Kenworthy Ln, Northenden,
Wythenshawe**

Project Number **KEN070**

Drawing Title

Perspective 04

Drawing Number

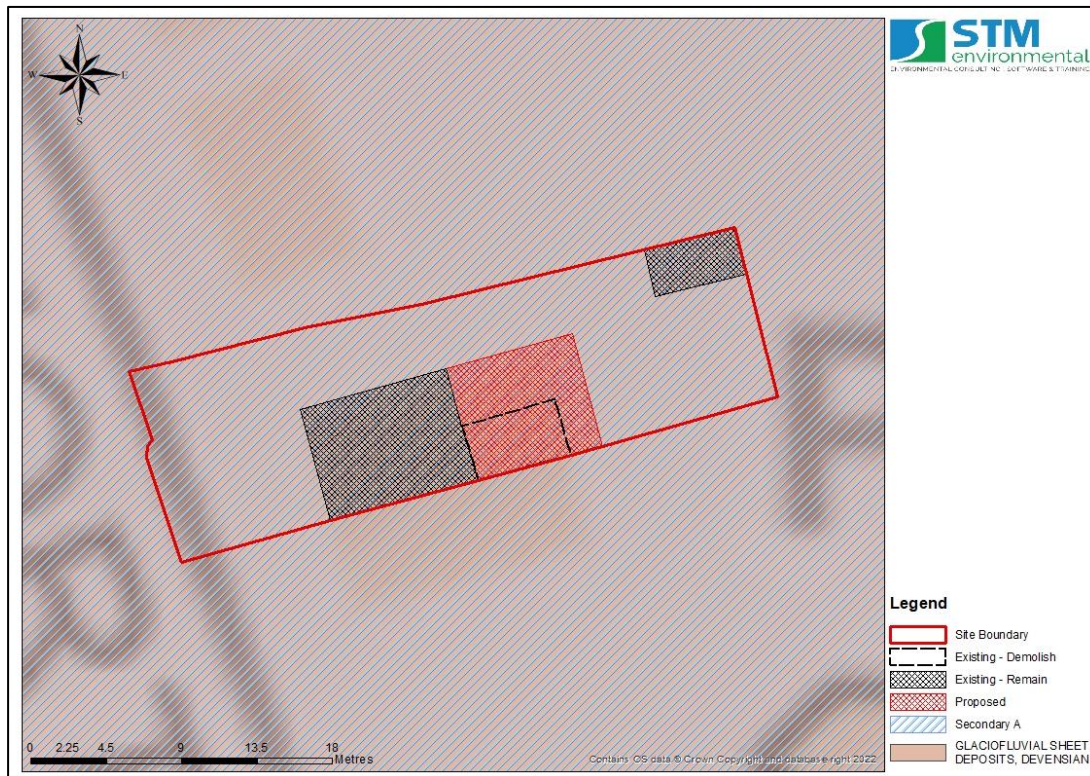
scale

WD9.4

@ A3

17.3 Appendix 3 – Environmental Characteristics

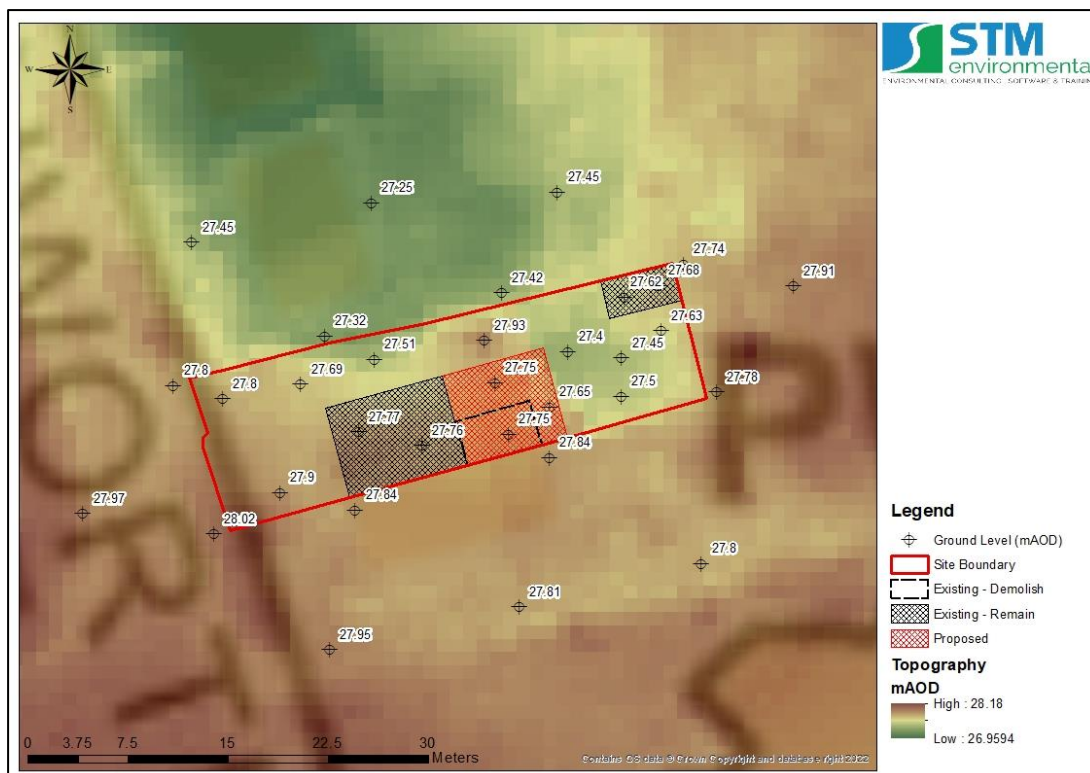
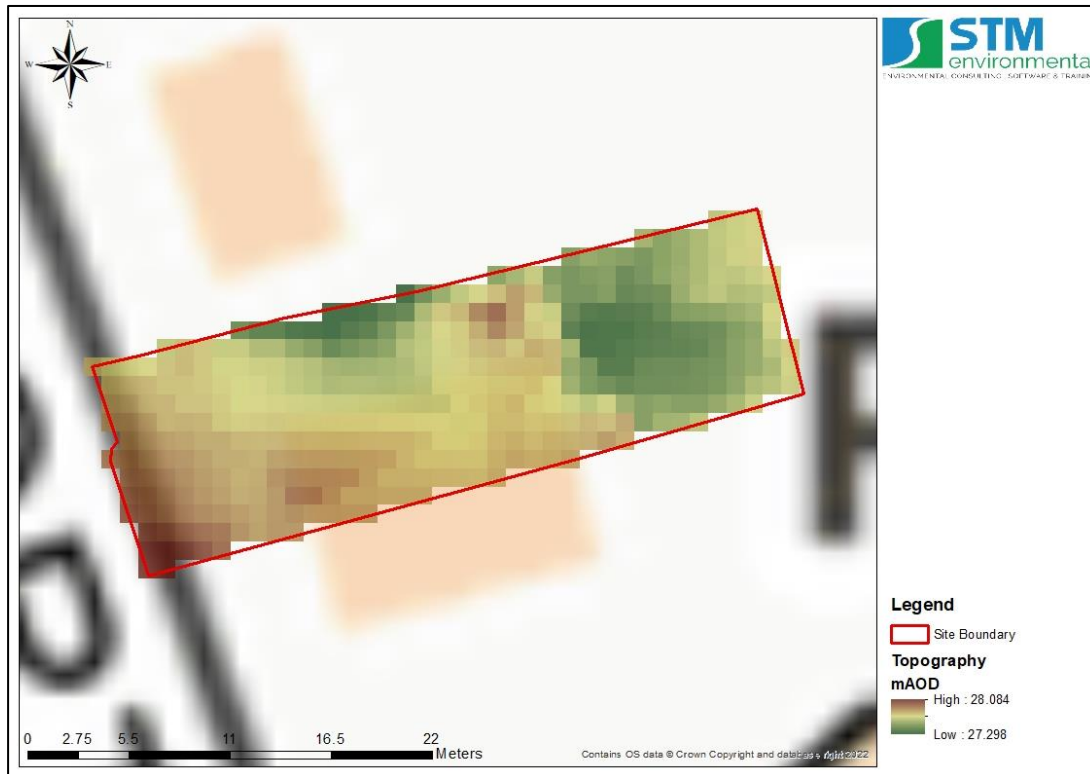
17.3.1 Superficial Hydrogeology Map



17.3.2 Bedrock Hydrogeology Map

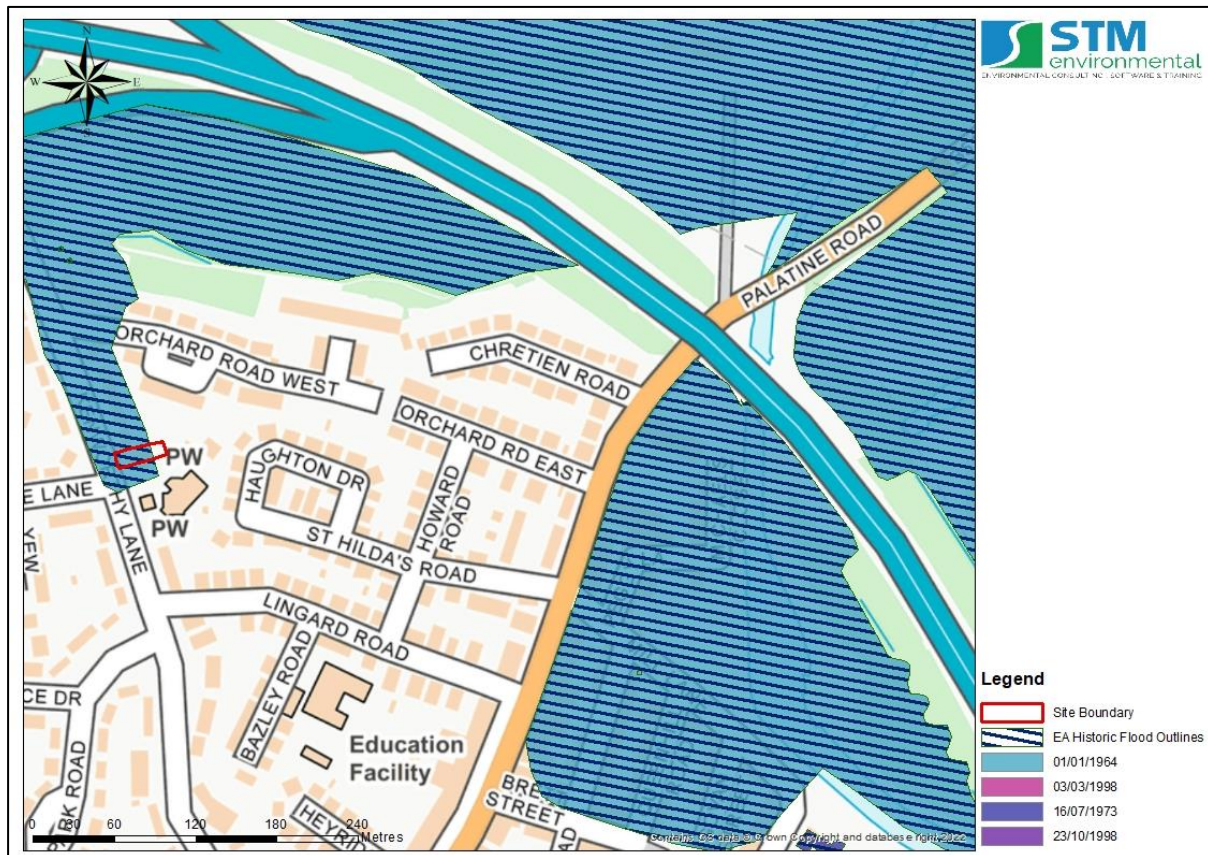


17.3.3 Topography Map

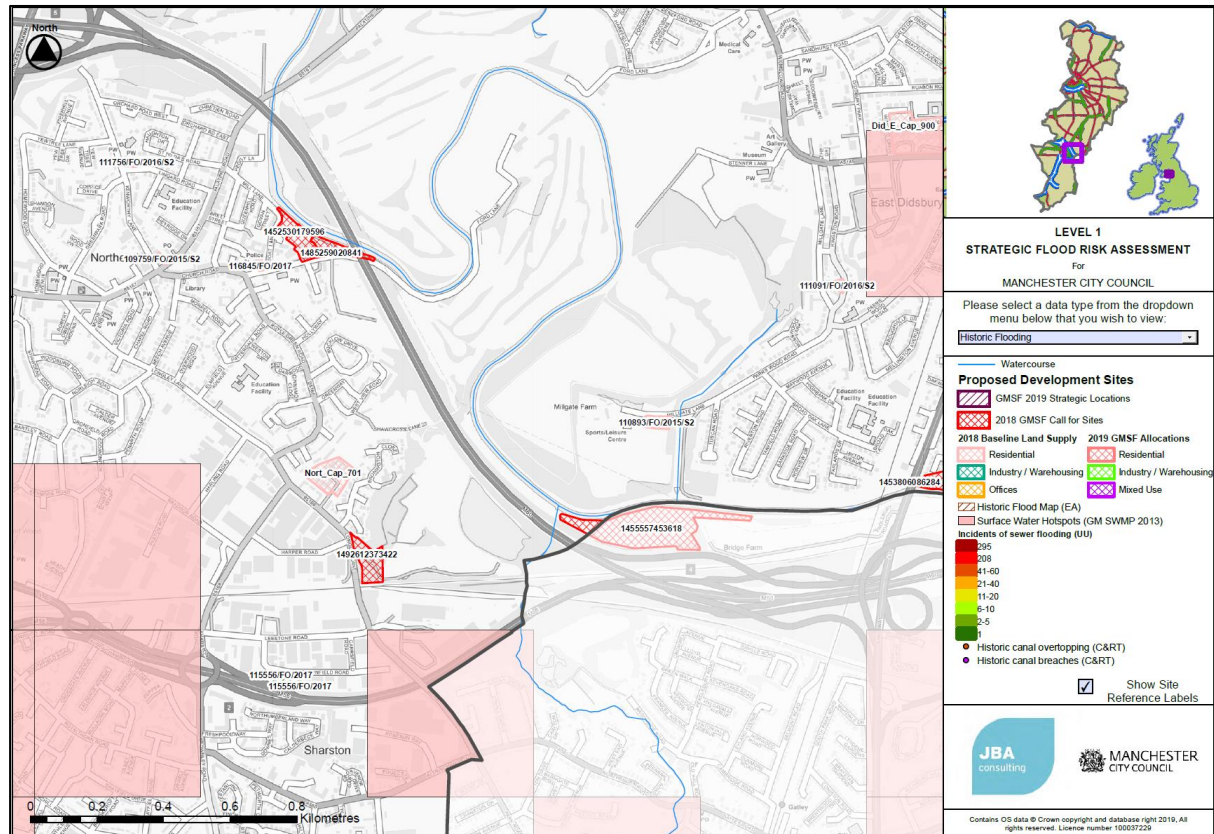


17.4 Appendix 4 – Historical Flood Incident Maps

17.4.1 EA Historic and Recorded Flood Outlines

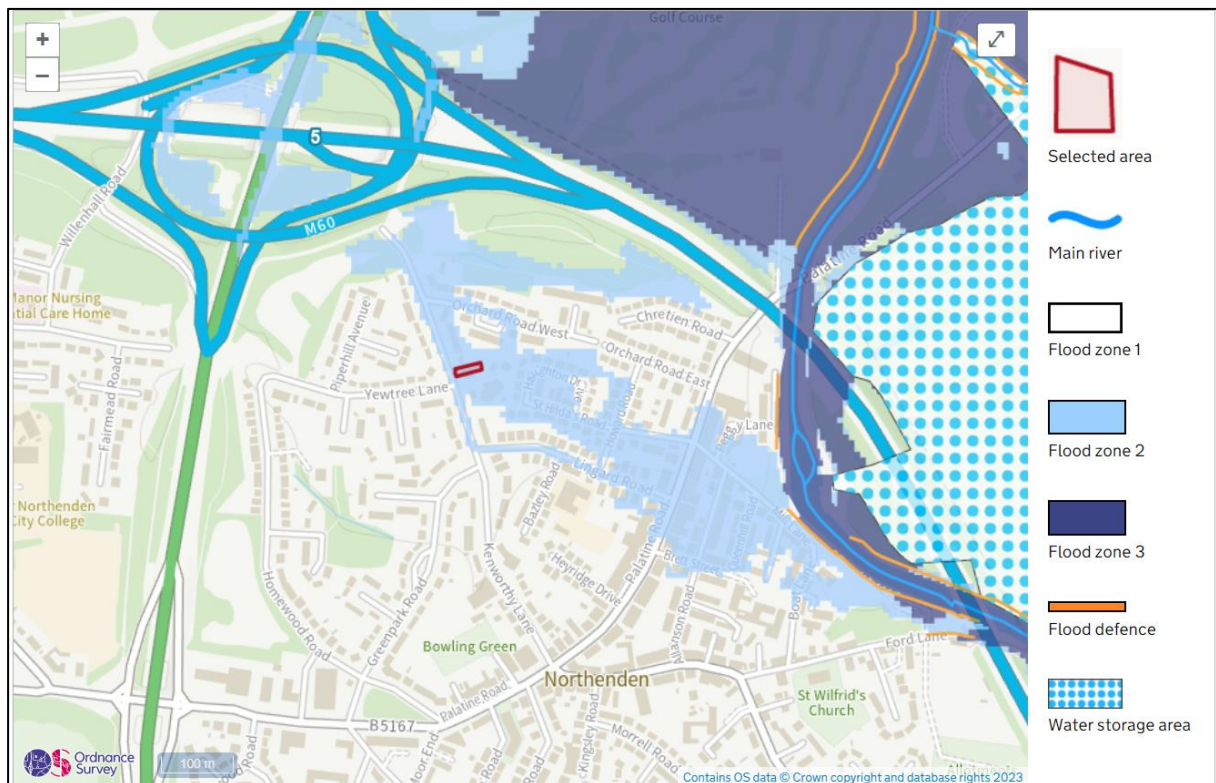


17.4.2 Map Recorded Historic Flooding

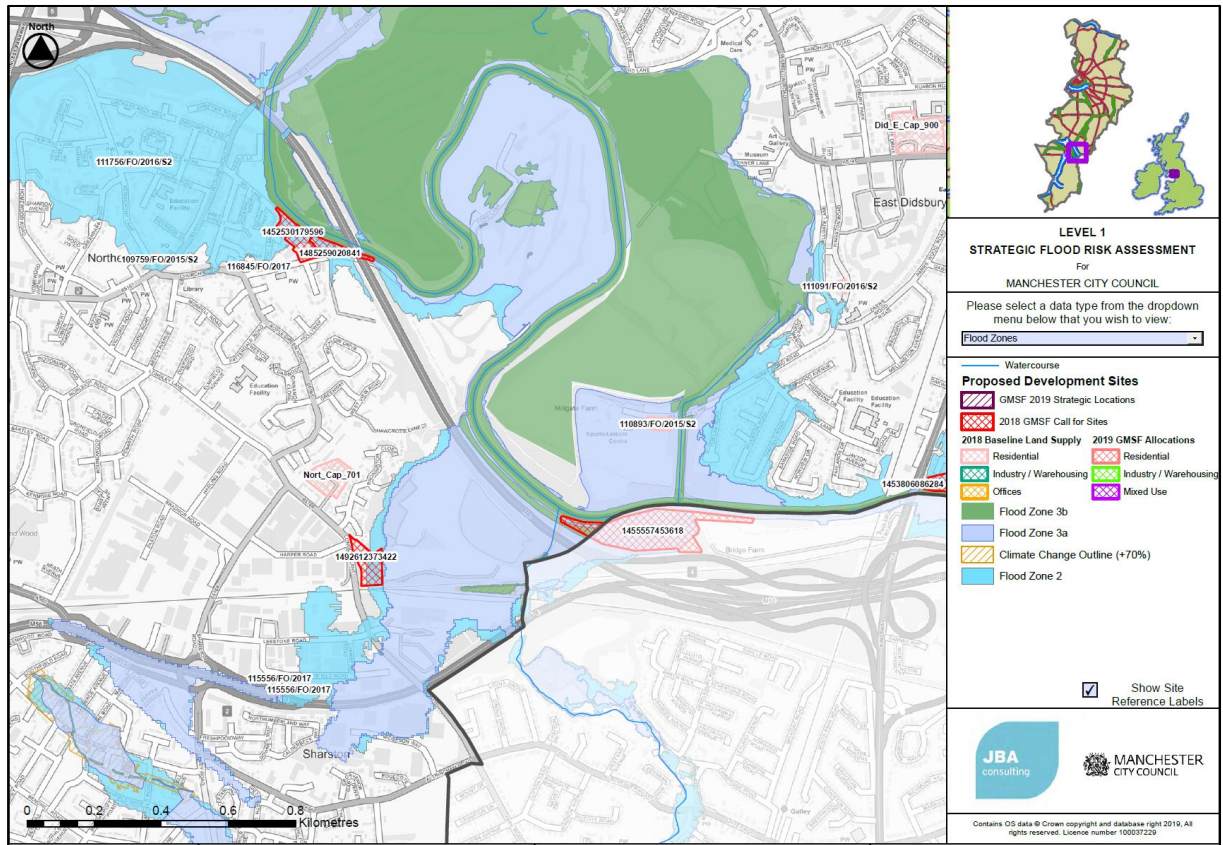


17.5 Appendix 5 - Flood Zone

17.5.1 EA Flood Zone Maps



17.5.2 SFRA Flood Zone Map



17.6 Appendix 6 – Surface Water Flood Extent and Depth Maps

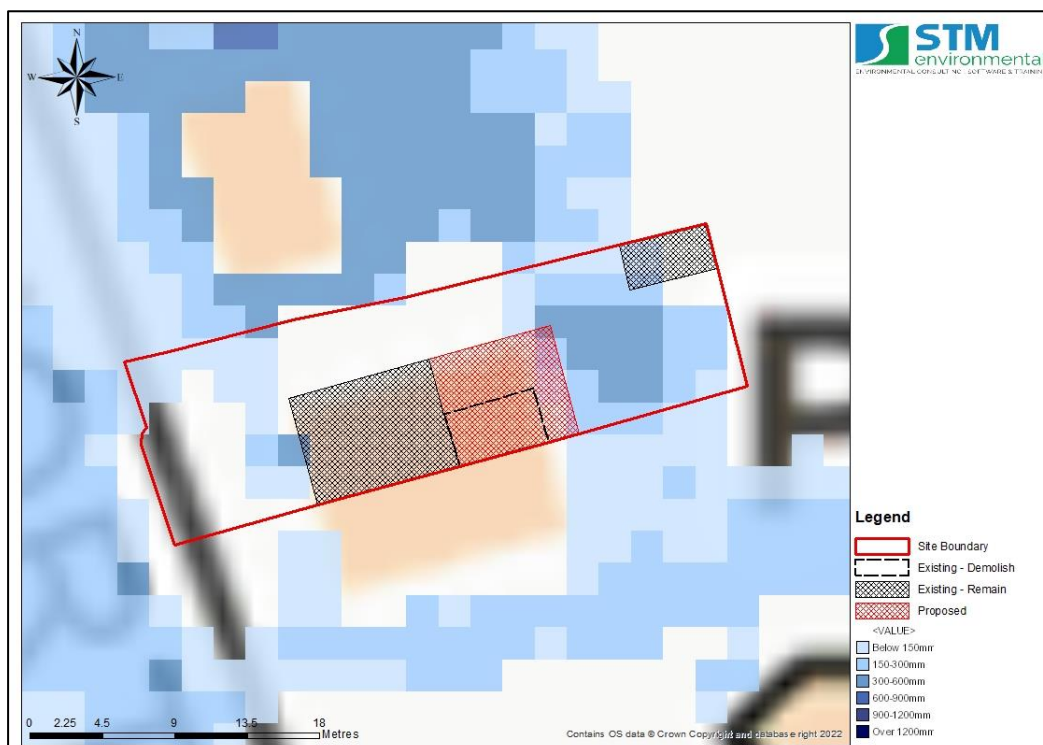
17.6.1 Predicted surface water flood depth for the 1 in 100-year return period

(Source: EA, 2016).



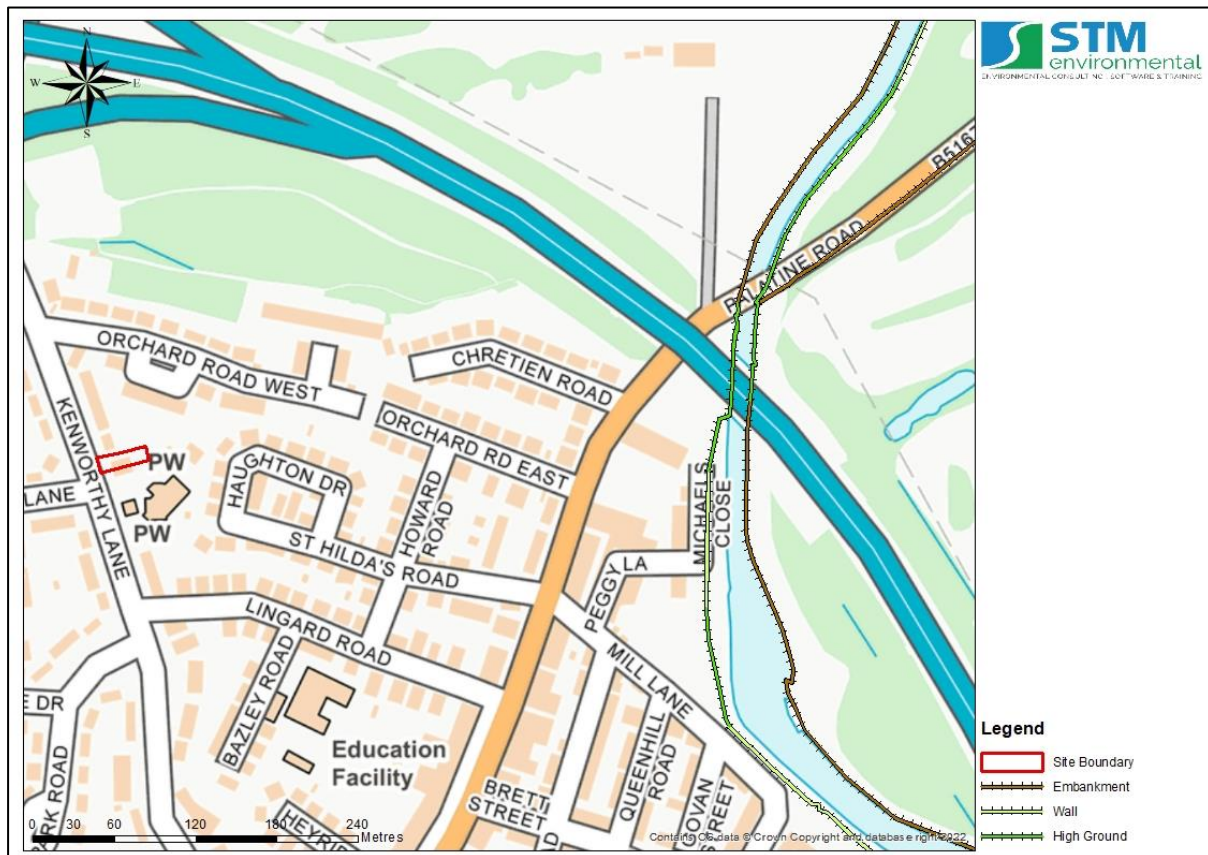
17.6.2 Predicted surface water flood depth for the 1 in 1000-year return period

(Source: EA, 2016).

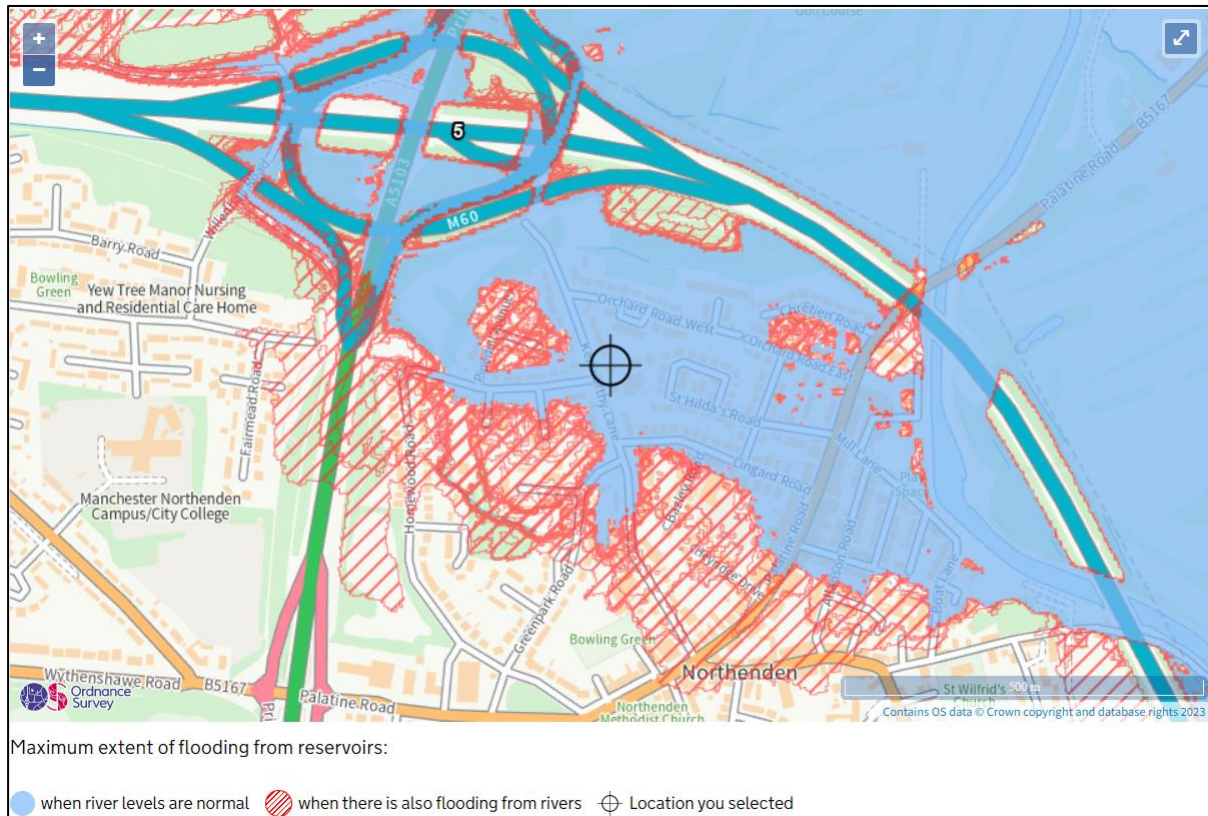


17.7 Appendix 7 –Flood Defence and Reservoir Flood Risk Maps

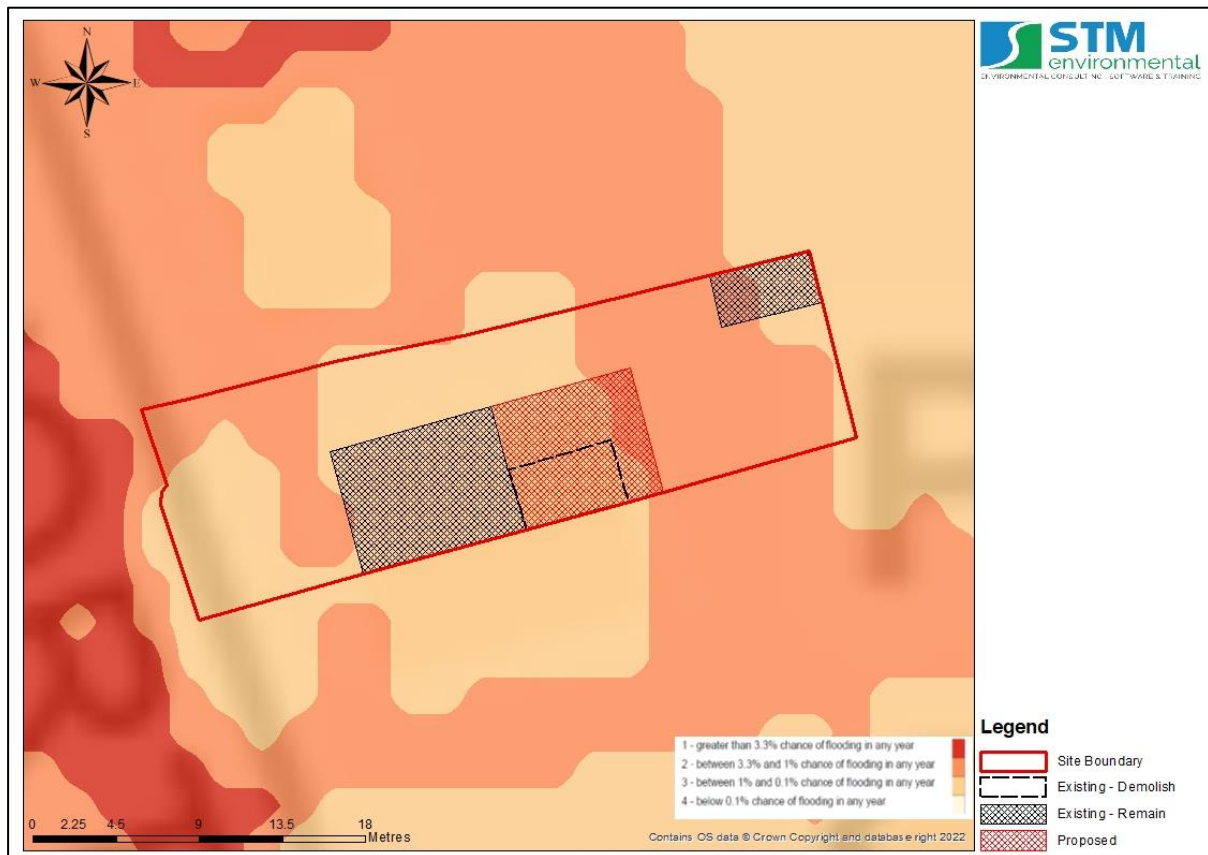
17.7.1 EA flood defence map



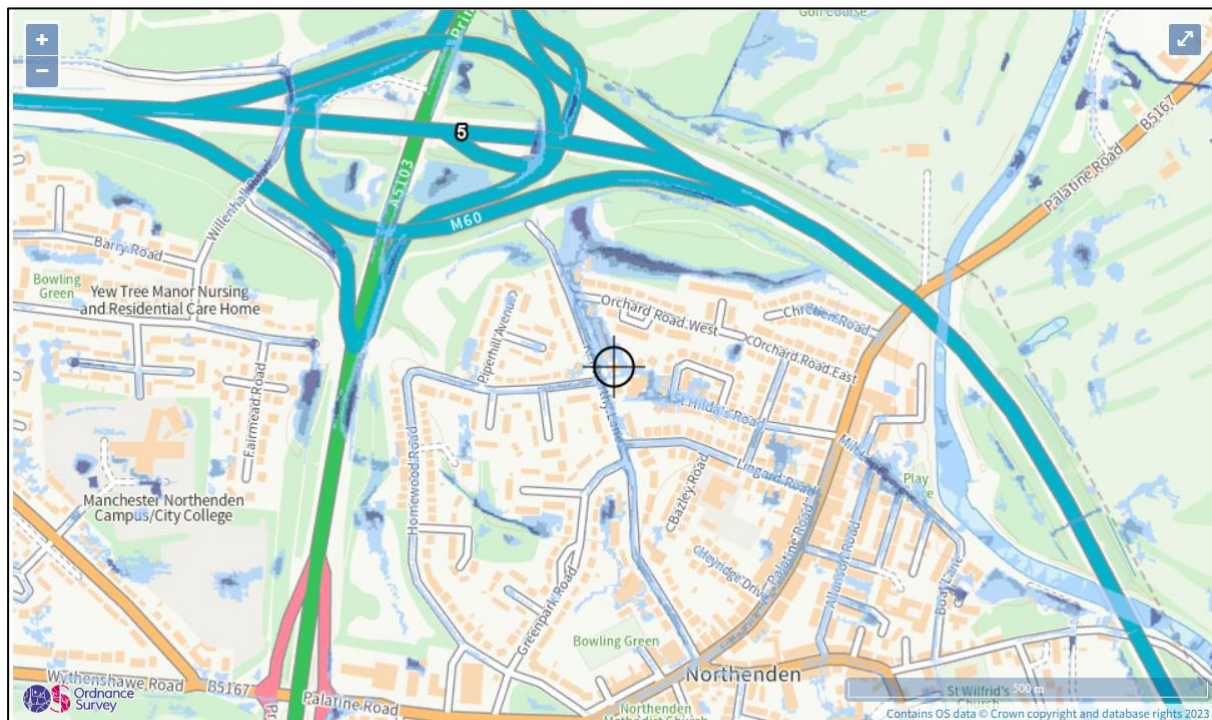
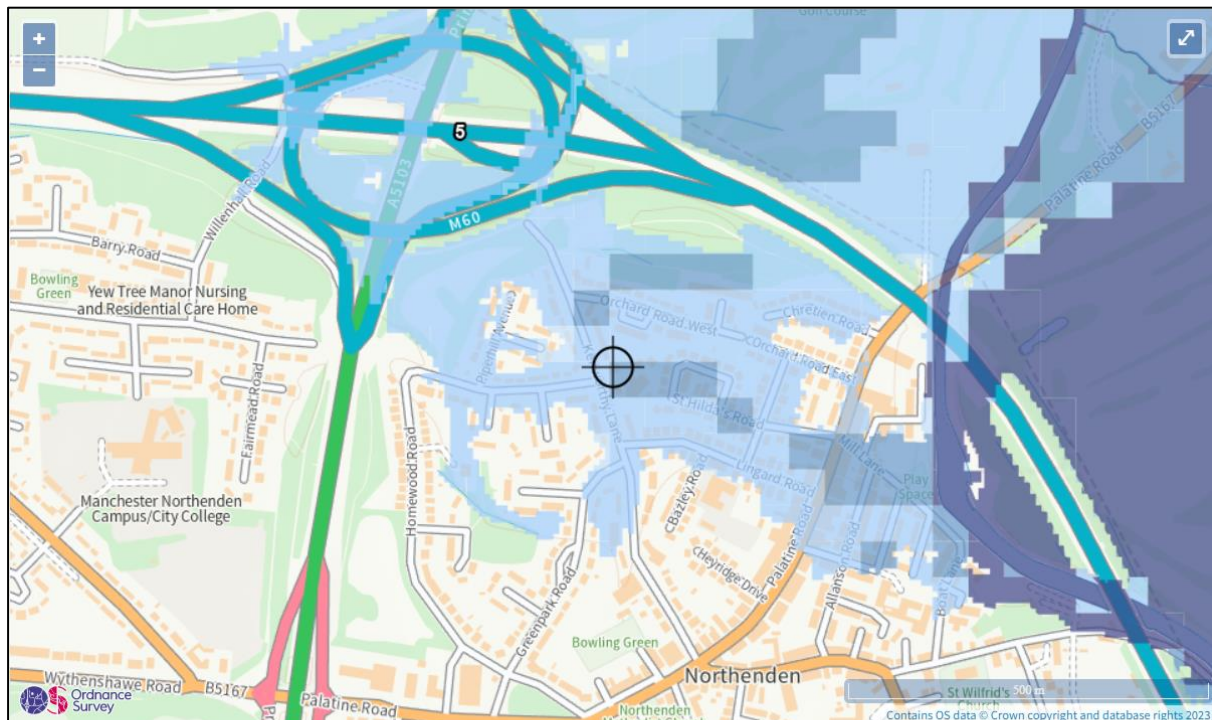
17.7.2 Reservoir Flood Risk Map



17.8 Appendix 8 – Risk of Flooding from Multiple Sources Map

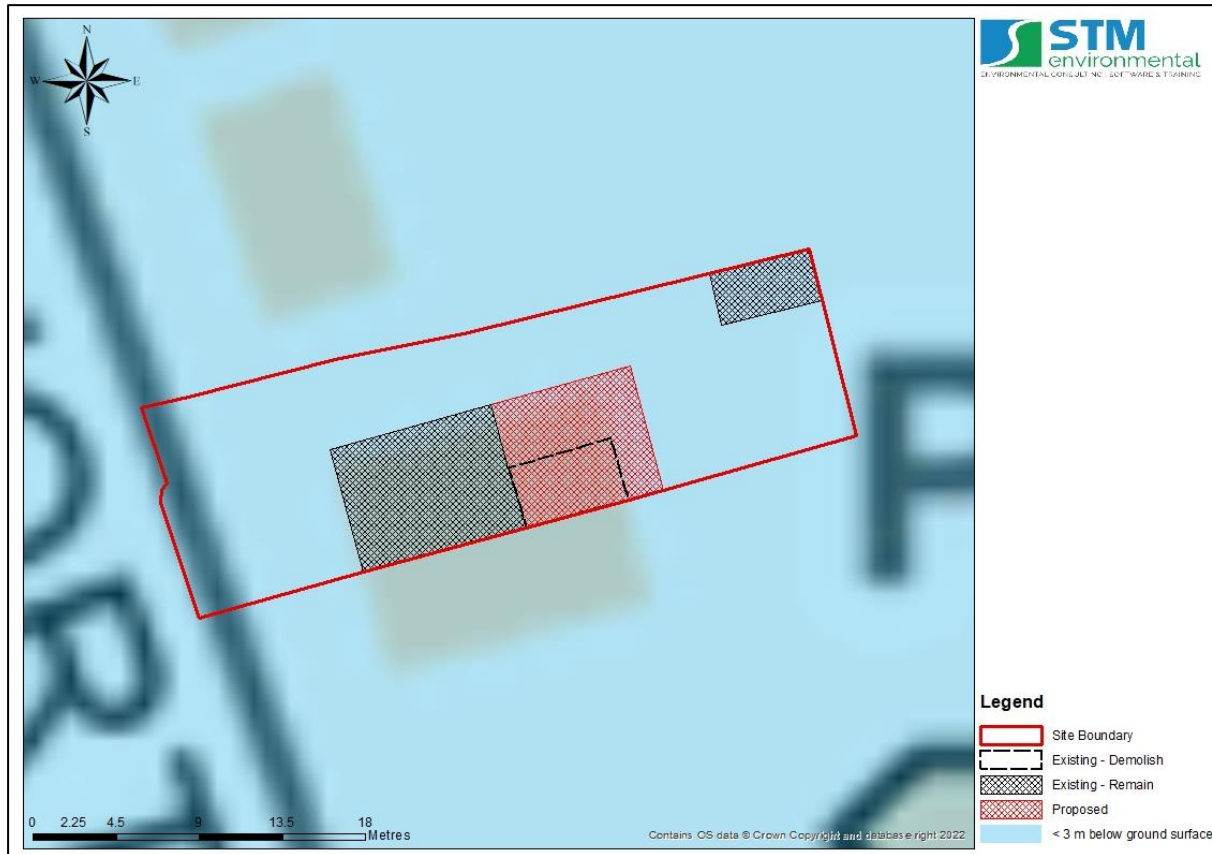


17.9 Appendix 9 – EA's Long Term Flood Risk Maps



17.10 Appendix 10 – Groundwater Flood Maps

17.10.1 Groundwater Flooding (Susceptibility) Map (BGS) and Potential Depth to the Groundwater Water Map (BGS)

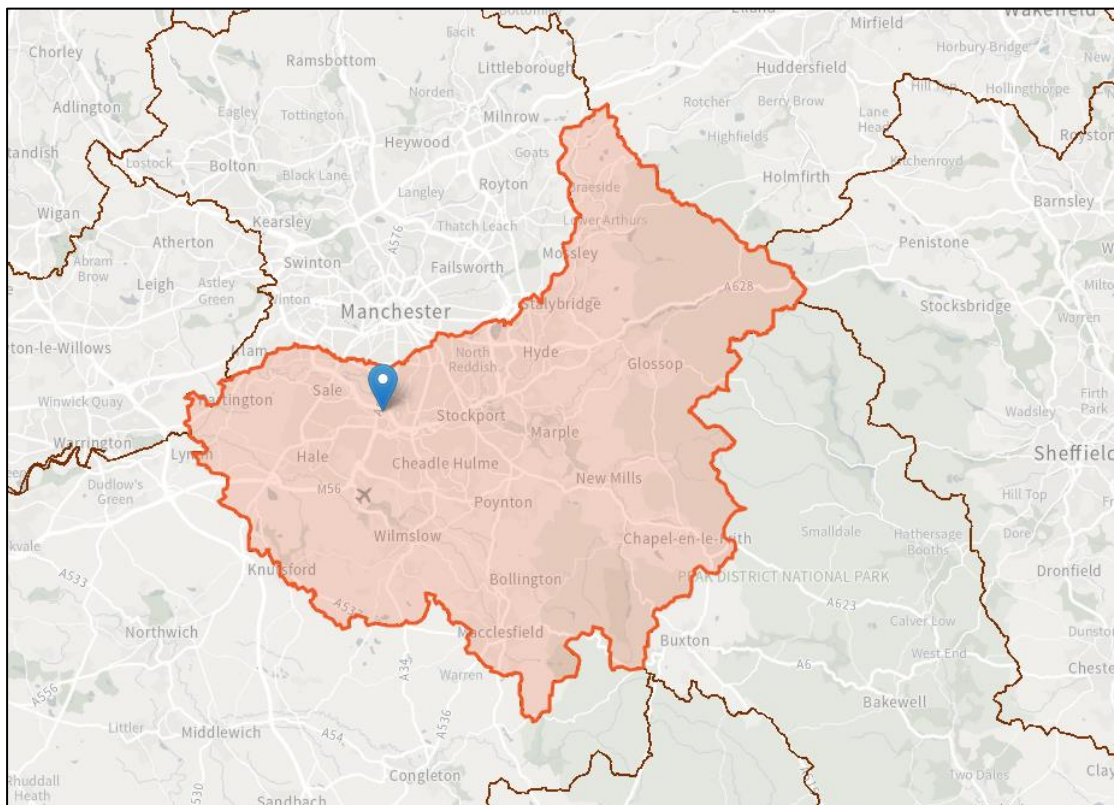


17.11 Appendix 11 - EA Product 4 (Detailed Flood Risk) Data

17.11.1 EA Climate Change Allowances for Peak River Flow

Upper Mersey Management Catchment peak river flow allowances

	Central	Higher	Upper
2020s	13%	17%	27%
2050s	22%	31%	51%
2080s	41%	53%	85%



17.11.2 EA Product 4 Data

See next page.

Flood risk assessment data

Location of site: 382745 / 390511 (shown as easting and northing coordinates)

Document created on: 30 January 2023

This information was previously known as a product 4.

Customer reference number: 8UFNB8G45CRF

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- flood defences and attributes
- information to help you assess if there is a reduced flood risk from rivers and the sea because of defences
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Not included in this document

This document does not include a Flood Defence Breach Hazard Map.

If your location has a reduced flood risk from rivers and sea because of defences, you need to request a Flood Defence Breach Hazard Map and information about the level of flood protection offered at your location from the Greater Manchester Merseyside and Cheshire Environment Agency team at inforequests.gmmc@environment-agency.gov.uk. This information will only be available if modelling has been carried out for breach scenarios.

Include a site location map in your request.

Information that's unavailable

This document **does not** contain:

- historic flooding

We do not have historic flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to flooding from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

Surface water and other sources of flooding

Use the [long term flood risk service](#) to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Upper Mersey 2017

Scenario(s): Defended fluvial, defences removed fluvial, defended climate change fluvial, defences removed climate change fluvial

Date: 14 April 2022

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occurring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 2.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

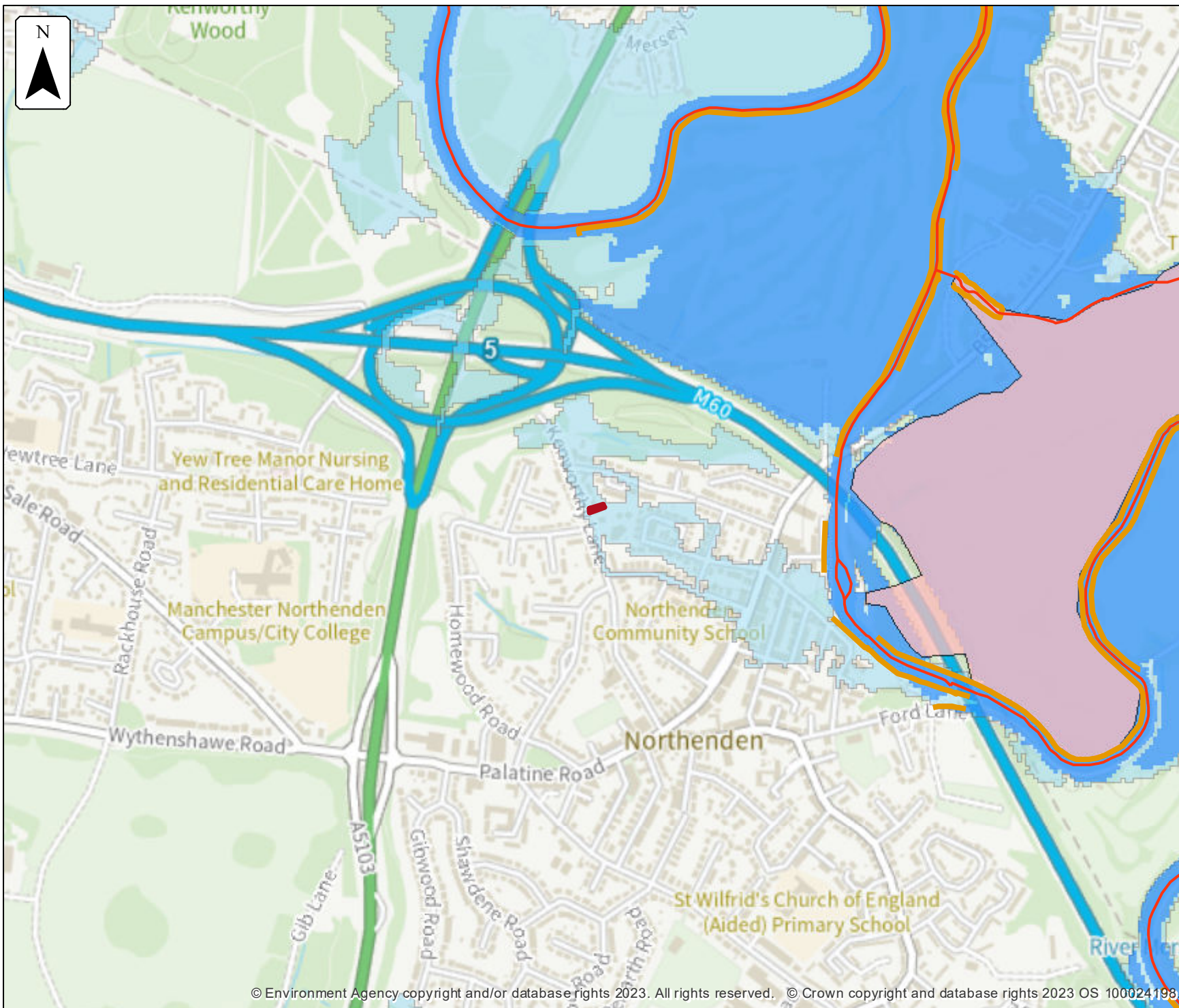
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

This data is updated on a quarterly basis as better data becomes available.



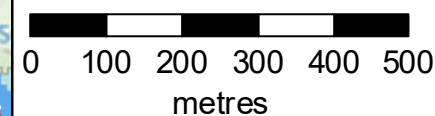
Flood map for planning

Location (easting/northing)
382745/390511

Scale
1:10,000

Created
30 Jan 2023

-  Selected area
-  Main river
-  Flood defence
-  Water storage area
-  Flood zone 3
-  Flood zone 2



Flood defences and attributes

The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences, their condition and the standard of protection. It shows the height above sea level of the top of the flood defence (crest level). The height is in mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis. The information here is based on the best available data.

Use this information:

- to help you assess if there is a reduced flood risk for this location because of defences
- with any information in the modelled data section to find out the impact of defences on flood risk



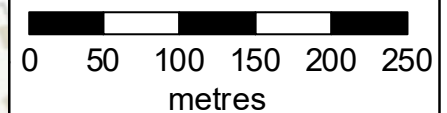
Flood defences

Location (easting/northing)
382745/390511

Scale
1:5,000

Created
30 Jan 2023

-  Selected area
-  Main river
-  Flood defence



Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	58940	Wall	150	Good	29.77	31.12	
2	411052	Engineered High Ground	150	Fair			
3	43272	Engineered High Ground	150	Fair	30.58	24.65	
4	122141	Engineered High Ground	100	Fair	30.58	30.85	
5	58973	Embankment	150		29.65	29.69	
6	121972	Engineered High Ground	100		29.69	31.11	
7	58941	Wall	150	Poor	32.28	30.07	
8	120736	Embankment	150		29.88	29.65	
9	120551	Embankment	100	Poor	27.48	29.16	
10	121971	Engineered High Ground	100		31.11	25.26	
11	120542	Wall	150	Poor	30.35	30.38	

Any blank cells show where a particular value has not been recorded for an asset.

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- modelled node point map(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

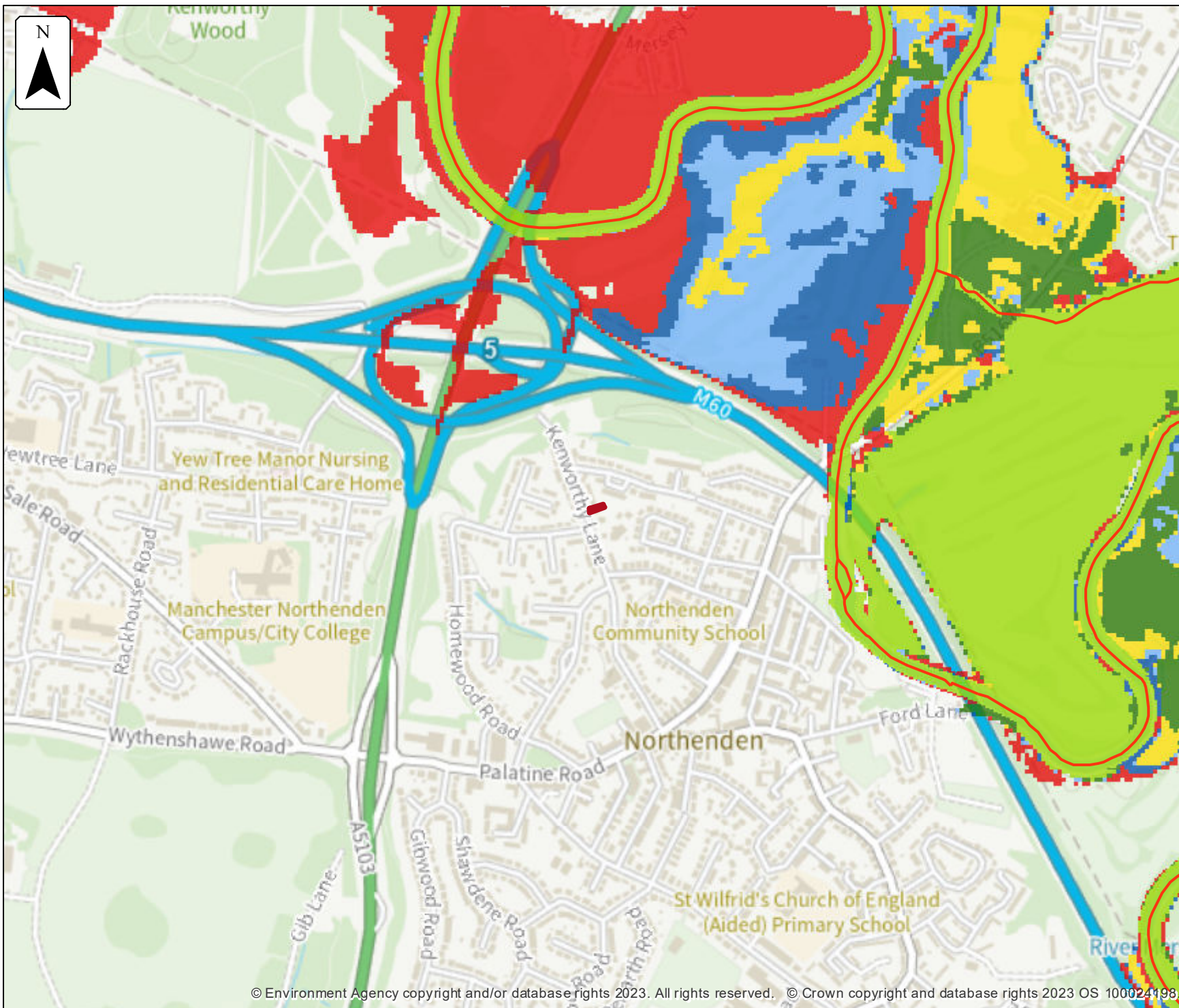
The climate change data included in the models may not include the latest [flood risk assessment climate change allowances](#). Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled fluvial: risk of flooding from rivers where there are flood defences
- Defences removed modelled fluvial: risk of flooding from rivers where flood defences have been removed
- Defended climate change modelled fluvial: risk of flooding from rivers where there are flood defences, including estimated impact of climate change
- Defences removed climate change modelled fluvial: risk of flooding from rivers where flood defences have been removed, including estimated impact of climate change



Defended modelled fluvial extent

Location (easting/northing)
382745/390511

Scale Created
1:10,000 30 Jan 2023

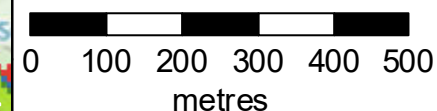
Model name
Upper Mersey 2017

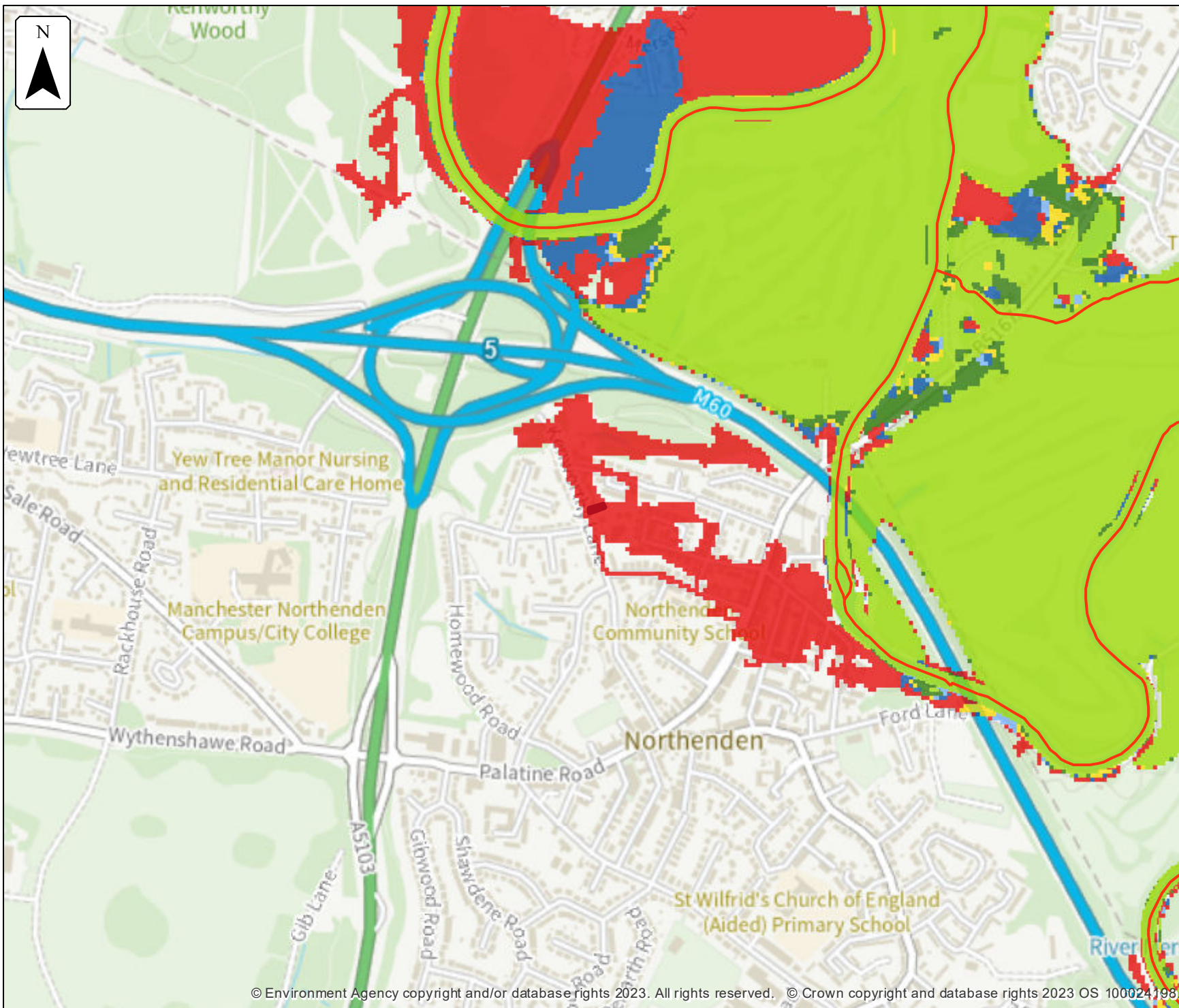
-  Selected area
-  Main river

Modelled flood extent

-  5% AEP
-  2% AEP
-  1.33% AEP
-  1% AEP
-  0.5% AEP
-  0.1% AEP

Flood extents may not be visible where they overlap other return periods





Defences removed modelled fluvial extent

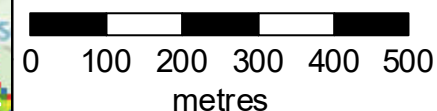
Location (easting/northing)
382745/390511

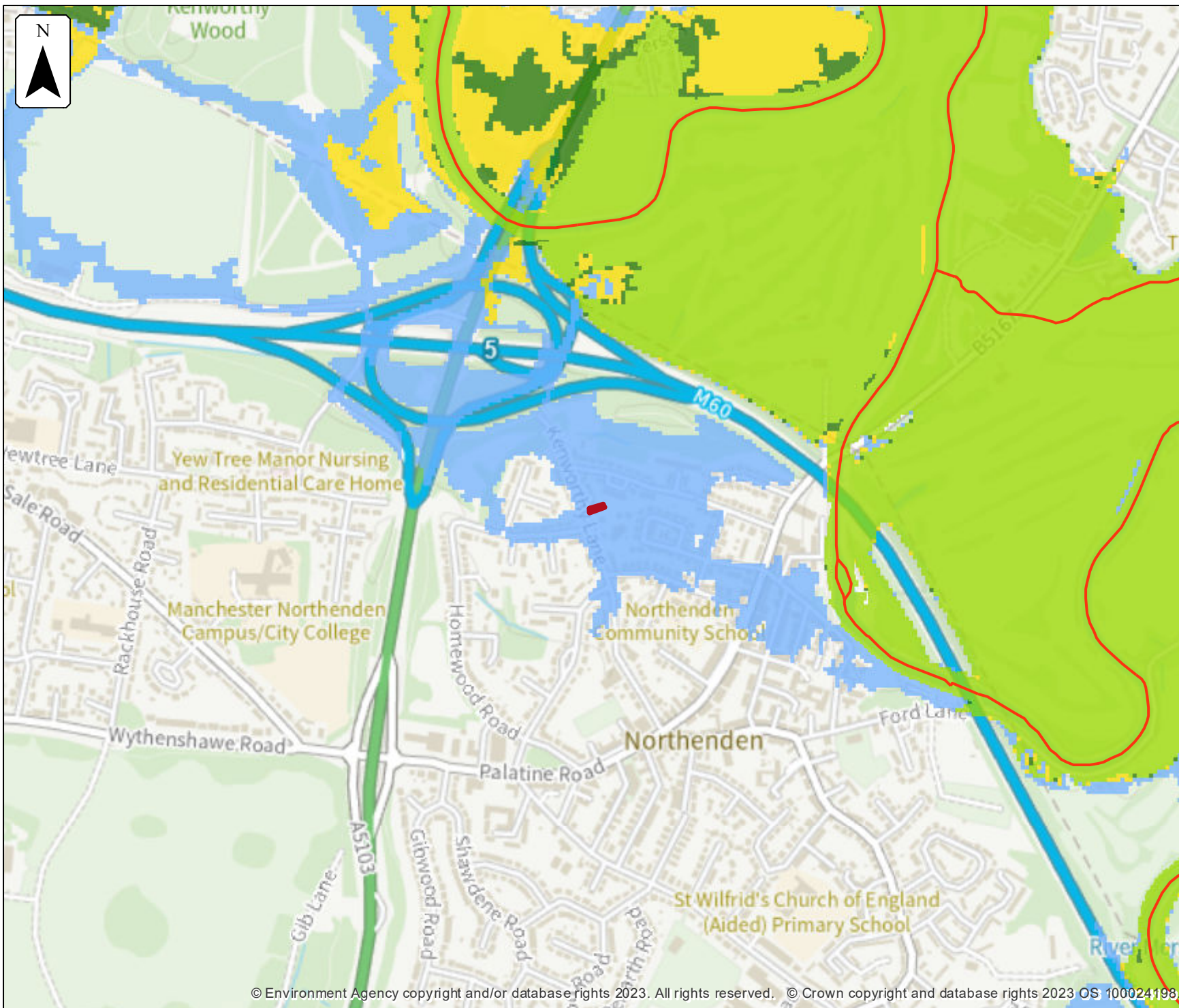
Scale Created
1:10,000 30 Jan 2023

Model name
Upper Mersey 2017

-  Selected area
-  Main river
- Modelled flood extent**
 -  5% AEP
 -  2% AEP
 -  1.33% AEP
 -  1% AEP
 -  0.5% AEP
 -  0.1% AEP

Flood extents may not be
visible where they overlap
other return periods





Defended climate change modelled fluvial extent

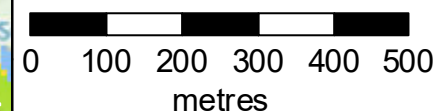
Location (easting/northing)
382745/390511

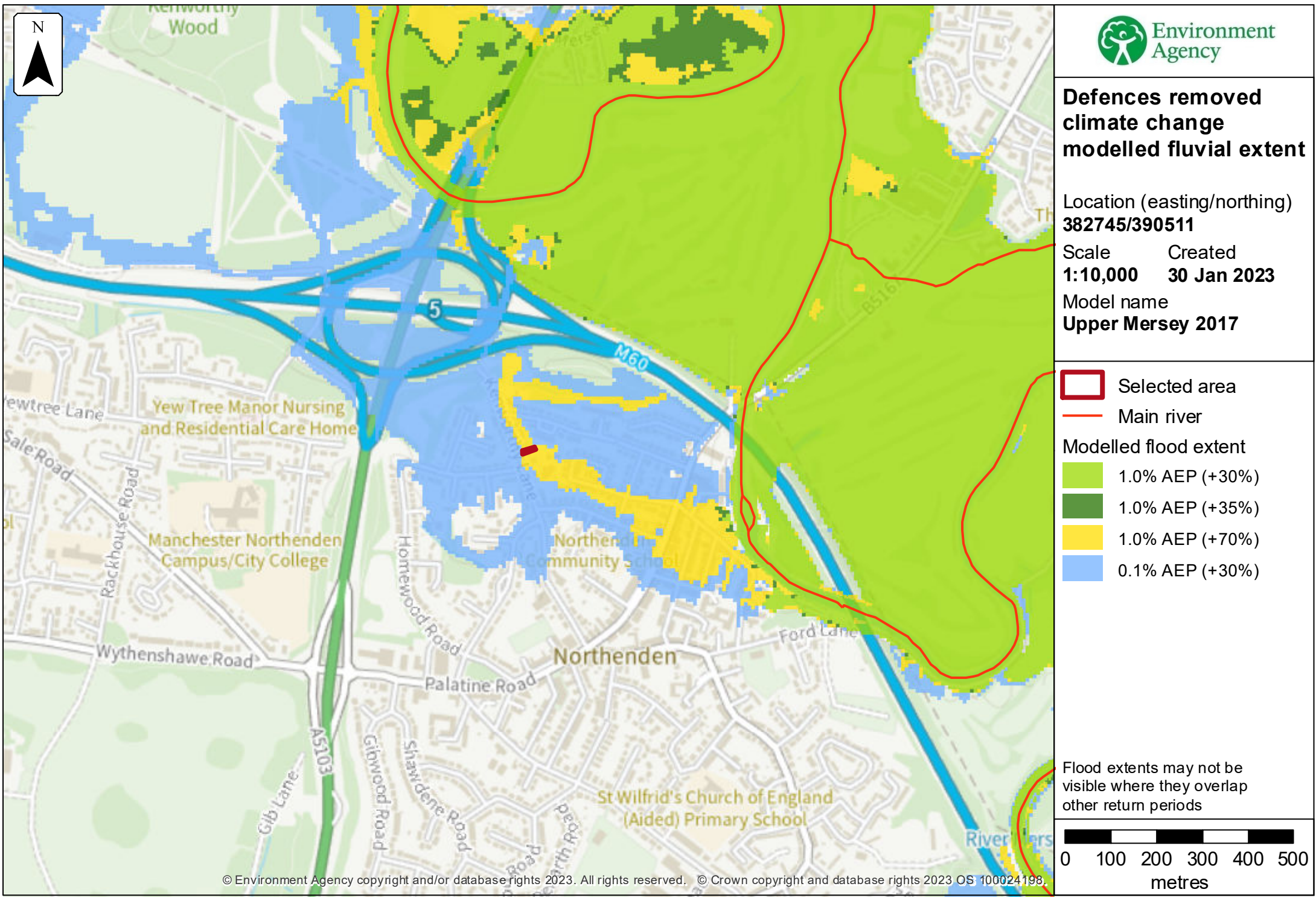
Scale Created
1:10,000 30 Jan 2023

Model name
Upper Mersey 2017

-  Selected area
-  Main river
- Modelled flood extent
 -  1.0% AEP (+30%)
 -  1.0% AEP (+35%)
 -  1.0% AEP (+70%)
 -  0.1% AEP (+30%)

Flood extents may not be
visible where they overlap
other return periods





**Defences removed
climate change
modelled fluvial extent**

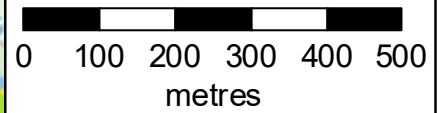
Location (easting/northing)
382745/390511

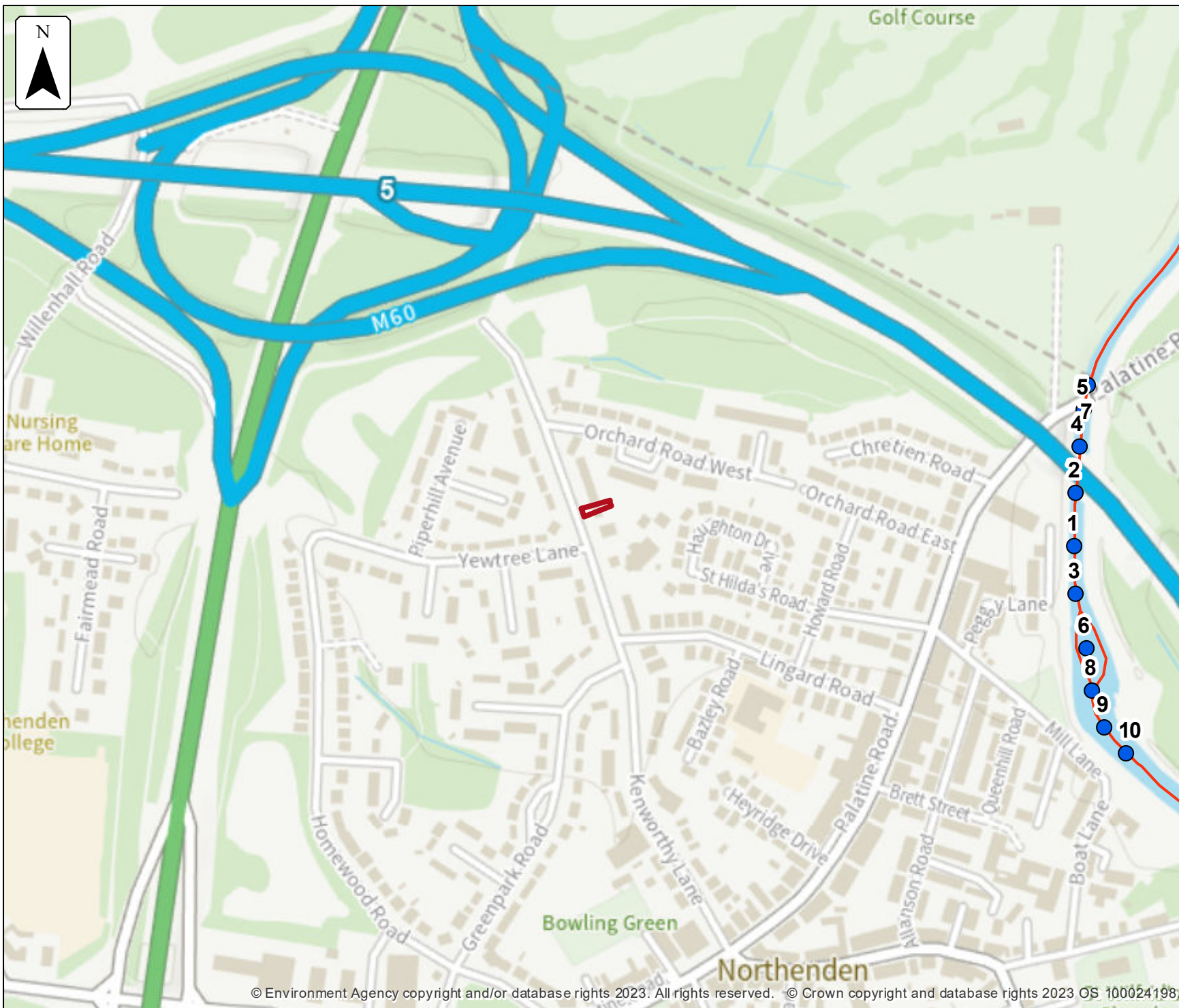
Scale Created
1:10,000 30 Jan 2023

Model name
Upper Mersey 2017

-  Selected area
-  Main river
- Modelled flood extent**
 -  1.0% AEP (+30%)
 -  1.0% AEP (+35%)
 -  1.0% AEP (+70%)
 -  0.1% AEP (+30%)

Flood extents may not be visible where they overlap other return periods





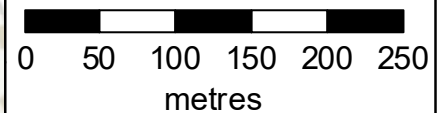
**Defended modelled
fluvial
node locations**

Location (easting/northing)
382745/390511

Scale Created
1:5,000 30 Jan 2023

Model name
Upper Mersey 2017

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

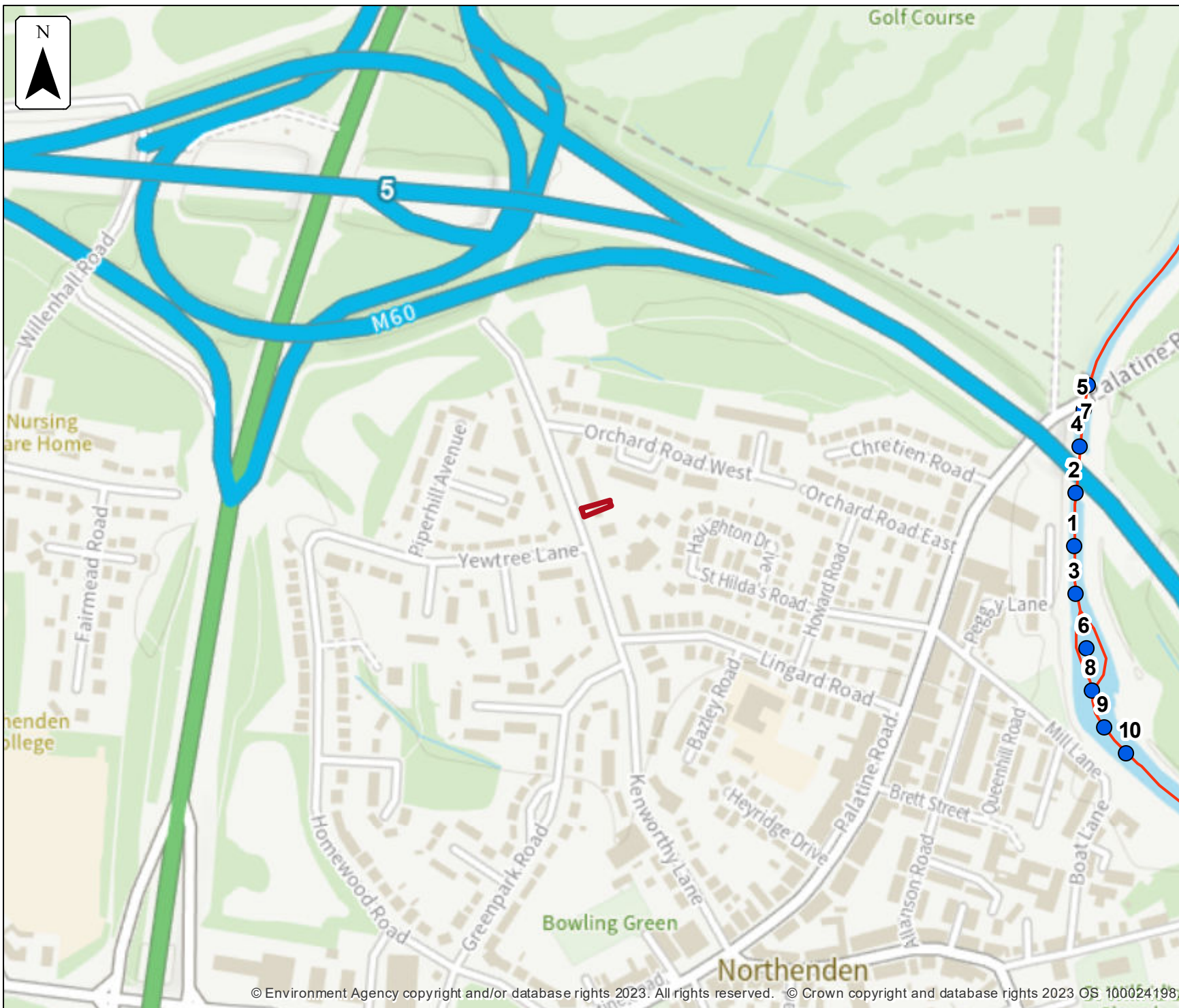
Defended

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1290764	383209	390473	28.87	280.76	29.04	300.24	29.08	303.56	29.24	306.02	29.34	310.76	30.05	323.39
2	1290738	383211	390525	28.81	280.38	28.98	300.19	29.02	303.80	29.19	305.81	29.29	310.73	29.96	323.20
3	1290768	383211	390427	28.97	280.47	29.14	300.28	29.17	303.88	29.33	305.83	29.43	310.76	30.12	323.60
4	1290699	383214	390569	28.82	280.50	28.99	300.14	29.03	303.63	29.19	305.95	29.29	310.72	29.91	323.98
5	1290755	383219	390605	28.82	280.57	28.99	300.16	29.04	303.63	29.20	305.86	29.30	310.69	29.89	335.80
6	1290562	383220	390374	29.06	280.80	29.24	300.31	29.27	303.62	29.42	305.83	29.52	310.80	30.17	324.08
7	1290756	383223	390629	28.76	280.57	28.93	300.16	28.98	303.63	29.14	305.86	29.24	310.69	29.84	335.80
8	1290567	383227	390332	29.08	280.93	29.26	300.38	29.29	303.54	29.44	306.16	29.54	310.83	30.18	324.61
9	1290683	383238	390296	29.13	280.93	29.31	300.38	29.34	303.54	29.48	306.16	29.58	310.83	30.22	324.61
10	1290759	383260	390272	29.02	280.64	29.20	300.44	29.23	304.10	29.38	305.83	29.48	310.82	30.15	325.31

Data in this table comes from the Upper Mersey 2017 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.



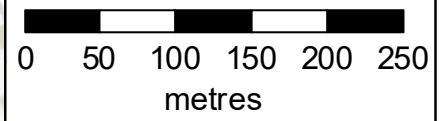
**Defences removed
modelled fluvial
node locations**

Location (easting/northing)
382745/390511

Scale Created
1:5,000 30 Jan 2023

Model name
Upper Mersey 2017

- Selected area
- Modelled location
- Main river



Modelled node locations data

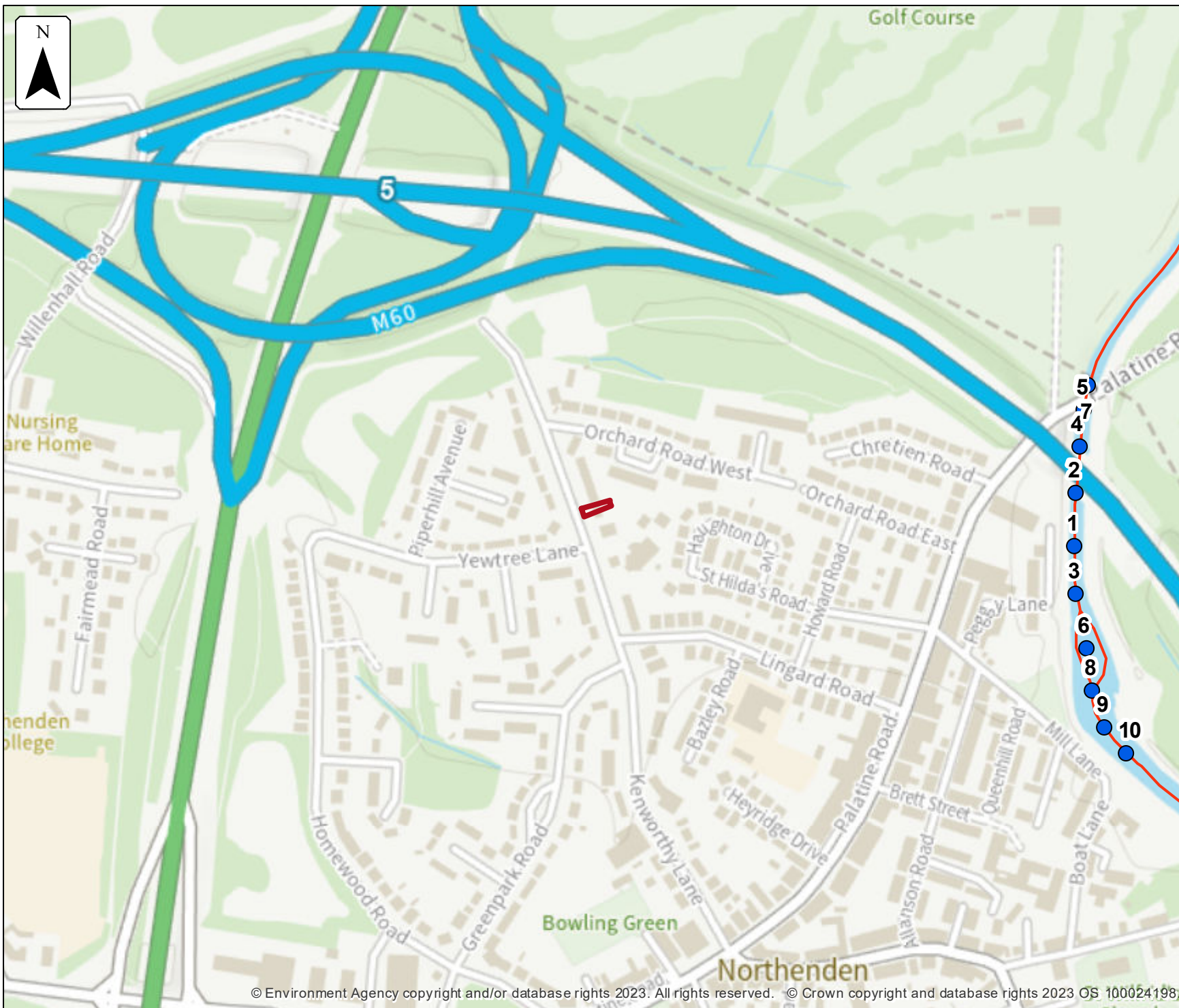
Defences removed

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1290764	383209	390473	27.72	277.41	27.99	296.55	28.11	301.73	28.21	304.84	28.46	311.05	29.64	325.04
2	1290738	383211	390525	27.61	277.26	27.88	296.40	28.01	301.70	28.11	304.81	28.38	310.99	29.56	325.67
3	1290768	383211	390427	27.88	277.13	28.13	296.55	28.26	301.83	28.35	304.90	28.59	311.28	29.71	325.28
4	1290699	383214	390569	27.54	277.18	27.84	296.36	27.98	301.67	28.08	304.90	28.35	311.93	29.51	337.39
5	1290755	383219	390605	27.50	277.34	27.80	297.09	27.95	302.67	28.06	306.18	28.34	313.92	29.48	348.05
6	1290562	383220	390374	28.05	277.50	28.30	296.53	28.41	301.98	28.50	305.12	28.72	311.47	29.79	325.81
7	1290756	383223	390629	27.27	277.34	27.61	297.09	27.78	302.67	27.90	306.18	28.22	313.92	29.44	348.05
8	1290567	383227	390332	28.09	277.58	28.33	296.92	28.44	302.06	28.53	305.21	28.75	311.67	29.80	326.24
9	1290683	383238	390296	28.15	277.58	28.39	296.92	28.50	302.06	28.59	305.21	28.81	311.67	29.84	326.24
10	1290759	383260	390272	28.05	277.32	28.28	297.01	28.39	302.16	28.47	305.26	28.69	311.96	29.76	326.48

Data in this table comes from the Upper Mersey 2017 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.



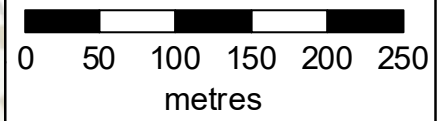
**Defended
climate change
modelled fluvial
node locations**

Location (easting/northing)
382745/390511

Scale Created
1:5,000 30 Jan 2023

Model name
Upper Mersey 2017

- Selected area
- Modelled location
- Main river



Modelled node locations data

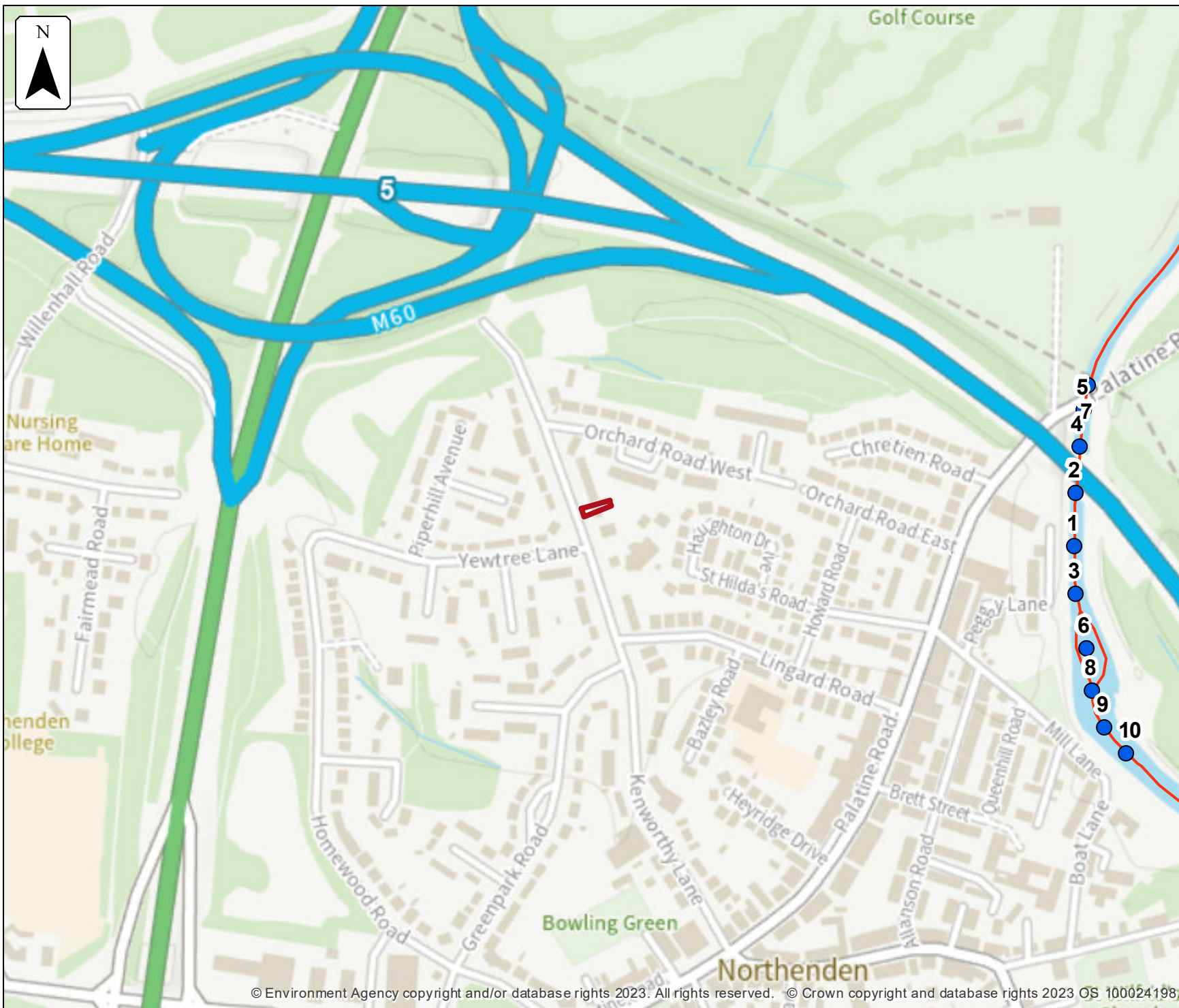
Defended climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+30%)		1.0% AEP (+35%)		1.0% AEP (+70%)		0.1% AEP (+30%)	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1290764	383209	390473	29.69	314.66	29.76	315.77	30.0	321.44	30.24	333.96
2	1290738	383211	390525	29.64	314.85	29.70	315.64	29.92	321.40	30.18	333.90
3	1290768	383211	390427	29.77	314.89	29.83	315.92	30.08	321.56	30.31	333.90
4	1290699	383214	390569	29.63	316.82	29.69	318.09	29.88	323.02	30.08	363.66
5	1290755	383219	390605	29.63	319.63	29.68	322.12	29.86	330.33	30.02	390.78
6	1290562	383220	390374	29.84	315.26	29.90	315.84	30.13	321.81	30.37	334.85
7	1290756	383223	390629	29.58	319.63	29.64	322.12	29.81	330.33	29.95	390.78
8	1290567	383227	390332	29.86	313.77	29.92	315.56	30.14	321.40	30.38	335.29
9	1290683	383238	390296	29.90	313.77	29.96	315.56	30.18	321.40	30.43	335.29
10	1290759	383260	390272	29.82	313.85	29.89	315.48	30.11	321.59	30.36	335.80

Data in this table comes from the Upper Mersey 2017 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.



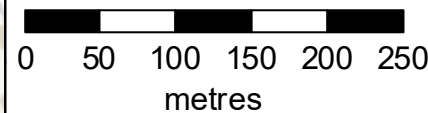
**Defences removed
climate change
modelled fluvial
node locations**

Location (easting/northing)
382745/390511

Scale Created
1:5,000 30 Jan 2023

Model name
Upper Mersey 2017

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+30%)		1.0% AEP (+35%)		1.0% AEP (+70%)		0.1% AEP (+30%)	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1290764	383209	390473	28.91	316.96	29.01	318.21	29.52	322.72	30.14	309.06
2	1290738	383211	390525	28.84	317.11	28.94	318.25	29.44	323.26	30.10	312.25
3	1290768	383211	390427	29.01	317.12	29.10	318.33	29.60	322.93	30.17	309.35
4	1290699	383214	390569	28.81	319.70	28.90	321.15	29.39	328.05	30.04	335.37
5	1290755	383219	390605	28.80	322.89	28.89	324.47	29.37	333.99	30.0	349.39
6	1290562	383220	390374	29.11	317.61	29.20	318.70	29.67	323.42	30.19	310.04
7	1290756	383223	390629	28.72	322.89	28.82	324.47	29.31	333.99	29.96	349.39
8	1290567	383227	390332	29.13	317.73	29.22	318.95	29.69	323.79	30.20	310.55
9	1290683	383238	390296	29.18	317.73	29.27	318.95	29.73	323.79	30.23	310.55
10	1290759	383260	390272	29.07	318.06	29.16	319.07	29.66	323.98	30.18	310.85

Data in this table comes from the Upper Mersey 2017 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.



Defended modelled fluvial extent and height

Location (easting/northing)
382745/390511

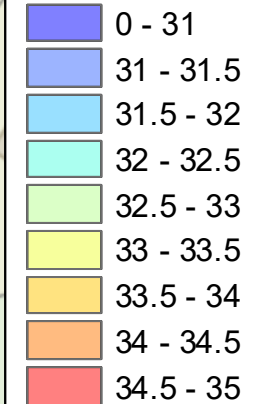
Scale Created
1:500 30 Jan 2023

Model name
Upper Mersey 2017

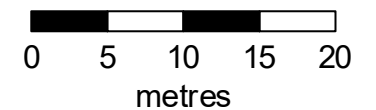
 Selected area

 Main river

Modelled 2D grid
Water level in mAOD



This map shows the
0.1% AEP height data



Sample point data

Defended

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	382730	390496	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	382736	390496	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	382742	390496	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	382724	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	382730	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	382736	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	382742	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	382748	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	382754	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	382724	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	382730	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	382736	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	382742	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	382748	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	382754	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	382760	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	382766	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	382724	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	382730	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	382736	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	382742	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	382748	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	382754	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	382760	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	382766	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	382730	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
27	382736	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
28	382742	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
29	382748	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
30	382754	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
31	382760	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
32	382766	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
33	382748	390526	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
34	382754	390526	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
35	382760	390526	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Upper Mersey 2017 model.

Height values are shown in mAOD, and depth values are shown in metres.

Any blank cells show where a particular scenario has not been modelled for this location.

Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.



Defences removed modelled fluvial extent and height

Location (easting/northing)
382745/390511

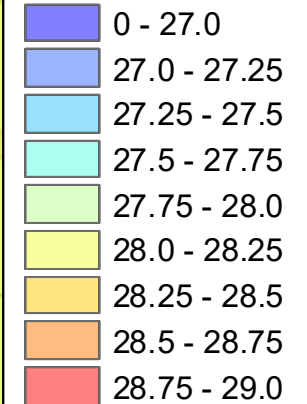
Scale Created
1:500 30 Jan 2023

Model name
Upper Mersey 2017

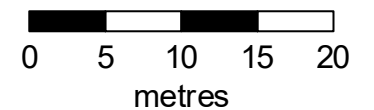
 Selected area

 Main river

Modelled 2D grid
Water level in mAOD



This map shows the
0.1% AEP height data



Sample point data

Defences removed

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	382730	390496	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.04	27.82
2	382736	390496	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.03	27.77
3	382742	390496	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.04	27.71
4	382724	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01	27.75
5	382730	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.02	27.73
6	382736	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.15	27.65
7	382742	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.30	27.61
8	382748	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.29	27.61
9	382754	390502	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.19	27.63
10	382724	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.02	27.70
11	382730	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01	27.67
12	382736	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.24	27.60
13	382742	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.36	27.58
14	382748	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.36	27.59
15	382754	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.29	27.61
16	382760	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.34	27.65

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	382766	390508	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.22	27.69
18	382724	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01	27.62
19	382730	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01	27.59
20	382736	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.48	27.58
21	382742	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.45	27.58
22	382748	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.47	27.58
23	382754	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.44	27.59
24	382760	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.20	27.61
25	382766	390514	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.18	27.64
26	382730	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.10	27.58
27	382736	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.57	27.58
28	382742	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.56	27.58
29	382748	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.51	27.58
30	382754	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.44	27.58
31	382760	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.14	27.61
32	382766	390520	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.12	27.63
33	382748	390526	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.41	27.58
34	382754	390526	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.24	27.58
35	382760	390526	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Upper Mersey 2017 model.

Height values are shown in mAOD, and depth values are shown in metres.

Any blank cells show where a particular scenario has not been modelled for this location.

Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.



Defended climate change modelled fluvial extent and height

Location (easting/northing)
382745/390511

Scale Created
1:500 30 Jan 2023

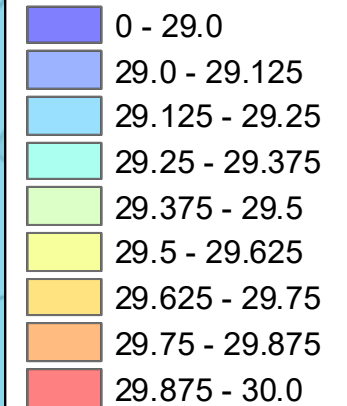
Model name
Upper Mersey 2017

 Selected area

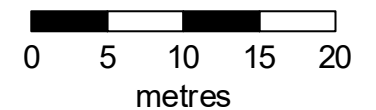
 Main river

Modelled 2D grid

Water level in mAOD



This map shows the
0.1% AEP +30% height data



Sample point data

Defended climate change

Label	Easting	Northing	1% AEP (+30%)		1% AEP (+35%)		1% AEP (+70%)		0.1% AEP (+30%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	382730	390496	NoData	NoData	NoData	NoData	NoData	NoData	1.37	29.15
2	382736	390496	NoData	NoData	NoData	NoData	NoData	NoData	1.40	29.15
3	382742	390496	NoData	NoData	NoData	NoData	NoData	NoData	1.48	29.15
4	382724	390502	NoData	NoData	NoData	NoData	NoData	NoData	1.36	29.15
5	382730	390502	NoData	NoData	NoData	NoData	NoData	NoData	1.43	29.15
6	382736	390502	NoData	NoData	NoData	NoData	NoData	NoData	1.65	29.15
7	382742	390502	NoData	NoData	NoData	NoData	NoData	NoData	1.84	29.15
8	382748	390502	NoData	NoData	NoData	NoData	NoData	NoData	1.84	29.15
9	382754	390502	NoData	NoData	NoData	NoData	NoData	NoData	1.71	29.15
10	382724	390508	NoData	NoData	NoData	NoData	NoData	NoData	1.46	29.15
11	382730	390508	NoData	NoData	NoData	NoData	NoData	NoData	1.46	29.15
12	382736	390508	NoData	NoData	NoData	NoData	NoData	NoData	1.80	29.15
13	382742	390508	NoData	NoData	NoData	NoData	NoData	NoData	1.94	29.15
14	382748	390508	NoData	NoData	NoData	NoData	NoData	NoData	1.93	29.15
15	382754	390508	NoData	NoData	NoData	NoData	NoData	NoData	1.84	29.15
16	382760	390508	NoData	NoData	NoData	NoData	NoData	NoData	1.84	29.15

Label	Easting	Northing	1% AEP (+30%)		1% AEP (+35%)		1% AEP (+70%)		0.1% AEP (+30%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	382766	390508	NoData	NoData	NoData	NoData	NoData	NoData	1.68	29.15
18	382724	390514	NoData	NoData	NoData	NoData	NoData	NoData	1.54	29.15
19	382730	390514	NoData	NoData	NoData	NoData	NoData	NoData	1.56	29.15
20	382736	390514	NoData	NoData	NoData	NoData	NoData	NoData	2.06	29.15
21	382742	390514	NoData	NoData	NoData	NoData	NoData	NoData	2.03	29.15
22	382748	390514	NoData	NoData	NoData	NoData	NoData	NoData	2.04	29.15
23	382754	390514	NoData	NoData	NoData	NoData	NoData	NoData	2.01	29.15
24	382760	390514	NoData	NoData	NoData	NoData	NoData	NoData	1.74	29.15
25	382766	390514	NoData	NoData	NoData	NoData	NoData	NoData	1.69	29.15
26	382730	390520	NoData	NoData	NoData	NoData	NoData	NoData	1.68	29.15
27	382736	390520	NoData	NoData	NoData	NoData	NoData	NoData	2.15	29.15
28	382742	390520	NoData	NoData	NoData	NoData	NoData	NoData	2.14	29.15
29	382748	390520	NoData	NoData	NoData	NoData	NoData	NoData	2.09	29.15
30	382754	390520	NoData	NoData	NoData	NoData	NoData	NoData	2.01	29.15
31	382760	390520	NoData	NoData	NoData	NoData	NoData	NoData	1.69	29.15
32	382766	390520	NoData	NoData	NoData	NoData	NoData	NoData	1.65	29.15
33	382748	390526	NoData	NoData	NoData	NoData	NoData	NoData	1.99	29.15
34	382754	390526	NoData	NoData	NoData	NoData	NoData	NoData	1.82	29.15
35	382760	390526	NoData	NoData	NoData	NoData	NoData	NoData	1.63	29.15

Data in this table comes from the Upper Mersey 2017 model.

Height values are shown in mAOD, and depth values are shown in metres.

Any blank cells show where a particular scenario has not been modelled for this location.

Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.



Defences removed climate change modelled fluvial extent and height

Location (easting/northing)
382745/390511

Scale Created
1:500 30 Jan 2023

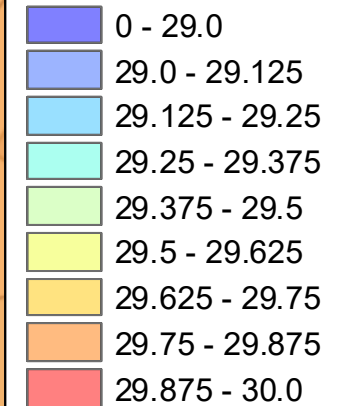
Model name
Upper Mersey 2017

 Selected area

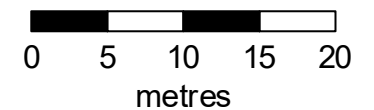
 Main river

Modelled 2D grid

Water level in mAOD



This map shows the
0.1% AEP +30% height data



Sample point data

Defences removed climate change

Label	Easting	Northing	1% AEP (+30%)		1% AEP (+35%)		1% AEP (+70%)		0.1% AEP (+30%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	382730	390496	NoData	NoData	NoData	NoData	0.00	27.78	1.97	29.75
2	382736	390496	NoData	NoData	NoData	NoData	0.01	27.73	1.99	29.75
3	382742	390496	NoData	NoData	NoData	NoData	0.02	27.68	2.08	29.75
4	382724	390502	NoData	NoData	NoData	NoData	NoData	NoData	1.96	29.75
5	382730	390502	NoData	NoData	NoData	NoData	NoData	NoData	2.03	29.75
6	382736	390502	NoData	NoData	NoData	NoData	0.07	27.57	2.25	29.75
7	382742	390502	NoData	NoData	NoData	NoData	0.20	27.51	2.44	29.75
8	382748	390502	NoData	NoData	NoData	NoData	0.18	27.49	2.44	29.75
9	382754	390502	NoData	NoData	NoData	NoData	0.08	27.52	2.31	29.75
10	382724	390508	NoData	NoData	NoData	NoData	NoData	NoData	2.06	29.75
11	382730	390508	NoData	NoData	NoData	NoData	NoData	NoData	2.06	29.75
12	382736	390508	NoData	NoData	NoData	NoData	0.12	27.47	2.39	29.75
13	382742	390508	NoData	NoData	NoData	NoData	0.22	27.44	2.54	29.75
14	382748	390508	NoData	NoData	NoData	NoData	0.22	27.45	2.53	29.75
15	382754	390508	NoData	NoData	NoData	NoData	0.16	27.47	2.44	29.75
16	382760	390508	NoData	NoData	NoData	NoData	0.22	27.53	2.44	29.75

Label	Easting	Northing	1% AEP (+30%)		1% AEP (+35%)		1% AEP (+70%)		0.1% AEP (+30%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	382766	390508	NoData	NoData	NoData	NoData	0.11	27.58	2.28	29.75
18	382724	390514	NoData	NoData	NoData	NoData	NoData	NoData	2.14	29.75
19	382730	390514	NoData	NoData	NoData	NoData	0	27.41	2.16	29.75
20	382736	390514	NoData	NoData	NoData	NoData	0.32	27.42	2.65	29.75
21	382742	390514	NoData	NoData	NoData	NoData	0.30	27.42	2.63	29.75
22	382748	390514	NoData	NoData	NoData	NoData	0.33	27.44	2.64	29.75
23	382754	390514	NoData	NoData	NoData	NoData	0.30	27.44	2.61	29.75
24	382760	390514	NoData	NoData	NoData	NoData	0.09	27.50	2.34	29.75
25	382766	390514	NoData	NoData	NoData	NoData	0.09	27.55	2.29	29.75
26	382730	390520	NoData	NoData	NoData	NoData	0.05	27.41	2.27	29.75
27	382736	390520	NoData	NoData	NoData	NoData	0.41	27.41	2.75	29.75
28	382742	390520	NoData	NoData	NoData	NoData	0.41	27.42	2.74	29.75
29	382748	390520	NoData	NoData	NoData	NoData	0.37	27.43	2.69	29.75
30	382754	390520	NoData	NoData	NoData	NoData	0.29	27.44	2.61	29.75
31	382760	390520	NoData	NoData	NoData	NoData	0.03	27.49	2.28	29.75
32	382766	390520	NoData	NoData	NoData	NoData	0.04	27.55	2.24	29.75
33	382748	390526	NoData	NoData	NoData	NoData	0.26	27.42	2.59	29.75
34	382754	390526	NoData	NoData	NoData	NoData	NoData	NoData	2.41	29.75
35	382760	390526	NoData	NoData	NoData	NoData	NoData	NoData	2.23	29.75

Data in this table comes from the Upper Mersey 2017 model.

Height values are shown in mAOD, and depth values are shown in metres.

Any blank cells show where a particular scenario has not been modelled for this location.

Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

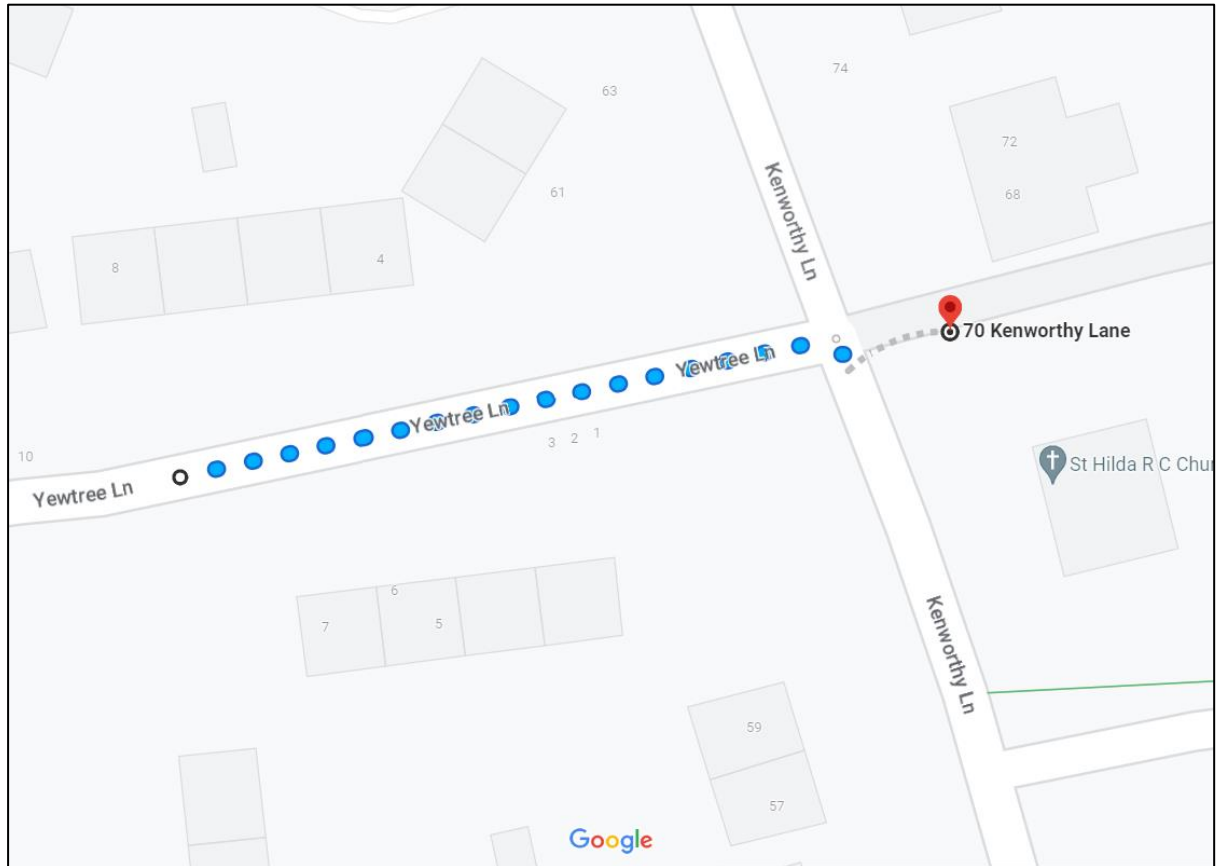
[Find out more about flood risk activity permits](#)

Help and advice

Contact the Greater Manchester Merseyside and Cheshire Environment Agency team at inforequests.gmmc@environment-agency.gov.uk for:

- [more information about getting a product 5, 6, 7 or 8](#)
- general help and advice about the site you're requesting data for

17.12 Appendix 12 – Safe Egress to Flood Zone 1 Map



17.13 Appendix 13 – Calculation of Flood Hazard Rating

Flood Hazard Rating Scores – based on DF score of 0

Velocity	Depth									
	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.0	2.25	2.50
0.0	0.13	0.25	0.38	0.50	0.63	0.75	0.88	1.00	1.13	1.25
0.5	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
1.0	0.38	0.75	1.13	1.50	1.88	2.25	2.63	3.00	3.38	3.75
1.5	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
2.0	0.63	1.25	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25
2.5	0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50
3.0	0.88	1.75	2.63	3.50	4.38	5.25	6.13	7.00	7.88	8.75
3.5	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
4.0	1.13	2.25	3.38	4.50	5.63	6.75	7.88	9.00	10.13	11.25
4.5	1.25	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50
5.0	1.38	2.75	4.13	5.50	6.88	8.25	9.63	11.00	12.38	13.75

Summary of Scores

	Score From	Score To	Flood Hazard	Description
	<0.75	0.75	Low	Exercise Caution
Class 1	0.75	1.5	Moderate	Danger for some
Class 2	1.5	2.5	Significant	Danger for most
Class 3	2.5	20.0	Extreme	Danger for all

Values for Debris Factor for different flood depths

Depths	Pasture/Arable Land	Woodland	Urban
0 to 0.25	0	0	0
0.25 to 0.75	0.5	1	1
d>0.75 and/or v > 2	0.5	1	1

-  The “danger to some” category includes vulnerable groups such as children, the elderly and infirm. “Danger: Flood zone with deep or fast flowing water”
-  The “danger to most” category includes the general public.

 The danger to all category includes the emergency services.

A flood emergency plan is considered to be an acceptable way of managing flood risk where the flood hazard has been given a “very low hazard” rating. In some instances, flood emergency plans may also be acceptable where the rating is “danger for some”. However, it is unlikely to be an acceptable way of managing residual flood risk where the hazard to people classification is “danger for most” or “danger for all”.